Comments on Responses to the Examining Authority's First Written Questions

for the

Royal Society for the Protection of Birds

Submitted for Deadline 3

19 December 2019

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

Registration Identification Ref: 20022916

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
2. Biodiversity, Biological Environment and Ecology					
2.0 General					
Q2.0.1	Applicant	The Applicant [AS-024] explained that it has updated numerous assessments and/or plans relevant to ecological matters. The ExA has noted the following are proposed: • Updated red throated diver displacement assessment • Updated gannet displacement assessment • Updated kittiwake collision risk assessment • Assessment of combined collision and displacement (alone and in-combination/cumulatively) • Assessment of impacts to seabird assemblage of Flamborough and Filey Coast SPA • Updated ornithological in-combination/cumulative assessment • Revised population viability analysis (PVA) for gannet, kittiwake and greater black-backed gull (at the EIA scale) • Revised PVA for Flamborough and Filey Coast SPA • Updated Haisborough, Hammond and Winterton SAC Site Integrity Plan • Interim Cable Burial Study • Updated Scour and cable protection plan • Updated offshore operations and maintenance plan • Updated Outline Landscape and Ecological Management Strategy	The Applicant confirms that the updated ornithology assessment has been submitted at Deadline 2 (ExA;AS-1,D2.V1). With respect to the list of topics the following aspects have been included which address the requests for further information and assessment made by Natural England in their relevant representation (REP-099). For all topics this has included additional consideration of impact estimates using the 95% confidence intervals of abundance for project alone assessments. Topic specific additions are noted below. • Updated red-throated diver assessment: this includes a project alone assessment for the Environmental Impact Assessment (EIA) and a 'like-for-like' assessment for the cumulative assessment (EIA). • Updated gannet displacement assessment: this includes a project alone and cumulative assessment for the EIA and project alone and in-combination assessment for the Habitats Regulations Assessment (HRA).	Natural England notes the provision of a significant amount of additional documentation at Deadlines 1 and 2. Natural England refers to our response to the Rule 8 letter regarding the timings of provision of our statutory advice.	The RSPB is continuing to review the updated assessments provided in the Offshore Ornithology Assessment Update (doc REP2-035). We provide further comments below as relevant. Where more time is required to respond in detail to the revised assessment outputs, we will ensure additional comments are provided in advance of the hearing on offshore issues on the 22nd January.

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		• Drilling fluid breakout clarification note. The Applicant is requested to submit these at Deadline 2 of the Examination.	• Assessment of gannet combined displacement and collision assessment: this includes project alone and cumulatively for EIA and project alone for the HRA (the HRA in-combination was provided in APP-201 and was not requested by Natural England in REP-099). • Assessment of impacts to the seabird assemblage of Flamborough and Filey Coast SPA: this has been included in the update and was also included in the updated Screening and Integrity matrices submitted at Deadline 1 (REP1-012, 5.3.5.3 - Norfolk Boreas Updated Appendix 5.3 Habitats Regulations Assessment Screening Matrices (Version 3) and REP1-014, 5.3.6.1 Habitats Regulations Assessment - Appendix 6.1 - Integrity Matrices) . • The in-combination and cumulative assessments for all relevant species and impacts have been updated throughout. • Revised Population Viability Analyses (PVA) for EIA populations of gannet, kittiwake and lesser black-backed gull have been provided. • Revised PVA for Flamborough and Filey Coast SPA: Natural		

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			England did not request updates to the PVA for the SPA populations assessed and therefore this has only been undertaken for one species (guillemot) for which an increased range of impact magnitudes was required. • The Interim cable burial report has been submitted to the examination as Appendix 2 of the updated outline Haisborough Hammond and Winterton SAC site integrity plan at deadline 1 (REP1-033). • Updates to the Outline Scour and Cable Protection plan (REP1-031), Outline Operations and Maintenance Plan (REP1-027) and Outline Landscape and Ecological Management Strategy (REP1-020) were all submitted at Deadline 1. • A drilling fluid breakout clarification note (titled Clarification Note Trenchless Crossings and Potential Effects of Breakout on the River Wensum) was also submitted at Deadline 1 (REP1-039).		
2.3 Onshore Ornithology					
Q2.3.1	The Applicant	**Razorbill and guillemot** The Applicant (Table 8 row 33 of [AS-024]) stated it did not agree with NE in relation to	The Applicant acknowledges that the response referred to erroneously made reference to SPA		The RSPB disagrees with the Applicant as to the degree of precaution applied in their

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		cumulative operational displacement to razorbill or guillemot at the EIA scale. The Applicant refers to SPAs, as opposed to EIA scale populations. The Applicant to further justify its position in relation to these species at the EIA scale.	populations and the assessment thereof. However the Applicant can confirm that the same response also applies to the EIA populations in relation to predicted cumulative operational displacement of razorbill and guillemot. Specifically the Applicant did not agree with Natural England's position at the end of the Norfolk Vanguard Examination (that a significant cumulative effect could not be ruled out) and the Applicant was able to conclude that there would not be a significant effect due to cumulative operational displacement on these species. The Applicant reached this conclusion through the application of evidence-based methods while Natural England applies what the Applicant considers to be highly precautionary approaches. Details on these precautions are provided in the updated ornithology assessment submitted at Deadline 2 (ExA; AS-1.D2.V1).		assessment, not only for guillemot and razorbill but throughout the assessment, and note that Natural England's recommended approach is in accord with the precautionary principle. The precautionary principle exists for situations where scientific data does not exist or is incomplete and therefore it is not possible to complete a full evaluation of the possible risks a plan, project or activity may cause to the environment, including possible danger to humans, animal or plant health, or to the environment in general. The European Commission's Precautionary Principle guidance[1] states that it should apply when a phenomenon, product or process may have a dangerous effect, identified by a scientific and objective evaluation, if this evaluation does not allow the risk to be determined with sufficient certainty. As such the degree of precaution applied to an evaluation, or assessment, can be seen to be directly proportional

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52000DC0001&from=EN

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					to the extent of scientific uncertainty inherent in that assessment. The guidance goes on to recommend "The implementation of an approach based on the precautionary principle should start with a scientific evaluation, as complete as possible, and where possible, identifying at each stage the degree of scientific uncertainty**."** We provided an overview of our position on the application of the precautionary principle and why we do not consider the approach outlined by the Statutory Nature Conservation Body and ourselves to be overly precautionary in the attached note submitted at Deadline 8 of the Norfolk Vanguard examination (Appendix 1). Whilst agreement has now been made over the appropriate model to be used to assess potential impacts, the points made regarding the precautionary principle, uncertainty, density and abundance, collision risk modelling, headroom, displacement, seasonality, density dependence continue to

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					be raised in the updated Offshore Ornithology Assessment. Appendix 1 therefore provides useful background on the RSPB's position at the start of the Norfolk Boreas examination.
Q2.3.2	Natural England	**Post-construction monitoring** Is NE content with the Applicant's explanation [AS-024] of why there is no post- construction monitoring of bird habitat temporarily disturbed during construction?		Issue 20 Birds Habitat Reinstatement RR-099 Natural England is content that there will be no post construction monitoring in relation to the mitigation area for Broadland SPA species which will be set aside for sugar beet during the construction phase.	We note Natural England's response and have no further comments.
4.0 Cumulative effects of other proposals					
4.0 General cumulative effects, including phasing					
Q4.0.1	The Applicant All Interested Parties	**Relevant projects for cumulative assessment** 1. A number of the ES aspect chapters explain that the projects identified for potential cumulative impacts were agreed as part of the PEIR consultation (November 2018). Taking into account the time that has elapsed since the PEIR consultation and the potential for developments that might have cumulative effects to have come forward since this date, IPs are asked to confirm that they are content that all the relevant projects have been included in the cumulative effects assessment. If not, list those projects which you think should be included.	Due to the long lead in times required to produce a DCO application it is necessary to set a cut-off date for incorporating new information in the application. As stated in the Environmental Statement (ES) Chapter 6 EIA methodology (APP-219): "Only projects which [were] reasonably well described and sufficiently advanced at [the] time [of] writing (the 20th March 2019) to provide information on which to	2. 3 and 4 Dudgeon and Sheringham extension are in the scoping phase, but are not considered to be foreseeable plans or projects to be included in in-combination/cumulative assessment as there is no data currently in the public domain to allow an assessment to occur. This is for all marine and terrestrial elements of the project.	The RSPB accepts that the plans for Dudgeon and Sheringham Shoal extensions are currently at the scoping stage. We note Natural England's comment on this issue. We recognise that data for the currently operational projects have been included in the cumulative/in-combination assessments, as highlighted in the Offshore Ornithology Assessment update (doc REP2-035).

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		2. Specifically, the ExA notes that extensions to the existing Dudgeon and Sheringham Shoal have been received by the Planning Inspectorate for a scoping opinion. Comments in respect of these projects are specifically requested. 3. The Applicant is invited to comment and to set out how the cumulative effects relating to the proposed extensions to the existing Dudgeon and Sheringham Shoal have been considered, 4. With either proposed option, the Dudgeon and Sheringham Shoal onshore cable would cross the Norfolk Boreas onshore cable. How have these cumulative effects been considered?	base a meaningful and robust assessment [were] included in the CIA". At the time of submission (June 2019) The Planning Inspectorate Advice Note Nine and its complementary guidance in Advice Note 17 (which has subsequently been updated, August 2019) provided guidance on plans and projects that should be considered in the Cumulative Impact Assessment (CIA) including: • Projects that are under construction; • Permitted applications, not yet implemented; • Submitted applications not yet determined; • Projects on the Planning Inspectorate's Programme of Projects; • Development identified in relevant Development Plans, with weight being given as they move closer to adoption and recognising that much information on any relevant proposals will be limited; and • Sites identified in other policy documents as development reasonably likely to come forward.		We welcome confirmation that data from East Anglia ONE north, East Anglia TWO and Hornsea FOUR projects are included in the assessments.

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			Consultation regarding the projects identified for CIA with Norfolk Boreas has been ongoing throughout the application process. This has been undertaken, for example, through the Norfolk Boreas Evidence Plan Process with key stakeholders; through the Scoping Report; and through the Norfolk Boreas Preliminary Environmental Information Report (PEIR) (October 2018). During consultation under Section 42, the Applicant sought feedback from stakeholders on projects and plans that should be included within the cumulative impact assessments and specifically whether any additional projects and plans (from those included within the PEIR) should be included. The ES summarises the consultation responses received with respect to CIA and how these have been addressed (see Appendix 32.1 (APP-683) for Offshore, and Table 33.2 of ES Chapter 33 (APP-246) for onshore). Following the PEIR consultation and prior to the completion of the		

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			ES a review of the projects to be considered as part of the CIA was undertaken in March 2019. A review was undertaken to update the status and information of any projects already identified and to identify any new developments which should be considered. The result was the projects and information identified in ES Appendix 32.2 (APP-684) for offshore, and ES Appendix 33.1 (APP-685) for onshore. With respect to the cumulative offshore ornithology assessment (which was updated for Deadline 2, see document reference ExA; AS-1.D2.V1), the list of wind farms included in the assessment has been updated to address comments from Natural England (REP-099) and the list is considered to be complete. The list includes the final submission estimates for East Anglia ONE North and East Anglia TWO and the Preliminary Environmental Impact Report (PEIR) estimates for Hornsea Project Four. The Dudgeon and Sheringham Shoal extensions, both being		

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			developed by Equinor, submitted a scoping report to the Planning Inspectorate in October 2019, after the Norfolk Boreas application had been accepted for examination. The scoping report illustrates two landfall areas being considered in the Weybourne and Bacton areas with subsequent potential onshore cable routes to a single grid connection location at Norwich Main which could accommodate both projects. The exact locations for the cable routes have not been finalised and preliminary environmental assessment for the projects has not been undertaken or reported. Site selection activities are ongoing and it can be anticipated that responses to the Scoping Request and an ongoing program of consultation will inform the refinement of the projects as the Environmental Impact Assessment (EIA) for the projects is progressed. In this respect, the Executive Summary of the scoping report for the Dudgeon and Sheringham Shoal extensions states: "The exact locations of the offshore and onshore infrastructure are not		

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			yet finalised. Site selection activities are ongoing and responses to the Scoping Request and an ongoing program of consultation will help to inform the refinement of the projects as the EIA is progressed." And: "This scoping report is the first stage of the assessment process, outlining all of the receptors that will be considered and the planned approaches to characterising the existing environment and assessing potential impacts associated with the projects." With respect to cumulative impact, the Dudgeon and Sheringham Shoal extensions will be required to undertake a cumulative assessment as part of their EIA, taking into consideration all potential activities and timescales from other projects in development, including Norfolk Boreas. As outlined in ES Chapter 33 Onshore Cumulative Impacts (APP-246) only projects that are		

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			reasonably well described and sufficiently advanced to provide information, on which to base a meaningful and robust assessment should be included in the Norfolk Boreas CIA. The scoping report for the Dudgeon and Sheringham Shoal extension projects was not submitted until after the Norfolk Boreas application was accepted, and in any event the information provided in the scoping report is not sufficiently developed to enable inclusion of the extension projects within the Norfolk Boreas CIA at this stage. For example, with respect to the cumulative impact assessment for offshore ornithology, there are no data available to include in a cumulative assessment, for either impacts at the wind farm site itself (e.g. collisions or displacement) or due to construction of the wind farm or installation of the export cables. Therefore any potential cumulative impacts of the projects with Norfolk Boreas will need to be considered as part of the Dudgeon and Sheringham Shoal extensions EIA and subsequent application.		

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Q4.0.2	Interested Parties	**Cumulative assessments and other infrastructure users** Provide any comments on the Applicant's cumulative assessments offshore [APP-245] and onshore [APP-246] and/or comments on the assessment of infrastructure and other users [APP-231].		Natural England has provided comment within our Relevant Representations [099] and has no further comment to make at this time.	The RSPB has no further comments to make on this point.
8. Habitats Regulations Assessment					
8.4 River Wensum SAC, Norfolk Valley Fens SAC, and The Broads SAC					
Q8.4.2	The Applicant, Natural England, RSPB	**In combination assessments** In-combination assessments for the River Wensum SAC, Norfolk Valley Fens SAC and The Broads SAC have not been undertaken as the Applicant considers there is no potential for AEOI to these sites and no real potential of an in-combination effect occurring with other plans or projects [APP-201]. However, the Applicant has acknowledged the potential for small effects from a number of different projects to add up to an effect of greater magnitude in some of the HRA in-combination assessments e.g. Paston Great Barn SAC, HHW SAC, FFC SPA and Alde-Ore Estuary SPA. The Applicant is requested to provide greater justification for not undertake in-combination effects for the River Wensum SAC, Norfolk Valley Fens SAC and The Broads SAC. Do any Interested Parties have comments on the in-combination assessments for these sites?	The general principle used to determine whether in-combination effects may occur in relation to a particular European site, as set out in Information to Support Habitat Regulations Assessment Report ('HRA Report') (APP-201) [para-1382], is that in order for Norfolk Boreas to be considered to have the potential to contribute to in-combination effects, there must be sufficient cause to consider that a relevant habitat or species is sensitive to effects due to the project itself (e.g. as a result of particular influence of sensitivity, or the presence of a species in notable numbers on at least one survey occasion, rather than simply being recorded within the site). With the exception of Paston Great Barn SAC, for each of the other	During the Vanguard examination Natural England requested further information on in combination effects of the cable route and Hornsea 3 cable route in proximity to Booton Common SSSI/Norfolk Valley Fen SAC. This was provided in a Clarification Note and hydrological impacts were screened out.	The RSPB has no further comments to make on this point.

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			onshore European sites considered within the HRA Report (APP-201) the qualifying features screened in for further assessment were either: (i) found, following targeted survey work, not to be not present within the onshore project area (e.g. Desmoulin's whorl snail in River Wensum SAC), or (ii) identified as being not sensitive to effects brought about by the project (e.g. otter associated with The Broads SAC). For Paston Great Barn, the information presented within the HRA Report shows that for the qualifying feature, barbastelle bats, effects generated by the project alone are likely to give rise to an effect upon this qualifying feature, but that these effects are small-scale, temporary and which, with mitigation, are not anticipated to result in any potential for adverse effect upon site integrity upon the qualifying habitats and species of the Paston Great Barn SAC [paras-1403 and 1409]. Therefore, an in-combination assessment has been conducted to determine whether these small-scale effects become larger in scale following the		

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			development of other nearby plans or projects.		
8.6 Offshore ornithology					
Q8.6.1	The Applicant, Natural England, RSPB	**CRM Assessment** The ExA has had regard to the RRs [RR-054, RR-099] raised in relation to offshore ornithology and is aware of the complex arguments and disagreement between the various parties. Noting these positions, the ExA requests that the Applicant, NE, RSPB and other relevant parties work collaboratively to respond effectively to each of the points raised in RR's on this issue.	The Applicant has been working closely with both Natural England and the Royal Society for the Protection of Birds (RSPB) with the aim of resolving outstanding issues of concern raised on the assessment wherever possible. With respect to the collision risk modelling assessment raised in this Written Question, the Applicant considers that the only outstanding methodological issue with both stakeholders relates to the use of the Marine Scotland Science stochastic collision risk model (sCRM). The Applicant has investigated the use of this model on several occasions, however the errors in the outputs identified by the Applicant (in September 2019) have still not been resolved and therefore it is not considered appropriate to use this model at present. However, it is important to note that the sCRM uses an identical model to the deterministic Band (2012) CRM used in the current assessment, with the only difference being that	Noted. Natural England is aware that the Applicant is working on an updated assessment which will be submitted at Deadline 2. We will provide our headline responses to this updated assessment prior to ISH with detailed comment at Deadline 4.	There were issues with the stochastic model, but the RSPB has received confirmation that those have now been resolved. Therefore, if the Applicant does any further collision risk modelling, we advise that this model formulation is used. We disagree that the proposed parameters that both the RSPB and Natural England have proposed are overly precautionary. We have set this out in our written representation (doc REP2-096) and response to written questions (doc REP2-095) and have provided more detail in our further comments on responses to Q2.3.1 and in our Appendix 1 attached to this response. Irrespective of the disagreement over model outputs, the Applicant's population model highlights substantial reductions in the population of key species (notably, kittiwake, gannet,

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			the model is run repeatedly with input parameters drawn at random from appropriately defined probability distributions for each model run. Therefore the mean output values obtained with the sCRM will be identical to the values obtained from the Band CRM using the mean parameter values as inputs. Therefore the current mean CRM outputs on which the assessment is based will be unaffected. Furthermore, the Applicant has undertaken an updated ornithology assessment which has been submitted at Deadline 2 (ExA; AS-1.D2.V1) which addresses the issues raised by Natural England in their Relevant Representation. This updated assessment also addresses those issues raised by the RSPB for which further assessment was required. The Applicant and Natural England and the RPSB do not agree the conclusions of the collision risk assessment due to the application by Natural England and the RSPB of what the Applicant considers to be overly precautionary assumptions (e.g. over-estimated model parameters for nocturnal activity		guillemot, razorbill and lesser black-backed gull) during the life of the project either through alone or in-combination effects. We do not agree that the assumptions listed are over precautionary. For example, the Nocturnal Activity parameters the Applicant prefers do not all take into account seasonal fluctuations in temporal activity patters, do not account for the lack of survey effort during crepuscular peaks in activity, and do not account for the difference in how the Band model defines daylight with other definitions of twilight and night, particularly how these affect behaviour. There are additional areas which we consider have not been adequately dealt with in the Applicant's submissions at deadline 2 and we will provide additional information on topics such as avoidance rates and consented vs. built layouts before the 22nd January.

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			and avoidance rates and use of consented wind farm designs rather than built ones in the cumulative and in-combination assessments). The Applicant considers that the methods used in its assessments have adopted a proportionate approach to precaution which takes into account reviews of available evidence. References: Band, W. (2012). Using a collision risk model to assess bird collision risks for offshore wind farms. The Crown Estate Strategic Ornithological Support Services (SOSS) report SOSS-02. SOSS Website. Original published Sept 2011, extended to deal with flight height distribution data March 2012		
Q8.6.2	Natural England	**CRM** Assessment NE to explain why it considers in [RR-099] the Applicant takes a more narrative approach to CRM assessment and considers the Option 1 outputs for gannet, kittiwake and great black-backed gull in the context of the relevant Option 2 figures for the 95% confidence intervals of the density data, as part of a more range-based approach to consideration of CRM impacts. How does NE	Although this question is not addressed to the Applicant, the Applicant's response is as follows: The Applicant has discussed the request for consideration of Option 1 CRM outputs with Natural England and has clarified that this aspect is not required in the assessment as explained below.	Following submission of our Relevant Representations [RR-099], Natural England had discussions with the Applicant via a Telecall on 10th September to discuss issues raised in RR-099 where the site-specific flight height data and hence Option 1 figures were discussed. During this call the Applicant confirmed that there was no confidence in any of	While the RSPB agrees that the greater weight should be put on the Option 2 outputs, we also agree with Natural England that presenting a range of outputs is an appropriate method to give an indication of the uncertainty around flight height, both in terms of spatial and temporal variability and in terms of error.

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		consider this approach should be used by the ExA to inform its consideration of HRA matters?	It was agreed during the Evidence Plan process that the assessment would be based on Option 2 outputs due to concerns which the aerial survey contractor raised about the potential for large errors in the methods used to estimate seabird flight heights from their images (this was new information which came to light during the survey period). As a consequence it was agreed with Natural England and the RSPB through the Evidence Plan Process that the assessment would use the flight height data presented by the BTO (Johnston et al. 2014a,b), calculated from a very large dataset, in conjunction with Option 2 of the Band collision model. As requested by Natural England and the RSPB, Option 1 results were also presented in the Norfolk Boreas technical appendix, however for the agreed reasons outlined above (and confirmed on a call between the Applicant and Natural England on the 10th September 2019) these outputs were not used in the assessment, and this position remains unchanged. Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. &	the site-specific flight height data following the survey contractor's statement that heights estimated from digital aerial surveys are inaccurate. Therefore given this it was agreed that the use of generic seabird flight height estimates in Collision Risk Modelling (CRM), i.e. Option 2 is appropriate. However, this highlights the importance and need for a range-based approach. The site-specific flight height data and hence Option 1 values, though potentially suspect, highlight the level of uncertainty around the flight heights of seabirds. In that context, there is a level of risk in basing assessments on a single, central value. Therefore the advantage of a range-based approach is that it encompasses the most likely extent of potential impacts. Therefore, as we have advised the Applicant, consideration of HRA matters should take into account the range of predicted collision impacts apportioned to relevant designated sites, drawing not just from the mean/central predicted collision figures, but also the range of	All methods of flight height estimation in current use for assessment have errors in that estimation, and so in highlighting the utility of a range-based approach, Natural England advocate an honest acknowledgement of this variability and error and resultant uncertainty.

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			Burton, E.H.K. (2014a). Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines. Journal of Applied Ecology, 51, 31-41. Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. & Burton, N.H.K. (2014b). corrigendum. Journal of Applied Ecology, 51, doi: 10.1111/1365-2664.12260.	predicted figures resulting from the Applicant's analysis of the uncertainty/variability in the input data (in the Boreas case, the greatest range results from consideration of the 95% confidence intervals of the seabird density).	
Q8.6.3	Natural England	**Stochastic Collision Model** Confirmation is required from NE that it accepts the inability of the Applicant to use Marine Scotland Science's Stochastic Collision Model, due to issues with the model providing accurate outputs (no timescale for when this model will be fixed), and that NE accepts the Applicant's proposed modelling outputs.	Although this question is not addressed to the Applicant, the Applicant's response is as follows: The Applicant would like to note that several requests have been made to the relevant organisations (Marine Scotland Science and the sCRM developer) to investigate the error in the outputs identified by the Applicant in order that the sCRM can be used as per Natural England's request. However, to date no further updates to the sCRM have been made available (last checked on the 21st November 2019). Furthermore, as outlined in response to WQ 8.6.1., the mean model outputs from the Band (2012) model used in the	We note that the Marine Scotland Science (MSS) stochastic collision risk model (sCRM) is essentially based on the Band (2012) model, but allows uncertainty in input parameters (e.g. avoidance rate, flight height, bird density etc.) to be fully incorporated into a predicted collision impact with estimated variability. As the sCRM is compatible with the Band (2012) model, for the same mean/central input parameters the sCRM when run as a deterministic model (i.e. standard deviations for all parameters set at 0) should therefore give the same central/mean collision predictions as those predicted by the Band (2012) model for these same input parameters.	The RSPB supports Natural England's response to this question. We also set out a similar position in our response to written questions (doc REP2-095). However, the issues with the MSS sCRM have now been resolved, and this model represents the best method for any subsequent collision modelling carried out by the Applicant.

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			Norfolk Boreas assessment and the mean outputs from the sCRM will be the same, since the models are identical in structure and will therefore generate the same results when the same input values are used.	However, at present it has been identified that this is not the case, due to technical issues with the sCRM. This issue has also been identified by the Applicant. These issues are currently subject to ongoing discussion/investigation between the SNCBs, MSS and the sCRM developers. However the timescales required to resolve the issues are currently uncertain. Hence, at the present time, the Applicant's current approach to the assessment (use of the Band 2012 model and varying each input parameter in turn, i.e. bird density, avoidance rate, flight heights, nocturnal activity) therefore represents appropriate use of the currently recommended collision risk model and the best approach to incorporating uncertainty that is available at this time. Natural England will base our advice on the ranges of predictions for the parameter that predicts the greatest uncertainty in the predictions from the variations of Band model outputs, which as noted above is the variation of bird density. If the issues with the sCRM do get resolved in the timescale of the Boreas examination	

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				and updated collision risk modelling is required (e.g. due to modification to design parameters), then we would advise this is undertaken using the stochastic model.	
Q8.6.4	The Applicant	**Reducing collision impacts** The Applicant to provide an update on the additional measures being considered for reducing collision impacts noted in [AS-024] in response to NE's recommendation for raising turbine draught height.	Notwithstanding the fact that the Applicant has been able to conclude that Norfolk Boreas will not have any significant impacts or AEoI due to collisions at the project alone, cumulatively or in-combination with other wind farms, the Applicant is giving consideration to options for further reducing the risk of collisions and this includes the possibility of raising the turbine draught height to reduce the proportion of bird flights at rotor height. The Applicant will provide further updates to the Examining Authority once options for additional mitigation have been considered further.	Natural England has previously provided regulators with our advice regarding our concerns about predicted level of cumulative/in-combination collision impacts on North Sea seabirds, e.g. EIA great black-backed gull at East Anglia 3, Flamborough and Filey Coast (FFC) SPA kittiwake at Hornsea 2. These concerns intensified during the recent three offshore wind farm (OWF) examinations (Hornsea 3, Norfolk Vanguard, Thanet Extension), and given three further OWF NSIPs have recently been submitted to PINS (Norfolk Boreas, East Anglia One North, East Anglia Two) with a further project expected to submit in 2020 (Hornsea 4), Natural England considers that without major project-level mitigation being applied to all relevant projects coming forward, there is a significant risk of large-scale impacts on seabird populations. As stated in our Relevant Representations [RR-099],	The RSPB welcomes the indication that raising turbine draught height is being considered, but look for greater certainty than simply "the Applicant is giving consideration to options". We support this measure, as we did at the Norfolk Vanguard examination. We also note that only consideration of an additional 5m draught height, up to 27m, is presented and would advise that a full range of potential draught heights is presented, at least up to 35m. This would be consistent with the approach taken by other offshore wind farms, such as Hornsea THREE.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
				Natural England therefore recommends that Norfolk Boreas (and all relevant future projects located in the North Sea), considers raising turbine draught height, as has been done by other projects (e.g. Hornsea 2, East Anglia 3 and Vanguard) as mitigation in order to minimise their contribution to the cumulative/in-combination collision totals by as much as is possible. We would also advise that Norfolk Boreas considers a range of possible options of draught heights be presented, to demonstrate due consideration of alternative mitigation options.	
8.7 Alde-Ore Estuary SPA					
Q8.7.1	Natural England	**Lesser black backed gull** The commentary that supports the Applicant's in-combination assessment for lesser black backed gull of Alde-Ore Estuary SPA infers that reliance has been placed on the as-built scenarios for other offshore wind farm developments. The RSPB has raised concerns with this Approach. What is NE's advice??	Although this question is not addressed to the Applicant, the Applicant's response is as follows: The Applicant acknowledges that there are legal considerations with respect to the acceptance of reduced collision predictions for wind farms which have been built using less impactful designs than those for which consent was awarded. However, the Applicant also considers that there are very persuasive arguments in support of	As Natural England have stated previously during the Vanguard examination (see our Deadline 2 and 8 responses for this examination) Natural England acknowledges that as built scenarios are an important issue with regard to cumulative/in-combination CRM predictions and assessments. However, without a legally secured reduction in the consented Rochdale envelope, and a re-run CRM with the final design parameters, cumulative/in-combination assessments should be	The RSPB has provided comments on the need for the cumulative/in-combination assessments to consider consented parameters. We agree with Natural England's response. However, we do not agree with the Applicants suggested "very straightforward method for calculating change" and would prefer that where there is a legally secured reduction in the consented Rochdale envelope

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			updating collision predictions for built designs which preclude the suggestions (by Natural England and the RSPB) that there is a risk that the wind farm developer could revert to the original design (e.g. the developer would require additional planning consent for further construction work). Furthermore, there is a very straightforward method for calculating the change in collisions resulting from turbine design changes. This calculates a correction rate which can be applied to the original collision predictions to obtain updated estimates. Thus the reference by the Applicant to assessment based on as-built wind farms is a robust approach to assessment which more accurately reflects the potential risks posed by existing wind farms rather than those for highly precautionary assessments based on worst case design envelopes which are rarely, if ever, realised.	based on consented parameters. We note that East Anglia 1 is currently the only project to date to meet these tests.	that a full re-run of the Collision Risk modelling is carried out.
Q8.7.2	The Applicant	**Lesser black backed gull** NE [RR-099] and RSPB [R-054] do not agree to no AEOI to lesser black backed gull of Alde-	The Applicant has produced an updated assessment, submitted at Deadline 2 (ExA;AS-1,D2.V1), which		The RSPB welcome the presentation of a range of apportioning values for lesser

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
		Ore Estuary SPA and Ramsar. NE has concerns on the basis of the breeding season apportionment and advises a range of rates. RSPB does not agree no AEOI from collision mortality alone and in-combination. NE explains it could not agree to no AEOI from collision risk to LBBG for Norfolk Vanguard and Boreas adds more birds to these totals. The Applicant [AS-024] states that it will respond to these concerns, when will the response be available?	responds to the points made. With respect to Natural England's request for assessment using a wider range of apportioning rates during the breeding season, the Applicant has discussed this with Natural England and confirmed that in fact the original assessment which covered values up to 30% was in line with previous Natural England advice and that no higher values are required. Additional assessment as per Natural England's relevant representation (RR-099) requests is provided in the updated assessment (ExA;AS-1,D2.V1) (this includes an assessment for the project alone using the 95% confidence intervals of abundance, additional wind farms in the cumulative and in-combination assessments and with and without the Hornsea Project Three and Four wind farms). However, it should be noted that the Applicant does not agree with either Natural England's or the RSPB's conclusions that an AEoI for Norfolk Boreas alone or in-combination cannot be ruled out. Through the application of evidence based methods the Applicant has been able to		black-backed gull, but would prefer a wider range, up to at least 40%, in order to fully capture the uncertainty inherent in the apportioning exercise and therefore incorporate a proportionate degree of precaution. The RSPB supports the inclusion of the Hornsea Three and Hornsea Four projects. The RSPB considers the Applicant's assessment approach to apply inappropriate adjustments to the outputs from the population models, such that final conclusions are based on underestimates for potential impacts that are not justified. We set out in our responses at Deadline 2 (doc REP2-095 and REP2-096) the areas that we consider have been misrepresented and highlight the areas where predicted impacts have been undervalued. Para 68 of the Offshore Ornithological Assessment update document (doc REP2-035) highlights that the BDMPS

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			conclude that Norfolk Boreas will not have an AEoI on the Alde Ore Estuary Special Protection Area (SPA) population of lesser black-backed gulls either alone or in-combination.		reduction would be at the 1% threshold, not under the 1% threshold as is stated in the document. Notwithstanding the RSPB view that such thresholds are entirely arbitrary, such statements are misleading and thereby increase the amount of uncertainty inherent in the assessment Para 84 indicates that there would be a 7.4% increase in mortality using the adjusted figures and 12% (para 83) using the unadjusted figures supported by the RSPB. Either of these figures is considered significant. The RSPB has already set out our thoughts on the apportionment of lesser black-backed gulls to the Alde-Ore Estuary SPA, specifically the proportion of rural and urban birds, in our written representation (doc REP2-096) and written questions (doc REP2-095).
8.8 Alde-Ore Estuary SPA and Flamborough and Filey Coast SPA					
Q8.8.1	The Applicant	**Compensation** NE and RSPB advise that an AEOI cannot be ruled out for Alde-Ore Estuary SPA,	The Applicant considers that Natural England's and the RSPB's conclusions that AEoI cannot be		The RSPB has set out our reasoning why the Applicant's method of assessment

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
		Flamborough and Filey Coast SPA. It is acknowledged that NE and RSPB previously reached these conclusions for Norfolk Vanguard and that Norfolk Boreas is proposing to add additional mortalities to those figures. In light of this, the Applicant is requested to present information relevant to the subsequent stages of the HRA process; namely consideration of alternatives, compensation and information to inform an IROPI case for these sites.	ruled out for these SPAs have been reached through the application of highly precautionary methods which over-estimate the magnitude of impacts to a large degree. These reasons have been set out in detail in ExA;AS-1.D2.V1, and in a report on precaution submitted to the Norfolk Vanguard Examination at Deadline 8 (REP8-067). The Applicant has concluded that when more proportionate levels of precaution are applied AEoI can be ruled out for these SPAs. The Applicant has set out its position in relation to alternatives/compensatory measures/IROPI in the response to Written Question 8.5.5 and this position applies equally to this question. As explained in response to Written Question 8.5.5, the issues of alternatives/compensatory measures/IROPI would only arise in the event that the Secretary of State were to produce a negative appropriate assessment which identified the precise nature and quantified extent of any contended		underestimates impacts in our written representation (doc REP2-096) and response to written questions (doc REP2-095). Irrespective of the disagreement over model outputs, the Applicant's model highlights substantial reductions in the population of key species (notably, kittiwake, gannet, guillemot, razorbill and lesser black-backed gull) during the life of the project either through alone or in-combination effects. Given BEIS is currently consulting on application of the Article 6(4) Habitats Directive derogation tests in respect of Hornsea Three and Norfolk Vanguard (as we highlighted in our response to the written questions; doc REP2-095), the RSPB considers the ExA is acting prudently in requesting that the Applicant present information now that is relevant to these stages of the HRA process for Norfolk Boreas i.e. alternative solutions, IROPI and compensation measures. This will help ensure the ExA is able to

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			adverse effect on integrity of these European sites.		provide the SoS with the relevant information and advice in order to make a decision. In the absence of such information, the SoS would be at liberty to refuse consent given an applicant's failure to provide the necessary information before the end of the examination. Based on the RSPB's considerable experience of Article 6(4) derogation cases in the UK, it is sensible to allow as much time as practicable for consideration of possible compensatory measures so that full consideration can be given to the complex issues raised and, as far as possible, agreement reached on any solution(s). This can provide the competent authority with the confidence that any necessary compensatory measures have been secured if the competent authority determines an adverse effect on integrity cannot be avoided and that the earlier derogation tests have been passed. Delaying discussion on this increasingly critical topic clearly

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
					has the potential to delay its proper and full consideration and therefore the overall decision-making process. In respect of compensation measures, it should be possible to conduct discussions and reach agreement on what may or may not be appropriate on a without prejudice basis such that it does not affect respective positions regarding the adverse effect on site integrity test. time to discuss and review. For this reason, the RSPB supports the ExA in its request to begin discussion on this key issue as soon as practicable during the Examination process.
8.9 Greater Wash SPA and Outer Thames Estuary SPA					
Q8.9.1	Natural England	**Mortality Rates** NE [RR-099] states that definitive mortality rates are unknown, therefore a range of mortality rates between 1% and 10% should be presented. It disagrees with the Applicants evidence review and that a magnitude of 100% out to 4km is over precautionary. NE calculates 0.87-2.46% increase in baseline mortality during construction phase, which it states is not insignificant. The Applicant [AS-024] states	Although this question is not addressed to the Applicant, the Applicant's response is as follows: Following further discussions with Natural England there is now agreement that, subject to proposed mitigation measures (included in the draft DCO), there will be no AEoI on red-throated	As definitive mortality rates of seabirds, including red-throated diver (RTD) and auks, are unknown Natural England continues to advise a range of mortality rates of between 1 and 10% are considered in assessments. Critically though, empirical evidence regarding the energetic consequences of displacement for seabirds and wintering waterbirds using the	The RSPB has no further comments to make on this topic, provided the agreed mitigation measures are secured.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
		that the full range of outputs was presented in its assessment. Does NE have further comments?	diver at the Greater Wash SPA due to cable installation.	marine environment are very limited, and the role of overwinter survival on seabird population dynamics is poorly understood. Furthermore, we again note that the mortality rates are a crude method of capturing a range of potentially deleterious effects that could arise from displacement, including reduced fitness for migration and reduced productivity during the breeding season. These are particularly relevant when considering displacement effects within sites designated for the species affected, such as the RTD feature of the Greater Wash SPA. We acknowledge that in its assessments of displacement for RTD and auks, the Norfolk Boreas Applicant has considered the range of predicted impacts from the displacement and mortality rates as recommended by Natural England alongside those predicted from their considered 'evidence based' rates. We note that our recommendation to consider up to 100% displacement over a 4km buffer is with respect to displacement of sensitive species	

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
				such as divers and seaduck from operational offshore windfarms, whilst for all other species it is for a 2km buffer (SNCBs 2017), which have been used by the Applicant in their assessments. The calculations referred to in the question of a 0.87- 2.46% increase in baseline mortality during the construction phase are with regard to 100% displacement and up to 10% mortality of RTD in the Greater Wash SPA from a 2km buffer around each cable laying vessel, based on the RTD density from the data used in the SPA Departmental Brief (Natural England & JNCC 2016). We consider that the use of the upper density figure for the cable route is likely to be appropriate bearing in mind recent surveys of the neighbouring Outer Thames Estuary SPA have identified higher RTD densities when digital aerial surveys have been undertaken. This results in a prediction of up to 8.5 RTD mortalities, equating to up to 2.46% of baseline mortality of the SPA RTD population at the upper range of the NE recommended mortality rates. Therefore, at this level, the predicted impacts are not insignificant and	

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
				without the mitigation proposed by Norfolk Boreas may not have resulted in no adverse effect on site integrity.	
Q8.9.2	Natural England	**Red throated diver** In its response to NE's RR [AS-024] the Applicant provides proposed mitigation measures for red throated diver of the Greater Wash SPA and Outer Thames Estuary SPA during operation and maintenance. Does the commitment in Schedules 9 & 10 Condition 14(1)(d)(vi) sufficiently alleviate NE's concerns to enable it to conclude no AEOI?	Although this question is not addressed to the Applicant, the Applicant's response is as follows: The proposed mitigation measures referred to in this question were also adopted for Norfolk Vanguard and East Anglia THREE, and for both projects Natural England has accepted these measures would satisfy their concerns regarding potential disturbance by operation and maintenance vessels.	In AS-024 the Applicant confirms that the same mitigation agreed for the operation and maintenance phase of Norfolk Vanguard has been adopted for Norfolk Boreas, specifically: • Avoid and minimise maintenance vessel traffic, where possible, during the most sensitive time period for red throated diver (RTD) in January/ February/ March. • During the months of January to March inclusive, construction activities consisting of cable installation for Work No. 4A and Work No. 4B must only take place with one main cable laying vessel. • Restrict vessel movements where possible to existing navigation routes. • Avoid over-revving of engines (to minimise noise disturbance). This mitigation has been included in the Outline PEMP [APP-705]. Condition 14 (1) (d) (vi) of Schedules 9 and 10 of the updated draft DCO version 2 [AS019] secures that the final project environmental	The RSPB has no further comments to make on this topic, provided the agreed mitigation measures are secured.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
				management plan (in accordance with the outline project environmental management plan) covering the period of construction and operation must include details of: "*procedures to be adopted within vessel transit corridors to minimise disturbance to red-throated diver during operation and maintenance activities*." Therefore, based on the adoption of best practice vessel operations to minimise disturbance to RTD, we agree that an AEOI from operation and maintenance vessel movements can be ruled out for RTD feature of the Greater Wash SPA and of the Outer Thames Estuary SPA.	
Q8.9.3	Natural England	**Red throated diver** NE [RR-099] recommends avoiding/reducing cable laying activities during the non-breeding season/period of peak red throated diver numbers. The Applicant [AS-024] confirms that the same mitigation agreed for Norfolk Vanguard has been adopted for Norfolk Boreas, as included in the outline PEMP [APP-705]. Does the Applicant's commitment to mitigation for red throated diver of the Greater Wash SPA, as included in	Although this question is not addressed to the Applicant, the Applicant's response is as follows: In the Statement of Common Ground (SoCG) (ExA.SoCG-17a.D2.V2) Natural England has confirmed that the adoption of the mitigation measures for offshore export cable installation, such as avoiding or reducing cable laying activities during the non-breeding	As noted in response to question 8.9.2 above, the Applicant confirms that the same mitigation agreed for Norfolk Vanguard has been adopted for Norfolk Boreas, which includes: • During the months of January to March inclusive, construction activities consisting of cable installation for Work No. 4A and Work No. 4B must only take place with one main cable laying vessel.	The RSPB has no further comments to make on this topic, provided the agreed mitigation measures are secured.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
		section 6.1.3 of the outline PEMP [APP-705] enable NE to agree to rule out an AEOI?	season/period of peak numbers, would enable Natural England to agree with the Applicant that cable installation would not result in an AEoI on the Greater Wash SPA population of red-throated diver. The Applicant has included this mitigation, by way of restriction on cable installation construction works, within the draft DCO Version 3, (REP1-008) at Condition 19 of the Transmission DMLs (Schedule 11-12), which states: "During the months of January to March inclusive, construction activities consisting of cable installation for Work No. 4A and Work No. 4B must only take place with one main cable laying vessel."	This mitigation has been included in the Outline PEMP [APP-705], the final version of which is secured through Condition 14 (1) (d) (vi) of Schedules 9 and 10 of the updated draft DCO version 2 [AS019]. Therefore, based on this commitment from the Applicant, we agree that an AEOI from displacement due to construction activities from the project alone and in-combination can be ruled out for RTD feature of the Greater Wash SPA.	
Q8.9.4	Natural England	**Red throated diver** Can NE confirm whether its comments regarding cumulative operational displacement to red throated diver in section 6.2 of Appendix 1 of its Relevant Representation [RR-099] also apply to red-throated diver qualifying features of Greater Wash SPA and Outer Thames Estuary SPA?	Although this question is not addressed to the Applicant, the Applicant's response is as follows: Norfolk Boreas is located a minimum of 36km from the Greater Wash SPA and 40km from the Outer Thames Estuary SPA. Thus, the wind farm is predicted to have limited connectivity to these SPAs. Nonetheless, as requested by Natural England, the Applicant has undertaken a 'like for like'	The comments in 6.2 of Appendix 1 of our Relevant Representation [RR-099] only apply to the cumulative (EIA scale) displacement assessment for RTD. Given the commitment by the Norfolk Boreas Applicant to the same mitigation as at Norfolk Vanguard for RTD displacement (in terms of reductions in cable laying vessels in the Greater Wash SPA during the key periods and to procedures to be	The RSPB has no further comments to make on this topic, provided the agreed mitigation measures are secured.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			assessment (included in the update submitted at Deadline 2, ExA;AS-1.D2.V1) which has demonstrated the very small (0.1%) contribution of Norfolk Boreas to the predicted cumulative displacement of red-throated diver in the southern North Sea. Since the Greater Wash SPA and Outer Thames Estuary SPA between them account for a large proportion of the favoured habitat for this species in the southern North Sea the Applicant considers that the potential for AEoI on these SPAs can also be ruled out.	adopted within vessel transit corridors to minimise disturbance of RTD during operation and maintenance activities) set out in the Outline PEMP [APP-705], the final version of which is secured through Condition 14 (1) (d) (vi) of Schedules 9 and 10 of the updated draft DCO version 2 [AS019], we can agree that AEoI from displacement due to construction activities in-combination can be ruled out for RTD feature of the Greater Wash SPA and that an AEoI from operation and maintenance vessel movements can be ruled out for RTD feature of the Greater Wash SPA and of the Outer Thames Estuary SPA.	
Q8.9.6	The Applicant	**Little gull collision risk** NE states the Applicant has not considered variability/uncertainty and a range of collision impacts for little gull. What is the Applicant's response?	The Applicant has provided the additional assessment requested by Natural England in the ornithology update submitted at Deadline 2 (ExA;AS-1.D2.V1). The conclusions of this assessment remain that Norfolk Boreas will not have an AEoI on the little gull population of the Greater Wash SPA either alone or in-combination with other plans and projects.		The RSPB welcomes the additional assessment of collision impacts including the 95% confidence intervals around density intervals. However, as the Applicant's own calculation show a potential increase in background mortality, (using the mean rather upper 95% confidence interval) of up to 3.2% (Section 3.6, doc REP2-035), we would advise that, following the updated offshore ornithology assessment, a PVA be carried out

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
					in order to properly assess this impact on a population scale.
8.10 Flamborough and Filey Coast SPA					
Q8.10.1	The Applicant	**Kittiwake** 1. NE [RR-099] and RSPB [RR-054] do not agree the apportionment of 26.1% of kittiwakes to the FFC SPA to be appropriate. The IPs recommend that a range of apportionment rates should be considered, up to 100%. 2. NE was unable to rule out AEOI for Norfolk Vanguard from in-combination collision risk, and Boreas is adding more birds. 3. RSPB does not agree no AEOI from in-combination collision mortality. The Applicant to respond to these concerns.	1. The Applicant has updated the assessment of potential kittiwake impacts at the Flamborough and Filey Coast SPA in the update submitted at Deadline 2 (ExA.AS-1.D2.V1) and this includes consideration of apportioning of up to 100% of the breeding season collisions to the SPA population. This additional assessment notwithstanding, the Applicant considers that the estimate of 26.1% is appropriate and was based on a review of the available evidence, which included, but was not limited to, RSPB kittiwake tracking data. 2 and 3. With respect to Natural England's and the RSPBs conclusions on AEoI, the Applicant considers that these have been reached using highly precautionary methods and assumptions and that when more proportionate levels of precaution are applied to the assessment (e.g. built designs vs. consented, over-estimated nocturnal activity rates, over-		The RSPB has set out our reasoning why the Applicant's method for assessing impacts underestimates impacts in our written representation (doc REP2-096) and response to written questions (doc REP2-095). The RSPB does not agree that 26.1% is an appropriate estimate of the potential kittiwake mortality apportioned to the Flamborough and Filey coast SPA. as this may considerably underestimate the actual impact. We recommend adoption of Natural England's recommendation at Norfolk Vanguard that apportioning to the Flamborough and Filey Coast SPA should be 86%. However, we welcome the more recent advice from Natural England that a range of apportioning rates are presented to reflect the large extent of the uncertainty inherent in the apportioning exercise.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			estimate flight speed, use of density independent population models; these are discussed in more detail in ExA.AS-1,D2.V1) it is possible to reach the Applicant's conclusion that there is no risk of AEoI for Norfolk Boreas alone or in-combination with other plans and projects.		Irrespective of the disagreement over model outputs, the Applicant's population model highlights substantial reductions in the population of key species (notably, kittiwake, gannet, guillemot, razorbill and lesser black-backed gull) during the life of the project either through alone or in-combination effects.
Q8.10.2	RSPB	**Gannet** RSPB [RR-054] does not agree no AEOI to gannets of Flamborough and Filey Coast SPA from collision mortality from the project alone and in-combination (but it may be able to rule out from the project alone through raising of draught height of turbines). Can the RSPB provide further details as to why it does not consider an AEOI to gannets of the Flamborough and Filey Coast SPA can be ruled out as a result of collision risk from the project alone?	Although this question is not addressed to the Applicant, the Applicant's response is as follows: The Applicant considers that the RSPB has reached this conclusion on the basis of highly precautionary assumptions and methods, including use of consented designs instead of as built projects, over-estimated nocturnal activity rates and the RSPB's use of a breeding season avoidance rate of 98% (in contrast to the Natural England advised rate of 98.9%). The Applicant has applied a more proportionate level of precaution in the assessment, and on this basis has been able to rule out AEoI for the project alone		The RSPB has provided details on this question in our written representation (doc REP2-096) and response to written questions (doc REP2-095). We consider that it is not currently possible to rule out an adverse effect on integrity of the Flamborough and Filey Coast SPA arising from the project alone because the Applicant's own calculations, with adjusted Avoidance Rate in the breeding season to RSPB preferred value, indicate a decline in the SPA population of up to **18%** as a result of the project alone. The RSPB advocates a lower avoidance rate for gannet during

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			and in-combination with other plans and projects. Nonetheless, despite the Applicant concluding that there will be no AEoI for gannet from the Flamborough and Filey Coast SPA, consideration is being given to options for further reducing the magnitude of impacts, including through increases in rotor draught height.		the breeding season due to the lack of available evidence relating to breeding birds. This is because, the response of foraging and commuting birds to the presence of a windfarm is likely to be different during the breeding season and so the avoidance rate, which incorporates such reactive behaviour, is also likely to be different. For example, Everaert and Stienen (2006)[2] describe terns that had previously avoided a wind farm flying through the turbine array when breeding in order to provision chicks. As acknowledged in the BTO Review that the SNCB advice is drawn from, the majority of evidence for avoidance behaviour of gannet is from non-breeding birds. The RSPB welcomes the indication that raising turbine draught height is being considered, but look for greater certainty that this will be applied to the project than simply "the Applicant is giving consideration to options".

[2] Everaert, Joris, and Eric WM Stienen. "Impact of wind turbines on birds in Zeebrugge (Belgium)." *Biodiversity and Conservation in Europe*. Springer, Dordrecht, 2006. 103-117.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
Q8.10.3	Natural England	**Breeding birds** RSPB [RR-054] advises a 98% avoidance rate for breeding birds as the review from which the SNCB advice of a 98.9% avoidance rate acknowledges the majority of evidence of gannet avoidance behaviour is from non-breeding birds and that breeding birds would behave differently. What is NE's advice regarding RSPB's assertion that a 98% avoidance rate is more appropriate for breeding gannets, than the 98.9% they have advocated?	Although this question is not addressed to the Applicant, the Applicant's response is as follows: There is good evidence to support the higher avoidance rate of 98.9% and this value is recommended by all the Statutory Nature Conservation Agencies. This value was derived from a comprehensive analysis conducted by the British Trust for Ornithology (BTO) on behalf of Marine Scotland Science (Cook et al. 2014). More recent empirical observations obtained through a study conducted for the Ornithology Research Joint Industry Programme (ORJIP) has given further support to the higher avoidance rate and in fact found evidence that the gannet avoidance rate should be increased to 99.5%, the same value accepted for large gull species (Skov et al. 2018). While it is acknowledged that much of the gannet observation data were collected in the nonbreeding season, there is no evidence that the Applicant is aware of which supports the RSPB's position, and there does not	We acknowledge RSPB's advice regarding this. However, we note that the work underpinning the SNCB advice note (Cook et al. 2014; SNCBs 2014) looked at all the data available and determined that 98.9% across all seasons was the most appropriate advice. We note that there is no empirical evidence to calculate an avoidance rate of 98% for gannet in the breeding season. This again highlights the importance and need for a range-based approach where there is uncertainty regarding CRM input parameters.	The RSPB has provided details as to why we prefer a 98% avoidance rate for gannet in the breeding season in our written representation (doc REP2-096) and response to written questions (doc REP2-095), but agree with Natural England regarding the need for a range-based approach. We also note that the Avoidance Rates in the study by Skov et al., (2018), cited by the Applicant, are compromised by both the lack of a pre-construction baseline and the presence of fishing vessels close to the wind farm boundary, resulting in an artificially generated distribution of birds (Bowgen and Cook, 2018).[3]

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

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			appear to be any robust basis for considering that gannet would have variable turbine avoidance depending on the time of year. Indeed, there is no indication that any species exhibits variable rates of turbine avoidance at different times of year. Therefore, overall the Applicant considers there to be a robust body of evidence in support of a higher avoidance rate than that advocated by the RSPB, and this is also the position held by the other relevant stakeholders involved in ornithology assessment for offshore wind farms. References Cook, A.S.C.P., Humphries, E.M., Masden, E.A., and Burton, N.H.K. (2014). The avoidance rates of collision between birds and offshore turbines. BTO research Report No 656 to Marine Scotland Science. BTO, Thetford. Skov, H., Heinänen, S., Norman, T., Ward, R.M., Méndez-Roldán, S. & Ellis, I. (2018). ORJIP Bird Collision and Avoidance Study. Final report –		

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			April 2018. The Carbon Trust. United Kingdom. 247 pp		
Q8.10.4	Natural England	**Auk** In response to NE's [RR-099] relating to definitive mortality rates for auk (razorbill and guillemot), the Applicant [AS-024] notes that the full range of outputs was presented in the assessment as requested. Using its own preferred rates, does NE consider an AEOI to razorbill and guillemot of the FFC SPA as a result of displacement can be excluded?	Although this question is not addressed to the Applicant, the Applicant's response is as follows: Although Natural England has requested auk displacement mortality rates between 1% and 10%, Natural England has also stated that mortality 'is likely to be at the low end of the range' (REP—099) which indicates a value closer to 1% than 10%. In addition the Applicant considers that even a rate of 1% should be considered to be precautionary since there is no evidence to indicate that displacement will result in an impact of this magnitude. Estimates for breeding auks have indicated possible additional mortality of no more than 0.3% and possibly as low as 0.003% (Searle et al. 2017). Although nonbreeding auks may experience different pressures, it is considered very unlikely that these would result in an effect as much as three times higher (i.e. to reach 1% mortality) and if anything the effect is likely to be lower since the	**<u>Razorbill (alone):</u>** We agree with the apportionment rates to the FFC SPA used by the Applicant (namely 0% in the breeding season, 3.4% for autumn and spring, and 2.7% for winter) in APP-201. Based on this at the lower end of the range of the Natural England advised rates of 30% displacement and 1% mortality results in an additional 0.15 (range based on 95% confidence intervals of abundance: 0.1-0.2) razorbill mortalities from the FFC SPA from Boreas alone. Whilst at the upper end of the range of the Natural England advised rates of 70% displacement and 10% mortality results in an additional 3.5 (range: 1.5-5.7) razorbill mortalities from the FFC SPA are predicted from Boreas alone. At the upper end of the Natural England advised range (i.e. 70% displacement and 10% mortality, this equates to 0.16% (range: 0.07- 0.26%) of baseline mortality of the razorbill population of the FFC SPA, based on the designated colony size of 10,570 pairs (21,140 adults) and an adult mortality rate of 10.5% (calculated	The RSPB's further comments are provided for Q8.10.5.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			requirement to provision a chick is removed, as is the requirement to commute to and from foraging areas. References Searle, K.R., Mobbs, D.C., Butler, D., Furness, R.W., Trinder, M.N. and Daunt, F. (2017). Fate of displaced birds. CEH Report NEC05978 to Marine Scotland Science.	from the adult survival rate of 0.895 in Horswill & Robinson 2015). The Conservation Objective for the razorbill feature of the FFC SPA is to maintain the size of the breeding population at a level which is above 10,570 breeding pairs whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. Given that the predicted impacts (even using the upper 95% confidence intervals of the abundance data) equates to less than 1% of baseline mortality of the colony, therefore we consider that this level of additional mortality could be considered non -significant and therefore would not be an AEOI. The conservation objectives regarding the razorbill feature would be met and **therefore Natural England advises an adverse effect on integrity (AEoI) of the razorbill feature of the FFC SPA can be ruled out for displacement impacts <u>from Boreas alone.</u>** **<u>Guillemot (alone):</u>** We agree with the apportionment rates to the FFC SPA used by the Applicant (namely 0% in the breeding season and 4.4% in the non -	

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
				breeding season) in APP -201. Based on this at the lower end of the range of the Natural England advised rates of 30% displacement and 1% mortality results in an additional 1.8 (range based on 95% confidence intervals of abundance: 1.1 -2.6) guillemot mortalities from the FFC SPA from Boreas alone. Whilst at the upper end of the range of the Natural England advised rates of 70% displacement and 10% mortality results in an additional 42.4 (range: 25.1 - 60.5) guillemot mortalities from the FFC SPA are predicted from Boreas alone. At the upper end of the Natural England advised range (i.e. 70% displacement and 10% mortality, this equates to 0.84% (range: 0.50 -1.19%) of baseline mortality of the guillemot population of the FFC SPA, based on the designated colony size of 41,607 pairs (83,214 adults) and an adult mortality rate of 6.1% (calculated from the adult survival rate of 0.939 in Horswill & Robinson 2015). The Conservation Objective for the guillemot feature of the FFC SPA is to maintain the size of the breeding population at a level which is above 41,607 breeding pairs whilst avoiding	

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				deterioration from its current level as indicated by the latest mean peak count or equivalent. Whilst the prediction based on the mean abundance even at the upper end of the Natural England recommended rates equates to less than 1% of baseline mortality, the displacement prediction based on the upper 95% CI of the abundance data does equate to more than 1% of baseline mortality of the FFC SPA colony at the upper range of the Natural England rates. However, the predicted displacement figures using the upper 95% CI of the abundance data equate to 1% or more of baseline mortality of the FFC SPA colony only at the very upper end of the Natural England recommended range at 60 -70% displacement and 10% mortality and even then at no more than 1.19%. Alde -Ore Estuary SPA colony. Therefore based on this, we consider that the conservation objectives regarding the guillemot feature would be met and **therefore Natural England advises an adverse effect on integrity (AEoI) of the guillemot feature of the FFC SPA can be ruled out for displacement impacts <u>from Boreas alone</u>**.	

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
				Razorbill and guillemot (in-combination): As we noted in our Relevant Representations [RR099], several relevant offshore wind farms were missing from the in-combination assessments of impacts on the FFC SPA, and updates were required to some of the sites included in the assessments. We understand that these issues are to be addressed by the Applicant in the updated offshore ornithology assessment due to be submitted at Deadline 2. Therefore, we will provide our advice on this following review of this document once it is submitted into the process. However, we note that at the end of the Norfolk Vanguard examination Natural England advised the Applicant that an AEoI could not be ruled out for razorbill or guillemot in-combination operational displacement when Hornsea Project Three was included (see our Deadline 9 response at Vanguard). Since Norfolk Boreas (and it is assumed East Anglia ONE North and East Anglia TWO) will be adding additional mortality to the in-combination figure presented for Norfolk Vanguard it is likely that	

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
				Natural England will provide similar advice here.	
Q8.10.5	RSPB	**Auk** RSPB [RR-054] does not agree no AEOI to razorbill and guillemot from in-combination operational displacement. Following the Applicant's response [AS-024] does RSPB have any further concerns?	Although this question is not addressed to the Applicant, the Applicant's response is as follows: The Applicant notes the RSPB's position on in-combination displacement of auks from the Flamborough and Filey Coast SPA, however the Applicant considers these are based on highly precautionary assumptions about the rates of displacement and mortality. The Applicant has applied more proportionate levels of precaution in the assessment and reached conclusions of no AEoI for auk displacement both from the project alone and in-combination with other plans and projects.		The RSPB notes Natural England's response to Q8.10.4. We support the position that they have set out. In the current version of the Statement of Common Ground between ourselves and the Applicant (doc REP2-059) we have accepted that Norfolk Boreas alone will not result in adverse effects on the integrity of the Flamborough and Filey Coast SPA populations of guillemot and razorbill. However, for the reasons Natural England have highlighted, the RSPB considers that in-combination with other projects an adverse effect on the integrity of the Flamborough and Filey Coast SPA cannot be ruled out.
Q8.10.6	The Applicant	**Puffin** The screening matrix for FFC SPA [AS-002] identify a LSE for puffin from operational displacement, however puffin is not included in the FFC SPA integrity matrix, nor is it identified in the HRA Report [APP-201]. The ExA understands that puffin forms part of the seabird assemblage feature of the FFC SPA,	Puffin was recorded in the Norfolk Boreas wind farm and 2km buffer in only two months (February and March) and in very small numbers: the estimated population sizes in these months were 5 and 23. Apportioning of the peak estimate to the Flamborough and Filey Coast		The RSPB welcomes provision of the seabird assemblage assessment reported in the updated Offshore Ornithology Assessment (doc REP2-035) and the inclusion of puffin alongside the other assemblage species. We will provide detailed

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
		which has not been included on the screening matrix. The Applicant to confirm whether a LSE should be screened in for the seabird assemblage of FFC SPA, and if so, provide information to support the making of an appropriate assessment for this feature.	SPA using Natural England's advised rate for the nonbreeding season (0.041%) it is predicted that less than 0.1 individuals from the SPA are present on the Norfolk Boreas site. On this basis there is no risk of a Likely Significant Effect (LSE) for puffin and its original inclusion in the screening matrix for the Flamborough and Filey Coast SPA was erroneous. Puffin has now been removed from the updated Screening Matrices submitted at Deadline 1 (REP1-012, 5.3.5.3 - Norfolk Boreas Updated Appendix 5.3 Habitats Regulations Assessment Screening Matrices (Version 3)) and there is also no requirement for any additional assessment, therefore this species is not included in the updated assessment submitted at Deadline 2 (ExA;AS-1,D2.V1). On the advice of Natural England, the seabird assemblage feature of the SPA has been screened in (5.3.5.3 - Norfolk Boreas Updated Appendix 5.3 Habitats Regulations Assessment Screening Matrices (Version 3)) and consideration of this has been included in the Deadline 2 ornithology update		comments in advance of the offshore issues hearing on 22nd January.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			(ExA;As-1.D2.V1) and summarised in the notes provided for this SPA in the integrity matrices submitted at Deadline 1 (REP1-014, 5.3.6.1 - Norfolk Boreas Updated Habitats Regulations Assessment Integrity Matrices (Version 3).		
Q8.10.7	The Applicant	**Sea bird Assemblage** The Applicant to explain why it is unable to provide a submission of assessment of sea bird assemblage for FFC SPA as requested by RSPB [AS-030].	The seabird assemblage feature of the Flamborough and Filey Coast SPA comprises the named individual species (gannet, kittiwake, guillemot and razorbill) and five other species which are not named individually (herring gull, fulmar, shag, cormorant and puffin). Following advice from Natural England the Applicant has now included consideration of the potential for effects on the seabird assemblage feature in the updated assessment submitted at Deadline 2 (ExA;AS-1.D2.V1) and in the screening and integrity matrices submitted at Deadline 1 (REP1-012, 5.3.5.3 - Norfolk Boreas Updated Appendix 5.3 Habitats Regulations Assessment Screening Matrices (Version 3 and REP1-014, 5.3.6.1 - Norfolk Boreas Updated Habitats Regulations Assessment Integrity Matrices (Version 3)).		The RSPB welcomes provision of the seabird assemblage assessment reported in the updated Offshore Ornithology Assessment (doc REP2-035) and will provide detailed comments in advance of the offshore issues hearing on 22nd January.

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
			The Applicant considers that there is no risk of an AEoI for the following reasons. 1) The species which are also features of the SPA in their own right (gannet, kittiwake, guillemot and razorbill) have been assessed in detail and the Applicant has concluded that there will be no AEoI for any species due to the project alone or in-combination with other plans and projects. 2) The other species in the assemblage feature are either considered to be at negligible risk of wind farm impacts (fulmar), have no likelihood of connectivity (herring gull, shag and cormorant), or were present in such low numbers (puffin) that there is no risk of an impact. On the basis of these considerations the Applicant has concluded that there will be no AEoI on the seabird assemblage feature due to the project alone or in-combination with other plans and projects.		
9. Landscape and Visual Effects					
9.5 Outline Landscape and Ecological Management Strategy (OLEMS)					

Question number	Question addressed to	ExA question	Applicant response	NE response	RSPB further comments
Q9.5.9	The Applicant, Natural England, The RSPB	**Removal of Vegetation** The Project Description [APP-218, para 417] proposes hedge and tree netting because hedge and tree removal is seasonal and removal ahead of the main works provides flexibility to account for seasonal restrictions and mitigates potential programme delays. 1. Netting is not mentioned in the OLEMS or the OCoCP. Does that mean it is not proposed to use netting? 2. What is Natural England's and the RSPB's view of the use of netting?	1. The option to use netting is retained by the Applicant, but only as a last resort if hedgerow removal outside of the bird nesting season is not a viable option. As set out in the Outline Landscape and Ecological Management Strategy (REP1-020) [section 9.2.3.1], vegetation which provides suitable habitat for nesting birds is intended to be removed as close to the start of construction as possible, but outside the bird nesting season (March – August inclusive). If hedgerows cannot be removed during this period, then the Applicant would consider the use of netting of trees in advance of the forthcoming breeding season. In these circumstances, the Applicant would follow the RSPB's advice on the use of netting on trees, bushes and hedgerows to prevent nesting birds (https://www.rspb.org.uk/our-work/rspb-news/news/stories/use-ofnetting/#m3SB71xJFBOizt8E.99).	**Large scale netting** [APP-218, para 417] It is for the Applicant to establish working practices that ensure no offence is committed under the Wildlife and Countryside Act 1981. There are no details provided on the specifics or scale of netting proposed and so it is difficult to comment. However, generally netting may come with its own welfare issues and difficulties including regular maintenance to ensure holes to do not occur and breeding birds enter and/or become entangled. It may be more effective to ensure breeding birds are not disrupted to remove vegetation in the appropriate season and then reinstate to an equal or better state to ensure no net loss of habitat and preferably net gain. Should the Applicant wish to proceed with netting we would be happy to provide comment on a more detailed proposal.	The RSPB welcomes the statement that any netting would be implemented as a last resort. If netting is to be used then it must be demonstrated that its use has been minimised and all alternative options have been eliminated.

APPENDIX 1: RSPB note on precaution submitted during Norfolk Vanguard examination

Re: Application by Norfolk Vanguard Limited for an Order Granting Development Consent for the Norfolk Vanguard Offshore Wind Farm

RSPB response to the Applicant's Deadline 8 submission 'Precaution in ornithological assessment for offshore wind farms'
Submitted at Deadline 9: 6th June 2019

Introduction

This note is a response to the submission by the Applicant to Deadline 8 of Document Reference: ExA; AS; 10.D8.8. In that document the Applicant has argued why they think the current approach to assessment of offshore wind farm developments is overly precautionary. Many of the arguments presented to support that position are unjustified and in this note the RSPB will demonstrate why the approach taken is not overly precautionary, rather is a measured and reasonable response to the considerable uncertainty inherent in the assessment procedure.

The precautionary principle

The precautionary principle exists for situations where scientific data does not exist or is incomplete and therefore it is not possible to complete a full evaluation of the possible risks a plan, project or activity may cause to the environment, including possible danger to humans, animal or plant health, or to the environment in general. The European Commission's Precautionary Principle guidance[4] states that it should apply when a phenomenon, product or process may have a dangerous effect, identified by a scientific and objective evaluation, if this evaluation does not allow the risk to be determined with sufficient certainty. As such the degree of precaution applied to an evaluation, or assessment, can be seen to be directly proportional to the extent of scientific uncertainty inherent in that assessment. As the guidance goes on to recommend, "The implementation of an approach based on the precautionary principle should start with a scientific evaluation, as complete as possible, and where possible, identifying at each stage the degree of scientific uncertainty."

Uncertainty

As there can be "almost as many definitions of uncertainty as there are treatments of the subject"[5], following Masden *et al* (2015), here we define it as a lack of knowledge, or incomplete information about a particular subject. Masden *et al.,* identified a hierarchy of uncertainty in offshore wind farm assessment. This included not only the uncertainty arising from scientific knowledge, as argued by the Applicant, but uncertainty arising more strategically from the process of assessment itself such as uncertainty within language and decision-making. Included within this process uncertainty can be considered anything that increases the difficulty in reaching firm and robust conclusions such as revisions in modelling approaches, late submissions, overly complicated language and unsupported arguments put forward as evidence. As such, the approach taken by the Applicant throughout the examination, and as evidenced below, is one of increasing uncertainty rather than reducing it. As the degree of precaution is proportional to the degree of uncertainty, such an approach increases the

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52000DC0001&from=EN

[5] Argote, L. (1982). Input Uncertainty and Organizational Coordination in Hospital Emergency Units. *Administrative Science Quarterly, 27*(3), 420-434. doi:10.2307/2392320

need for precaution in the assessment, and unfortunately in our view, the Applicant's Deadline 8 precaution submission, further increases this uncertainty. The reasons are described below.

Density and Abundance

Following Masden *et al.,* (2015) Natural England request that an indication of uncertainty is given around estimates of abundance – a request that the RSPB strongly supports. This means that although there may be insufficient scientific knowledge for an estimate to be made with full confidence, as uncertainty is inherent in all scientific research, providing an indication of the extent of this uncertainty provides a measure of confidence that greatly assists any decision making. This point is made by Millner-Gullard & Shea, (2017) as follows: "In order to manage uncertainty it must first be acknowledged and identified".

However, the Applicant argues in section 2.1 of its Deadline 8 precaution submission, that the 95% confidence intervals requested by Natural England to give the indication of uncertainty, are inappropriate as they are influenced by only one year's data and use of the mean is more appropriate. This misinterprets the advice given by Natural England, which is that the means are used in the overall assessment, but confidence intervals also need to be presented to allow *consideration* of the variability (and therefore the uncertainty) in the underlying annual population estimates. This ensures confidence in any conclusions can be expressed, but does not affect the actual conclusions, which should of course be based on the means (or other measure of central tendency). This is an entirely appropriate method and not in any way over precautionary. Not to express this uncertainty, as the Applicant seems to advocate, would not be consistent with European Commission Guidance on the Precautionary Principle - by not identifying and highlighting uncertainty the need for precaution could therefore increase.

Collision Risk Modelling

This same argument is used by the Applicant in section 2.2 to say that the assessment is over-precautionary in terms of collision risk modelling as Natural England have requested the 95% confidence intervals to be presented. Again, these are only used, quite correctly, to inform the confidence around the assessment, by giving a necessary indication of uncertainty. This is made clear in the conclusions given by Natural England at Deadline 3, as follows:

> "From Table 1 below, we note that all the central CRM predictions equate to less than 1% baseline mortality of largest BDMPS for all species. This is also the case for the upper 95% confidence intervals of the bird density for all species except great black-backed gull (GBBG), where the predicted CRM figures of 410 equates to 2.43% of baseline mortality of the largest BDMPS for all turbines in Vanguard East and 0.94% of baseline mortality of the biogeographic population. Therefore, based on these figures we conclude that the collision risk from Vanguard alone would have no significant impact at the EIA scale for all species, although this conclusion can only be made with low confidence regarding impacts on GBBG at Vanguard East."

As such we support Natural England's approach, and argue that by following their advice in quantifying and expressing uncertainty, confidence in the assessment would be increased, leading to a reduction in the need for precaution. Therefore, their recommended approach is not in any way over-precautionary.

The Applicant further argues that the use of their own stochastic version of the collision risk model would have reduced uncertainty. However, by relying on a model version that is untested, without peer-review, or the opportunity for review by either Natural England or the RSPB, the Applicant

effectively *reduces* confidence in its outputs, thereby *increasing* uncertainty and consequently the need for precaution.

Headroom (Cumulative Impacts)

For section 2.3, the Applicant relies on a report commissioned by the Crown Estate. This report, which was not designed for use in an assessment, was flawed for a number of reasons, given below: The approach taken in the report is 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 available environmental capacity – as they see it. 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 make the decision as to whether predicted impacts of any future proposals are acceptable.

The report is limited as it does not take account of potential impacts from displacement and emerging concerns regarding barrier effects of migratory birds that are largely unexplored, but which are becoming increasingly important due to the scale of development that has and is planned to be deployed.

The report assumes that predicted impacts of consented development were acceptable and still are acceptable and are using the consented impacts as thresholds. They should not be used for this purpose. Assessment methodologies and improvements in understanding of seabird ecology are developing all the time whilst new marine areas are being identified as important and the need for their protection recognised. This new knowledge and understanding is not accommodated within the report. For instance, there is no clarity on the accuracy of the underlying baseline data sets, uncertainties within the modelling and expression of confidence intervals for the outputs of those models.

Perhaps most importantly, a number of assumptions are stated throughout the report in a discursive manner, the majority or all stating that existing methodologies of assessment are precautionary and that impacts are likely to be smaller (which is not always demonstrated to be true, for example Bowgen and Cook, (2018), and Wischnewski *et al.,* (2018). There also exist considerable inaccuracies throughout the report that we could comment on separately. Taking these two points together there exists the risk of raising expectations amongst the intended audience in the absence of any evidence and which could be unfounded. This report simply emphasises the point that adequate monitoring is required to provide an evidence base to inform future assessment and consideration of cumulative/in-combination impacts.

Therefore, the RSPB do not agree that this report should be used as part of the consideration of this application.

The Applicant also suggests that the criticisms made under section 2.2 of its Deadline 8 precaution submission, regarding the use of confidence intervals in collision risk modelling are also applicable for in-combination assessments. None of the assessments in the list of in-combination projects used the upper confidence limits for conclusions of mortality and so this has no bearing on the precautionary nature, or lack of, in the in-combination assessment. Again, by presenting information

in a confusing and contradictory manner, the Applicant is increasing the uncertainty around the assessment and thereby increasing the need for precaution.

Displacement

In Section 2.4 of its Deadline 8 precaution submission, on displacement, the Applicant repeats their assertion that 95% confidence limits are used to reach conclusions of displacement impact by Natural England, despite, quite correctly, their use being restricted to expressing confidence in the conclusions reached by using the central measure or mean. Again, we support Natural England's approach, and argue that by quantifying and expressing uncertainty it increases confidence and therefore reduces the need for precaution. As such the approach is not in any way over-precautionary.

In paragraph 24 of this section the Applicant claims there is "very little evidence" that displacement extends over distances as large as 2-4km, the buffer size recommended by Natural England. However, while there is a large amount of variation in the displacement distances reported in the literature, displacement has been recorded up to 12km[6] from a wind farm. As such the Applicant's comments are entirely misleading. The use of such misleading comments has the effect of increasing the uncertainty within the assessment process.

The Applicant further argues, correctly, that displacement rates are based on evidence from studies carried out at older wind farms and that these had smaller, more closely spaced turbines. However, the argument is then made, without evidence, that displacement will be reduced with modern turbine design, where the turbines are spaced further apart and are considerably larger. Notwithstanding the lack of evidence for this assertion it intuitively seems very unlikely that larger turbines will cause less displacement. It would be more far more likely that greater displacement would arise. Again, the use of these speculative and counter-intuitive arguments has the effect of increasing the uncertainty within the assessment process.

Seasonality

In section 2.5. the Applicant details their perception of precaution in the definition of seasonality. In support the Applicant cites Furness (2015) a report commissioned with the specific aim to "review and define species-specific non-breeding season seabird populations maximum ranges". As part of the report, seasons were defined where there was spatial overlap between breeding and migrating birds. As such it is clear by definition that these periods include breeding birds. However, the Applicant argues that this is not the case for Norfolk Vanguard for several reasons including that the maximum foraging ranges presented by Thaxter *et al*. (2012) represent unusual situations that could not be sustained as typical values by breeding seabirds. This is not the case as these foraging ranges are derived from small samples of birds for constricted periods of time, and as the amount of data from tracking studies increases, carried out with more individuals, more colonies and over greater periods of time, the distances recorded are likely to increase, as has been shown to be the case with kittiwake[7].

[6] Mendel, B., Schwemmer, P., Peschko, V., Müller, S., Schwemmer, H., Mercker, M., & Garthe, S. (2019). Operational offshore wind farms and associated ship traffic cause profound changes in distribution patterns of Loons (Gavia spp.). *Journal of environmental management*, *231*, 429-438.

[7] Wischnewski, S., Fox, D.S., McCluskie, A. and Wright, L.J. 2018. Seabird tracking at the Flamborough & Filey Coast: assessing the impacts of offshore wind turbines. Pilot study 2017 Fieldwork report & recommendations. RSPB, Sandy.

The Applicant further argues that the density of breeding adults declines rapidly with distance offshore from colonies and is likely to be extremely low beyond 100km. It is not true that density simply decreases with distance from colony. While there will be an area of high density around the colony, there will be foraging hotspots, associated with prey density and other factors. As kittiwake have been recorded foraging 324 km from breeding colonies the entirely arbitrary 100 km figure is unsupported.

It is concluded by the Applicant that the assumption that all birds present in March, April and August are breeding birds makes a large difference to the assessment but has little support from the available evidence. While it is true that there is little evidence that *all* birds present are breeding, there is evidence that some are breeders, as implicit in the definition of these periods by Furness (2015) as periods of overlap (between breeding and migration). The Applicant's alternative approach, of excluding all these birds as non-breeders, is equally unsupported by evidence as all birds being breeders. It is such situations, where there is a lack of evidence, that the precautionary principal must be applied, and in this circumstance the precautionary approach is the approach advocated by Natural England.

Density dependence

The RSPB agree with the Applicant that there is strong evidence for density dependence acting on the kittiwake population of the UK, and that the mechanisms remain unknown. We further agree with Furness *et al.* (2013) who recommended the use of density independent PVA outputs, saying "In such circumstances the most robust approach is to avoid the temptation to include density dependence, since it is often based on the premise that 'it must be operating therefore it must be included', even if the mechanism is unknown". Since the publication of Furness *et al.* (2013), there has been no new evidence describing density dependence with sufficient accuracy to include in models. Indeed, almost all the references cited by the Applicant in support of the use of density independent models predates the publication of Furness *et al.* (2013).

In addition to Furness *et al.* (2013), more recent guidance is available. The Joint Nature Conservation Committee commissioned a review which recommend the use of density independent PVA (Cook and Robinson 2016), and a Marine Science Scotland commissioned review also recommended the same approach (Jitlal *et al*., 2017). In the JNCC review, Cook and Robinson (2016) also highlighted that using a density independent model is not necessarily the most precautionary approach.

As such, the RSPB support the position of Natural England with regard to the use of the density independent model and disagree with the Applicant that this is an overly precautionary approach. It is not the most precautionary approach, rather it is the most scientifically robust.

Conclusion

In presenting a review of precaution in assessment of offshore wind farms the Applicant, rather than reducing uncertainty has instead increased it. This is because the approaches taken, and information submitted have misrepresented the position of Natural England, advocated the use of a model version that is untested, un-peer-reviewed nor been subject to any scrutiny, relied on partial, incomplete or flawed evidence and set itself against guidance derived from the consensus of the Statutory Nature Conservation Bodies and the scientific community (as well as the European Commission). As such, it increases the need for precaution in the assessment and does not alter the view of the RSPB with regard to the potential for adverse effects on the integrity of protected sites

and their species as a result of predicted mortality from this project in-combination with other plans and projects.