THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK VANGUARD OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010079

Comments on Offshore Ornithological Aspects of Applicant's Response to Section 51 Advice from the Planning Inspectorate [AS-006]

30 January 2019

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1. Updated Greater Wash SPA citation and assessment (Section 2.1 and Section 13.4.4-13.4.5 of Appendix 1)

1.1. As noted in our response to Examining Authority question 23.3 on the corrections to the Greater Wash SPA citation (Natural England, 2019a), the changes to the area of the SPA (due to the exclusion of an area around the outer perimeters of Lincs, Lynn and Inner Dowsing and LID6 offshore wind farms) would not affect the Applicant's assessment for the relevant species, as the Vanguard offshore cable route does not pass through the footprints of the three offshore wind farms in the area that is now excluded from the SPA boundary.

1.2. We welcome the Applicant's revised assessments in Section 2.1 and Sections 13.4.4-13.4.5 of Appendix 1 of the Applicant's Response to the Section 51 Advice Report, which accounts for changes in the calculated baseline mortality rates for the SPA population due to the revised SPA citation population estimates for red-throated diver (RTD) and little gull.

1.3. With regard to the RTD construction displacement assessment (Section 2.1.1.1 and Section 13.4.5.1 of Appendix 1), we note that the density data for the Greater Wash SPA has not been altered by the SPA corrections, meaning that the density figures for the offshore cable corridor used by the Applicant of 1.36-3.38 birds/km2 have not altered and hence the numbers of birds at risk of 100% displacement around a 2km buffer from two cable laying vessels remains at between 34 and 85 RTDs. However, the Applicant has used a 5% mortality rate in their updated assessment. As noted in our Relevant Representations [RR-106] (Natural England, 2018) and Written Representations [REP1-088] (Natural England 2019b), Natural England advises a worst case scenario of 10% mortality, which predicts between 3 and 8.5 birds would be expected to die (compared to the Applicant's calculation of 2-4 birds). Using the corrected SPA RTD population size of 1,407 and the corrected natural mortality of the SPA population figure of 281 (rather than the approx. 300), the addition of between 3 and 8.5 birds equates to 0.94-2.65% of baseline mortality (compared to 0.67-1.3% calculated by the Applicant). Based on our preferred mortality rate of 10%, these levels of predicted additional mortality for Vanguard alone when expressed as a % of the baseline mortality level are not insignificant and require further consideration by the Applicant, including seasonal restrictions that ensure cable laying within the SPA take place outside the peak period for RTD.

1.4. As noted in our Relevant Representations [RR-106] (Natural England, 2018), the in-combination assessment for RTD at the Greater Wash SPA (Section 2.1.1.2 and Section 13.4.5.2 of Appendix 1) should also consider the potential for displacement from cable laying for Hornsea 3 offshore wind farm. 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 Greater Wash SPA, not just those consented after Triton Knoll. We note that the export cable route for Triton Knoll falls within the Greater Wash SPA, and that the cable has not yet been installed. No further information has been provided in the Applicant's Response to the Section 51 Advice Report, so this issue still remains and therefore we cannot reach a conclusion regarding the level of impact from in-combination displacement at this stage.

1.5. For the updated CRM assessment for little gull from the Greater Wash SPA (Section 2.1.2.1 and Section 13.4.4 of Appendix 1), as previously stated we agree with the approach undertaken by the Applicant to apportion collisions to the Greater Wash SPA little gull population. We also welcome that the Applicant has updated its assessment based on the revised little gull population from the updated Greater Wash SPA citation. However, we again note the methodological issues/uncertainties raised in our Relevant and Written Representations [REP1-088] (Natural England 2018 & 2019b) regarding the CRM undertaken. Therefore we currently cannot agree to the Vanguard CRM figures used in the Greater Wash SPA assessment, and hence reach any conclusions regarding the impact of collision risk from Vanguard alone.

1.6. In Section 2.1.2.2 and Section 13.4.4.1 of Appendix 1, the Applicant considers that given the low number of little gull collisions at Norfolk Vanguard alone that their assessment predicts, it is apparent that the project will not contribute to an in-combination impact. Again we note the methodological issues/uncertainties raised regarding the CRM undertaken for Vanguard alone and therefore recommend that the in-combination collision risk to little gulls from the Greater Wash SPA is revisited once these issues/uncertainties are resolved.

1.7. We also advise that whilst the predicted Vanguard CRM impact to little gulls from the Greater Wash SPA is likely to equate to less than 1% baseline mortality and could be considered non-significant and therefore would not be an AEOI. However, while 1% baseline mortality can be considered to be insignificant in the context of the population, this does not mean that this level of additional mortality should not be added to an assessment of in-combination impacts. Therefore, we advise that the in-combination CRM figures for other relevant North Sea offshore wind farms (OWFs) for little gull from the Greater Wash SPA are presented (where figures are available) and that the overall in-combination CRM figure is presented.

2. Offshore Ornithology Cumulative Impact Assessment (Section 2.2 and Appendix 1 and 2)

Inclusion of updated figures for Hornsea 3 and Thanet Extension projects

2.1. In this report, the figures included in the cumulative and in-combination assessments (Appendix 1: Tables 13.10-13.13; Appendix 2: Table 2) for the Hornsea 3 and Thanet Extension projects have been updated to include the figures presented in the submission documents for these projects, rather than those from the PEIRs as were included in the Vanguard submission documents. Whilst we welcome this update from the Vanguard Applicant, we note that there remain a number of issues regarding the density data used in the Hornsea 3 assessments and outstanding issues regarding the Thanet Extension data that are currently being discussed during the Examination phases for both projects. Therefore, the abundance and collision risk modelling (CRM) figures presented for Hornsea 3 and Thanet Extension projects in the Vanguard updated cumulative/in-combination tables for both displacement and CRM are not agreed by Natural England at this stage. We recognise that these figures will be subject to ongoing review as the three examinations progress.

Changes to consented configurations of projects and implications for cumulative/in-combination CRM

2.2. The Applicant notes that many of the collision estimates for other offshore wind farms included in the cumulative CRM tables (see paragraphs 25-26, 38-39, 48-49 56-57 of Appendix 1) were calculated on the basis of consented designs with higher total rotor swept areas than have been installed (or are planned) and that this is a key factor in collision risk. Examples given by the Applicant are the Beatrice offshore wind farm, which is currently under construction, was consented on the basis of 125 turbines but only 84 are being installed and the Triton Knoll Offshore Wind Farm for which an amendment order has been made by the Secretary of State (SoS) to reduce turbine numbers from 288 to 90.

2.3. Natural England acknowledges that this is an important issue with regard to cumulative/in-combination CRM predictions and assessments. Our understanding is that the figures presented by the Applicant in Tables 13.10-13.13 of Appendix 1 are the figures calculated on the basis of consented designs, with the exception of East Anglia One (see below). In order for the Examining Authority/SoS to be able to consider retrospective changes to the collision figures for projects in the cumulative and in-combination assessments the Applicant would need to:

- Provide documentary proof that the design envelope used to calculate new collision figures is:
    - Legally secured with no further change possible (i.e. written confirmation from the appropriate Regulator provided);
    - In addition, for projects that are not built, demonstration that the design parameters proposed for any updated CRM represent the worst case scenario design envelope for collisions for each species considered.
- For projects where revisions to the turbine design parameters can be used to update CRM figures (i.e. there is proof of a legally secured new

design envelope), Natural England would need to agree updated collision risk modelling figures – including bird parameters used in the CRM, which CRM model/option to be used etc.

- Our advice is that in these circumstances 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 MacArthur Green (2017)) and see the full calculation details for these correction factors. 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.

2.4. We note that the figures presented in the updated cumulative and in-combination CRM in Appendix 1 (Tables 13.10-13.13 and 13.15-13.17) for the East Anglia One offshore wind farm (OWF) appear to be the figures for CRM undertaken for a 102 turbine configuration. Our understanding is that a non-material change for a reduction from 240 to 150 turbines has been consented by the Secretary of State. If evidence can be secured that the 150 turbine design is legally secured, then the CRM figures included in the cumulative/in-combination tables should be for the 150 turbine layout. If there is no evidence that the 150 turbine design is legally secured, then the figures included in the cumulative/in-combination figures for this project should be those based on the consented design.

Nocturnal activity

2.5. As noted in our Relevant Representations [RR-106] (Natural England 2018), in its stochastic CRM for Vanguard alone the Applicant has used nocturnal activity rates of:

- 4.3% (S.E. 2.7%) for the breeding season and 2.3% (S.E. 0.4%) for the non-breeding season for gannet; and

- 20% (S.E. 5%) for the breeding season and 17% (S.E. 1.5%) for the non-breeding season for kittiwake.

2.6. In our Written Representations [REP1-088] (Natural England 2019b), we noted that the nocturnal activity rates used by the Vanguard Applicant for gannet (4.3% in the breeding season and 2.3% in the non-breeding season) were not the same as those recommended in the paper recently published in Environmental Impact Assessment Review by Furness et al. (2018), which recommended use of a "precautionary" nocturnal activity of 8% of daytime activity in the breeding season and 3% in the non-breeding season applied to the period sunset to sunrise.

In Section 2.2.1.2 of this response to Section 51 advice, the Applicant notes:

'The actual average rates from the Furness et al. (2018) study were 7.1% and 2.3% respectively. Furthermore, the breeding season value was very heavily influenced by the results from the smallest study in the review, which was based on only three tagged birds in Shetland (Garthe et al., 1999). This study yielded

a nocturnal activity rate of 20.9% (compared to daytime) but the total duration of flight activity recorded was only 215 hours, which was less than 3% of the > 8,000 hours covered by the remaining studies. If the NFAR is calculated without this study a breeding season rate of 4.3% (Standard Error (SE) 2.7%) is obtained. Given the relative sample sizes this is considered to be a more robust estimate and has therefore been used in the current assessment. Similarly, the actual nonbreeding season rate of 2.3% (SE 0.4%) has been used here in preference to the rounded-up value of 3% reported in Furness et al. (2018).'

2.7. Natural England has reviewed both Furness et al. (2018) and the Garthe et al. (1999) paper and has not been able to replicate the figure of 20.9% quoted (see section on interpretation of data and sources of variability below) and requests clarification on this and other issues (see sections below on source data and interpretation of data and sources of variability).

2.8. As noted in our Relevant Representations [RR-106] (Natural England, 2018) and Written Representations [REP1-088] (Natural England, 2019b) 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 we also note that there is uncertainty about the empirical activity levels derived from tracking studies and how these levels may vary, uncertainty around the models that are used to derive daylight hours and how day-length is defined (Forsythe et al. 1995), and uncertainty about how these might translate into nocturnal factors applicable to the Band model.

2.9. The nocturnal activity factors historically used for collision risk modelling (CRM) are taken directly from Garthe & Hüppop (2004). For example a factor of 2 has been typically assigned to gannet and 3 for kittiwake for CRM and these are the same factors given in Garthe & Hüppop (2004).

2.10. A recent review of the potential vulnerability of seabirds to marine renewable energy developments by Wade et al. (2016) considered that nocturnal activity factors of 2 for gannet and 3 for kittiwake following Garthe & Hüppop (2004), King et al. (2009) and Furness et al. (2013) remained appropriate for the assessment of renewable impacts from collisions.

2.11. However, while the Band (2012) model requires users to input a factor of 1 to 5 to represent nocturnal activity levels, Band (2012) translates these factors to levels of flight activity relative to daytime flight activity that are respectively 0%, 25%, 50%, 75% and 100% of daytime activity.

2.12. Band (2012) recommends that "*Flight activity estimates should allow both for daytime and night-time activity. Daytime activity should be based on field survey. Night-time flight activity should be based if possible on night-time survey; if not on expert assessment of likely levels of nocturnal activity*." Band (2012) also recommends that *"where there is no night-time survey data available, or other records of nocturnal activity, for the species in question, (or for other sites if not at this site), it should be assumed that the Garthe & Hüppop (2004)/ King et al. (2009) 1-5 rankings apply.*" Natural England agrees with these recommendations. Band (2012) acknowledges that the translation of the factors to percentages of daytime activity is simplistic and may be precautionary.

2.13. As noted in our Relevant Representations [RR-106] (Natural England, 2018) and Written Representations [REP1-088] (Natural England, 2019b), the Applicant has presented actual percentages of nocturnal activity relative to daytime activity rather than factors (1-5) for gannet and kittiwake. Further the Applicant has presented different percentages for the breeding and non-breeding seasons. The Applicant uses 4.3% nocturnal activity relative to daytime activity for the breeding season and 2.3% for the non-breeding season for gannet and 20% for the breeding season and 17% for the no-breeding season for kittiwake. Natural England does not agree that the empirical data on nocturnal activity for gannet and kittiwake that the Applicant has used is sufficient to justify the nocturnal activity rates used by the Applicant for CRM, as set out in our Written Representations [REP1-088] (Natural England, 2019b). Key points to consider with regard to the nocturnal activity rates used by the Applicant are:

2.14. Source data:

- The percentages of night-time flight activity relative to daytime flight activity presented in (Furness et al. 2018, MacArthur Green 2018) have been derived from an analysis of data from a number of different tagging studies for gannet and kittiwake.
- The original tagging studies were mostly not designed to measure nocturnal activity levels, and information on nocturnal activity is not always presented in the source papers cited Furness et al. (2018) and MacArthur Green (2018) – or if it is presented it is not in a format applicable to the calculation of nocturnal activity levels for CRM.
- The nocturnal activity factors presented in Garthe & Hüppop (2004) were derived from consideration of empirical data from tracking studies – some of which are the same studies that have been used to derive the nocturnal activity percentages presented in Furness et al. (2018).

2.15. **Interpretation of data and sources of variability:**

- Nocturnal activity levels are not measured directly in the tagging studies. In order to derive information on nocturnal activity levels (which Furness et al. 2018 defines as flight activity), Furness et al. (2018) makes assumptions about how parameters derived from tags on birds translate into flight activity.
- The types of tags used varies across the studies as do the parameters that can be used to derive flight activity information. For example, some studies used internal and external temperature monitors – where for example temperature is used to indicate whether a bird is sitting on the water or not or has ingested food, others used accelerometer data to estimate flying activity, others salt-water immersion sensors to indicate periods resting on water etc. Different models, methods and assumptions need to be made to derive estimates of flight behaviour from the tag data.
- There are also differences in sample sizes and location of colonies between the studies etc. Therefore there are a number of sources of variability and uncertainty in the measures of percentage night-time activity levels presented in Furness et al. (2018). These account for some of the differences in nocturnal activity rates between different publications (e.g. between Furness et al. 2018 and MacArthur Green 2018) as different datasets are included.

- Table 1 in Furness et al. (2018) presents "*Flight activity from sunset to sunrise as % of flight activity during day*" derived from 11 publications and it is an average of these percentages that is used to denote nocturnal activity levels for CRM in Furness et al. (2018) for gannet. However it is not clear where the % figures in Table 1 come from or how they have been calculated as they are not generally presented in the publications cited. For example, according to Table 1, night time flight activity was 20.9% of the daytime levels based on the Garthe et al. (1999) study (as stated by the Vanguard Applicant in paragraph 21 of Section 2.2.1.2 of the Response to the Section 51 Advice report). However, Garthe et al. (1999) does not include this percentage. Figure 3 in Garthe et al. (1999) shows the diel[1] pattern of activity of tagged birds which includes percentage of time birds were flying. Based on Figure 3, flight activity from sunset to sunrise as a % of flight activity during day appears to be greater than 25% whether calculated using all activity data (including time birds spent at the colony), or if calculated using only the data for when birds were at sea.

- Further, Figure 3 in Garthe et al. (1999) shows that birds were in flight less during the period during the core daylight hours away from sunrise and sunset (when at sea surveys typically take place) and therefore calculating nocturnal flight activity from sunset to sunrise as a % of flight activity during the day should be higher if compared to activity in these core daytime hours. This is also evident from Figures 2 and 3 in Furness et al. (2018) where activity levels were generally lower in the middle of the day. This is relevant because the percentage nocturnal activity used in collision risk modelling (e.g. at Norfolk Vanguard) is applied relative to the activity level measured during day-time by the snapshot of birds in flight from the digital aerial surveys. If a digital aerial survey records 100 birds of which 30 are in flight, then applying a nocturnal activity percentage of 8% translates into 2 birds at night. This means that CRM will be applied to 30 birds in the daytime and 2 during the night – i.e. 2% of the birds recorded at sea on surveys, which given that night-time includes periods of twilight has the potential to be underestimating nocturnal activity levels.

2.16. It is therefore Natural England's view that there is considerable variability and uncertainty about the appropriate activity level to use in CRM when applied relative to a daytime activity level that is estimated from an at sea survey. The calculated empirical nocturnal activity rates presented within Furness et al. (2018) and those used by the Vanguard Applicant do not present sufficient variability measure or confidence intervals to reflect this. We continue to advise that the appropriate nocturnal activity factors to use for gannet are 1-2 (i.e. 0-25% of daytime activity as measured from an at-sea survey) and 2-3 for kittiwake (i.e. 25-50% of daytime activity as measured from an at-sea survey). These rates are likely to better reflect the variability in nocturnal activity than the single figures proposed by the Applicant. Furthermore, we do not consider that there is sufficient evidence to apply different rates to the Norfolk Vanguard data for the breeding season and non-breeding seasons for kittiwake and gannet, as applied by the Applicant. Therefore, we currently do not agree with the updated cumulative and in-combination figures presented in Tables 13.10-13.17 of

[1] Involving a 24 hour period that usually includes a day and the adjoining night

Appendix 1 of the Applicant's Response to the Section 51 Advice Report for Vanguard alone.

2.17. In paragraph 23 of the Applicant's Response to the Section 51 Advice Report, the Applicant states:

'Furthermore, because NFAR is used in the model as a multiplier of daytime activity (to obtain total activity across day and night) it is straightforward to adjust existing collision estimates for other wind farms so they reflect the new evidence (the only requirement is that monthly collisions and the value of the NFAR used to obtain them were provided in the assessments). Since submission of the Norfolk Vanguard ES, this retrospective assessment has been conducted for all offshore wind farms included in the cumulative assessment for which these data were available (i.e. those which reported monthly collisions and the NFAR value used; see Appendix 2 for details).'

2.18. Given that we do not agree with the use of the 'empirical' nocturnal activity rates used by the Applicant in its CRM assessment for Vanguard alone for gannet and kittiwake for the reasons set out above, we also do not consider it appropriate to adjust the CRM figures for the other OWFs included in the cumulative assessments to account for this (which the Applicant has done in Appendix 2, Table 2).

2.19. Additionally, 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.

Other issues noted regarding updated cumulative and in-combination assessments

2.20. In addition to the issues highlighted above with the cumulative and in-combination assessments, namely:

- Unable to agree with the figures presented in the displacement and CRM assessments for Hornsea 3 and Thanet Extension

- Issues regarding use of nocturnal activity factors/rates in CRM assessments for Vanguard alone and for adjustment of figures for other OWFs.

2.21. We also note that the other issues raised in our Relevant Representations [RR-106] and Written Representations [REP1-088] (Natural England, 2018 & 2019b) regarding the cumulative and in-combination figures still remain, namely:

- Outstanding issues regarding the Vanguard CRM approach – use of the Applicant's stochastic collision risk model, use of median bird densities rather than mean bird densities (using the mean densities rather than the median densities, will result in increased CRM predictions). Therefore, the Vanguard alone CRM figures are not yet agreed.

- The figures presented in the updated LBBG cumulative CRM table (Table 13.12 of Appendix 1) for the Vanguard worst case scenario for the breeding and non-breeding seasons are different to those presented in the updated in-combination CRM table (Table 13.15) for LBBG from the Alde-Ore Estuary SPA. As the annual predicted totals in both tables are the same, we assume this is because the cumulative figures are based on using the migration free breeding season, whilst the in-combination figures are based on using the full breeding season. We suggest that the same figures are presented in both tables, and that these are based on the full breeding season.

- Outstanding issues regarding Population Viability Analysis (PVA) and the existing models utilised by the Applicant (e.g. use of matched runs/pairs, recommended counterfactuals, models run over 25 years rather than the 30 year lifespan of the Vanguard offshore wind farm).

- We also note that the Applicant again refers to PBR outputs in some of the cumulative and in-combination assessments in Appendix 1. As noted in our Relevant Representations [RR-106] (Natural England, 2018) and Written Representations [REP1-088] (Natural England 2019b), Natural England continues to advise that wherever possible the population level impacts of predicted mortality from developments should be assessed using Population Viability Analysis (PVA) models rather than PBR.

- There remains no cumulative CRM assessment for herring gull. As noted in our Relevant Representations [RR-106] (Natural England, 2018) herring gull is one of the species that is not fully assessed for CRM due to the collision predictions currently being predicted to be less than 10 per year. The exclusion of herring gull from full assessment of collision impacts and hence consideration of cumulative impacts under EIA is of particular concern to Natural England. This should be considered by the Applicant.

- Apportionment approaches used for the Vanguard figures, particularly for lesser black-backed gull (LBBG) from the Alde-Ore Estuary SPA in the breeding season and kittiwake from the Flamborough and Filey Coast (FFC) SPA in the breeding season. Therefore, the Vanguard alone CRM figures are not yet agreed. In addition, we note that the Applicant has applied its calculated apportionment figure of 25% for LBBG from the Alde-Ore SPA in the breeding season to the cumulative total CRM in the breeding season from all other OWFs that are within mean-maximum foraging range of the Alde-Ore. 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 OWFs, the size of each of the other OWFs etc. We suggest that the Applicant considers both these issues and the points we raised in our Written Representations [REP1-088] (Natural England, 2019b) regarding the need to consider segregation in its approach to calculating in-combination CRM impacts in the breeding season for LBBG at the Alde-Ore SPA.

- The cumulative and in-combination tables in Appendix 1 and 2 of the Applicant's Response to the Section 51 Advice Report do not include figures for the Hywind and Kincardine OWFs – these OWFs are not included in the cumulative and in-combination tables presented in Appendix 1 and 2 of the Applicant's Response to the Section 51 Advice Report.

- The cumulative and in-combination tables presented in Appendix 1 and 2 of the Applicant's Response to the Section 51 Advice Report list Moray OWF (in displacement tables) and Moray Firth EDA (in CRM tables). It is currently unclear whether these are referring to the Moray East or Moray West OWFs, or both combined. Figures should be included for both Moray OWFs.

- The updated cumulative displacement tables in Appendix 1 of the Applicant's Response to the Section 51 Advice Report for all three auk species (guillemot, razorbill and puffin, Tables 13.4, 13.6 and 13.8) have corrected the errors in summing up noted in our Relevant Representations [RR-106] (Natural England, 2018). In all of these auk cumulative displacement tables, the figures for the non-breeding seasons for Seagreen Alpha and Bravo are listed as being N/A. We acknowledge that the Environmental Statement (ES) for these projects does not present displacement figures for the non-breeding seasons. However, graphs of monthly abundances of each auk species at each of the project sites across the two survey years are presented in the ES Chapter (Seagreen Wind Energy 2012). These indicate that both guillemot and razorbill were recorded in in all surveys of both Alpha and Bravo during the study period and puffins were recorded in lower numbers in most months. Therefore, consideration should be given to this in the cumulative assessments.

- For the updated cumulative RTD displacement assessment (Section 13.2.1 of Appendix 1 of the Applicant's Response to the Section 51 Advice Report):

    - The mortality has been conducted by the Applicant using the same magnitudes of displacement (80%) and mortality (5%) applied to all birds within the 4km wind farm buffer. As highlighted in our Relevant Representations [RR-106] (Natural England, 2018) for the original submission documents, Natural England does not consider this to be a precautionary approach and advises that a worst case scenario of 100% displacement and 10% mortality is used.

    - The Applicant has again considered that all wind farms at which turbines were installed before or during 2012 form part of the Norfolk Vanguard baseline. As noted in our Relevant Representations [RR-106] (Natural England, 2018) for the original submission, whilst we agree that as Vanguard's baseline characterisation surveys didn't start until 2012, any displacement effects from offshore wind farms operating at that time would be picked up in Vanguard's survey data if the effects from the other wind farms cover the Vanguard survey area, Natural England does not agree that these wind farms should be considered part of the baseline. This is because, although some of the wind farms included in the Applicant's list have been operational for over 10 years, the RTD population data pre-date the installations (e.g. that used in Furness 2015 to inform the RTD BDMPS comes from a variety of sources including O'Brien et al. 2008, which draws on aerial survey data from 2001-06 and Wetland Bird Survey and county bird records from 1995-2005). Therefore the baseline cannot be assumed to include the effects of these wind farms. In addition, we again note that several wind farms located within the south-west North Sea RTD BDMPS in Furness (2015) have not been included in the Applicant's cumulative assessment, namely: Blyth Demonstrator, Dogger Bank Creyke Beck A and B, Dogger Bank Teeside A and B (note that B is now known as Dogger Sofia) Teesside, Westermost Rough, Humber Gateway, Hornsea 1, Hornsea 2 and Hornsea 3.

  - As per our Relevant Representations [RR-106] (Natural England, 2018), we again suggest that a similar approach to that undertaken for the auk cumulative displacement assessments is undertaken for RTD, i.e. to sum the bird abundance estimates for each relevant offshore wind farm and put this total through a displacement matrix, and then assess with a worst case scenario of 100% displacement and 10% mortality. The assessment should include all offshore wind farms located within the south-west North Sea RTD BDMPS.

- We again suggest that a similar approach to that undertaken for the auk cumulative displacement assessments is undertaken for gannet, i.e. to sum the bird abundance estimates for each relevant offshore wind farm and put this total through a displacement matrix, and then assess with a range of displacement of 60-80% and mortality of 1-10%. We also advise that once the figures are agreed and the summed figures accurately presented that the assessment and conclusion of the LSE screening for gannet in-combination displacement from FFC SPA is reviewed by the Applicant.

- For comments on the updated CRM assessment for little gull from the Greater Wash SPA, please see comments under point 1 above.

Summary of NE position regarding updated cumulative and in-combination displacement and CRM assessments

2.22. Due to the issues noted in Sections 2.1-2.4 above with the Applicant's updated cumulative and in-combination assessments included in the Applicant's Response to the Section 51 Advice Report, our position remains that at present we are not in a position to provide formal advice on the accuracy of the predicted impacts at either the biogeographic/BDMPS or SPA scale.

2.23. However, we note that at East Anglia 3 Natural England concluded that AEOI could not be ruled out for HRA for kittiwake at the FFC SPA due to in-combination CRM, and a significant effect at EIA could not be ruled out for great black-backed gull (GBBG) for cumulative CRM. As there have been no changes since East Anglia 3 in terms of avoidance rates etc., and that more collisions are being added to these totals from the additional projects currently under examination (Hornsea 3, Norfolk Vanguard and Thanet Extension) it is considered unlikely these positions will change.

3. Screening and integrity matrices (Section 2.3 and Appendix 3)

3.1. As noted in our response to ExA question 23.41 (Natural England, 2019a)), we consider that the LSE screening should be a coarse filter and as the offshore cable route passes through the Greater Wash SPA, this would indicate a potential impact pathway for species sensitive to disturbance/displacement from the presence of vessels and hence an LSE concluded for the common scoter and RTD features of this site. The analysis of whether the cable corridor overlaps spatially with the distributions of these species should then be considered within the Appropriate Assessment.

3.2. Regarding migratory non-seabird species, the Vanguard project will have connectivity with a large number of wintering waterbirds that migrate through the Vanguard sites and are features of SPAs. The Applicant has currently not conducted any CRM for such species, as it has concluded that there were no issues identified at East Anglia 3 and therefore, the same will apply for Vanguard. In our Relevant Representations [RR-106] (Natural England, 2018), we noted that we do not consider it appropriate that no further work on non-seabird migration modelling and hence CRM has been undertaken since East Anglia 3. Whilst the Norfolk Vanguard sites may be of a similar area to the East Anglia 3 site, there are coastal SPAs with wintering waterbirds that are qualifying species that are in the shadow of the Vanguard sites – particularly Broadland and Breydon Water SPAs and potentially also the North Norfolk Coast SPA. Until this issue is addressed, Natural England is not in a position to advise on whether there would be an LSE from operational CRM for both Vanguard alone and in-combination for the relevant wintering waterbird SPAs.

3.3. The Applicant should screen in/consider SPAs where there is an impact pathway in the non-breeding season (even if there is no impact pathway in the breeding season). Given the potential for all three auks to winter in the North Sea, this would therefore include consideration of the Farne Islands SPA (guillemot and the seabird assemblage feature, which includes razorbill and puffin) and Coquet Island SPA (seabird assemblage feature, which includes puffin).

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