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Natural England's comments on G4.7 Ornithological Assessment Sensitivity Report - Revision: 2 [REP5-065]

For:

The construction and operation of Hornsea Project Four Offshore Wind Farm, located approximately 69 km from the East Riding of Yorkshire in the Southern North Sea, covering an area of approximately 468 km^2.

Planning Inspectorate Reference EN010098

27th July 2022

Overview Comments

This submission compares the positions of the Applicant and Natural England on ornithological assessment parameters and the influence these exert on the impact assessment for key seabird species. The report also provides an update to Volume A2.5 Offshore and Intertidal Ornithology [APP-017] and 2.2: Report to Inform Appropriate Assessment [APP-167 & APP-178] based on new evidence and additional guidance from Natural England.

The Applicant suggests that it is unrealistic to adopt a precautionary approach to each aspect of an assessment as the accumulation of precaution can lead to an over-inflated impact for the project level assessment. Natural England highlights the assessment process currently relies on limited empirical evidence that hinders our understanding of potential impacts of offshore wind farm developments. Inevitably this introduces complications and layers of precaution: however, we consider it reflects the reality of the current 'state of play' regarding evidence. It is critical that sources of variation and uncertainty are considered throughout the assessment process, and that these are appropriately presented throughout e.g. through the use of confidence intervals. This is to ensure that false levels of confidence are not assigned to predicted impacts. Understanding how this variability, and sources of uncertainty, may influence the outcomes of an assessment is important for determining how much confidence can be placed in a predicted outcome and whether significant effects, or adverse effects on integrity (AEoI) of a designated feature, can be ruled out beyond scientific doubt. Annex I sets out a number of the uncertainties that make assessing the impacts of offshore windfarms problematic.

We also note that specific situations require tailored approaches to impact assessment. Whilst a one-size-fits-all approach is often desirable in terms of providing a common currency, it may not be appropriate to always adopt the same approach to assessment. In the case of Hornsea Four, Natural England have sought and then proposed a bespoke approach to the assessment of displacement for guillemot and apportioning to Flamborough and Filey Coast Special Protection Area (FFC SPA) for guillemot and razorbill [REP5-115]. This is due to the proximity of the site to the colony and the large numbers of birds found within the development area following breeding, prior to winter (see DL6 submission B6.1). At this time of year these species are in moult and may have attendant chicks. Impacts on these birds during this period may influence overwinter survival and carryover to breeding success the following year. Thus, Natural England have provided advice on how this risk should be addressed following a **logical** process.

The Applicant also notes that the level of precaution is amplified when including other projects during cumulative or in-combination assessments. We acknowledge that this is a potential risk, though highlight that cumulative/in-combination assessments typically use central impact values rather than worst case assessments as a reflection of this.

Looking ahead, we note that the evidence base for offshore wind farm (OWF) impacts is rapidly building, based on projects commissioned by, and involving, a wide range of stakeholders across the sectors. These projects are being targeted to address the key sources of uncertainty in relation to consenting decisions and Natural England, along with the other UK SNCBs, are continuously reviewing the results and updating our advice where there is sufficient confidence in the underlying science and results.

A good example of this is the recent Natural England commissioned northern gannet macro-avoidance project. In response to emerging evidence regarding the extent to which gannets avoid windfarms, this project is seeking to provide guidance on how displacement and collision risk assessment can be combined effectively. Under Natural England's agreement and

following our advice, the Applicant has incorporated the initial outcomes of this project within the assessment for gannet. This is the first time that this approach has been applied during an Examination and has resulted in a significant reduction in the predicted impacts, resulting in a clear conclusion that significant effects and AEoI at FFC SPA can be ruled out for northern gannet.

Whilst we recognise the additional work that has gone into the Applicant's additional reviews of displacement and mortality rates for the auk species and gannet, Natural England's position remains that the current empirical data suggests there is still considerable uncertainty in our understanding of these rates. This arises from the differences in methods applied across the displacement studies reviewed as well as the different responses recorded by the studies, and the lack of empirical data on the mortality rates of displaced birds. Again, there are ongoing and planned projects which are seeking to address these knowledge gaps in an effort to remove this uncertainty and which will be used to refine SNCB guidance and advice in the future.

To summarise, we consider this report usefully catalogues some of the areas of precaution within OWF impact assessments. However, we observe that an assessment of the various sources of uncertainty regarding seabird behaviour and distribution, and the potential impacts of offshore windfarms on seabirds, would have provided a more balanced analysis of the need for that precaution. The need to handle these uncertainties carefully in the face of a shortfall of robust evidence informs Natural England's advice regarding impact methodologies and the parameters that should be used within them. **Accordingly, Natural England continues to advise the ExA that our recommended parameters be used when making EIA and HRA judgements, and that a range-based approach, rather than one based on single impact values, is taken to ensure the level of risk to seabird populations is carefully appraised.**

Detailed Comments on G4.7 Ornithological Assessment Sensitivity Report

Part 1: Sources of uncertainty

Reference population

- Natural England have provided detailed comments on the estimation of BDMPS breeding bio-season population estimates at Deadline 5a [REP5a-029]. We consider it inappropriate to include estimates of overseas birds that could be present in a BDMPS area based on non-breeding season information. Natural England therefore maintain our advice that the breeding season BDMPS should only consider UK colony populations within the relevant BDMPS area.

Collision risk assessment

- The Applicant questions whether the avoidance rates (AR) advised by Natural England (Cook et al. 2014, JNCC 2014) are suitable and note that an update to Cook (2021) is pending along with an updated SNCB guidance note. Natural England acknowledges this and have been working with JNCC and other SNCBs to complete this work. We will keep the Applicant and the Examination updated on this work.
- The Applicant notes that, due to uncertainties around the calculation of the standard deviations (SD) around the biometrics, it was agreed to only use the central estimates without any variability. Natural England acknowledge this agreement.

- The Applicant has considered the impacts of different flight speeds on CRM estimates and the overall assessment. Natural England note that there is currently a project (commissioned by Marine Scotland) to provide improved values for CRM and the SNCBs will look to incorporate the results of this study into their guidance when it is published. However, this will not be available within the timeframes of this Examination.
- The Applicant notes that there is uncertainty in the Nocturnal Activity Factors (NAF) and that more recent studies have suggested the use of lower NAFs. Natural England note that the Applicant requested that a range of NAFs be considered, to take into account the lower values preferred by the Applicant. However, we highlight that there could be significant variation in NAFs between individuals, seasons and sites and that including a higher value within the range suggested incorporates this variation and uncertainty.
- The Applicant has included the SDs associated with density estimates for flying birds. Natural England remain unclear about how these SDs were calculated from the modelled or design-based estimates for all behaviours, but we welcome their provision.
- The Applicant reinforces their position that it is inappropriate to use the 95% confidence intervals (CI) around the generic flight height data. However, they have now included consideration of this in line with Natural England advice. Natural England would like to reinforce that we advocate for the collection of site-specific flight height data using suitable, agreed methods. Such data are likely to provide a more accurate/precise assessment of species-specific flight height distributions that better reflect variability within and between seasons.

Displacement

- The Applicant notes the precaution inherent in Natural England's advised displacement and mortality rates. We maintain our position on the advised rates based on the information contained in the reviews provided by the Applicant (G1.47 Auk Displacement and Mortality Evidence Review [REP1-069] and G2.9 Gannet Displacement and Mortality Evidence Review [REP2-045]). Furthermore, we again note that the mortality rates are a crude method of capturing a range of potentially deleterious effects that could arise from displacement, including reduced fitness for migration and reduced productivity during the breeding season. Natural England acknowledge the need for a more thorough and systematic meta-analysis of displacement rates weighing the merits of each study to provide greater confidence in the compatibility of datasets and interpretation of outcomes. However, in the absence of such a review, we consider a range-based approach to displacement assessments remains necessary.
- The Applicant has referred to recent studies by Degraer et al. (2021) and Vanermen et al. (2019) that suggest habituation to OWFs may occur. Whilst we acknowledge there is potential for changes in displacement or indeed attraction rates, there is currently little empirical data to allow generalisations across other OWFs in different locations or sufficient understanding to incorporate this into assessments.
- More generally, whilst we recognise that monitoring techniques are improving and that as they do so improved data will emerge, we urge caution in assuming that 'latest is best', and consider that a 'weight of evidence' approach looking across all studies and understanding the relevance and quality of each is a better approach.
- The Applicant also quotes several individual-based model simulation studies which have been undertaken that have provided some estimate of potential mortality rates resulting from displacement. Natural England note that these studies have not been

validated and are purely theoretical. We also note that in some cases the simulation models have produced estimated mortality rates that are greater than 1 or 2%.

- Whilst Natural England have requested the Applicant provides consideration of mortality rates of 1-10% across all species assessed for displacement impacts, we note that this does not suggest that a mortality rate of 10% represents the most likely scenario. Critically, **Natural England has never advised solely on the basis of a 10% mortality rate.** However, we consider that this could represent a worst-case scenario in extreme cases where, for example, the excluded birds have not been able to access a critical resource that is only available within the developed area.
- Regarding the assessment of combined displacement and collision assessments for gannet, Natural England have agreed and advised the Applicant on the incorporation of a macro-avoidance rate within collision risk modelling.

Apportioning

- Natural England agree all the values used for the Applicant's apportioning approach for gannet and kittiwake, with the exception of the adult proportions derived by the Applicant for use in the breeding season apportioning calculation in the EIA & HRA Annex [REP5a-012]. We advise that empirical data on proportions of adults should be limited to those collected at the AFL + 4 km buffer during the breeding season, as defined by Natural England.
- We advise this approach, rather than the use of the theoretical stable age structure (Furness 2015), as the empirical data from the site is likely to be more representative of the proportions of adult gannet and kittiwake that are present within the site during the breeding season. Whilst we agree that this may not be fully representative of the proportions of adult kittiwake using the site, this is in line with the precautionary approach in lieu of more accurate empirical data [REP5-116].
- Natural England agree with the Applicant's take on our advice in relation to the non-breeding apportioning of birds to FFC SPA, except for guillemot and razorbill. Please see REP5-115 and our DL6 submission B6.1.

PVA

- Natural England have highlighted two potential issues with the PVA undertaken and these were noted at Deadline 5a [REP5a-029]. These pertain to the use of adjusted breeding season BDMPS values including overseas birds (influencing kittiwake, guillemot and puffin), and a bug in the NE PVA tool that may influence the outputs from the kittiwake PVAs. We hope that these issues will be addressed by the Applicant at Deadline 6.
- We note that the Applicant does not present the counterfactual of final population size metrics that are produced from model runs. Natural England continue to request that these values are provided to allow a full and transparent assessment of the PVA metrics. This will enable stakeholders to fully consider the implications of the seabird populations in question.
- We agree the demographic rates used by the Applicant for the Natural England PVA and acknowledge that the Applicant has provided an update to the kittiwake PVA using our advised productivity value. Natural England welcome that the Applicant has undertaken PVA considering an array of potential impacts. We also note that the Applicant has undertaken a validation exercise which also provides useful context for the PVA results under the demographic rates agreed with Natural England.

Part 2: Results and discussion

- We acknowledge that running the assessments with different parameters will have a variable effect on assessment outcomes but note that Natural England advocate a range-based approach which looks, where possible, to consider impacts in the context of both the upper and lower confidence intervals around parameters. Given the considerable level of doubt regarding input parameters, cleaving to a central impact value rather than looking at a range of potential impacts runs the significant risk of giving advice (and indeed making decisions) based on 'false precision'.
- We again note that Natural England have been actively pursuing the application of macro-avoidance rates for collision risk assessment of gannet and are awaiting the final outcomes of a Natural England commissioned project to provide our final advice on specific values to be adopted. However, we note that, in line with our advice the Applicant has now provided a range of potential scenarios within EIA & HRA Annex [REP5a-012]. We can also confirm that Natural England can now rule out adverse effects on FFC SPA gannet both alone and in-combination (when SEP&DEP and Rampion 2 are excluded from the totals, there still being uncertainty about the impacts of these pre-submission developments.)
- We also note that other projects are currently underway to refine advice on parameters for use in CRM, namely ARs and relevant biometric and behavioural data. However, unfortunately we do not anticipate these will be available during the timeframes of the Hornsea Four Examination. We consider the current values advocated by Natural England for use by Hornsea Four, which are in line with those on which the Secretary of State has judged other recent OWF projects, represent an appropriate precautionary approach in lieu of the results of these studies.
- We are grateful that the Applicant has considered a wide range of potential impacts within their PVA runs using the Natural England advised parameters and their own modifications. We will use these indicative values to inform our final position.

Annex I. Sources of uncertainty regarding quantifying the impacts of offshore windfarms of seabirds

Assessment element	Detail of source of uncertainty	Species influenced	Implications for the assessment
Abundance estimates	**Site characterisation.** Digital aerial surveys represent a brief snapshot of the utilisation of the survey area and may not adequately capture changes in use depending on spatial and temporal coverage.	All	This could result in under- (or over-) estimation of the importance of the site for key species.
	Effects of other offshore wind farms. Uncertainty around how/if the adjacent Hornsea 1 and 2 OWFs will/have altered the use and importance of the Hornsea Project Four area.	Species subject to displacement (auks and gannet)	The importance of the project area for key species could be under or overestimated.
Assessment method	**Seasonal definitions.** Species-specific seasonal definitions will influence seasonal and total mean of peak abundance estimates within displacement assessment. How seasons are defined relative to site-specific trends in abundance can influence predicted impact levels.	Species subject to displacement assessments (auks and gannet)	Displacement impacts could be significantly under or overestimated depending on how seasons are defined relative to site utilisation.
	Collision Risk Modelling (CRM). There is uncertainty in CRM parameters including avoidance rates, flight heights, flight speeds, nocturnal activity and morphometric parameters.	Species subject to collision assessments	Collision impacts could be significantly under or overestimated depending on the values used and the actual response of birds to the wind farm.
	Displacement methods. The displacement matrix allows consideration of a range of possible impact scenarios. This relies on available evidence and expert judgement to inform displacement and mortality rates for relevant species. There is inherent uncertainty within this in relation to how birds will respond to an individual project at different times of year. Whilst alternative approaches (individual-based models) have been developed, these are currently very limited in temporo-spatial scope.	Species subject to displacement assessments (auks and gannet)	Displacement impacts could be significantly under or overestimated depending on the actual response of birds to the project. The size of turbines, layout of the array, constraints on the movements of birds and importance of an area at different times of year, amongst other factors, could influence the selection of appropriate values and further research is needed to refine our understanding of displacement and associated mortality rates.
	Barrier effects. There is currently a lack of dedicated method for quantifying potential impacts that can be included in the assessment. Assessments tend to be based upon qualitative assessment or a reliance on the assumption that displacement assessments including birds in flight and on the water includes consideration of barrier effects. Individual-based models can provide consideration of the potential impacts of barrier effects. However, these are currently limited in temporo-spatial scope.	Species subject to potential barrier effects (breeding or non-breeding)	Barrier effects have the potential to influence both foraging movements of birds tied to the colony during the breeding season and migratory movements around the breeding season. It remains difficult to quantity the potential energetic costs associated with any changes in behaviour resulting from barrier effects and how this may translate to condition, productivity and mortality rates.
	Combined impact pathways. Where species are subject to both collision and displacement risks, there is potential for double counting of impacts. Thus, Natural England have advocated consideration of a correction for macro-avoidance to collision risk estimates. However, we note that there is still some remaining uncertainty regarding the scale of macro-avoidance response and	Species subject to combined displacement and collision assessments (gannet)	The selection and application of appropriate macro-avoidance rates is required but carries uncertainty which may results in under or overestimation of predicted collision estimates and associated combined collision and displacement estimates.

Assessment element	Detail of source of uncertainty	Species influenced	Implications for the assessment
	how this may vary between projects, years and seasons.		
	Reference populations. Natural England note that there is some uncertainty around the definition of appropriate reference population scales and estimates used for EIA. We currently advise the use of the Biologically Defined Minimum Population Scale (BDMPS) maximum seasonal population estimate for the annual assessment. However, we acknowledge that, for the breeding season, there is no reliable way of including birds from overseas colonies that may be present in a specific BDMPS region.	All species assessed at EIA	The scale of the populations assessed for EIA will influence interpretation of whether a 1% increase in baseline mortality rates are reached and starting populations considered in Population Viability Analyses (PVA). This could influence interpretation of the potential for significant adverse effects on some species. Further work is required to refine this approach.
	Population Viability Assessment (PVA) methods. There is inherent uncertainty around some of the demographic parameters currently adopted due to a lack of robust monitoring and variations between colonies. Moreover, demographic rates and predicted impacts of projects are likely to change throughout the lifespan of the project. We also note that current PVAs do not currently include consideration of sabbaticals/skipped breeders or density dependence. They also generally work on the assumption that a population is closed with no in- or out-migration.	All species where PVA has been used to further investigate population level impacts.	The specification of PVAs and consideration of more complex demographic process may influence interpretation of population level effects associated with specific impacts.
	Uncertainty. There is uncertainty around all aspects of the assessment where parameters are specified. This uncertainty has been quantified to different degrees but complicates interpretation of potential impacts from offshore wind farms on seabirds.	All	Impacts interpretation of the level of confidence that can be placed in the central estimates and how this effects the degree of certainty in conclusions.
Implications for individuals and populations	**Population trends.** There is significant uncertainty in how population demographic rates have changed historically and what will happen to populations in the future naturally and under different extrinsic factors.	All species where PVA has been used to further investigate population level impacts.	A lack of understanding of current and future population trends hinders interpretation of the population level effects of specific impacts.
	Indirect effects. The potential for significant indirect effects arising from Hornsea Project Four cannot be ruled out. These may occur through a variety of pathways, influencing productivity, prey abundance and biodiversity.	All species	Whilst effects cannot be ruled out, it is unclear how they would ultimately influence ecosystem functioning. There is the potential for both positive and negative effects to arise from changes in productivity which could cascade through the food web and influence seabirds. Further research is needed to understand how such effects operate and what they mean for seabirds and other top predators.
	Habituation. It remains unclear whether seabirds will habituate, or be attracted, to specific offshore wind farm projects and how this could reduce the levels of displacement and collision risk over the lifespan of the wind farm.	All species	Habituation, or attraction, of birds to specific offshore wind projects could result in reductions in predicted impacts (e.g. displacement and barrier effects) or increases in predicted impacts (e.g. collision risk). Further long-term studies are required to understand these changes and how they influence predicted impacts over the life of a wind farm.

Assessment element	Detail of source of uncertainty	Species influenced	Implications for the assessment
	Climate change. Climate change may influence the phenology of key life history events (e.g breeding and migrations), prey distribution and availability, and other vital processes.	All species	Climate change could influence the success of important seabird populations over the lifespan of the offshore wind project. This introduced uncertainty in the interpretation of the resilience of a population to different impact levels and the potential for significant adverse effects or Adverse Effects on Integrity (AEoI).
	Avian Influenza. There have been significant increases in the prevalence and impacts of Avian Influenza in recent years. This could result in a further substantial pressure on important seabird populations.	All species	The potential for catastrophic losses of seabirds from important populations leads to uncertainty in the interpretation of the resilience of a population to different impact levels associated with offshore wind farms and the potential for significant adverse effects or Adverse Effects on Integrity (AEoI).