THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK BOREAS OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010087

Deadline 7

Natural England's response to Applicants comments on Deadline 4 submissions

March 31st 2020

Our Ref:NE.NB.D7.O3.Applicants D4 Response

Contents

1 Introduction

Please find below Natural England's comments on the following documents as submitted at Deadline 5:

Applicant's Comments on Deadline 4 Submissions and Additional Submissions (ExA.ASR.D5.V1). [REP5-051].

We have not provided comment in relation Natural England's Updated Ornithology Advice (provided prior to ISH4) REP4-039, as this has been superseded by REP4 040.

2 Detailed Comments

2.1 Natural England's Updated Benthic Ecology Advice REP4-038

	Summary of Submission	Applicant's Comments	Natural England's Comments
DCO Document 8.11 Outline Offshore Operation and Maintenance Plan			
2.2	*Page 10* Why in the Table (Appendix 1) is 'cable burial with surface protection' – no marine licence required included and then the next row is 'placement of cable protection in new areas' - yes marine licence required. This is confused as surely the first one is replacement of cable protection installed during installation? Please can the Applicant clarify.	Appendix 1 of the Norfolk Boreas OOOMP has been drafted to accord with the Norfolk Vanguard OOOMP. This is especially relevant to any licensed activity within the HHW SAC as both projects would be installing cables within the site. The Applicant does however acknowledge that the three rows to which Natural England refer do overlap. Accordingly, the Applicant has removed the line with the words "using surface protection" from the updated OOOMP submitted at Deadline 5 [document 8.11].	Natural England thanks the Applicant for amending the table to aid clarity
2.4	*Section 1.1, Page 4* Please note that monitoring is for residual impacts to ensure that they are not significantly affecting the environment, and that the predictions/assessment conclusions are correct. Monitoring will need to demonstrate this and any hypothesis of the HRA.	The Applicant agrees that monitoring should be for residual impacts and this is discussed further in section 3 of the IPMP.	See comment on the IPMP

2.5	*Section 9, Page 5* What happens if NVG is under construction and impacts upon NB pre construction surveys and vice versa in terms of NVG monitoring requirements?	The only part of the offshore project area where Norfolk Boreas surveys have a realistic potential to overlap with Norfolk Vanguard construction surveys would be within the offshore cable corridor and within the project interconnector search area, should the final design include a project interconnector. In order not to damage already installed cables there is a requirement for Norfolk Boreas cables to be located up to 250m from the Norfolk Vanguard cables [Plate 5.2 REP1-033]. Norfolk Boreas have committed to undertake a survey of the area within which it is proposed that seabed works will be carried out. In the unlikely event that the survey for Norfolk Boreas would need to be undertaken at the same time as export cable installation works for Norfolk Vanguard, the surveys would focus on different geographical areas. Furthermore, It would be in the interests of Norfolk Boreas Limited to ensure that its survey timelines are developed in such a way as to maximise the use of data and experience gathered by Norfolk Vanguard as well as ensuring that the surveys would not interfere with Norfolk Vanguard's construction. The following text has been added to the updated IPMP submitted at Deadline 5 to state: Norfolk Boreas Limited will endeavour to develop its survey timelines in such a way as to maximise the use of data and experience gathered by Norfolk Vanguard.	The Applicant's response hasn't really addressed the point in relation to monitoring and ensuring that if necessary a BACI style survey design can be used. What happens if it is found the NVG data can't be used and NB data is required?

2.6	*Section 35, Page 15* Natural England would like clarity from the Applicant as to what they see the benefits being of undertaking an Annex I reef survey in 2020. Our understanding is that the survey results will not feed into the Boreas examination. And whilst we always welcome more survey data in this situation we envision there being two likely outcomes; a) Applicant demonstrates reef is there and Natural England advice doesn't change or b) Applicant demonstrates there isn't any reef currently present and Natural England advice doesn't change as the fisheries byelaw/management measures to ensure recovery hasn't started being implemented yet. Moreover, in relation to outcome b we advise there is a risk that 2 years' post 2020 a similar survey could have very different results. Outside of the byelaw areas the data could start to help form a core reef approach, but again more than one additional dataset would be required to fully implement that. Therefore we wish to highlight this to the Applicant in order to inform their decision making process.	The survey has been designed to provide the Applicant and Norfolk Vanguard with a reliable baseline to underpin the core reef approach and to allow initial cable routeing design to avoid areas of *S.spinulosa* reef . This data would then be supplemented by the Norfolk Vanguard pre-construction surveys and then the Norfolk Boreas pre-construction surveys. The Applicant understands that two fisheries management areas have been proposed which overlap with the cable corridor and that this may result in a change to the extent and location of *S.spinulosa* reef. The first area to be implemented is likely to be the EIFCA byelaw area which is expected to come into effect sometime in the Autumn of 2020 [REP2-069]. This would only occupy approximately 1.5% of the section of the offshore cable corridor within the SAC. Whilst *S.spinulosa* reef could increase within this protected area as a result of less fishing activity, this change will not affect the remaining 98.5% of the offshore cable corridor. Furthermore, the proposed bylaw does not stretch across the entire width of the offshore cable corridor, therefore even if the change results in recovery of Annex I *S.spinulosa* reef, ould not occur across the entire width of the offshore cable corridor in that particular location. The Applicant's clarification note submitted at Deadline 4 [REP4-022] demonstrates that in this scenario, sufficient space would remain within the offshore cable corridor at this location to install the Norfolk Boreas and Norfolk Vanguard export cables. The Applicant is also aware of a fisheries management area which has been proposed by Defra to restrict fishing activity across a much larger section of the SAC. Given the joint recommendation requirements to implement this restriction, there is however little prospect that it will be implemented in advance of the anticipated offshore construction date for Norfolk Boreas, especially given the uncertainty on how fisheries closures will be progressed following Brexit. Furthermore,, there is no guarantee that the restriction proposed by Defra will lead to recovery of Annex 1 S.spinulosa reef. The Vessel Monitoring System (VMS) data used in the Joint recommendation for the restriction showed that there has been very little fishing within the majority of the Norfolk Boreas offshore cable corridor and therefore the restrictions will not result in a significant change in fishing pressure.. This is applicable to both the Defra recommended restriction and the EIFCA proposed byelaw. For further discussion on this please see section 3.1.1 of the Applicant's position paper on the HHW SAC [ExA.AS-6.D5.V1]). There is also recent research which has found S.spinulosa reef in areas that experience	Natural England thanks the Applicant for the clarification and has no further comment at this time

		high levels of fishing pressure; Van de Reijden (2019), published a paper on the Discovery of Sabellaria spinulosa reefs in an intensively fished area of the Dutch Continental Shelf, North Sea. It is however recognised that, should the fisheries management area be implemented prior to Norfolk Boreas construction, further survey work will be required to establish to what extent (if any) the S.spinulosa reef has recovered as a result of the fishing restrictions. This would be completed as part of the Norfolk Vanguard and Norfolk Boreas Pre-construction surveys.	

2.7	*Table 4.2 The IPMP only seems to focus on construction and not on Operations and Management (O&M). The requirement for Annex I reef surveys for O&M activities seems to have fallen between the cracks. Monitoring of Annex 1 reefs for O&M will be required in the form of Geophysical data and ground truthing using drop down video, completed 18 months – 2 years prior to the works taking place. For anything other than this justification will be required*	Three surveys will inform understanding prior to commencement of any works, being the proposed *S.spinulosa* reef surveys in 2020, the Norfolk Vanguard pre construction surveys likely to be undertaken in 2023-2024 and the Norfolk Boreas preconstruction surveys (likely to be undertaken in 2024 -2025). The scope of each survey would be agreed with Natural England and the MMO. The IPMP (REP1-029) commits the Applicant to undertake surveys to monitor known areas of S.spinulosa reef at "a frequency to be agreed with the MMO (e.g.3 years non-consecutive e.g. 1, 3 and 6 years or 1, 5 and 10 years). If evidence of recovery is available and agreed with the MMO, monitoring will cease. Surveys specifically targeting those reefs identified in the baseline survey will be undertaken as a check on their condition using the same methodology set out for pre-construction monitoring to be agreed with the MMO". Therefore the Applicant considers that monitoring during the operation period has been considered with the possibility of three or more surveys over a period of ten or more years post construction.	Natural England does not believe that this is sufficient to address potential impacts to Annex I reef over the life time of the project from proposed works Therefore this remains in disagreement
DCO Document 8.20 Outline Norfolk Boreas Haisborough Hammond and Winterton Special Area of Conservation Site Integrity Plan			
2.1	*Section 56, Section 4.2.1* An Annex I reef survey is planned for 2020, it would be good to know how this relates to the construction time table.	An indicative construction programme is provided in Table 5.26 of the ES [APP-218]. Based on this the 2020 survey would take place four years prior to pre-construction activity taking place and five years prior to the main construction activity commencing.	Natural England thanks the Applicant for the clarification and has no further comment at this time
2.1	*Section 77, Page 25* Natural England notes the Applicant refers to temporary disturbance if Annex I reef cannot be avoided. This is something that Natural England has advised against in our RR [099], and our advice remains unchanged.	The Applicant understands this advice, however as requested by Natural England, the Applicant has had to account for a scenario where the entire cable route contains *S.spinulosa* reef, at which point temporary impact would be necessary over a relatively small (in terms of the extent that *S.spinulosa* reef would have to have increased to create this situation) area.	Natural England advice remains unchanged

2.2	*Section 127, Page 37* The proposals are not mitigation, but best practice and doesn't remove cable protection requirement.	The Applicant agrees this is not additional mitigation which removes the need for cable protection. However the Applicant considers that these commitments do reduce the risk of impacts on the SAC.	Area of uncommon ground.
2.2	*Appendix 3 of SIP - likely Cable protection locations* Whilst this document gives more confidence that areas of reef will be avoided, we remain concerned that protection is still being proposed within the site.	The Applicant has now made the commitment to avoid cable protection in the areas which Natural England have identified as priority areas [RR-099].	This does not address Natural England's concerns about the wider SAC.

2.2 Natural England Updated Ornithology Advice REP4-040

Summary of Submission	Applicant's Comments	Natural England's Comments
General		
Precaution in assessments	Natural England provided a response on the Applicant's concerns regarding the over-precaution in the ornithology assessment in REP4-039 which included the same information as presented in REP4-040. The Applicant has responded to these comments in Table 1.1.1 . In addition to the comments in REP4-039 addressed above, in REP4-040 Natural England suggests that because the collision estimates obtained using Option 1 of the Band collision risk model (CRM) are higher than those obtained using Option 2 this supports the degree of precaution Natural England applies in ornithology assessment. However, the Applicant does not consider it appropriate to consider the Option 1 estimates in this manner due to the concerns raised by the aerial survey contractor about the reliability of their own methods. Furthermore, for these reasons it was agreed with Natural England during the Evidence Plan Process tha t the Applicant's assessment would be based on Option 2 (Project document ref: PB5640-004-025). Therefore, the Applicant considers Natural England's reference to the Option 1 estimates is inappropriate and that these should not be used as supporting evidence for the high levels of precaution proposed by Natural England.	We note that our response did not mean that because the Option 1 collision estimates are higher than the Option 2 values using generic flight height data, this supports the degree of precaution. Our representation was simply noting that if the site-specific flight height data are in fact more reflective of the behaviour of birds using the Norfolk Boreas site than the generic flight height data, then the collision predictions based on Option 2 may lack sufficient precaution.
Cumulative / in-	The Applicant welcomes that Natural England has confirmed that, with the following exceptions, the cumulative assessment has been conducted as	As noted in our previous representations, the non-material change application for Dogger Bank Creyke Beck does not change the consented

combination assessments	requested in RR-099. The Applicant notes Natural England's position with regard to the inclusion of projects which have not yet been determined and for which Natural England has outstanding concerns regarding the figures presented (Hornsea Project Three and Hornsea Project Four). For these reasons the Applicant has provided cumulative and in-combination assessments with and without these projects. Natural England has also requested that the Applicant reverts to the consented collision mortality estimates for the Dogger Bank Creyke Beck wind farm, in place of those submitted in that project's non-material change application. The updated cumulative and in-combination collision assessment to be submitted at Deadline 6 will include this revision.	worst case scenario for collisions from this windfarm. We therefore welcome that Applicant's commitment to include this revision in the updated cumulative and in-combination collision assessments that they will submit at D6. Natural England will provide comment on these updated assessments for D7.
Population Viability Analysis (PVA)	The Applicant welcomes the fact that Natural England has given consideration to the PVA results as presented at Deadline 2 (REP2-035), and also acknowledges Natural England's request that the PVA results be updated following a planned update to the Natural England PVA tool. Natural England informed the Applicant that the updates to this tool have been further delayed and these will not be available within the project's timeframe for examination. However, Natural England has also advised the Applicant that their own internal comparison of the original and updated PVA outputs has confirmed that the results are not materially altered and therefore the outputs in REP2-035 are robust for assessment.	Please note that Natural England has not confirmed that the updated PVA tool would definitely not be available within the Boreas examination timeframe. Since our D5 response to ExA Q2.2.2.1 [REP5-077], we have advised the Applicant (in an email dated 03/03/2020) that version 2 of the PVA Tool has been uploaded. A link to the new version was sent to the Applicant. We noted that the guidance documents etc. had also been updated and were available from the links sent to the Applicant. We recommend that the models are re-run using version 2 of the tool in instances where the current models are not e set-up and parameterised in the way we have advised (i.e. sufficient simulations etc.) in our Deadline 4 response [REP4-040]. We also advised the Applicant that there is a bug in version 2 which is affecting the annualised growth rates presented in the full table of outputs – however this is only an issue for the year prior to the impact being added. The bug doesn't affect any of the other metrics – it is just affecting the way the table presents values for the run of years prior to when an impact is added. Furthermore, if the tool is run with respect to a baseline population it doesn't affect the table outputs for this. Finally, it is noted that when the model is run with an impact, it doesn't affect the annualised growth rate calculations in the full table of outputs for the period when the impact is applied.

EIA		
EIA Impacts of Norfolk Boreas – overall	The Applicant welcomes Natural England's agreement that the project alone will have no significant adverse impacts on any species (with the exception of red-throated diver for which Natural England has been unable to rule out a significant adverse effect. This is discussed in more detail under the project alone displacement, below). Nonetheless, the Applicant has continued to explore options for reducing impacts through design mitigations, with a commitment to an increase in draught height (to a minimum of 30m from Mean high Water Springs (MHWS) for wind turbines of 14.7MW and above and t o a minimum of 35m from MHWS for wind turbines of up to 14.6MW) and removal of turbine models of less than 11.55MW from the design envelope. The updated collision assessment for these changes has been submitted at Deadline 5 (ExA.AS-8.D5.V2). These mitigations reduce collision estimates by up to 74% compared with the values in the original application (APP-226).	Natural England welcomes the further mitigation from the Applicant and the updated CRM to account for this mitigation submitted by the Applicant at D5. Natural England will provide comment on this updated CRM for D7.
EIA impacts of Norfolk Boreas alone – collision risk	The Applicant welcomes Natural England's agreement with the Applicant that the project alone will have no significant adverse impacts on any species due to collisions, and notes that further reductions in predicted collision risk have been submitted at Deadline 5 (ExA.AS-8.D5.V2).	Natural England has provided comment for D7 (Ref NE.NB.D7.08 CRM).
EIA impacts of Norfolk Boreas alone – displaceme	The Applicant welcomes Natural England's agreement with the Applicant that the project alone will have no significant adverse impacts on gannet, guillemot and razorbill due to displacement. However, Natural England considers that a significant impact cannot be ruled out for red-throated diver. The Applicant disagrees with Natural England's conclusion as it has been reached through a combination of assumptions in the assessment which the Applicant has provided following Natural England advice, but	As has been previously noted in our Relevant Representations for the Norfolk Boreas project [RR-099], definitive mortality rates for seabirds (including RTDs) are unknown and therefore we advise a range of figures for mortality rates of between 1% and 10% are considered for red-throated diver (RTD) assessments. The joint SNCB interim displacement advice note (SNCBs 2017) acknowledges that summing seasonal impacts to give an annual prediction could result in birds being assessed

nt risk	which are considered over-precautionary, as discussed in detail in REP2-035 (paragraphs 132 to 136) and the strict application of Natural England's preferred displacement and mortality rates. The Applicant considers that Natural England has not given due consideration to other factors which combine to indicate that for this assessment the application of a 10% mortality rate is highly precautionary and not appropriate. In summary, the annual (non-breeding) displacement total is the sum of the seasonal totals for autumn, winter and spring, of which the spring contribution is over 77%. The spring density estimate used in the assessment was strongly influenced by a late March survey (see REP2-035 for details) which is in the middle of the peak period of migration. During this period a large number of this species passes through the region and currently individuals are likely to be present for relatively short periods. Consequently the application of a 10% mortality rate to birds likely to be present for no more than two to three weeks at most (and even that duration is likely to be an over-estimate) is highly precautionary. At 10% mortality the predicted spring mortality due to displacement is 80, while at the Applicant's evidence based (precautionary) rate of 1% it is 8. The threshold for a 1% increase in the background mortality of the smaller Biologically Defined Minimum Population Scale (BDMPS) is 30 individuals. Therefore even if the mortality rate was as high as 3.75% this would still not result in a detectable effect on this BDMPS population while for the larger biogeographic population a mortality of less than 61 individuals (obtained with a 7.8% mortality rate) wold be undetectable. Thus, even with still precautionary assumptions on displacement mortality (of up to 3.75 and 7.8% for the BDMPS and biogeographic populations respectively) the effect would be undetectable against background variations. Thus, the Applicant does not agree with Natural England's conclusion and considers that a significant impact due to displacement from the project alone can be ruled out.	in more than one season, and thus 'double counted'. However, the precautionary approach is required in the absence of empirical information on seasonal turnover on development sites. The Applicant argues that summing the seasonal predicted displacement impacts for autumn, winter and spring for RTD is precautionary, because the same birds could be affected in more than one season. If there is a high degree of turnover of individual birds, as suggested here for RTD passing through the Boreas site on spring migration (in late March), Natural England agrees that it is probably unrealistic to assume that 10% of the RTDs at this time would be likely to die as a result of displacement mortality, given they are likely to be present at the site for a short time period. The spring contribution to the overall number of RTDs at risk of displacement annually from Norfolk Boreas is over 77%. The annual number of RTDs predicted to die as a result of displacement from the Norfolk Boreas array footprint only exceeds 1% of baseline mortality of the largest Biologically Defined Minimum Population Scale (BDMPS) when the displacement rate is 100% and the mortality rate is at 4% and above. For the biogeographic population, the annual number of RTDs predicted to die as a result of displacement from the Norfolk Boreas array footprint only exceeds 1% of baseline mortality when the displacement rate is 100% and the mortality rate is at 8% and above. Therefore, considering these outputs in the context of the specific timings of RTD peak abundance on the Norfolk Boreas site, we would now agree with the Applicant that a significant adverse impact can be ruled out for operational displacement of RTD from Norfolk Boreas alone.

EIA impacts of Norfolk Boreas alone – displacement and collision risk combined (gannet)	The Applicant welcomes Natural England's agreement with the Applicant that the project alone will have no significant adverse impact on gannets due to collisions and displacement combined (and that this combined assessment introduces precaution into what the Applicant considers to already be a highly precautionary assessment). The Applicant also notes that further reductions in the predicted collision risk component of this potential impact have been submitted at Deadline 5 (ExA.AS-8.D5.V2).	As noted in our Deadline 4 response [REP4-040], in summing the predicted mortalities that arise via collision and displacement these two mechanisms, there is a risk of some degree of double counting as a bird that collides with a turbine and dies cannot be displaced and a bird that dies as a result of displacement cannot collide with the turbine. Thus, it is acknowledged that this simplistic approach will therefore incorporate a degree of precaution. The level of precaution is difficult to gauge, but will be highest when the number of birds recorded flying at turbine height (and therefore the predicted number of collisions) is greatest (SNCBs 2017). However, as noted in our Deadline 4 responses [REP4-039 and REP4-040], Natural England does not consider that the overall assessment is highly precautionary in terms of displacement rates, mortality rates, avoidance rates etc. and the use of a range of predicted impacts.
EIA Impacts of Norfolk Boreas cumulatively - overall	The Applicant welcomes that Natural England has agreed that cumulative impacts can be ruled out for displacement of gannets and collisions of lesser black-backed gull, herring gull and little gull (when the uncertainty regarding impact levels for Hornsea Project Three and Hornsea Project Four are omitted). However, the Applicant does not agree with Natural England's conclusions for the remaining impacts, as detailed in the rows below. In addition, Natural England has highlighted that little gull collision figures for East Anglia ONE North and East Anglia TWO need to be included. These will be added to the little gull cumulative assessment to be submitted at Deadline 6.	Natural England welcomes the commitment from the Applicant to include the little gull collision figures for EA1N and EA2 in the updated cumulative collision assessments to be submitted at D6. We will provide comment on these assessments for D7.

EIA impacts of Norfolk Boreas cumulatively – collision risk	**Gannet** The Applicant considers that the approach Natural England has taken in reaching a conclusion that a significant cumulative impact cannot be ruled out due to collisions is overly precautionary. The PVA prediction (REP2-035) was that the population growth rate could be reduced by up to 0.8%. To provide a measure of what this level of reduction could mean for the population the Applicant has compared it to the recent growth rate of the population (2-3%), on the basis that this is the most robust current indication of the status of the population to use. On this basis the Applicant concluded that the cumulative impact would not have a significant impact on the population. Natural England disagrees with this conclusion on the basis that the population may not continue to grow at this rate. While this is undeniable, it remains the case that the best predictor of the future (and indeed the basis of all models designed to predict the future such as PVA) is the past, and more specifically the recent past. Thus the Applicant considers that Natural England is applying an approach to the interpretation of the PVA outputs which can never be countered (i.e. that the future is unknowable and could be worse than the model prediction) and fails to take account of the fact that the most reliable predictor of the future is the recent past. **Kittiwake** The Applicant considers that the approach Natural England has taken in reaching a conclusion that a significant cumulative impact cannot be ruled out due to collisions is overly precautionary and also fails to acknowledge the counterfactual aspect of the analysis. The PVA prediction (REP2-035) was that the population growth rate could be reduced by up to 0.6%. Natural England has considered this against the approximate 40% decline in European kittiwake populations over the last 39 years and reached a conclusion that this magnitude of decline in growth rate is therefore significant. However, the observed kittiwake population declines are not due to wind farm collision mortality. The annual decline (to achieve a 40% reduction over 39 years) is approximately 2.3% per year, which is almost four times the maximum predicted decline for the smaller biologically	Gannet: Natural England's position regarding the uncertainty of future population trends is not a hypothetical one. The environment of the North Sea is likely to be significantly modified by anthropogenic impacts in the coming decades, most notably warming of sea temperatures due to climate change and the associated shifts in gannet prey distribution and availability, and the expected delivery of fisheries management changes such as the ending of 'discarding' practices, gannet being known to take advantage of discarded fish. These factors have significant potential to affect gannet productivity and therefore the potential for population growth. In this context, and given the uncertainty around the level of cumulative collisions and their influence on the population, Natural England considers it entirely reasonable to assert that the UK gannet population may not continue to grow at current rates. Kittiwake: Natural England is not suggesting that wind farm collisions are driving the kittiwake population declines currently being recorded. Our conclusions relate to the additional impact of cumulative collisions of windfarms in the context of a population already experiencing significant stresses. The likely changes to the North Sea environment described for gannet are also highly relevant for kittiwake, which as a surface-feeder may be more likely to be affected by climatic changes and changes to discards due to their inability to penetrate the water column as far as diving seabirds. It is worth noting that kittiwake is a Red-listed Bird of Conservation Concern (BoCC4, Eaton et al. 2015) as a result of severe population declines in the UK. Great black-backed gull (GBBG): At a UK level the GBBG is an Amber listed bird of conservation concern (BoCC4, Eaton et al. 2015) due to moderate declines in both the breeding and non-breeding populations. Any additional mortality from the wind farms should be considered in the context of and in addition to that population decline.

	defined minimum population scale (BDMPS) and over 20 times that for the biogeographic population scale (growth rate reduction of 0.11%), and the latter is arguably the more appropriate comparison at the European scale. Thus, while it is not disagreed that kittiwake populations are in decline, the potential maximum contribution to this is relatively small and in this context the Applicant was able to conclude the cumulative impact of wind farm collisions was not significant. Furthermore, while in the case of gannet Natural England disputed a suggestion the population may continue to grow at the recent rate, the same could equally be argued of kittiwake, that the recent trend may not be maintained and population growth cannot be ruled out. **Great black-backed gull** The Applicant presented predictions that the cumulative great black-backed gull collisions could result in population growth rate reductions of up to 1.4% for the BDMPS population or 0.55% for the biogeographic population. Against a backdrop of relative stability in this population (REP2-035) the Applicant considered these reductions would be so small they would have an undetectable effect on the population and therefore no significant impact would result. While Natural England has stated that the predicted effects have the potential to give rise to significant effects, the Applicant considers that very little evidence has been presented in support of this position in REP4- 040 and therefore the Applicant considers that no significant effect remains a robust conclusion.	
EIA impacts of Norfolk Boreas cumulatively – displacement risk Red-	The Applicant welcomes Natural England's agreement that Norfolk Boreas' contribution to the cumulative displacement of red-throated diver is small at 0.1%, although the Applicant would suggest that in fact the project's contribution is extremely small. Furthermore, the Applicant disagrees with Natural England's conclusion (of a significant impact) for the following reasons. The like-for-like assessment of this impact (REP2-035) has demonstrated that 84% of the total impact is due to operational wind farms. During the period these wind farms have been installed,	RTD: Natural England notes that the apparent increases in RTD numbers may well be linked to changes in survey platform, i.e. from aerial visual to aerial digital surveys, as has been the case for the Outer Thames Estuary SPA surveys, which the figures the Applicant refers to are for. We know there is an underestimate from visual aerial methods, linked to disturbance of this sensitive species. It is also likely that at high RTD densities, detection rates are higher for digital aerial surveys than from aerial visual surveys.

throated diver	surveys of the region for this species have reported that the population has trebled in size from around 6,000 individuals to over 18,000. The Applicant considers that these highlight there is a large degree of over-precaution in Natural England's approach to this assessment, since impacts of the magnitude suggested (100% displacement and 10% mortality) would appear to be incompatible with a population which has grown considerably in spite of such effects apparently occurring. Thus the Applicant considers that there will be no significant cumulative displacement impact for red- throated diver. Guillemot and Razorbill The Applicant welcomes Natural England's agreement that most wind farms in the cumulative assessment are located in regions of lower importance to auks and that as a consequence mortality of displaced birds will be at the lower end of the 1%-10% range that is advised. The Applicant considers that Natural England's position is therefore not that different from its own. Furthermore, the Applicant has presented evidence in support of the rates used in the assessment (50% displaced and 1% mortality) which also explained why these retain precaution (REP2-035). Consequently the Applicant does not agree with Natural England that there will be a significant cumulative displacement effect for these species, since the evidence based assessment indicates much lower impact magnitudes.	As there is no preconstruction baseline corrected for the underestimates of visual aerial surveys, it is not possible to say whether there has been an increase in RTD numbers. However, we certainly know there is displacement of RTDs from offshore wind farms as the digital aerial surveys of the Outer Thames Estuary SPA demonstrate gaps in RTD distribution where offshore wind farms are located. Auks: We note that whilst Natural England may have indicated that mortality of displaced auks is likely to be at the lower end of the 1-10% range that is advised, this does not mean agreement that 50% displacement and 1% mortality is the appropriate impact level to consider. We again note that evidence for levels of auk displacement is variable and likely to be site and state specific, and accordingly we advise that a range of displacement rates are considered. We also note that empirical evidence regarding the energetic consequences of displacement for seabirds and wintering waterbirds using the marine environment are very limited, and the role of overwinter survival on seabird population dynamics is poorly understood. Therefore as there is very little information available about the consequences of displacement for individuals, there is actually no evidence to suggest that 10% is precautionary. Furthermore, we 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. For cumulative displacement of razorbills and of guillemots, for all projects excluding Hornsea 3 and Hornsea 4, the predicted mortality exceeds 1% of baseline mortality for the largest BDMPS at between 40% and 50% displacement at 2% mortality (and between 30-40% displacement and 2% mortality when Hornsea 3 and Hornsea 4 are included in the cumulative totals). Therefore, we have advised that a significant adverse impact cannot be ruled out for displacement of both auk species for cumulative displacement.

EIA impacts of Norfolk Boreas cumulatively – displacement and collision risk combined (gannet)	The same arguments made above in relation to gannet cumulative collision risk apply to this aspect of the assessment since displacement makes a very small contribution to the total.	See comments on gannet above.
HRA		
HRA Impacts of Norfolk Boreas – overall	The Applicant welcomes Natural England's agreement with the Applicant that the project alone will have no adverse effects on the integrity (AEoI) of any Special Protection Area (SPA) populations (noting that includes the Applicant's commitment to mitigation with respect to red-throated diver disturbance during cable installation and resulting from vessels involved in the project's operation and maintenance). Nonetheless, the Applicant has continued to explore options for reducing impacts through design mitigations, with an increase in draught height of at least 8m (from 22 m to 30m above MHWS for wind turbines of 14.7MW and above and of at least 13m for wind turbines of up to 14.6MW) and removal of turbine models of less than 11.55MW from the design envelope. The updated collision assessment for these changes has been submitted at Deadline 5 (ExA.AS-8.D5.V2). In addition the Applicant welcomes Natural England's agreement that the project, in-combination with other plans and projects (when Hornsea Project Three and Hornsea Project Four are excluded), will not result in any AEoI for SPA populations, with the exception of kittiwake from the Flamborough and Filey Coast SPA and lesser black-backed gull from the	Natural England welcomes the mitigation considered by the Applicant in their D5 submission and we have provided detailed comment in our Deadline 7 submission (NE.NB.D7.08 CRM). With regard to the in-combination assessments and total figures including Hornsea 3 and Hornsea 4, we note that Natural England's advice throughout the Hornsea 3 Examination regarding offshore ornithology issues was that insufficient baseline survey data had been collected in order to allow Natural England to make conclusions regarding the impacts of the proposal on a number of qualifying features of seabird SPAs. Without the ability to advise on, and therefore rule out, adverse effects on integrity (AEOI) from the project alone, it inevitably followed that we would also be unable to advise on, or rule out, AEOI, when considered in-combination with other plans and projects. In contrast, sufficient offshore ornithology baseline survey information had been collected by the Norfolk Boreas Applicant to allow us to draw conclusions regarding the impacts of the project alone on the relevant SPAs. It is therefore also possible to properly consider the extent of in-combination impacts with other plans or projects. However, this has

	Alde-Ore Estuary SPA. These are discussed in more detail below. With respect to Natural England's conclusions where AEoI can be ruled out without Hornsea Project Three and Hornsea Project Four, but cannot be ruled out with these wind farms included (gannet, razorbill, guillemot and assemblage from Flamborough and Filey Coast SPA and little gull from the Greater Wash SPA), the Applicant notes that Natural England state these relate to their 'significant concerns' regarding the data used in the assessment of Hornsea Project Three and the preliminary nature of the figures for Hornsea Project Four. Thus, Natural England's conclusions appear to relate to the uncertainty that is introduced when these projects are included rather than to the actual in-combination impact magnitudes as presented. It was for this reason that the Applicant has presented in-combination impacts with and without the Hornsea wind farms and as advised by Natural England.	proved problematic when trying to incorporate the impacts of Hornsea 3 into this assessment, given the significant lack of confidence in the baseline data collected (this was also the case for the Norfolk Vanguard project). In addition, the best currently available figures for Hornsea 4 are those from the PEIR for this project. These figures and the methodologies to produce them are hence subject to ongoing discussions through the evidence plan process and therefore have an element of uncertainty associated with them and a likelihood of being subject to change. For example, the CRM figures presented in the Hornsea 4 PEIR were undertaken using the stochastic CRM, and therefore are potentially affected by the issues that have been noted with this model. We therefore welcome that the Applicant has presented in-combination assessments that both include and exclude Hornsea 3 and Hornsea 4. These have clarified that for some SPA qualifying features, it is possible to rule out an AEOI in-combination when Hornsea 3 and Hornsea 4 are excluded from the assessment. However, as there is uncertainty in the figures included in the in-combination assessment totals for Hornsea 3 and Hornsea 4, it follows that there will be uncertainty in the assessment totals presented when these two projects are included. Therefore it inevitably follows that we would also be unable to advise on, or rule out, AEOI, based on the actual in-combination impact magnitudes as presented when Hornsea 3 and Hornsea 4 are included in the totals.

Flamborough and Filey Coast SPA – Kittiwake	The Applicant disagrees with the basis for Natural England's conclusions on the potential that in- combination collisions would have an AEoI because this fails to take into account the reduced mortality for built wind farms compared with the consented designs and the Applicant also considers that the conservation objective for this population has been derived from erroneous data (as discussed in REP2-035). Thus, while Natural England considers that that target is a population of 80,000 pairs, there is robust evidence that the population has never been that large and that this is almost certainly unachievable. When this is taken into account, and the revised target is to maintain the population around its current size (i.e. between 40,000 and 50,000 pairs) it can be seen that the Applicant's PVA predictions would permit such an outcome, even including the sources of precaution inherent in the assessment.	With regard to as built wind farms and consented designs and the potential for reduced predicted cumulative/in-combination collision mortality, as has been previously stated, Natural England acknowledges that this is an important issue with regard to cumulative/in-combination collision risk modelling (CRM) predictions and assessments. However, there are significant issues associated with adjusting the collision predictions for projects included in the cumulative/in-combination assessments, as set out in our Deadline 6 response [REP6-049] to the Applicant's REP4-014. Therefore, as discussed during ISH 4 and set out in REP4-043 and REP6-049, Natural England has been raising the issue of whether as built or consented projects should be considered for in-combination effects with The Crown Estate, and we note the need for a strategic approach to this issue. If conducted simply on a project-by-project basis this has significant risks of inconsistency of approach across applications. Therefore, we consider that this issue needs to be addressed strategically on behalf of the whole sector, including developing consensus on an approach. However we do recognise that this is not possible in the timescale for the Norfolk Boreas examination. Conservation objective: As noted in our Deadline 4 response [REP4-040] Natural England notes that the topic of the 1987 estimate has been discussed in detail previously during the Hornsea 2 Examination in our Deadline 4 and Deadline 6 submissions for this examination. During the examination for Hornsea 2, JNCC and Natural England reviewed in detail the actual count forms from 1987 and as a result JNCC are happy for this count to be included in the Seabird Monitoring Programme (SMP) database as a legitimate count. Natural England has accepted this and this count has been used for all statistical analysis and reporting for the colony, and hence was used in setting the conservation objective target. The target for the 'breeding population: abundance' attribute for this species is to restore the population to 83,700 breeding pairs at this site and therefore the conservation objective for the SPA should be to restore the kittiwake population. It is this target that should be considered in the assessment when judging the significance of predicted impacts against the conservation objectives for this feature. For more information see

		Supplementary Advice on Conservation Objectives available from: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9006101&SiteName=flamb&SiteNameDisplay=Flamborough+and+Filey+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 . Please note that the draft conservation advice package has undergone a public 'invitation to comment' consultation.
Alde-Ore Estuary SPA – Lesser black-backed gull	The Applicant disagrees with Natural England's basis for concluding that the in-combination mortality of lesser black-backed gulls will result in an AEoI because this fails to take into account the reduced mortality for built wind farms compared with the consented designs and that the status of the gull population has been much more strongly influenced by changes in local farming practice and predation at the colony. Against this population context, the Applicant considers that the estimated (and precautionary) in-combination mortality will not result in an AEoI. In addition, the Applicant's contribution to the in-combination total has been further reduced by 64% following the project design revisions (with a revised worst case turbine of 14.7MW and minimum draught height of 30m from Mean High Water Springs). As a consequence the predicted collision mortality apportioned to the SPA population from Norfolk Boreas is now between 1.5 (Applicant's apportioning rate) and 2.1 (Natural England's apportioning rate), reduced from 4.3 and 6 respectively as estimated for the original project design. The revised collision estimates represent less than 4% of	Please see our comments on kittiwake above regarding as built wind farms and consented designs and the potential for reduced predicted cumulative/in-combination collision mortality. Whilst the gull population at the site may have been impacted by changes in local farming practice and predation at the colony, as the site population has seen significant declines and hence has a restore conservation objective, any additional mortality from the wind farms should be considered in addition to any existing impacts. We welcome the Applicant's design revisions and revised worst case scenario and increase to draught height. Natural England will respond to the updated CRM for these revisions submitted by the Applicant in REP5-059 at Deadline 7. We note that Natural England has already advised (at Norfolk Vanguard) that it was not possible to rule out an adverse effect on integrity on the Alde-Ore Estuary SPA from operational and consented projects due to the level of annual collision mortality predicted for LBBGs. There is the potential for the Norfolk Boreas proposal to make a

	the total in-combination estimate.	contribution to the overall collision mortality total. Whilst the Norfolk Boreas alone contribution to the total will have decreased following the design revisions compared to that at the point of submission, based on the figures presented here by the Applicant, the project still makes a relevant contribution (2 birds per annum) to the total based on the revised worst case scenario.
Greater Wash SPA and Outer Thames Estuary SPA – Red-throated diver	The Applicant welcomes Natural England's agreement that AEoI can be ruled out for red-throated diver displacement at the Greater Wash SPA and Outer Thames Estuary SPA as a result of the mitigation that the Applicant has agreed to put in place (restrictions on both cable installation and the movement of vessels involved in operation and maintenance through the Greater Wash SPA), as secured in the DCO: · Generation DMLs beneath the Project Environmental Monitoring Plan (PEMP) - Condition 14(1)(d)(vi) of Schedule 9 and 10 which reads as follows: *(vi) procedures to be adopted within vessels transit corridors to minimise disturbance to red-throated diver during operation and maintenance activities.* · Transmission DMLs at Condition 19 of Schedule 11 and 12, as follows: *Restriction on cable installation construction works* *19. 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.*	We welcome the Applicant's commitment to securing this mitigation in the DCO.