

Natural England's key to RAG status	RAG Status
<p><b>Purple</b> Note for Examiners and/or competent authority. May relate to DCO/DML</p>	
<p><b>Red</b> Natural England considers that unless these issues are resolved it will have to advise that (in relation to any one of them, and as appropriate) it is not possible to ascertain that the project will not affect the integrity of an SAC/SPA and/or comply fully with the Environmental Impact Assessment requirements and/or avoid significant adverse effect on landscape/seascape, unless the following are satisfactorily provided:</p> <ul style="list-style-type: none"> <li>new baseline data;</li> <li>significant design changes; and/or</li> <li>significant mitigation;</li> </ul> <p>Natural England feels that issues given Red status are so complex, or require the provision of so much outstanding information, that they are unlikely to be resolved during examination, and respectfully suggests that they be addressed beforehand.</p>	
<p><b>Amber</b> Natural England considers that if these issues are not addressed or resolved by the end of examination then they would become a Red risk as set out above. Likely to relate to fundamental issues with assessment or methodology which could be rectified; preferably before examination.</p>	
<p><b>Yellow</b> These are issues/comments where Natural England doesn't agree with the Applicant's position or approach. We would flag these at the PEI stage with the view that they would be addressed in the Application. But otherwise we are satisfied for <u>this particular project</u> that it will not make a material difference to our advice or the outcome of the decision-making process. However, it should be noted that this may not be the case for other projects. Therefore it should be noted by interested parties that just because these issues/comments are not raised as part of our Relevant Representations in this instance it should not be understood or inferred that in other cases or circumstances Natural England will take this approach. Furthermore, these may become issues should further evidence be presented.</p>	
<p><b>Green</b> Natural England supports the Applicant's approach.</p>	



Issue Number	NE's Relevant Representation RR-099	RAG Status Rel Rep	Actions, progression	RAG Status D1	Actions, progression	RAG Status D2	Actions, progression	RAG Status D3	Actions, progression	RAG Status D4	Actions, progression	RAG Status D5	Actions, progression	RAG Status D6	Actions, progression	RAG Status D7	Actions, progression	RAG Status D8	Actions, progression	RAG Status D9	Issue Resolved
<b>Offshore Ornithology</b>																					
	Summary of NE's key concerns: <ul style="list-style-type: none"> <li>Breeding season apportionment of impacts for kittiwake and lesser black-backed gull in Habitats Regulations Assessment (HRA);</li> <li>Calculation of gannet colony baseline mortality in HRA;</li> <li>Consideration of range of predicted impacts due to variability (uncertainty) in EIA and HRA assessments;</li> <li>Assessment of displacement impacts;</li> <li>Collision risk modelling (CRM) and input parameters;</li> <li>Cumulative and in-combination assessments (displacement and CRM);</li> <li>Additive impacts (collision plus displacement for gannet);</li> <li>Population modelling (Environmental Impact Assessment, EIA and HRA);</li> <li>Scale of predicted cumulative and in-combination impacts and requirement for mitigation.</li> <li>Post-construction monitoring.</li> </ul>		Applicant has submitted an Offshore Ornithology Update 07.11.2019. NE to provide comment by 28.11.2019. Applicant to submit to ExA at suitable D i.e. 2 or 3.		Applicant to submit Updated Ornithology Assessment at D2		Applicant submitted Updated Ornithology Assessment at D2		Applicant submitted Updated Ornithology Assessment at D2		NE responded for D4		NE will provide comments on approach to as built vs consented turbine numbers and headroom in cumulative /in-combination collision assessments [REP4-014] for D6 to ensure consistency with Vanguard.								NE provided response to CRM, kittiwake flight speed and Geadroom Position Paper. Response to derogations will be provided for D9.
<b>Breeding season apportionment of kittiwake at Flamborough &amp; Filey Coast (FFC) SPA and lesser black-backed gull at the Alde-Ore Estuary SPA</b>																					
1	It is not currently possible to ascertain no AEIOI to FFC SPA or Alde-Ore Estuary SPA. NE does not consider the apportionment of 26.1% of kittiwakes to the FFC SPA to be appropriate. We advise that information should be presented on the age classes of the kittiwakes recorded in the Boreas baseline surveys to inform the apportioning. We also recommend that a range of apportionment rates for the breeding season are considered when assessing the likely impacts of the proposal on kittiwake at the FFC SPA and LBBGs at the Alde-Ore Estuary, which for the former could potentially be up to 100%.																				Yes
<b>Calculation of gannet colony baseline mortality in HRA</b>																					
2	We advise that the assessment of displacement of gannets at the FFC SPA is conducted using baseline mortality calculations using the adult colony figure and adult mortality rate.																				Yes
<b>Consideration of the range of impacts to account for uncertainty/variability in input data</b>																					
3	NE requires that the variability (uncertainty) in the underlying population estimates (i.e. through consideration of appropriately calculated upper and lower confidence intervals) is considered in the displacement assessments. This has not been considered by the Applicant in the impact assessments for construction or operational displacement for Boreas alone at EIA, or for the assessment of gannet displacement for the FFC SPA for Boreas alone, with only the mean peak seasonal abundances considered. Neither has the Applicant given consideration to the range of collision impacts, in order to account for variability/uncertainty in the input parameters in the assessments of lesser black-backed gull (LBBG) at the Alde-Ore Estuary SPA and little gull at the Greater Wash SPA. These also require consideration.																				Yes
<b>Assessment of displacement impacts</b>																					
4	<p>It is not currently possible to ascertain no adverse effect for RTD in Greater Wash SPA or that the EIA information is insufficient to allow a full understanding of the position.</p> <p>Red-throated diver (RTD) displacement assessments for EIA and HRA The Applicant states that: 'NE have advised that an unconfirmed 10% mortality rate should be used for birds displaced by cable laying vessels' and that for displacement of RTDs from the array that 'NE's preferred method assumes 100% of birds will be displaced and mortality of displaced birds will be 10%'. This is not an accurate reflection of our advice. Definitive mortality rates for seabirds, including RTDs, are unknown due to a lack of empirical data. Therefore, NE advise that a range of figures for mortality rates of between 1% and 10% are considered for RTD displacement assessments.</p> <p>NE disagrees that the RTD evidence review in MacArthur Green (2019a) indicates that the SNCB recommended buffer distance is highly precautionary for divers. We do not consider that assuming a magnitude of 100% out to 4km is over- precautionary – further details regarding the evidence and justification for this are set out in Appendix 1.</p> <p>In relation to the HRA, for the installation of the offshore export cable through the Greater Wash SPA, the predicted impacts both alone and in-combination for the upper rates of the NE advised range (i.e. 100% displacement and 10% mortality) are not insignificant and may result in an adverse effect on the integrity of the designated site. The assessments should also not only consider any potential mortality as a result of displacement but also effects on the distribution of RTD. We suggest that Boreas consider mitigation options for RTD disturbance from offshore cable route laying, such as avoiding or reducing cable laying activities during the non-breeding season/period of peak RTD numbers.</p>																			Yes	
5	Auk (razorbill and guillemot) displacement assessments for EIA and HRA The Applicant states that: 'NE has advised that an unconfirmed 10% mortality rate should be used for auks displaced from wind farms'. This is not an accurate reflection of our advice. We note that definitive mortality rates associated with displacement for seabirds, including auks are not known. We therefore continue to advise consideration of a range of mortality rates are used in EIA and HRA assessments. Whilst NE agrees that the mortality for auks is likely to be at the low end of the range, we do not agree that using 1% mortality with 50% displacement can be considered precautionary. Therefore, our recommendation remains that a range of mortality rates of 1-10% and displacement rates of 30-70% should be considered, with 70% displacement and 10% mortality as the worst case across the site plus 2km buffer for assessment of impacts alone and cumulatively/in-combination. Further details regarding the evidence and justification for this are set out in Appendix 1.																				Yes
<b>Collision risk modelling (CRM) and input parameters</b>																					
6	<p>It is not currently possible to ascertain no adverse effect for collision risk for features of the Alde Ores Estuary SPA, FFC SPA or Greater Wash SPA, and the EIA information is insufficient to allow a full understanding of the position.</p> <p>NE welcomes that the Applicant has considered the uncertainty/variability in the CRM parameters by using the Band (2012) model and presenting multiple tables of the outputs using the variations in the various parameters (bird density, avoidance rate, flight height distribution and nocturnal activity factor). However, we note that this does not allow the uncertainty/variability in the various input parameters to be fully integrated and therefore, we recommend that if the Applicant undertakes any further collision risk modelling that this is undertaken using the Marine Scotland Science (MSS) stochastic collision risk model (sCRM) and that the log file produced by the sCRM is also included. Given that the full uncertainty/variability cannot be fully integrated, we 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 is the variation of bird density.</p> <p>With regard to nocturnal activity factors (NAFs), we currently do not have any agreed 'empirically derived' nocturnal activity factors that can be used with the Band model. Therefore, NE advises that collision risk outputs covering a range of nocturnal activity factors are considered to account for the uncertainty/variability – further details regarding our advised rates are set out in the attached Annex.</p> <p>The assessments do not consider the CRM predictions from the Band Option 1 outputs, only those for Option 2. We note that from Annex 3 of Appendix 13.1 that of the key species at risk of collision, gannet and kittiwake have over 100 records for both the Boreas site and the site+4km buffer, whilst there are over 100 records of great black-backed gull (GBBG) in flight for the site+4km buffer. The proportions at collision height (%PCHs) for these species from the site-specific data are higher than those from the generic data and the resulting CRM predictions for Boreas alone at the EIA scale are considerably higher than those from Option 2 (e.g. 203 kittiwake collisions from Option 2 compared to 1,138 from Option 1 for the central input values). Whilst we acknowledge the contractors concerns over the aerial survey data flight height figures, we recommend that the Applicant takes a more narrative approach to the assessment, and considers the Option 1 outputs for the above species in the context of the relevant Option 2 figures for the 95% confidence intervals (CIs) of the density data, as part of a more range-based approach to consideration of CRM impacts.</p>																			Yes	
<b>Cumulative and in-combination assessments (displacement and CRM)</b>																					
7	It is not currently possible to ascertain no AEIOI on features of the Alde-Ore SPA, FFC SPA, and Greater Wash SPA. The EIA information is insufficient to allow a full understanding of the position with regards:																				



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	Gannet (displacement + collision combined)																				Following Applicant's updated cumulative assessments at D2, D6 and D8, NE is unable to rule out a significant adverse impact on gannet from cumulative collision plus displacement impacts excluding or including Hornsea 3 and 4
	Red-throated diver (displacement)																				Following Applicant's updated cumulative assessment at D2, NE is unable to rule out a significant adverse impact on red-throated diver from cumulative displacement impacts excluding or including Hornsea 3 and 4
	Kittiwake (collision)																				Following Applicant's updated cumulative assessment at D2, D6 and D8, NE is unable to rule out a significant adverse impact on kittiwake from cumulative collision impacts excluding or including Hornsea 3 and 4
	Lesser black-backed gull (collision)																				Following Applicant's updated cumulative assessment at D2, D6 and D8, NE is able to rule out a significant adverse impact on lesser black-backed gull from cumulative collision impacts when Hornsea 3 and 4 are excluded. However, due to the significant uncertainty regarding the figures for Hornsea 3 and the inevitable uncertainty with the figures for Hornsea 4 (as from PEIR) we are not in a position to advise that a significant adverse impact can be ruled out for lesser black-backed gull cumulative collision when Hornsea 3 and 4 are included
	Herring gull (collision)																				Following Applicant's updated cumulative assessment at D2, D6 and D8, NE is able to rule out a significant adverse impact on herring gull from cumulative collision impacts when Hornsea 3 and 4 are excluded. However, due to the significant uncertainty regarding the figures for Hornsea 3 and the inevitable uncertainty with the figures for Hornsea 4 (as from PEIR) we are not in a position to advise that a significant adverse impact can be ruled out for herring gull cumulative collision when Hornsea 3 and 4 are included
	Great black-backed gull (collision)																				Following Applicant's updated cumulative assessment at D2, D6 and D8, NE is unable to rule out a significant adverse impact on great black-backed gull from cumulative collision impacts excluding or including Hornsea 3 and 4
	Little gull (collision)																				Following Applicant's updated cumulative assessment at D2, D6 and D8, NE is able to rule out a significant adverse impact on little gull from cumulative collision impacts excluding or including Hornsea 3 and 4
	Razorbill (displacement)																				Following Applicant's updated cumulative assessment at D2, NE is unable to rule out a significant adverse impact on razorbill from cumulative displacement impacts excluding or including Hornsea 3 and 4
	Guillemot (displacement)																				Following Applicant's updated cumulative assessment at D2, NE is unable to rule out a significant adverse impact on guillemot from cumulative displacement impacts excluding or including Hornsea 3 and 4
	NE is currently unable to reach any conclusions at present regarding cumulative and in-combination displacement and collision impacts (to features of Alde-Ore SPA, FFC SPA, and Greater Wash SPA) due to missing projects and incorrect figures for certain projects (e.g. Vanguard) in the assessments.																				Following Applicant's updated in-combination assessments at D2, D6 and D8, the missing projects in assessments and incorrect figures have been resolved. Following this, NE agrees no AEoI for: • FFC SPA: for gannet (in-combination displacement, collision and collision plus displacement); guillemot and razorbill (in-combination displacement); seabird assemblage (in-combination collision and displacement); when Hornsea 3 and Hornsea 4 are excluded. • Greater Wash SPA: for little gull (in-combination collision) excluding or including Hornsae 3 and 4); and red-throated diver (in-combination displacement) However, due to the significant uncertainty regarding the figures for Hornsea 3 and the inevitable uncertainty with the figures for Hornsea 4 (as from PEIR) we are not in a position to advise that AEoI can be ruled out for FFC SPA in-combination gannet (displacement, collision, and collision plus displacement), razorbill and guillemot (in-combination displacement) and seabird assemblage (in-combination displacement and collision) when Hornsea 3 and 4 are included. Following the Applicant's updated in-combination assessments, NE is unable to rule out an AEoI from in-combination collisions for: Alde-Ore Estuary SPA lesser black-backed gull excluding Hornsea 3 and 4 (no collisions apportioned from Hornsea 3 and 4). There will be an AEoI for FFC SPA kittiwakes including and excluding Hornsea 3 and 4.
	NE is currently unable to reach any conclusion at present regarding cumulative RTD displacement impacts (to Greater Wash SPA) due to an inappropriate approach having been taken by the Applicant. Further details regarding this and recommendation for a more appropriate approach can be found in Appendix 1. However, we note that at the end of the Vanguard examination NE concluded that a significant adverse impact could not be ruled out for Red Throated Diver cumulative displacement impacts – the Boreas project is adding more birds to this total.																				Approach resolved, but NE unable to rule out a significant adverse impact from cumulative RTD displacement
	<b>Additive impacts (collision plus displacement for gannet)</b>																				
8	NE considers the two impacts of collision and displacement as additive for gannet and advises that they should be summed. We welcome that the Applicant has undertaken this assessment for in-combination combined displacement plus collision for the FFC SPA. However, such an assessment should also be undertaken for Boreas alone for both EIA and HRA scales and also cumulatively at the EIA scale.																				Yes
	<b>Population modelling (EIA and HRA)</b>																				
9	Within the EIA there is insufficient information regarding gannet, kittiwake and GBBG. For HRA there is insufficient information with regards features of FFC SPA .																				In their D2 and D7 updated assessments the Applicant has updated the EIA scale PVAs for gannet, kittiwake and great black-backed gull using



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	NE does not consider that the Population Viability Analysis (PVA) models used for the EIA cumulative assessments (namely the SOSS gannet PVA and the EIA PVA models for kittiwake and GBBG) are adequate to inform the assessments for Norfolk Boreas. This is because these models have not: • Been run using a 'matched' pairs/runs approach as advised by NE; • Do not present outputs for the NE required metrics of counterfactuals of both population size and population growth rate; • Been run over 30 years (the lifespan of the Boreas project) – these models have been run over only 25 years. Further details regarding these issues can be found in Appendix 1. We recommend that these PVAs are updated by the Applicant to address these issues.																				the 'Seabird PVA tool' (and has also undertaken an EIA scale PVA for lesser black-backed gull). These models have been run using a matched pairs approach, have been run over 30 years and the output metrics of counterfactual of population size and counterfactual of growth rate have been presented. The kittiwake models were initially run using only 500 simulations.	
<b>Scale of predicted cumulative and in-combination impacts and requirement for mitigation</b>																						
10	At the end of the Vanguard examination NE concluded that a significant adverse impact could not be ruled out for gannet cumulative collision plus displacement impacts combined, kittiwake and great-black backed gull (GBBG) cumulative collision impacts, or razorbill and guillemot cumulative displacement impacts.																				Following the Applicant's updated cumulative assessments (submitted at D2, D6 and D8) NE have concluded that a significant adverse impact could not be ruled out for gannet cumulative collision and collision plus displacement impacts combined, kittiwake and great-black backed gull (GBBG) cumulative collision impacts, or razorbill and guillemot cumulative displacement impacts.	
	NE also concluded that an adverse effect on site integrity could not be ruled out for in-combination collision impacts to kittiwake and the seabird assemblage from the FFC SPA or to lesser black-backed gulls from the Alde-Ore Estuary SPA. This is as well as gannet, guillemot and razorbill when Hornsea 3 was included in the in-combination assessment due to the concerns about the incompleteness of the Hornsea 3 baseline data. We note that the Boreas project is adding more birds to these totals.																				NE have concluded there will be AEOI for in-combination collision impacts to kittiwake from the FFC SPA and cannot rule out AEOI for LBBG from the Alde-Ore Estuary SPA. This is as well as FFC SPA gannet, guillemot, razorbill and seabird assemblage when Hornsea 3 and Hornsea 4 are included in the in-combination assessment due to the concerns about the incompleteness of the Hornsea 3 baseline data and the inevitable uncertainty regarding the Hornsea 4 data (as from PEIR).	
	NE, therefore, recommends that the Applicant (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). This is in order to minimise their contribution to the cumulative/in-combination collision totals by as much as is possible. Further details can be found in Appendix 1.																					
<b>Post-construction monitoring</b>																						
11	NE does not agree with the HRA conclusions set out by the Applicant in the In Principle Monitoring Plan for offshore ornithology. We consider the aspects that are likely to be relevant for consideration for post-consent monitoring are: improving understanding of collision risk and displacement, collection of reliable data on																					
<b>Benthic</b>																						
	Summary of NE's key concerns: Adverse effect on the integrity of Haisborough Hammond Winterton (HHW) SAC Consideration of alternative cable routes Sandwave Levelling and evidence to support recovery Effectiveness of the proposed mitigation for Cable Installation Cable protection within designated sites Use of a Site Integrity Plan for benthic issues Favourable condition status of the reef features of the HHW SAC Colonisation of foundations / cable protection / scour protection may affect benthic ecology and biodiversity		Applicant to submit Clarification Notes at suitable Deadline		Applicant submitted number of Docs at D 1.							Ongoing Discussion. NE submitted updated benthic advice (REP4-038) and (REP4-041).		Ongoing discussion. Please see NE benthic responses for D5 for further detail.						NE provided response to HHW SAC position Paper		
<b>Adverse Effect on Integrity of the Haisborough, Hammond and Winterton SAC</b>																						
12	As part of the Vanguard Examination both the Applicant and NE have identified several impact pathways that could impact on the Annex I Sandbank and/or Reef features of the HHW SAC, when considered alone and cumulatively.																				Please see NE's D9 response.	
	NE has concerns in relation to the Applicant's use of data sets, the over-reliance on the evidence presented, and assessment of the impacts against the conservation objectives for the designated site, which has resulted in a disagreement between the Applicant and NE on the significance of these impacts.																				Please see NE's D9 response.	
	Therefore, NE is unable to agree with the conclusions within the Habitats Regulation Assessment for Boreas Offshore Windfarm (OWF) that there will be no adverse effect on the integrity of Haisborough Hammond and Winterton SAC Annex I sandbanks and reef features both alone and in-combination.																		Ongoing discussion		Please see D9 position statement.	
<b>Consideration of Alternative Cable Routes</b>																						
13	Whilst we welcome the engagement by the Applicant during the Evidence Plan Process when considering site selection and their commitment to avoiding the Cromer Shoal Chalk Beds MCZ, we still have outstanding concerns in relation to the cable route through HHW SAC. As our understanding of cable installation has developed over the last 10 years and especially so over the last 18 months we are aware that installation impacts are considerably greater than once thought. For example, the impacts from cable protection have the potential to persist and have been considered by the Applicant to be permanent habitat loss. Permanent loss of Annex 1 habitat from an SAC has a high likelihood of amounting to an adverse effect on the integrity of that SAC.																				Please see NE's D9 response.	
	Therefore, NE advises that where possible sites designated for habitat features should be avoided. Where avoidance is not possible impacts must be minimised to a level which allows the competent authority to be confident that there will be no adverse effect on the integrity of designated sites.																			Ongoing discussion		Please see NE's D9 response.



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	As set out below NE has concerns in relation to the ability to effectively implement some of the proposed mitigation measures i.e. microsite/route around Sabellaria spinulosa reef, and thus we believe that the conservation objectives for the site could be undermined. Therefore we do not currently agree with the conclusions of the HRA and believe that there is a risk of an adverse effect on site integrity. We will continue to work closely with the Applicant on this matter, and highlight that cable routes avoiding areas with known areas of designated sites and/or Annex I reef is the best guarantee of avoiding adverse effects.												NE notes the updated SIP. However as raised at ISH, Oral Rep, D5 submission, there are outstanding concerns.			Ongoing discussion					Please see NE's D9 response.
<b>Sandwave levelling and evidence supporting recovery</b>																					
14	It should be noted that we do not agree that you can separate out sandwaves from the form and function of Annex I sandbanks – they are the mobile part of the sandbank and therefore affecting sandwaves would be affecting the form and function of sandbanks.																				Please see NE's D9 response.
	Generally, NE is content with the sandwave levelling assessment that has been undertaken. We also welcome the commitment by the Applicant to ensure that the dredged material will be deposited within HHW SAC such that the sediment will remain within the sandbank system. We would wish areas of Annex I Sabellaria spinulosa reef to be avoided when depositing the sediment.												NE note the commitment to use a fall pipe, and not release sediment at the surface. If this is secured this may be considered resolved.								Please see NE's D9 response.
	NE acknowledges that the mobile nature of this particular sandbank system would make it more likely to recover from changes in structure than less mobile ones. But, there is no empirical data that relates to interventions of similar spatial and temporal scale to the proposals and for this particular sandbank system to support the modelling. Therefore, NE continues to have residual concerns in relation to the overall impacts to the form and function of the Annex I sandbank sandwave fields and their potential recoverability.																				Please see NE's D9 response.
	The main factors that are considered to influence the recovery potential (i.e. the mechanism and speed of recovery) of the levelled sandwaves are: The dimensions of the dredged area, particularly the width and depth of the dredged channel relative to the overall sandwave height, and the alignment of the dredged channel relative to the crest axis; and The degree of sediment mobility at the dredge location, which is in turn controlled by the environmental forcing conditions and water depth.																				Please see NE's D9 response.
	In addition, it is not clear in 'Appendix 5.3.7.1 sandwave levelling' as to how a single build vs phased build - and either option in-combination with Boreas - has been assessed against the conservation objectives for the site. That is, it remains unclear whether the impacts are better, worse or no different.																				Please see NE's D9 response.
	Therefore, due to the limited amount of supporting evidence and uncertainty in the cumulative/in-combination assessment we are currently unable to advise beyond reasonable scientific doubt that there will be no AEOI of HHW SAC Annex I sandbanks in-combination from sandwave levelling.																				Please see NE's D9 response.
<b>Effectiveness of proposed mitigation for Cable installation (incl. non-sandwave levelling ground preparation)</b>																					
15	NE agrees that where Annex I Sabellaria spinulosa reef can be successfully avoided, there is a reduced risk of adverse effects on the SAC from ground preparation and installation activities associated with the project. However, consideration also needs to be given to the conservation objective to restore the reef features of the SAC, and therefore efforts must be made to minimise impacts on areas that have the potential to support reef in the future - please see point below regarding restoration of the reef features.																				Please see NE's D9 response.
	In the above context, NE currently has significant doubt regarding the evidence presented to i) support the successful avoidance of reef and ii) the ability of reef to recover if impacted through cable installation.																				Please see NE's D9 response.
	a) <b>Mapping:</b> The maps presented in relation to extent of Sabellaria spinulosa reef are hard to interpret because no evidence is presented in relation to the ability to distinguish reef from surrounding substrata. Furthermore there are differences in extent of the surveys and timing of the surveys.																				Please see NE's D9 response.
	b) <b>Analysis:</b> Some complex analyses have been applied to the data, but it is not clear why the methods have been used and what advantage they have over standard methods. It would be helpful to understand what challenges or limitations each method is attempting to overcome, and why the method selected is preferred. In addition, the use of multiple methods on multiple datasets at once conflates the confidence issues surrounding ability to identify reef and changes in space and time. Therefore, if the intention of the consensus mapping is to deal with the variation in distribution over time then there are significant limitations with the way in which this has been approached.																				Please see NE's D9 response.
	c) <b>Survey timings:</b> Due to changes in the distribution of Sabellaria spinulosa over time as well as space, it should be recognised that there are limitations with the use of ground truth data collected several years apart from a geophysical dataset to determine the current location of reef. (This information will help inform probable areas of reef however.) Furthermore, due to the patchiness of reef unless the same data point for grabs and other surveys are utilised and collected on the same day there may be a discord between the two. Therefore, on the evidence presented, the SNCBs have reservations regarding any approach to categorically determine the likelihood of reef being present/absent in the future at a given part of the SAC.																				Please see NE's D9 response.
	d) <b>Restore Conservation objective:</b> Site management measures are being developed for other operations likely to damage the interest features of the site and will be implemented in the future. In the absence of those pressures there is a high likelihood that Sabellaria spinulosa reef will recover/develop. One such management measure that is being considered is the use of fisheries byelaws to protect areas where Sabellaria spinulosa reef have been shown to be regularly present. Therefore it is hoped that more extensive Sabellaria spinulosa reefs will be restored in these areas, and that existing encrusting and low quality reef will develop into higher quality reef habitat. NE would therefore advise that cable installation activities are avoided in these areas.																				Please see NE's D9 response.
	Given the above, the applicant's survey data and the recent CEFAS survey data, NE believes that there is a high probability that Sabellaria spinulosa reef could develop in a way that straddles the cable corridor route in the post-consent period. This would leave insufficient space to 'micro-route' around the reef feature. Therefore, whilst NE continues to advocate that the standard mitigation measure/marine licence condition to avoid reef features is included in the Projects DML, it may not be feasible to fully micro route the cables. To address this the Applicant has included the caveat 'where possible', but NE has concerns about the increased level of risk to the integrity of the site such a caveat would endorse, as there are no parameters to assess and agree what is "possible".												Area for ongoing discussion. Please see NE D5 submission.								Please see NE's D9 response.
	NE considers that a worst case scenario can be identified during the consenting phase. The Applicant proposes to use a Grampian condition to aid consenting and then a Site Integrity Plan to demonstrate no adverse effect on site integrity post consent/preconstruction. This is not helpful especially as based on best available evidence an adverse effect on site integrity cannot be ruled out at this time. The AA should be undertaken now, and on the best available evidence. The Applicant's proposals would push the regulatory duty from BEIS SoS (consenting) to MMO/DEFRA SoS (post consent). We advise that under The Conservation of Habitat and Species Regulations 2017 (as amended) this is addressed at the consenting phase. The DCO consenting process represents the best opportunity for the decision-maker to be presented with all relevant evidence and arguments and NE advise that all evidence is submitted as part of the application to allow the statutory authority to make an informed decision.												Area for ongoing discussion. Please see NE submission REP4-041 (D4) and D5 submission.								Please see NE's D9 response.



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	This advice differs from that provided to Vanguard as recent evidence, being generated in connection with Triton Knoll OWF, has now demonstrated that micro siting around Annex I reef within Inner Dowsing Race Bank and North Ridge SAC is not possible and therefore a risk based decision needs to be made as to whether or not the cable can be installed. Given that there is evidence to demonstrate that there is a higher probability for Vanguard/Boreas to have Annex I <i>Sabellaria spinulosa</i> reef within the cable corridor than at Triton Knoll we advise that an adverse effect, both now and post consent, can't be ruled out. Therefore we advise that alternatives and/or compensation is secured.												Area for ongoing discussion. Please see NE submission REP4-041 (D4) and D5 submission.								Please see NE's D9 response.
	In addition, the evidence presented in the HRA to support conclusions on recoverability relates only to individuals/abundance, but not to reef per se (being the Annex 1 habitat). Thus we have limited confidence in the ability of reef to recover from cable installation activities. Therefore, we further advocate that the standard mitigation measure of avoidance is adhered to.												Area for ongoing discussion. Please see NE submission REP4-041 (D4) and D5 submission.								Please see NE's D9 response.
	NE's consistent advice is that all qualities of reef (from low to high) are protected. Therefore, it is our view that targeting the impact on 'inferior' areas of reef to minimise the significance of the effect is not Habitat Regulations compliant.												Area for ongoing discussion. Please see NE submission REP4-041 (D4) and D5 submission.								Please see NE's D9 response.
	Furthermore whether reef is avoided or not during installation there does remain a risk during O&M cable remediation activities that reef could establish across the cable corridor. Accordingly, every effort should be made, with input from the MMO and NE, to minimise the impacts at the time of undertaking the works.																				Please see NE's D9 response.
<b>Cable protection within designated sites</b>																					
16	In general, NE strongly advises against the use of cable protection within designated sites as the addition of hard substrata is often incompatible with the conservation objectives for Annex I sandbanks and reef features. NE notes that there is a potential worst case scenario (WCS) of up to 8km of cable protection within Annex I habitats of the HHW SAC (although clarity around this figure is required). NE would advise that an AEOL can't be ruled out from the permanent habitat change as a result of the placement of artificial hard substrata within HHW SAC alone and/or in-combination.												NE welcome the commitment that cable protection within the fisheries byelaw areas has now be excluded by the Applicant. However the ability to micro site cables remains a concern.								Please see NE's D9 response.
<b>Use of a Site Integrity Plan for benthic issues</b>																					
17	The use of a Site Integrity Plan (SIP) for SAC benthic habitat features has only been used previously by Vanguard. We have reviewed our advice with the MMO in light of the Triton Knoll OWF case and we do not believe that SIPs are an appropriate means of avoiding adverse effect on site integrity for benthic issues where a worst case scenario can be determined. In addition they do not enable in-combination assessments with other plans and projects and may therefore restrict other development within the SAC. Therefore, NE does not support the use of this Grampian style condition within the Boreas DCO. Please note that unlike with the Southern North Sea SAC where the in-combination assessment is dependent on factors outside the control of the project and there are several options to mitigate the impacts, this is not the case for benthic SACs.												Ongoing Discussion. Please see NE D4 submission (REP4-041).			Ongoing discussion					Please see NE's D9 response.
<b>Favourable condition status of the reef features of the HHW SAC</b>																					
18	The HHW SAC features, Sandbanks which are slightly covered by sea water all the time and Reefs, are both in unfavourable condition .The HHW SAC is under pressure from historic and ongoing activities from proposed offshore windfarm cables plus existing oil and gas pipelines and associated pipeline protection.												Ongoing discussion, ISH, Oral Rep and D5 submission								Please see NE's D9 response.
	Cable installation in sandbank sites has been shown to be challenging due to impacts associated with cable installation such as sandwave clearance and use of hard substrate as cable protection. Cabling through this site may be possible if evidence is provided that impacts are short-lived and the feature will recover. Consideration would need to be given as to how sufficient cable burial is achieved without the need for cable protection. Should sandwave clearance be necessary to achieve burial depth and avoid the use of cable protection then, as above, it would need to be demonstrated that impacts are short-lived, the feature can recover, and that dredged material is retained in the system and can be deposited on material of the same grain size.												Ongoing discussion, ISH, Oral Rep and D5 submission								Please see NE's D9 response.
<b>Colonisation of foundations / cable protection / scour protection may affect benthic ecology and biodiversity</b>																					
19	We agree that potential beneficial effects may occur from introduction of hard substrate into a soft substrate system. However, within MPAs where the features of interest include soft mixed sediments, the establishment of any artificial hard reef on soft/mixed sediments must be considered against the conservation objectives to restore or maintain the features for which the site is designated. As such, any potential benefits from the introduction of hard substrate are outweighed in HHW SAC by the impact that the hard substrate will have on habitat change and the features of the site and the achievement of recovery.												NE note commitment not to use cable protection within fisheries byelaw areas, however concerns remain across the wider protected site.			Please see D7 submission.					Please see NE's D9 response.
	Furthermore, any suggestion that the loss of natural Annex I feature is being compensated for by the creation of new artificial reef brings in issues of compensation, and therefore Imperative Reasons of Overriding Public Interest and Article 6.4.															Please see D7 submission.					Please see NE's D9 response.



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<b>Operation and Maintenance Activities</b>																					
20	It is the view of NE that Operations and Maintenance activities should either be excluded from within this designated site (at the consenting stage with option to apply for a separate marine licence at a later date) or sufficiently restricted to ensure no adverse effect. This is because repeated O&M activities can result in continued disturbance which would prevent recovery of Annex I reef, as seen for Race Bank.	Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow	Please see NE's D9 response.
<b>Marine Mammals</b>																					
21	As per NE's advice on other recent NSIP applications, a mechanism needs to be developed by the regulators to ensure continuing adherence to the SNCB thresholds over time. Multiple SIPs will be developed, piling can take place over several years, and new projects can come online during this time. Should potential exceedance of the thresholds occur, a process for dealing with this issue needs to be in place – the affected developers / industries will need to work together with the regulator and SNCBs to prevent adverse effect on the Southern North Sea SAC. Until the mechanism by which the SIPs will be managed, monitored and reviewed is developed, NE are unable to advise that this approach is sufficient to address the in-combination impacts and therefore the risk of AEOL on the Southern North Sea SAC cannot be fully ruled out. This is not an issue unique to the project and work will need to be undertaken to reduce the noise levels of multiple wind farms potentially constructing at the same time.	Red		Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple	
<b>Onshore works</b>																					
	Summary of NE's Key concerns; Further information required regarding potential HDD effect to River Wensum SAC Inclusion of mitigation for Paston Great Barn SAC Consultation on Water Crossing Plans Inclusion of mitigation for impacts on Air Quality Impacts on Protected Species Inclusion of mitigation for impacts to Broadland SPA and Ramsar Post construction monitoring					Applicant Provided numbers of documents at D1.		Applicant Provided numbers of documents at D2.		NE Response at D3		Applicant to provided updated documents at suitable Deadlines as discussed in meeting 14.01.2020		NE reviewed Applicant D4 submissions.		NE commented on D5 and D6 submissions		No update for D8			
<b>Mitigation of impacts to Terrestrial Ecology</b>																					
22	Given the number of Horizontal Directional Drilling (HDD) drilling mud breakouts experienced recently during the construction of other wind farms a more thorough HDD methodology should be presented and the potential effects of a drilling break out on designated sites and species assessed as part of the ES.	Red		Red		Red		Green	Resolved												Yes
23	Broadland SPA and Ramsar are currently scoped-out, These sites were scoped-in for Vanguard and mitigation agreed and incorporated within the Outline Landscape and Environmental Management Strategy (OLEMS). NE advises that these sites are scoped-in and the same mitigation commitments incorporated within the Boreas OLEMS. Without mitigation it is not possible to rule out an adverse effect on the integrity of these sites.	Yellow		Yellow		Yellow		Green	Resolved												Yes
24	Mitigation agreed during the Vanguard examination, as detailed within the Code of Construction Practice (CoCP) and OLEMS should be incorporated into the Boreas OWF DCO documents at the earliest opportunity. For example mitigation agreed as part of the Vanguard Examination process for Broadland SPA/Ramsar has not been incorporated into Boreas Documents as yet. Without appropriate mitigation as agreed there may be an adverse effect in the integrity of designated sites and species. Commitments to mitigation and post construction monitoring for bats should be included in the OLEMS. Additionally, it is not currently clear where the commitment to provide site specific water crossing plans in consultation with NE is incorporated in the DCO.	Yellow		Yellow		Yellow		Green	Resolved												Yes
25	There is currently only limited onshore post construction survey or monitoring proposed to ensure protected habitats and species have been successfully reinstated post construction. Within the OLEMS post construction monitoring is currently only proposed for water voles and newts. NE advise that a commitment to monitoring is also included for other designated habitats and species which will be effected, such as hedgerows used by bats, grasslands, ponds, cereal field margins etc.	Yellow		Yellow		Yellow		Green	Resolved												Yes
26	There is currently no inclusion of net gain within the proposed project design. We recommend the Applicant incorporate net gain into their design at the earliest opportunity and produce a net gain DCO document. This is required in order to demonstrate how the development will contribute to net gain and contribute a biodiversity legacy to the Norfolk environment.	Yellow		Yellow		Yellow		Purple	Note for ExA												NE continue to recommend Net Gain
<b>More detail required on the mitigation in relation to HDD</b>																					
27	We consider that there is insufficient information to enable us to conclude that the designated site will be safeguarded from impact from HDD during construction. There is insufficient detail in the CoCP for measures to safeguard the designated site in relation HDD drilling mud 'breakout' (where the drilling fluid leaves the bore and escapes into the surrounding substrate). This comment relates to crossings of all water dependant designated sites including River Wensum SAC, Norfolk Valley Fens SAC, The Broads SAC and SSSI sites downstream.	Yellow		Yellow		Yellow		Yellow	Welcome submission of documents suggest including reference to gaining SSSI consent for operations.				As set out in our response to ExA Ques 2.2.1.1 suggest wording is amended.								NE note updates to OCOCP at D8, and consider this resolved
<b>The need for a mitigation plan for Paston Great Barn SAC</b>																					
28	We advise that, as a requirement of the development, that prior to removal of hedgerows, a mitigation plan should be drawn up and agreed with NE. The plan should include for the improvement of the hedgerows either side of the section to be removed including any gapping up, tree management and the development of scrub/rough grassland margins. The mitigation plan should be in place for 7 years or until the original hedgerow has recovered fully. There should also be a commitment to monitoring to establish that hedgerows identified as of medium to high importance have been re-established to the same or higher quality.	Yellow		Yellow		Yellow		Yellow	Welcome inclusion of mitigation in OLEMS, though the area of hedge to be left to thicken up either side of gaps appears to be different for Vanguard and Boreas and Applicant should clarify differences.				NE note that the different mitigation provided between Vanguard and Boreas is due to differing cable corridor widths (REP4-010).								Yes
<b>Consultation on Water Crossing Plans</b>																					
29	During the Vanguard OWF examination process the Applicant committed to producing site specific water crossing plans on which NE would be consulted NE is particularly concerned regarding where the onshore cable route may impact upon water dependant designated sites, such as under the River Wensum SAC/SSSI. It is not clear where this commitment is incorporated within Boreas application. Consultation with NE does not appear to be specified within the COCP 20(2) (g) as this refers to Construction Method Statements, rather than site specific water crossing plans. Documents should be updated within mitigation as outlined during the Vanguard examination and submitted as soon as possible in the examination. NE looks forward to receiving the detailed scheme and programme of watercourse crossings which will be produced by the Applicant post-consent, which is secured through DCO Schedule 1 requirement 25.	Yellow		Yellow		Yellow		Green	Resolved												Yes
<b>The need for mitigation for impacts on Air Quality</b>																					



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30	The EIA identified that the development may have in combination air quality impacts on designated sites in proximity to traffic and transport routes, in particular The River Wensum SAC/SSSI and Felbrigg Woods SSSI. NE advises the Applicant to include commitments within the Outline Traffic Management Plan, CoCP and Schedule of Mitigation to include mitigation to reduce wherever possible impacts to designated sites. If there is likely to be an effect on a designated feature, the OLEMS should include mitigation measures to reduce changes in air quality, e.g. using efficient vehicles, reducing number of vehicles/time on the road, timing of construction to support biodiversity, possible use of barriers etc.							In discussion Applicant confirmed final traffic numbers (as agreed at end of Boreas) were below significant effect levels and agreed to include designated sites in Traffic Management Plan. Designated sites are not currently considered or mapped within Outline Traffic Management Plan [APP-699]. It is not clear how the					NE welcome that the Applicant will include reference to locations of designated sites within the OTMP and include a commitment that if traffic numbers change than the assessment of air quality impacts will be revisited (REP4-010). (Issue may be considered green once document updated)				Welcome inclusion of para 74 in OTMP, advise that the Applicant include ES figure 26.5 as an Appendix to the OTMP to allow reference should the ES not be publicly available by the time of construction				NE note updates to OTMP at D8, and consider this resolved
<b>Impacts on Protected Species</b>																					
31	NE has received a draft Great Crested Newt Licence Application and is currently considering issuing a Letter of No Impediment. We advise the Applicant to submit licence applications for protected species as soon as possible.							Resolved													Yes
<b>The need for Mitigation for Impacts to Onshore Ornithology</b>																					
32	During the Vanguard examination it was noted that the survey data collected for onshore ornithology species was not of sufficient duration and had not been linked to crop rotations so it would not be possible to comment on where Broadland SPA and Ramsar species may be using Functionally Linked Land, during the construction phase and that there could be direct effects on ex situ habitats. The Applicant committed to providing ornithological mitigation in a Clarification Note and the Vanguard OLEMS. These commitments are not reflected in the Boreas documents as submitted, namely the integrity matrices, Information to support HRA, Schedule of Mitigation or OLEMS. We advise that these documents are amended to include mitigation as incorporated as part of Vanguard OWF OLEMS (D 9) and submitted as soon as possible during the examination process.							Resolved													Yes
<b>Development Consent Order</b>																					
33	There are several areas of concern where NE advises that further clarification is required in order to ensure that the DCO accurately captures the various commitments and parameters of the project that have been agreed through consultation thus far.																				
	Many of the volumes assessed in the Environmental Statement project description (disposal, cable protection and scour protection) do not appear to match those used in the DCO/DML. Clarification should be requested from the Applicant on these issues.									Resolved											Yes
	NE requests that a period of 6 months be allowed for submission, consultation and approval of pre-construction plans.																				As stated in SOCG it should be left to the SoS to decide whether 4 or 6 months is included in the final DCO. However, the Applicant advocate 4 months whereas NE Advocate 6 months.
	NE reiterates its support of the MMO position on the inclusion of appeals process as raised in the Vanguard OWF hearings.																				parties agree that there should be consistency in the arbitration and appeals approach across Norfolk Vanguard and Norfolk Boreas. The parties are therefore content for the SoS to apply the same approach to Norfolk Boreas as that decided following the Norfolk Vanguard decision.
	NE welcomes that decisions made on the DML have been excluded from the arbitration provision.																				Yes



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<b>1. Breeding season apportionment of impacts for kittiwake and lesser black-backed gull in HRA</b>																					
1	<p>The Applicant has apportioned 26.1% of kittiwake collisions in the breeding season to the Flamborough and Filey Coast (FFC) SPA. The figure of 26.1% was calculated by the Vanguard Applicant and was calculated by taking the proportion that the FFC SPA adult kittiwake colony population (89,040 adults at designation) equates to out of a total BDMPS calculated by summing the FFC adult population with the UK North Sea spring migration BDMPS total immature kittiwake population given in Furness (2015) (i.e. a total BDMPS of 89,040 + 252,001 = 341,041; so: (89,040 / 341,041) x 100 = 26.1%). We raised some concerns with this approach during the Vanguard examination process (see our comments by species on the Vanguard D6 and 6.5 information submitted in our D7 response at Vanguard, which is available from: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a>).</p> <p>The tracking data up until 2015 suggests low connectivity of the Boreas site with foraging birds from the colony. However, further tagging of kittiwakes from the FFC SPA colony has been undertaken in 2017 and the results of this does indicate that birds from the FFC SPA do forage within the Boreas site (Aitken et al. 2017; Wischniewski et al. 2018).</p> <p>As we advised the Applicant in our comments on the draft Boreas HRA report, we recommend that information is presented on the age classes of the kittiwakes recorded in the Boreas baseline surveys. We also again recommend that a range of apportionment rates for the breeding season are considered in the assessment, which could potentially be up to 100%.</p> <p>In addition, we also recommend that a range of apportionment rates for the breeding season are considered when assessing the likely impacts of the proposal on lesser black-backed gulls (LBBGs) at the Alde-Ore Estuary.</p>	Yellow	Applicant has submitted a draft Offshore Ornithology Update 07.11.2019. NE to provide comment by 28.11.2019.	Yellow	NE has provided comment. Applicant to submit final document at D2	Yellow		Yellow		Green	Resolved. Applicant has in the updated assessments considered a range of breeding season apportionment rates up to 100% for impacts from the project alone, as recommended by NE. For the in-combination assessment, the Applicant has considered Vanguard & Boreas predicted figures for both a 26.1% and 86% breeding season apportionment rates.	Green		Green		Green		Green		Green	
2	<p>As was advised during the Vanguard examination, given that the outputs of the existing PVAs tend to be on an adult currency and that SPA colony population sizes for breeding seabirds are defined in terms of pairs (adult) or breeding adults and the baseline mortality calculations require a survival rate and typically survival rates for non-adult age classes are not available or are poor. Therefore, we advise that assessments should be done using baseline mortality calculations using the adult colony figures and adult mortality rates.</p> <p>We welcome that the Applicant has followed this advice for the assessments of collision risk to gannet and kittiwake at the FFC SPA and LBBGs at the Alde-Ore Estuary. However, in the assessment of gannet displacement for the FFC SPA, the Applicant has calculated the baseline mortality rates for the FFC SPA colony based on using an all age colony count and all age survival/mortality rates to calculate baseline mortality. This assessment should be updated by the Applicant.</p>	Yellow		Yellow		Yellow		Yellow		Green	Resolved. All HRA assessments of breeding features in the updated assessments have been undertaken using baseline mortality calculations using the adult colony figures and adult mortality rates	Green		Green		Green		Green		Green	
<b>3. Lack of consideration of range of predicted impacts due to variability (uncertainty) in assessments</b>																					
3	<p>NE advise that the variability (uncertainty) in the underlying population estimates is considered in the EIA displacement assessments, through consideration of appropriately calculated upper and lower confidence intervals. Whilst the upper and lower confidence limits around the bird abundance estimates are presented in the tables in Annex 1 of Appendix 13.1, these have not been considered by the Applicant in the impact assessments for construction or operational displacement for Boreas alone within the Environmental Statement Chapter or for the assessment of gannet displacement for the FFC SPA for Boreas alone, with only the mean peak seasonal abundances considered.</p> <p>However, as the confidence intervals are presented in the tables in Annex 1 of Appendix 13.1, NE has evaluated these figures as well. We note that for construction displacement at EIA, consideration of the range of impacts predicted by considering the confidence limits does not alter the conclusions made by the Applicant for any species for displacement due to construction. The same is true for assessments of operational displacement at EIA for gannet and razorbill, but for red-throated diver and guillemot the predictions for some seasons and the annual totals exceed 1% of baseline mortality for relevant population scale for the upper 95% confidence intervals of the abundance data at the upper end of the NE recommended ranges. For gannet displacement from the FFC SPA for Boreas alone, consideration of the annual prediction for the upper 95% confidence intervals of the abundance data at the upper end of the considered range also exceeds 1% of baseline mortality of the colony. These therefore require further consideration by the Applicant.</p> <p>Additionally, the Applicant has not given consideration to the range of collision impacts accounting for variability/uncertainty in the input parameters in the assessments of LBBG at the Alde-Ore Estuary SPA and little gull at the Greater Wash SPA. These therefore also require consideration by the Applicant.</p>	Yellow		Yellow		Yellow		Yellow		Green	Resolved. All assessments in the updated assessments document for the project alone at both EIA and HRA scale have considered the range of predicted impacts based on consideration of the 95% confidence intervals for the bird abundance/density data	Green		Green		Green		Green		Green	
<b>4. Assessment of Displacement Impacts</b>																					
<b>4.1 RTD displacement assessment (EIA &amp; HRA)</b>																					
4.1	<p>The Applicant states that: 'NE has advised that an unconfirmed 10% mortality rate should be used for birds displaced by cable laying vessels'. This is not an accurate reflection of our advice. The Applicant has considered that for the assessment of disturbance/displacement impacts to RTD from offshore export cable laying that a 1% mortality rate (based on the Vanguard evidence review submitted by the Vanguard Applicant during the examination phase, MacArthur Green 2019a) is precautionary both for EIA and HRA assessments. As was noted during the Vanguard examination (see our Relevant Representations, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002065-EN010079%20250654%20Natural%20England%20Norfolk%20Vanguard%20Relevant%20Representations%20%20Appendices.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002065-EN010079%20250654%20Natural%20England%20Norfolk%20Vanguard%20Relevant%20Representations%20%20Appendices.pdf</a>), as definitive mortality rates for seabirds (including RTDs), are unknown we advise a range of figures for mortality rates of between 1% and 10% are considered for RTD assessments.</p> <p>NE disagrees that the RTD evidence review in MacArthur Green (2019a) indicates that the SNCB recommended buffer distance is highly precautionary for divers. We do not consider that assuming a magnitude of 100% out to 4km is over precautionary. Whilst we accept that a magnitude of displacement beyond the boundary of the array is lower than 100%, there is evidence that the extent of displacement in some cases is significantly greater than 4km. We note that there are studies that have been undertaken that have not been considered by the MacArthur Green (2019a) review. These include studies from Horns Rev I and II reported in Petersen et al. (2014). The work undertaken by Petersen et al. (2014) uses spatially explicit modelling to predict the distribution of red-throated diver pre- and post-construction. This work suggests a maximum displacement extent of 13km (based on the cumulative frequency distribution approach), however the authors suggest that 5-6 km might be a realistic displacement extent and this is supported by the mapped redistribution of RTDs post construction. Webb et al. (2017) reports on the post consent monitoring at Lincs and Lyn and Inner Dowsing (LID) offshore wind farms. This study covered a large area using first visual aerial surveys and then digital video and used spatially explicit modelling (MRSea). The study reported a displacement effect out to 8km (comparing the pre-construction average with the post construction average distribution).</p> <p>Hence, as stated in our response to Vanguard at D3 (in our comments on the RTD displacement appendix submitted at D3, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002568-DL3%20-%20Natural%20England%20-%20Deadline%203%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002568-DL3%20-%20Natural%20England%20-%20Deadline%203%20Submission.pdf</a>), NE's position remains that there is no compelling evidence to warrant a change to our current advice of 100% displacement within 4km buffer of the wind farm boundary (as advised in the joint SNCB displacement interim advice note, SNCBs 2017) for the purpose of impact assessment. It would seem that while 4km may be an underestimate of the true extent of the displacement, assuming a magnitude of 100% out to 4km is likely to be an over-estimate. Therefore, the use of the two components of our current advice (a conservative estimate of extent and a precautionary estimate of magnitude within that extent) in combination is likely to result in an appropriate estimate, based on our current understanding of the evidence base. Indeed the recent evidence suggests that this approach (100% 4km) might be closer to the truth, and hence less precautionary than has been previously suggested. As a result we continue to advise that assessments of operational disturbance and displacement for RTD for offshore wind farm assessments are based on a constant displacement rate across the offshore wind farm site and a 4km buffer and suggest that a range of displacement rates up to 100% and a mortality rate of up to 10% are considered. As a result we continue to advise that assessments of operational disturbance and displacement for RTD for offshore wind farm assessments are based on a constant displacement rate across the offshore wind farm site and a 4km buffer and suggest that a range of displacement rates up to 100% and a mortality rate of up to 10% are considered.</p> <p>We also note that the Applicant's preferred rates of 90% displacement and 1% mortality does not follow SNCB guidance (SNCBs 2017) for this species. However, as the Applicant has produced impact figures for a range of rates of 90-100% displacement and 1-10% mortality for both construction and operational RTD displacement, this covers the range recommended by NE.</p> <p>We also consider that the NE advised range of 100% displacement and 1-10% mortality should be used in the assessment disturbance and displacement to RTD from offshore export cable installation for both EIA and for the HRA assessment for RTD at the Greater Wash SPA. However, we note that consideration of this would not alter the conclusion of minor adverse impact significance at EIA scale made by the Applicant in Section 13.7.3.1.2 of the Environmental Statement Chapter on assessment of offshore cable laying and of the combined impact of construction of Norfolk Boreas.</p>	Yellow		Yellow		Yellow		Yellow		Green	Resolved. In the updated assessments the Applicant has considered the predicted impacts covering the range of NE advised displacement rates up to 100% and mortality rates of 1-10% across a 4km buffer.	Green		Green		Green		Green		Green	
											Resolved. The updated assessments cover the predicted impacts covering the range of up to 100% displacement and 1-10% mortality for construction and operational displacement.										
											Resolved. The updated assessments cover the predicted impacts covering the range of up to 100% displacement and 1-10% mortality for displacement from cable laying for EIA and HRA.										



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	For HRA for the Greater Wash SPA under the worst case scenario of 100% displacement and 10% mortality between 3 and 8.5 birds will die (based on the density ranges of the cable area from the SPA Departmental Brief data), which equates to 0.87-2.46% of baseline mortality. 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 Outer Thames Estuary SPA have identified higher RTD densities when digital aerial surveys have been undertaken although this may well be precautionary. Therefore, at this level, the predicted mortality is not insignificant and may not result in any adverse effect on site integrity. In any event, the assessment should also not only consider any potential mortality as a result of displacement but also effects on the distribution of RTD within the SPA, acknowledging that the mortality rates are a crude means to assess both lethal and sub-lethal effects. We recommend that Boreas consider mitigation options for RTD disturbance from offshore cable route laying, such as avoiding or reducing cable laying activities during the non-breeding season/period of peak RTD numbers.										Resolved. The Applicant has committed to the mitigation regarding 'cable installation for Work No. 4A and Work No. 4B must only take place with one main cable laying vessel', which is included in the Outline Project Environmental Management Plan [APP-705] and 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, NE can agree with no AEOI from displacement due to construction activities from Norfolk Boreas alone and in-combination for the RTD feature of the Greater Wash SPA.														
	With regard to displacement of RTDs from the Greater Wash SPA and/or the Outer Thames Estuary SPA due to operation and maintenance vessel movements, we welcome the Applicant's commitment in paragraphs 335 and 359 of the Report to Inform HRA to engage with NE to agree the terms of these vessel management measures, and that this will be appropriately reflected in the final DCO.										Resolved. The same mitigation agreed for the operation and maintenance phase of Norfolk Vanguard has been adopted for Norfolk Boreas. This mitigation is included in the Outline Project Environmental Management Plan [APP-705] and 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 the adoption of best practice vessel operations to minimise disturbance to RTD, NE can agree with no AEOI from displacement from operation and maintenance vessel movements for the RTD feature of the Greater Wash SPA and the Outer Thames Estuary SPA.														
4.2	<b>Auk (razorbill and guillemot) displacement assessment (EIA &amp; HRA)</b> The Applicant states that: 'NE has advised that an unconfirmed 10% mortality rate should be used for auks displaced from wind farms'. This is not an accurate reflection of our advice. We note that definitive mortality rates associated with displacement for seabirds, including auks are not known and therefore we continue to advise consideration of a range of mortality rates are used in assessments. Whilst NE agrees that the mortality for auks is likely to be at the low end of the range, we do not agree that using 1% mortality with 50% displacement can be considered precautionary. Therefore, our recommendation remains that a range of mortality rates of 1-10% and displacement rates of 30-70%, with 70% displacement and 10% mortality as the worst case across the site plus 2km buffer for assessment of impacts alone and cumulatively/in-combination. We recommend that the Examining Authority considers the potential impacts on this basis rather than focus solely on the single values advocated by the Applicant.										Resolved. In the updated assessments for EIA and HRA the Applicant has considered the predicted impacts covering the range of NE advised displacement rates 30-70% and mortality rates of 1-10% across a 2km buffer.														
	As was noted in our D3 response during the Vanguard examination (in our comments on the auk and gannet displacement appendix submitted at D3, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002568-DL3%20-%20Natural%20England%20-%20Deadline%203%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002568-DL3%20-%20Natural%20England%20-%20Deadline%203%20Submission.pdf</a> ), we note that while some studies have found a strong displacement effect of guillemots and razorbills from offshore wind farms, other studies have found none. For example displacement of guillemots and razorbills have been reported in the non-breeding season in the southern North Sea of distances from 2 to 4km (Petersen et al. 2004) and Petersen & Fox (2007) demonstrated the exclusion of guillemots out to at least 2km at Horns Rev development site. However, this has not been the case for other studies, e.g. guillemots at Robin Rigg wind farm in Scotland (Vallejo et al. 2017). We note that displacement of auks may be state-specific (breeding or non-breeding) or it may be due to habitat quality and/or availability (e.g. birds could be more likely to be displaced from poorer quality habitat or where habitat is not limiting). We also noted that the evidence review produced by the Vanguard Applicant (in their auk displacement update submitted at D1 of the examination) did not provide much support to their assertion that a 1% mortality rate is sufficiently precautionary. Therefore, our advice remains as that set out above.																								
	However, we note that the Applicant has produced impact figures for alone and cumulative/in-combination that covers the NE recommended range of rates.																								
<b>5. Collision Risk Modelling (CRM) and input parameters (EIA and HRA)</b>																									
5	We welcome that the Applicant has incorporated uncertainty in seabird density, collision avoidance rates, flight heights and nocturnal activity in their collision assessments of Boreas alone. This has been undertaken using the Band (2012) model and presenting multiple tables of the outputs using the variations in the various parameters (bird density, avoidance rate, flight height distribution and nocturnal activity factor), as presented in Annex 4 of Appendix 13.1 of the submission documents.										Resolved. In the updated assessments for EIA and HRA the Applicant has taken into account the range of predicted collision impacts drawing not just from the mean/central predicted collision figures, but also the range of predicted figures resulting from the Applicant's analysis of the uncertainty/variability in the input data. Due to the issues found with the stochastic collision risk model, the Applicant has run Band (2012) models varying each input parameter in turn (i.e. bird density, generic flight heights, avoidance rate and nocturnal activity). This approach currently represents the best available approach to accounting for the uncertainty/variability. In the Boreas case, the greatest range of predicted collisions results from consideration of the 95% confidence intervals of the seabird density, and it is this range of predictions that the Applicant has considered in the updated assessments. Although we note that this may underestimate the effect of variability across the whole range of input parameters.														
	Whilst we welcome that the Applicant has considered the uncertainty/variability in this way, we note that this does not allow the uncertainty/variability in the various input parameters to be fully integrated and therefore, we recommend that if the Applicant undertakes any further collision risk modelling that this is undertaken using the Marine Scotland Science (MSS) stochastic collision risk model (sCRM) and that the log file produced by the sCRM is also included.										With regard to the stochastic collision risk model, the SNCBs are working through various questions related to collision risk modelling and use of the stochastic tool, noting the issues are complicated, and are working towards an update of the joint SNCB advice. In the meantime, our advice remains to use the Band model, as the best available tool, but to consider uncertainty and variability in the input data by varying each parameter in turn, as the Applicant has currently done. It is considered unlikely this will be resolved and that updated advice will be available in the timescales of the Norfolk Boreas examination.														
	We welcome that all the required input parameters for the CRM have been provided and NE agrees with the outputs for the various scenarios. Given that the full uncertainty/variability cannot be fully integrated, we 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 is the variation of bird density. We agree with the central figures and the ranges presented by the Applicant in Table 13.34 of the Environmental Statement Chapter. We also agree with all the outputs for the various scenarios presented in Tables 1-12 of Annex 4 of Appendix 13.1 of the submission documents, with the exception of the lower range of predictions for the lower 95% CI of the PCH for gannet - we suggest that the Applicant checks the calculation of 0 collisions.																								
	With regard to nocturnal activity factors (NAFs), as was noted in our advice at Vanguard and Hornsea Project 3, we currently do not have any agreed 'empirically derived' nocturnal activity factors that can be used with the Band model. We recognise from recent evidence presented e.g. by MacArthur Green (2015) that nocturnal activity levels for some species may be lower than the levels that equate to the nocturnal activity factors currently used in CRM, however we also note that there is uncertainty about the empirical activity levels and uncertainty about how these might translate into nocturnal factors applicable to the Band model.										Resolved. The Applicant has considered varying each input parameter in turn (i.e. bird density, flight height, avoidance rate and NAF). The variations of the NAF input parameter has considered the range of values as recommended by NE as well as those 'empirical' rates preferred by the Applicant. In the updated assessments the predicted figures that give the greatest range are considered i.e. those from varying the bird density with the central values for the other input parameters. The central values considered for the NAF in these assessments are the upper figure of the NE range, i.e. 2 (or 25%) for gannet and 3 (or 50%) for kittiwake and the large gulls.														
	Therefore, NE advises that collision risk outputs covering a range of nocturnal activity factors are considered to account for the uncertainty/variability (in the same way as has been recommended for bird densities, avoidance rates and flight heights). The suggested range of nocturnal flight activities to be considered within the Band model CRM are: - Gannet: 1-2 (equating to 0-25% nocturnal activity) - Kittiwake: 2-3 (equating to 25-50% nocturnal activity) - Large gulls: 2-3 (equating to 25-50% nocturnal activity) (as has been used by the Applicant in the stochastic CRM and that where uncertainty in nocturnal activity has been considered).																								
	However, we do note that the Applicant has considered the range of NE advised nocturnal activity factors to be used with the Band (2012) and therefore, we will consider the predicted impacts from use of the NE recommended rates for all species.																								
	The assessment does not consider the CRM predictions from the Band Option 1 outputs, only those for Option 2. We note that from Annex 3 of Appendix 13.1 that of the key species at risk of collision, gannet and kittiwake have over 100 records for both the Boreas site and the site+4km buffer, whilst there are over 100 records of GBBG in flight for the site+4km buffer. The %PCHs for these species from the site-specific data are higher than those from the generic data and the resulting CRM predictions are considerably higher than those from Option 2 (e.g. 203 kittiwake collisions from Option 2 compared to 1,138 from Option 1 for the central input values). NE acknowledge the contractors concerns over the aerial survey data flight height figures, noting this was also the case at Thanet Extension, where aerial survey data flight height figures were also significantly higher than the generic flight heights. However, this dataset emphasises the critical importance of considering potential variability in flight heights when assessing collision risk impacts, rather than assuming the central input value necessarily represents the 'most likely' impact. Accordingly, we recommend that the Applicant takes a more narrative approach to the assessment, and considers the Option 1 outputs for the above species in the context of the relevant Option 2 95% CIs, as part of a more range-based approach to consideration of CRM impacts.										Resolved. Following information provided by the Applicant regarding issues with the accuracy of the site-specific flight height data and use of Option 1 of the Band model, NE considers that given the issues with the site-specific flight height data and as the Applicant has taken into account in the updated assessments 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 predicted figures resulting from the Applicant's analysis of the uncertainty/variability in the input data, the Applicant has done as much as they can. However, there is clearly an issue with the collection of accurate														

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	We note that Table 2 of Annex 3 presents the %PCH for each species from the site-specific data for Boreas, however, paragraph 5 of Annex 4 states that Option 1 has been run using aerial survey flight height data collected for East Anglia Two. Clarification is therefore required from the Applicant as to whether the Option 1 figures use site-specific flight height data for Boreas or for East Anglia Two. Additionally, if data from East Anglia Two has been used then clarification is also required from the Applicant as to whether there is confidence in the flight height data collected for East Anglia Two.										evidence on site-specific flight heights of seabirds and this highlights the need to collect real evidence on actual collisions and also highlights the need for consideration of mitigation through raising turbine draught heights by as much as is possible.											
<b>6. Cumulative and In-combination Assessments</b>																						
<i>Figures used in cumulative and in-combination assessments of displacement and collision risk assessments</i>																						
6.1	General comments applicable to both displacement and collision risk: As was noted by NE during the examination process for both Hornsea 3 and Vanguard, there is still considerable uncertainty around the Hornsea 3 cumulative/in-combination contribution due to the lack of a full baseline dataset (see our comments on the Vanguard Applicant's D7 and 7.5 submissions in relation to offshore ornithology submitted at D8, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a> ). Therefore, as the Hornsea 3 project is currently not yet consented, we advise that Boreas present cumulative/in-combination figures with and without Hornsea 3, as was presented during the Norfolk Vanguard examination.										In the updated assessments the Applicant has presented cumulative and in-combination figures with and without Hornsea 3. However, the considerable uncertainty around the Hornsea 3 contribution to the cumulative/in-combination still remains.		Discussed with Applicant 13.02.2020. Applicant to provide update for D5.									
	We welcome that the Applicant has included figures for the East Anglia One North and East Anglia Two projects in the cumulative/in-combination assessments. We note that the figures included are from the Preliminary Environmental Information Reports (PEIRs) for these projects, as these represent the best publicly available figures for these projects at the current time. However, we note that the PEIRs for these projects were based on incomplete data sets and the full 24 months of baseline survey data will be included in the submission documents, which are due later in 2019. Furthermore, it is anticipated that Hornsea 4 will consult on a PEIR in 2019 as well. Therefore, the cumulative and in-combination assessments will require updating during the examination process.										In the updated assessments, the Applicant has updated the figures included for East Anglia One North and East Anglia Two to those from the submission documents for these projects. However, there is the potential that these figures could change during the Boreas examination. The figures for Hornsea 4 in the updated assessments still come from the PEIR for that 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. Therefore, the Applicant has included cumulative/in-combination figures for including and excluding Hornsea 4. However, we acknowledge that values currently included by the Norfolk Boreas Applicant for these projects represent the most appropriate at present.											
	<b>Auk cumulative and in-combination assessments:</b> The cumulative/in-combination auk (razorbill and guillemot) operational displacement assessment totals are based on an incomplete data set. The following wind farm projects are missing from the assessments: Beatrice Demonstrator, Gunfleet Sands, Kentish Flats, Kentish Flats Extension, Methil, Rampion and Scroby Sands. Whilst these missing projects are likely to involve low numbers of auks, the missing data would reduce confidence in the assessments and result in an under-estimation of the cumulative/in-combination assessments.										Resolved. The updated cumulative/in-combination assessments include figures for these projects.											
	As was advised for Vanguard in our D3 response to the Applicant's auk displacement update note (see comments on the auk and gannet displacement appendix submitted at D3, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002568-DL3%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002568-DL3%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a> ), we advise that the figures used for Thanet Extension are those in Annex 3 on range of displacement matrices for seabirds recorded in Thanet Extension (APEM 2018). This document presents separate displacement matrices for each season for each of the Thanet Extension site only and the Thanet Extension 2km buffer only, meaning that for each season the figures from the Thanet Extension site only need to be summed with the figures for the Thanet Extension 2km buffer only to give the total for the Thanet Extension site + 2km buffer, which are the figures required for the cumulative (and hence in-combination) assessments.										Resolved. The figures included for this project have been updated as per NE recommendations in the updated cumulative/in-combination assessments											
	We note that the figures included in the assessments for Hornsea 3 are those from the project's Environmental Statement. As was noted to Vanguard in our D7 response (see: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a> ), during the examination phase for the Hornsea 3 project discussions were held over the appropriateness of the baseline dataset for the project and hence the abundance estimates generated, there were also discussions regarding the seasonal definitions used. Therefore, we advise Boreas that the abundance estimates used in the auk cumulative (and hence in-combination) displacement assessments for the Hornsea 3 project are those presented for the 'alternative analysis' in Annex C of Appendix 28 of the D4 submission by the Hornsea Three Applicant (Hornsea Project Three Offshore Wind Farm 2019a) in Table 1.11 for guillemot and Table 1.15 for razorbill. We note that these are the figures used by NE in our Hornsea 3 D7 response for displacement. We again note that NE have highlighted throughout our written and oral submissions for Hornsea 3 that the lack of sufficient baseline information for the Hornsea Three Zone (i.e. the array area) means that there is a considerable degree of uncertainty (and thereby level of risk) associated with these figures and these should in no way be seen as NE's agreed position on the levels of impact from Hornsea 3.										The figures included for this project have been updated in the updated cumulative/in-combination assessments to those from the 'alternative analysis'. However, we note that the concerns regarding the uncertainty regarding the Hornsea 3 figures remain.											
	There is an error in the razorbill EIA figure presented in the Boreas ES Chapter for Vanguard East for the non-breeding (winter period) – as was noted in our Relevant Representation for Vanguard (see: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002065-EN010079%2020654%20Natural%20England%20-%20Norfolk%20Vanguard%20Relevant%20Representations%20-%20Appendices.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002065-EN010079%2020654%20Natural%20England%20-%20Norfolk%20Vanguard%20Relevant%20Representations%20-%20Appendices.pdf</a> ), this figure should be 491 and not 279. However, this error is not repeated in the Boreas HRA report.										Resolved. The figure included for Vanguard East has been corrected in the updated assessments											
	We would also advise that the figures included in the guillemot cumulative (and hence in-combination) assessment are checked for the following sites: Galloper, Greater Gabbard and the Hornsea projects, as the figures presented by Boreas are significantly different from those presented by Vanguard in their D8 submission (MacArthur Green 2019b).										Resolved. The figures included for these projects have been updated in the updated cumulative/in-combination assessments											
	We note that the cumulative/in-combination displacement tables for razorbill for the non-breeding seasons suggest no birds were recorded during these seasons at the Seagreen sites. We acknowledge that the Environmental Statement (ES) for these projects does not present displacement figures for the non-breeding seasons. However, graphs of monthly abundances of each auk species at each of the project sites across the two survey years are presented in the ES Chapter (Seagreen Wind Energy 2012). These indicate that razorbill were recorded in all surveys of both Alpha and Bravo during the study period. Therefore, consideration should be given to this in the cumulative/in-combination assessments. We also note that the figures included for these two projects for this species are significantly different from those presented by Vanguard in their D8 submission (MacArthur Green 2019b).										Resolved. The figures included for this project for these seasons have been updated in the updated cumulative/in-combination assessments											
	We therefore advise that the Applicant updates the cumulative/in-combination assessments to take account of the above points. As a result of the above, we are currently unable to make any conclusions regarding the level of cumulative/in-combination operational displacement impact on auks.										Resolved. The Applicant has updated the figures included in the cumulative/in-combination assessments in the updated assessment to the best that can be done with the current data available											
	<b>However, we note that at Vanguard, NE was unable to rule out a significant adverse effect for cumulative operational displacement on razorbill or guillemot at the EIA scale.</b>										For Boreas, based on the updated cumulative figures presented in the updated assessment, NE is unable to rule out a significant adverse effect for cumulative operational displacement on razorbill or guillemot at the EIA scale (as set out in our D4 response)											
	Additionally, we note that during the Vanguard examination, NE were able to rule out AEOI of the FFC SPA due to in-combination operational displacement on the razorbill and guillemot features of the site when Hornsea 3 was not included in the in-combination total. However, due to NE's significant concerns regarding the incomplete baseline surveys for the Hornsea 3 project, and the associated level of uncertainty as regards the potential impacts of that project, NE was not in a position to advise that an AEOI could be ruled out for the razorbill and guillemot features of the FFC SPA for impacts in-combination with other plans and projects when Hornsea 3 was included in the in-combination total (see our comments on the Applicant's D8 updated auk displacement assessment submitted at D9, available from: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003190-DL9%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003190-DL9%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a> ).										For Boreas, based on the updated in-combination figures presented in the updated assessment, NE is able to rule out AEOI of the FFC SPA due to in-combination operational displacement on the razorbill and guillemot features of the site when Hornsea 3 and Hornsea 4 are not included in the in-combination total. However due to NE's significant concerns regarding the incomplete baseline surveys for Hornsea 3 and the associated level of uncertainty as regards the potential impacts of that project, combined with the inevitable uncertainty regarding the figures included for Hornsea 4 (as the figures come from the PEIR), NE are not in a position to advise that and AEOI can be ruled out for the razorbill and guillemot features of the FFC SPA for impacts in-combination with other plans and projects when Hornsea 3 and Hornsea 4 are included in the in-combination total (as set out in our D4 response).											
	<b>The Boreas project is adding further birds to these totals.</b>																					
	Cumulative and in-combination collision assessments:																					



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	The following wind farm projects are missing from the assessments: Kentish Flats Extension and Methil.										Resolved. The updated cumulative/in-combination assessments include figures for these projects.												
	Clarification is required as to which set of collision risk figures have been used for Vanguard in the assessments. The figures that should be included are those from the final set of updated figures for the project (i.e. those for the 10MW turbine, revised layouts and raised draught height and using the full breeding season for gannet, kittiwake and LBBG, as presented in the Applicant's additional submission, MacArthur Green 2019).										Resolved. The updated cumulative/in-combination assessment include figures for Vanguard based on the 10MW turbine, revised layouts, raised draught height and using the full breeding season for gannet, kittiwake and LBBG.												
	Clarification is also required as to which set of collision risk figures have been used for Thanet Extension in the assessments. We suggest that the figures included for Thanet Extension are those presented in Table 3 of Appendix 39 of the D3 submission for this project's examination (available from: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010084/EN010084-001282-D3_Appendix39_TEOW_CRM_RevB.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010084/EN010084-001282-D3_Appendix39_TEOW_CRM_RevB.pdf</a> ). The approach taken for all species for the Thanet Extension figures should be consistent (i.e. all the upper figures, or all the central figures of the range presented in Table 3 of Appendix 39 of the D3 Thanet Extension submission).										Resolved. The figures included for this project have been updated as per NE recommendations in the updated cumulative/in-combination assessments												
	There are differences in the figures used in the EIA cumulative assessments for Vanguard, Thanet Extension and Moray West to those that are then used in the apportioning to the SPA colonies in the in-combination assessment. The figures used should be consistent in the ES and the HRA reports.										Resolved. The appropriate figures for these projects have been used in the updated assessments and the same figures are used across EIA and in HRA prior to apportionment.												
	As was noted in our D7 responses at Vanguard (see: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a> ), we suggest that the figures included in the assessments for the Hornsea 3 project are those from our D7 response (NE 2019). These figures were used for an illustrative assessment of collision impacts based on the parameter values that were most closely aligned with the approach advised by NE. However, it should still be noted that NE have highlighted throughout our written and oral submissions for Hornsea 3 that the lack of sufficient baseline information for the Hornsea 3 Zone (i.e. the array area) means that there is a considerable degree of uncertainty (and thereby level of risk) associated with these figures and these should in no way be seen as NE's agreed position on the levels of impact from Hornsea 3.										The figures included for this project have been updated in the updated cumulative/in-combination assessments to those from our D7 response at Hornsea 3. However, we note that the concerns regarding the uncertainty regarding the Hornsea 3 figures remain.										The Applicant submitted updated cumulative/in-combination collision figures at D6 and D8. Whilst revised kittiwake collision estimates for the Hornsea 3 project were submitted to the Planning Inspectorate on the 14th February 2020, we welcome that the Applicant has not updated the figures included in the cumulative/in-combination tables in REP6-024 for Hornsea 3 to reflect these. We note that whilst any amendments to the Hornsea 3 project design envelope (i.e. lower tip height and reduction in turbine numbers) would result in a proportional reduction in the collision estimates, NE will most likely be unable to agree on what the absolute level of reduction for Hornsea 3 will be as we believe the issues with the underlying baseline data have still not been resolved.		
	We would advise the Applicant checks the summing up of the LBBG collisions in the breeding season of the offshore wind farms located within 141km of the Alde-Ore SPA, as NE calculates the total for the wind farms and figures currently presented to be 102.6 birds (rather than the Applicant's calculation of 87.2).										Resolved. The figures in the updated assessment have been updated, and NE agrees with the summed totals												
	NE also does not consider it is appropriate to apply the 30% calculated by Boreas to apportion figures from the other OWFs within 141km of the Alde-Ore during the breeding season. NE notes that a range of approaches have been used to conduct in-combination assessments for OWFs, with applicants applying a blanket apportioning rate across projects out to a certain distance, using the figures from the Environmental Statements (or associated examinations), or using a mixture of values from these two main approaches. Until such time that a robust alternative methodology is agreed, NE continues to advise that the figures used in in-combination assessments should be based on the apportionment rates agreed during the assessments of that project. We would welcome further discussions regarding the best approach to in-combination apportioning.										Resolved. In the updated assessment, the Applicant has applied the SNH apportionment method to calculate breeding season apportionment rates for the relevant offshore wind farms included in the in-combination assessment. Whilst we note that NE has previously raised some concerns regarding the SNH apportionment method (as set out in our D4 response), we consider this to be a more appropriate than the blanket apportionment approach previously taken.												
	We therefore advise that the Applicant updates the cumulative/in-combination assessments to take account of the above points. As a result of the above, we are currently unable to make any conclusions regarding the level of cumulative/in-combination operational collision impact on any of the relevant species or to the combined impact of gannet cumulative/in-combination displacement plus cumulative/in-combination collision.										Resolved - following the updates undertaken by the Applicant in the updated assessments (as detailed above)												
	However, we note that at Vanguard, NE was unable to rule out a significant adverse effect for cumulative operational collision impacts on gannet, kittiwake or GBBG. We were also unable to rule out AEOL due to in-combination collision risk on the LBBG feature of the Alde-Ore Estuary SPA or the kittiwake feature of the FFC SPA (see our D8 response, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a> ).										For Boreas, based on the updated cumulative and in-combination figures presented in the updated assessments, NE is unable to rule out a significant adverse effect for cumulative operational collision impacts on gannet, kittiwake or GBBG. We are also unable to rule out AEOL due to in-combination collision risk on the LBBG feature of the Alde-Ore Estuary SPA or the kittiwake feature of the FFC SPA (as set out in our D4 response).											For Boreas, based on the updated cumulative and in-combination figures presented at D6 to account for revised mitigation and hence figures for Vanguard and Boreas, NE remains unable to rule out a significant adverse effect for cumulative operational collision impacts on gannet, kittiwake or GBBG. We remain unable to rule out AEOL due to in-combination collision risk on the LBBG feature of the Alde-Ore Estuary SPA or the kittiwake feature of the FFC SPA (as set out in our D7 response).	
	Additionally, we note that during the Vanguard examination, NE were able to rule out AEOL of the FFC SPA due to in-combination operational displacement plus collision impacts on the gannet feature of the site when Hornsea 3 was not included in the in-combination total. However, due to NE's significant concerns regarding the incomplete baseline surveys for the Hornsea 3 project, and the associated level of uncertainty as regards the potential impacts of that project, NE was not in a position to advise that an AEOL could be ruled out for the gannet feature of the FFC SPA for impacts in-combination with other plans and projects when Hornsea 3 was included in the in-combination total (see our D8 response, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a> ).										For Boreas, based on the updated in-combination figures presented in the updated assessment, NE is able to rule out AEOL of the FFC SPA due to in-combination operational collision, in-combination displacement and in-combination collision plus displacement impacts on the gannet feature of the site when Hornsea 3 and Hornsea 4 are not included in the in-combination total. However, due to NE's significant concerns regarding the incomplete baseline surveys for Hornsea 3 and the associated level of uncertainty as regards the potential impacts of that project, combined with the inevitable uncertainty regarding the figures included for Hornsea 4 (as the figures come from the PEIR), NE are not in a position to advise that and AEOL could be ruled out for the gannet feature of the FFC SPA for impacts in-combination with other plans and projects when Hornsea 3 and Hornsea 4 are included in the in-combination totals (as set out in our D4 response).												Following the updated in-combination collision figures presented at D6, our advice regarding gannet at the FFC SPA remains as set out at D4, namely: NE is able to rule out AEOL of the FFC SPA due to in-combination operational collision, in-combination displacement and in-combination collision plus displacement impacts on the gannet feature of the site when Hornsea 3 and Hornsea 4 are not included in the in-combination total. However, due to NE's significant concerns regarding the incomplete baseline surveys for Hornsea 3 and the associated level of uncertainty as regards the potential impacts of that project, combined with the inevitable uncertainty regarding the figures included for Hornsea 4 (as the figures come from the PEIR), NE are not in a position to advise that and AEOL could be ruled out for the gannet feature of the FFC SPA for impacts in-combination with other plans and projects when Hornsea 3 and Hornsea 4 are included in the in-combination totals.
	<b>We note that the Boreas project is adding further affected birds to these totals.</b>																						
6.2	<b>RTD cumulative operational displacement assessment</b>																						

Issue Number	NE's Relevant Representation RR-099	RAG Status Rel Rep	Actions, progression	RAG Status D1	Actions, progression	RAG Status D2	Actions, progression	RAG Status D3	Actions, progression	RAG Status D4	Actions, progression	RAG Status D5	Actions, progression	RAG Status D6	Actions, progression	RAG Status D7	Actions, progression	RAG Status D8	Actions, progression	RAG Status D9	Actions, progression						
	<p>We welcome that all OWFs in the south-west North Sea BDMPs have been considered in the RTD cumulative operational displacement assessment. However, the Applicant has considered that all OWFs at which turbines were installed before or during 2012 form part of the Boreas baseline. Whilst we agree that as Boreas's baseline characterisation surveys didn't start until 2016, any displacement effects from OWFs operating at that time would be picked up in Boreas's survey data if the effects from the other wind farms cover the Boreas survey area. However, NE does not agree that these wind farms should be considered part of the baseline. This is because, although some of the wind farms included in the Applicant's list have been operational for over 10 years, the RTD population data pre-date the installations (e.g. that used in Furness 2015 to inform the RTD BDMPs comes from a variety of sources including O'Brien et al. 2008, which draws on aerial survey data from 2001-06 and Wetland Bird Survey and county bird records from 1995-2005). Therefore the baseline cannot be assumed to include the effects of these wind farms. In addition, we note that no figures have been included in the cumulative assessment for the East Anglia One North and East Anglia Two projects.</p> <p>In Table 13.41 of the Environmental Statement Chapter many of the OWFs are listed as having no RTD displacement assessments or qualitative assessments with no numbers available. We would therefore recommend that a better approach would be to take the same approach as for auks, i.e. present the seasonal mean peak abundances (as we would assume that even if no RTD displacement assessment was done, the survey data from the relevant Environmental Statements would be available) and then sum figures across the OWFs and put this through the matrix. However, we note that not all Round 1 or 2 OWFs may have survey data covering the OWF sites and a 4km buffer and therefore, the data may not be 'like for like' in terms of the survey areas covered.</p> <p>An alternative way of undertaking the cumulative RTD assessment using a 'like for like' approach could be to take a similar approach to that taken by Thanet Extension (and was taken by Vanguard during the examination in the Applicant's D6 Updated Offshore Ornithology Assessment, MacArthur Green 2019d), which used the predicted density map and the underlying dataset of the SeaMaST project (Seabird Mapping and Sensitivity Tool) described in Bradbury et al. (2014) as a common data source of RTD density in the North Sea. The underlying dataset can be accessed from NE following a specific data request. This approach is outlined in Annex C of Thanet Extension's Appendix 1, Annexes A to G to D1 Submission (available from: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010084/EN010084-001076-Vattenfall%20Wind%20Power%20LTD%20-%20Summary%20of%20RR%20Annex%20A%20-%20G.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010084/EN010084-001076-Vattenfall%20Wind%20Power%20LTD%20-%20Summary%20of%20RR%20Annex%20A%20-%20G.pdf</a>).</p> <p>We therefore do not agree that the cumulative RTD operational displacement mortality total combines several sources of precaution, as the calculated figure does not include estimates of displacement for wider region projects and the calculated total is a massive under-estimate of the level of displacement. As highlighted above a method that takes account of the contribution of RTD operational displacement from all projects, whether or not figures have been presented in their Environmental Statements, needs to be brought forward. Therefore, we are currently unable to consider the significance of the cumulative impact from operational displacement until the full extent of displacement from all relevant OWFs.</p> <p>However, we note that at Vanguard, NE were unable to rule out a significant adverse effect for cumulative operational displacement on RTD at the EIA scale (see our D7 response, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-002878-DL7%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a>). We note that the Boreas project is adding further affected birds to this total.</p>									Resolved. Applicant has taken the 'like for like' approach taken at Vanguard and Thanet Extension in the updated assessment.																	
6.3	<p><b>Gannet cumulative and in-combination operational displacement assessment</b></p> <p>Whilst we agree that the impacts to gannet from operational cumulative displacement at the EIA scale is likely to be negligible, we suggest that a similar approach to that undertaken for the auk cumulative displacement assessments is undertaken for gannet, i.e. to sum the bird abundance estimates for each relevant offshore wind farm and put this total through a displacement matrix, and then assess with a range of displacement of 60-80% and mortality of 1-10% (as was undertaken by Vanguard during the examination in the Applicant's D6 Updated Offshore Ornithology Assessment, MacArthur Green 2019d), as has been undertaken by the Applicant for in-combination gannet displacement for the FFC SPA.</p>										Resolved. An assessment as per the recommendations has been undertaken in the updated assessment.																
7	<p><b>7. Additive impacts (collision plus displacement for gannet)</b></p> <p>NE considers the two impacts of collision and displacement as additive and advises that they should be summed – this is of particular relevance for gannet both for Boreas alone and cumulatively/in-combination. We welcome that the Applicant has undertaken this assessment for in-combination combined displacement plus collision for the FFC SPA. However, such an assessment should also be undertaken for Boreas alone for both EIA and HRA and also cumulatively at the EIA scale.</p> <p>We acknowledge that in summing the predicted mortalities that may arise via these two mechanisms, there is a risk of double counting. Thus it is acknowledged that this simplistic approach will therefore incorporate a degree of precaution. However, the extent of that is hard to gauge given that the predictions of the number of fatalities due to collisions depends critically upon application of an assumed overall avoidance rate (i.e. an assumed percentage of individuals which alter their flight behaviour to avoid collisions) which in some cases can be considered to incorporate some degree of macro-avoidance of entire wind farms and might otherwise be classed as barrier impacts. The SNCBs are seeking further evidence from ongoing and proposed studies into avoidance rates that will help clarify the relationship between collision risk, displacement and so called 'macro' avoidance.</p>										Resolved. In the updated assessment the Applicant has undertaken gannet combined displacement plus collision assessments for Boreas alone and cumulatively/in-combination at both the EIA and HRA scale. We again acknowledge that this requested approach risks double counting.																
8	<p><b>8. Population modelling (EIA and HRA)</b></p> <p>The significance of the predicted in-combination collision impacts has been considered by reference to various PVA models that are currently in existence:</p> <p>For HRA: the PVA undertaken during the Vanguard OWF examination for LBBG at the Alde-Ore Estuary SPA; and the PVAs undertaken during the Hornsea 3 OWF examination for gannet and kittiwake at the FFC SPA.</p> <p>For EIA: the national gannet PVA undertaken by the SOSS-04 work (WWT 2012) and the kittiwake and great black-backed gull EIA PVAs undertaken for the East Anglia 3 OWF assessment (EATL 2015 &amp; 2016).</p> <p>We note that NE had some outstanding concerns/queries regarding this PVA during the Vanguard Examination (namely regarding the adjustment of the productivity to take account of the proportion of birds that miss breeding each year; and that we were unable to check the baseline growth rate predicted by the model from the outputs of counterfactuals presented, see our D8 response, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-003121-DL8%20-%20Natural%20England%20-%20Deadline%20Submission.pdf</a>). We also had outstanding concerns with the Hornsea 3 PVAs which were not resolved by the close of the Examination, relating to the number of simulations and the demographic data not being updated (see our D6 response to the Hornsea 3 Examination – written summary of representations of ISHS, available at: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010080/EN010080-001688-Natural%20England%20-%20Written%20Submission%20of%20Natural%20England%20Representations%20at%20Issue%20Specific%20Hearing%20-%20-%20Offshore%20Ecology.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010080/EN010080-001688-Natural%20England%20-%20Written%20Submission%20of%20Natural%20England%20Representations%20at%20Issue%20Specific%20Hearing%20-%20-%20Offshore%20Ecology.pdf</a>). These models nevertheless represent the best available evidence on which to base an assessment, though this should not be taken as a NE endorsement or 'acceptance' of the models.</p>										The Applicant has run EIA scale Population Viability Analysis (PVA) models for gannet, kittiwake, lesser black-backed gull (LBBG) and great black-backed gull (GBBG) for the Biologically Defined Minimum Population Scale (BDMPS) and biogeographic population scales using the NE commissioned Seabird PVA tool ( <a href="https://github.com/naturalengland/Seabird_PVA_Tool">https://github.com/naturalengland/Seabird_PVA_Tool</a> ). This updates the previous PVA models for EIA scale kittiwake and GBBG undertaken at East Anglia 3 assessment (EATL 2015 & 2016) and the SOSS national gannet PVA (WWT 2012), so that the models are run over 30 years, the stochastic simulations are run as 'matched pairs' and present outputs for the NE recommended metrics of the counterfactual of population growth rate and the counterfactual of population size to quantify the relative changes in a population in response to anthropogenic impacts. However, updates to the tool are being undertaken (as has been noted to the Applicant) and NE are aiming to make the updates to the tool available in the next 1-2 weeks. Therefore, we advise that the models are re-run when the updated version of the tool is available. We request that any revised assessments present the metrics calculated across the whole population (the new version of the tool will have this as a new option that can be selected as an output type). We also advise that the Applicant includes information the outputs from the models in terms of the growth rates predicted by the models for the un-impacted scenarios in order to assess whether the models are suggesting a reasonably sensible trajectory for the populations with no offshore wind farm impacts. Our outstanding concerns regarding the Hornsea 3 FFC SPA PVAs and the LBBG Alde-Ore SPA PVA remain. We note that some of the EIA scale PVA models have been run for only 500 or 1,000 simulations. The Seabird PVA Tool report (Searle et al. 2019) states that 'it is not recommended to use small values of sim.n (number of simulations) because PVAs based on small numbers of simulations are likely to be unreliable (using a value of less than 1,000 will generate a warning message in the tool, but in practice the minimum number of simulations may need to be substantially higher than this in order to achieve reliable results)'. NE considers that a larger number of simulations than 500 would be needed to generate reliable results and for models run for 1,000 simulations, we recommend that the Applicant presents evidence to demonstrate that using 1,000 simulations in the models produces reliable results. Therefore, whilst NE has considered the outputs from these models (both for EIA and HRA) in our advice at D4, as they nevertheless currently represent the best available evidence on which to base an assessment this should not be taken as a NE						Version 2 of the NE PVA tool is now available and links have been sent to the Applicant. We recommend that the PVA models are re-run using version 2 of the tool in instances where the current models are not set-up and parameterised in the way we have advised (i.e. sufficient simulations etc.) in our D4 response [REP4-040].				No updates have been undertaken by the Applicant to these PVAs and our outstanding concerns/queries with these models remain. However, we have continued to use the outputs of these models in our advice in REP7-047, as they currently represent the best available evidence on which to base an assessment.			Whilst updated EIA scale PVAs have been undertaken by the Applicant using the 'Seabird PVA tool' in updated assessments (submitted at D2 and D7), the large gull EIA scale PVAs undertaken by the Applicant in their D2 updated assessment have been undertaken using 1,000 simulations. As noted in our D9 response, we would recommend that 5,000 simulation should be considered best practice in PVA models. However, we have continued to use the outputs of these large gull models in our advice in REP7-047, as they currently represent the best available evidence on which to base an assessment. Resolved for gannet and kittiwake as outputs for models run for 5,000 simulations presented in the Applicant's D2 update (for gannet) and D7 (for kittiwake).			No updates have been undertaken by the Applicant to these PVAs and our outstanding concerns/queries with these models remain. However, we have continued to use the outputs of these models in our advice in REP7-047, as they currently represent the best available evidence on which to base an assessment.

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	The appropriateness of the SOSS gannet PVA and the EIA PVA models for kittiwake and GBBG have been discussed during the Vanguard examination, and has been indicated to Norfolk Boreas, NE does not consider that these models are adequate to inform the assessments for Norfolk Boreas for the following reasons:																				Whist updated EIA scale PVAs have been undertaken by the Applicant using the 'Seabird PVA tool' in updated assessments (submitted at D2 and D7), the large gull EIA scale PVAs undertaken by the Applicant in their D2 updated assessment have been undertaken using 1,000 simulations. As noted in our D9 response, we would recommend that 5,000 simulation should be considered best practice in PVA models. However, we have continued to use the outputs of these large gull models in our advice in REP7-047, as they currently represent the best available evidence on which to base an assessment. Resolved for gannet and kittiwake as outputs for models run for 5,000 simulations presented in the Applicant's D2 update (for gannet) and D7 (for kittiwake).	
	The stochastic simulations were not run as matched pairs. Where stochastic PVA models are used, it is important to use a 'matched-runs' approach where a metric is derived for each matched pair of baseline and impacted simulations (as has been done for the PVAs undertaken during the Hornsea 3 and Vanguard examinations for the FFC SPA and Alde-Ore Estuary SPA). Stochasticity is included in the population models, but the survival and productivity rates used for a 'pair' of impacted and un-impacted populations at each time step are the same. This means that the effect that is measured with the metric can be more clearly attributed to the impact, than to model uncertainties such as the variability in the demographic parameters that have been sampled or to observation errors. Cook & Robinson (2017) tested the effect of using unmatched compared to matched runs in PVA models and demonstrated that the median values of several evaluation metrics (e.g. counterfactual of population size) were greater when a matched runs approach was used compared to when the simulations were unmatched and the uncertainty around the metrics was much greater in the unmatched scenario. Models were run with 1,000 iterations. It may be the case that the median values of the matched versus unmatched runs approach will converge if a larger number of simulations (e.g. 5,000) are used, however the confidence limits are still expected to vary between the two approaches. NE therefore advises that one amendment required to the existing PVA models used by Boreas is to run the simulations using matched-pairs.																				Resolved as models (EIA scale and HRA) used by Applicant in updated assessments (submitted at D2 and D7) have been run using matched pairs	
	NE recommends using the counterfactual of population growth rate and the counterfactual of population size to quantify the relative changes in a population in response to anthropogenic impacts. NE considers that assessments should focus on the counterfactual of growth rate and the counterfactual of final population size, as these are the two metrics that are, in NE's opinion, least sensitive to miss-specification of the population trend and demographic rates used in the PVA model. These metrics should be calculated at the end of the impact period. These models do not present outputs for the required metrics.																					Resolved as updated assessments for EIA and HRA in Applicant's updated assessments (submitted at D2 and D7) present PVA metrics for the counterfactual of growth rate and the counterfactual of population size.
	These PVA models used were only run over 25 years and the Boreas project will have a lifespan of a maximum of 30 years. The current approach whereby PVA models are run over 25 rather than 30 years would lead to an underestimate of impact, given that if the OWF has an operational period of 30 years, then potential impacts occurring in the last five years of operation are not being accounted for in the models. Therefore, we recommend that these PVAs are revisited.																					Resolved as the PVAs used by the Applicant in the updated assessments for EIA and HRA (submitted at D2 and D7) have been run over 30 years or more.
<b>9. Scale of predicted cumulative and in-combination impacts and requirement for mitigation</b>																						
	NE has previously provided regulators with our advice regarding our concerns about predicted level of cumulative and in-combination impacts on North Sea seabirds:																					
	For EIA we have been unable to rule out a significant adverse effect for cumulative operational impacts on:																					
	- Gannet for cumulative collision plus displacement impacts;																					
	- Kittiwake and GBBG for cumulative collision impacts;																					
	- Guillemot and razorbill for cumulative displacement impacts;																					
	- RTD for cumulative displacement impacts.																					
	For HRA we have been were also unable to rule out AEOI for in-combination operational impacts on:																					
	- LBBG at the Alde-Ore Estuary SPA due to in-combination collision impacts;																					
	- Kittiwake at the FFC SPA due to in-combination collision impacts.																					
	Additionally for HRA, we have previously (at Vanguard) been able to rule out AEOI due to in-combination impacts when Hornsea 3 was not included in the in-combination total, but due to NE's significant concerns regarding the incomplete baseline surveys for the Hornsea 3 project, and the associated level of uncertainty as regards the potential impacts of that project, NE was not in a position to advise that an AEOI could be ruled out for:																					
	- Gannet at the FFC SPA due to in-combination collision plus displacement impacts;																					
	- Razorbill at the FFC SPA due to in-combination displacement impacts;																					
	Guillemot at the FFC SPA due to in-combination displacement impacts.																					
	For Boreas, based on the updated assessments, NE's advice regarding our concerns about predicted level of cumulative and in-combination impacts on North Sea seabirds is set out in our D4 submission:																					
	For EIA we have been unable to rule out a significant adverse effect for cumulative operational impacts on:																					
	- Gannet for cumulative collision plus displacement impacts;																					
	- Kittiwake and GBBG for cumulative collision impacts;																					
	- Guillemot and razorbill for cumulative displacement impacts;																					
	- RTD for cumulative displacement impacts.																					
	For HRA we have been were also unable to rule out AEOI for in-combination operational impacts on:																					
	- LBBG at the Alde-Ore Estuary SPA due to in-combination collision impacts;																					
	- Kittiwake at the FFC SPA due to in-combination collision impacts.																					
	For Boreas, based on the Applicant's updated assessments at D2 and updated cumulative/in-combination collision figures submitted at D6, NE's advice regarding our concerns about predicted level of cumulative and in-combination impacts on North Sea seabirds is set out in our D4 and D7 submissions:																					
	For EIA we have been unable to rule out a significant adverse effect for cumulative operational impacts on:																					
	- Gannet for cumulative collision plus displacement impacts;																					
	- Kittiwake and GBBG for cumulative collision impacts;																					
	- Guillemot and razorbill for cumulative displacement impacts;																					
	- RTD for cumulative displacement impacts.																					
	For HRA we have been were also unable to rule out AEOI for in-combination operational impacts on:																					
	- Gannet for cumulative collision plus displacement impacts;																					
	- Kittiwake and GBBG for cumulative collision impacts;																					
	- Guillemot and razorbill for cumulative displacement impacts;																					
	- RTD for cumulative displacement impacts.																					
	For HRA we have been were also unable to rule out AEOI for in-combination operational impacts on:																					
	- LBBG at the Alde-Ore Estuary SPA due to in-combination collision impacts;																					
	- Kittiwake at the FFC SPA due to in-combination collision impacts.																					
	Additionally for HRA for Boreas, based on the updated assessments, we have been able to rule out AEOI due to in-combination impacts when Hornsea 3 and Hornsea 4 are not included in the in-combination total, but due to NE's significant concerns regarding the incomplete baseline surveys for the Hornsea 3 project and the associated level of uncertainty as regards the potential impacts of that project, and the inevitable uncertainty regarding the Hornsea 4 figures (as from the PEIR), NE is not in a position to advise that an AEOI could be ruled out for:																					
	- Gannet at the FFC SPA due to in-combination collision, in-combination displacement, and in-combination collision plus displacement impacts;																					
	- Razorbill at the FFC SPA due to in-combination displacement impacts;																					
	Guillemot at the FFC SPA due to in-combination displacement impacts.																					
	For Boreas, based on the Applicant's updated assessments at D2 and D6, we have been able to rule out AEOI due to in-combination impacts when Hornsea 3 and Hornsea 4 are not included in the in-combination total, but due to NE's significant concerns regarding the incomplete baseline surveys for the Hornsea 3 project and the associated level of uncertainty as regards the potential impacts of that project, and the inevitable uncertainty regarding the Hornsea 4 figures (as from the PEIR), NE is not in a position to advise that an AEOI could be ruled out for:																					
	- Gannet at the FFC SPA due to in-combination collision, in-combination displacement, and in-combination collision plus displacement impacts;																					
	- Razorbill at the FFC SPA due to in-combination displacement impacts;																					
	Guillemot at the FFC SPA due to in-combination displacement impacts.																					

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	As noted above, these concerns are likely to only intensify at Boreas given that additional birds are being added to these totals. Three further offshore wind farm NSIPs are due to be submitted to PINS in the next twelve months (East Anglia One North, East Anglia Two, Hornsea Four). NE therefore 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.	Red		Red		Red		Red		Red		Red		Red		Red		Red		Red	
	NE therefore recommends that the Boreas Applicant (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), in order to minimise their contribution to the cumulative/in-combination collision totals by as much as is possible.															Green		Green		Green	
	NE welcomes the mitigation proposed by the Applicant during Issue Specific Hearing 4, namely to remove the smallest (and most numerous) turbine options (10MW and 11MW) from the Project design envelope, with the smallest turbine to be considered being an 11.55MW model together with a minimum of a 5m rise in draught height (i.e. from 22m HAT clearance to 27m HAT clearance). NE understands that updated collision predictions for Norfolk Boreas alone based on this mitigation and hence updated cumulative/in-combination figures will be submitted to the examination at D6.																				
	Resolved - NE welcomes the mitigation committed to by the Applicant in terms of removal of the smallest turbines (10MW and 11MW) from the project design envelope and consideration of 11.55MW turbines with a 35m draught height and 14.7MW turbines with a 30m draught height. We also welcome the revised CRM for the project alone based on this mitigation submitted by the Applicant at D5. We also welcome the revised cumulative and in-combination collision numbers presented by the Applicant at D6 to take account of the additional mitigation in terms of turbine sizes and draught heights for both Vanguard and Boreas.																				
<b>10. Post-construction monitoring</b>																					
10	We welcome the commitment from the Applicant in the In Principle Monitoring Plan regarding offshore ornithological monitoring that the Applicant will engage with stakeholders and that the methodology would be developed through the Ornithological Monitoring Plan (required under Condition 14(1) (i) of Schedule 9 and 10 of the DCO). We agree with the Applicant that the aims of monitoring should be to reduce uncertainty for future impact assessment and address knowledge gaps. Given NE's previous advice at recent projects (e.g. Vanguard) regarding our concerns about predicted levels of cumulative and in-combination impacts on North Sea seabirds (see point 9 above), and Boreas' likely contribution to those impacts should it be consented, we consider the aspects that are likely to be relevant for consideration for post-consent monitoring are as follows:	Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow	
	Improving our understanding of collision risk (which could potentially include monitoring of collisions at the site via cameras on turbines, improvements to modelling, options for mitigation and reduction);																				
	Improving our understanding of displacement (particularly understanding the consequences of displacement);																				
	Collection of reliable data on seabird flight heights, and;																				
	Colony-based studies (improvements to reference population estimates and evidence for colony phenology and connectivity).																				
	Once the final impact figures are agreed, the key issues should be identified and narrowed down so that discussion can be held with relevant stakeholders and the Applicant to identify what may need to be explored further.																				

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Chapter 8 Marine Geology, Oceanography and Physical Processes																					
182	Please be advised that the placement of seabed material from cable installation to remain within HHW SAC and agreeing the approach to this (i.e. upstream of site excavated, on similar particle sized sediment, avoiding impacts on Sabellaria reef within site) needs to be implemented as a license condition and assessed as part of the Appropriate Assessment for the site.												NE notes that the Applicant has committed to - ensuring that all sediment remains with the SAC - disposing of sediment upstream - to disposing of sediment at least 50m from S.spinulosa reef.  NE Oral submission: NE confirmed that the proposed disposal location is acceptable to NE and welcomed retention within the SAC sandbank system. However, we wait for confirmation as to how this will be secured on the DCO/DML, once secured this may be considered resolved.				Ongoing discussion with MMO and Applicant				NE recognises the issues for the marine process and securing of mitigation measures is now resolved and secured in the Control Documents SIP or CSIMP.  NE has outstanding concerns in relation to disposal of sediment in areas of similar grain size to ensure that there is no change to the receiving habitat but that is covered under benthic habitats
8.7.5, 180	Any sandwave levelling within the SAC (if agreed) must have detailed monitoring before and after the activity, with method and frequency to be agreed with NE in order to monitor impact and recovery, as there is currently an evidence gap in this area. This needs documenting for the record and implementing as a specific license condition.												NE notes that the Applicant has committed to a single post construction survey and then "Further surveys may be required 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 recorded and agreed with the MMO, monitoring will cease" within the IPMP. However, there is no mention of specific pre construction survey and/or timeframes for the post construction survey. At the moment what is meant by post construction is too ambiguous to appropriately capture the ability of sandbanks to recover.							D6 update remains unresolved and is covered in our D9 response.	
202	Please be advised that there is currently no evidence that NE has seen that sandwave levelling ensures cables remain buried and there is no future need for reburial or cable protection. Whilst this has been asserted by a number of projects we are yet to understand if this is the reality.																				As no evidence is available at this time this point remains unresolved and adds uncertainty to the achievability of proposed mitigation measures.
Table 8.16	Table 8.16 – note that whilst it is intended the material remains in the system the volume of material proposed to be dredged is large and comparable to some aggregates dredging.																				For attention of the regulator. No further action by applicant or NE required.





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8.7.6.5.1, 270	Please be advised that best practice would be to deposit any material dredged immediately upstream of where it is removed to allow natural infill as soon as possible, rather than removal to another or central site. NE would prefer material from the export cable route within HHW SAC to be deposited within the site and not removed to the offshore windfarm array. Additionally any sediment deposited should be deposited on material of a similar grain size to avoid habitat change whether inside or outside of an MPA.												We note commitments as set out in row 3. Discussions are on going on principles relating to similar grain size/ particle size. And this is not secured in the DCO/DML as yet .								Comments at D6 remain unresolved and the comments made in the control documents do not address our concerns. However, there is potential considered required by the decisions makers for this to be resolved.	
280	NE does not agree there will be negligible impact. The issue is not just bed level changes as described here, but impacts on the sandbank feature and relevant attributes – volume, extent, morphology etc. as described in the supplementary advice on conservation objectives. <a href="https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030369&amp;SiteName=hais&amp;SiteNameDisplay=Haisborough%2c+Hammond+and+Winterton+SAC&amp;countyCode=&amp;responsiblePerson=&amp;SeaArea=&amp;IFCAArea=">https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030369&amp;SiteName=hais&amp;SiteNameDisplay=Haisborough%2c+Hammond+and+Winterton+SAC&amp;countyCode=&amp;responsiblePerson=&amp;SeaArea=&amp;IFCAArea=</a>												Whilst NE recognise that the Applicants commitments to disposing of material close to where it was dredged from is likely to reduce the risk of changes in volume, extent and morphology. The assessment however doesn't fully cover the conservation objectives for the site as raised in Rel Rep.								NE maintains that impacts from sandwave levelling are not negligible as there is an impact pathway for an adverse effect on integrity. We note that the conservation objectives for the site have now been assessed against.  The conservation objectives for the site raised at D6 are HRA benthic issues and therefore we believe for EIA this is resolved.	
	Also we note that there appears to be no assessment here of the impact of the dredging itself on the attributes. NE does not agree that near field effects are low in scale due to the large volume of proposed dredging and material released. NE does not agree that the scale is low – what is the justification for this given the large volumes dredged?												We acknowledge that a detailed response was provided (AS-024) (D0) in the Applicants comments on RR row 13 in Table 3, However NE do not concur with the justification.								Whilst NE continues to disagree with the position of the Applicant in relation to the magnitude of the impacts, it doesn't materially change the outcome of our advice on the proposed mitigation measures.	
330	As mentioned previously there is currently no evidence for timescales for recovery of sandwaves from sandwave clearance, or that the sandbank system will remain undisturbed. Initial monitoring from Race Bank showed that some dredged areas showed some signs of infill within a few months of dredging and other areas did not. Whilst we agree that theoretically larger morphological processes should enable the sandbank to recover, the impact is none the less significant and timescales for recovery are unclear.																				As set out in our D9 response the level of uncertainty in relation to the recoverability of the sandbanks and also the achievability of the desired outcome i.e. cable remain buried over the lifetime of the project means that we are unable to exclude an adverse on integrity beyond reasonable scientific doubt.	
	If permitted monitoring will be required to demonstrate that recovery does occur within a year and should be a license condition.																					
Chapter 10 Benthic and Intertidal Ecology (Ref. 6.1.10)																						
General Comment	The magnitude of the impact to Sabellaria spinulosa reef is only low if micro-siting is possible.																					Please see D7 submission  As set out in D9, the ability to micro-site remains an unresolved issue.



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137	NE queries the extent of Sabellaria spinulosa at the time of pre-construction surveys and the likelihood that it will be located across the majority of the cable corridor. In point 139 it is good the Applicant has assessed room available for micro-routing, but as set out in our Site Integrity Plan and Habitat Regulations advice we have limited confidence in the feasibility of this mitigation measure.												As raised at ISH, Oral Rep, and in supporting benthic doc at D5. Area for ongoing discussion.									As set out in our D9 response this remains unresolved.
Table 10.2	Impact 2b - This states that disposal will be at least 50m from Sabellaria spinulosa reef identified in pre-construction surveys, which is consistent with nearshore aggregates advice –and may be acceptable for disposal on the seabed. But it should be noted that for offshore designated sites the appropriate buffer is normally 500m and therefore further justification for a reduced buffer should be considered to ensure a consistent approach across sites and industry.												NE notes the commitment to not releasing sediment at the surface, and using a fall pipe.									NE believes that this is now addressed by the control documents 8.20.
	If the sediment is to be surface released then this needs to be taken account of and release points identified at specific states of the tide that will ensure the resting place of the bulk of the material is a minimum of 50m from Sabellaria spinulosa reef identified in pre-construction surveys (noting Sabellaria spinulosa is tolerant to a certain amount of smothering, but the volumes being discussed here are large). This needs to be a license condition.													NE notes the commitment to not releasing sediment at the surface, and using a fall pipe, therefore this issue is may be resolved once this mitigation is secured within DCO or certified documentation.								
214	Please note that low reef is still reef.																					No further action required.
5.3.7.1 Appendix 7.1 ABPmer Sandwave Study April 2018																						
General Comment	Overall, NE remains uncertain about what the impacts are from i.e. cable installation or cable repair - terminology seems to switch between the two with a lack of clarity. For example top of page 5 it is unclear whether the dredge corridor is 7m per cable – so 28m in total or 7m per pair so 14m in total.												Whilst we recognise that the Applicant have clarified this in their comments on RR (AS-024) as 7m per cable pair so 14 in total but with a gap between. How will this be secured so that there is no ambiguity post consent/pre construction?									This remains unresolved.
iii and 4.3.3	No evidence/ justification has been presented to show that there is no difference in deposition following surface or near bed release of disposal material. We advise that this assessment is completed in order to ensure that the best method is used to minimise the impacts as much as possible. However, we note that this is covered in Chapter 8, but again is limited assessment and dependent on disposal location.												This issue can be considered resolved if commitment to near bed disposal of sediment can be secured in DCO/DML.									NE now believes that this has been addressed in the control documents and agreement of seabed release.
P1	More detailed information can be found in NE's supplementary advice on conservation objectives which should be used to assist in more detailed assessment of impacts of pressures, although we acknowledge the high level conservation objectives replicated here are correct: <a href="https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030369&amp;SiteName=hais&amp;SiteNameDisplay=Haisborough%2c+Hammond+and+Winterton+SAC&amp;countyCode=&amp;responsiblePerson=&amp;SeaArea=&amp;IFCAArea">https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030369&amp;SiteName=hais&amp;SiteNameDisplay=Haisborough%2c+Hammond+and+Winterton+SAC&amp;countyCode=&amp;responsiblePerson=&amp;SeaArea=&amp;IFCAArea</a>																					We believe that the applicant has used NE's conservation advice package in their updated assessments.



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P5	NE is currently unsure if one dredge spoil disposal zone is sufficient or whether there should be multiple zones to aid recovery. This could have potential implications for other site features such as Sabellaria spinulosa reef												NE Oral submission (REP4-043) confirmed that the proposed disposal location is acceptable to NE and welcomed retention within the SAC sandbank system. This issue can be considered green once secured in DCO/DML.								NE believes that this is now secured in the control documents.
P29	NE notes that the impacts will be bigger where the cable corridor runs east of Newarp bank, and that the areas dredged will be parallel to and therefore affect a greater proportion of sandwave. NE advises that options are considered to avoid and/or minimise the impacts as much as possible?																				We do not believe that this has been taken into consideration by the Applicant.
	We do not agree that you can separate sandwaves out from form and function of Annex I sandbanks – they are the mobile part of the sandbank and therefore affecting sandwaves is affecting the form and function of sandbanks.																				Impacts have been assessed against Annex I sandbanks in the control documents and updated HRA so this is now a moot point.
P30	NE's understanding is unclear from an impact on the SAC perspective whether phased or single build is preferable – would be good to discuss and come to a view. P31 implies that phased build between the two windfarms will not have greater impacts, but again this needs further evidence to support conclusions												This is considered by the Applicant (AS-024) in Row 21 of Table 3 in their response to RRs. Impacts to the same sandbank are still occurring even if geographically different areas are being impacted. Whilst we understand the Applicant thinks it is unlikely we would welcome further consideration on whether or not further sandwave levelling and installation activities have additional impacts on the sandbank recovery that could effect the features form and function.							We do not believe that this has been considered further by the Applicant.	
Section 4.3.1	NE would like to discuss further and agree appropriate sediment disposal locations to maximise recovery However, it is not clear what the impact and benefit is from the one proposed/ modelled disposal location?												NE notes that the Applicant has committed to - ensuring that all sediment remains with the SAC - disposing of sediment upstream - to disposing of sediment at least 50m from S.spinulosa reef.  NE Oral submission: NE confirmed that the proposed disposal location is acceptable to NE and welcomed retention within the SAC sandbank system. However, we wait for confirmation as to how this will be secured on the DCO/DML.							This has now been included in the Control documents and is therefore considered to be secure.	
P35	It is stated that dredged material being placed 'a short distance from individual bed forms' must be agreed and conditioned.												We welcome that the Applicant has committed to this, and consider this issue resolved.								



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	We agree with this. In order to ensure the ongoing form and function of the sandwaves and sandbank system is perpetuated, the dredged material would ideally be disposed of nearby and up-drift (i.e. to the south) from the proposed levelling works. And while disposal zones are highlighted, only one is indicated.												NE notes that the Applicant has committed to - ensuring that all sediment remains with the SAC - disposing of sediment upstream - to disposing of sediment at least 50m from S.spinulosa reef.  NE Oral submission: NE confirmed that the proposed disposal location is acceptable to NE and welcomed retention within the SAC sandbank system. However, we wait for confirmation as to how this will be secured on the DCO/DML.								We believe that this has been committed to within the Control document and is therefore resolved.	
	We believe that removing material would affect the structure of Annex I sandbanks and potentially change sediment extent and distribution and/or result in a change in biological composition, which is contrary to the conclusions of the HRA. The Applicant believes that it is noteworthy that the volume of material being dredged from any individual sandbank is minimal compared to the total sediment volume contained within the sandbank and for these reasons, the form and function of the sandbank systems within the Haisborough Hammond and Winterton SAC would not be disrupted by the proposed bed levelling works.												It is acknowledged that the new measures proposed would mean that sediment is not removed from the system. Once secured in the DCO/DML this can be considered resolved.									We believe that this has been committed to within the Control document and is therefore resolved.
	We would welcome the opportunity to see the detail of this assessment, in order to assess the implications for the conservation objectives of the site.																					We believe that the applicant has used NE's conservation advice package in their updated assessment.
<b>Appendix 7.2 Vanguard and Boreas Sabellaria Review</b>																						
General	There are two key challenges with mapping <i>Sabellaria spinulosa</i> reef. In some locations, <i>S. spinulosa</i> reef is difficult to map at any given time due to issues such as the acoustic signal of <i>S. spinulosa</i> reef being similar to that of the substrates on which it most commonly forms. Secondly, the distribution of <i>S. spinulosa</i> reef is variable in space and time and so any given survey is a snapshot in time. The report does not distinguish between these two issues, which makes it harder to interpret the data. Some complex methods have been employed, but it is not always clear why these methods have been used, and what advantage they have over standard methods, such as those described in Limpenny et al. 2010. It would increase the clarity of the project if it was clearly stated what challenges or limitations each method is attempting to overcome, and why the method selected is preferred.												NE note Applicants comments in response to RR (AS-024) (D0). However concerns remain as outlined in NE ISH comments, oral rep and D5 submission.									Both parties agree that mapping of <i>S. spinulosa</i> reef is inherently difficult over large areas, such as the HHW SAC and Norfolk Boreas offshore cable corridor. Although the Applicant and NE have used different methods and differing data sets to answer different mapping related questions, the outputs broadly align (see Figure 1) albeit that Natural England's approach has identified much larger and fuller "Areas to be managed as <i>S. spinulosa</i> reef" and the Applicant has identified smaller more concise areas where the Applicant is confident that reef currently exists.



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	It is best practice to determine the confidence in each map which will feed into this project (e.g. the East Coast REC) by reviewing how accurately the methods that project used will map reef at a given time, based on the data used in that project and the analysis techniques employed. Once the confidence in each individual contributing map has been considered then the maps can be compared to consider the temporal element. In using multiple methods on multiple datasets at once, the Applicant runs the risk of conflating the two challenges. If the intention of the consensus mapping is to deal with the variation in distribution over time then there are significant limitations with the way in which this has been approached, and we would advise further discussion with NE on what would be appropriate. For example, the two EC REC datasets are derived from the same survey and so do not deal with variation over time. The approach used does not account for survey effort, meaning the final map will be skewed. Specific examples of this issue are included in the table below.																				
General	<p>The ground truthing data span a wide temporal range, but are all compared to a single geophysical dataset. <i>Sabellaria spinulosa</i> reef distribution is variable spatially and temporally. If there is a considerable gap between the collection of ground truthing and that of the geophysical data (e.g. 7 years between the collection of the East Coast REC seabed samples and the Fugro geophysical data) then it will reduce the data's ability to assist in detecting reefs from the geophysical data, as the reef distribution may well change between the collection of geophysical data and ground truthing data.</p> <p>In addition, combining data from different times will reduce the usefulness of the data collected at the same time as the geophysical data. The ability to identify a relationship between the ground truthing data and the geophysical data will be diminished by the use of ground truthing data from such a wide temporal range, as inevitably the distribution of habitats at this scale will have changed over such a time period, thus obscuring or confounding the relationship between relevant ground truthing and the geophysical data.</p>																				
Page 19. Section 2.3 para 2	If an area has been mapped as reef, but a grab sample or video tow at a different point in time did not find reef in the same location, then this is not sufficient information to say this area is less likely to support reef without further clarification. <i>S. spinulosa</i> reef is patchy, and so grab samples taken on the same day at the same sampling station can differ in whether they find reef. <i>S. spinulosa</i> reef is also variable in space and time and so it can be expected that an area which is found to support reef on one occasion may not consistently support reef all of the time. One ground truthing sample compared to a map is not enough to determine the probability that the location will support reef in the future. This is particularly an issue in how individual ground truthing points have been used to change the confidence in entire polygons for Figure 9; the ground truthing point will be small relative to the polygon and so this change overestimates what the point data tells us about a patchy habitat.																				
Page 20. Figure 9.	The categories used in this map need defining. What were the possible mapping scenarios (for example, polygon with two ground truthing points from the relevant survey, one which indicates reef presence and one which does not) and how do these relate to the categories used in the map?																				
Page 21. Table 2.	Using the Gubbay criteria, low reef is still reef, so why have areas with low reefiness been mapped as sediment? This table does not make it clear what thresholds have been used for determining whether a sample is reef. It also does not refer to the primary criteria described in Gubbay; elevation, patchiness and extent.																				



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Page 27. Section 2.7.	The process outlined in this paragraph takes different datasets and maps each multiple times and then compares them, which combines two issues; confidence in mapping techniques and distribution in <i>Sabellaria spinulosa</i> reef over time. Taking one dataset and using a number of methods to create maps, and then creating a consensus map from these maps would enable an assessment of confidence in the final map based on how many of the mapping techniques had indicated that area to be that habitat i.e. consensus based on one dataset mapped using a number of techniques. This could be used to consider whether an area is appropriate to support reef. Conversely, comparing habitat maps created from many different datasets (i.e. Fugro vs East Coast REC) could feasibly be used to consider temporal variation in reef extent and distribution (given a number of caveats and a robust method). If sufficient data was available this could then be used to consider how likely an area which is appropriate to support reef is to be supporting reef at a given time. The technique outlined in this paragraph therefore does not allow us to determine whether two maps do not agree because one is of low confidence, or because there was a change in habitat distribution over time.																				
Appendix 8.16 Scour and Cable Protection Plan																					
General Point	The Scour protection and Cable protection plan doesn't cover any operation and maintenance placement of protection. Does this mean that the plan is only for construction? Where will the O&M be considered? There were concerns in relation to Vanguard and the same Applicant wanting the ability to use up to the consented about of cable protection at any point over the lifetime of the project. NE would not support such a proposal and the amount included on the face of the DCO/DML are for installation only. Thus the outline Operations and maintenance plan should be amended to reflect this.												The Applicant has updated the OOOAMP and through various submissions made clear that additional cable protection would be subject to a separate licence. Therefore this issue is resolved.								Yes
General Point	NE notes that rather than acting as a stand-alone document, this Plan summarises the worst case scenario outlined in the project description and signposts to the relevant parts of the Environmental Statement where the potential impacts have been considered.																welcome the revisions to OSPaCPCP to take into account the reductions in scour and cable protection. We have no further advice to that already provided in our previous responses.				Natural England notes that a Cable Specification, Installation and Monitoring Plan (CSIMP) or SIP include the control mechanisms for within HHW SAC. Therefore we are in agreement on this point.
General	NE would ordinarily expect such a Plan to include consideration of the WCS along with a more detailed analysis of the project zone identifying where scour and cable protection is more likely to be required, based on survey data gathered by the project. This should be followed by a detailed consideration of the potential impacts of installing protection in these areas. In addition, we would expect to see detail around the potential options to minimise or mitigate the impact of protection as far as possible. The Plan should be considered to be a live document, subject to further refinement as the project parameters are more clearly defined post-consent.																8.16 Outline Scour Protection and Cable Protection Plan (Version 3) (Clean) (REPS-039)				Natural England notes that a CSIMP or SIP include the control mechanisms for within HHW SAC. In addition a cable burial assessment has been undertaken to inform the Control documents based on the best available evidence which is must welcome and demonstrates where cable burial is more likely to be required. However, please note that we still have concerns in relation to the use of cable protection within the SAC.



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2	NE notes that this only relates to areas outside of Haisborough Hammond and Winterton Special Area of Conservation (HHW SAC). But the section of cable route through the SAC is outlined in section 3 with reference to the Site Integrity Plan (SIP). However, NE advises that the SIP has insufficient detail to fully absolve the need for a scour and cable protection plan for the SAC	Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Green	The SIP and CSIMP (Control docs Deadline 6) have been updated to remove the requirement for a scour protection and cable protection plan for HHW SAC.
7	NE welcomes the consideration of the cable protection in the application. But believes that an adverse effect can't be ruled out from its placement in HHW SAC. Please Appendix 2.2, 2.3 and 2.4.	Red		Red		Red		Red		Red		Red		Red		Red	Responded at D7 to say we have no further comments to that already made	Red		Red	
34	NE queries the justification for 100m of scour protection leading up to and from the turbines when other projects have used much less. Can this be minimised further?	Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow	NE believes that this point remains outstanding.
Appendix 8.20 HHW SIP																					
General Point		Red		Red		Red		Red		Red		Red	Ongoing discussion.	Red		Red	NE provided comment at D7 to the HHW SAC Position Paper.	Red		Red	Please see D9 position statement.
General Comment		Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple	Please see D9 position statement.
General Comment		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow	NE believe that this remains unresolved.
7	Because a minimum amount of space is required per project NE considers that a single corridor doesn't reduce the impacts unless installed at the same time and/or the infrastructure is installed once and is for both projects.	Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple		Purple	No further comment - Information for the decision maker.
10	NE considers that a worst case scenario can be identified in the consenting phase. The Applicant propose to use a Grampian condition to aid consenting and then a Site Integrity Plan to demonstrate no adverse effect on integrity post consent/preconstruction. This is not helpful especially as based on best available evidence an adverse effect on integrity could not be ruled out at this time. The AA should be undertaken now on the best available evidence. Their proposals push the regulatory duty from BEIS SoS (consenting) to MMO/Defra SoS post consent. We advise that under The Conservation of Habitat and Species (as Amended) that this is addressed at the consenting phase. This advice differs from that provided to Vanguard as we have a current case in Triton Knoll OWF that has now demonstrated that micro siting of Annex I reef within Inner Dowsing Race Bank and North Ridge SAC is not possible and therefore a risk based decision needs to be made as to whether or not the cable can be installed. Given that there is evidence to demonstrate that there is a higher probability for Vanguard/Norfolk Boreas (NB) to have Annex I Sabellaria spinulosa reef within the cable corridor than at Triton Knoll we advise that an Adverse Effect, both now and post consent, can't be ruled out. Therefore we advise that alternatives and/or compensation is secured	Red		Red		Red		Red		Red		Red		Red		Red		Red		Red	Please see D4 submission [REP4-041] and D9 submission.
11	Whilst NE has received legal advice that supports the use of a Grampian condition; on this occasion due to the high probability of an adverse effect on integrity which can be determined at the consenting phase, that is unlikely to diminish prior to construction, (even with the ephemeral nature of Annex I reef), we believe that this matter should be dealt with as part of the consenting phase. It should also be noted that the only proven mitigation would be to microsite and where that is not possible then an 'alternative' route would need to be found. It is unlikely that agreement could be found on compensation for the permanent loss of Annex I reef.	Red		Red		Red		Red		Red		Red	Concerns remain as outlined in ISH, oral rep and D5 submission.	Red		Red		Red		Red	Please see D9 response in relation to permanent habitat loss and the decommissioning of cable protection.



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12 – 1 <sup>st</sup> bullet point	NE agrees that Sabellaria spinulosa is ephemeral, but there is evidence to demonstrate that it consistently occurs in some areas more than others also known as high confidence reef areas. These are the areas where fisheries management measures are being implemented in the form of byelaws and closure areas to aid in the recovery of Annex I reef. It is therefore anticipated that reef would develop and expand in these management areas (i.e. more likely to be present with the removal of fisheries pressures). Two of which overlap with the NB cable corridor. Please see Appendix 2.2 in relation to our advice on the byelaw areas. It should be noted that any plan or project should not hinder the objectives of such management measures i.e. the restoration of reef.												Concerns remain as outlined in ISH, oral rep and D5 submission.								Please see D9 response where we set out the remaining uncertainties. But we acknowledge that the Applicant has adopted mitigation measures to significantly reduce the risk of an AEol.
12 - 2 <sup>nd</sup> bullet point	Please see Appendix 2.5 which provides rationale for NE's advice that an adverse effect on integrity can't be ruled out from the permanent loss of Annex I reef from cable protection within a designated site.												NE recognises and welcomes the Applicant's proposed mitigation to not put cable protection within areas to be managed as reef, however this doesn't remove our concerns in relation to lasting habitat change of Annex I habitats from the use of cable protection within the SAC.								Please see NE's D9 response.
12 – 3 <sup>rd</sup> Bullet Point	NE recognises that remediation in discrete areas where there will be cable crossing is a necessity and due to the presence of existing infrastructure it is less likely for Annex I reef to be present. However we would strongly encourage the removal of decommissioned cable rather than the use of cable protection.												NE welcomes the Applicants consideration of the removal of redundant cables. We would like to see this conditioned within the DCO/DML.								NE notes that there are agreements in place with BT for the removal of sections of disused cables within HHW to reduce the number of cable crossings and therefore cable protection. Therefore we agree that Applicant has addressed this point but recognise that is hasn't fully mitigated the impacts of cable protection.
13	The use of Site Integrity Plan (SIP) for SAC habitat features has only been used by Vanguard. We have reviewed our advice with the MMO as stated above in light of the Triton Knoll OWF case we do not believe that SIPs are appropriate for benthic issues where a worst case scenario can be determined. In addition they do not enable in-combination assessments with other plans and projects and may therefore restrict other development within the SAC. Please note that unlike with the Southern North Sea SAC where the in-combination assessment is dependent of factors outside the control of the project and there are several options to mitigate the impacts, this is not the case for benthic SACs.												Concerns remain as outlined in ISH, oral rep and D5 submission.								
14	Whilst NE is of the view that all issues should be dealt with upfront; the SIP is a good framework for reviewing impacts at all phases of the project. Although please see Appendix 2.1 on our advice on small scale impacts.																				Please see NE D9 submission in relation to small scale losses.
15 and Plate 1.1	Whilst the post consent consultation is welcomed. It still doesn't address the adverse effect on integrity which currently can't be ruled out. It is assumed by the flow chart that mitigation can be found, but based on NE's recent experience we believe that this will not be possible for the installation of the NB cables and/or cable protection. Please note that future marine licence variation requests, which may or may not be permitted, are not mitigation for the current project.												Concerns remain as outlined in ISH, oral rep and D5 submission.								
24	As set out earlier Sabellaria spinulosa reef has already been found and therefore we do not agree with the Applicant.																				



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30	Please see the published condition assessment for Haisborough, Hammond and Winterton SAC (July 2019). HHW SAC is under pressure from historic and ongoing activities from proposed offshore windfarm cables plus existing oil and gas pipelines and associated pipeline protection, aggregates extraction and fishing activities. This has resulted in the site being in unfavourable condition. Fishing activities are resulting in the implementation of management measures for Annex I reef features in the form of byelaws and closure areas. NE advises that other activities should not hinder any management measures designed to restore site features. Therefore there is conflict between the aspirations of two government departments.	Red		Red		Red		Red		Red		Red	Concerns remain as outlined in ISH, oral rep and D5 submission.	Red		Red		Red		Red	Please see D9 response where we set out the remaining uncertainties. But acknowledge that the applicant has adopted mitigation measures to significantly reduce the risk of an AEol.
Section 2.3	It is not just the installation of the cables that will impact Annex I features. The proposed operation and maintenance (O&M) activities are likely to hinder the recoverability of any Annex I reef features.	Red		Red		Red		Red		Red		Red		Red		Red		Red		Red	
Table 2.1	It is not clear to NE if sufficient time has been factored in to the timetable to take account of processes required should an adverse effect on integrity be determined. In our experience on other terrestrial projects this has taken 12-24month to agree and secure any compensation i.e. it is not a quick or a straight forward process especially when it is untested in the marine environment and agreement from several interested parties is required.	Yellow		Yellow		Yellow		Yellow		Yellow		Yellow	We note Applicant submission (AS-024) ROW 29. This is an area of ongoing discussion, further detail in NE D4 submission.	Yellow		Yellow		Yellow		Yellow	Please see NE D9 submission in relation to the proposed mitigation measures. Whilst there are outstanding concerns we believe there is potential for these to be addressed.
38 - 41	Whilst NE welcomes the commitments made by the Applicant to update the SIP based on best available information there still remains a fundamental project risk of an adverse effect on integrity.	Red		Red		Red		Red		Red		Red		Red		Red		Red		Red	Remains unchanged. Details provided at D9.
42	Whilst we understand that the Applicant is proposing to reduce the amount of cable protection required in HHW SAC from 10% to 5% this is still not confirmed. Therefore, we reserve the right to amend our advice once such a proposal is confirmed. However, please note that this reduction whilst welcomed is unlikely to change our advice. As per the advice provide for Vanguard.	Red		Red		Red		Red		Red		Red	This was confirmed since the additional submissions on the 2nd of October 2019. But the issue in relation to cable protection having a lasting impact on features within a designated site remains.	Red		Red		Red		Red	Please see NE D9 response for update.
Table 3.1 – 1 <sup>st</sup> Bullet	NE requests and notes that no assessment of the disposal location and impacts has been made. We therefore advice that this is undertaken during examination.	Red		Red		Red		Red		Red		Green	Due to the disposal methods proposed NE no longer feels that this is required.	Green		Green		Green		Green	
Table 3.1 – 2 <sup>nd</sup> Bullet	NE would argue that the presence of Sabellaria spinulosa is known and whilst the location may change prior to installation the adoption of the fisheries byelaws is more likely to ensure the ongoing presence of reef and the possible expansion.	Red		Red		Red		Red		Red		Red	Ongoing discussion	Red		Red		Red		Red	Please see NE's D4, 5, 7 and 9 responses for update.
Table 3.1 – 3 <sup>rd</sup> Bullet	The impacts to Annex I reef features is considered by the Applicant to be temporary. This is something that the SNCBs are currently seeking to confirm through monitoring, but until this is completed (outside of the examination timeframe for NB) there remains doubt over the severity of the impacts and the recoverability.	Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow	Unchanged.
Table 3.1	Please note that there is uncertainty over the recoverability especially from repeated impacts from O&M activities.	Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow		Yellow	Whilst we note that further information has been included in the control documents, this remains an outstanding concern.
Table 3.1	HHW SAC is under pressure from historic and ongoing activities from proposed offshore windfarm cables plus existing oil and gas pipelines and associated pipeline protection.	Red		Red		Red		Red		Red		Red		Red		Red		Red		Red	

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	Cable installation in sandbank sites has been shown to be challenging due to impacts associated with cable installation such as sandwave clearance and use of hard substrate as cable protection. Cabling through this site may be possible if evidence is provided that impacts are short-lived and the feature will recover. Consideration would need to be given as to how sufficient cable burial is achieved without the need for cable protection. Should sandwave clearance be necessary to achieve burial depth and avoid the use of cable protection then, as above, it would need to be demonstrated that impacts are short-lived, the feature can recover, material is retained in the system and can be deposited on material of the same grain size.																				Natural England believes that the sandwave levelling document and the control documents including the cable installation assessment provide sufficient evidence that there is the potential for sandwave levelling to mitigate the impacts. However because there is limited evidence on the duration of recovery and the effectiveness over a longer period to ensure that cable remain buried we believe an AEoI can't be excluded beyond all reasonable scientific doubt.
Table 3.1.	Permanent loss of Annex I reef hasn't been assessed because the Applicant considered that reef could recolonise artificial structure. However, NE doesn't consider this to be Annex I reef - Please see Appendix 2.1												Ongoing discussion. Applicant to provide further documents.								Agree to disagree
45	NE is concerned that the only form of mitigation for Annex I reef i.e. Micrositing will not be possible due the presence of Annex I reef across the cable corridor. Case example Triton Knoll OWF.																				Please see NE D9 response.
48	Whilst NE recognises that a Grampian condition is appropriate, the use of the SIP to remove consideration of adverse effect on integrity at consenting isn't. We would argue that there is a risk to achieving a successful CFD. If a CFD is secured then the key milestones are unlikely to be met due to trying to resolve adverse effect on integrity pre construction. It also puts both the MMO and NE under additional and potentially unreasonable pressure to resolve.																				Please see REP4 - 041.
54	NE agrees with the Annex I survey occurring within 12months of construction, but we recognise that the cable procurement process has happened before this. Therefore how will the Applicant guarantee there is sufficient slack to micro site the cables?																				NE notes that in the control document a further interim Annex I reef survey is proposed prior to the pre-construction reef survey. We therefore feel that the Applicant is building confidence in the data set. However, NE's REP5 - 081 on the Applicant's clarification note on optimising cable route through the HHW SAC identifies outstanding concerns.
56	NE would welcome further consideration on the significance of small scale impacts to the site and potential (more robust) mitigation measures. As set out previously it is not possible to assess the parameters of 'where possible' under the Habitat Regulations. The Annex I reef mitigation is designed to ensure the complete avoidance of an Annex I reef (define within a specific area/boundary. Therefore the current SIP is contradictory in places as it is identified that not all impacts will be avoided/fully mitigated. Please note that NE is of the view that the project impacts are not de minimis.																				Whilst we acknowledge that the applicant has attempted to do this please see REP4 - 041 and our D9 response.
58 - 60	NE would argue that it is not just about the maintaining the extent of the feature, but also the form and function. The favourable condition status of the feature will also need to be used to provide the context for any decision making process, both at the consenting and pre construction phase.																				Please see NE REP5 - 78 and D9 response that provides further advice. However this remains unresolved.



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67	The Applicant has committed to having the 'least effect' on priority areas managed as reef, but there is nothing provided to demonstrated how this will be achieved and to what extent.												NE notes and welcomes that cable protection within these areas has now be excluded by the Applicant. However the ability to micro site cables remains a concern.								Please see NE D9 response.
71 and 5.2.1	Please see previous comment of the ability to microsite. NE notes in Annex 1 of the SIP Annex I reef is shown to straddle the length of the cable corridor. Therefore in this scenario mitigation in the form of micrositing will not be possible.												Concerns remain as outlined in ISH, oral rep and D5 submission.								Please see NE's D9 response.
82	Please note that Vanguard has the same issue as NB therefore unlikely to learn from sister project.																				
Table 5.1	NE welcomes commitment but it doesn't alter our advice that an adverse effect on integrity can't be ruled out.																				Please see NE's D9 response.
85-90	Where will the disposal areas be? How can it be guaranteed that the sediment will remain in the system and that the dredge material will be >95% similar in particle size to disposal locations?												NE Oral submission (REP4-043) NE confirmed that the proposed disposal location is acceptable to and welcomed retention within the SAC sandbank system.								
	NE suggest that the SIP should contain criteria that the disposal locations within the SAC should meet to ensure that any sediment will remain within the system, to ensure that the dredge material will be >95% similar in particle size to disposal locations whilst ensure that there is no interaction with Annex 1 reef.												NE notes the updated SIP. NE notes that there is ongoing discussions in relation to the 95% similar grain size and wording of the condition with MMO.			Ongoing discussion					Please see NE's D9 response where we note that there is disagreement between the Applicant and NE.
	NE continue to suggest that the disposal volumes should be split according to type of material, for example drill arisings, boulders, sand and mud. This is important because different materials have different impacts and those impacts have been assessed based on maximum volumes as provided in the ES.													Please see NE's comments on the responses to RR row 9 "NE is content with the answer provided and considers this issue closed."							
	Also the maximum volumes taken within the Haisborough, Hammond and Winterton SAC should be detailed separately to ensure the impacts to the designated site remain within the impacts assessed. The wording should also limit the area of impact from removal of substances for disposal to the area assessed.																				
89	NE advises that an in principle sediment disposal strategy should be undertaken and provided as part of the consenting process .												We note that the Applicant has made a change to the SIP (D1) to commit to this.								NE notes that this is included with the control documents . However, this doesn't consider how it will be ensured that sediment will be deposited in areas of similar grain size.
91-92	NE advises that this needs to be updated as there is no qualification as to what is essential and the impacts thereof. It is our view that an adverse effect on integrity can't be ruled out for cable protection at both 5% and 10% of the length within the HHW SAC.												NE recognises and welcomes the Applicant's proposed mitigation to not put cable protection within areas to be managed as reef.								Please see NE's D9 response.



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Comment on decommissioning of cable protection	Please note that within NE's post-examination submission for Norfolk Vanguard Annex 4 which discusses the possible decommissioning of cable protection, NE highlights that whilst the impacts from cable protection are no longer considered to be permanent; the placement of cable protection is considered to be having a lasting change on the habitat over a period of 30 years (life time of project) and beyond, as recovery will not be immediate. For decommissioning to be considered as mitigation then this would need to be restricted to concrete mattresses (or similar type product) in the DCO/DML.																				Please see NE's D9 response.
Comment on functionality of sediment between Annex I features	NE notes that Norfolk Vanguard and Boreas highlight only the delineated Sandbank feature and buffer zone as areas of Annex I Sandbanks that are to be managed for conservation as Sandbanks. However, the sediment between Sandbanks is also important for the functioning of the Sandbanks, as well as for Annex I Reef formation, and therefore impacts occurring between features may still be detrimental to the Annex I feature(s). Therefore it cannot be determined that the impacts are small scale and inconsequential.																				Please see NE's D9 response.
Comment on decommissioning of cable protection	We reiterate that we can agree that decommissioning cable protection would change the impact to temporary, however, there is still a further consideration of significant temporal impacts from a lasting impact for >30 years. It therefore can't be considered with certainty to be a temporary impact. In addition, it is our view that 30 years of change in habitat can't be considered to be a small scale loss/change.																				Please see NE's D9 response.
Comment on decommissioning of cable protection	Whilst the removal of cable protection would potentially change the impact to temporary the longevity of the impact and uncertainty in relation to recoverability means that NE is unable to say beyond reasonable scientific doubt no adverse effect on integrity. In addition we expect impacts to Annex I sandbank to be taken into consideration.																				Please see NE's D9 response.
Comment on decommissioning of cable protection	Reference is made to cable protection, but it is not clear if that relates solely to concrete mattresses (or similar type product) as set out in the additional mitigation measures. We advise that it is clearly indicated whether cable protection is assessed in relation to only concrete mattress or if still required, the worst case scenario for cable protection. However, if it is worst case scenario NE advises that decommissioning is not considered as a mitigation measure on which to be reliant on in the decision making process.																				Please see NE's D9 response.



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Comment on compensatory mea	Please note NE's post-Examination submission (Annex 7) on Norfolk Vanguard 8.25 in-principle compensation measures on the following: consideration of planting native oyster, consideration of extension to HHW SAC, fisheries management and removal of disused anthropogenic structures and litter.																				Please see NE's D9 response.

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Chapter 12 Marine Mammal Ecology																					
Para 739 & 742	NE is broadly in agreement that the implementation of the SIP will reduce impacts to Grey seal to minor adverse; however we would welcome further discussion around this to better understand how the Applicant envisages this will work. NE also notes that the reference populations that have been used for grey seals appear to be lower than expected.												NE is in agreement with the explanation provided by the Applicant to this point in AS-024. NE considers it is reasonable to put the impact to grey seal in the context of the wider in-combination reference population here and agrees it is unlikely that all the grey seal potentially impacted will be from the Humber Estuary SAC.								
5.3 Information to Support Habitats Regulations Assessment																					
Para 1194 & Table 8.63	NE would welcome further discussion with the Applicant regarding their conclusion of no adverse effect on integrity of the Humber Estuary SAC considering up to 37% of the grey seal population of the SAC could potentially be impacted from Norfolk Boreas and all other projects and plans.												NE is in agreement with the explanation provided by the Applicant to this point in AS-024. NE considers it is reasonable to put the impact to grey seal in the context of the wider in-combination reference population here and agrees it is unlikely that all the grey seal potentially impacted will be from the Humber Estuary SAC.								
8.12 Offshore In Principle Monitoring Plan																					
General	NE considers it is not sufficient to just commit to undertaking strategic marine mammal monitoring. Marine mammal monitoring should seek to answer questions or validate assumptions made in the environmental assessment and it is those questions and issues that should be included in the monitoring plan. NE acknowledges that marine mammal assessment issues are likely to be very similar across projects and it may be that monitoring is best undertaken at or between several projects to address these issues and find answers to the original questions. How this is devised and undertaken is for discussion and agreement between the Applicant and other developers and NE will be happy to work with them to achieve this.												Ongoing discussion with Applicant and MMO to determine wording of condition. NE to provide an example of condition wording for D6.			NE provided suggested wording for condition in NE.NB.D7.02.DCO					NE is willing to accept the Marine Mammal Monitoring condition proposed by the MMO by email on the 24.04.20. Once incorporated in the DCO this may be considered resolved.

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8.17 In Principle SNS SAC Site Integrity Plan (SIP)																						
General	As per NE's advice on other recent NSIP applications, a mechanism needs to be developed by the regulators to ensure continuing adherence to the SNCB thresholds over time. Multiple SIPs will be developed, piling can take place over several years, and new projects can come online during this time. Should potential exceedance of the thresholds occur, a process for dealing with this issue needs to be in place – the affected developers / industries will need to work together with the regulator and SNCBs to prevent adverse effect on the Southern North Sea SAC. Until the mechanism by which the SIPs will be managed, monitored and reviewed is developed, NE are unable to advise that this approach is sufficient to address the in-combination impacts and therefore the risk of adverse effect on integrity on the Southern North Sea SAC cannot be fully ruled out. This is not an issue unique to the project and work will need to be undertaken to reduce the noise levels of multiple wind farms potentially constructing at the same time.		Agreed within SoCG 4th November that while the Applicants agree that a mechanism is needed that this has been assigned as a Purple RAG status and needs consideration by ExA																			It is agreed that a strategic mechanism is required from the Regulator to ensure that disturbance can be limited to an acceptable level. The current requirement for a SIP (as supported by the Review of Consents) is sufficient to allow any mechanism to be fully incorporated without need for variation. However, without a mechanism in place to manage the SIPs then NE are concerned with the management of in-combination impacts.
Table 2.1	NE welcomes the commitment from the Applicant to periodically review the SIP as the project develops, however NE considers that 4 months prior to piling commencement is not much time to agree the final SIP so it will be imperative that as much information and review as possible is undertaken as soon as possible, particularly after the final project design has been decided.												Ongoing discussion									As stated in SOCG it should be left to the SoS to decide whether 4 or 6 months is included in the final DCO. The Applicant advocate 4 months whereas NE Advocate 6 months.

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DCO DOC 6.1.22 Environmental Statement Chapter 22 Onshore Ecology																					
	There is currently no policy included regarding net gain either within the Onshore Ecology Chapter or the Planning Statement. The upcoming revisions to the NPS: The recent government response to the revised NPS consultation in relation to net gain states that "the 2011 Natural Environment white paper set out an ambition to achieve net gain for biodiversity as opposed to net loss. The recently published 25 Year Environment Plan identified actions to both strengthen the commitment to biodiversity net gain and expand the approach over time to natural capital net gain and ultimately wider environmental net gains as appropriate metrics become available. The NPS will establish the need to consider the potential to achieve biodiversity net gain and will set the context for achieving this at a strategic level without analysis of impacts on individual sites. More detailed assessment, for example based on the Defra biodiversity metric, will be undertaken as part of the DCO application". The Government's 25 Year Environment Plan: As already mentioned, net gain is embedded in the Government's recently published 25 Year Environment Plan as a key action for ensuring that land is used and managed sustainably (see pp. 32-34 for general principles). As per the Advice Note 11, Annex C – NE and the Planning Inspectorate, "NE will seek opportunities for positive environmental outcomes from major infrastructure developments. NSIPs can make a significant contribution to delivering the environmental ambition in the Government's 25 Year Environment Plan (25YEP). This aims to deliver an environmental net gain through development and infrastructure. We can help Applicants and the Examining Authority to better understand and value the benefits derived from the natural environment ('natural capital'). We may advise on opportunities to secure positive environmental benefits from NSIPs. Priorities include...establishing more coherent and resilient ecological networks and providing and enhancing habitats for protected species. We can also advise on approaches and metrics that enable projects to achieve biodiversity net gain, as set out in the National Planning Policy Framework and the recent and developing National Policy Statements, and on approaches to achieving wider natural capital gains". Furthermore, the spring statement from the Chancellor (13th March 2019) also made specific reference to mandating biodiversity net gain, in which he said: "Following consultation, the government will use the forthcoming Environment Bill to mandate biodiversity net gain for development in England, ensuring that the delivery of much-needed infrastructure and housing is not at the expense of vital biodiversity". The recent mandatory biodiversity net gain consultation: The requirement for biodiversity net gain was also the subject of this consultation, for which an associated new metric 2.0 is to be produced imminently. The construction industry research and information association (CIRIA), the Chartered Institute of Ecology and Environmental Management (CIEEM) and the Institute of Environmental Management and Assessment (IEMA) recently launched Biodiversity net gain Best Practice guidance to which NE provided input to and further best practice guidance is expected soon. Many major infrastructure projects in the UK have now committed to delivering a biodiversity net gain and some examples of these are included in this guidance. NE recommends that in order to future proof the Boreas DCO application that net gain is incorporated into the design at the earliest opportunity.	NE understand through SOCG discussions that the Applicant will include environmental enhancements but will not undertake Net Gain for this development. We continue to recommend to the Applicant that there is the potential for Net Gain within the red line boundary and that this be considered in future.						NE continue to recommend that Net Gain is considered on this project.					NE continue to recommend that Net Gain is considered on this project.								NE note that it is not currently required for NSIPs to provide Net Gain but we continue to recommend Net Gain for all projects.
22.7	Given the recent HDD drilling mud breakouts experienced on a number of other OWFs, NE advises that a commitment to use best available techniques and a precautionary methodology be included and that the worst case scenario impacts of potential bentonite breakout are assessed. Given that the Wensum SAC and SSSI are largely in an unfavourable recovering or unfavourable no change we would advise that any effects may constitute an adverse effect on integrity. We advise the Applicant to partner with Environment Agency on the River Wensum Partnership project. The Applicant needs to outline potential impacts of a drilling mud breakout either under, or in the floodplains of, the Wensum, and potential effects on SAC and SSSI features that may be located up or downstream of the breakout. There is currently insufficient information provided in the documents provided on HDD tolerance monitoring, how quickly bentonite release can be stopped, or an assessment of a worst case scenario bentonite breakout considering extent, timings and environmental impacts.	Red	Applicant to provide a HDD Clarification Note at next appropriate Deadline	Red	Applicant has submitted Clarification Note Trenchless Crossings and Potential Effects of Breakout on the River Wensum D1.	Red	Applicant submitted Method Statement for the crossing of the River Wensum D2.	Green	NE are content with the detail currently provided in the Clarification Note [AS-3.D1.V1] and Method Statement [AS-5.D2.V1]. NE look forward to being consulted on the site specific water crossing plans post consent as specified within oCoCP.	Green		Green		Green		Green		Green		Green	Yes
Table 22.8	The Zones of influence for the study areas should be determined by the designated sites and features of interest and potential impact pathways. We advise the Applicant to refer to NE's Impact Risk Zone for SSSI, available on Magic (Link). Setting the scope of the study area as 2km from designated sites is not sufficient to incorporate sites wide ranging mobile species for example, the study area for Paston Great Barn SAC Barbastelle bats should cover foraging areas and supporting habitat, and should consider Functionally Linked Land for swan or geese species for Broadland SPA; as discussed during the Vanguard examination	Yellow		Yellow	Area for ongoing discussion.	Yellow		Green	We note a 5km ZOI for assessment of impacts to Paston Great Barn has been adopted based on foraging areas and a 5km ZOI identified in relation to Broadland SPA and Ramsar features.	Green		Green		Green		Green		Green		Green	Yes
Table 22.8	The zones of influence for Ancient Woodland should be clearly stated. From Figure 22.2 would appear that the HDD compound TC3 is in close proximity to Ancient woodland and that Necton Wood may have trenching or development occurring adjacent to two of its edges. Consideration should be given to any edge effects and air quality impacts. We note that the onshore cable route will not encroach within 15m of Ancient Woodland. We refer the Applicant to NE's standing advice for ancient woodland and the management of buffers (Link) and suggest these are incorporated into the OLEMS.	Yellow		Yellow	Area for ongoing discussion.	Yellow		Green	We note updated OLEMS submitted at D1 welcome that preconstruction survey mitigation will adhere to Forestry Commission and NE's Standing Advice.	Green		Green		Green		Green		Green		Green	Yes
Table 22.10	Does not include a number of designated sites where potential impact pathways have been identified such as Broads SAC or Broadland SPA and Ramsar. We do note however the updated 5.3.5.3 Information to support HRA, see comments below.	Yellow		Yellow		Yellow		Green	Welcome screening in of Broadland SPA and Ramsar features for direct and indirect effects on ex situ habitats for swan, goose and assemblage species during construction and decommissioning, as raised in our Rel Rep [099]. We also note that Broads SAC though not included in Table is included in screening Matrices (Site 183).	Green		Green		Green		Green		Green		Green	Yes
22.6.3.13.1	Arable Land- there is no discussion on any Countryside Stewardship or Environmental Stewardship schemes agreements in place along the route. The Applicant must consult the Rural Payments Agency at the earliest opportunity to discuss the impacts to schemes.	Yellow		Yellow		Yellow		Green	We note within the Schedule of Mitigation (184)A commitment will be made within the private agreements between Norfolk Boreas Limited and the landowner/occupier to compensate for losses incurred due to potential impacts on ESS during the construction phase of the project. Within SOCG 'the Applicant will discuss any Countryside Stewardship agreements with landowners and the Rural Payments Agency post-consent'.	Green		Green		Green		Green		Green		Green	Yes



22.6.3.13.1	We are also pleased to see that the project will take account of any agri-environment schemes and their land management objectives by negotiation with individual agreement holders. During the Vanguard examination the Applicant reassessed (Eratta document 9.4) all Grade 3 land as best and most versatile agricultural land and the effects to BMV were reassessed as minor adverse. The Applicant should confirm that they have incorporated this methodology into the Boreas assessment.						Applicant confirmed with in SoCG p39) That 'All land classified as Grade 3 has been assumed to be 'best and most versatile' (i.e. Grade 3a) land for the purpose of the assessment presented in the ES'.												Yes
22.6.5.5	Great Crested Newt draft Licence application has been received (25.07.2019) and NE are currently considering a Letter of No Impediment.		GCN Letter of No Impediment Issued 09.09.19				GCN Letter of No Impediment Issued 09.09.19 and included in DCO application.												Yes
Table 22.13	Identifies core commuting/foraging areas, are these presented on a Figure? Maps of the main commuting/foraging areas for Barbastelle, as provided as Clarification Notes for Vanguard do not seem to have been incorporated within Boreas application Documents. The Examination process is supposed to be front loaded so please provide this evidence as soon as possible.		Applicant to submit Clarification Note at suitable Deadline				Applicant has not submitted Clarification Note regarding Paston Great Barn but has included Hedgerow Mitigation as included within Boreas. Is a clarification Note still to be submitted?							NE note that the clarification notes were submitted into examination in AS-025					Yes
Table 22.21	Embedded mitigation could include that where gaps in hedgerows of medium to high importance for bats are open for 2 year duct installation and then 2 year duct pulling to include temporary planting. We advise this is included within the OLEMS and Hedgerow Mitigation Plan.						Applicant has confirmed that it will not be possible to install temporary planting in gaps in hedgerows however will consider planting more mature plants to reduce timeframes. NE would prefer if this was a commitment rather than a consideration, especially for hedgerows of medium to high importance for Barbastelle, within the 5km ZOI from Paston Great Barn												Yes
22.7.5.17 Para 680	Fish- There is currently insufficient information provided for NE to comment on the potential impact of water crossings on fish we would expect any impacts to fish to be considered in the site species water crossing plans. Please confirm where the commitment to produce site specific water crossing plans is incorporated in the Boreas application.			Area for ongoing discussion.			We note the commitment within Schedule of Mitigation (159) and oCoCP (140) to select techniques that can allow fish passage to be maintained in watercourses which support migratory fish species such as brown trout, where appropriate. We presume this will include eel and look forward to being consulted on the site specific plans.												Yes
<b>DCO DOC 5.3 Information to Support Habitats Regulation Assessment</b>																			
5.4.1	Direct impacts on the River Wensum SAC have been ruled out given the use of HDD. However given the number of HDD drilling mud breakouts that have occurred recently on other OWF projects, we advise that this is a regular enough occurrence to be considered a likely impact. We therefore advise that direct effects of HDD breakouts on the Wensum SAC designated features are scoped in and impacts assessed against a worst case scenario considering, scale, duration and timing. The conservation objectives require supporting processes (on which the features rely) are maintained. The target for water quality is to achieve at least good chemical and biological status. The potential impacts of HDD breakout and bentonite breakout and chemicals used to stop and clear up breakouts should be assessed against water quality guidelines.		Applicant to submit Clarification Notes at suitable Deadline		Applicant has submitted Clarification Note Trenchless Crossings and Potential Effects of Breakout on the River Wensum D1.		Applicant submitted Method statement for the crossing of the River Wensum and additional water courses							NE are content with the detail provided in the Clarification Note[ AS-3.D1.V1] and Method Statement [AS-5.D2.V1]. NE is content that with the methodology and safeguards as laid out, that there is unlikely to be a Significant Effect from HDD bentonite breakout on the River Wensum and its features of interest. NE look forward to being consulted on the site specific water crossing plans post consent as specified within oCoCP.					Yes
5.4.1	Natural levels of coarse sediment supply are critical to the maintenance of high quality spawning habitat for lamprey species, maintaining bed substrates in optimal condition for egg-laying and juvenile and adult cover. Excessive delivery of fine sediment, can cause siltation of egg-laying sites and juvenile and adult refugia (conservation objectives Supplementary Advice (2019)). The potential impact of a HDD breakout on features of interest and their supporting habitats should be assessed.													NE is content that with the methodology and safeguards as laid out, that there is unlikely to be a Significant Effect from HDD bentonite breakout on the River Wensum and its features of interest. NE look forward to being consulted on the final water crossing plan, based on site specific findings.					Yes
5.4.1	The restoration of the HDD compound on the flood plain of the river Wensum should be restored in accordance with the River Wensum Restoration Strategy and the River Wensum SAC conservation objectives Supplementary Advice. Where possible restore appropriate soil/ground moisture conditions so that water levels are continuously at or just above the ground surface throughout the year.													Welcome that The River Wensum Restoration Strategy and River Wensum SAC conservation objectives will be reviewed during the development of the final CoCP as committed to within the Schedule of Mitigation.					Yes
5.4.2	Direct impacts on the Paston Great Barn SAC have been ruled out. There is currently no consideration of indirect effects on the SAC in accordance with the conservation objectives. The onshore cable route will pass through a number of medium to high important feeding and foraging hedgerow corridors, which link core foraging areas to the south of the cable route (Satellite Tracking data). Without appropriate mitigation this could have a LSE on the Barbastelle bat population. Suggest the Applicant refer to the OLEMS for Vanguard (Deadline 9) and incorporate similar commitment within Boreas DCO.		Applicant to submit Clarification Notes as for Vanguard at suitable Deadline		Applicant has submitted 8.7 Outline Landscape and Ecological Management Strategy (Version 2)									The text of the OLEMS (Para 89) differs to that entered for Vanguard Deadline 9 OLEMS in that at each hedgerow a total of up to 22m will be left to become overgrown, whereas for Vanguard OLEMS specified 25m each side of gap. It is not clear why proposed mitigation is different.				NE note that the different mitigation provided between Vanguard and Boreas is due to differing cable corridor widths (REP4-010)	Yes
<b>DCO DOC 2.11 Important Hedgerows Plan</b>																			
	There are a number of important hedgerows for bats that will be permanently affected or lost in proximity to the substation site. NE recommend that the Applicant adopt a net gain approach to hedgerow habitat and connectivity to provide a legacy of more intact, medium to high quality and connected hedgerow features around the proposed site. Currently the loss of hedgerows would appear to equate to a net loss.				Applicant has confirmed they will not adopt Net Gain, but will include environmental enhancements where possible.									Applicant has confirmed they will not adopt Net Gain, but will include environmental enhancements where possible. We continue to recommend to the Applicant that there is the potential for Net Gain within the red line boundary and that this be considered in future.				NE continue to recommend that Net Gain is considered on this project.	NE note that it is not currently required for NSIPs to provide Net Gain but we continue to recommend Net Gain for all projects.

	We advise that a commitment is included that were hedgerow gaps will be open for a period of years the temporary planting is put in place so as to minimise disruption to foraging and commuting corridors.						Applicant has confirmed that it will not be possible to install temporary planting in gaps in hedgerows, but that more mature hedge plants will be considered to reduce recovery time.										Yes	
DCO DOC 6.6 Schedule of Mitigation																		
	During the Vanguard OWF examination process the Applicant committed to producing site specific water crossing plans on which NE would be consulted on, where is this commitment incorporated within Boreas application? Consultation with NE does not appear to be specified within the COCP 20(2) (g) as this refers to Construction Method Statements, rather than site specific water crossing plans.				Area for ongoing discussion		Note that oCoCP and schedule of mitigation (149) now includes a commitment to site specific water course crossing plans, secured through requirement 25 of the DCO, in consultation with NE.											Yes
	The cable route may cross a number of Countryside Stewardship or Environmental Stewardship agreements. NE advises the Applicant to contact the Rural Payments Agency and the landowners at the earliest opportunity to discuss changes and financial implications of changes to schemes. This does currently not appear to be stipulated in the mitigation document.				Area for ongoing discussion		We note within the Schedule of Mitigation (184)A commitment will be made within the private agreements between Norfolk Boreas Limited and the landowner/occupier to compensate for losses incurred due to potential impacts on ESS during the construction phase of the project. Within SOCG 'the Applicant will discuss any Countryside Stewardship agreements with landowners and the Rural Payments Agency post-consent'.											Yes
	General- There is the potential for the Applicant to deliver net gain. For example 129 states that at trenchless crossings that they will reinstate the channel at preconstruction depth, however this could include an aspiration to improve the condition of the watercourse where possible. We note that 132 states that localised improvements to geomorphology and in channel habitats will be considered. Ideally we would like to water crossing improvement where possible, as an objective of the reinstatement and the Applicant to work collaboratively where river restoration projects have already taken place or been proposed.				Applicant has confirmed they will not adopt Net Gain, but will include environmental enhancements where possible.		Note that oCoCP and Schedule of Mitigation (150) now includes a commitment to consider The River Wensum Restoration Strategy and River Wensum SAC.											Yes
	During the Vanguard OWF examination there was a commitment within Appendix 2 Water Dependant sites to produce site specific water crossing plans prior to construction. the Applicant has committed to develop a scheme and programme for each watercourse crossing, diversion and reinstatement, which will include site specific details regarding sediment management and pollution prevention measures. This scheme will be submitted to and approved by the relevant planning authority in consultation with NE. This commitment is secured through Requirement 25 (Watercourse Crossings) of the draft DCO. Due to the current uncertainty of ground conditions and sites for HDD and trenchless crossings it is not currently possible for NE to comment on potential environmental impacts pre application and detailed comments will be provided post construction. This commitment does not appear to have been included in either the Schedule of Mitigation or the Outline Code of Construction Practice. Please confirm where this commitment has been incorporated within the Boreas OWF application.				Area for ongoing discussion		Note that oCoCP and Schedule of Mitigation (149) now includes a commitment to site specific water course crossing plans, secured through requirement 25 of the DCO, in consultation with NE. The Ecological Enhancement document only currently allows for enhancement where crossed by open cut trenching or temporary culverts, there does not appear to be a consideration of enhancement of HDD compounds and work areas- would welcome this being specified within the CoCP, schedule of mitigation, ecological enhancements documents as appropriate. though we do note the commitment to consider conservation objectives of the Wensum. Suggest text is amended so as to include HDD compounds.		NE welcome that the OCoCP will be updated to include consideration of any enhancements where possible, subject to landowner agreement ( REP4-010). (Issue may be considered green once document updated).			Note update to OCOCP V3 Para 142.. Please can the Applicant clarify if pre construction surveys will include a phase 1 survey. We would also welcome the inclusion of the term ecological enhancements, to differentiate between flood risk and sediment management enhancements. Natural England would welcome further definition of post construction ecological monitoring to be included on the OCOCP, to include detail of what will be monitored and at what time intervals (we note that more detail was provided in the response to Ex WQ 2.15.0.11 but that this does not appear to have been incorporated into the DCO documents as yet.).					NE note updates to OCOCP at D8, and consider this resolved	
DCO DOC 8.1 Outline Code of Construction Practice																		
10	There are currently no air quality control measures for air quality impact to designated sites on the traffic route.				Applicant to include designated sites in Traffic Management plans.	Applicant to include designated sites in Traffic Management plans.	In discussion Applicant confirmed final traffic numbers (as agreed at end of Boreas) were below significant effect levels and agreed to include designated sites in Traffic Management Plan to ensure final Traffic Plan Numbers for Vanguard considered impacts to designated sites. Designated sites are not considered or mapped within Outline Traffic Management Plan [APP-699]. It is not clear how the final Traffic Management Plan will consider potential impacts to designated sites alone or in combination with other projects.		NE welcome that the Applicant will include reference to locations of designated sites within the OTMP and include a commitment that if traffic numbers change than the assessment of air quality impacts will be revisited (REP4-010). (Issue may be considered green once document updated).			Welcome inclusion of para 74 in OTMP, advise that the Applicant include ES figure 26.5 as an Appendix to the OTMP to allow reference should the ES not be publicly available by the time of construction.						NE Note updates to OTMP at D8 and consider this resolved
11.1.6	Given the number of bentonite or drilling mud breakouts experienced recently with other wind farms during their construction phase HDD we would expect more detail on the methods to be used for drilling, incorporating lessons learnt from previous breakouts. This will be particularly important in proximity to designated sites. The Wensum is a chalk river with a complicated hydrogeology. The methods should demonstrate that the potential of a break out has been reduced as far as practicably possible; moreover that the effect of a breakout on water quality should be assessed as part of a worst case scenario. How would breakouts below the Wensum be identified and managed?		Applicant to submit Clarification Note at suitable Deadline		Applicant has submitted Clarification Note Trenchless Crossings and Potential Effects of Breakout on the River Wensum D1.		NE is content with the detail provided in the Clarification Note[ AS-3.D1.V1] and Method Statement [AS-5.D2.V1]. NE is content that with the methodology and mitigation as laid out, that there is unlikely to be a Significant Effect from HDD bentonite breakout on the River Wensum and its features of interest. NE look forward to being consulted on the site specific water crossing plans post consent as specified within oCoCP.											Yes

13	Environmental incident response and contingency. There is no clarification of how environmental incidents will be responded to and reported on. NE would expect to be consulted within 24 hours if the incident occurs within proximity to a designated site. In particular with regards a bentonite break out clear up we would expect to be consulted immediately and prior to clear up operations beginning as clean-up operations may cause more damage to surrounding features of interest.						>Welcome the inclusion of environmental incident response reporting to NE within 24 hours if any incident occurs within proximity to a designated site within the oCoCP. We advise the Applicant that they may need to consider SSSI consent for operations under The Wildlife and Countryside Act. The immediate seeking of consents required for operations within the SSSI from NE during an environmental incident should also be included as a stipulation in the oCoCP. Please see our comments regarding 5.4 Consents and licences required Under Other Legislation for further information.			NE advises that the text in the OCoCP is amended to the following 'In the event that operations are required within a SSSI (outside of the DCO boundary) in response to an environmental incident, NE must be consulted and SSSI assent sought immediately as required'. If an environmental incident occurs while undertaking agreed activities as part of the cable installation as agreed in the DCO/DML then NE is not the regulator as the activities are part of an existing plan or project. In this case the LPA and/or the MMO as the regulator must consult with NE immediately and seek our advice. But a separate assent is not required.			NE note OCoCP para 175 has been updated and recommend that this is updated in future revisions to reflect the wording suggested at D5.			NE note updates to OCoCP at D8, and consider this resolved
DCO DOC 8.7 Outline Landscape and Ecological Management Strategy																
	General- There is currently no onshore post construction survey or monitoring proposed to ensure protected habitats and species have been successfully reinstated post construction.						updated OLEMS submitted NE to respond D3			Note inclusion of monitoring of grassland, 1 year post construction and hedgerows, seven years post construction.						Yes
9.7.3.3	Hedgerow crossings. Where hedgerow crossings of high importance for bats are removed and are going to be open for extended periods, possibly four years. NE advised during Vanguard that these could be filled with temporary planting or similar, we advise commitments are made within the OLEMS such as: temporary planting across hedgerows must comprise either a line of potted shrubs/trees, willow woven fencing, or wooden or close board fencing (or a combination of these); the existing flight path must remain in existence for as long as possible and only removed when it is essential to facilitate construction; the flight paths must connect to existing/retained flight paths without gaps which prevent or reduce shelter or potential use by bat species confirmed or likely to use the flight path; the features should be at least two metres high and, where involving vegetation, the features should be left in situ for as long as is practicably possible, until such time that other mitigation (e.g. reinstatement of other flight path features) has been implemented, where required. This should be included in OLEMS post construction section 9.7.3.3.								Applicant has confirmed that it will not be possible to install temporary planting in gaps in hedgerows however within OLEMS will consider planting more mature plants to reduce timeframes. We would welcome that this be committed to within the OLEMS, for all gaps in hedgerows of medium to high importance for Paston Great Barn SAC.						Yes	
	In our response to the Vanguard Bat Clarification Note NE advised that, as a requirement of the development, that prior to removal of hedgerows, an OLEM/EMP is developed in consultation with NE. The plan should include for the improvement of the hedgerows either side of the section to be removed including any gapping up, tree management and the development of scrub/rough grassland margins. The mitigation plan should be in place for 7 years or until the original hedgerow has recovered fully. Consideration could be given within the OLEM/EMP to the planting of more mature hedge plants, that could reduce the time required for these hedgerows to return to their original state/or better.						updated OLEMS submitted			The Boreas OLEMS (section 89) differs to that entered for Vanguard Deadline 9 OLEMS in that at each hedgerow a total of up to 22m will be left to become overgrown, whereas Vanguard OLEMS specified 25m each side of gap. It is not clear why proposed mitigation is different.			NE note that the different mitigation provided between Vanguard and Boreas is due to differing cable corridor widths (REP4-010).			Yes
	NE welcome that some of these have been incorporated but notice that the planting of more mature plants in order to reduce recovery time has not been included, nor has a commitment to net gain. Moreover that there is currently no Post construction monitoring of hedgerows specified. NE advises that this is included as a specification for assessing whether the habitat management and hedgerow planting has been successful or whether further management is required. We would expect all hedgerows replanted to provide species rich good quality and provide at the least the equivalent importance to bats for foraging and commuting as pre construction and preferably demonstrate a net gain legacy.						Area for ongoing discussion			Welcome with in OLEMS that planting of more mature hedge plants will be considered to reduce recovery time. We would welcome that this be committed to within the OLEMS, for all gaps in hedgerows of medium to high importance for Paston Great Barn SAC.					Yes	
7.2.3 9.2.3	A detailed Hedgerow Mitigation Plan has not yet been developed (DCO Requirement 24). The Mitigation Plan should be developed and be included in the OPEMP. It was agreed during the Vanguard examination that post construction monitoring of hedgerows used for commuting and foraging bats associated with Paston Great Barn SAC will be undertaken for seven years, or until the original hedgerow has recovered fully, and a commitment was included within the OLEMS. We advise this commitment also be included within Boreas OLEMS to ensure severed hedgerows have returned to good or high importance for bats.						updated OLEMS submitted			Within OLEMS (Para 12.2.3) welcome inclusion of commitment to post construction monitoring of hedgerows used for commuting and foraging bats, to be undertaken for 7 years or until the original hedgerow has recovered fully.					Yes	
7.3, 7.5	Water dependant designated sites. NE look forward to receiving the site specific water crossing plans for areas of HDD and open cut trenching and will comment on the Environmental Impacts when these are provided.						Area for ongoing discussion			Content that site specific plans are secured through DCO requirement.					Yes	
9.3	There is currently no post construction monitoring proposed to ensure that grassland identified as UKHPI and Norfolk LBAP priority habitat at preconstruction has been reinstated through natural regeneration. We advise that monitoring is included with trigger points established for habitat management if grassland has not restored naturally,						to be included			Welcome inclusion of commitments within OLEM and Schedule of Mitigation for monitoring of grasslands, 1 year post construction.					Yes	
9.6.3.2 and 9.7.3.1.2	General- NE cannot comment on whether a licence may be required to disturb protected species until the route has been surveyed and mitigation measures proposed. We advise the Applicant submit a draft application and seek a Letter of No Impediment where appropriate.						GCN LONI issued			GCN LONI issued and submitted as part of DCO.					Yes	
10	Birds- Mitigation for Broadland SPA species, as specified within the Clarification Note provided during the Vanguard examination does not appear to be included in the Boreas OLEMS.						Updated OLEMS submitted			Welcome inclusion of preconstruction monitoring or mitigation as outlined in 10.3.2 of OLEMS for Broadland SPA as agreed for Vanguard Examination.					Yes	
DCO DOC 8.14 Outline Project Environmental Management Plan																
	Within the OLEMS the Ecological Management Plan (EcoMP) document is identified as providing information and detail on a number of terrestrial issues including detail on PMoW, Hedgerow Mitigation Plan, timing of mitigation, details on licences to be sought, monitoring proposed, however this document does not appear to have been provided as part of the DCO application. Could this document be signposted or provided. NE cannot provide comment on the EcoMP.									Note confirmation within OLEMS that EcoMP to be developed post consent (DCO Requirement 24).					Yes	

7	Environmental Incident and response contingency. Whilst this states that any environmental incidents will be reported this appears to be mainly marine focused. We advise that as a condition of the licence terrestrial incidents are also reported to NE in a timely manner, and in the case of bentonite breakouts within designated sites within 24 hours and before clean-up operations begin.						Welcome the inclusion within OCoCP of environmental incident response reporting to NE within 24 hours if any incident occurs within proximity to a designated site. NE will remind the Applicant that works within an SSSI may require consent for NE under the Wildlife and Countryside Act 1981. Operations requiring NE's consent for each SSSI are included on <a href="https://designatedsites.naturalengland.org.uk">https://designatedsites.naturalengland.org.uk</a>			Please see comments in row 13 and in response to ExA Further Questions (D5).			NE note OCoCP para 175 has been updated and recommend that this is updated in future revisions to reflect the wording suggested at D5.			NE note updates to OCoCP at D8, and consider this resolved
DCO DOC Appendix 5.3 screening matrices Version 2																
	During the Vanguard examination it was noted that the survey data collected for onshore ornithology species was not of sufficient duration and had not been linked to crop rotations so it would not be possible to comment on where Broadland SPA and Ramsar species may be using Functionally Linked Land, during the construction phase and that there could be direct effects on ex situ habitats. The Applicant committed to providing mitigation. This is not reflected within Appendix 5.3 Screening Matrices and the tables should be updated accordingly.		Applicant to submit Clarification Note at suitable Deadline		Updated docs submitted D1		HRA screening matrices updated to include Broadland SPA and Ramsar features for direct and indirect effects on ex situ habitats for swan, goose and assemblage species during construction and decommissioning. Note mitigation as agreed during Vanguard is included in OLEMS.									Yes
	Marsh Harrier is also on the Broadland SPA citation.				Updated docs submitted D1		Marsh Harrier screened in as site Feature									Yes
	The River Wensum SAC -The matrices presents that The use of trenchless crossing techniques will ensure no direct effects upon any of the qualifying features of the SAC. However, given the number of HDD drilling mud breakouts experienced by other wind farms recently NE feel that trenchless crossing does not ensure that there will be no direct effects, and further information on the HDD methodology and potential effects need to be provided.		Applicant to submit Clarification Note at suitable Deadline		Updated docs submitted D1		The updated screening Matrices does not currently screen in Direct effects on the Wensum SAC and its features, due to trenchless crossing. As discussed in our Rel Rep [099] we consider the chance of HDD break out likely enough that site and features should be screened in. We note the additional information provided in the Clarification note and Method statement for Crossing the River Wensum and adjacent Watercourses AS-5.D2.V1. NE is content these documents provide sufficient information with regards design, methodology and mitigation to be confident that the proposal will not adversely affect the integrity of the site. However the screening matrices should be updated accordingly.			NE welcome that the Applicant will update the screening matrices (REP4-010) and integrity matrices. (Issue may be considered green once document updated).			NE provided comment on updated matrices for D7.			Yes
DCO DOC Appendix 6.1 Habitat Regulations Assessment Integrity Matrices																
	Broadland SPA/Ramsar- There is the potential for the proposed onshore development to cause displacement and disturbance of SPA/Ramsar features using Functionally Linked Land ex situ of the site during the construction phase. Mitigation was agreed as part of the Vanguard examination process and should be included in the Boreas OLEMS accordingly. Displacement/Disturbance is currently assessed as N/A for construction.		Applicant to submit Clarification Note at suitable Deadline		Updated docs submitted D1		Note the updated Integrity Matrices for Broadland SPA and Ramsar (onshore). NE is content that with the further information and mitigation proposed (at Deadlines 1 and 2) within the OLEMS that there will not be an adverse effect on integrity of the Broadland SPA features.									Yes

Issue Number	NE's Relevant Representation RR-099	RAG Status Rel Rep	Actions, progression	RAG Status D1	Actions, progression	RAG Status D2	Actions, progression	RAG Status D3	Actions, progression	RAG Status D4	Actions, progression	RAG Status D5	Actions, progression	RAG Status D6	Actions, progression	RAG Status D7	Actions, progression	RAG Status D8	Actions, progression	RAG Status D9	Actions, progression
DCO – Schedule 1																					
General	All references to NE should be amended to the Statutory Nature Conservation Body and an interpretation should be added to define the Statutory Nature Conservation Body.						to be updated		DCO now updated												
General	NE requests that a requirement be added to the DCO for the Applicant to confirm in writing to the MMO and Relevant Local planning Authorities once the construction phase has ended and the operations and maintenance phase has commenced. Following that notification no more activities related to the construction of the offshore wind farm may be conducted. This is to ensure clarity on when conditions applying to construction end and when conditions applying to operations and maintenance are active.						Ongoing discussion		Ongoing discussion				Ongoing discussion		Discussed with Applicant 17.02.2020, Applicant to consider definition and approach.		ongoing discussion		ongoing discussion		NE reviewing change to MMO position and updated response from applicant.
General	NE recommends that a condition be included in the DCO for the Applicant to produce a net gain DCO plan demonstrating how the proposed project will deliver net gain.						Ongoing discussion		Ongoing discussion												Final position NE considers Net Gain should be included, Applicant does not agree.
Schedule 1 Part 1 Page 35	Offshore disposal volumes do not match the disposal volumes in the ES project description for either total disposal or drill arisings.						Ongoing discussion		Resolved												
Schedule 1 part 3 Page 55	The total volumes for cable protection do not match the ES; I suspect this is due to not including cable crossings. Clarification required.						Ongoing discussion		Resolved												
5 and 11	The total volumes and areas for scour protection do not match the ES.						Ongoing discussion		Resolved												
Schedule 1 Part 3 Page 59	The code of construction practice details Environment Agency for consultation, but not NE.						Ongoing discussion		DCO updated												
20	The code of construction practice details Environment Agency for consultation, but not NE.						to be updated		DCO updated												
Schedule 1 Part 3	NE requests that the maximum hammer energy to be used while piling be included within the requirements and within the Deemed Marine Licences. This is an important metric in the measurement of noise impact and represents a significant part of the projects Rochdale envelope.						Ongoing discussion		Discussions around ExA questions ongoing. Acceptance that maximum hammer energy for monopiles is secured.					Resolved draft DCO (REP4-003) includes hammer energy for monopiles and pin piles.							
DML Schedule 9/10/13																					
General	The DCO and ES project description provide assessment of specific volumes of boulder relocation work. However, there is no mention of this as a licenced activity nor of the limits of this licenced and potentially damaging activity within any of the DMLs.						Ongoing discussion		Issue resolved												
General	The Offshore In Principle Monitoring Plan includes potential marine mammal monitoring. However, no DML contains any condition that would secure the requirement to conduct any agreed Marine Mammal monitoring. NE considers that a condition should be included to ensure that monitoring occurs.						Ongoing discussion		Ongoing discussion				Ongoing discussion		Discussed in meeting 17.02.2020. NE to provide example wording in relation to condition for D6.		NE provided draft condition pending response from Applicant		Awaiting comment from Applicant		Agreed with Applicant and MMO wording for the Marine Mammal monitoring condition. Issue resolved pending changes to draft DCO.
Part 4 Condition 12 (5)	This condition should be amended to ensure that any material of non-natural origin must be disposed of to an appropriate disposal site onshore. Subject to any requirements under the appropriate archaeological conditions.						Ongoing discussion		Ongoing discussion					Agreed updated wording in updated Draft DCO (REP4-003)							



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Part 4 Condition 14 (g) (iii)	NE does not agree that cable protection can be deployed under this licence for the duration of operation. The outline Operations and Maintenance plan states that cable protection may be deployed up to the full volume assessed in the ES across the full operation lifetime of the project. Cable protection to be deployed after construction has ended should be applied for under a new consent. This is due to the wide spatial and temporal scale of these construction works. Additionally the definition of maintain within the DCO and DMLs does not include construction of new works such as new areas of cable protection. Furthermore, there appears to be no provision which would require provision of updated plans and methodologies prior to each instance of additional work to allow consultation on their appropriateness and the MMO to make a determination on if the works are within those assessed in the ES, or HRA.						Ongoing discussion		Applicant has confirmed no cable protection to be included post consent.												
Part 4 condition 14 (l)	NE notes there is no reference to the timing requirement within this condition and would suggest cross linking to condition 14 (b) for the avoidance of doubt.						Ongoing discussion		ongoing discussion				Agreed new wording following call 13.02.2020. Pending submission of updated DCO this can be considered resolved.					Agree with new proposed condition, issue resolved			
Part 4 condition 15 (4)	NE does not consider 4 months an appropriate timeframe to approve all plans and documentation. Documents such as site integrity plans are likely to require detailed assessment, such as habitats regulation assessment. This is likely to take multiple consultation periods of 4 weeks. NE would recommend this be amended to 6 months prior to commencement, to ensure sufficient time to sign off the large volume of complex documentation that will need to be submitted.						Ongoing discussion		Ongoing discussion				Ongoing discussion		Ongoing discussion			Ongoing discussion			Final position, NE requires 6 month, Applicant insists 4 months is appropriate.
Part 4	NE notes this condition implies only 1 survey will be conducted in any event. However, the Offshore In Principle Monitoring Plan table 4.2 highlights that in the event of damage to reef features further surveys may be needed as to be agreed with the MMO, in consultation with NE. NE would, therefore, recommend that this condition be altered to reflect that more than 1 survey may be needed. For example the use of the term appropriate surveys as used in condition 18 (2) (a).						Ongoing discussion		Ongoing discussion				Update in Draft DCO (REP4-003) accepted								
Condition 20 (2) (a)							Ongoing discussion		Ongoing discussion				Update accepted								
Part 5 Appeals process	At this time NE has no detailed comment to make on the appeals process proposed. However, we are aware such a process was proposed for the Vanguard project. The MMO raised concerns regarding this process and NE support and agree with the MMO position on these concerns.						Ongoing discussion		Ongoing discussion		Ongoing discussion		Ongoing discussion		Ongoing discussion			Ongoing discussion			Final position, agree for Vanguard decision re: arbitration and appeals to apply to Boreas.
DML Schedule 11/12 Interconnector																					
General	All issues raised on Schedule's 9 and 10 also apply to this schedule where similar conditions exist. To avoid repetition NE will only provide detail of additional issues within this section.						Ongoing discussion		Ongoing discussion		Ongoing discussion		Ongoing discussion		Ongoing discussion			Ongoing discussion			
Part 4 Condition 9 (1) (m)	NE notes the inclusion of a Site Integrity Plan for the Haisborough, Hammond and Winterton SAC. NE would refer to the advice we provided on Vanguard on the appropriateness of including a site integrity plan given that the maximum impacts of this project on the site are known. It is important that any decision made should be made on the worst case scenario and not deferred to post consent.						Ongoing discussion		Ongoing discussion		Ongoing discussion		Ongoing discussion		Ongoing Discussion			NE considering a new condition for an alternative mitigation plan to the SIP			Ongoing concerns, we want the CIMP alternative condition to be renamed Construction installation mitigation and monitoring plan to ensure prominence of the need to mitigate.
Offshore Operations and Maintenance Plan																					
Appendix 1	The table plan lists new cable protection as amber. Amber implies that a new marine licence will only be needed if cable protection exceeds the volumes assessed in the ES. NE's interpretation is that this is implying cable protection may be deployed across the full operation lifetime of the project. However, the wording in the table is ambiguous and NE would request clarification on if this is the case.						OOOMP		NE to review changes to draft OOOMP and confirm if resolved				Resolved. updated OOOMP (REP1-028) acceptable								



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Appendix 1	If the undertaker confirms their intention is for cable protection to be deployed for the lifetime of this development under this licence then NE would reiterate the points raised on the Vanguard case. NE does not agree that cable protection can be deployed under this licence for the duration of operation. Cable protection to be deployed after construction has ended should be applied for under a new marine licence. This is due to the wide spatial and temporal scale of these construction works.						Ongoing discussion		NE to review changes to draft OOOMP and confirm if resolved				Resolved. updated OOOMP (REP1-028) acceptable								
Appendix 1	Additionally the definition of maintain within the DCO and DMLs does not include construction of new works such as new areas of cable protection. Furthermore, there appears to be no provision which would require provision of updated plans and methodologies prior to each instance of additional work to allow consultation on their appropriateness and the MMO to make a determination on if the works are within those assessed in the ES, or HRA.						Ongoing discussion		NE to review changes to draft OOOMP and confirm if resolved				Ongoing discussion		ongoing discussion						Ongoing discussion
Appendix 1	Replacement of a failed foundation is listed as amber. Given that removal and reinstallation of foundations have not been assessed in the ES, NE considers this should be marked as red. Any need for removal and reinstallation of a foundation will require a new Marine Licence.						Ongoing discussion		NE to review changes to draft OOOMP and confirm if resolved				Resolved OOOMP (REP1-028) updated to identify an additional licence likely to be required.								