THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

NORFOLK BOREAS OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010087

Updated Ornithology Collision Risk Modelling Advice

Deadline 7

12th March 2020

(Prior to ISH)

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Contents

Natural England's Advice on Norfolk Boreas Offshore Ornithology Assessment Update: Project Alone Collision Risk Modelling [as set out in REP5-059 from the Applicant]

1. General Comments

Natural England welcomes the additional mitigation measures proposed by Norfolk Boreas in REP5-059 to consider 11.55MW turbines with a minimum draught height of 35m above mean high water springs (MHWS) and 14.7MW turbines with a minimum draught height of 30m above MHWS. We therefore welcome the Applicant's efforts in identifying ways to reduce collision impacts.

We acknowledge that the worst case scenario (WCS) is now based on the 14.7MW turbines as the predicted collisions are greater for this turbine layout than for the 11.55MW, largely due to the larger turbines having a lower minimum draught height. Natural England welcomes that information has been provided in Table 1 of REP5-059 on the numbers of each turbine type and their associated parameters required to run the Band (2012) collision risk model (CRM). We have verified the CRM for the 11.55MW and 14.7MW turbines and agree with the annual collision predictions from the project alone presented in Table 2.1 for EIA and Tables 2.5-2.7 for HRA for these turbine options and draught heights. (NB: that this has been based on using the bird densities from the data presented in the Environmental Statement Technical Appendix 13.1 [APP-566], as the bird densities used are not reproduced in REP5-059).

If the turbine options presented in this document are going to represent the final assessed WCS for CRM for the Norfolk Boreas project, Natural England suggests that, in addition to the turbine parameters and wind farm information, the Applicant also presents all of the other input data required for the CRM (e.g. bird densities, bird biometrics etc.). As was advised at Deadline 5 [REP5-077], we would welcome a mechanism that clearly identifies the revised assessments/technical documents/WCS as those in which a decision will have/has been made.

2. EIA collision impacts from Norfolk Boreas alone

As shown in Table 1 below, based on the figures for the 14.7MW WCS from REP5-059, all the central CRM predictions (i.e. using mean density, mean avoidance rate, maximum likelihood flight height data and the standard nocturnal activity rates) equate to less than 1% baseline mortality of the largest Biologically Defined Minimum Population Scale (BDMPS) and biogeographic populations for all of the six key species (gannet, kittiwake, LBBG, herring gull, GBBG and little gull). This is also the case for the upper 95% confidence intervals of the bird density for all species.

Therefore, based on these figures we again agree that the collision risk from Norfolk Boreas alone would have no significant adverse impact at the EIA scale for all species.

Table 1 Percentage of baseline mortality for predicted impact levels for Norfolk Boreas operational collision risk alone for EIA based on WCS using 14.7MW turbines with a minimum draught height of 30m above MHWS, using average across all age class mortality rates, as used by the Applicant

	CRM prediction, Boreas alone from REP5-059	**Largest BDMPS (North Sea) individuals, Furness (2015)**	**% baseline mortality largest BDMPS**	**Biogeographic population individuals (Furness 2015)**	**% baseline mortality biogeographic**
Gannet	31 (9-63)	456,298	0.04 (0.01-0.07)	1,180,000	0.01 (0.00-0.03)
Kittiwake	58 (24-101)	829,937	0.04 (0.02-0.08)	5,100,000	0.01 (0.00-0.01)
LBBG	14 (1-39)	209,007	0.06 (0.01-0.15)	864,000	0.01 (0.00-0.04)
Herring gull	7 (0-21)	466,511	0.01 (0.00-0.03)	1,098,000	0.00 (0.00-0.01)
GBBG	36 (6-77)	91,399	0.27 (0.04-0.59)	235,000	0.11 (0.02-0.23)
Little gull	1 (0-4)	10,000*	0.03 (0.00-0.10)	75,000**	0.01 (0.00-0.03)

* 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 in APP-226

3. HRA collision impacts from Norfolk Boreas alone

a) Flamborough & Filey Coast (FFC) SPA: Gannet

As noted above, we agree with the annual collision prediction in Table 2.5 of REP5-059 for the 14.7MW turbine of 15 (range: 1-36) gannet collisions from the FFC SPA. These predictions equate to:

- 0.84% (range: 0.06-2.03%) of baseline mortality of the FFC SPA gannet colony based on the colony population size at classification;
- 0.69% (range: 0.05-1.67%) of baseline mortality of the FFC SPA gannet colony based on the colony population size from the 2017 colony count;
- 0.76% (range: 0.06-1.82%) of baseline mortality of the FFC SPA gannet colony based on the colony population size from the mean of the 2012, 2015 and 2017 colony counts.

The central predicted collision impacts for the 14.7MW WCS for gannets from the FFC SPA for the project alone equate to less than 1% of baseline mortality for the colony, although the predicted figures based on the upper 95% confidence interval of the density data exceed 1% of baseline mortality of the colony. However, in our Deadline 4 response [REP4-040] Natural England was able to conclude no adverse effect on integrity (AEOI) of the gannet feature of the FFC SPA from collision risk from the Norfolk Boreas project alone for the previous WCS of 10MW turbines with a 22m draught height (based on consideration of PVA metrics, plausible future growth rates for the gannet FFC SPA colony and the maintain conservation objective for the colony). Therefore, as the predicted collisions for the revised WCS of 14.7MW turbines with a 30m draught height (as presented in REP5-059) have decreased from the previous WCS, **our advice remains that an AEOI of the gannet feature of the FFC SPA can be ruled out for collision impacts from Norfolk Boreas alone**.

The updated collision prediction for the project alone for gannets from the FFC SPA should be added to the previous assessment of displacement of gannet from the FFC SPA. Again, we note that in our Deadline 4 response [REP4-040] Natural England was able to conclude no adverse effect on integrity (AEOI) of the gannet feature of the FFC SPA from collision plus displacement impacts from the Norfolk Boreas project alone when the collision figure for the previous WCS of 10MW turbines with a 22m draught height was included (based on consideration of PVA metrics, plausible future growth rates for the gannet FFC SPA colony and the maintain conservation objective for the colony). Therefore, as the predicted collisions for the revised WCS of 14.7MW turbines with a 30m draught height (as presented in REP5-059) have decreased from the previous WCS, **our advice remains that an AEOI of the gannet feature of the FFC SPA can be ruled out for collision plus displacement impacts from Norfolk Boreas alone**.

b) Flamborough & Filey Coast (FFC) SPA: Kittiwake

As noted above, we agree with the annual collision prediction in Table 2.6 of REP5-059 for the 14.7MW turbine of 14 (range: 4-28) kittiwake collisions from the FFC SPA based on Natural England's preferred apportionment rates. These predictions equate to:

- 0.11% (range: 0.03-0.21%) of baseline mortality of the FFC SPA kittiwake colony based on the colony population size at classification;
- 0.09% (range: 0.03-0.19%) of baseline mortality of the FFC SPA kittiwake colony based on the colony population size from the mean of the 2016 and 2017 colony counts.

The central predicted collision impacts for the 14.7MW WCS for kittiwakes from the FFC SPA for the project alone equate to less than 1% of baseline mortality for the colony, as do those for the upper 95% confidence interval of the density data. Therefore, based on these figures we again **advise that an adverse effect on integrity (AEOI) of the kittiwake feature of the FFC SPA can be ruled out for collision impacts from Norfolk Boreas alone.**

c) Alde-Ore Estuary SPA: Lesser black-backed gull (LBBG)

As noted above, we agree with the annual collision prediction in Table 2.7 of REP5-059 for the 14.7MW turbine of 2 (range: 0.4-5) LBBG collisions from the Alde-Ore Estuary SPA based on Natural England's preferred apportionment rates. These predictions equate to 0.47% (range: 0.10-1.19%) of baseline mortality of the Alde-Ore Estuary SPA LBBG colony (based on a population of 2,000 pairs).

The central predicted collision impacts for the 14.7MW WCS for LBBGs from the Alde-Ore Estuary SPA for the project alone equate to less than 1% of baseline mortality for the colony, although the predicted figures based on the upper 95% confidence interval of the density data exceed 1% of baseline mortality of the colony. However, in our Deadline 4 response [REP4-040] Natural England was able to conclude no AEOI of the LBBG feature of the Alde-Ore Estuary SPA from collision risk from the Norfolk Boreas project alone for the previous WCS of 10MW turbines with a 22m draught height (based on consideration of PVA metrics and acknowledgement that that a breeding season apportionment rate of 30% is likely to be overly precautionary, see REP4-040). Therefore, as the predicted collisions for the revised WCS of 14.7MW turbines with a 30m draught height (as presented in REP5-059) have decreased from the previous WCS, **our advice remains that an AEOI of the LBBG feature of the Alde-Ore Estuary SPA can be ruled out for collision impacts from Norfolk Boreas alone**.

4. Detailed Comments

a) Increases to draught height

We note that in Table 1 of REP5-059, the point of reference to which the draught height is measured for all turbine scenarios included in the document is MHWS. However, we note that the point of reference to which the draught height is measured in the submission documents (see Table 5 of Annex 3 of Appendix 13.1, APP-566) was above Highest Astronomical Tide (HAT). Natural England's understanding is that the hub height entered in the Band (2012) spreadsheet should be referenced to Highest Astronomical Tide (HAT) – Band (2012)[1] states:
'Normally, the hub height of wind turbines is measured from Highest Astronomical Tide (HAT), to help ensure navigational clearance requirements are satisfied. However, bird flight heights are measured relative to sea level, which may be 2-3 metres or more lower. Mean sea level (Z_0) and HAT are normally stated relative to Chart Datum (CD). The calculation allows for a tidal offset to be added to the hub height, to allow for this additional height above mean sea level.'

Also in Table 1 of REP5-059, the Applicant states that the tidal offset parameter (of 0.8m for all turbine sizes considered by Boreas) is the difference between Mean Sea Level (MSL) and MHWS. Natural England's understanding is that the tidal offset used in the Band (2012) spreadsheet should be the difference between MSL and HAT (see Band 2012). The Applicant also states in REP5-059 that:
'In previous submissions the offset was erroneously labelled as the difference between Highest Astronomical Tide (HAT) and Mean High Water Spring (MHWS). This was only an error in labelling (corrected here) and the values used in the modelling are unaffected.'

It will be important that these points of reference are checked and clarified, as they may have an impact on the collision predictions if incorrect reference points have been used in the current assessments. Band (2012) notes that *'the tidal offset can make a substantive difference to the calculated collision risk, reducing the estimate of risk by 25-30% for some species'*. This clarification will also assist our understanding of the scale of the proposed increase in draught height.

Natural England reserves the right to amend the advice given in section 1 above if the resolution of this issue requires an update of the CRM.

5. Minor Comments

- Paragraph 25 of REP5-059 notes that in order to secure the additional mitigation, it is proposed to revise Requirement 2(1)(e) of the draft DCO (and

[1] Band, W. (2012). *Using a collision risk model to assess bird collision risks for offshore wind farms*. The Crown Estate Strategic Ornithological Support Services (SOSS) report SOSS-02.

the corresponding DML conditions), and part e) will be amended to say '*have a draught height which is less than the minimum draught height specified for the relevant wind turbine generator capacity in the table below.'* We note the table given lists wind turbine generator capacity up to 14.6MW and 14.7MW and above. As Norfolk Boreas are in REP5-059 committing to removing the 9MW, 10MW and 11MW options from their design envelope, Natural England suggests that requirement needs to clearly indicate that turbines smaller than 11.55MW turbines cannot be installed. This paragraph also notes the need to transcribe the changes into the DML as well as the draft DCO and Natural England confirms that this is required. Natural England will provide further comment on the updated Draft DCO once submitted.

- We query whether the revised WCS of 14.7MW turbines is now based on a turbine that is not yet available on the market. However, it is recognised that the 14.7MW turbine scenario has higher collision predictions than the 11.55MW turbine scenario, so even if the smaller 11.55MW turbine was constructed, the CRM predictions for this are lower than the WCS assessed.
- We note that in Table 2.6 and in paragraph 21 of REP5-059 the Applicant presents an annual figure of 49.5 collisions of kittiwakes from the FFC SPA based on the Natural England preferred apportionment rates for the previous WCS of 10MW turbines with a 22m draught height. Natural England recommends that the Applicant checks this figure, as using the full breeding season and adjusted migration seasons together with the upper breeding season apportionment rate of 86% preferred by Natural England, we calculate the annual predicted total collisions to be 45.4.