THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK BOREAS OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010087

Deadline 7

Natural England's advice on Norfolk Boreas' updated cumulative (EIA) and in-combination (HRA) collision risk offshore ornithological assessment

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31st March 2020

Our Ref: NE.NB.D7.08.CRM

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Introduction

Please find below Natural England's advice on Norfolk Boreas updated cumulative (EIA) and in-combination (HRA) collision risk offshore ornithological assessment, submitted at Deadline 6 [REP6-024]

We welcome the updated cumulative and in-combination collision totals and assessments submitted by the Applicant at Deadline 6 in RE6-024. In general we broadly agree with the cumulative and in-combination totals presented by the Applicant in REP6-024. Our advice provided in this document and associated appendices is based on best available evidence at the time of writing and is subject to change in the future should further evidence be presented.

Main comments on updated assessments

1.1 Updated cumulative and in-combination collision figures presented by the Applicant in REP6-024

The updated cumulative and in-combination collision figures in REP6-024 include revised collision predictions for Norfolk Boreas and Norfolk Vanguard to account for the revised mitigation and project design committed to by these project developers (commitment to smallest turbines of 11.55MW with a draught height of 35m and a worst case scenario of 14.7MW turbines with a 30m draught height for both projects) in REP5-059 for Norfolk Boreas and MacArthur Green (2020)[1] for Norfolk Vanguard. However, please note Natural England's specific comments on the updated collision risk modelling (CRM) for Norfolk Boreas alone in our submission (submitted 12th March and formally for D7) in particular the issues/concerns regarding the increases to draught height and reference points used for turbine hub height and tidal offset, and those regarding the amended wording of the draft DCO to secure the additional mitigation.

We welcome that the Applicant has in REP6-024 updated the gannet and kittiwake figures included for the Dogger Bank Creyke Beck A and B projects from those for the non-material change application to those for the consented project, as advised by Natural England in REP4-040.

We welcome that the Applicant has not updated the figures included in the cumulative/in-combination tables in REP6-024 for Hornsea 3 to reflect the revised kittiwake collision estimates for this project that were submitted to the Planning Inspectorate on the 14th February 2020. Natural England notes that whilst any amendments to the Hornsea 3 project design envelope (i.e. lower tip height and reduction in turbine numbers) would result in a proportional reduction in the collision estimates, Natural England will most likely be unable to agree on what the absolute level of reduction for Hornsea 3 will be as we believe the issues with the underlying baseline data have still not been resolved. **Therefore, again 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 a significant adverse impact for cumulative impacts at EIA scale or that an adverse effect on**

[1] MacArthur Green (2020) Norfolk Vanguard Offshore Wind Farm: Additional mitigation – Appendix 1 Updated Collision Risk Modelling. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-004215-ExA;%20Mit;%2011.D10.2.App1%20Additional%20Mitigation%20Appendix%201%20Updated%20Collision%20Risk%20Modelling.pdf

integrity (AEOI) can be ruled out for any relevant feature of an SPA when the Hornsea 3 project is included in the totals.

The figures included in REP6-024 for Hornsea 4 come from the PEIR for that project, which currently represents the best available data to include for this project. However, as noted in REP4-040, these figures and the methodologies to produce them are subject to ongoing discussions through the evidence plan process, and therefore have an element of uncertainty associated with them and a likelihood of being subject to change. For example, the CRM figures presented in the Hornsea 4 PEIR were undertaken using the stochastic CRM, and therefore are potentially affected by the issues currently being investigated with this model. **Therefore, the inevitable uncertainty around the Hornsea 4 figures, along with our position set out above regarding inclusion of Hornsea 3 in the cumulative/in-combination assessments, means that Natural England is not in a position to advise that a significant adverse impact for cumulative impacts at EIA scale or that an AEOI for in-combination impacts at HRA can be ruled out for any relevant species or feature of an SPA when the Hornsea 3 and Hornsea 4 projects are included in the totals.**

In this context we welcome that the Norfolk Boreas Applicant has presented cumulative and in-combination collision totals for all projects including Hornsea 3 and Hornsea 4 and excluding Hornsea 3 and Hornsea 4 in REP6-024. We recommend that the Applicant checks all of the total collision figures (cumulative and in-combination, for all seasons and annually) presented in Table 2.2 in REP6-024 for kittiwake for excluding Hornsea 3 from the totals, as these do not appear to be correct.

1.2 Assessed vs consented vs as built turbine numbers and headroom

We refer the Examiners to Natural England's comments in REP6-049 on the Applicant's Deadline 4 [REP4-014] legal arguments and revised collision estimates to calculate headroom. We also note our Deadline 7 submission on the Applicant's headroom position submitted at Deadline 6 [REP6-021].

In summary, Natural England acknowledges the work that the Norfolk Boreas Applicant and their consultants have done to consider potential headroom in the in-combination/cumulative collision risk figures by assessing the 'as built' rather than the worst case scenario (WCS). Natural England recognises that headroom is a significant issue, however it is a highly complex one, and it is important to note that there is not yet an agreed way forward at present. The Applicant's approach has also not been subjected to judicial scrutiny.

We do not disagree that there is likely to be some headroom; however the exact extent of any potential headroom is not agreed.

There are a number of uncertainties/issues with the approach proposed by the Applicant in REP4-014 and in REP6-021, namely:

- Whether consented or as-built scenarios can be considered 'legally secured'.
- Issues with the approach developed by MacArthur Green for The Crown Estate (TCE) to adjust altering the collision figures of planned and consented projects (Trinder 2017) and hence Natural England's advice that it is not used.

These uncertainties/issues are set out in detail in our Deadline 6 response [REP6-049] to the Applicant's headroom approach in REP4-014. Therefore, until the uncertainties are addressed and an industry wide approach is agreed we recommend that the default 'standard' approach is appropriate. This is to use the consented parameters of each project and to refer to the worst case scenario (WCS) assessed within the relevant Environmental Statement (ES), taking account of any updated assessments provided throughout the examination process.

If revised layouts (e.g. consented or as built) can be considered legally secured, our position remains that CRM should be re-run to generate updated collision figures against any agreed changes to turbine design layouts. Where this is not possible for a project, because original bird density data cannot be obtained, we would need to agree whether correction ratios can be calculated (for example following an approach such as that presented in Trinder (2017)). Natural England would need to see the full calculation details for these correction factors. It is Natural England's advice that simplistic scaling of collision figures based on reductions in turbine numbers from the consented number should not be used, for example due to variation in flight activity at different heights and differences in turbine parameters such as rotor speeds.

Natural England has been raising the issue of whether as built or consented projects should be considered for in-combination effects with The Crown Estate and we note the need for a strategic approach to this issue. If conducted simply on a project-by-project basis this has significant risks of inconsistency of approach across applications. Therefore, we consider that this issue needs to be addressed strategically on behalf of the whole sector, including developing consensus on an approach. However we do recognise that this is not possible in timescale for the Norfolk Boreas examination.

Summary of Natural England Advice

Natural England has reviewed the evidence presented in the updated assessments in REP6-024. A summary of our advice is presented in

Table *1* and detailed advice around how these conclusions were reached is set out in Appendix 1 (for EIA) and Appendix 2 (for HRA).

Based on the CRM predictions for the revised WCS for Norfolk Boreas (as presented by the Applicant in REP5-059), whilst the collision predictions from Norfolk Boreas alone have been significantly reduced, 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*).

Table 1 Summary of conclusions for collision assessments of Norfolk Boreas alone and cumulatively / in-combination with other plans and projects for relevant species following Applicant's updated assessments in REP5-059 and REP6-024

EIA species	**Norfolk Boreas alone (based on revised CRM figures in REP5-059)**	**Norfolk Boreas cumulatively with other plans & projects (based on revised collision totals in REP6-024)**
Gannet: collision	No significant adverse impact.	Unable to rule out significant adverse impact excl. & incl. H3 & H4.
Kittiwake: collision	No significant adverse impact.	Unable to rule out significant adverse impact excl. & incl. H3 & H4.
Lesser black-backed gull: collision	No significant adverse impact.	No significant adverse impact excl. H3 & H4. Unable to rule out significant

		adverse impact incl. H3 & H4.
Herring gull: collision	No significant adverse impact.	No significant adverse impact excl. H3 & H4. Unable to rule out significant adverse impact incl. H3 & H4.
Great black-backed gull: collision	No significant adverse impact.	Unable to rule out significant adverse impact excl. & incl. H3 & H4.
Little gull: collision	No significant adverse impact.	No significant adverse impact excl. and incl. H3 & H4.
HRA species & site	**Norfolk Boreas alone (based on revised CRM figures in REP5-059)**	**Norfolk Boreas in-combination with other plans & projects (based on revised collision totals in REP6-024)**
Gannet, Flamborough & Filey Coast SPA: collision	No adverse effect on site integrity (AEOI).	No AEOI excl. H3 & H4. Unable to rule out AEOI incl. H3 & H4.
Kittiwake, Flamborough & Filey Coast SPA: collision	No AEOI.	Unable to rule out AEOI excl. and incl. H3 & H4.
Lesser black-backed gull, Alde-Ore Estuary SPA: collision	No AEOI.	Unable to rule out AEOI excl. H3 & H4 (no collisions apportioned from H3 & H4).
Little gull, Greater Wash SPA: collision	No AEOI.	No AEOI excl. and incl. H3 and H4.

Appendix 1: Natural England detailed comments/conclusions on Norfolk Boreas updated cumulative (EIA) collision risk offshore ornithological assessment, submitted at Deadline 6 [REP6-024]

This document is a technical document submitted into the Norfolk Boreas Examination to provide scientific justification for Natural England's advice provided on the significance of the potential cumulative collision impacts at the Environmental Impact Assessment (EIA) scale, 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 should further evidence be presented.

1.1 Cumulative operational collision risk impacts

Table A2.1 shows the cumulative collision risk total predictions for all relevant projects both including and excluding Hornsea 3 and Hornsea 4, as presented by the Applicant in REP6-024, for each of the key species considered to be at risk of collisions. The shaded cells of the table indicate where the predicted cumulative totals exceed 1% of baseline mortality of the largest BDMPS or biogeographic population.

Table A2.1 Percentage of baseline mortality for cumulative CRM for EIA for both all projects (so includes figs for Hornsea 3 and Hornsea 4) and also for all projects excluding Hornsea 3 and Hornsea 4 – agreed with them that this was probably the least complicated way of doing things for now given the uncertainty over figures for both of these projects. (Using average across all age class mortality rates, as used by the Applicant)

	Cumulative collision prediction*		**Largest BDMPS (North Sea) individuals, Furness (2015)**	**% baseline mortality largest BDMPS**		**Biogeographic population individuals (Furness 2015)**	**% baseline mortality biogeographic**	
	Excl. H3 & H4	**ALL projects**		**Excl. H3 & H4**	**ALL projects**		**Excl. H3 & H4**	**ALL projects**
Gannet	2,965	3,075	456,298	3.40	3.53	1,180,000	1.32	1.36
Kittiwake	3,928	4,423	829,937	3.03	3.42	5,100,000	0.49	0.56
LBBG	526	545	209,007	2.03	2.10	864,000	0.49	0.51
Herring gull	783	795	466,511	0.98	0.99	1,098,000	0.41	0.42
GBBG	986	1,069	91,399	5.83	6.32	235,000	2.27	2.46
Little gull	61	61	10,000**	1.52	1.54	75,000***	0.41	0.41

* Based on the Applicant's cumulative figures presented in REP6-024

** 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

1.1.1 Gannet cumulative operational collision impacts

The Applicant's revised cumulative collision totals for gannet in Table 2.1 of REP6-024 of 2,965 birds excluding Hornsea 3 and Hornsea 4 and of 3,075 including all projects exceed 1% of baseline mortality of the North Sea BDMPS scale and the biogeographic population (Furness 2015) – the figure excluding Hornsea 3 and Hornsea 4 equates to 3.40% of

baseline mortality of the BDMPS and 1.32% of baseline mortality of the biogeographic population, and the figure including all projects equates to 3.53% of the BDMPS and 1.36% of the biogeographic population baseline mortality (Table A2.1 above). This is significant and requires further consideration.

There have been no updates to the BDMPS and biogeographic scale PVAs run by the Applicant using the Natural England PVA tool that were presented by the Applicant in REP2-035. We have advised the Applicant that version 2 of the PVA tool is now available for use. We note the issues raised in our Deadline 4 response [REP4-040] regarding these PVAs (namely regarding numbers of simulations, presentation of metrics calculated across the whole population etc.) As noted in our main comments regarding REP6-024 and the updates to the PVA tool and the previous outputs presented in REP2-035, we advise the Applicant considers these and the potential need to re-run the PVAs using version 2 of the tool. However, the models presented in REP2-035 nevertheless currently represent the best available evidence on which to base an assessment, though this should not be taken as a Natural England endorsement or 'acceptance' of the model outputs.

The revised cumulative gannet collision totals in REP6-024 have reduced by 82 birds from the totals presented by the Applicant in REP2-035 (following the reductions in the Norfolk Vanguard and Boreas predictions, but there has also been an increase in the figure included for Dogger Bank Creyke Beck A & B due to the consented total now being included). Using the outputs from the gannet PVAs presented in REP2-035, if the additional mortality from the offshore wind farms is 3,000-3,100 per annum (closest PVA outputs to the revised cumulative collision mortality figures in REP6-024 of 2,965 excluding Hornsea 3 and Hornsea 4 and 3,075 including all projects) then:

- The BDMPS population after 30 years will be 21.33-21.95% lower than it would have been in the absence of the additional mortality using the density independent model and 21.15-21.76% lower using the density dependent model. The population growth rate would be reduced by 0.77-0.80% using the density independent model and by 0.76-0.79% using the density dependent model (
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- **Table A1.*3***).
- The biogeographic population after 30 years will be 8.84-9.13% lower than it would have been in the absence of the additional mortality using the density independent model and 8.75-9.03% lower using the density dependent model. The population growth rate would be reduced by 0.30-0.31% using the density independent model and by 0.29-0.30% using the density dependent model (
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- **Table A1.*3***).

Table A1.3 Predicted Population impacts on the gannet BDMPS and biogeographic population for the range of revised mortality impacts in REP6-024 predicted for cumulative collision. PVA Impact Metrics are as provided in Table 3.2 of REP2-035. The range of predicted figures is indicated in purple. The darker shaded cells represent the level of impact closest to the combined cumulative collision predictions

GANNET, EIA CUMULATIVE COLLISIONS – DENSITY INDEPENDENT PVA MODELS						
Additional mortality	**% baseline mortality largest BDMPS as used by Applicant**	**Counterfactual of Final Population Size (CPS), BDMPS**	**Counterfactual of Growth Rate (CGR), BDMPS**	**% baseline mortality biogeographic, as used by Applicant**	**Counterfactual of Final Population Size (CPS), biogeographic**	**Counterfactual of Growth Rate (CGR), biogeographic**

3,000	3.44	0.7867	0.9923	1.33	0.9116	0.9970
3,100	3.56	0.7805	0.9920	1.38	0.9087	0.9969
3,200	3.67	0.7744	0.9918	1.42	0.9059	0.9968
GANNET, EIA CUMULATIVE COLLISIONS – DENSITY DEPENDENT PVA MODELS						
Additional mortality	**% baseline mortality largest BDMPS as used by Applicant**	**Counterfactual of Final Population Size (CPS), BDMPS**	**Counterfactual of Growth Rate (CGR), BDMPS**	**% baseline mortality biogeographic, as used by Applicant**	**Counterfactual of Final Population Size (CPS), biogeographic**	**Counterfactual of Growth Rate (CGR), biogeographic**
3,000	3.44	0.7885	0.9924	1.33	0.9125	0.9971
3,100	3.56	0.7824	0.9921	1.38	0.9097	0.9970
3,200	3.67	0.7761	0.9919	1.42	0.9070	0.9969

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).

Based on current UK gannet population growth rates of ~2-3% per annum and using the PVA model outputs, then the level of additional cumulative mortality from collisions from the offshore wind farms would still allow the population to grow. However, it is not known what the growth rate of the UK gannet population will be over the next 30 years and this should therefore be considered when judging the significance of predicted impacts and whether a 0.8% reduction in annual growth rate would be significant. The environment of the North Sea is likely to be significantly modified by anthropogenic impacts in the coming decades, most notably warming of sea temperatures due to climate change and the associated shifts in gannet prey distribution and availability, and the expected delivery of fisheries management changes such as the ending of 'discarding' practices, gannet being known to take advantage of discarded fish. These factors have significant potential to affect gannet productivity and therefore the potential for population growth. In this context, and given the uncertainty around the level of cumulative collisions and their influence on the population, the UK gannet population may well not continue to grow at current rates. Natural England again considers that it is likely that the level of predicted cumulative impact would not be significant for a population growing at 2-3% per annum. However, if the population does not grow at that level for the next 30 years (say if the growth rate was around 1% per annum), we consider that it is uncertain that a 0.8% reduction in growth rate would not be significant.

Based on consideration of the PVA metrics as currently presented, the above conservation assessment, consideration of future growth of the population, and given the UK's particular responsibility for gannet because of supporting over half of the global population, we again consider that the predicted impacts at the North Sea population scale have the potential to give rise to significant effects. **Therefore we remain unable to rule out a significant**

adverse impact on gannet from cumulative collision mortality at an EIA scale irrespective of whether the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals or not. However, we note that version 2 of the Natural England PVA tool is now available and hence, if the Applicant updates the PVAs using the version 2 of the tool, Natural England reserves the right to revise the advice provided here based on the best available evidence presented.

As noted in our Deadline 4 response [REP4-040], in the 2017 SNCB interim advice on displacement (SNCBs 2017), the number of birds at risk of reduced individual fitness (i.e. mortality and productivity losses) as a result of displacement is based on the numbers of birds present within a development area and buffer both on the water and in flight. Assessment of the number of birds at risk of mortality as a result of collisions (e.g. with wind turbines) is based on the number of birds present within a development area that are in flight only. The mortality impacts estimated from CRM are assumed to be in addition to any mortality caused by displacement impacts (because the collision estimates take account of birds that avoid the wind farm). Productivity impacts due to displacement would be a further addition (but this is not currently quantitatively accounted for under existing methods/advice). Therefore, at present, the SNCBs regard the two impacts (collision and displacement) as potentially additive and advise that they should be summed.

1.1.2 Kittiwake cumulative operational collision risk

The Applicant's revised cumulative collision totals for kittiwake in Table 2.2 of REP6-024 of 3,928 birds excluding Hornsea 3 and Hornsea 4 and of 4,423 including all projects exceeds 1% of baseline mortality of the North Sea scale BDMPS – the figure excluding Hornsea 3 and Hornsea 4 equates to 3.03% of baseline mortality, and the figure including all projects equates to 3.40% (Table A2 above). This is significant and requires further consideration.

There have been no updates to the BDMPS and biogeographic scale PVAs run by the Applicant using the Natural England PVA tool that were presented by the Applicant in REP2-035. We have advised the Applicant that version 2 of the PVA tool is now available for use. We note the issues raised in our Deadline 4 response [REP4-040] regarding these PVAs (namely regarding numbers of simulations, presentation of metrics calculated across the whole population etc.) As noted in our main comments regarding REP6-024 and the updates to the PVA tool and the previous outputs presented in REP2-035, we advise the Applicant considers these and the potential need to re-run the PVAs using version 2 of the tool. However, the models presented in REP2-035 nevertheless currently represent the best available evidence on which to base an assessment, though this should not be taken as a Natural England endorsement or 'acceptance' of the model outputs.

The revised cumulative kittiwake collision totals in REP6-024 has increased by 25 birds from the totals presented by the Applicant in REP2-035, as although there have been reductions in the Norfolk Vanguard and Boreas predictions, there has also been an increase in the figure included for Dogger Bank Creyke Beck A & B due to the consented total now being included. Therefore, as the revised cumulative totals in REP6-024 have increased from those presented by the Applicant in REP2-035, our advice remains as that presented in REP4-040, namely:
Based on consideration of the PVA metrics as presented in REP4-040, the conservation assessment in REP4-040 and particularly given the population declines at a UK and wider scale for the species, the predicted impacts at the North Sea population scale have the potential to give rise to significant effects. **Therefore, we are unable to rule out a significant adverse impact on kittiwake from cumulative collision mortality at an EIA scale irrespective of whether the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals or not**.

However, we note that version 2 of the Natural England PVA tool is now available and hence, if the Applicant updates the PVAs using the version 2 of the tool, Natural England reserves the right to revise the advice provided here based on the best available evidence presented.

1.1.3 Lesser black-backed gull (LBBG) cumulative operational collision risk

The Applicant's revised cumulative collision totals for LBBG in Table 2.3 of REP6-024 of 526 birds excluding Hornsea 3 and Hornsea 4 and of 545 including all projects exceeds 1% of baseline mortality of the North Sea BDMPS scale (Furness 2015) – the figure excluding Hornsea 3 and Hornsea 4 equates to 2.03% of baseline mortality, and the figure including all projects equates to 2.10% (Table A2 above). This is not insignificant and requires further consideration.

There have been no updates to the BDMPS PVAs run by the Applicant using the Natural England PVA tool that were presented by the Applicant in REP2-035. We have advised the Applicant that version 2 of the PVA tool is now available for use. We note the issues raised in our Deadline 4 response [REP4-040] regarding these PVAs (namely regarding numbers of simulations, presentation of metrics calculated across the whole population etc.) As noted in our main comments regarding REP6-024 and the updates to the PVA tool and the previous outputs presented in REP2-035, we advise the Applicant considers these and the potential need to re-run the PVAs using version 2 of the tool. However, the models presented in REP2-035 nevertheless currently represent the best available evidence on which to base an assessment, though this should not be taken as a Natural England endorsement or 'acceptance' of the model outputs.

The revised cumulative LBBG collision totals in REP6-024 have reduced by 37 birds from the totals presented by the Applicant in REP2-035 (following the reductions in the Norfolk Vanguard and Boreas predictions). Therefore, as the revised cumulative totals in REP6-024 have decreased from those presented by the Applicant in REP2-035, our advice remains as that presented in REP4-040, namely:
Based on consideration of the information presented in REP4-040, the PVA metrics as currently presented in REP2-035 and the conservation assessment in REP4-040, **we therefore agree with the Applicant's conclusion of no significant adverse impact from cumulative collision to LBBG at an EIA scale if the Hornsea 3 and Hornsea 4 projects are excluded from the cumulative total**. However, we note that version 2 of the Natural England PVA tool is now available and hence, if the Applicant updates the PVAs using the version 2 of the tool, Natural England reserves the right to revise the advice provided here based on the best available evidence presented.

However, again 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, together with the inevitable uncertainty associated with the figures for Hornsea 4 from the PEIR and are subject to change, Natural England therefore is not in a position to advise that significant impact can be ruled out for LBBG for cumulative collision impacts when the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals.

1.1.4 Herring gull cumulative operational collision risk

The Applicant's revised cumulative collision totals for herring gull in Table 2.4 of REP6-024 of 783 birds excluding Hornsea 3 and Hornsea 4 and of 795 including all projects equates to 0.98% (excluding Hornsea 3 and Hornsea 4) and to 0.99% (including all projects) of baseline mortality of the largest BDMPS and to 0.41% (excluding Hornsea 3 and Hornsea 4) and

0.42% (including all projects) of baseline mortality of the biogeographic population (Table A2 above).

The revised cumulative herring gull collision totals in REP6-024 have reduced by 18 birds from the totals presented by the Applicant in REP2-035 (following the reductions in the Norfolk Vanguard and Boreas predictions). Therefore, as the revised cumulative totals in REP6-024 have decreased from those presented by the Applicant in REP2-035, our advice remains as that presented in REP4-040, namely:
The cumulative collision mortality is unlikely to be detectable against background mortality and **we agree with the Applicant's conclusion of no significant adverse impact from cumulative collision to herring gull at an EIA scale if the Hornsea 3 and Hornsea 4 projects are excluded from the cumulative total.**

However, again 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, together with the inevitable uncertainty associated with the figures for Hornsea 4 from the PEIR and are subject to change, Natural England therefore is not in a position to advise that significant impact can be ruled out for herring gull for cumulative collision impacts when the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals.

1.1.5 Great black-backed gull (GBBG) cumulative operational collision risk

There is a slight error in the Applicant's revised cumulative collision totals when Hornsea 4 is included for GBBG presented in Table 2.5 of REP6-024 – this is due to an error in the summing of the annual collisions of Hornsea 4: the combined total of 3 collisions in the breeding season and 13.6 collisions in the non-breeding seasons is 16.6 and not 13.6 as presented by the Applicant, meaning the cumulative total including Hornsea 3 and Hornsea 4 is 1,069 birds (and not 1,066 as presented by the Applicant). These revised cumulative totals exceed 1% of baseline mortality of the North Sea BDMPS scale and the biogeographic population (Furness 2015) – the figure excluding Hornsea 3 and Hornsea 4 equates to 5.83% of baseline mortality of the BDMPS and 2.27% of baseline mortality of the biogeographic population, and the figure including all projects equates to 6.32% of the BDMPS and 2.46% of the biogeographic population baseline mortality (Table A2 above). This is not insignificant and requires further consideration.

There have been no updates to the BDMPS and biogeographic scale PVAs run by the Applicant using the Natural England PVA tool that were presented by the Applicant in REP2-035. We have advised the Applicant that version 2 of the PVA tool is now available for use. We note the issues raised in our Deadline 4 response [REP4-040] regarding these PVAs (namely regarding numbers of simulations, presentation of metrics calculated across the whole population etc.) As noted in our main comments regarding REP6-024 and the updates to the PVA tool and the previous outputs presented in REP2-035, we advise the Applicant considers these and the potential need to re-run the PVAs using version 2 of the tool. However, the models presented in REP2-035 nevertheless currently represent the best available evidence on which to base an assessment, though this should not be taken as a Natural England endorsement or 'acceptance' of the model outputs.

The revised cumulative GBBG collision totals in REP6-024 have reduced by 75 birds from the totals presented by the Applicant in REP2-035 (following the reductions in the Norfolk Vanguard and Boreas predictions). Using the outputs from the gannet PVAs presented in REP2-035, if the additional mortality from the offshore wind farms is 1,000-1,100 per annum (closest PVA outputs to the cumulative collision mortality figures of 986 excluding Hornsea 3 and Hornsea 4 and 1,069 including all projects) then:

- The BDMPS population after 30 years will be 30.70-33.23% lower than it would have been in the absence of the additional mortality using the density independent model

and 25.54-27.75% lower using the density dependent model. The population growth rate would be reduced by 1.18-1.30% using the density independent model and by 0.95-1.04% using the density dependent model (Table A1.4).

- The biogeographic population after 30 years will be 13.26-14.48% lower than it would have been in the absence of the additional mortality using the density independent model and 10.56-11.55% lower using the density dependent model. The population growth rate would be reduced by 0.46-0.50% using the density independent model and by 0.36-0.40% using the density dependent model (Table A1.4).

Table A1.4 Predicted Population impacts on the GBBG BDMPS and biogeographic population for the range of mortality impacts in REP6-024 predicted for cumulative collision. PVA Impact Metrics are as provided in Table 3.18 of REP2-035. The range of predicted figures is indicated in purple. The darker shaded cells represent the level of impact closest to the combined cumulative collision predictions

GBBG, EIA CUMULATIVE COLLISIONS – DENSITY INDEPENDENT PVA MODELS						
Additional mortality	**% baseline mortality largest BDMPS as used by Applicant**	**Counterfactual of Final Population Size (CPS), BDMPS**	**Counterfactual of Growth Rate (CGR), BDMPS**	**% baseline mortality biogeographic, as used by Applicant**	**Counterfactual of Final Population Size (CPS), biogeographic**	**Counterfactual of Growth Rate (CGR), biogeographic**
1,000	5.91	0.6930	0.9882	2.30	0.8764	0.9954
1,100	6.51	0.6677	0.9870	2.53	0.8552	0.9950
1,200	7.10	0.6437	0.9859	2.76	0.8432	0.9945
GBBG, EIA CUMULATIVE COLLISIONS – DENSITY DEPENDENT PVA MODELS						
Additional mortality	**% baseline mortality largest BDMPS as used by Applicant**	**Counterfactual of Final Population Size (CPS), BDMPS**	**Counterfactual of Growth Rate (CGR), BDMPS**	**% baseline mortality biogeographic, as used by Applicant**	**Counterfactual of Final Population Size (CPS), biogeographic**	**Counterfactual of Growth Rate (CGR), biogeographic**
1,000	5.91	0.7446	0.9905	2.30	0.9844	0.9964
1,100	6.51	0.7225	0.9896	2.53	0.8845	0.9960
1,200	7.10	0.7014	0.9886	2.76	0.8746	0.9957

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. Any additional mortality from the wind farms should be considered in the context of and in addition to that population decline

Based on consideration of the PVA metrics as currently presented, the above conservation assessment and particularly that the GBBG population is stable to possibly declining and that we are not aware of any evidence to suggest that the population is going to start increasing, the predicted impacts at the North Sea population scale have the potential to give rise to significant effects. **Therefore**, **we remain unable to rule out a significant adverse impact on GBBG from cumulative collision mortality at an EIA scale irrespective of whether the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals or not**. However, we note that version 2 of the Natural England PVA tool is now available and hence, if the Applicant updates the PVAs using the version 2 of the tool, Natural England reserves the right to revise the advice provided here based on the best available evidence presented.

1.1.6 Little gull cumulative operational collision risk

We welcome that the revised cumulative collision totals for little gull in Table 2.6 of REP6-024 includes figures for East Anglia One North and East Anglia Two projects.

The Applicant's revised cumulative collision totals for little gull in Table 2.6 of REP6-024 of 60.9 birds excluding Hornsea 3 and Hornsea 4 and of 61.4 including all projects (based on the consented project layout scenarios) exceeds 1% of baseline mortality of the precautionary BDMPS 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. However, for the larger figure estimated to be up to 75,000 for the little gull population with connectivity to the southern North Sea, the cumulative totals equate to less than 1% of baseline mortality for this population and can be considered undetectable against background mortality.

The assessment of little gull CRM undertaken by Hornsea 3 was undertaken using a migration modelling approach and didn't utilise their baseline survey data for little gull. Therefore, 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 do not apply to the little gull cumulative collision totals. No figures are available for little gull CRM for Hornsea 4.

Therefore, based on the above we agree with a **conclusion of minor adverse impact from cumulative collisions to little gull at an EIA scale irrespective of whether the Hornsea 3 and Hornsea 4 projects are excluded or included from the cumulative total.** However, it should be noted that this is made on the basis that the cumulative assessment includes all appropriate and publicly available collision estimates for other wind farms only, and as a consequence our confidence in this conclusion is reduced.

Appendix 2: Natural England detailed comments/conclusions on Norfolk Boreas updated in-combination (HRA) collision risk offshore ornithological assessment, submitted at Deadline 6 [REP6-024]

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 in-combination impacts on designated site 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 should further evidence be presented.

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

1.1 Impacts from Norfolk Boreas in-combination with other plans and projects

We again agree with the apportionment rates of 4.8% in autumn and 6.2% in spring used by the Applicant for apportionment of collision and/or displacement impacts in these seasons for each of the other offshore wind farm predictions to the FFC SPA in the assessments in REP6-024. However, we advise the Applicant checks the apportioned collision figures presented in Table 2.1 of REP6-024 for autumn and spring for Norfolk Vanguard and Norfolk Boreas, as it appears that a 6.2% apportionment rate has been applied to the autumn collision predictions and a 4.8% apportionment rate applied to the spring collision predictions rather than vice versa. We note that this does not materially affect the annual in-combination total.

The revised in-combination collision total calculated by the Applicant in Table 2.1 of REP6-024 is 288 gannets from the FFC SPA per annum excluding Hornsea 3 and Hornsea 4 and 359 for all projects including Hornsea 3 and Hornsea 4. These predicted in-combination collision impacts equate to more than 1% of baseline mortality of the colony (see Table A2.5).

Table A2.5 Percentage of baseline mortality for in-combination collision impact levels for excluding and including the Hornsea 3 (H3) and Hornsea 4 (H4) for gannet for the FFC SPA. Baseline mortality calculated using adult only colony size and adult mortality rate (8.1% 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 2.1 of REP6-024	288 excl. H3 & H4 359 incl. H3 & H4	16.04 excl. H3 & H4 20.04 incl. H3 & H4	13.25 excl. H3 & H4 16.55 incl. H3 & H4	14.43 excl. H3 & H4 18.02 incl. H3 & H4

* 11,061 pairs (22,122 adults), 1% baseline mortality = 18 birds
** 13,391 pairs (26,782 adults), 1% baseline mortality = 22 birds
*** 24,594 adults, 1% baseline mortality = 20 birds

The revised in-combination gannet FFC SPA collision totals in REP6-024 have reduced by 43 birds from the totals presented by the Applicant in REP2-035. This follows the reductions in the Norfolk Vanguard and Boreas predictions, but there has also been an increase in the

figure included for Dogger Bank Creyke Beck A & B due to the consented total now being included. Therefore, as the revised in-combination totals in REP6-024 have decreased from those presented by the Applicant in REP2-035, our advice remains as that presented in REP4-040, namely:

Natural England therefore advises that based on the above information, an adverse effect on integrity (AEOI) of the gannet feature of the FFC SPA can be ruled out for in-combination collision impacts if Hornsea 3 and Hornsea 4 are excluded from the in-combination totals.

However, as was the case in our Deadline 4 response [REP4-040], 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, together with the inevitable uncertainty associated with the figures for Hornsea 4 from the PEIR which are subject to change, Natural England therefore is not in a position to advise that an AEOI can be ruled out for the gannet feature of the FFC SPA for in-combination collision impacts when the Hornsea 3 and Hornsea 4 projects are included in the in-combination totals.

As noted in our Deadline 4 response [REP4-040], in the 2017 SNCB interim advice on displacement (SNCBs 2017), the number of birds at risk of reduced individual fitness (i.e. mortality and productivity losses) as a result of displacement is based on the numbers of birds present within a development area and buffer both on the water and in flight. Assessment of the number of birds at risk of mortality as a result of collisions (e.g. with wind turbines) is based on the number of birds present within a development area that are in flight only. The mortality impacts estimated from CRM are assumed to be in addition to any mortality caused by displacement impacts (because the collision estimates take account of birds that avoid the wind farm). Productivity impacts due to displacement would be a further addition (but this is not currently quantitatively accounted for under existing methods/advice). Therefore, at present, the SNCBs regard the two impacts (collision and displacement) as potentially additive and advise that they should be summed.

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

2.1 Impacts from Norfolk Boreas in-combination with other plans and projects: operational collision risk

We again agree with the apportionment rates of 5.4% in autumn and 7.2% in spring used by the Applicant for apportionment of collision impacts in these seasons for each of the other offshore wind farm predictions to the FFC SPA in the assessments in REP6-024. We also welcome that the in-combination figures presented in Table 2.2 of REP6-024 includes the breeding season figures using the Natural England preferred apportionment rates for Norfolk Vanguard and Norfolk Boreas**.**

The revised in-combination collision total calculated by the Applicant in Table 2.2 of REP6-024 is 363 kittiwakes from the FFC SPA per annum excluding Hornsea 3 and Hornsea 4 and 699 for all projects including Hornsea 3 and Hornsea 4. These predicted in-combination collision impacts equate to more than 1% of baseline mortality of the colony (see

Table A2.*6*).

Table A2.6 Percentage of baseline mortality for in-combination collision impacts for excluding and including Hornsea 3 (H3) and Hornsea 4 (H4) 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**
In-combination CRM, based on figures from Table 2.2 of REP6-024 (note: uses 86% breeding season apportionment for Norfolk Boreas & Norfolk Vanguard)	363 excl. H3 & H4 699 incl. H3 & H4	2.79 excl. H3 & H4 5.38 incl. H3 & H4	2.42 excl. H3 & H4 4.67 incl. H3 & H4

* 89,040 adults, 1% baseline mortality = 130 birds
** 102,536 adults, 1% baseline mortality = 150 birds

The revised in-combination kittiwake FFC collision totals in REP6-024 have increased by 33 birds from the totals presented by the Applicant in REP2-035. Whilst there have been reductions in the Norfolk Vanguard and Boreas predictions, there has also been an increase in the figure included for Dogger Bank Creyke Beck A & B due to the consented total now being included. Therefore, as the revised in-combination totals in REP6-024 have increased from those presented by the Applicant in REP2-035, our advice remains as that presented in REP4-040, namely:

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 and Hornsea 4.**

We note that Norfolk Boreas's contribution of 14 birds to the in-combination totals is 3.87% of the total excluding Hornsea 3 and Hornsea 4 and 2.01% of the total including Hornsea 3 and Hornsea 4.

3. ALDE-ORE ESTUARY SPA: LESSER BLACK-BACKED GULL (LBBG)

3.1 Impacts from Norfolk Boreas in-combination with other plans and projects: operational collision risk

We note our previous comments in REP4-040 regarding the breeding season apportionment rates calculated by the Applicant, using the SNH apportionment tool for the projects considered in the in-combination assessment. We welcome that the in-combination figures presented in Table 2.3 of REP6-024 includes the breeding season figures using the Natural England preferred apportionment rates for Norfolk Vanguard and Norfolk Boreas**.**

The revised in-combination collision total calculated by the Applicant in Table 2.3 of REP6-024 (using the upper figure of the range advised by Natural England of 30% apportionment for the breeding season for both Norfolk Boreas and Norfolk Vanguard) of 54 LBBGs from the Alde-Ore Estuary SPA per annum equates to more than 1% of baseline mortality of the colony (see Table A2.7).

The revised in-combination collision total calculated by the Applicant in Table 2.3 of REP6-024 (using the Applicant's preferred breeding season apportionment rates of 21% for Norfolk Boreas and 17% for Norfolk Vanguard) of 53 LBBGs from the Alde-Ore Estuary SPA per annum also equates to more than 1% of baseline mortality of the colony (see Table A2.7).

Natural England notes that no collisions are apportioned to the Alde-Ore from Hornsea 3 or Hornsea 4, which we are content with as both sites are outside of the 141km foraging range of the Alde-Ore and no LBBG collisions are predicted in the non-breeding season for either project.

Table A2.7 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 or Hornsea 4 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)
In-combination CRM, based on figures from Table 2.3 of REP6-024 (using 30% breeding season apportionment for Norfolk Boreas & Norfolk Vanguard)	54	11.83
In-combination CRM, based on figures from Table 2.3 of REP6-024 (using Applicant's preferred breeding season apportionment of 21% for Norfolk Boreas & 17% for Norfolk Vanguard)	53	11.48

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

The revised in-combination LBBG Alde-Ore collision totals in REP6-024 have reduced by 7 birds from the totals presented by the Applicant in REP2-035 for using the Natural England preferred breeding season apportionment rates, and by 4 birds using the Applicant's preferred breeding season apportionment rates for Norfolk Boreas and Vanguard (following the reductions in the Norfolk Vanguard and Boreas predictions).

There have been no updates to the LBBG Alde-Ore PVA undertaken during the Norfolk Vanguard examination (e.g. through the Applicant updating/re-running this through the Natural England PVA tool, as advised by Natural England in REP4-040). Therefore, we have continued to use the counterfactual of population size (CPS) and counterfactual of growth rate (CGR) metric outputs from the PVA undertaken for LBBG at the Alde-Ore Estuary SPA during the Norfolk Vanguard examination (MacArthur Green 2019[2]). We note that the

[2] MacArthur Green (2019) Norfolk Vanguard Offshore Wind Farm: Responses to Natural England initial comments on the Alde-Ore Estuary SPA lesser black-backed gull PVA Offshore Ornithology Cumulative and In-combination Collision Risk Assessment: Appendix 1. Available from:

outstanding concerns we have previously noted regarding this PVA in our Relevant Representations [RR-099] and Deadline 4 response [REP4-040] for Norfolk Boreas remain. However, the model presented during the Vanguard examination (MacArthur Green 2019[2]) nevertheless currently represents the best available evidence on which to base an assessment, though this should not be taken as a Natural England endorsement or 'acceptance' of the model outputs.

Natural England has again focused our conclusions on the PVA outputs from the density independent model (Table A2.8). If the additional mortality from the windfarm is 55 adults per annum (closest PVA outputs available in MacArthur Green (2019) to predicted 53 mortalities for the in-combination total using Applicant's calculated breeding season apportionment rates for Norfolk Boreas and Vanguard and to the 54 in-combination total using 30% breeding season apportionment for both Norfolk Boreas and Vanguard) then the population of the Alde-Ore Estuary SPA after 30 years will be 33.1% lower than it would have been in the absence of the additional mortality. The population growth rate would be reduced by 1.4% (Table A2.8). If it is assumed that the population is stable then this would mean that the population would be 33.1% lower than the current population size. This would be counter to the restore conservation objective for this feature of the site.

Table A2.8 Predicted population impacts on the LBBG population of the Alde-Ore Estuary SPA for the range of revised mortality impacts predicted for Norfolk Boreas in-combination with other plans and projects presented in REP6-024. PVA impact metrics are as provided in MacArthur Green (2019)[2]. The shaded cells represent the level of impact closest to the in-combination predictions in Table A2.7.

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 MacArthur Green (2019)[2]	Counterfactual of Growth rate (CGR) after 30yrs – see Table 3 of MacArthur Green (2019)[2]*
55		0.669 (0.616-0.731)	0.986 (0.983-0.990)
60	13.04	0.645 (0.592-0.703)	0.985 (0.982-0.988)

* The Norfolk Vanguard Applicant confirmed that the headings for the median and lower CIs are the wrong way around in MacArthur Green (2019)[2]. So, we have presented the figures the correct way around above

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.

As noted previous in REP4-040 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.

As the Alde-Ore LBBG population is at best currently stable and the PVA undertaken for Norfolk Vanguard (MacArthur Green 2019) suggests a baseline growth rate of -2% for the density independent model we have considered these levels of growth rates per annum. As in REP4-040, we have again 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.

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https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-002883-ExA;%20AS;%2010.D7.21A_Alde%20Ore%20Estuary%20SPA%20PVA%20Responses.pdf

If we assume a -2% per annum growth rate, a stable population or a 1% per annum growth rate then 55 additional mortalities per annum would result in the population declining below its current level, let alone be able to reach the target population of the conservation objective.

If we assume a 2% per annum growth rate then 55 additional mortalities per annum would result in the population being approximately 2,400 birds lower than without the additional mortality after 30 years, and it would take over an additional 145 years to reach the target population compared to the no windfarm mortality scenario.

If the LBBG population were to grow at a rate of 3% per annum over the next 30 years, then additional mortality of 55 per annum would result in the population being approximately 3,300 birds lower than without the additional mortality after 30 years and it would take over an additional 35 years to reach the target population compared to the no windfarm mortality scenario.

As noted in REP4-040, 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 again also considers that it is not possible to rule out AEOI even if the population starts to show modest growth.

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 again advises that it is not possible to rule out an adverse effect on integrity (AEOI) of the LBBG feature of the Alde-Ore Estuary SPA for from in-combination collision impacts with other plans and projects.

We note that Norfolk Boreas's contribution of 2 birds to the in-combination totals is 4.03% of the total excluding Hornsea 3 and Hornsea 4 (no birds are apportioned to Hornsea 3 and 4, so the contribution is the same even if these projects are included in the in-combination total).

4. GREATER WASH SPA: LITTLE GULL

4.1 Impacts from Norfolk Boreas in-combination with other plans and projects: operational collision risk

We welcome that the revised figures included in Table 2.6 of REP6-024 now include figures for East Anglia One North and East Anglia Two. We again agree that the CRM figures presented for the various sites in Table 2.6 of REP6-024 have been updated for an avoidance rate of 99.2%. However, as per REP4-040, we do not consider it is appropriate to adjust the figures for the other offshore wind farms based on build out capacities unless the reduction is legally secured and CRM re-run.

As was noted by the Applicant in REP2-035, we note that not all wind farms with potential connectivity to this population have presented collision estimates for little gull (e.g. Dudgeon, and other sites within the former East Anglia Zone: East Anglia One and East Anglia Three), as these figures are not available or in the public domain. As noted on EIA cumulative collision in Appendix 1 above, assessment of little gull CRM undertaken by Hornsea 3 was undertaken using a migration modelling approach and didn't utilise their baseline survey data for little gull. Therefore, 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 do not apply to the little gull cumulative collision totals. No figures are available for little gull CRM for Hornsea 4.

The revised predicted cumulative collision impacts for little gull has reduced by 5 birds from the totals calculated by Natural England in REP4-040 (following the reductions in the Norfolk Vanguard and Boreas predictions). Therefore, our advice remains that on the basis of the information regarding little gull presented in REP4-040 and above and these figures, **Natural England advises that an adverse effect on integrity (AEOI) of the little gull feature of the Greater Wash SPA can be ruled out for in-combination collision impacts irrespective of whether Hornsea 3 and Hornsea 4 are included in the totals or not.**

We again note that the in-combination assessment includes all appropriate and publicly available collision estimates for other wind farms. However, as there is no publically available information regarding some potentially relevant projects, our confidence in this conclusion is somewhat reduced.