Date: 30 May 2019
Our ref: 280592

Planning Inspectorate

BY EMAIL ONLY

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

T 0300 060 3900

Dear Sirs,

Deadline 8 Cover Letter: Norfolk Vanguard Offshore Wind Farm

Natural England wishes to express its concerns regarding the acceptance of additional submissions between Examination deadlines, particularly where those submissions are updates on documents only recently submitted and are still being reviewed by consultees. PINS has accepted two such submissions relating to offshore ornithology in the later stages of the Vanguard examination, between Deadlines 6 and 7, and 7 and 8. These have both been received whilst Natural England has been mid-review of the prior submissions, leading to this work having to be discarded, and has led to staff working overtime in order to meet PINS's requirement that these documents be reviewed in time for the next deadline. Please be aware that undertaking overtime in Natural England is on a voluntary basis and is reliant on the good will of Natural England staff. Therefore there is no guarantee that overtime can be done.

Natural England observes that these 'between deadline' submissions are chiefly a consequence of the belated provision of Collision Risk Modelling outputs (and to some extent displacement assessments) to Natural England's standard requirements and using Natural England's advised parameters, despite advice regarding these being given in the pre-application phase as well as in our relevant representations. This has meant that Natural England's initial integrity judgements for those SPA features most likely to be affected by collision mortality were not able to be made until Deadline 8.

Looking ahead to future examinations, Natural England would advise both PINS and Applicant's that presentation of CRM and displacement assessment outputs using Natural England's advised parameters (alongside the Applicant's preferred approach if desired) is critical in allowing stakeholders the appropriate information and sufficient time to carefully assess offshore ornithology impacts, and for mitigation, should it be required, to be brought forward in a timely and considered manner and be properly tested. Otherwise, Natural England is unable to guarantee that all matters will be satisfactorily resolved prior to the end of examination.

Please note, that due to this additional workload Natural England have been unable to progress Statement of Common Ground or produce Position Statements with the Applicant and therefore these will be provided at Deadline 9. We understand the Applicant will also be noting this.

Yours sincerely,

[redacted]

Jessica Taylor
Marine Lead Adviser
E-mail: Jessica.Taylor@naturalengland.org.uk
Telephone: 0208 225 8234

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Schedule of Natural England's responses to Examining Authority's Rule 17 requests for further information or written comments

30 May 2019

The tables below present Natural England's responses to the Examining Authority's Rule 17 requests for further information or written comments. Table 1 contains response to questions that were directed to Natural England and Table 2 contains responses to questions that were directed to other Interested Parties but which Natural England wishes to provide comment on. All other questions have been omitted from this document.

Table 1: Natural England's responses to questions directed to Natural England within Examining Authority's Rule 17 requests for further information or written comments letter

Question Number	Question to	Question	Natural England Comments
1.	**Policy/project design/ecology/HRA**		
FQ 1.3	Applicant, NE and MMO	Please set out whether an increase in turbine draught height of 5m, from 22m to 27m above MHWS would have any implications for any other matters assessed in the Environmental Statement, and if so, explain what you consider these would be?	Please see our detailed advice regarding offshore ornithology (primarily Section 1), also provided at Deadline 8.
FQ 1.7	Applicant and NE	Natural England in its deadline 7 response [REP7-075], and previously, has strongly advised against the use of cable protection within designated sites. In light of the Interim Cable Burial Study that has been submitted at Deadline 7 (Appendix 2 of the draft Outline HHW SAC Site Integrity Plan [REP7-026]), please comment on the feasibility of such an approach.	Please see our detailed advice regarding Interim Cable Burial Study also provided at Deadline 8.
FQ 1.8	Applicant, NE and RSPB	Please comment on the areas that contain question marks, i.e. where there is not agreement between the Interested Parties and the Applicant	Please see our detailed comments on RIES also provided at Deadline 8. The SoCG will be updated for Deadline 9

Question Number	Question to	Question	Natural England Comments
		that LSE and/or an AEOI can be excluded, as set out in Annexes 2 and 3 of the Report on the Implications for European Sites (RIES) [PD-016].	
FQ 1.9	NE and RSPB	Having regard to the Applicant's comments on 'over precaution' in section 2 of the Offshore Ornithology Cumulative and In-combination Collision Risk Assessment (Update) [AS-048] and the 'Waddenzee judgment', please comment on the precautionary nature of the information that has been submitted.	Natural England considers that there are five main dimensions of uncertainty that should influence the level of precaution applied in collision risk assessments, which are summarised below: i) <u>Representativeness of data collected</u>: seabird distribution across marine areas used for foraging appears to be highly variable at a range of scales through time (days, seasons, years) and space. While the level of survey information collected by Norfolk Vanguard meets Natural England's standard advice regarding offshore ornithology survey effort, and therefore is not under dispute, it remains the case that, due to this high variability, data collected over 2 years has the potential to over- or underestimate the densities of seabirds that use the Norfolk Vanguard project area. Hence Natural England requests, for example, the upper and lower confidence intervals for the seabird densities used in CRM. ii) <u>Seabird ecology and behaviour:</u> limited empirical data is available regarding the behaviour of seabirds in the offshore environment, including between different seasons. For example, whilst tracking data has significantly improved our understanding of seabird foraging behaviour in the breeding season, data collected is confined to certain colonies/species and in any given tracking season only a very small proportion of the birds present at the colony are tracked. In the case of

Question Number	Question to	Question	Natural England Comments
			Nocturnal Activity Factors (NAF), some of the evidence brought forward by the Applicant is not yet peer-reviewed or is of uncertain applicability to the survey data collected. There is also a broader tendency in impact assessments to straightforwardly adopt findings from the latest research rather than also consider previous research findings using a 'weight of evidence' approach. In this context Natural England considers that a range-based approach to key parameters such as apportioning rates and NAF is advisable. To do otherwise and rest assessments on single values, sometimes based on a limited number of studies or even a single study, risks incorporating a misleading level of precision into impact assessments. iii) Levels of collision impacts: collisions of seabirds with turbines are highly difficult to detect, not least because collision is likely to be an infrequent event given our admittedly limited understanding of behavioural responses to windfarms, particularly in the offshore environment. Whilst the recent camera studies at Thanet windfarm have yielded important information regarding seabird avoidance and collisions at windfarms, there is still much to understand regarding their reactions, the associated avoidance rates that should be applied within CRMs and ultimately the likely collision mortality from a given project. iv) Implications of impacts, including cumulative/in-combination impacts – there is rather limited data regarding the basic demographic parameters seabird ecology, particularly in response to environmental changes, with estimations of baseline mortality and productivity sometimes based on a small

Question Number	Question to	Question	Natural England Comments
			number of studies from well-studied colonies, which may not be applicable to populations in different locations and environments. This makes predicting the likely implications of a given amount of annual mortality, hence the development and ongoing refinement of Population Viability Analysis models, and Natural England considering a range of outputs within PVA rather than those associated with a single, central mortality value. This uncertainty is compounded when a number of projects, all carrying their own uncertainties, are considered cumulatively or in-combination. Precaution in the Habitats Regulations – the ECJ 'Waddenzee judgment'[1] (case reference C:127/02) elucidated several key principles for Habitat Regulations Assessments, including the Appropriate Assessment (AA) stage. Paragraph 57 of the Judgment states that *'…where doubt remains as to the absence of adverse effects on the integrity of the site linked to the plan or project being considered, the competent authority will have to refuse* authorisation'. This reflects the centrality of the precautionary principle within the Habitats Directive. The associated legal opinion of the Advocate General also gives more specific guidance on how to deal with uncertainty in an AA in paragraphs 97 and 98, stating that *"In many areas there is considerable scientific uncertainty as to cause and effect. If no certainty can be established even having exhausted all scientific means and sources, it will consequently be necessary also to work with probabilities and estimates. They must be identified and reasoned. Following an appropriate assessment, a reasoned judgement must be made as to whether or not the integrity of the site concerned will be adversely affected. In that respect it is necessary to list the areas in which*

[1] Judgment of the Court (Grand Chamber) of 7 September 2004. Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij. Reference for a preliminary ruling: Raad van State - Netherlands. Directive 92/43/EEC -Conservation of natural habitats and of wild flora and fauna - Concept of "plan' or "project' - Assessment of the implications of certain plans or projects for the protected site. Case C-127/02. (http://curia.europa.eu/juris/liste.jsf?language=en&num=C-127/02)

Question Number	Question to	Question	Natural England Comments
			the occurrence or absence of adverse effects cannot be established with certainty and also the conclusions drawn therefrom." For the reasons set out in i)-iv) above, there are a number of important elements of seabird CRM analysis which are by no means not 'established with certainty' and therefore require an appropriate degree of precaution to be applied by Applicants in impact assessments, in order to allow the competent authority to carry out an AA that meets the requirements set out in the Waddenzee Judgment.

Table 2: Natural England's responses to questions directed to other Interested Parties but which Natural England wishes to provide comment on within Examining Authority's Rule 17 requests for further information or written comments letter

Question Number	Question to	Question	Natural England Comments
1.	**Policy/project design/ecology/HRA**		
FQ 1.5	Applicant	Please indicate whether you consider the information you have submitted for deadline 7 (including the late submissions [AS-048 and AS-049] and previously, has addressed the specific Adverse Effect on Integrity (AEOI) concerns that Natural England has raised in its Interim Position Statement at Deadline 7 for Offshore Ornithology [REP7-075] as detailed in paragraphs 2.5.2 (little gull at Greater Wash SPA), paragraph 2.7.1 (gannet at FFC SPA), paragraph 2.8.2 (kittiwake at FFC	Whilst this question was directed to the Applicant Natural England advise that it is our opinion that this information **does not** address the concerns in relation to AEOI, as we are concluding that AEOI cannot be ruled out for kittiwake at Flamborough and Filey Coast (FFC) SPA in-combination, lesser black-backed gull at Alde-Ore Estuary SPA in-combination and gannet at FFC SPA in-combination if Hornsea Project Three is included Please see Natural England's detailed advice regarding offshore ornithology also provided at Deadline 8 for further information.

Question Number	Question to	Question	Natural England Comments
		SPA) paragraphs 2.91 and 2.9.3 (guillemot/all three auk species at FFC SPA), 2.10.1 (razorbill at FFC SPA), and 2.11.1 (puffin at FFC SPA). If you consider that you have not yet addressed these outstanding concerns, then please indicate how you intend to do so or provide a justification as to why you propose not to.	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Written Submission for Deadline 7

Natural England's comments on the Report on the Implications for European Sites (RIES)

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on the Report on the Implications for European Sites (RIES).

1.2. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor concerns).

2. General Comments

2.1. Quality of the RIES

2.1.1. On the whole, Natural England considers the RIES to provide a comprehensive and balanced account of the key HRA issues.

2.2. Statutory requirement to consult Natural England on an Appropriate Assessment (AA)

2.2.1. Natural England wishes to highlight that it does not consider the Examining Authority's consultation on the RIES as adequately discharging the requirement for competent authorities to consult the relevant Statutory Nature Conservation Body (SNCB) on its Appropriate Assessment, and then to have regard to the SNCB's advice.

2.2.2. As the RIES does not draw any conclusions regarding adverse effect on integrity (AEOI) where there is no agreement between the applicant and the SNCB, it does not afford the SNCB any opportunity to advise on the ecological and legal robustness of the conclusions that the Secretary of State as competent authority intends to make - as is routinely the case for other competent authorities.

2.2.3. This is of particular concern for applications with significant outstanding HRA assessment issues, such as Norfolk Vanguard, not least because significant material relating to these issues has already been submitted at the same time as the publication of the RIES. Therefore the RIES is based on material that has not yet been reviewed by the SNCB. Furthermore, additional significant material regarding these issues has been submitted by the Applicant between Deadlines 7 and 8, and we foresee the potential for further material from the Applicant to be submitted between Deadline 8 and the end of the examination.

2.3. Determination of Likely Significant Effect (LSE)

2.3.1. The LSE test is often described as a 'coarse filter'. Natural England generally advises that where an impact pathway between a designated site feature and the proposed activity is identified, the feature should be screened in to the Appropriate Assessment (AA) for more detailed assessment. Therefore, unless the impact can be considered to be trivial or inconsequential, an LSE should be concluded.

2.3.2. There are occasions in the RIES where the Applicant's judgement have rested on a more detailed assessment to rule out an LSE, for example displacement to Flamborough and Filey Coast (FFC) SPA guillemot, razorbill and the puffin component of the seabird assemblage. Natural England's view is that these considerations should form part of the AA.

2.4. Presentation of Natural England's Deadline 7 advice in relation to Offshore Ornithology

2.4.1. In Annex 3, for 3 SPA features (FFC SPA kittiwake and gannet, Alde-Ore Estuary SPA lesser black-backed gull), Natural England's advice at Deadline 7 is presented after the text describing the revised Collision Risk Modelling (CRM) submitted at that Deadline. This could be interpreted as meaning that Natural England's Deadline 7 advice reflects our view on the Applicant's Deadline 7 submission.

2.4.2. As this may not be the case, given that our advice on these will not be submitted until Deadline 8, and also because updated figures have been submitted at Deadline 7.5, this could potentially cause confusion. This issue is noted in places e.g. the FFC SPA/gannet section of Annex 3, but not in other parts of the RIES.

3. Detailed Comments

Ref.	Section/Para	Comment	
3.1	2.1.10	Please note that the extended Outer Thames Estuary Special Protection Area (OTE SPA) is now a classified SPA, and therefore is no longer a potential SPA (pSPA).	
3.2	2.2.3	For clarity, Natural England advised that new Collision Risk Modelling (CRM) for migrating Bewick's swan and avocet should be carried out in addition to updated CRM for a wider suite of species which were considered at East Anglia Three offshore windfarm (OWF)	
3.3	2.3.2	As noted in section 2.3.2 of the REIS 'In-combination effects were not assessed for the River Wensum SAC, Norfolk Valley Fens SAC and The Broads SAC on the basis that the project alone was not determined to have the potential for AEOI, therefore there is "no real prospect of an in-combination effect occurring with another plan or project" (section 9.3.1.4 [APP-045]). The applicant concluded that 'If a potential for AEOI was not determined with respect to a site due to Norfolk Vanguard, there is no real prospect of an in-combination effect occurring with another plan or project'. Natural England advises that the methodology for in combination impact assessment is not in line with the Waddenzee judgment. If a plan or project would not be likely to have a significant effect on the site alone, it should nevertheless be considered in combination with other plans and projects to establish whether there would be likely to be a significant effect arising from their combined impacts (English Nature 2006 Report Number 704). We welcome that in combination effects were considered for the water dependant site at Booton Common SSSI/Norfolk Valley Fens SAC within a Clarification Note submitted February 2019. However in-combination effects with other plans and projects should have been assessed for other sites within the EIA.	
3.4	2.3.3	Natural England notes the recommendation that the impacts on Norfolk Valley Fens SAC are considered in combination with Hornsea Project Three. The Applicant has provided a Clarification Note regarding water dependant designated sites and on the basis of that document Natural England is satisfied that in combination the projects will not have an AEoI on Norfolk Valley Fens SAC.	

Ref.	Section/Para	Comment	
3.5	2.3.7 - 2.3.9 – features omitted	Following Natural England advice, alone and in-combination displacement assessments were also carried out for the following features of the Flamborough and Filey Coast SPA: • Guillemot • Razorbill • Seabird assemblage (puffin component of the assemblage). Natural England notes that updated versions of these assessments are due to be submitted at Deadline 8.	
3.6	2.3.9 – Greater Wash red-throated diver	At the time of the RIES being published, Natural England has outstanding concerns regarding the scope and content of the in-combination assessment for red-throated diver (RTD) from the Greater Wash SPA. Please see Section 2.9 and 2.10 of our Deadline 7 response [REP7-075).	
3.7	2.5.1	The apportioning of impacts to FFC SPA features and Alde-Ore Estuary (A-OE) SPA lesser black-backed gull (LBBG), including the appropriate definitions of breeding seasons, have also been a key subject of discussions.	
3.8	2.5.1 3rd bullet	Text should read **Outer** Thames Estuary SPA rather than Thames Estuary SPA	
3.9	2.5.20	Specifically, Natural England advised that there would be an adverse effect on integrity (AEOI) for FFC kittiwake in-combination with other plans and projects, and that it was not possible to ascertain no AEOI for FFC gannet and Alde-Ore Estuary SPA LBBG.	
3.9	2.5.28	Please see Natural England's advice regarding Hornsea Project Three OWF; See Relevant Representation and Annex C of our Written Representation, RR-097 and REP1-211 of the Hornsea Project Three OWF Examination Library respectively.	
3.10	2.5.32 – 2.5.33	Natural England wishes to note that we have for some time been advising that the Hornsea 2 PVAs have not been sufficiently robust, including during the Hornsea 3 evidence plan process and in our Hornsea 3 Written Representations (Natural England 2018 – Hornsea 3 REP1-211[1]	

[1] Natural England (2018) Hornsea Project Three Offshore Wind Farm: Annex C Natural England detailed advice on ornithology. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-001237-EN10080%20261379%20Annex%20C%20Hornsea%20Three%20-%20NE%20Detailed%20ornithology%20comments.pdf

Ref.	Section/Para	Comment	
3.11	2.5.34	It is unclear whether this part of the RIES is referring to the first updated PVA models produced for Hornsea 3 at Deadline 1 of that Examination, or the second update at Deadline 4 of that Examination. We note that whilst the 'Deadline 1' PVAs showed no difference between the matched and unmatched runs, when these PVAs were updated at Deadline 4 following Natural England's advice the confidence intervals were indeed different to those at Deadline 1. Natural England's continued position is that a 'matched runs' approach is still required to ensure PVAs are robust.	
3.12	2.5.45	Natural England is content with the current version of the Scour Protection and Cable protection Plan [REP7-024] please see our response in this regard also provided at Deadline 8. We also acknowledge that cable protection within Haisborough, Hammond and Winterton SAC will be taken forwards in the Site Integrity Plan. Natural England's detailed comments on the Site Integrity Plan that was submitted by the Applicant at Deadline 7 [REP7-026] have also been provided at Deadline 8.	
3.13	2.5.48	As stated at Issue Specific Hearing 4 and presented in REP6-032, whilst Natural England continues to advise that the use of cable protection within Haisborough, Hammond and Winterton SAC should not be permitted; we advise that the SIP should allow for flexibility at time of decommissioning to allow for removal of cable protection if technology / methodology had developed sufficiently to provide confidence that decommissioning would be achieved without causing more harm to the SAC to return the site to its pre impact condition.	
3.14	2.6.2, 2.6.3, 2.6.6, Table 4.1, section 3 of Annex I	Please see our comment on 2.1.10 above.	
3.15	3.2.3	• We note that the Applicant has not always explicitly treated puffin as a component of the FFC SPA seabird assemblage feature, as opposed to a feature in its own right. Impacts on FFC puffin should be assessed in the context of the seabird assemblage. We also note that all qualifying features of the FFC SPA also form part of the seabird assemblage feature. Draft Natural England conservation advice on the assemblage and all other FFC features was published in March 2019 and can be seen at: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9006101&SiteName=flamb&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=	

Ref.	Section/Para	Comment	
		• Natural England is still in discussion with the Applicant regarding Broadland SPA and Ramsar (including Criterion 6). • Natural England are still in discussion with the Applicant considering collision risk modelling for a number of sites.	
3.16	3.2.5	Natural England received a Clarification Note (dated 25th February 2019) from the Applicant which now provides sufficient detail regarding potential groundwater/ hydrology changes and water quality impacts on water dependant designated sites. Natural England agrees with the Applicant's conclusions of no AEoI on Norfolk Valley Fens SAC and Booton Common SSSI from open cut trenching and dewatering or directional drilling based on the conceptual model and the mitigation measures proposed within site specific scheme for watercourse crossings. Natural England is satisfied that this will not have an AEoI either alone or in combination with Hornsea Project Three.	
3.17	3.3.5	Natural England notes that the Examining Authority has progressed impacts regarding trenchless crossing at the River Wensum SAC and construction hours at Paston Great Barn SAC to the integrity stage in line with recent case law. Something that Natural England welcomes.	
3.18	4.1.2	Please note Natural England provided the Southern North Sea SAC Register entry UK0030395 under Regulation 19 of The Conservation of Offshore Marine Habitats and Species Regulations 2017 and draft Conservation Objectives and Advice on Activities at Deadline 6 [REP6-032].	
3.19	5.0.2	Natural England continues to advise that AEoI cannot be ruled out for several sites (see our detailed advice also provided at Deadline 8 with regards to Haisborough, Hammond and Winterton SAC and SPAs) and therefore recommends that the Applicant takes into consideration alternatives, compensation and IROPI now rather than delaying this to post examination.	

4. Detailed Comments on Table 3.2 - European sites, features and potential impacts discussed during examination with regard to LSEs

Ref.	Section/Para	Comment
4.1	Table 3.2 – FFC SPA	'Auk' is not a feature of FFC SPA. The relevant features that NE advised an LSE for are: • Guillemot • Razorbill • Seabird assemblage (puffin component of the assemblage)
4.2	Table 3.2 – RTD	Please note that the LSE considers the project in question 'alone or in-combination' (our emphasis). Therefore, as an LSE has been agreed for the project alone for RTD at Greater Wash (GW) SPA and OTE SPA, it is not necessary to then consider whether there would be an LSE in-combination. Where an LSE is identified for the project alone, in-combination effects are then considered as part of the Appropriate Assessment.

5. Detailed Comments on Table 4.1 - European sites, features and potential impacts subject to discussion during the examination with regard to effects on integrity

Ref.	Section/Para	Comment
5.1	Gannet – FFC SPA	Please note that Natural England does not disagree with the avoidance rates used by the Applicant for gannet.
5.2	RTD – Greater Wash (GW)SPA	As noted in our Relevant Representations (RR-106), consideration should also be given to the in-combination disturbance/displacement effect on RTD of cable laying with the currently constructed or consented wind farms within the GW SPA. Therefore effects considered together with those from Hornsea Three's cable installation are not the only in-combination issues that require consideration.
5.3	Common scoter – GW SPA	Mortality rates are not in dispute as regards to common scoter. Natural England's principal disagreement regarding common scoter related to the Applicant's conclusion of 'no LSE' for this feature.
5.4	Paston Great Barn SAC	As stated in our Deadline 7 response [REP7-075], following the provision of additional clarification notes by the Applicant Natural England has withdrawn our concerns in this regard and therefore agree with the Applicant's assessment of no AEoI. Within this response we also advised that, as a requirement of the development, that prior to removal of hedgerows, an

Ref.	Section/Para	Comment	
		OLEM/EMP is developed in consultation with Natural England. 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. **Please note that whilst Natural England acknowledges that some mitigation has been included in the OLEMS; we are disappointed that a full Hedgerow Mitigation Plan was not submitted as part of the OLEMS, and so cannot provide further comment.** Natural England also recommended that the developer incorporate Net Gain for bats within the final design and suggests consultation with the Norfolk Barbastelle Study Group/ Norwich Bat Group, as they will be the best placed to recommend local enhancement for the species.	
5.5	River Wensum SAC	Key matters: Sediment management and restoration/reinstatement and Pollution Control Natural England 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 requirement 25. Natural England welcomes the provision of further clarification regarding reinstatement of work areas methodology and commitment to include in the updated Code of Construction Practice. Natural England looks forward to receiving information on the exact number of HDDs under the River Wensum SAC, we understand that this will be post-consent and secured through DCO Requirement.	
5.6	The Broads SAC	Natural England 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 requirement 25	
5.7	General – Onshore Ecology	The Applicant produced a Clarification Note (Appendix 1 of [REP6-013]) to clarify its approach to sediment management at the River Wensum crossing. It should be acknowledged that the Applicant has committed to developing 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 Natural England. This commitment is secured through Requirement 25 (Watercourse Crossings) of the draft DCO.	

Ref.	Section/Para	Comment	
		Therefore Natural England provides no further comment at this time. **<u>Please note that this commitment is not captured within the CoCP and should be included.</u>**	

6. Detailed Comments on Annex 2: Screening Matrices (Stage 1)

Ref.	Section/Para	Comment	
6.1	FFC SPA kittiwake	Regarding (b), whilst Natural England is content that displacement/disturbance/barrier effects can be screened out for LSE, we do not support the statement that *'it is <u>exceptional</u> for breeding kittiwakes to travel more than 200km from the colony when foraging'* [our emphasis]. The Applicant's analysis of the 2017 kittiwake tracking data indicates that 5 of 17 tracked kittiwakes had maximum foraging ranges of 205km or more, and this was the case for 6 of 11 kittiwakes in July. This dataset suggests that foraging beyond 200km is better described as infrequent rather than exceptional.	
6.2	FFC SPA gannet	Regarding (h), as noted above, where an LSE is identified for the project alone, in-combination effects are then considered as part of the Appropriate Assessment. In such instances, it is not necessary to consider whether there is an LSE in-combination.	
6.3	FFC SPA guillemot, razorbill and puffin	Regarding (k), and as noted in our general comments above, Natural England advises that where an impact pathway between a designated site feature and the proposed activity is identified, the feature should be screened in to the AA unless the impact can be considered to be trivial or inconsequential. Given the potential for displacement effects on FFC SPA auks in the non-breeding season, Natural England's advice is that there is an LSE alone.	
6.4	FFC SPA seabird assemblage	Please see our comments on 3.2.3 above.	
6.5	GW SPA All features	Regarding (j), we are unclear as to the point being made in the RIES here, unless it specifically refers to those effects not considered to be LSE alone? LSEs have been identified for red-throated diver (construction and operational disturbance) and little gull (collision risk). The consideration of these in the Appropriate Assessment inevitably includes an assessment of in-combination impacts. Please also see our general comments on the LSE test above.	

Ref.	Section/Para	Comment	
6.6	OTE SPA in-combination effects	Regarding (e), we are unclear as to the point being made in the RIES here, unless it specifically refers to those effects not considered to be LSE alone? An LSE has been identified for red-throated diver (operational disturbance). The consideration of this in the Appropriate Assessment inevitably includes an assessment of in-combination impacts. Please also see our general comments on the LSE test above.	

7. Detailed Comments on Annex 3: Adverse Effects on Integrity Matrices (Stage 2)

Ref.	Section	Comment	
1) Alde-Ore Estuary SPA			
7.1	LBBG	Regarding (b), as set out in our Deadline 2 response, REP2-038, to the Applicant's Section 51 advice response AS-006, Natural England advises that reductions in predicted impacts resulting from 'as-built wind farm designs' should not be given weight in an Appropriate Assessment, unless the reduction of the Rochdale Envelope has been legally secured and that updated CRM is carried out using the final turbine parameters and overall project design. To date, there is only one English OWF where these two criteria have been met: East Anglia One. Natural England considers that an AA that rests its in-combination conclusions on 'as-built' impact reductions for which are not legally secured could leave any associated consent decisions open to challenge.	
7.2	LBBG	Regarding (c), as noted in our response to the first set of Examiners questions [REP1-088], predation levels at the Alde-Ore Estuary SPA LBBG colony form part of the environmental baseline (and associated condition status) and therefore the Appropriate Assessment will need to consider the impacts of Norfolk Vanguard as potentially exerting a potential additional pressure on a struggling colony, rather than comparing the relative importance of different negative impacts. We also note that predator control has not been able to be implemented at the Orfordness part of the SPA despite funds being available for such measures. We recommend that considerations of predator management form no part of the Secretary of State's AA.	
2) Flamborough and Filey Coast SPA			
7.3	kittiwake	Regarding (a), Natural England does not consider a single CRM when making integrity judgements, taking a range-based	

Ref.	Section	Comment	
		approach wherever possible. For example, Natural England's Deadline 6 calculations [REP6-032] for FFC SPA kittiwake for the project alone produced a range of 4 – 195, with a central value of 68.	
7.4	kittiwake	Regarding (b), following its initial use during some windfarm examinations, Potential Biological Removal (PBR) outputs have now been widely discredited as an appropriate means to assess collision risk to seabird receptors. Natural England advises that they form no part of the Secretary of State's AA. Also regarding (b), we note that Natural England's advice that an adverse effect on the integrity of the FFC SPA kittiwake population in-combination could not be ruled out predates the East Anglia Three examination e.g. Hornsea Two examination.	
7.5	gannet	Regarding (c), as noted above Natural England generally considers a range of CRM values rather than a single figure. Therefore for the project alone Natural England would consider the overall range of 1-94 annual adult collisions, as well as the central value of 33.	
3) Greater Wash SPA			
7.6	RTD	In the section of a) regarding 'Displacement and mortality rates', there is some confusion with respect to Natural England's advice regarding RTD displacement. The worst-case scenario set out in the SNCB advice note (100% displacement and 10% mortality across the array and a 4km buffer) relates solely to turbine arrays and not the installation of the export cable. For export cables Natural England advises a worst case scenario of up to 100% displacement and up to 10% mortality out to 2km from the cable route.	
7.7	RTD	Regarding (b), for avoidance of doubt, Natural England advised that a seasonal cable restriction would enable an AEOI in-combination to be *ruled out* (not *concluded* as stated in the RIES).	
7.8	RTD	Regarding (e), a number of aspects of this section relate to EIA-level impacts, namely the discussion of the south-west North Sea BDMPS and the SeaMast sensitivity tool. The key HRA issue here relates to Natural England's outstanding concerns regarding the scope and content of the in-combination assessment on the Greater Wash SPA. Please see Section 2.9 and 2.10 of our Deadline 7 response [REP7-075]. Please also note that our concerns regarding impacts on OTE SPA from the Norfolk Vanguard project relate solely to disturbance/displacement from operational phase traffic and not from the array itself.	

Ref.	Section	Comment	
7.9	common scoter	Natural England can confirm that the provision of the map showing common scoter densities and the offshore cable route has allowed us to reach a conclusion of no AEOI alone for the common scoter feature of the SPA.	
5) Haisborough, Hammond and Winterton SAC			
7.10	a) Temporary physical disturbance (construction)	Paragraph 4 states *At Deadline 5, the Applicant and NE [REP5-007] had agreed that the physical processes of Annex 1 Sandbanks in the HHW SAC has the potential to recover from construction activities, within the range of natural variation; however, it is unclear whether there is agreement that an AEOI to sandbanks from temporary disturbance during construction can be excluded.* Natural England advises that whilst Annex I Sandbanks have the potential to recover from certain construction activities, AEoI cannot be ruled out for this feature as the Applicant proposes sandwave levelling and cable protection is still within HHW SAC and Natural England continue to advise that cable protection should not be permitted within designated sites.	
7.11	a) Temporary physical disturbance (construction) : dredging	As stated previously in our Deadline 3 [REP3-051], Deadline 5 [REP5-017] and Deadline 7 [REP7-075] responses Natural England advises that greater clarity is still required as to where this sediment is to be disposed of. This is particularly important when looking at locations within an SAC boundary. Natural England suggests that this detail could be provided in the SIP, With this in mind Natural England suggests 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, that the dredge material will be >95% similar in particle size to disposal locations whilst ensuring that there is no interaction with Annex I reef. Natural England would 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. The maximum volumes taken within the Haisborough, Hammond and Winterton SAC should also be detailed separately to ensure the impacts to the designated site remain within the impacts assessed. Finally the wording in the DCO should limit the area of impact from removal of substances for disposal to the area assessed. Until this is done, we are unable to update our previous advice.	

Ref.	Section	Comment	
7.12	(b) – Temporary physical disturbance (operation)	Natural England is of the view that in the parameters set out in the RIES an AEOI could be ruled out. However, this position is dependent on no cable protection being used at the ends of the cable repair sections which may be sub-optimally buried.	
7.13	(c) - Introduction of new substrate (operation)	The RIES states that the Applicant's conclusions have not been disputed by any Interested Parties, however, this assertion is based on information that was presented at Deadline 7. As responses to Deadline 7 documents will not be provided until Deadline 8 (which is post publication of the RIES) Natural England disputes this statement. Point 5 c states: *The Applicant's revised integrity matrix [REP7-035] concluded that the extremely small areas associated with the new substrate (0.002% of the total area of SAC and 0.004% of the area of sandbanks within the SAC) would have no significant effect on the governing processes or sandbank communities of the SAC. Therefore, there would be no AEOI.* Natural England advises that currently 5% cable protection is proposed as a contingency should cables be sub optimally buried within the SAC which if permitted as set out would result in persistent habitat loss of Annex I sandbank feature. Habitat change is a pressure different to habitat loss, but it is still a change to the feature that the site was designated for. Sandbanks features have high sensitivity to both habitat loss and habitat change.	
7.14	Annex 3:5 (d) – In-combination effect	Natural England remains concerned about permanent change to the sandbank features both alone and in-combination from the placement of cable protection. And whilst we recognise that the impacts from Norfolk Vanguard and Norfolk Boreas will be temporary and spatially separate, bar some site preparation works. There are still impacts occurring to the same sandbank and the combination to the two projects may hinder the recoverability of the feature over a longer period. All of this will need to be thoroughly considered going forwards in SIP.	
7.15	(f) – Habitat loss (operation) – sandbanks and Reefs and SIP	Within this section the note on SIP is presented after the text describing Natural England's position on sandbanks and reefs. This could be interpreted as meaning that Natural England now agrees with the Applicant's conclusions in this regard. Therefore, for clarity Natural England continue to advise that cable protection will result in permanent habitat loss and this position has not changed following our review of the SIP provided by the Applicant at Deadline 7 [REP7-026]. This problem occurs throughout this section of the RIES.	

Ref.	Section	Comment	
7.16	Annex 3: 5 (h) – Site Integrity Plan	Please see Natural England deadline 8 comments on the SIP	
7.17	(j) – Temporary physical disturbance (operation)	The RIES states: *However, NE [REP6-032] advised that operation and maintenance activities should either be excluded from within the site (with the option to apply for separate marine licence at later date) or sufficiently restricted as repeated operations and maintenance activities could result in continued disturbance and prevent recovery of Annex I reef. As noted in section 2.5 of this RIES, the Applicant subsequently agreed cable protection cannot be deployed during operation and maintenance, save in relation to cable protection already deployed which may be moved or extended to the extent assessed in the ES [REP7-040].* *NE did not have the opportunity to respond to the Applicant's comment before publication of this RIES and it is unclear whether there is agreement between the two parties whether an AEOI to reef from temporary physical disturbance during operation can be excluded.* Whilst Natural England are pleased to hear that the Applicant has committed to not deploying cable protection in any new areas during operation and Maintenance activities, Natural England still do not agree that AEoI to reef from temporary physical disturbance during operation can be excluded as Natural England does not agree with the placement of cable protection within a designated site in the first place. Therefore moving or extending cable protection already deployed would result in AEoI of the site. In addition to the above repeated O&M activities including (but not exclusively) cable remediation works in areas of Annex I reef may hinder the recovery of the interest feature over a prolonged period of time and affect the favourable condition of the site.	
7.18	(l) – Increased suspended sediment and smothering (construction)	Natural England advised within Statement of Common Ground with Applicant [REP1-049] that combined suspended sediment increases associated with aggregates and Norfolk Vanguard cable installation should be considered for Haisborough Hammond and Winterton SAC. Natural England is not aware that this has been completed.	
7.19	m) and n) – In-combination effects (construction phase) and (operation)	Natural England note that DML condition 9(m) restricts the commencement of construction until such time that mitigation measures can be adopted to rule out AEoI. We also acknowledge that the SIP commits the Applicant to providing a robust evidence base and mitigation measures for which they can be held to account. But due to ongoing concerns with cable protection within the site, even with the 5% reduction in cable	

Ref.	Section	Comment	
		protection, the regulators should be aware that these commitments may still be considered insufficient. Therefore, based on the best available evidence at this time and a valid worst case scenario as set out in the SIP Natural England remains of the view that there is a high probably of an AEoI on integrity of Haisborough, Hammond and Winterton SAC Annex I sandbanks and reef features both alone and in-combination. Therefore we are unable to agree with the conclusions within the Habitats Regulation Assessment.	
6) Southern North Sea SAC			
7.20	l) In-combination effects (construction)	Natural England welcomes the timeline laid out by MMO with regard to the development of a mechanism to manage multiple SIPs, however our position remains that we are unable to advise that an AEoI in-combination on the SNS SAC can be ruled out until this mechanism is in place.	
7) Paston Great Barn SAC			
7.21	General	As stated in our Deadline 7 response [REP7-075], following the provision of additional clarification notes by the Applicant Natural England has withdrawn our concerns in this regard and therefore agrees with the Applicant's assessment of no AEoI. Within this response we also advised that, as a requirement of the development, that prior to removal of hedgerows, a OLEM/EMP is developed in consultation with Natural England. 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. **Please note that whilst Natural England note that some mitigation has been included in the OLEMS, we are disappointed that a full Hedgerow Mitigation Plan was not submitted as part of the OLEMS, and so cannot provide further comment.** Natural England also recommended that the developer incorporate Net Gain for bats within the final design and suggests consultation with the Norfolk Barbastelle Study Group/ Norwich Bat Group, as they will be the best placed to recommend local enhancement for the species.	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on Habitats Regulations Assessment - Integrity Matrices (Updated) (Clean & Tracked Changes Versions) [REP7-035 & REP7-036]

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on the Habitats Regulations Assessment - Integrity Matrices (Updated) (Clean & Tracked Changes Versions) [REP7-035 & REP7-036] as submitted by the Applicant at Deadline 7**.**

1.2. Comments have only been provided for sites where the Applicant has made an update at Deadline 8. For all other sites we would refer back to our earlier advice [RR-106, REP1-088, REP2-036, REP3-051, REP4-062, REP5-017, REP6-032 AND REP7-075] or further detailed information also provided at Deadline 8.

1.3. Please note, Natural England is advising that AEOI cannot be ruled out (or significant effect for EIA) for several SPAs. Natural England would therefore welcome discussions with the Applicant regarding proposed / in principle monitoring, for example placing cameras on turbines to monitor collisions.

1.4. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor concerns).

2. Detailed Comments

Ref.	Section/Para	Comment	
Alde-Ore Estuary SPA – Table 2.1			
2.1	Lesser black-backed gull	Natural England agree there is unlikely to be an AEOI from collision risk from Vanguard alone, but we do not agree with the Applicant that AEOI can be ruled out for in-combination collision risk. Natural England advise that an AEOI cannot be ruled of from in-combination collision risk for this feature – for detailed advice see our offshore ornithology document also provided at Deadline 8.	
Breydon Water SPA / Ramsar site – Table 2.2			
2.2	Migrant non-seabirds	Natural England can confirm that we agree with the Applicant's conclusions for migrant non-seabirds that an AEOI for collision risk alone and in-combination can be ruled out. Please see our Deadline 5 response to other consultees responses to the 2nd round of ExA questions (Q23.70) [REP5-017] were we said that following the non-seabird migrant collision risk modelling document submitted by the Applicant (not withstanding some methodological issues identified with this by Natural England in REP4-062) we do not anticipate an AEOI for the relevant features of these sites in-combination.	
Broadland SPA/Ramsar - Table 2.3			
2.3	Migrant non-seabirds	Natural England can confirm that we agree with the Applicant's conclusions for migrant non-seabirds that an AEOI for collision risk alone and in-combination can be ruled out.	

Ref.	Section/Para	Comment	
		Please see our Deadline 5 response to other consultees responses to the 2nd round of ExA questions (Q23.70) [REP5-017] were we said that following the non-seabird migrant collision risk modelling document submitted by the Applicant (not withstanding some methodological issues identified with this by Natural England in REP4-062) we do not anticipate an AEOI for the relevant features of these sites in-combination.	
Flamborough and Filey Coast SPA – Table 2.4			
2.4	Kittiwake	Natural England agree there is unlikely to be an AEOI from collision risk from Vanguard alone, but we do not agree with the Applicant that AEOI can be ruled out for in-combination collision risk. Natural England advise that an AEOI cannot be ruled of from in-combination collision risk for this feature – for detailed advice see our offshore ornithology document also provided at Deadline 8.	
2.5	Gannet	Natural England agree there is unlikely to be an AEOI from collision risk from Vanguard alone. We also agree with the Applicant that AEOI can be ruled out for in-combination collision plus displacement combined when Hornsea Project Three is excluded from the in-combination total (NB: this also applies for just in-combination collision risk and just in-combination displacement). However, as set out in our detailed advice with regards to offshore ornithology also provided at Deadline 8, due to Natural England's significant concerns regarding the incomplete baseline surveys for Hornsea Project Three, and the associated level of uncertainty with regards to the potential impacts of that project, Natural England is not in a position to advise that an AEOI of the gannet feature of the FFC SPA for in-combination collision plus displacement combined when Hornsea 3 is included in the in-combination total can be ruled out. (NB: This will also apply for just in-combination collision with H3 included and just in-combination displacement with H3 included).	
2.6	Auks (guillemot, razorbill, puffin)	Natural England cannot make comment until we have reviewed the revised auk displacement assessment that we aware the Applicant intends to submit at Deadline 8. Please note that breeding puffin is not a qualifying feature of the FFC SPA in its own right – it is a component of the seabird assemblage and the assemblage is the qualifying feature. Based on the data, we consider puffin to be a named component of the assemblage. The impacts to this species and the assemblage QF should be assessed against the conservation objectives for abundance and diversity of the feature (see the supplementary advice on conservation objectives available from: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9006101&SiteName=flamb&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=#hlco)	

Ref.	Section/Para	Comment	
Greater Wash SPA – Table 2.5			
2.7	Red-throated diver	Natural England do not agree with the Applicant's conclusion of no AEOI for displacement from construction (cable laying) alone or in-combination – see reasons set out in our Deadline 7 [REP7-075] response. No further information has been provided by the Applicant since this (e.g. no agreement to mitigation such as avoiding undertaking cable laying activities during the most sensitive months. And nothing on in-combination displacement from cable laying with the displacement from the currently constructed or consented wind farms within the Greater Wash SPA). Nevertheless, should the Applicant commit to no cable installation within or affecting the Greater Wash SPA between November and March inclusive, Natural England foresees that the potential for Norfolk Vanguard to contribute to in-combination affects is likely to be minimal, and therefore no AEOI in-combination could be concluded. However, Natural England does agree that an AEOI for RTD from operation and maintenance vessel movements can be ruled out. Although we note that this is based on the adoption of best practice vessel operations to minimise disturbance to RTD.	
2.8	Little Gull	Natural England agree with the Applicant that an AEOI from collision risk from Vanguard alone can be ruled out. But cannot reach a conclusion regarding in-combination collision impacts due to some offshore wind farm sites currently missing from the in-combination assessment (notably Dudgeon, but potentially also EA1 and EA3) – for detailed advice see our offshore ornithology document also provided at Deadline 8.	
North Norfolk Coast SPA / Ramsar - Table 2.6			
2.9	Migrant non-seabirds	Natural England can confirm that we agree with the Applicant's conclusions for migrant non-seabirds that an AEOI for collision risk alone and in-combination can be ruled out. Please see our Deadline 5 response to other consultees responses to the 2nd round of ExA questions (Q23.70) [REP5-017] were we said that following the non-seabird migrant collision risk modelling document submitted by the Applicant (not withstanding some methodological issues identified with this by Natural England in REP4-062) we do not anticipate an AEOI for the relevant features of these sites in-combination. <u>However, we suggest that the listed features for the North Norfolk Coast SPA/Ramsar are checked as they are not correct.</u>	
Outer Thames Estuary SPA – Table 2.7			
2.10	RTD	Natural England agree with the Applicant that an AEOI for RTD from operation and maintenance vessel movements can be ruled out. Although	

Ref.	Section/Para	Comment	
		we note that this is based on the adoption of best practice vessel operations to minimise disturbance to RTD.	
Haisborough, Hammond and Winterton (HHW) SAC – Table 2.8			
2.11	All features	Natural England continue to advise that AEOI cannot be ruled out for Reefs and Sandbanks features of HHW SAC. Please see our full detailed advice on Site Integrity Plan also provided at Deadline 8 for further information	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on Norfolk Vanguard Ltd. Deadline 7 and Deadline 7.5 submissions in relation to Offshore Ornithology Related Matters

30 May 2019

This document is a technical document submitted into the Norfolk Vanguard Examination to provide scientific justification for Natural England's advice provided on the significance of the potential impacts on designated sites features, as summarised within each section. Our advice is based on best available evidence at the time of writing and is subject to change in the future (likely to be outside of this examination process) should further evidence be presented.

Table of Contents

1. Summary

1.1. The Norfolk Vanguard alone and cumulative at EIA scale and alone and in-combination at HRA predicted collision risk impact figures have been updated by the Applicant since Natural England's Deadline 7 response in REP7-075, and indeed since the Applicant's own Deadline 7 submissions. The figures have been updated following revised collision risk modelling (CRM) by the Applicant to account for increased draught height for the Vanguard project (as presented in the Deadline 7.5 'Deterministic Collision Risk Modelling for revised layout scenarios and increased draught height' document, AS-049). We have therefore based our comments below on the evidence presented by the Applicant in AS-049 and the 'Cumulative and In-combination collision risk assessment update', AS-048.

1.2. We welcome the Applicant has now considered this mitigation measure, as Natural England has recommended that increased draught height be considered since our advice on the Preliminary Environmental Information Report (PEIR). This has further reduced the level of impacts predicted by the Applicant, following the previous refinement of the 'worst case scenario' at Deadline 6.5 (AS-043). Nevertheless, the project continues to make a meaningful contribution to cumulative and in-combination effects on several seabirds at both the EIA scale and with respect to qualifying features of seabird colony SPAs through collision mortality, particularly with respect to North Sea populations of great black-backed gull, gannet and kittiwake, Flamborough and Filey Coast SPA kittiwake and gannet, and Alde-Ore Estuary SPA lesser black-backed gull (see Table 1). Detailed advice on these and other receptors follows.

Table 1 Summary of conclusions for assessment of collision risk from Vanguard alone and cumulatively / in-combination with other plans and projects for relevant species following Applicant's updated collision risk assessment in AS-048 to account for revised layout scenarios and increased draught height

EIA species	**Collision risk alone**	**Collision risk cumulative**
Gannet	Not significant (negligible to minor adverse)*	Significant (moderate adverse)*
Kittiwake	Not significant (negligible to minor adverse)	Significant (moderate adverse)
Lesser black-backed gull	Not significant (negligible to minor adverse)	Not significant (minor adverse)
Herring gull	Not significant (negligible to minor adverse)	Not significant (moderate adverse)
Great black-backed gull	Not significant (negligible to minor adverse)	Significant (moderate adverse)
Little gull	Not significant (negligible to minor adverse)	Unable to reach a conclusion due to missing sites in the cumulative assessment
HRA species & site	**Collision risk alone**	**Collision risk in-combination**
Gannet: Flamborough & Filey Coast SPA	No adverse effect on site integrity (AEOI)*	No AEOI excl. H3* AEOI incl. H3*
Kittiwake: Flamborough & Filey Coast SPA	No AEOI	AEOI excl. and incl. H3
Lesser black-backed gull: Alde-Ore Estuary SPA	No AEOI	AEOI excl. H3 (no collisions apportioned from H3)
Little gull: Greater Wash	No AEOI	Unable to reach a conclusion due to missing sites in the in-combination assessment

* Gannet considered for collision risk plus displacement for assessments of Vanguard alone and cumulatively/in-combination with other plans and projects

1.3. Natural England has previously provided regulators with our advice regarding our concerns about predicted level of cumulative impacts on North Sea seabirds, e.g. EIA great black-backed gull at East Anglia 3, Flamborough and Filey Coast (FFC) SPA kittiwake at Hornsea 2, which were subsequently consented. These concerns have intensified during the recent three offshore wind farm (OWF) examinations (Hornsea 3, Norfolk Vanguard, Thanet Extension), and given four further OWF NSIPs are due to be submitted to PINS in the next twelve months (Norfolk Boreas, East Anglia One North, East Anglia Two, Hornsea Four), Natural England considers that without major project-level mitigation being applied to all relevant projects coming forward, there is a significant risk of large-scale impacts on seabird populations.

1.4. Natural England therefore recommends that for all relevant future projects located in the North Sea, raising turbine draught height should be considered as standard mitigation practice, and that where appropriate relevant proposals should include this measure in order to minimise their contributions to the cumulative/in-combination collision totals by as much as is possible.

1.5. No further updates have been made by the Applicant with regard to auk displacement assessments since the updated assessment in the Deadline 6 documents (REP6-021. Therefore, our position regarding auk displacement alone and cumulatively/in-combination remains as set out in our Deadline 7 response (REP7-075). However, we understand from discussions with the Applicant that they intend to submit updated auk cumulative and in-combination assessments at Deadline 8. Natural England will endeavour to respond to these at Deadline 9.

2. Environmental Impact Assessment (EIA)

2.1. EIA impacts from collision risk from Vanguard alone

2.1.1. The Vanguard alone predicted collision risk impact figures have been updated by the Applicant since our Deadline 7 response in REP7-075. The figures have been updated following revised collision risk modelling (CRM) by the Applicant to account for increased draft height (as presented in AS-049).

2.1.2. Natural England has evaluated the CRM outputs presented by the Applicant in the Deadline 7.5 'Deterministic Collision Risk Modelling for revised layout scenarios and increased draft height' document, AS-049 for each of the six key species considered to be at risk of collision impacts at an EIA scale: gannet, kittiwake, lesser black-backed gull (LBBG), herring gull, great black-backed gull (GBBG) and little gull.

2.1.3. With regard to the figures presented in the Deadline 7.5 CRM for the updated layout scenarios and increased draft height (AS-049), we understand that the input parameters used, including the mean bird densities and upper and lower 95% Confidence Intervals (CIs) of this, are the same as those presented in Appendix 1 of REP6-019 (with the exception of the turbine revs per minute and turbine hub height). We have therefore reviewed the CRM outputs for the revised layout scenarios and increased draft height using the updated figures for turbine rpm, hub height and turbine numbers in each of Vanguard West and East, but retaining the other parameters, including the mean bird densities and associated CIs. We agree with the predicted figures given by the Applicant in Table 2 of AS-049 for the central (based on mean density) for the revised CRM, but we do not get the same ranges of figures based on the 95% CIs of the density data.

2.1.4. Based on the updated predictions for the WCS turbine layout option (namely 1/2 of the turbines in Vanguard West and 1/2 in Vanguard East for gannet, kittiwake, herring gull, GBBG and little gull and 2/3 of the turbines in Vanguard West and 1/3 in Vanguard East for LBBG) with the increased draft height, we note that based on the Natural England calculated ranges presented in Table 2 below, all the central CRM predictions (i.e. using mean density, mean avoidance rate, maximum likelihood flight height data and the standard nocturnal activity rates) equate to less than 1% baseline mortality of the largest BDMPS and biogeographic populations for all of the five key species. This is also the case for the upper 95% confidence intervals of the bird density for all species.

Table 2 Percentage of baseline mortality for CRM for vanguard alone at EIA scale, using average across all age class mortality rates, as used by the Applicant

	CRM prediction, Vanguard alone, Deadline 7.5,Table 2 AS-049*	**Largest BDMPS (North Sea) individuals , Furness (2015)**	**% baseline mortality largest BDMPS Deadline 7.5, AS-049***	**Biogeographic population individuals (Furness 2015)**	**% baseline mortality biogeographic Deadline 7.5, AS-049***
Gannet	66 (12-161)	456,298	0.08 (0.01-0.18)	1,180,000	0.03 (0.01-0.07)
Kittiwake	115 (12-300)	839,456**	0.09 (0.01-0.23)	5,100,000	0.01 (0.002-0.04)
LBBG	23 (1-66)	209,007	0.09 (0.004-0.25)	864,000	0.02 (0.001-0.06)
Herring gull	14 (0-52)	466,511	0.02 (0-0.06)	1,098,000	0.01 (0-0.03)
GBBG	47 (1-155)	91,399	0.28 (0.001-0.92)	235,000	0.11 (0.002-0.36)
Little gull	5 (0-12)	10,000***	0.25 (0-0.6)	75,000****	0.03 (0-0.08)

* Note discrepancies in figures calculated by Applicant for the range based on 95% CIs of bird density and those calculated by Natural England. The figures calculated by Natural England are presented above

** Population estimate for all UK colonies within North Sea BDMPS scale (from Furness 2015)

*** Precautionary estimate based on the surveys conducted across the Greater Wash Area of Search and analysis of those data in Natural England & JNCC (2016), as used by Applicant

**** Little gull population with connectivity to the southern North Sea was estimated to be up to 75,000 (Stienen et al. 2007), as used by Applicant

2.1.5. **Therefore, based on these revised figures we conclude that the collision risk from Norfolk Vanguard alone would have no significant impact at the EIA scale for all species.**

2.2. EIA cumulative impacts with other plans and projects

a. General comments

2.2.1. In AS-048, the Applicant refers to projects in the cumulative and in-combination assessments that have been built out to a lower capacity than that consented as a source of precaution within the assessments. As we have stated previously (see our Deadline 2 response, REP2-038, to the Applicant's Section 51 advice response AS-006) Natural England acknowledges that this is an important issue with regard to cumulative/in-combination CRM predictions and assessments. However, without a legally secured reduction in the consented Rochdale envelope, and a re-run CRM with the final design parameters, cumulative assessments should be based on consented parameters. We note that East Anglia 1 is the only project to date to meet these tests.

2.2.2. The Applicant also refers to nocturnal activity factors used in the assessments as being overestimates. As we have noted previously (in our Relevant and Written Representations, RR106, REP1-088), we recognise that from recent evidence presented e.g. by MacArthur Green (2015) and Furness et al. (2018), nocturnal activity levels relative to daytime levels for some species may be lower than the levels that equate to the nocturnal activity factors currently used in CRM. However, our position regarding nocturnal activity rates/factors has been set out in RR-106, REP1-088, REP2-038 and our position remains unchanged, which includes that offshore survey periods will have missed peak activity around dawn and dusk and therefore it is not appropriate to apply 'empirically derived' nocturnal activity rates from tracking studies to offshore survey recorded results. Additionally, as we have previously noted in REP2-038, it is not appropriate to simply adjust the CRM figures for the other OWFs included in the cumulative assessments to account for a change in nocturnal activity rate without re-running the CRM, as the modelling calculates the reduction in activity at night through the interaction of nocturnal activity and the latitude of the specific wind farm. Therefore this is a calculation specific to that wind farm and hence a re-run of the model is required.

2.2.3. We note that the figures the Vanguard Applicant has used in the cumulative and in-combination assessments in AS-048 are in some cases (e.g. gannet, kittiwake) different to those used by Natural England in our Deadline 7 response at Hornsea 3 (Natural England 2019). The Hornsea 3 figures we used in Natural England (2019) were essentially the Hornsea 3 Applicant's data but with our preferred parameters, and were presented for illustrative purposes only. We have used the same figures for Hornsea 3 in this response as we have used in the Hornsea 3 Deadline 7 response to ensure consistency across the projects (Natural England 2019). Our advice remains that there is still considerable uncertainty around the Hornsea 3 cumulative contribution due to the lack of a full baseline dataset, hence our suggestion that NV present figures with and without Hornsea 3.We also note that the cumulative/in-combination total figures that the Vanguard Applicant presents in their updated assessments in AS-048 are different to those presented by Natural England in our Deadline 7 response at the Hornsea 3 examination (Natural England 2019). This is partly due to the differences in the Hornsea 3 figures used, and also due to the changes to the Vanguard alone predicted CRM figures due to the revised layout scenarios and increased draught heights considered by Vanguard since our Hornsea 3 Deadline 7 submission.

b. Cumulative collision risk

2.2.4. The Applicant has updated the EIA cumulative collision risk assessments since our Deadline 7 response in REP7-075. The figures have been updated following revised collision risk modelling (CRM) for Vanguard alone by the Applicant to account for increased

draft height (as presented in AS-049). Therefore, Natural England has evaluated the cumulative CRM assessments presented by the Applicant in the updated cumulative and in-combination collision risk assessments in the Deadline 7.5 document, AS-048 for each of the five key species considered to be at risk of cumulative collision impacts: gannet, kittiwake, lesser black-backed gull (LBBG), herring gull and great black-backed gull (GBBG).

2.2.5. Table 3 shows the cumulative CRM total predictions for each of the five key species at risk of CRM for both excluding and including Hornsea 3 in the cumulative totals, as calculated by the Applicant in AS-048, which Natural England are in agreement with.

Table 3 Percentage of baseline mortality for cumulative CRM for EIA for both excluding Hornsea 3 (H3) and including Hornsea 3, using average across all age class mortality rates, as used by the Applicant

	Cumulative CRM prediction*		**Largest BDMPS (North Sea) individuals, Furness (2015)**	**% baseline mortality largest BDMPS**		**Biogeographic population individuals (Furness 2015)**	**% baseline mortality biogeographic**	
	Excl. H3	**Incl. H3****		**Excl. H3**	**Incl. H3**		**Excl. H3**	**Incl. H3**
Gannet	2,686	2,735	456,298	3.08	3.14	1,180,000	1.19	1.21
Kittiwake	3,817	4,144	839,456***	2.91	3.16	5,100,000	0.48	0.52
LBBG	513	530	209,007	1.74	1.80	864,000	0.42	0.44
Herring gull	761	770	466,511	0.94	0.95	1,098,000	0.40	0.40
GBBG	937	1,003	91,399	5.54	5.93	235,000	2.16	2.31

* Based on the Applicant's cumulative figures presented in AS-048.
** Figures included for Hornsea 3 are those used by Natural England in our Deadline 7 response during the examination for that project (Natural England 2019)
*** Population estimate for all UK colonies within North Sea BDMPS scale (from Furness 2015)

2.3. GANNET CUMULATIVE: collision risk + displacement combined

2.3.1. Natural England's calculated cumulative collision total for gannet of 2,686 birds excluding Hornsea 3 and 2,735 including Hornsea 3 exceeds 1% of baseline mortality of the North Sea BDMPS scale and the biogeographic population (Furness 2015) – the figure excluding Hornsea 3 equates to 3.08% of baseline mortality of the BDMPS and 1.19% of baseline mortality of the biogeographic population, and the figure including Hornsea 3 equates to 3.14% of the BDMPS and 1.21% of the biogeographic population baseline mortality (Table 3). This is not insignificant and requires further consideration.

2.3.2. The Applicant has considered in their assessment outputs from the Population Viability Analysis (PVA) model for the British gannet population undertaken by WWT (2012). This PVA was run over 25 years and therefore does not cover impacts from the last 5 years of the 30 year lifespan of Norfolk Vanguard (or the last 10 years of the 35 year lifespan of the Hornsea 3 project). Additionally it has not been run using the 'matched runs/pairs' approach advised by Natural England and the counterfactual metrics of population size and growth rate (as recommended by Natural England) are not presented (these issues were all highlighted in our Relevant Representations RR-106). Therefore, ideally this PVA should have been updated by the Applicant to address these issues. We also note that this PVA was undertaken using the estimated gannet population in 2004 (the most recent census available at that time), and the British gannet population has increased considerably since this time.

2.3.3. It should be noted that the figures above are for predicted collision mortalities only. The Applicant has not considered the combined impact of cumulative collision risk and cumulative displacement to gannet at the EIA scale in AS-048, and has only considered the combined in-combination impact of in-combination displacement and in-combination displacement for HRA. However, the cumulative displacement assessment has not been

updated since the Applicant's Deadline 6 submission (Table 7 of REP6-021), so we note that adding predicted cumulative gannet displacement mortality would add 253-337 birds per annum including Hornsea 3 to the cumulative collision total. This gives a combined total cumulative collision plus displacement impact of up to **3,072** gannet mortalities including Hornsea 3 at the EIA scale, which equates to 3.52% of baseline mortality of the BDMPS and 1.36% of baseline mortality of the biogeographic population, which is not insignificant and requires further consideration.

2.3.4. Vanguard contributes 91 birds (66 from collision and up to 25 from displacement – see Chapter 13 of application documents, APP-337), 2.96% to this cumulative collision plus displacement total.

2.3.5. The northern gannet is classified as 'Least Concern' with respect to the potential for global extinction (BirdLife International 2018). However, at the UK scale the species is Amber listed in Birds of Conservation Concern (BoCC) 4 (Eaton et al. 2015). The BoCC Amber listing is due to:

- Localisation of breeding population within Important Bird Areas (IBAs)/Special Protection Areas (SPAs) (Eaton et al. 2015).
- International importance of UK population – threshold of 20% of global population (Eaton et al. 2015). It has been estimated that the UK holds 55.6% of the global population (JNCC 2016).

2.3.6. Based on the above conservation assessment, and given the UK's particular responsibility for gannet because of supporting over half of the global population, the predicted impacts at the North Sea population scale have the potential to give rise to significant effects and therefore **we are unable to rule out a significant (moderate adverse) effect on gannet from cumulative collision and displacement mortality at an EIA scale**.

2.4. KITTIWAKE CUMULATIVE: collision risk

2.4.1. Natural England's calculated cumulative collision total for kittiwake of 3,817 birds excluding Hornsea 3 and 4,144 including Hornsea 3 exceeds 1% of baseline mortality of all UK kittiwake colonies within the North Sea BDMPS scale (Furness 2015) – the figure excluding Hornsea 3 equates to 2.91% of baseline mortality and the figure including Hornsea 3 equates to 3.16% (Table 3). This is not insignificant and requires further consideration.

2.4.2. We note that the Applicant has used the kittiwake PVA constructed during the East Anglia 3 offshore wind farm examination for assessing the cumulative CRM impacts on the UK North Sea and Channel BDMPS population, available from Appendix 1 of EATL (2015). This PVA was run over 25 years and therefore does not cover impacts from the last 5 years of the 30-year lifespan of Norfolk Vanguard (or the last 10 years of the 35-year lifespan of the Hornsea 3 project). Additionally, it has not been run using the 'matched runs/pairs' approach advised by Natural England and it appears that only the counterfactual of population size metric is available and that the counterfactual of growth rate metric is not presented (these issues were all highlighted in our Relevant Representations RR-106). Therefore, ideally this PVA should have been updated by the Applicant to address these issues.

2.4.3. Vanguard contributes 115 collisions to the cumulative totals, this equates to 3.03% of the total of 3,817 excluding Hornsea 3 and 2.78% of the total of 4,144 including Hornsea 3.

2.4.4. Kittiwake are listed as 'Vulnerable' to global extinction on the IUCN Red List (raised from Least Concern to Vulnerable in 2017) as a result of breeding population declines in Europe of >40% over 39 years (Birdlife International 2018). Kittiwake is also listed as Red on BoCC4 (Eaton et al. 2015) as a result of severe population declines in the UK.

2.4.5. Therefore, based on the above the predicted impacts at the North Sea population scale have the potential to give rise to significant effects and therefore **we are unable to rule**

out a significant (moderate adverse) effect on kittiwake from cumulative collision mortality at an EIA scale.

2.5. LESSER BLACK-BACKED GULL (LBBG) CUMULATIVE: collision risk

2.5.1. Natural England's calculated cumulative collision total for LBBG of 513 birds excluding Hornsea 3 and 530 including Hornsea 3 exceeds 1% of baseline mortality of the North Sea BDMPS scale (Furness 2015) (which are the same as those calculated by the Applicant) – the figure excluding Hornsea 3 equates to 1.74% of baseline mortality and the figure including Hornsea 3 equates to 1.80% (Table 3). This is not insignificant and requires further consideration.

2.5.2. Vanguard contributes 23 collisions to the cumulative totals, this equates to 4.5% of the total of 513 excluding Hornsea 3 and 4.3% of the total of 530 including Hornsea 3.

2.5.3. The LBBG is classified as 'Least Concern' (BirdLife International 2018). The overall population trend across its range is increasing, although it has experienced recent declines at a UK level (Balmer et al. 2013) and the species is Amber listed in BoCC 4 (Eaton et al. 2015). Quite a high proportion of birds in the largest BDMPS of 209,007 will be UK breeding birds (Furness 2015). However, there is uncertainty in the predicted collision figures due the uncertainty/variability in the input parameters and some degree of precaution in the cumulative total regarding the nocturnal activity rate and build out scenarios. It is also worth noting that there is limited evidence and therefore some uncertainty around baseline mortality rates. **Therefore, we agree with the Applicant's conclusion in paragraph 148 of AS-048 of minor adverse impact from cumulative collision to LBBG at an EIA scale.**

2.6. HERRING GULL CUMULATIVE: collision risk

2.6.1. Natural England's calculated cumulative collision total for herring gull of 761 birds excluding Hornsea 3 and 770 including Hornsea 3 equates to 0.94% (excluding Hornsea Three) and 0.95% (including Hornsea 3) of baseline mortality of the largest BDMPS and to 0.40% (excluding and including Hornsea 3) of baseline mortality of the biogeographic population (Table 3).

2.6.2. Vanguard contributes 14 collisions to the cumulative totals, this equates to 1.84% of the total of 761 excluding Hornsea 3 and 1.82% of the total of 770 including Hornsea 3.

2.6.3. Therefore, based on the cumulative CRM figures presented in AS-048, our conclusion remains that set out in our Deadline 7 response (REP7-075) that we could conclude no significant cumulative CRM impact at the EIA scale for herring gull. **We therefore agree with the Applicant's conclusion in paragraph 109 of AS-048 of minor adverse impact from cumulative collision to herring gull at an EIA scale.** We again note that the cumulative total is now approaching 1% of baseline mortality of the largest BDMPS, reinforcing the need for herring gull CRM to have been carried out, and the need for all future offshore wind farm projects in the North Sea to do similarly.

2.7. GREAT BLACK-BACKED GULL (GBBG) CUMULATIVE: collision risk

2.7.1. Natural England's calculated cumulative collision total for GBBG of 937 birds excluding Hornsea 3 and 1,003 including Hornsea 3 exceeds 1% of baseline mortality of the North Sea BDMPS scale and the biogeographic population (Furness 2015) (which is the same as the Applicant has calculated) – the figure excluding Hornsea 3 equates to 5.54% of baseline mortality of the BDMPS and 2.16% of baseline mortality of the biogeographic population, and the figure including Hornsea 3 equates to 5.93% of the BDMPS and 2.31%

of the biogeographic population baseline mortality (Table 3). This is not insignificant and requires further consideration.

2.7.2. Vanguard contributes 47 collisions to the cumulative totals, this equates to 5.0% of the total of 937 excluding Hornsea 3 and 4.67% of the total of 1,003 including Hornsea 3.

2.7.3. GBBG is classed as 'Least Concern' of global extinction by IUCN. The overall population trend across its range is stable, although at a UK level the species is Amber listed in BoCC 4 (Eaton et al. 2015) due to moderate declines in both the breeding and non-breeding populations.

2.7.4. We note that the Applicant has used the GBBG PVA constructed during the East Anglia 3 offshore wind farm examination for assessing the cumulative CRM impacts on the UK North Sea and Channel BDMPS population, available from Appendix 1 of EATL (2016). This PVA was run over 25 years and therefore does not cover impacts from the last 5 years of the 30 year lifespan of Norfolk Vanguard (or the last 10 years of the 35 year lifespan of the Hornsea 3 project). Additionally it has not been run using the 'matched runs/pairs' approach advised by Natural England and it appears that only the counterfactual of population size metric is available and that the counterfactual of growth rate metric is not presented (these issues were all highlighted in our Relevant Representations RR-106). Therefore, ideally this PVA should have been updated by the Applicant to address these issues. However, using the existing PVA as the current best available evidence, the outputs suggest:

- If the additional mortality from the wind farms excluding Hornsea 3 is 950 (closest PVA output to the cumulative total of 937 excluding Hornsea 3) then the UK North Sea and Channel BDMPS GBBG population after 25 years will be around 6.5-8% lower than it would have been in the absence of the additional mortality using the density dependent model or around 22% lower using the density independent model.
- If the additional mortality from the wind farms including Hornsea 3 is 1,000 (closest PVA output to the cumulative total of 1,003 including Hornsea 3) then the UK North Sea and Channel BDMPS GBBG population after 25 years will be around 6.8-8.9% lower than it would have been in the absence of the additional mortality using the density dependent model or around 23% lower using the density independent model.

2.7.5. Based on the above and the cumulative CRM figures presented in AS-048, **we are unable to rule out a significant (moderate adverse) effect on GBBG from cumulative collision mortality at an EIA scale**, which is the same conclusion we reached at East Anglia 3.

2.8. LITTLE GULL CUMULATIVE: collision risk

2.8.1. We note that the Applicant has included in the cumulative/in-combination assessment Triton Knoll, Race Bank, Sheringham Shoal, Hornsea 1, Hornsea 2, Hornsea 3 and Vanguard in Table 25 of AS-048.

2.8.2. Natural England would also advise that:

- Dudgeon is also included in the in-combination assessment (note that Dudgeon has completed an assessment of collision risk for little gull at the Greater Wash SPA).
- As Vanguard is included in the in-combination assessment, we also query why the other projects in the former East Anglia zone (e.g. East Anglia 1 and East Anglia 3) are also not included.

2.8.3. We agree that the CRM figures presented for the various sites in Table 25 of AS-048 have been updated for an avoidance rate of 99.2%.

2.8.4. As noted in our general comments above on cumulative assessments, we do not consider it is appropriate to adjust the figures for the other OWFs based on build out capacities unless the reduction is legally secured and CRM re-run.

2.8.5. As we do not consider that figures have been included in the assessment from all relevant OWFs we cannot reach a conclusion regarding the significance of the level of predicted cumulative impact.

3. HABITATS REGULATIONS ASSESSMENT (HRA)

It should be noted that the general comments on the cumulative assessment in Section 1.2.1 above regarding built out layouts/capacity, nocturnal activity and the Hornsea 3 figures are also relevant to the HRA in-combination assessments.

3.1. FLAMBOROUGH & FILEY COAST (FFC) SPA: GANNET

a. Vanguard alone: collision and displacement impacts

3.1.1. For the impact from collision risk from Vanguard alone to gannets from the FFC SPA, we again agree with the apportionment rates used by the Applicant in AS-048 of 100% in the breeding season, 4.8% in autumn and 6.2% in spring. We also welcome that the full breeding season with adjusted migration seasons has also been presented.

3.1.2. We agree with the apportioned figure of 20 gannet collisions per annum from Vanguard alone set out by the Applicant in Table 3 of AS-048 based on the above apportionment rates and seasonal definitions for the central input values. We welcome that the Applicant has also considered the uncertainty/variability in the input data through considering in the assessment the range of collision predictions based on using the 95% confidence intervals (CIs) around the bird density data. However, as we noted previously in our Deadline 7 response (REP7-075), we again do not get the same seasonal range of figures as presented by the Applicant in paragraph 17 of AS-048: the Applicant's calculated range is 5.8-39.2 gannet collisions, whereas Natural England calculates this to be 1-56 collisions. We therefore again suggest the Applicant revisits these figures.

3.1.3. From Table 4, the predicted collision impacts presented in the Applicant's AS-048 document for the gannet feature of FFC SPA are **20 (1-56)** collisions per annum for Norfolk Vanguard alone. The predicted 20 adults per annum equates to around 1% of baseline mortality of the colony.

3.1.4. It should be noted that these figures are for predicted collision mortalities only. The Applicant has not considered the combined impact of collision risk and displacement from Vanguard alone in its submissions in AS-048, and has only considered the combined in-combination impact with other plans and projects of in-combination collision plus in-combination displacement. However, we note that adding predicted gannet displacement mortality for Vanguard alone would add 2.5-3.3 adults per annum to FFC SPA (as presented by the Applicant in Table 7 of REP6-021 (which Natural England are in agreement with) to the alone total. The Applicant has not considered the uncertainty/variability in the displacement predictions through considering the predictions using the upper and lower 95% Confidence Intervals (CIs) of the bird abundance data. Natural England calculates this range to be 0.8-1.1 birds using the lower CI data and 6.2-8.3 using the upper CI data. This gives a combined total alone impact of up to **23 (range of up to 2-64)** adult gannet mortalities from FFC from combined collision and displacement from the project alone. The predicted 23 adults per annum also equates to around 1% of baseline mortality of the colony (see Table 4).

3.1.5. Therefore, the potential impacts on the SPA require further consideration.

Table 4 Percentage of baseline mortality for impact levels for Vanguard alone for gannet for FFC SPA. Baseline mortality calculated using adult only colony size and adult mortality rate (8.8% from Horswill & Robinson 2015).

	GANNET PREDICTED MORTALITY VANGUARD ALONE, HRA: FFC SPA			
	Mortality prediction (range based on 95% CIs of density data)	% of baseline mortality of FFC SPA designated population* (used by Applicant)	% of baseline mortality of FFC SPA 2017 count** (used by Applicant)	% of baseline mortality of FFC SPA mean of 2012, 15 & 17 census data***
Based on CRM figures from Table 3 of AS-048 WCS 50% turbines in Vanguard West & 50% in Vanguard East) with increased draught height	20 (1-56)****	0.83 (0.02-2.36)	1.00 (0.03-2.86)	0.90 (0.03-2.57)
Collision + displacement for Vanguard alone	23 (2-64)*****	0.98 (0.08-2.72)	1.18 (0.1-3.29)	1.06 (0.09-2.96)

* 11,061 pairs (22,122 adults), 1% baseline mortality = 19 birds
** 13,391 pairs (26,782 adults), 1% baseline mortality = 24 birds
*** 24,594 adults, 1% baseline mortality = 22 birds. We recommend that this population size is sued in assessment of baseline mortality, as it covers the years contemporaneous with the Vanguard baseline survey data
**** Note discrepancies in figures calculated by Applicant for the range based on 95% CIs of bird density and those calculated by Natural England. The figures calculated by Natural England are presented above
***** Based on combined CRM alone figures plus displacement figures (based on WCS of 80% displacement and 1% mortality)

3.1.6. We welcome that the Applicant has considered in AS-048 the predicted collision figures for Vanguard alone with the outputs from the updated FFC SPA gannet PVA undertaken during the Hornsea 3 examination (Hornsea Project Three Offshore Wind Farm 2019). Natural England notes that we 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 Deadline 6 response to the Hornsea 3 Examination – written summary of representations of ISH5[1]). This nevertheless represents the best available evidence on which to base an assessment, though this should not be taken as an endorsement or 'acceptance' of the model.

3.1.7. There is no clear evidence to support the application of any particular form or magnitude of density dependence in the modelling, therefore Natural England has based its advice on the outputs of the density independent PVA model (as these make no assumptions about the form or strength of any density dependent effects). Therefore, Natural England has focused our conclusions on the PVA outputs from the density independent model for demographic rate set 2 (the rates Natural England considers to be the most appropriate) using a matched runs approach (as per Natural England advice) (see Table 5).

3.1.8. For the combined collision and displacement impacts to gannets from the FFC SPA from Vanguard alone, if the additional mortality from the wind farm is 25 adults per annum (closest PVA output available in Hornsea Project Three Offshore Wind Farm 2019 to

[1] Natural England (2019) Hornsea Project Three Offshore Wind Farm: Natural England Written Submission for Deadline 6 – Written Submission of Natural England's Representations at Issue Specific Hearing 5, Offshore Ecology. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-001688-Natural%20England%20-%20Written%20Submission%20of%20Natural%20England's%20Representations%20at%20Issue%20Specific%20Hearing%205%20-%20Offshore%20Ecology.pdf

Vanguard alone predicted 23 mortalities from collision and displacement combined) then the population of FFC SPA after 30 years will be 3.2% lower than it would have been in the absence of the additional mortality. The population growth rate would be reduced by 0.1% (Table 5).

3.1.9. If the upper range of collision and displacement combined of 64 birds (as calculated by Natural England) is considered, then if the additional mortality from Vanguard alone is 50-75 adults per annum (closest PVA outputs available in Hornsea Project Three Offshore Wind Farm 2019 to Vanguard upper range predicted for collision and displacement combined of 64 mortalities) then the population of FFC SPA after 30 years will be 6.4-9.4% lower than it would have been in the absence of the additional mortality and the population growth rate would be reduced by 0.2-0.3% (Table 5).

Table 5 Predicted population impacts on the gannet population of FFC SPA for the range of mortality impacts predicted for Norfolk Vanguard alone. PVA impact metrics are as provided in Hornsea Project Three Offshore Wind Farm (2019). The range of predicted project alone figures are indicated in pink. The darker shaded cells represent the level of impact closest to the central value of the prediction.

GANNET – FFC SPA VANGUARD ALONE					
Additional mortality	% Baseline Mortality using designation population size (22,122 adults), as used by Applicant	% Baseline Mortality using 2017 count size (26,782 adults), as used by Applicant	% Baseline Mortality using mean of 2012, 15 & 17 census data (24,594 adults)	Counterfactual of Final Population Size (CPS)*	Counterfactual of Growth rate (CGR)**
5	0.26	0.21	0.23		No value available
10	0.51	0.42	0.46		No value available
20	1.03	0.85	0.92		No value available
25*	1.28	1.06	1.16	0.968 (0.967-0.968)	0.999
30	1.54	1.27	1.39		No value available
40	2.05	1.70	1.85		No value available
50*	2.57	2.12	2.31	0.936 (0.936-0.937)	0.998
75	3.85	3.18	3.47	0.906 (0.905-0.907)	0.997
100	5.14	4.24	4.62	0.877 (0.876-0.878)	0.995

* Gannet, demographic rate set 2, counterfactuals of population size after 30 years, estimated using a matched runs method, from 1000 density independent simulations. See Table A2_3.1 in Hornsea Project Three Offshore Wind Farm (2019)

** Gannet, demographic rate set 2, counterfactuals of population growth rate after 35 years, estimated using a matched runs method, from 1000 density independent simulations. See Table A2_3.3 in Hornsea Project Three Offshore Wind Farm (2019). Whilst Vanguard's lifespan is 30 years, data on counterfactuals of growth rate are only available in Hornsea Project Three Offshore Wind Farm (2019) for after 35 years.

3.1.10. The gannet population of FFC SPA increased at 11.1% per annum (between 2003/4 and 2015, JNCC Seabird Monitoring Programme SMP data). Using FFC SPA census data 2002-2017 the growth rate was 9.4% per annum. However, it is not known what the growth rate of the colony will be over the next 30 years and this should therefore be considered when judging the significance of predicted impacts against the conservation objectives for the feature.

3.1.11. Natural England has reviewed growth rates for the 22 gannet colonies across Britain, Channel Islands and Ireland with repeated census data (Cramp et al. 1974, Lloyd et al. 1991, Mitchell et al. 2004, plus more recent count data from the SMP). The Flamborough/Bempton gannet colony was founded in the late 1930s (Cramp et al. 1974) and so has been in existence now for about 80 years. Thus, by the end of 30 years of Vanguard it will be about 110 years in age. Given the analysis of trends in gannet colony growth rates amongst a suite of long-established colonies, it is highly likely that its annual growth rate averaged over the whole period since founding will drop from its current

average of c 11% over the first 80 years. The highest annual colony growth rate calculated over a period of >100 years is 4.5% at Grassholm. The Flamborough colony is unlikely to achieve a higher annual growth rate than this. The average annual growth rate calculated over a period of >90 years across the 8 gannet colonies with records exceeding 90 years is 1.8%. Amongst these colonies the mean annual growth rate over the most recent years of their records (80+ years) has been just 1.2% per annum (or 1.3% excluding Sula Sgeir (as the growth rate here may be influenced adversely by an annual licenced harvest of young birds)) compared to an average rate of 2.0% per annum during the first 80 or so years of their existence. Therefore, Natural England has considered the counterfactuals of final population size for the predicted levels of alone additional mortality for a range of plausible future growth rate scenarios for FFC of 1, 2, 3, 4 and 5% per annum.

3.1.12. The Conservation Objective for the gannet population of the FFC SPA is to maintain the size of the breeding population at a level which is above 8,469 pairs (16,938 adults), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. The latest mean count is 24,594 adults based on the mean of the 2012, 2015 and 2017 counts.

3.1.13. For the predicted Vanguard alone collision plus displacement mortality to FFC SPA gannets of 23 (range 2-64) mortalities per year, from the closest updated PVA outputs in Hornsea Project Three (2019) of 25 and 75 additional mortalities, the colony would still be predicted to grow above the current mean population of 24,594 adults under any growth rate scenario from 1% to up to 5%. This would allow the conservation objective to be met and therefore **no AEOI of the gannet feature of the FFC SPA can be concluded for collision plus displacement impacts from Vanguard alone**.

b. <u>In-combination collision risk and displacement impacts with other plans and projects</u>

3.1.14. As noted in our Deadline 7 response (REP7-075), we again welcome that for gannet for the FFC SPA all of the other offshore wind farm collision and displacement predictions for autumn and spring in Table 5 of AS-048 have been apportioned using the Natural England recommended rates of 4.8% in autumn and 6.2% in spring. We also again welcome that figures for the Hywind, Kincardine and Moray West offshore wind farms (OWFs) are again included. We also welcome that the in-combination assessment in AS-048 makes reference to the updated PVA undertaken for Hornsea 3, but note our above comments regarding the outstanding with this PVA**.**

3.1.15. The in-combination collision total calculated by Natural England is 212 gannets from the FFC SPA per annum excluding Hornsea 3 and 230 including Hornsea 3 (Natural England has used the same figures for Hornsea 3 as we used in Natural England 2019). These predicted in-combination collision impacts equate to more than 1% of baseline mortality of the colony (see Table 6).

3.1.16. Again, these figures are for predicted collision mortalities only. The Applicant has considered the predicted impacts to gannets from the FFC SPA of in-combination collision and in-combination displacement combined in Section 3.1.2.1 of AS-048. Adding predicted displacement mortality would add 49-65 birds to the in-combination total. This gives a combined total in-combination collision plus displacement impact of up to 212+65=**277 (excluding Hornsea 3)** or 230+65=**295 (including Hornsea 3)**. The predicted impacts again equates to more than 1% of baseline mortality of the colony (see Table 6).

Table 6 Percentage of baseline mortality for in-combination impact levels for excluding and including Hornsea 3 (H3) for gannet for FFC SPA. Baseline mortality calculated using adult only colony size and adult mortality rate (8.8% from Horswill & Robinson 2015).

	GANNET PREDICTED IN-COMBINATION MORTALITY, HRA: FFC SPA			
	Mortality prediction	% of baseline mortality of FFC SPA designated population* (used by Applicant)	% of baseline mortality of FFC SPA 2017 count** (used by Applicant)	% of baseline mortality of FFC SPA mean of 2012, 15 & 17 census data***
In-combination CRM, based on figures from Table 5 of AS-048	212 excl. H3 230 incl. H3****	10.87 excl. H3 11.79 incl. H3	8.98 excl. H3 9.74 incl. H3	9.78 excl. H3 10.61 incl. H3
In-combination collision + in-combination displacement*****	277 excl. H3 295 incl. H3****	11.84 excl. H3 15.15 incl. H3	9.78 excl. H3 12.52 incl. H3	10.65 excl. H3 13.63 incl. H3

* 11,061 pairs (22,122 adults), 1% baseline mortality = 19 birds
** 13,391 pairs (26,782 adults), 1% baseline mortality = 24 birds
*** 24,594 adults, 1% baseline mortality = 22 birds. We recommend that this population size is sued in assessment of baseline mortality, as it covers the years contemporaneous with the Vanguard baseline survey data
**** Figures included for Hornsea 3 collisions are those used by Natural England in our Deadline 7 response during the examination for that project (Natural England 2019)
***** In-combination displacement figure used in total is that for WCS of 80% displacement and 1% mortality

3.1.17. We welcome that the Applicant has considered in AS-048 the predicted in-combination collision figures and the combined in-combination collision plus displacement figures with the outputs from the updated FFC SPA gannet PVA undertaken during the Hornsea 3 examination (Hornsea Project Three Offshore Wind Farm 2019), though we again note our comments above regarding outstanding issues with this PVA.

3.1.18. For the reasons set out above, Natural England has again focused our conclusions on the PVA outputs from the density independent model for demographic rate set 2 using a matched runs approach (see Table 7).

3.1.19. For the combined collision and displacement impacts in-combination with other plans and projects, if the additional mortality from the offshore wind farms is 275-300 per annum (closest PVA outputs to the combined in-combination displacement and collision mortality figures of 277 excluding Hornsea 3 and 295 including Hornsea 3) then the population of FFC SPA after 30 years will be 30.4-32.7% lower than it would have been in the absence of the additional mortality. The population growth rate would be reduced by 1.2-1.4% (Table 7).

Table 7 Predicted Population impacts on the gannet population of FFC SPA for the range of mortality impacts predicted for in-combination collision and in-combination collision plus in-combination displacement. PVA Impact Metrics are as provided in Hornsea Project Three Offshore Wind Farm (2019). The range of predicted figures are indicated in purple. The darker shaded cells represent the level of impact closest to the combined in-combination collision plus in-combination displacement predictions

GANNET	FFC SPA				
Additional mortality	% Baseline Mortality using designation population size (22,122 adults), as used by Applicant	% Baseline Mortality using 2017 count size (26,782 adults), as used by Applicant	% Baseline Mortality using mean of 2012, 15 & 17 census data (24,594 adults)	Counterfactual of Final Population Size (CPS)*	Counterfactual of Growth rate (CGR)**
225	11.56	9.55	10.40	0.743 (0.741-0.746)	0.990
250	12.84	10.61	11.55	0.719 (0.716-0.722)	0.989
275	14.13	11.67	12.71	0.696 (0.693-0.698)	0.988
300	15.41	12.73	13.86	0.673 (0.670-0.676)	0.986
325	16.69	13.79	15.02	0.651 (0.648-0.654	0.985

* Gannet, demographic rate set 2, counterfactuals of population size after 30 years, estimated using a matched runs method, from 1000 density independent simulations. See Table A2_3.1 in Hornsea Project Three (2019)
** Gannet, demographic rate set 2, counterfactuals of population growth rate after 35 years, estimated using a matched runs method, from 1000 density independent simulations. See Table A2_3.3 in Hornsea Project Three (2019).

3.1.20. As noted in the assessment of impacts from Vanguard alone above (Section 2.1.1), it is not known what the growth rate of the colony will be over the next 30 years and this should be considered when judging the significance of predicted impacts against the conservation objectives for the feature.

3.1.21. Natural England has used the same review of gannet colony growth rates as used in the alone assessment and has again considered the counterfactuals of final population size for the predicted levels of in-combination additional mortality for a range of plausible future growth rate scenarios for FFC of 1, 2, 3, 4 and 5% per annum.

3.1.22. The Conservation Objective for the gannet population of the FFC SPA is to maintain the size of the breeding population at a level which is above 8,469 pairs (16,938 adults), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. The latest mean count is 24,594 adults based on the mean of the 2012, 2015 and 2017 counts.

3.1.23. For the predicted in-combination with other plans and projects collision plus displacement mortality to FFC SPA gannets of 277 mortalities per year excluding Hornsea 3, from the closest updated PVA output in Hornsea Project Three (2019) of 275 additional mortalities, the colony would be predicted to reduce from its current size of 24,594 adults for a growth rate of 1%, but would still be above the size of the 8,469 pairs or 16,938 adults. The colony would be predicted to continue to grow above the current mean population of 24,594 adults under any growth rate scenario from 2% to up to 5% per annum.

3.1.24. If the colony were to experience an annual growth rate of 2% or more per annum over the next 30 or so years, then the integrity of the site for this feature is high, with high rates for self-repair, and self-renewal under dynamic conditions with minimal external management. Therefore, the FFC Gannet Population is believed to be robust enough to allow the conservation objective to maintain the population at (or above) designation levels and sustain additional alone and in-combination mortalities from the offshore wind farms. Our justification for this position is we consider it to be highly unlikely that the FFC annual growth rate would be as low as 1%, and from the analysis of gannet colony growth rates we have conducted the current annual growth rate of c 11% appears to be relatively high for a colony of this age and so the colony is likely to do better than a 1.3 % annual growth rate in the foreseeable future.

c. Overarching summary for FFC Gannet in-combination.

3.1.25. Natural England advises that on the above information that an AEOI of the gannet feature of the FFC SPA can be ruled out for collisions plus displacement impacts from in-combination with other plans and projects if Hornsea 3 is excluded from the in-combination total.

3.1.26. **However, due to Natural England's significant concerns regarding the incomplete baseline surveys for the Hornsea 3 project, and the associated level of uncertainty as regards the potential impacts of that project, Natural England is not in a position to advise that an AEOI can be ruled out for the gannet feature of the FFC SPA for collision plus displacement impacts in-combination with other plans and projects when Hornsea 3 is included in the in-combination total.**

3.2. FLAMBOROUGH & FILEY COAST (FFC) SPA: KITTIWAKE

a. Vanguard alone: collision impacts

3.2.1. We note that in AS-048 the HRA for kittiwake at the FFC SPA for Vanguard alone appears to be based on collision predictions for the breeding season at the Vanguard West site combined with the collision predictions across the worst case scenario layout option b (50% turbines in Vanguard West and 50% in Vanguard East) across both sites in the migration seasons. This is because the Applicant considers the Vanguard West site is closer to the FFC SPA and there is more compelling evidence for connectivity on this site. It would assist the Examining Authority if the Applicant could clarify this point.

3.2.2. If this is the case Natural England has significant concerns regarding this approach, as this will not be the realistic worst case scenario for the Vanguard Rochdale envelope, as using the full breeding season and the Applicant's apportionment rates of 26.1% in the breeding season, 5.4% in autumn and 7.2% in spring to apportion collisions from the worst case scenario layout option of 50% of turbines in Vanguard West and 50% in Vanguard East results in a higher annual collision prediction of kittiwakes from the FFC SPA than the Applicant's approach in AS-048. Given that there is evidence from the tracking data for connectivity of kittiwakes from the FFC SPA with the Vanguard sites during the breeding season, we consider the full breeding season with adjusted migration seasons to be the appropriate seasonal definitions to use for this assessment.

3.2.3. The Applicant has continued to consider that the calculated apportionment of 26.1% for the breeding season is precautionary and has not considered the approach of a matrix as advised by Natural England at the telecall with the Applicant on 2nd April 2019 and as advised in our Deadline 7 response (REP7-075).

3.2.4. Based on the above, our advice regarding collision impacts to kittiwake from the FFC SPA from Vanguard alone remains that presented in our Deadline 7 response, REP7-075. However, our calculations have been updated to reflect the revised collision figures from Vanguard alone based on the increased draft height as presented in AS-048.

3.2.5. Natural England has considered the apportionment of kittiwake collisions to the FFC SPA from Vanguard alone using what is likely to be a precautionary 86% apportioning rate in the breeding season together with the agreed 5.4% in autumn and 7.2% in spring. This assessment has been made by applying these apportionment rates to the CRM predictions for the revised worst case layout of 50% of the turbines in Vanguard West and 50% in East together with the increased draft height (as set out in AS-049). Using these rates results in annual total of **43 kittiwake collisions (range of 2-120 based on 95% CIs of density data) to the FFC SPA**. These figures equate to 0.33% (range 0.02-0.93%) of baseline mortality of the FFC SPA kittiwake colony using the designated colony adult population or to 0.29% (range 0.02-0.80%) of baseline mortality using the mean of 2016-17 population and an adult mortality rate of 14.6% (Horswill & Robinson 2015). It is worth noting that there is limited evidence and therefore some uncertainty around baseline mortality rates. On the basis of these figures, **Natural England advises that a conclusion of no AEOI of the**

kittiwake feature of the FFC SPA from collision risk from Norfolk Vanguard alone can be reached.

b. **In-combination collision risk impacts with other plans and projects**

3.2.6. As noted in our Deadline 7 response (REP7-074), we again welcome that for kittiwake for the FFC SPA all of the other offshore wind farm collision predictions for autumn and spring in Table 12 of AS-048 have been apportioned using the Natural England recommended rates of 5.4% in autumn and 7.2% in spring and that the breeding season apportionment rates labelled as the 'NE method'[2] from the East Anglia 3 assessment have been used with the higher rate of 83% also used for Hornsea 2. We also again welcome that figures for the Hywind, Kincardine and Moray West offshore wind farms (OWFs) are again included. We welcome that the in-combination assessment in AS-048 makes reference to the updated PVA undertaken for Hornsea 3, though as with the gannet PVA, Natural England notes that we 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 Deadline 6 response to the Hornsea 3 Examination – written summary of representations of ISH5). This nevertheless represents the best available evidence on which to base an assessment, though this should not be taken as an endorsement or 'acceptance' of the model.

3.2.7. **The in-combination collision total calculated by the Applicant is 332 kittiwakes from the FFC SPA per annum excluding Hornsea 3 and 490 including Hornsea 3**. Natural England calculates the annual apportioned figure to the FFC SPA from Vanguard alone to be higher than the Applicant at 43 collisions per year for using a precautionary 86% breeding season apportionment rate and the Applicant's rates of 5.4% in autumn and 7.2% in spring all on the figures for the worst case scenario layout of 50% of turbines in Vanguard West and 50% in Vanguard East. We have also used the same annual figure of 181 kittiwakes apportioned to the FFC SPA for Hornsea 3 as used in our Deadline 7 response during the Hornsea 3 examination (Natural England 2019) **Using these figures in the in-combination assessments brings the total figures to 366 kittiwake collisions excluding Hornsea 3 and 547 including Hornsea 3**. Both the Applicant's calculated in-combination figures and those calculated by Natural England equate to more than 1% of baseline mortality of the colony (see Table 8).

Table 8 Percentage of baseline mortality for in-combination collision impacts for excluding and including Hornsea 3 (H3) for kittiwake for FFC SPA. Baseline mortality calculated using adult only colony size and adult mortality rate (14.6% from Horswill & Robinson 2015).

	KITTIWAKE PREDICTED IN-COMBINATION CRM MORTALITY, HRA: FFC SPA		
	Mortality prediction	% of baseline mortality of FFC SPA designated population* (used by Applicant)	% of baseline mortality of FFC SPA mean 2016-17 census data**
Applicant's in-combination CRM, based on figures from Table 12 of AS-048	332 excl. H3 490 incl. H3	2.55 excl. H3 3.77 incl. H3	2.22 excl. H3 3.27 incl. H3
Natural England's calculated in-combination CRM, based on preferred apportionment rates and CRM figures for Vanguard & same H3 figures as used in Natural England (2019)	366 excl. H3 547 incl. H3	2.81 excl. H3 4.20 incl. H3	2.44 excl. H3 3.65 incl. H3

* 89,040 adults, 1% baseline mortality = 130 birds

** 102,536 adults, 1% baseline mortality = 150 birds

[2] It should be noted that this is not an "NE method" but an interpretation of HOW2's figures using parameters that were more closely aligned with our advice than the ones the Applicant had used.

3.2.8. There is no clear evidence to support application of any particular form or magnitude of density dependence in the modelling, therefore Natural England has based our advice on the outputs of the DI models (as these make no assumptions about the form of strength of any density dependent effects). Therefore, Natural England has focused our conclusions on the PVA outputs from the density independent model for demographic rate set 2 using a matched runs approach (see Table 9).

Table 9 Predicted population impacts on the kittiwake population of FFC SPA for the range of mortality impacts predicted for Norfolk Vanguard in-combination with other plans and projects. PVA impact metrics are as provided in Hornsea Project Three Offshore Wind Farm (2019). The range of predicted in-combination figures are indicated in purple. The darker shaded cells represent the level of impact closest to the in-combination predictions in Table 8.

KITTIWAKE	FFC SPA			
Additional mortality	% Baseline Mortality using designation population size (89,040 adults)	% Baseline Mortality using mean 2016-17 census data (102,536 adults)	Counterfactual of Final Population Size (CPS)*	Counterfactual of Growth rate (CGR)**
300	2.31	2.00	0.907 (0.906-0.908)	0.997
350	2.69	2.34	0.892 (0.891-0.893)	0.996
400	3.08	2.67	0.878 (0.877-0.879)	0.996
450	3.46	3.01	0.863 (0.862-0.865)	0.995
500	3.85	3.34	0.849 (0.848-0.851)	0.994
550	4.23	3.67	0.835 (0.834-0.837)	0.994

* Kittiwake, demographic rate set 2, counterfactuals of population size after 30 years, estimated using a matched runs method, from 1000 density independent simulations. See Table A2_7.1 in Hornsea Project Three Offshore Wind Farm (2019)

** Kittiwake, demographic rate set 2, counterfactuals of population growth rate after 35 years, estimated using a matched runs method, from 1000 density independent simulations. See Table A2_7.3 in Hornsea Project Three Offshore Wind Farm (2019). Whilst Vanguard's lifespan is 30 years, data on counterfactuals of growth rate are only available in Hornsea Project Three Offshore Wind Farm (2019) for after 35 years. No CLs given as they are the same as the median values.

3.2.9. If the additional mortality from the windfarm is 350 adults per annum (closest PVA outputs available in Hornsea Project Three Offshore Wind Farm 2019 to Applicant's predicted 332 mortalities for in-combination total excluding Hornsea 3 and to the 366 in-combination total calculated by Natural England using our preferred approach for Vanguard alone figures) then the population of FFC SPA after 30 years will be 10.8% lower than it would have been in the absence of the additional mortality. The population growth rate would be reduced by 0.4% (Table 9). If it is assumed that the population is stable then this would mean that the population would be 10.8% lower than the current population size. This would be counter to the restore conservation objective for this feature at the site and would result in an adverse effect on the integrity of the site. Vanguard's contribution to the in-combination total excluding Hornsea 3 based on the Applicant's figures is 2.89%, whilst Vanguard's contribution to the in-combination total excluding Hornsea 3 based on Natural England's figures is 11.76%.

3.2.10. If the additional mortality from the windfarm is 500-550 adults per annum (closest PVA outputs available in Hornsea Project Three Offshore Wind Farm 2019 to Applicant's predicted 490 mortalities for in-combination total including Hornsea 3 and to the 547 in-combination total calculated by Natural England using our preferred approach for Vanguard

alone figures and the Hornsea 3 figures used in Natural England 2019) then the population of FFC SPA after 30 years will be 15.1-16.5% lower than it would have been in the absence of the additional mortality. The population growth rate would be reduced by 0.6% (Table 9). If it is assumed that the population is stable then this would mean that the population would be 15.1-16.5% lower than the current population size. This would be counter to the restore conservation objective for this feature at the site. Vanguard's contribution to the in-combination total including Hornsea 3 based on the Applicant's figures is 1.96%, whilst Vanguard's contribution to the in-combination total including Hornsea 3 based on Natural England's figures is 7.86%.

3.2.11. It is not known what the growth rate of the colony will be over the next 30 years and this should be considered when judging the significance of predicted impacts against the conservation objectives for the feature. There has been a 2.2% per annum decline in numbers for Flamborough Head and Bempton Cliffs colony[3] between 1987 and 2017 (a growth rate of 0.979 per annum). Over the period 2000 to 2017 the population has shown a 0.37% per annum increase in numbers (a growth rate of 1.0037 per annum) based on census counts in SMP (JNCC 2016).

3.2.12. Across colonies in the UK the kittiwake population declined by 44% between 1998/2000 and 2015. Between the SCR Census (1985–88) and Seabird 2000 (1998–2002) for major colonies in Britain, no sites showed a per annum increase that exceeded 4.5% (see Section B of Natural England's Deadline 4 submission for Hornsea Project 2[4]). The growth rate of the colony at Bempton/Flamborough between 2000 and 2017 was 0.37% per annum, following declines from 1987. So, it seems reasonable to assume that the FFC SPA colony growth rate is <1% per annum. Therefore Natural England has considered the counterfactuals of final population size for the predicted levels of in-combination additional mortality for a range of plausible future growth rate scenarios for FFC of stable, 0.37, 1, and 3% per annum.

3.2.13. The Conservation Objective for the kittiwake population of the FFC SPA is to restore the size of the breeding population at a level which is above 83,700 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

3.2.14. If we assume a 1% per annum growth rate then 350 additional mortalities per annum would result in the population being approximately 15,000-16,000 birds lower than without the additional mortality after 30 years and it would take over an additional 30 years to reach the target population compared to the no windfarm mortality scenario. If we assume a 1% per annum growth rate then 500-550 additional mortalities per annum would result in the population being around 20,000-25,000 birds lower than without the additional mortality after 30 years and it would take over an additional 70 years to reach the target population compared to the no windfarm mortality scenario. It is not possible to rule out AEOI for these scenarios.

3.2.15. If the kittiwake population were to grow at the a rate of 3% per annum over the next 30 years, then additional mortality of 500-550 per annum would result in the population being approximately 40,000 birds lower than without the additional mortality after 30 years and it would take over an additional 4 years to reach the target population compared to the no windfarm mortality scenario. In the context of a population trajectory that is currently stable or increasing at <1% per annum an additional mortality of 500-550 adults per annum over 30 years causing a reduction in growth rate of 0.4% would further harm the population and

[3] It should be noted that the new Flamborough and Filey Coast SPA includes additional cliff areas at Filey which support kittiwake but were not previously monitored as part of the SPA, hence the reference to Flamborough Head and Bempton Cliffs.

[4] Natural England (2015) Hornsea Project Two Offshore Wind Farm – Written Submission for Deadline 4. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001163-Natural%20England.pdf

make it more difficult to restore the population to a favourable condition. Natural England is therefore currently unable to advise beyond reasonable scientific doubt that this level of impact would not be an AEOI.

3.2.16. There is no evidence to suggest that the future population trend will be significantly different from the current trend of 0.37% per annum (2000-2017), for example productivity at the colony has not been increasing in recent years (see Figure 1) (Aitken et al. 2017). So, based on the review of growth rates above, it seems reasonable to assume that the FFC SPA colony growth rate will be <1% per annum.

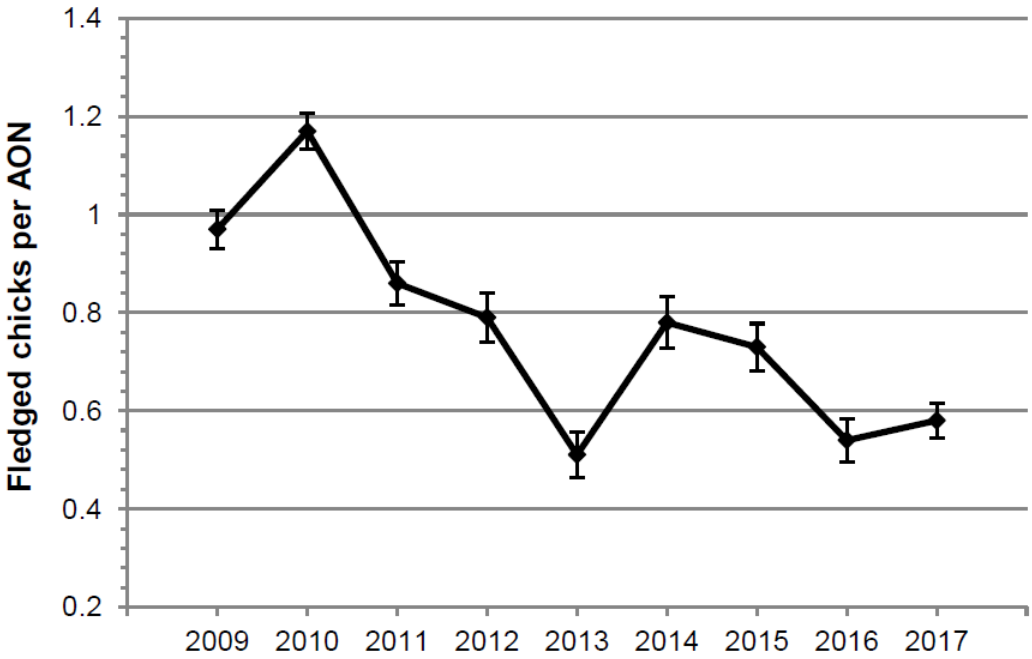

Figure 1 Flamborough/Bempton Black-legged kittiwake productivity 2009-2017, mean of plot results +/- SE. From Aitken et al. (2017). Note this does not include productivity data for Filey, where productivity is lower (e.g. in 2017 mean productivity for kittiwake at Filey was 0.39 (SE ± 0.0742) chicks per AON).

3.2.17. Therefore, as this feature has a restore conservation objective, and because there are indications that the predicted level of mortality would mean the population could decline from current levels should it currently be stable, it is not possible to rule out AEOI of the kittiwake feature of the FFC SPA for collision impacts from in-combination with other plans and projects, both including and excluding Hornsea 3.

3.3. ALDE-ORE ESTUARY SPA: LESSER BLACK-BACKED GULL

a. <u>Vanguard alone: collision impacts</u>

3.3.1. The Applicant has continued to consider a breeding season apportionment rate for LBBG to the Alde-Ore Estuary SPA of 17% and has again not considered the approach of a matrix as advised by Natural England at the telecall with the Applicant on 2nd April and as advised in our Deadline 7 response (REP7-075) or focused on the range 10-30% as advised in our Deadline 7 response (REP7-075).

3.3.2. As noted in our Deadline 7 response (REP7-075), all of the information provided by the Applicant indicates just how variable the ecology of this species can be, both between individuals within a colony and between seasons and years. As a result, it is difficult to have much confidence in pinning down an actual figure for use in apportionment. Therefore, we have based our calculations of impact from Vanguard alone in Table 10 on use of a range of breeding season apportionment rates of 10-30%, including the Applicant's preferred rate

of 17% and using the revised CRM figures from AS-048. Whilst the Applicant's calculated apportionment rates for the non-breeding seasons of 3.3% in autumn and spring and 5% in winter have not been calculated from Natural England's standard approach (as highlighted in our Relevant Representations, RR-106), the Applicant's approach does not appear to make a significant difference to the apportionment figures that result from taking the Natural England recommended approach and therefore, we are content with the rates used by the Applicant for the non-breeding seasons and have used these in the calculations in Table 10.

Table 10 Percentage of baseline mortality for impact levels for LBBG for the Alde-Ore Estuary SPA, using a range of breeding season apportionment rates from 10-30% advised by Natural England and the Applicant's apportionment rates in the non-breeding seasons of 3.3% in autumn and spring and 5% in winter. Baseline mortality calculated using adult colony size and adult mortality rate (11.5% from Horswill & Robinson 2015). Grey shaded cells represent scenarios equating to more than 1% baseline mortality

		Impact collisions per annum to Alde-Ore SPA	% of baseline mortality of Alde-Ore SPA population of 2,000 pairs as used by Applicant **
Based on CRM figs in Table 16 of AS-048, using 10% breeding season apportionment*	Lwr 95% CI density	0.1	0.02
	Central	2	0.40
	Upr 95% CI density	5	1.11
Based on CRM figs in Table 16 of AS-048, using 17% breeding season apportionment (as used by Applicant)*	Lwr 95% CI density	0.2	0.04
	Central	3	0.64
	Upr 95% CI density	8	1.74
Based on CRM figs in Table 16 of AS-048, using 30% breeding season apportionment*	Lwr 95% CI density	0.3	0.07
	Central	5	1.08
	Upr 95% CI density	13	2.90

* Note that Natural England does not agree with the Applicant's figures for the 95% CIs at EIA and therefore the range of CRM predictions are based on apportionment on the Natural England calculated range of figures using the 95% CIs of density for the EIA CRM assessment
** 2,000 pairs (2007-2014), 4,000 adults. 1% baseline mortality = 4.6 birds

3.3.3. Based on the above, considering the apportionment of LBBG collisions to the Alde-Ore Estuary SPA from Vanguard alone using a precautionary upper apportioning rate in the breeding season of 30% together with the Applicant's rates of 3.3% in autumn and spring and 5% in winter, results in annual total of **5 LBBG collisions (range of 0.3-13 based on 95% CIs of density data) to the Alde-Ore Estuary SPA**. These figures equate to 1.08% (range 0.07-2.90%) of baseline mortality of the Alde-Ore Estuary SPA LBBG colony using a colony population of approximately 2,000 pairs (2007-2014) as used by the Applicant and an adult mortality rate of 11.5% (Horswill & Robinson 2015). Therefore, the potential impacts on the SPA require further consideration.

3.3.4. If the Applicant's rate of 17% apportionment in the breeding season is used with the non-breeding season rates, the predicted impacts are a total of **3 LBBG collisions (range of 0.2-8 based on 95% CIs of density data) to the Alde-Ore Estuary SPA**. These figures equate to 0.64% (range 0.04-1.74%) of baseline mortality of the Alde-Ore Estuary SPA LBBG colony. Whilst the central value equates to less than 1% of baseline mortality, the

collision predictions based on the upper 95% CI of the density data does equate to more than 1% of baseline mortality of the Alde-Ore Estuary SPA colony.

3.3.5. Natural England welcomes that the Applicant has updated in REP7-063 the LBBG Alde-Ore Estuary PVA to address Natural England's comments on the previous version submitted at Deadline 6 (REP6-020). With regard to the updated version of this PVA in REP7-063, we note the following:

i. We welcome that the updated version of the PVA in REP7-063 has now been run over 5,000 simulations as recommended by Natural England.

ii. It appears that the Applicant has the column headings for the median and lower CIs the wrong way around in the tables for the counterfactuals of growth rates (CGRs) in Tables 3 and 5 of REP7-063. This has been confirmed by the Applicant in an email to Natural England dated 20th May 2019.

iii. It appears there is an error in the figure heading for Figure 3 and that this should be the counterfactuals of population size for the density dependent simulations rather than the density independent simulations. This has been confirmed by the Applicant in an email to Natural England dated 20th May 2019.

iv. With regard to the adjustment of national mean LBBG productivity with a figure to take account of the proportion of birds that miss breeding each year (in an average LBBG population), as we have no information on the proportion of birds that don't breed in any year for the Alde-Ore colony rather than try to adjust a national productivity figure to "account" for a crude estimate for the proportion of birds that don't breed in a particular year it would be better to actually use productivity rates that have been measured for the colony – i.e. to use the colony specific rates, as this seems the most evidence based approach. There will then need to be a caveat that not all birds may breed in a given year so actual productivity across the population may be lower. It looks as though there is colony specific information on productivity available and we would therefore advise using this rather than an adjusted national level.

v. We previously noted that in the version of the PVA submitted at Deadline 6 (REP6-020) we could not check the 10% baseline growth figure from the outputs presented. Whilst the Applicant now say in the Deadline 7 version (REP7-063) that this growth figure was incorrect and baseline growth rate for the density independent model is -2%, we again cannot check this from the outputs presented as the version in REP7-063 contains the same graphs and tables of counterfactuals as presented in REP6-020.

vi. We note that in the version of the PVA submitted at Deadline 6 (REP6-020) the Applicant was saying the models predicted a 10% per annum growth rate under baseline conditions and now in the updated version submitted at Deadline 7 (REP7-063) they are saying it was actually a 2% per annum decline, but state that this doesn't affect the counterfactuals. This is perhaps not unexpected, given that one merit of Natural England's preferred counterfactuals is that they are relatively robust to mis-specification of e.g. growth rates. This confusion emphasises the relevance of our request at Deadline 7 (REP7-075) for the Applicant to provide clear information about the model input and output parameters such as what the baseline growth rate in the models is, so its performance can be evaluated in detail. Furthermore, this clarification does undermine some of the assertions made by the Applicant in their Deadline 6 document (REP6-020), which stated: "*Although the trend in the Alde-Ore Estuary population is not well known, and allowing for the potential limitations in the data as noted above, the demographic rates indicate that under baseline conditions the population growth rate would be in excess of 10%. While this estimate must be treated with caution, it does indicate that smaller reductions in the growth rate, such as up to 3% for example, are unlikely to trigger a population decline. Thus, using the more precautionary density independent model, the results suggest that an adult mortality of up to 120, which corresponds to a 3% reduction in growth rate, is unlikely to trigger a population decline.*"

i. Natural England would take an alternative view, namely that a reduction in growth rate of 3% has the potential to be significant for a population that already has a negative growth rate of a 2% per annum decline. Natural England also notes that there is no evidence that the LBBG Alde-Ore Estuary SPA population could or is likely to experience a 10% per annum growth rate over the next 30 years.

3.3.6. However, whilst we still have some outstanding concerns/queries regarding the updated PVA, given the examination timescales we have nevertheless considered the predicted collision figures for Vanguard alone with the outputs from the updated Alde-Ore Estuary SPA LBBG PVA in REP7-063 (see Table 11 below), as this represents the best model currently available for the assessment. Please note that this should in no way be interpreted as Natural England endorsing or 'accepting' all elements of the PVA.

3.3.7. Given that there is no evidence of density dependence operating on the LBBG Alde-Ore Estuary colony or of how it is operating, Natural England has focused our conclusions on the PVA outputs from the density independent model.

Table 11 Predicted population impacts on the LBBG population of the Alde-Ore Estuary SPA for the range of mortality impacts predicted for Norfolk Vanguard alone using 10-30% apportionment in the breeding season and agreed rates of 3.3% in autumn and spring and 5% in winter. PVA impact metrics are as provided in the Applicant's Deadline 7 updated LBBG Alde-Ore Estuary SPA PVA (REP7-063). The range of predicted project alone figures are indicated in pink. The darker shaded cells represent the level of impact closest to the central values of the prediction for the range of apportionment scenarios considered above

LBBG – ALDE-ORE ESTUARY SPA VANGUARD ALONE			
Additional mortality	% Baseline Mortality using population size of 4,000 adults (2007-2014), as used by the Applicant	Density Independent Model	
		Counterfactual of Final Population Size (CPS) after 30yrs – see Table 2 of REP7-063	Counterfactual of Growth rate (CGR) after 30yrs – see Table 3 of REP7-063*
5	1.09	0.966 (0.893-1.046)	0.999 (0.996-1.002)
10	2.17	0.930 (0.858-1.006)	0.997 (0.994-1.000)
15	3.26	0.897 (0.828-0.969)	0.996 (0.993-0.999)

* The Applicant has confirmed that the headings for the median and lower CIs are the wrong way around in REP7-063. So, we have presented the figures the correct way around above

3.3.8. If the additional mortality from Vanguard alone is 5 adults per annum (closest PVA outputs available in REP7-063 to Applicant's apportionment approach of 3 predicted adult mortalities and to the Natural England precautionary apportionment approach of 5 predicted adult mortalities, based on the mean density CRM predictions) then the population of the Alde-Ore Estuary SPA after 30 years will be 3.4% lower than it would have been in the absence of the additional mortality using the density independent model outputs and 1.1% lower using the density dependent model outputs. The population growth rate would be reduced by 0.1% using the density independent model and would not be reduced using the density dependent model (Table 11).

3.3.9. Taking account of uncertainty/variability in the CRM input parameters (using the upper 95% CI of the bird density data, as this accounts for the greatest variability in the predictions), if the additional mortality is 10-15 adults per annum (closest PVA outputs available in REP7-063 to Applicant's apportionment approach of 8 predicted adult mortalities and to the Natural England precautionary apportionment approach of 13 predicted adult mortalities, based on the upper 95% CI of density CRM predictions) then the population of the Alde-Ore Estuary SPA after 30 years will be 7-10.3% lower than it would have been in the absence of the additional mortality using the density independent model outputs and 2.1-3.2% lower using the density dependent model outputs. The population growth rate would be reduced by 0.3-0.4% using the density independent model and by 0.1% using the density dependent model (Table 11).

3.3.10. These values would be of some concern. However, Natural England does acknowledge that a breeding season apportionment rate of 30% is likely to be overly precautionary, given the proportion of the East Anglian LBBG population that the Alde-Ore Estuary SPA currently holds, and that there are other colonies (town colonies) located closer to Vanguard than the Alde-Ore. We note also note that even using the precautionary rate of 30% results in a collision prediction that only just exceeds 1% of baseline mortality (1.08%). On this basis, no AEOI for the LBBG feature of the Alde-Ore Estuary SPA can be concluded for collision impacts from Vanguard alone.

b. **In-combination collision risk impacts with other plans and projects**

3.3.11. As noted in our Deadline 7 response (REP7-075), we welcome that figures for the Hywind, Kincardine and Moray West offshore wind farms (OWFs) are included in the cumulative CRM table (and hence the in-combination assessment) for LBBG (Table 20 of AS-048).

3.3.12. As noted in our Deadline 7 response (REP7-075), we consider the approach taken by the Applicant for LBBG from the Alde-Ore Estuary SPA in paragraph 117 of REP6-021 for reaching an apportionment rate for in-combination in the non-breeding season of 4% is acceptable and note that this approach is again taken in AS-048. We also welcome that the Applicant has considered all offshore wind farms within 141km from the Alde-Ore in the breeding season assessment. However, the Applicant has again then applied a generic rate of 30% apportionment to the total breeding season collision predictions from all the wind farms within 141km of the Alde-Ore to apportion total in-combination collisions in the breeding season. As we have advised previously noted in REP2-038 and REP7-075, we consider this to be an overly simplistic approach, as this does not consider the distance of each of these wind farms from the Alde-Ore SPA, the other colonies within foraging range of each of these offshore wind farms, the size of each of the other offshore wind farms etc. This approach will potentially overestimate the contribution of some of the other projects and underestimate the contribution of others and the extent to which this underestimation of values is cancelled out by any overestimated values in the Applicant's calculated overall total is currently not known. We again suggest that the Applicant re-considers this issue. Potentially the most straightforward approach would be to use the apportionment rates used by the other wind farms in their assessments, as Natural England has advised for FFC SPA kittiwake, though other options might be appropriate and we would be happy to try to identify these with the Applicant.

3.3.13. We welcome that the in-combination assessment in AS-048 makes reference to the outputs from the updated LBBG Alde-Ore Estuary PVA outputs presented by the Applicant in REP7-063, but note the comments raised with regard to this PVA update set out in the section on impacts from Vanguard alone above.

3.3.14. We note an error in the Applicant's calculation in paragraph 150 of AS-048 for the number of in-combination LBBG collisions apportioned to the Alde-Ore Estuary in the breeding season. We calculate that 30% of the breeding season total of 63.3 birds for all wind farms within 141km of the Alde-Ore excluding Vanguard equals 19 birds. Then with the 2.6 birds apportioned to the Alde-Ore in the breeding season by the Applicant for Vanguard equals 21.6 (and not 19.9 as calculated by the Applicant). This gives an annual total of 21.6 in the breeding season plus 15 birds in the non-breeding season, which equals 37 birds per annum in-combination using the Applicant's apportionment rates for the Vanguard figures.

3.3.15. Natural England calculates the annual apportioned figure to the Alde-Ore Estuary SPA from Vanguard alone to be slightly higher than the Applicant at 5 collisions per year (4.7 in the breeding season and 0.3 in the non-breeding season) for using a precautionary 30% breeding season apportionment rate and the Applicants rates of 3.3% in the autumn and spring and 5% in winter for the worst case scenario layout of 2/3 of turbines in Vanguard West and 1/3 in Vanguard East. Using these figures gives a breeding season in-combination total of 19 + 4.7 = 23.7 and a non-breeding season in-combination total of 15. **This gives an annual in-combination total of 39 LBBG collisions per year**. Natural England notes that no collisions were apportioned to the Alde-Ore from Hornsea 3, which

we are content with as the site is outside of the 141km foraging range of the Alde-Ore and no LBBG collisions were predicted in the non-breeding season. Both the Applicant's calculated in-combination figures and those calculated by Natural England equate to more than 1% of baseline mortality of the colony (see Table 12).

Table 12 Percentage of baseline mortality for in-combination collision impacts for LBBG for the Alde-Ore Estuary SPA. Baseline mortality calculated using adult only colony size and adult mortality rate (11.5% from Horswill & Robinson 2015). Note no collisions apportioned to Hornsea 3 in the in-combination assessment

LBBG PREDICTED IN-COMBINATION CRM MORTALITY, HRA: ALDE-ORE ESTUARY SPA		
	Mortality prediction	% of baseline mortality of Alde-Ore SPA* (2,000 pairs 2007-14, as used by Applicant)
Applicant's in-combination CRM, based on figures from Table 20 of AS-048	37	8.04
Natural England's calculated in-combination CRM, based on preferred apportionment rates and CRM figures for Vanguard	39	8.48

* 4,000 adults, 1% baseline mortality = 5 birds

3.3.16. Natural England has again focused our conclusions on the PVA outputs from the density independent model (see Table 13).

Table 13 Predicted population impacts on the LBBG population of the Alde-Ore Estuary SPA for the range of mortality impacts predicted for Norfolk Vanguard in-combination with other plans and projects. PVA impact metrics are as provided in REP7-063. The shaded cells represent the level of impact closest to the in-combination predictions in Table 12.

LBBG – ALDE-ORE ESTUARY SPA			
Additional mortality	% Baseline Mortality using population size of 4,000 adults (2007-2014), as used by the Applicant	Density Independent Model	
		Counterfactual of Final Population Size (CPS) after 30yrs – see Table 2 of REP7-063	Counterfactual of Growth rate (CGR) after 30yrs – see Table 3 of REP7-063*
35	7.61	0.775 (0.714-0.843)	0.991 (0.988-0.994)
40	8.70	0.748 (0.687-0.815)	0.990 (0.987-0.993)

* The Applicant has confirmed that the headings for the median and lower CIs are the wrong way around in REP7-063. So, we have presented the figures the correct way around above

3.3.17. If the additional mortality from the windfarm is 35-40 adults per annum (closest PVA outputs available in REP7-063 to Applicant's predicted 37 mortalities for the in-combination total and to the 39 in-combination total calculated by Natural England using our preferred approach for Vanguard alone figures) then the population of the Alde-Ore Estuary SPA after 30 years will be 22.5-25.2% lower than it would have been in the absence of the additional mortality. The population growth rate would be reduced by 0.9-1% (Table 13). If it is assumed that the population is stable then this would mean that the population would be 122.5-25.2% lower than the current population size. This would be counter to the restore conservation objective for this feature of the site. Vanguard's contribution to the in-combination total based on the Applicant's figures is 8.1%, whilst Vanguard's contribution to the in-combination total based on Natural England's figures is 12.8%.

3.3.18. It is not known what the growth rate of the colony will be over the next 30 years and this should be considered when judging the significance of predicted impacts against the conservation objectives for the feature.

3.3.19. As the Alde-Ore LBBG population is at best currently stable and the Applicant's PVA (REP7-063) suggests a baseline growth rate of -2% for the density independent model we

have considered these levels of growth rates per annum. We have also considered a range of 1-5% growth rates per annum for if the colony may potentially grow in the future, although at present there seems considerable uncertainty regarding whether this can be achieved.

3.3.20. The Conservation Objective for the LBBG population of the Alde-Ore Estuary SPA is to restore the size of the breeding population to a level which is above 14,074 whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

3.3.21. If we assume a -2% per annum growth rate or a stable population then 35 or 40 additional mortalities per annum would result in the population declining below its current level and let alone be able to reach the target population of the conservation objective.

3.3.22. If we assume a 1% per annum growth rate then 35-40 additional mortalities per annum would result in the population being approximately 1,000-1,500 birds lower than without the additional mortality after 30 years and it would take over an additional 1,000 years to reach the target population compared to the no windfarm mortality scenario with 35 additional mortalities. But the population would never reach the target population of the conservation objective with an additional 40 mortalities.

3.3.23. If we assume a 2% per annum growth rate then 35-40 additional mortalities per annum would result in the population being approximately 2,000 birds lower than without the additional mortality after 30 years and it would take over an additional 50-60 years to reach the target population compared to the no windfarm mortality scenario.

3.3.24. If the LBBG population were to grow at a rate of 3% per annum over the next 30 years, then additional mortality of 35-40 per annum would result in the population being approximately 2,000-2,500 birds lower than without the additional mortality after 30 years and it would take over an additional 20 years to reach the target population compared to the no windfarm mortality scenario.

3.3.25. There is no evidence to suggest that the future population trend will be significantly different from the current trend, which is most likely to be stable, in which case there is a risk that the population could decline due to predicted mortality levels. Furthermore, given that the population is likely to be hindered from restoration to target levels even when more optimistic assumptions about the population trend of the colony are made, Natural England also considers that it is not possible to rule out AEOI even if the population starts to show modest growth.

3.3.26. **Therefore, as this feature has a restore conservation objective, and because there are indications that the population might even decline from current levels, Natural England advises that it is not possible to rule out AEOI of the LBBG feature of the Alde-Ore Estuary SPA for collision impacts from in-combination with other plans and projects**.

3.4. GREATER WASH SPA: LITTLE GULL

a. Vanguard alone: collision impacts

3.4.1. As noted in our Relevant Representations (RR-106), we agree with the Applicant's approach to apportioning of little gull collisions to the Greater Wash for Vanguard alone. Therefore, we agree with the Applicant's calculation in paragraph 187 of AS-048 of 0.6 collisions per annum apportioned to the Greater Wash SPA from Vanguard alone for the central collision prediction and that this equates to 0.24% of baseline mortality of the SPA population (using an SPA population of 1,255 and a mortality rate of 20% (calculated from the adult survival rate in Horswill & Robinson 2015 of 0.8).

3.4.2. We note that the Applicant has not considered the uncertainty/variability in the CRM input parameters in the assessment through considering the range of predicted impacts resulting from use of the 95% Cis of the density estimates. The range of figures for EIA alone for little calculated by Natural England is 0-12 birds. Therefore, for the upper 95% CI of density

and using the Applicant's approach to apportionment, a total of 1.5 collisions is apportioned to the Greater Wash SPA. This equates to 0.6% of baseline mortality of the SPA population.

3.4.3. **Based on this, we agree with the Applicant's conclusion in paragraph 188 of AS-048 of no AEOI of the little gull feature of the Greater Wash SPA for collision impacts from Vanguard alone.**

b. **<u>In-combination collision risk impacts with other plans and projects</u>**

3.4.4. We welcome that the assessment in AS-048 now includes an in-combination assessment for collision risk to little gull from the Greater Wash SPA. We note that the Applicant has included Triton Knoll, Race Bank, Sheringham Shoal, Hornsea 1, Hornsea 2, Hornsea 3 and Vanguard in Table 25 of AS-048 as OWFs considered to have connectivity with the Greater Wash SPA.

3.4.5. Clarification is required on the approach the Applicant has taken to decide whether sites have connectivity with the Greater Wash SPA. Natural England would also advise that:

- Dudgeon is also included in the in-combination assessment (note that Dudgeon has completed an assessment of collision risk for little gull at the Greater Wash SPA).
- As Vanguard is included in the in-combination assessment, we also query why the other projects in the former East Anglia zone (e.g. East Anglia 1 and East Anglia 3) are also not included.

3.4.6. We agree that the CRM figures presented for the various sites in Table 25 of AS-048 have been updated for an avoidance rate of 99.2%.

3.4.7. As noted in our general comments above on cumulative/in-combination assessments, we do not consider it is appropriate to adjust the figures for the other OWFs based on build out capacities unless the reduction is legally secured and CRM re-run.

3.4.8. As we do not consider that figures have been included in the assessment from all relevant OWFs we cannot reach a conclusion regarding the impacts of in-combination collisions on the little gull feature of the Greater Wash SPA.

4. References

Aitken, D., Babcock, M., Barratt, A., Clarkson, K.C., Prettyman, S. (2017) *Flamborough and Filey Coast SPA Seabird Monitoring Programme - 2017 Report*. RSPB. Available from: http://publications.naturalengland.org.uk/file/5574008674451456

BirdLife International (2018) *The IUCN Red List of Threatened Species* 2018. Available from: https://www.iucnredlist.org/

Balmer, D., Gillings, S., Caffrey, B., Swann, R., Downie, I. & Fuller, R. (2013) *Bird Atlas 2007–11: the breeding and wintering birds of Britain and Ireland.* BTO Books, Thetford.

Cramp, S., Bourne, W.R.P. & Saunders, D. (1974) *The Seabirds of Britain and Ireland*. Collins, London.

EATL (2015) East Anglia Three: Appendix 13.4 North Sea Kittiwake Population Viability Analysis. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010056/EN010056-000302-6.3.13%20(4)%20Volume%203%20Chapter%2013%20Offshore%20Ornithology%20Appendix%2013.4.pdf

EATL (2016) *East Anglia Three: Applicant's Comments on Written Representations: Appendix 1 – Great black-backed gull PVA*. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010056/EN010056-001424-East%20Anglia%20THREE%20Limited%202

Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. & Gregory, R. (2015) Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds*, **108**: 708-746.

Furness, R.W. (2015). *Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS)*. Natural England Commissioned Report Number 164. 389 pp.

Furness, R.W., Garthe, S., Trinder, M., Matthiopoulos, J., Wanless, S. & Jeglinski, J. (2018) Nocturnal flight activity of northern gannets *Morus bassanus* and implications for modelling collision risk at offshore wind farms. *Environmental Impact Assessment Review,* **73** (2018) 1–6.

Hornsea Project *Three Offshore Wind Farm (2019) Appendix 73 to Deadline 4 Submission – Detailed response to ExA Q2.2.30 and Q2.2.39: PVA information*. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-001892-Natural%20England%20-%20Annex%20E%20-%20Ornithology%20Response.pdf

Horswill & Robinson (2015) *Review of Seabird Demographic Rates and Density Dependence*. JNCC Report No. 552.

JNCC (2016) *Seabird Population Trends and Causes of Change: 1986-2015 Report* (http://jncc.defra.gov.uk/page-3201). Joint Nature Conservation Committee. Updated September 2016.

Lloyd, C., Tasker, M.L. & Partridge, K. (1991) *The Status of Seabirds in Britain and Ireland*. T. & A.D. Poyser, London.

MacArthur Green (2015). East Anglia THREE. Ornithology Evidence Plan Expert Topic Group Meeting 6. Appendix 7- Sensitivity analysis of collision mortality in relation to nocturnal activity

factors and wind farm latitude. In: East Anglia THREE Appendix.13.1. Offshore Ornithology Evidence Plan. Volume 3 [doc. ref. 6.3.13(1)].

Mitchell, P.I., Newton, S.F., Ratcliffe, N. & Dunn, T.E. (2004) *Seabird Populations of Britain and Ireland. Results of The Seabird 2000 Census (1998-2002).* T. & A.D. Poyser, London.

Natural England (2019) Hornsea Project Three Offshore Wind Farm, Written Submission for Deadline 7: Annex E – Offshore Ornithology Comments for Deadline 7, including information requested by ExA question F2.26. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-001892-Natural%20England%20-%20Annex%20E%20-%20Ornithology%20Response.pdf

Natural England & JNCC (2016) *Departmental Brief: Greater Wash Special Protection Area.*

Stienen, E.W.M., Waeyenberge, V., Kuijken, E. & Seys, J. (2007) Trapped within the corridor of the southern North Sea: the potential impact of offshore wind farms on seabirds. Available at: http://www.vliz.be/imisdocs/publications/129847.pdf

WWT (2012). *SOSS-04 Gannet population viability analysis: demographic data, population model and outputs.*

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on 8.12 Offshore In Principle Monitoring Plan (Clean and Tracked Changes Versions) [REP7-020 & REP7-021]

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on the Offshore In Principle Monitoring Plan (IPMP) [REP7-020 & REP7-021] as submitted by the Applicant at Deadline 7.

1.2. Overall, Natural England agrees that the In Principle Monitoring Plan provides an appropriate framework to agree monitoring. However, we note that there are several places within the document that states that consultation will happen with MMO but without reference to the Statutory Nature Conservation Body. **Natural England would expect to be consulted on all elements of monitoring program.**

1.3. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor concerns).

2. Detailed Comments

Ref.	Section/Para	Comment	
2.1	1.1 Para 4 onwards	Natural England would seek clarification as to why the Paragraphs originally labelled as 5 and 6 (as per the track changes version) have been removed from this document? Paragraph 5 / 7 (clean / track changes versions) still makes reference to the construction of the project under **either** approach. However, the Applicant has removed the paragraphs which describe these approaches.	
2.2	Table 1.1	Natural England notes the removal of the 9MW turbine option and subsequent decrease in total number of turbines as a result of this.	
2.3	4.2.2 Para 23 & 4.3.2 Para 26	Natural England notes the inclusion of this paragraph which states: *Monitoring of the section of the offshore cable corridor which overlaps with the Haisborough, Hammond and Winterton Special Area of Conservation (SAC) would be addressed in the Haisborough, Hammond and Winterton SAC Site Integrity Plan (SIP) required under Condition 9(1)(m) of the Transmission DMLs (Schedules 11 and 12) in accordance with the Outline Haisborough, Hammond and Winterton SAC SIP (document 8.20).* Natural England can confirm that we are happy that this is captured in the SIP. Further information can be provided in our detailed advice also provided at Deadline 8	
2.4	Table 4.1	Natural England welcomes the commitment from the Applicant to submit the Offshore In Principle Monitoring Plan six months prior to commencement of any survey works rather than four as originally stated.	
2.5	Table 4.1	Natural England notes the inclusion of this paragraph which states: *Monitoring of recovery of Annex 1 Sandbanks at the location of pre-sweeping (if used) within the Haisborough, Hammond and Winterton SAC –*	

Ref.	Section/Para	Comment	
		details to be addressed in the Haisborough, Hammond and Winterton SAC SIP (document 8.20) Natural England can confirm that we are happy that this is captured in the SIP. Further information can be provided in our detailed advice also provided at Deadline 8	
2.6	Table 4.1	Natural England welcomes the flexibility and ability to take account of best available evidence through provision of the extra wording which states: *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.*	
2.7	4.3.1 Para 25	Natural England does not agree with the addition of the word '*potential*' to describe the *Sabellaria spinulosa* reefs. Natural England would advise that *Sabellaria spinulosa* was recorded during the site specific surveys.	
2.8	4.4	As advised in Statement of Common Ground with the Applicant [REP5-007], whilst Natural England is concerned that no further monitoring or independent surveys are proposed regarding Fish and Shellfish ecology within the In Principle Monitoring Plan, Natural England acknowledges that the applicant will seek to address these concerns post consent. However, we would suggest that this is clearly stated by the Applicant within the IPMP. Sandeel and herring habitat is of particular interest as these are important prey species including for harbour porpoise of the Southern North Sea SAC. However Natural England would defer to Cefas on this issue.	
2.10	4.7	Natural England notes that no changes have been made to the Offshore Ornithology section of the IPMP. However, as advised in Statement of Common Ground with the Applicant [REP5-007], Natural England does not agree that the proposed mitigation and monitoring (to be developed through the Ornithological Monitoring Plan, in accordance with the In Principle Monitoring Plan) is adequate. **Natural England would like to undertake further discussions with the Applicant to explore mitigation options.**	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on 8.14 Outline Project Environmental Management Plan (Clean and Tracked Changes Versions) [REP7-022 & REP7-023]

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on the Outline Project Environmental Management Plan (EMP) [REP7-022 & REP7-023] as submitted by the Applicant at Deadline 7.

1.2. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor concerns).

2. Detailed Comments

Ref.	Section/Para	Comment	
2.1	1.1 Para 4 onwards	Natural England would seek clarification as to why the Paragraphs originally labelled as 5 and 6 (as per the track changes version) have been removed from this document? Paragraph 5 / 7 (clean / track changes versions) still makes reference to the construction of the project under **either** approach, however, the Applicant has removed the paragraphs which describe these approaches.	
2.2	2 Para 11 vi)	Natural England welcomes the addition of this text regarding the mitigation measures suggested by Natural England regarding red-throated diver (RTD) at Deadline 5 [REP5-017] and that these will be secured via the Development Consent Order (DCO) as a requirement within the Project Environmental Management Plan (PEMP). However, as stated in our Deadline 7 response [REP7-075] Natural England has reviewed the proposed amendment to the DCO/DML and whilst we find it broadly acceptable, recommends the replacement of the word 'adopted' with 'followed'.	
2.3	6.1.3 Para 40 onwards	Natural England welcomes the inclusion of text regarding mitigation measures for RTD. We note that these broadly match those measures suggested by Natural England at Deadline 5 [REP5-017]. However, Natural England would advise that a mechanism should be put in place to control boat traffic as this is currently missing from this document.	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on 8.11 Outline Offshore Operation and Maintenance Plan (Clean and Tracked Changes Versions) [REP7-018 & REP7-019] and 8.16 Outline Scour Protection and Cable Protection Plan (Clean and Tracked Changes Versions) [REP7-024 & REP7-025]

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on the following documents submitted by the Applicant at Deadline 7:

- Outline Offshore Operation and Maintenance Plan (OOMP) [REP7-018 & REP7-019]
- Outline Scour Protection and Cable Protection Plan [REP7-024 & REP7-025]

1.2. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor concerns).

2. Detailed Comments on Outline Offshore Operation and Maintenance Plan

Ref.	Section/Para	Comment	
2.1	1.1 Para 5	Natural England would seek clarification as to why the Paragraphs originally labelled as 5 and 6 (as per the track changes version) have been removed from this document? Paragraph 5 / 7 (clean / track changes versions) still makes reference to the construction of the project under **either** approach. However, the Applicant has removed the paragraphs which describe these approaches.	
2.2	1.2 Para 8	Natural England welcomes the commitment from the Applicant to submit the Operations and Maintenance Plan six months prior to construction rather than four as originally stated.	
2.3	1.2 Para 12	Natural England welcomes confirmation from the Applicant that any new cable protection required during maintenance would be subject to additional licensing. **However, Natural England continue to advise that cable protection should not be allowed within designated sites and therefore, whilst the Applicant continues to make a request for cable protection within Haisborough, Hammond and Winterton SAC Natural England is unable to advise that an Adverse Effect on Integrity can be ruled out.**	
2.4	1.2 Para 13 and relevant section of Appendix 1	Please see separate document also provided at Deadline 8 with regards to Natural England's comments on HHW SAC Site Integrity Plan.	
2.5	Appendix 1: Wind turbines (topside): J-Tube and ladder cleaning	As stated in both our Relevant Representations [RR-106] and Written Representations [REP1-088]. The ES project description does not detail the volumes of material being deposited in the marine environment. This does not seem to have been considered at all within the ES. Therefore, either information needs to be provided or this should not be considered as part of the works consented.	

Ref.	Section/Para	Comment	
2.6	Appendix 1: Cables outside the Haisborough Hammond and Winterton (HHW) SAC & Cables within the Haisborough Hammond and Winterton SAC (addressed in the Haisborough Hammond and Winterson SAC SIP, document 8.20)	Natural England welcomes the amendment to the OOMP to reflect the parameters as assessed in the ES project description para 253 page 70 (i.e. only 1 export cable failure per year) [APP-329]. However, the Applicant has now split the cables section of Appendix 1 into 2 separate parts (one for inside HHW SAC and one for outside HHW SAC), stating: *While it is not possible to determine the number and location of repair works that may be required during the life of the project, an average estimate of* ***one export cable repair*** *every 10 years within the SAC is included in the assessment.* **Natural England would therefore seek clarification as to whether this additional one export cable repair is in addition to the figure stated above as if it is this would be over the WCS assessed in the ES.**	
2.7	Appendix 1: Cables outside the Haisborough Hammond and Winterton (HHW) SAC & Cables within the Haisborough Hammond and Winterton SAC (addressed in the Haisborough Hammond and Winterson SAC SIP, document 8.20)	Natural England seeks further clarification from the Applicant as to the length of cable repair for all cables. The length for array cables is stated as 6km (para 257 page 71 of ES Project Description) [APP-329] as this is not clear in either the OOMP or ES.	
2.8	Appendix 1: Wind Turbine, Metmast and Accommodation Platform Foundations: Additional scour protection	As stated in our Deadline 7 response [REP7-075] as well as throughout the examination, Natural England advises that the DCO and DML should further split maximum scour protection areas out for individual structures. A mass total is not appropriate to ensure scour protection is installed within the predicted maximums for each element of the project. This should be captured in both the Scour Protection and Cable Protection Plan **and within** the OOMP.	

Ref.	Section/Para	Comment	
	around foundations.	This is also in agreement with the position laid out by MMO in their Deadline 6 response [REP6-030].	

3. Detailed Comments on Outline Scour Protection and Cable Protection Plan

Ref.	Section/Para	Comment	
3.1	New Para 13	Natural England welcomes the Applicant's commitment to report the amounts and location of scour and cable protection installed. Natural England note that this has also been updated with draft Development Consent Order / Deemed Marine Licence.	
3.2	New Para 20	Natural England welcomes the reduction in scour protection that the Applicant has committed to during this examination.	
3.3	Old Para 20	Natural England welcomes the removal of the text in relation to cable protection within the HHW SAC, and is content that this is considered in the HHW SIP.	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on Documents Related to draft Development Consent Order and Arbitration

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on documents related to the draft Development Consent Order and Arbitration, including:

- The Examining Authority's schedule of changes to the draft Development Consent Order [PD-017]
- Norfolk Vanguard Ltd. Counsel's Written Opinion in relation to Arbitration [REP7-065]
- Norfolk Vanguard Ltd. 3.1 Applicant's revised draft DCO (Clean & Tracked Changes Versions) [REP7-003 & REP7-004]
- Norfolk Vanguard Ltd. Applicant's revised draft DCO Schedule of Changes [REP7-038]

1.2. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor concerns).

2. Detailed Comments on The Examining Authority's schedule of changes to the draft Development Consent Order [PD-017]

Ref.	Section	Comment	
2.1	Requirement 2 (2)	Natural England welcomes this change, noting additional amendments will be required following application of collision risk modelling. Please see Natural England's detailed advice in relation to offshore ornithology also provided at Deadline 8 for further information.	
2.2	Deemed Marine Licences Condition 14	Natural England notes that this condition has been amended to remove the automatic extension to the deadline for pre-construction documentation sign off, in the event that further information is provided. Natural England does not agree with this amendment as it means the Applicant gets to decide if an extension is granted upon submission of additional information. It is the opinion of Natural England that the decision on any extension due to additional information should rest with the regulator and not the Applicant. The condition should be amended to reflect this as it is not appropriate for the applicant to set extensions, given they clearly have a biased position.	

3. Detailed Comments on Counsel's Written Opinion in relation to Arbitration [REP7-065]

3.1. Natural England notes the provision of this letter, however, we believe that this is directed to Marine Management Organisation (MMO) and Trinity House and therefore have no further comments at this time.

4. Detailed Comments on Applicant's revised draft DCO (Clean & Tracked Changes Versions) [REP7-003 & REP7-004] and Applicant's revised draft DCO Schedule of Changes [REP7-038]

Ref.	Section	Comment	
4.1	Schedule 9 Part 4 Condition 14 (1) (e)	Natural England notes that the Applicant has removed reference to the need to update and resubmit the Scour Protection and Cable Protection Plan if changes are proposed following cable laying. Natural England advises that as this would mean any additional cable protection / scour protection could not be deployed under this licence we would welcome this change.	
4.2	Schedule 9 Part 4 Condition 22.	Natural England welcomes the addition of this condition which ensures that the amount of cable protection actually deployed will be reported.	
4.3	Schedule 9 Part 5	Natural England notes this change, however, would defer to MMO in this regard.	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on Norfolk Vanguard Ltd. Deadline 7 Submission - 8.1 Outline Code of Construction Practice (clean and tracked changes version) [REP7-006 & REP7-007]

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on the Code of Construction Practice (CoCP) [REP7-006 & REP7-007] as submitted by the Applicant at Deadline 7.

1.2. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor / no concerns).

2. Detailed Comments

Ref.	Section	Natural England's Comments	
2.1	1.2 para 5. a	The Final CoCP should be developed in consultation with Natural England. This should be acknowledged in all relevant documentation and text therein.	
2.2	2.3.1	We advise that this should be updated to include all appropriate guidance as referred to in supporting documents such as: • Construction Code of Practice for the Sustainable Use of soils on Construction Sites. • Lighting guidance for bats i.e. Bat Conservation Trust • Code for the relief of soil compaction.	
2.3	3.1 para 43	'*Perimeter and site lighting would be required during working hours and a lower level of lighting would remain overnight for security purposes'*. We advise that overnight lighting should be kept to a minimum and all lighting should adhere to lighting guidance with regards to bats.	
2.4	3.1 para 49	Interceptor drains, sediment traps and maintenance schedule should be included in the CoCP as per OLEMS [REP7-008 & REP7-009] and Onshore Ecology Clarification Note [REP6-013]. We advise that this is rectified.	
2.5	3.3.1 para 56	Woodland/Hedgerow Protection Natural England note that '*Further detail on fencing in relation to hedgerows and woodland will be contained within the Outline Landscape and Ecological Management Strategy (OLEMS) (document reference 8.7), secured under Requirement 18*'. **This is not currently included within the OLEMS. We advise that this is rectified.**	
2.6	3.7	Artificial Light Emissions. There is no specific mention of bats and guidance for lighting for bats. We advise that this is amended.	
2.7	3.8	This section states that '*Specific replanting measures are also described within the OLEMS (document reference 8.7)'*. Please be advised that **specific planting is not currently outlined in OLEMS and is deferred to the Hedgerow Management Plan post consent. We advise that this is rectified.**	

Ref.	Section	Natural England's Comments	
2.8	6.1	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 Natural England. Whilst we welcome that this commitment is secured through Requirement 25 (Watercourse Crossings) of the draft DCO; **this commitment is not captured within the CoCP.** We therefore advise its conclusion is in all relevant documentation.	
2.9	6.1	Please be advised that Natural England should be consulted on a scheme and programme for each watercourse crossing. We would welcome recognition of this in all documentation and text therein.	
2.10	10.	The Outline Code of Construction Practice should refer to the Traffic Management Plan. **Natural England advise that the Traffic Management Plan assess the most up to date in combination traffic datasets against air quality criteria for designated sites identified along the final routes.** **Therefore, we advise that this document is amended accordingly.**	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on Norfolk Vanguard Ltd. Deadline 7 Submission - 8.7 Outline Landscape and Ecological Management Plan (Clean and tracked changes version) [REP7-008 & REP7-009]

30 May 2019

1. Introduction

1.1. In this document Natural England provides comments on the Outline Landscape and Ecological Management Plan (OLEMS) [REP7-008 & REP7-009] as submitted by the Applicant at Deadline 7

1.2. Please note, the colour coding of specific points indicates the significance of the advice (red – major concerns; amber – moderate concerns; green – minor concerns).

2. Detailed Comments

Ref.	Section	Natural England Comments	
2.1	7.2.3.1 para 62	Please see our comments on Code of Construction Practice (CoCP) in relation to River Wensum also submitted at Deadline 8.	
2.2	7.3.3.1 para 68	Natural England welcomes the incorporation of text regarding Hedgerow Monitoring, and the commitment to monitor for 7 years or until hedgerow has recovered fully. This commitment should be updated throughout the supporting documents as in other text it still refers to 5 years.	
2.3	7.3.3.1 Para 69	Natural England welcomes the commitment to '*seek to avoid mature trees within hedgerows through the micro-siting of individual cables, in order to retain as many mature trees as possible'*. We advise the Applicant commit to no net loss of trees in hedgerows along the cable route.	
2.4	7.3.3.2 Para 70	This section identifies that six hedgerows are important for foraging and commuting bats. Natural England suggests that the wording is changed to incorporate **all** hedgerows which provide moderate or high potential for foraging or commuting bats. The Paston Great Barn SAC Clarification Note [REP6-013] identified 17 hedgerows as providing moderate to high potential for bats.	
2.5	7.3.3.2 Par 71	Natural England welcomes the clarification of the replanting scheme and look forward to receiving the Hedgerow Plan.	
2.6	9.1.3.1 Para 102	Preconstruction survey mitigation should include commitment to adhere to measures for any ancient woodland, ancient trees and veteran trees as per Natural England's standing advice. See: https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences#avoid-impacts-reduce-mitigate-impacts-and-compensate-as-a-last-resort	
2.7	9.7.2 Para 154	Natural England notes that the full Hedgerow Mitigation Plan is not included in the OLEMS as stated and will instead be submitted post consent. Natural England welcomes the inclusion of *'monitoring of replacement of hedgerows for 7 years or until the hedgerow has recovered fully'*. However, Natural England is disappointed that all of our advice has not been incorporated into the OLEMS, for example the development of scrub/rough grassland margins, the planting of more mature hedge	

Ref.	Section	Natural England Comments	
		plants, that could reduce the time required for these hedgerows to return to their original state/or better.	
2.8	9.13.2 Para 200	Natural England notes that the un-surveyed areas adjacent to the River Wensum will be surveyed for Desmoulins whorl snail. Future invertebrate surveys should include an aim to identify all invertebrate features of interest on the River Wensum SSSI and SAC citation within the survey area.	
2.9	10.3.1	Natural England is currently in discussion with the Applicant with regards to additional mitigation for birds.	
2.10	12.2	Post construction monitoring of hedgerows (7 years) and their successful use by Barbastelle bats for commuting and foraging is referred to previously in the document and should be included here for completeness.	

3. Detailed Comments on Table 2 – Extent of pre-construction surveys required for each receptor

Ref.	Section	Natural England Comments	
3.1	Bats	A number of hedgerows were not surveyed for bats during the 2017 surveys. Specific mention should be made to bat surveys of hedgerows and assessing commuting foraging habitat, to provide a baseline data set for mitigation and monitoring, as outlined in 7.3.3.1.	
3.2	Reptiles	Natural England welcomes that further reptile surveys are to be completed post consent.	
3.3	Other invertebrates	Natural England notes that the Northern bank of the River Wensum within the onshore project area will be surveyed for Desmoulin's Whorl Snail. However there is no mention of survey for other invertebrate species as listed in the River Wensum SSSI/SAC citation. **The Applicant should clarify whether or not all invertebrate species will be surveyed for.**	

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on other Documents Related to Onshore Elements of the Project as Submitted at Deadline 7

30 May 2019

1. Introduction

1.1. In this document Natural England provides comment, where necessary, on any other documents which have been submitted at Deadline 7 with regards to onshore elements of the project.

2. Documents

2.1. North Norfolk District Council Deadline 7 submission [REP7-080].

2.1.1. Natural England supports the suggestion by North Norfolk District Council with regards to amendments to Requirement 18 to include details of trees to be removed and securing a commitment to no overall net loss of trees.

2.2. Norfolk Vanguard Ltd. Deadline 7 Submission - 8.8 Outline Traffic Management Plan (Clean and tracked changes version - Part 1 of 4 [REP7-010 & REP7-014]

2.2.1. Natural England notes that '*management of the potential cumulative impacts can be addressed in the final submitted Traffic Management Plan (post DCO determination) when there is greater certainty with regard to RIS scheme construction traffic data. Norfolk Vanguard's commitment to engage with HE to establish opportunities to coordinate activities and avoid significant impacts resulting from cumulative peak traffic is captured in the OCoCP (document reference 8.01)'.*

2.2.2. Natural England advises that potential cumulative impact assessment in the Traffic Management Plan be based on the most up to date information available, be mapped and assessed in relation to designated sites sensitive to air quality.

2.2.3. It was proposed (at scoping) that an Air Quality Management Plan be developed as part of the CoCP and the Secretary of State (SoS) recommended that a draft version be provided with the DCO application. **Natural England would advise that if this has not been provided, that this be included as a condition in the CoCP.**

2.3. Norfolk Vanguard Ltd. Deadline 7 Submission - 8.8 Outline Traffic Management Plan (Clean and tracked changes version – Part 2 of 4 [REP7-011 & REP7-015], Part 3 of 4 [REP7-012 & REP7-016] and Part 4 of 4 [REP7-013 & REP7-017]

2.3.1. Natural England notes the Outline Traffic Management Plan and advise that the Traffic Management Plan assess the most up to date in combination traffic datasets against air quality criteria for designated sites identified along the final routes.

2.3.2. It was proposed (at scoping) that an Air Quality Management Plan be developed as part of the CoCP and the SoS recommended that a draft version be provided with the DCO application. **Natural England would advise that if this has not been provided that this be included as a condition in the CoCP.**

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on Outline Norfolk Vanguard Haisborough Hammond and Winterton Special Area of Conservation Site Integrity Plan [REP7-026] and Consideration of the Purpose of the Haisborough Hammond and Winterton Special Area of Conservation Site Integrity Plan [REP7-058]

30 May 2019

1. General Comments

1.1. Natural England welcomes the work undertaken by the Applicant to produce the Site Integrity Plan for Haisborough Hammond and Winterton Special Area of Conservation.

1.2. Overall, we believe this document combined with the Grampian condition at DML 9 (1)(m) restricts the commencement of construction until such time that mitigation measures can be adopted to rule out AEoI. We also acknowledge that the SIP commits the Applicant to providing a robust evidence base and mitigation measures for which they can be held to account. But due to ongoing concerns with cable protection within the site, even with the 5% reduction in cable protection, the regulators should be aware that these commitments may still be considered insufficient.

1.3. Therefore, based on the best available evidence at this time and a valid worst case scenario as set out in the SIP Natural England remains of the view that there is a high probably of an AEoI on integrity of Haisborough, Hammond and Winterton SAC Annex I sandbanks and reef features both alone and in-combination. Therefore we are unable to agree with the conclusions within the Habitats Regulation Assessment.

1.4. Natural England 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 Natural England is of the view that the project impacts are not de minimis.**

1.5. Natural England notes that at Figure 4.1 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. It is stated in the SIP that if an AEoI can't be removed then alternative options would be taken forwards like a new Marine Licence or DCO variation, but it is not explicitly clear what the purpose of this would be. We assume that it would be to alter the red line boundary to enable the avoidance of Annex I reef?

1.6. We suggest that it would be prudent for the Applicant to consider other mitigation options to ensure that the project can be appropriately assessed. Options for potentially restricting the activities to a one off activity (with requirement for a future marine licence for further Operation & Maintenance work) and/or potential compensation options.

1.7. Natural England has also reviewed REP7-058 'Purpose of the HHW SIP position statement' and our advice provide at Deadline 6 [REP6-032] remains unchanged. A worst case scenario for benthic impacts can be assessed and unlike with the Southern North Sea SIPs, its content and permission is not dependent on the parameters of other projects. Therefore, Natural England wishes to make it clear to the Applicant and Regulators that it is not appropriate for any future projects within the same 'benthic' designated site to rely upon a SIP at the consenting stage to discharge Habitat Regulations requirements for an in-combination assessment. The only exception to this may be Norfolk Vanguard Sister Project, Norfolk Boreas, depending the Application submitted.

1.8. Natural England suggest that the Applicant should produce a summarised list detailing conditions / documents that will be provided prior to construction.

1.9. Please note that whilst the current document focuses on the Annex I habitats with HHW SAC there are areas of good quality Sabellaria spinulosa reef bordering the SAC, which are priority habitats under Section 40 of the NERC Act 2006 that will also be impacted by cable installation. We advise that these areas are avoided.

2. Detailed Comments

Ref.	Section / Paragraph	Comment
2.1	12 onwards	There is no consideration of the current unfavourable condition of the site.
2.2	Section 1.3	Natural England welcomes the condition, but we would advise that a Worst Case Scenario (WCS) can be considered at this time. It is not appropriate to defer consideration of uncertainties on the permanency of the impact and achievability of mitigation measures to post consent. 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. As set out at the Issue Specific Hearings on 27th and 28th March 2019, Natural England is mindful of the time constraints once the Contract For Difference (cfd) is agreed and therefore how will the Applicant ensure that the regulator and their advisers pre construction won't be put under undue pressure to resolve an HRA issue to enable a project to meet their desired timeframes at the potential detriment of the SAC features?
2.3	28	Natural England welcomes the commitment from the Applicant to submit a final detailed SIP at least 6 months prior to construction.
2.4	45.	Natural England seek clarification as to what mitigation is suggested if not avoidance of reef? The Applicant seeks to identify mitigation measures post consent by suggesting that a conclusion of no AEoI can be made at the consenting stage as the wording of the Transmission DMLs states *that construction cannot commence until the MMO is satisfied, in consultation with Natural England, that there is 'no adverse effect beyond reasonable scientific doubt'*. However, Natural England has reservations about this approach it is kicking it down the road. Please is main comments.
2.5	46	Whilst Natural England agrees that the byelaw only legally restricts bottom towed fishing gear they also apply to the overall management of the feature and therefore apply to all activities within HHW SAC which may impact on this management trying to achieve favourable condition of the Annex 1 Reef feature within the site. This therefore applies to Norfolk Vanguard. Please see our response at Deadline 6 for detailed information [REP6-032].
2.3	81. – 86.	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?

Ref.	Section / Paragraph	Comment
		As stated in our Deadline 7 response [REP7-075] Natural England 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. Natural England 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. 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.

3. Comments on Table 3.1 – Worst Case Scenario in the HHW SAC

Ref.	Section	Comment
Construction		
3.1	Temporary physical disturbance Annex 1 Sandbank	Natural England note that the Applicant states in Table 3.1 that the figure provided of 2.4km^2 in relation to temporary physical disturbance to Annex 1 Sandbank from cable installation is based on maximum potential disturbance width of 30m for a 10m wide plough with 10m of spoil either side of the trench, along 80km of export cable trenching within the SAC. Therefore when the area is mapped the Applicant will need to identify a 30m wide channel containing no *Sabellaria spinulosa.*
3.2	Temporary physical disturbance Annex 1 Sandbank	Natural England advises that any disposal areas must either be agreed now and identified in the SIP, or a separate Marine Licence is required.
3.3	Temporary physical disturbance on Annex 1 Reef	Please note for other projects a worst case scenario has been based on the known areas within the corridor at the time of consenting.
Operation		
3.4	Temporary physical disturbance on Annex 1 Sandbank	Please note there needs to be a commitment that if pre sweeping is undertaken then either the reburial allowance is reduced or is considered under a separate Marine Licence.
3.5	Temporary physical disturbance on Annex 1 Reef	Natural England advise that consideration should be given over the full lifetime of the project. Natural England suggest that it would be much better to note that if reef develops over cables then there is a high probability that recovery will happen in that location.
3.6	Persistent habitat loss on Annex 1 Sandbank	As set out previously Natural England remains concerned about the ongoing impacts to Annex I habitats from the placement of cable protection within a designated site. Even if

Ref.	Section	Comment
		it is permanent change in the interest features over the lifetime of the project it is considered to be a lasting impact. Please see our deadline 6 response on small scale impacts [REP6-032]
3.7	Permanent habitat loss of Annex 1 Reef	Natural England seek clarification from the Applicant as to whether they are committing to micro route around Annex 1 Reef or if the Applicant is still stating that micro routing will occur 'where possible' as this is unclear from the wording in the SIP.

4. Comments on Table 5.2 – Overview of Mitigation Commitments in the HHW SAC

Ref.	Comment
4.1	Natural England note that the Applicant has stated in Table 5.2 that *the total area and volume of cable protection in the SAC will not exceed 32,000m2 and 20,800m3, respectively*. This is a significant increase from the figures stated previously of 26,000m^2 and 15,400m^3. Natural England would therefore seek clarification as to why these figures have changed.
4.2	Natural England seek clarification as to why cable reburial has been removed from Table 5.2?

5. Comments on Appendix 2: Interim Cable Burial Study

5.1. Whilst Natural England welcomes the production of this document, we advise that this note does not alter our current advice as provided above.

5.2. Natural England would expect the Applicant to produce something more similar to that produced at Deadline 5 for Hornsea Project Three.

5.3. In addition Natural England would flag that the Applicant will need to ensure that any such document is continually revised as further evidence is produced.

6. Comments on Consideration of the Purpose of the Haisborough Hammond and Winterton Special Area of Conservation Site Integrity Plan [REP7-058]

6.1. Please note, in light of the submission of this document Natural England's advice as provided at Deadline 6 remains unchanged [REP6-032].

THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Natural England's Comments on Norfolk Vanguard Ltd. Deadline 7 Submission - Proposed Fisheries Management Area Areas - Norfolk Vanguard position statement Written Summary of Oral Submissions: Issue Specific Hearing 6 - Appendix 2 [REP7-056]

30 May 2019

1.1. In this document Natural England provides comments on the Proposed Fisheries Management Area Areas - Norfolk Vanguard position statement Written Summary of Oral Submissions: Issue Specific Hearing 6 - Appendix 2 [REP7-056] as submitted by the Applicant at Deadline 7.

1.2. Section 1.3, point 20 states *'The management proposals do not seek to control any other non-repeat activities within the HHW SAC such as cable laying and therefore the restrictions do not apply to Norfolk Vanguard.'*

1.3. The proposed management measures outlined by Eastern Inshore Fisheries and Conservation Authority (EIFCA) within the inshore area of Haisborough, Hammond and Winterton SAC have now gone to formal consultation. All proposed management measures are to protect the sites designated features from pressures exerted by bottom towed gear, whether this be a repeat or non-repeat activity, for example; abrasion/disturbance of the substrate on the surface of the seabed or penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion.

1.4. Natural England has advised that fisheries closures protect areas which are suitable for reef formation, as described in the Conservation Advice package, rather than solely where reef is present at any given time, due to *Sabellaria spinulosa* reef extent being variable in space and time and reliant on the physical and biological processes that allow reef to form on natural substrate.

1.5. Annex 1 reef at Haisborough, Hammond and Winterton SAC is currently in unfavourable condition, the proposed management should enable the reef to recover and achieve the conservation objectives.

1.6. In respect of cable laying, burial and protection, *Sabellaria* spp. reef is sensitive to the following pressures associated with cable works:

- Abrasion/disturbance of the substrate on the surface of the seabed
- Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
- Habitat structure changes - removal of substratum (extraction)
- Physical change (to another sediment type)
- Physical loss (to land or freshwater habitat)
- Smothering and siltation rate changes (Heavy)

1.7. Whilst the management proposals are only restricting fishing activities within the designated sites, **any activity that would hinder a sites ability to achieve its conservation objectives or undermine management measures would also need to be restricted in order to fulfil the requirements of the Habitats Directive.**

1.8. **Therefore. Natural England are currently not in a position to advice that an AEoI on Haisborough, Hammond and Winterton SAC can be ruled out.**

1.9. Please see our full advice provided at Deadline 6 for further information [REP6-032].