From:	Brown, Emma (NE)
To:	Hornsea Project Three
Cc:	Burton, Louise (NE)
Subject:	Natural England Deadline Three Submission for Hornsea Project Three
Date:	14 December 2018 19:16:02
Attachments:	EN 10080 NE Hornsea Project three Deadline 3 Submission - ISH 4.pdf EN 10080 NE Hornsea Project three Deadline 3 Submission - ISH 1 (002).pdf EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 2 PART 1 - Ornithology.pdf HP00066_101_HOW03_HiDef_Method_statement_20160401.pdf EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 2 PART 2 - Benthic.pdf EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 2 PART 2 - Benthic Annex 2.2B Response on REP2-004.pdf EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 3 .pdf

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Hello,

Please find attached Natural England's Deadline Three Submission.

This includes the following documents:

- EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 1
- EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 2 PART A – Ornithology
- HP00066_101_HOW03_HiDef_Method_statement_20160401 (Submitted as appendix 5 of ISH 2 Part 1)
- EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 2 PART 2 – Benthic
- EN 10080 NE Hornsea Project Three Deadline 3 Submission – ISH 2 PART 2 – Benthic Annex 2.2A – Review of Applicant's response to IP response to ExA Questions – Benthic Ecology
- EN 10080 NE Hornsea Project Three Deadline 3 Submission – ISH 2 PART 2 – Benthic Annex 2.2B – Response on REP2-004
- EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 3
- EN 10080 NE Hornsea Project Three Deadline 3 Submission - ISH 4

Kind regards,

Emma

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Please note I currently work Monday - Thursday

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THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

HORNSEA PROJECT THREE OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010080

NATURAL ENGLAND

WRITTEN SUBMISSION FOR DEADLINE 3

Dated 14th December 2018

Table of Contents

INTRODUCTION

1 This submission follows the 2nd Issue Specific Hearing on Offshore Ecology for Hornsea Project 3 which took place at Mercure hotel Norwich, on the 7th December 2018 and details the oral responses to questions asked of Natural England during that hearing.

2 This submission consists of responses from Natural England to questions raised at the Issue Specific Hearing on Wednesday 5th December 2018 in relation to **Ornithology.** The following information is provided in the Appendices:

- Comments on Applicant's Deadline 1 and 2 Ornithology Clarification Notes.
- Comments on Appendix 9 of the Applicant's Deadline 1 Submission (PVA)
- Personal Communications from RSPB colony managers on the Flamborough and Filey Coast SPA (FFC SPA) breeding seasons.
- Clarification of SPA features
- Hornsea Project Three (HOW03) – method statement for ornithological, marine mammal and marine megafauna survey April 2016.

WRITTEN SUBMISSION OF THE ORAL ANSWERS PROVIDED TO QUESTIONS AT THE ISSUE SPECIFIC HEARING ON WEDNESDAY 5TH DECEMBER 2018.

PART ONE: ONRITHOLOGY.

Representing Natural England: Dr Melanie Kershaw, Emma Brown, Charles Forrest, Dr Chris McMullon.

3 Progress on Statements of Common Ground

3.1 The lack of Statements of Common Ground for Ornithology and Benthic Ecology reflect the level of uncommon ground between the applicant and Natural England in these areas.

3.2 The applicant's high level and all-encompassing drafting of the Ornithology Statement of Common Ground (SoCG) made it difficult for Natural England to reach agreement on individual items within the statement. However these items are made clear in Natural England's written representations.

3.3 (For clarity, Natural England provided initial comment on the draft Ornithology SoCG to the Applicant in advance of deadline one.)

3.4 The clarification notes submitted by the applicant were more than mere clarifications but involved significant amendments to methodologies and other matters and introduced new material to the Examination. The substantial submission from the applicant made it difficult for Natural England to review within the time permitted.

3.5 Natural England did not receive the draft Benthic Ecology SoCG NE until early October, considerably later than requested, therefore Natural England has not had sufficient time to respond. Natural England intend to outline areas of agreement within the SoCG in due course.

3.6 Natural England have come to substantially more agreement with the applicant regarding the Marine Mammal SoCG.

3.7 Natural England agrees to make arrangements to meet with the applicant to make progress regarding the SoCGs where it is likely that common ground can be reached.

4 Ornithology

a) Baseline characterisation

4.1 With reference to written question 1.2.38, The Examiner stated that there appears to be "some difference of opinion" as to the absence of a two-year baseline for the Impact Assessment.

4.2 The Applicant said they conducted digital surveys for 20 months that captured two breeding seasons. They also acknowledged both Natural England and RSPB's clear preference for two-year survey data - and extended their survey programme from 12 to 20 months accordingly. This left only four months represented by a single data-point. They felt this was "sufficient and representative".

4.3 The Examiner questioned whether this survey data was statistically robust. The Applicant said they were open to suggestion in terms of data-checking. Indeed, they possess data going back to 2010 (boat based data covering the Hornsea Zone).

4.4 Natural England stated the importance of quantifying the baseline correctly for parameters including density and abundance. There is considerable variability between years in the parameters such as bird abundance at offshore projects sites, and therefore 2 years is a minimum requirement to get an accurate measure of population abundance and density. Ideally more than 2 years would be obtained however Natural England recognise the constraints involved in undertaking offshore surveys. Natural England articulated the requirement for a minimum of two years of baseline survey data to the Applicant in 2016 and through the Evidence Plan Process. Natural England and the RSPB also suggested examining the Hornsea Zone (including data from Hornsea One and Two Projects) ornithological data sets but the main purpose of this meta-analysis was inform the design of the baseline survey methodology for Hornsea Three, not to develop a method for integrating these data with Hornsea 3 surveysas the Hornsea 2 boat based surveys and Hornsea 3 digital aerial surveys are not necessarily comparable.

4.5 Natural England stated that projects have been consented with less than two years survey data but in a number of these cases the Project survey design intention was to collect two years of survey data but poor weather, for example, had prevented or limited coverage of some individual surveys. Natural England advice is that a minimum of two years of survey data are required to quantify the baseline for offshore ornithology. This failure to characterise the baseline correctly is a fundamental concern for Natural England, and a data set of at least two years is crucial for Natural England to be able to advise on Adverse Effects on Integrity (AEOI) on designated sites.

4.6 Natural England stated that Hornsea 3 is already a high-risk project, considering that kittiwake from the Flamborough and Filey Coast SPA are at the stage of Adverse Effect on Integrity in combination with other plans and projects cumulative impacts on gannet and great black-backed gull potentially reaching significant levels in an EIA context. Natural England suggested that given these concerns there would be a strong case for the applicant providing more than the minimum level of baseline information rather than less.

4.7 Natural England commented on the clarification notes submitted by the applicant and highlighted that they were substantially more than clarification notes, they were detailed technical documents which introduced new material and analyses to the Examination.

4.8 In addition to these documents not having addressed Natural England's concerns, Natural England also questioned why they were submitted so late on in the process,

given that we have raised these issues through the Evidence Working Group process which started in March 2016.

4.9 The Examiner asked what kind of problems have been encountered in projects where less than two years survey data was submitted.

4.10 Natural England stated that if the data is not comprehensive enough, it will not accurately reflect the impacts (it may over or under estimate impacts), and this will also impact on Projects applying for consent in the future which will rely on Hornsea Three data for their in-combination and cumulative effects assessments and this will undermine the consents process.

4.11 Natural England highlighted that if the developers want to use the data for post consent monitoring it needs to be robust or it will introduce more errors into the monitoring process.

4.12 Natural England went on to point out that other developers will need to rely on this information to inform their in-combination assessments and this can lead to errors being compounded. In statistical terms the baseline value becomes meaningless if the initial data input is inaccurate.

4.13 The Examiner questioned whether the survey data paints a true picture of combined effects. The Examiner questioned the applicant on Policy Test 1.6.1.2 methods should be discussed with the statutory adviser.

4.14 The applicant accepted the policy said there should be discussion with the statutory authority but agreement is not a requirement.

4.15 The applicant referenced and agreed with an earlier comment from Natural England regarding the use of data collected for a project. This comment referred to data being used from the initial project to inform the extension of that project without the need for a two year baseline dataset. The applicant then drew parallels indicating this data could be used for adjacent projects, such as Hornsea 3 using Hornsea 2 datasets. The applicant stated it was trying to make the best use of the available data and be as precautionary as possible. (For clarity, the Applicant hasn't actually proposed using data from adjacent sites and have argued against this previously).

4.16 Natural England did not agree that using data from adjacent projects was necessarily suitable to assess the Hornsea 3 project area. The key issue is that the data from nearby project sites was collected using a different survey platform compared to Hornsea Three surveys (boat versus digital aerial surveys) and these data were not compatible. (For clarity, Natural England has been providing this advice throughout the Evidence Plan Process)

4.17 Natural England stated that some species (e.g. kittiwake, great black-backed gull and gannet) and SPAs (Flamborough and Filey Coast SPA) are already high risk. Therefore the cumulative and in-combination effects remained important to Natural England.

4.18 The Examiner asked why the industry standard was two years of survey data.

4.19 The Applicant said this dated back to Round 1 when there was less information as to the aims of the proposal. In addition, techniques of aerial photography were less developed. Also, variability was reasonably high so the two-year window was taken as a compromise that would not unduly prolong the process. The Applicant added that inter-annual variability was a feature of seabird populations. It was therefore useful to look at historic data to understand longer-term trends.

4.20 The Applicant said that variability was higher in the breeding season. The Applicant went on to discuss winter survival / mortality rates with the Examiner and said they were not claiming the winter months were unimportant; only that they were less sensitive to the absolute mortality calculation. In terms of Collision Risk Modelling they require a representative figure for a particular period of time. It's more than a qualitative assessment and the clarification note contains extensive statistical data.

4.21 The Examiner asked whether the cumulative effect would be undermined by having less than 24 months survey data?

4.22 The Applicant did not accept this view for the following reasons: the months not covered by a second data point were during the winter and therefore less variable; they were also relatively less important. In short, the Applicant felt 20-month data gave them a reasonably good understanding and was enough to allow risk assessment.

4.23 The Examiner questioned if data collected from December to March was less valuable and whether additional submissions would make any difference.

4.24 Natural England disagreed by stating analysis of the two years of survey data from Hornsea 1 and Hornsea 2 showed considerable variability. Natural England also felt it was wrong to imply the non-breeding season (winter months) were not important. For cumulative assessment, Natural England needed to see impacts across the whole cycle. Indeed, these impacts can be higher during the non-breeding season. Natural England cited the data from Hornsea Three for the first (complete) year of surveys which showed, for example, that peak abundance of guillemot and gannet was in December.

4.25 The Examiner asked about moulting during the non-breeding season and the subsequent vulnerability of birds.

4.26 Natural England said that auks moult during the non-breeding seasons and that during periods when birds are flightless they are constrained to sea areas.

4.27 The examiner directed a question to Natural England asking their opinion on Rep 2.004. That variation in numbers is lower in winter therefore you would get little variation in winter.

4.28 Natural England stated that there is considerable inter-annual variation in numbers of birds in winter which is apparent through their analysis of Hornsea 1 and Hornsea 2 data.

4.29 The Hornsea 3 data is showing that peak numbers of birds e.g. guillemots in December for the year with complete survey coverage, therefore large number of

birds are using this area during the non-breeding season. Therefore it is not true for the applicant to suggest that the breeding season is the only important season for impacts.

4.30 Examiner asked if the mortality is greater during the non-breeding season.

4.31 Natural England said this cannot be assumed but birds are likely to experience variable levels of mortality at different times of the year and lifecycle, therefore it is important to consider impacts across the whole annual cycle as it cannot be assumed that an impact will have a greater effect on a population in one season over another.

b) Designated Features

4.32 The Examiner asked for qualifying features at the Flamborough and Filey coast SPA. Namely, which document should form the basis of the Examining Panel's consideration.

4.33 Natural England announced the Flamborough and Filey Coast SPA was now formally notified as an SPA as detailed in their representation. In other words, Flamborough Head and Bempton Cliffs SPA has now been subsumed and no longer requires a separate assessment. Natural England have updated their website to reflect this change.

4.34 The Examiner pressed for its definite features with a particular query around the status of the puffin as a feature.

4.35 Natural England stated that puffin were part of the assemblage feature but not a named component.

4.36 Natural England advised that a detailed list of designated features can be found on the .gov.uk website. However Natural England will provide a table of designated features for the next deadline for this SPA as requested by the examiner.

4.37 The Examiner noted the marsh harrier and hen harrier had been screened in as part of the North Norfolk SPA. The examiner queried why the Montague's harrier had not been screened in.

4.38 The applicant said it would clarify at a later point as the relevant expert was not present.

4.39 The Examiner noted that adverse effects cannot be ruled out in terms of Kittiwake, Guillemot, Gannets and Puffin and queried the adverse effects on other features.

4.40 Natural England said that a number of species that are features of FFC SPA and present in the Hornsea Three Project area were a concern for Natural England. Natural England stated that kittiwake at FFC SPA, are of most concern in-

combination with other plans and projects. Other species such as and gannet and great black-backed gull are of concern cumulatively at a North Sea Scale.

4.41 Natural England were still not satisfied with the baseline assessment, but those species listed by the Examiner were the main ones in terms of the HRA. Natural England added that other wind farm projects, for example those currently in Application stage in the southern North Sea will add to the cumulative total for species like great black-backed gull and gannet.

4.42 The Examiner refered to Q1.2.102 and asked why a complete list of features had not been supplied by Natural England for the SAC.

4.43 Natural England said this would be addressed via the benthic issue agenda point.

4.44 The Examiner referred to Q1.2.96 and queried the variable Kittiwake population data. Asking why the applicant stated the Kittiwake has positive population growth, which appears to contradict the RSPB statement that the population saying the population is decreasing.

4.45 The Applicant said it was a case of productivity rather than population; being that their population had halved since the 1970s.

4.46 The Examiner asked if this was a population trend.

4.47 Natural England confirmed that during the late 1980s the population of Kittiwake was accepted as being 83,000 pairs at Flamborough head and Bempton Cliffs SPA and this is the citation population for the SPA. More recently (during 2008-11), a colony count for the newly designated FFC SPA identified around 45,000 pairs; whereas a further count in 2016-17 identified around 50,000 pairs. Natural England said this represented a currently stable population or perhaps a slight increase in growth (but a population level lower than the original citation count from the 1980s) of around 0.35% per annum.

4.48 The Examiner referred to outstanding concerns with respect to Question 1.2.96 Document reference 2004. Namely, the number of bird species (i.e. qualifying features).

4.49 Natural England does not agree with the list of SPA features that the Applicant has concluded no likely significant effect for (and that was without mentioning those SPAs not listed).

4.50 Natural England has concern about conclusions for common tern, little tern and Sandwich tern excluded variously from Greater Washe SPA and North Norfolk Coast SPA and , puffin and Herring gull excluded from FFC SPA

4.51 The Examiner enquired as to Natural England's concerns for all species.

4.52 Natural England confirmed that the cormorant and shag features of FFC SPA did not need to be included in the Appropriate Assessment as there was unlikely to be an impact pathway. The tern species, puffin and Herring Gull all did, however.

4.53 The Examiner stated that the panel would return to the list of species at Agenda item 4j.

c) DAS Coverage

4.54 The Examiner asked Natural England to elaborate on why 10% coverage (rather than 20%) was the accepted norm.

4.55 The Applicant said a decision on how to configure surveys was taken at an early stage. They use video rather than still photography; and use four cameras, but only analyse data from two of those cameras. Plenty of other surveys use a similar percentage. The Applicant added that this issue had not arisen during the pre-application process.

4.56 The Examiner asked how easy it would be to add in coverage from the other two cameras.

4.57 The Applicant said this was a resource issue. A decision had been made early as to the collection of data. In response to the examiner clarifying that the data from these 2 extra cameras were still available, the applicant confirmed this but indicated this data would require significant processing.

4.58 The Examiner asked why two cameras were deemed appropriate.

4.59 The Applicant said it was a sampling exercise: Mean estimate with confidence intervals. Increased numbers of cameras improve confidence, but it depends on how species are distributed in space. Species within Hornsea 3 are not highly clumped; therefore the marginal gain would only have a small effect on precision of the mean. It's more important to gather more data if you want to compare if there is a change in population from the baseline to the operational phase of the offshore wind development. However this is a characterisation exercise for distribution and abundance of species. The Applicant said trend analysis is not what they were doing here. The contractor (Hi-Def) follows this same process at other sites.

4.60 The Examiner asked if the process was fit for purpose. It seems the issue emerged latterly.

4.61 Natural England clarified that the issue was not recent and had been discussed in April 2016 during the Evidence Working Group meetings, when Natural England had queried with HiDef (the surveying contractor) if using two out of the four cameras was sufficient. HiDef proposed that if the coefficient of variation (CV) was greater than 16% then the other two cameras could be analysed. Natural England stated that while the data on precision had not been fully disclosed in the applicant's final submission the interim reports suggested they were not getting the precision that was originally claimed (in that the CV was considerably higher than 16% for most months/species).

4.62 Natural England had also questioned how the contractor came to the conclusion that 10% would be sufficient to determine the baseline. HiDef indicated that 10% survey coverage has been found to deliver the required levels of precision for other projects

(achieving a CV of 16% or better for abundance estimates of the key species), but that the data from the additional cameras could be used to achieve a higher level of precision if required.

4.63 The Examiner asked if the precision was lower than originally sold to Natural England?

4.64 The applicant queried where the 16% CV was stated.

4.65 Natural England referred the applicant to HiDef's Marine Megafauna Survey Method Statement from April 2016. (See Appendix 5)

4.66 The Applicant said Hi-Def claimed 16% was a high target. The applicant has achieved higher survey coverage than other wind farm projects (e.g. East Anglia 3). There's no reason to think these figures are not sufficient. Hornsea 3 shouldn't be judged to a higher standard than other wind farm projects.

4.67 In summary, Natural England stated they advise that data from the other two cameras are analysed because of the lack of precision in the current abundance estimates. Natural England also noted that given the lack of precision in abundance estimate it is important that the assessments consider the uncertainty in the mean estimates by using the upper and lower confidence intervals around the mean values.

d) Hierarchical Data Selection

4.68 The Examiner referred to Annex C 2.11, Deadline 1: Geospatial data issues (Rep 1.2.11) and the integration of boat and aerial survey data.

4.69 Natural England confirmed that the applicant has not demonstrated that the boat based data and digital aerial survey data could be integrated.

4.70 The Applicant said boat data was adequate for both Hornsea 1 & 2. It was not fundamentally flawed. They are two methods of observing the same things. There were differences, but it was important not to dismiss data because of methodology.

4.71 Natural England stated it was not excluding the use of the boat based data entirely. However the variability (i.e. confidence intervals) in boat based data is calculated differently from variability in digital aerial data, therefore using a methodology that relies on overlapping confidence intervals (as per the Applicant's hierarchical approach to decide whether or not to use a boat based estimate alongside the digital aerial data for a given month) is not valid.

4.72 In response to the applicants request for clarification as how best to use the boat based data, Natural England stated that the data was unreliable due to limited survey coverage by the boat based data of the Hornsea 3 development area.

4.73 The examiner asked would it be possible for the Applicant and Natural England to meet and agree on the methodology.

4.74 Natural England declined as further discussion would not change their stance that the data coverage was not sufficient.

e) *Temporal and Spatial Statistics*

4.75 The Examiner pursued Natural England's view on the Applicant's submission

4.76 Natural England acknowledged the submission on age classes; although a full dataset was required. One that included digital aerial data.

4.77 The Applicant said they will supply this data.

4.78 The Examiner asked about pooled density estimates and a mean based on two data-points.

4.79 The Applicant said this was explained by document submission. They will clarify the technical points later. There followed a discussion on statistical methodology between the Examiner and the Applicant.

4.80 Natural England stated that variability (whether around the mean or median) around parameter estimates should be accounted for in the impact assessments. Central values have a degree of uncertainty, and that should not be ignored. A new version of the collision risk model (Stochastic Collison Risk model) now exists that allows variability around input parameters to be incorporated.

4.81 The Applicant has provided tables that present collision risk outputs which reflect uncertainty around some of the input parameters but these have been calculated separately for each variable (and cannot be combined) as there is no mechanism to incorporate uncertainty across a range of parameters in the Band Model. Natural England noted that the Applicant had not used the variability in predicted collision impacts to assess the significance of population impacts in the subsequent assessment (their assessment is based on mean parameters).

4.82 Natural England stated that they do not agree with the baseline data that the Applicant has used for collision risk modelling. Some calculations are based on digital aerial surveys alone, others a combination of boat and digital aerial densities. The variability around the mean densities will make a difference to the collision figures that are derived.

4.83 The Examiner asked whether ensemble modelling allows one to get a feel for uncertainty prior to the ES and HRA.

4.84 Consideration of the effect of the uncertainty around the individual parameters separately does give an indication of which variables affect the collision risk collision most, but there is no mechanism to combine the variability across the parameters. We know that variability around avoidance rates, species density and flight height parameters have a significant effect on results and that is why the stochastic model was developed.

4.85 The Examiner asked what the findings of the analysis are.

4.86 Natural England stated that variability and uncertainty around avoidance rates, bird densities and flight heights all have a large influence on collision figures. That is why Natural England considered it important to account for this uncertainty in the collision modelling process as can be done with Stochastic Collision Model

4.87 The Examiner asked if the stochastic model was developed after this application, and if so how is it relevant to the hearing.

4.88 Natural England confirmed it was published after this application but clarified that they had advised that the Applicant needed to account for the variability and uncertainty when undertaking the collision risk modelling, but have not specifically requested that the applicant should use the new stochastic model.

4.89 The Examiner asked if Natural England were satisfied with the Collision Risk Modelling outputs.

4.90 Natural England are not satisfied with the numeric tables. Natural England require a table using CRM Band-model outputs that utilise the digital aerial data alone for birds in flight density and include upper and lower confidence intervals

4.91 The Examiner asked if Natural England wanted the data to be reworked.

4.92 Natural England want a Collision Risk Model run with the parameters as outlined in their written representation (this includes using DAS density data only). Natural England also require data on the upper and lower confidence intervals of the DAS density value for each month. Natural England will take a view on uncertainty around those months missing from the dataset.

4.93 The Applicant said they can supply this data. In addition to appendices, they calculated the collision rate as not just a mean monthly value, but also at upper and lower confidence values (with aerial data only).

4.94 Natural England stated that this will allow them to progress with some form of assessment (Noting that the lack of adequate data prevents a full and robust assessment).

4.95 The Applicant said they need reassurance on how the data will be used. Most projects were content to use the mean.

4.96 The Examiner said the Applicant had a fair point if it was accepted in other schemes. Why did Natural England want upper and lower confidence values?

4.97 Natural England clarified that these data were requested and supplied for the Hornsea 2 project and used by Natural England in the assessment of impacts at that project.

4.98 The Examiner asked how representative were mean estimates, in relation to sample size.

4.99 The Applicant said they were high as they covered a large area over a long time.

4.100 Natural England highlighted that the sample size is 20 as the Applicant used the transects as the unit for bootstrapping to generate the mean density estimates.

4.101 There followed a brief discussion between Natural England and the Examiner around standard error and "bootstrapping".

4.102 Natural England stated that it was important to note the lack of adequate baseline characterisation point cuts through all these issues and reiterated that the Applicant had not complied with advice and guidance.

4.103 The Examiner asked if Natural England were unwilling to entertain a DAS survey with upper and lower confidence levels.

4.104 Natural England expressed a lack of confidence in the methodology and data output and therefore unable to rule out an adverse effect on integrity. This remains a fundamental concern.

4.105 The Examiner asked if additional data would be a waste of time.

4.106 Natural England notes that while they are not able to rule out adverse effect on integrity due to the baseline data, it will be for the Secretary of State as advised by the panel to make a decision on this issue. In order to support the process, Natural England are keen to advise on the methodologies used within the applicants assessment to ensure that they can be as robust as possible, but that this would not change Natural England's overall advice.

4.107 The Examiner asked what, if any, additional information would allow a small increase in certainty.

4.108 Natural England's conclusion would still not be able to rule out adverse effect beyond reasonable scientific doubt. Even with a small increase in certainty through appropriate modelling

4.109 Natural England's barrister asserted this is why they have not engaged with the appendices. They would be entertaining something that could not change Natural England's conclusions (without changing the baseline data-point). In terms of significant effects it's important to remember the standard by which these things are judged and the potential consequences. In respect to LSE and AEOI it important to see how these are judged in respect to the precautionary principle.

4.110 The Applicant added that they were happy to undertake further analysis if that would be constructive. They understand the issue around the baseline, but even so the Secretary of State may disagree with Natural England.

4.111 The Examiner asked if the Stochastic Model had been formally endorsed.

4.112 Natural England clarified that McGregor et al. 2018 was published after the application was submitted. The model has not been endorsed by the SNCBs. Natural England

would like developers to use this model in the future but have not asked the applicant to use it retrospectively.

4.113 The Examiner asked about Flamborough density estimates: Was there an even spread across the study area.

4.114 Natural England said that density estimates were a single estimate per annum and this comes back to using confidence intervals derived in different ways. Natural England wish to see densities that reflect variability.

f) Collision Risk Modelling

4.115 The Examiner asked in relation to Q1.2.61 on migrating sea birds does Natural England have a view on the changed Deadline 1 representation.

4.116 Natural England questioned the suite of migratory species that the Applicant had selected but and do not consider impacts on migratory birds to be a high-risk in terms of the Impact Assessment. Natural England weren't clear on the rationale of the Applicant regarding ow the species were selected for migratory collision risk modelling.

4.117 The Examiner enquired as to the rationale for selection.

4.118 The Applicant referenced Hornsea 2: It was both recent and adjacent – and a robust evidence base. They cannot understand why Natural England would reach a different conclusion as it felt like a highly relevant starting point.

4.119 Natural England commented that this list of species was not agreed with them.

4.120 The Examiner asked why "adjacent" was not sufficient?

4.121 Natural England clarified that this issue arose because the Hornsea 2 species list was not agreed at that time. Other projects, for example, have used different suites of species.

4.122 The Examiner asked what Natural England need?

4.123 Natural England commented that they were not necessarily asking for further Collision Risk Modelling. However it would be useful if they can compare lists of species compiled for adjacent windfarms and clarify why they haven't been included.

4.124 The Applicant said they can provide this information.

4.125 The Examiner asked whether avoidance rates differ from Natural England's advice in terms of the HRA and ES. Referencing Cook et al. Avoidance Behaviour paper.

4.126 Natural England stated that the SNCB paper broadly aligns with Cook et al. 2014 report. The exception to this is Kittiwake where the SNCBs advise a different avoidance rate.. The SNCBs peer-reviewed the Cook et al 2014 Report and decided the most

appropriate avoidance rates. The only rate that differed in the SNCB advice from the Cook et al 2014 report was that of Kittiwake.

4.127 The Examiner asked whether the guidance also explains the rationale in the submitted document.

4.128 Natural England stated that the guidance did set out the reason for the difference.

4.129 The Examiner asked why they reached a different conclusion to the Cook et al. paper for Kittiwake.

4.130 Natural England stated that the avoidance rates presented were not based on kittiwake collision data, but (on gull collision data. The rationale is explained in the SNCB guidance which Natural England will submit as evidence

4.131 The Applicant said they agreed with the Cook et al 2014 paper.

f) Collision risk modelling

(i) *Band Options*

4.132 The Examiner asked for Natural England's concerns in terms of Collision Risk Modelling, Option 3.

4.133 Natural England's barrister said Natural England cannot comment as there were fundamental issues understanding the data

4.134 The Examiner asked if Natural England were able to offer some response for all aspects of Collision Risk Modelling.

4.135 Natural England's barrister informed the Examiner that Natural England had responded via a written representation. They have not commented further as the Applicant did not follow their advice on methodology.

(ii) *Mean Estimate / Maximum Likelihood*

4.136 The Examiner confirmed that Natural England said there's no basis for a single value in Collision Risk Modelling.

4.137 The Applicant claimed they've not deviated from typical practice (in that you have to choose a value).

4.138 Natural England highlighted that uncertainty (upper and lower confidence intervals) should still be taken in to account and that the Band Model guidance highlights the need to account for uncertainty and variability in the input parameters.

4.139 The Applicant said that more input from Natural England would be useful.

4.140 Natural England's barrister identified that relevant points were made as a written representation and further information will be provided if required.

(iii) *Nocturnal Activity Factors*

4.141 The Examiner queried the applicant's assumption of zero "night-activity" for Gannet.

4.142 The Applicant acknowledged there was limited night time activity, but said they were held to percentages by the band model. They've now referred to specifics in the appendices.

4.143 Natural England stated that their written representation describes why they are not in agreement with the Furness et al 2018 paper as a definitive model as there are issues with the evidence base.

4.144 The Examiner asked Natural England to clarify the variation in studies to define nocturnal parameters.

4.145 Natural England stated that the Furness 2018 paper was only published recently. The Applicant's ES submission used nocturnal activity factors from other papers by MacArthur Green. There are some differences in the datasets that were included in the different assessments and in definitions of nocturnal periods and how these interface with definitions of nocturnal periods within the Band Model. Further, the Band Model uses a factor to relate to a percentage nocturnal activity rather than an exact percentage value being specified. Natural England has provided details relating to daytime and night-time activity in their written representation. Natural England consider that given the variation in the empirical data and issues regarding the comparison of daytime and nocturnal activity levels from tagging data applied to activity levels from offshore survey data there is no robust, single evidence-based value.

4.146 The Examiner commented that most empirical studies suggest 0-25% in terms of the Gannet's nocturnal flight. Therefore the model seems reasonable being that it encompasses a range of uncertainty.

4.147 The Applicant said they accepted this in their appendix. The band model allows for decimals: If 25 = 1 then 20 = 0.8 etc. Furness takes a great deal of evidence into account and also explains the workings of the model.

4.148 The Examiner asked if nocturnal activity data could be provided.

4.149 The Applicant said diurnal activity could be provided but not nocturnal activity discretely.

4.150 Natural England stated that daytime activity levels derived from tagging studies may not match with the daytime activity levels assumed from offshore survey data. Activity levels vary across the day and this can be reflected in the activity levels for daytime derived from tagging studies. However these activity levels may not match the snapshot activity levels (defined as percentage of birds in flight) during an offshore survey. Since the nocturnal activity factors are a relative measure of nocturnal compared to daytime activity Natural England are not sure whether the relative nocturnal activity percentages derived from tracking data can be directly applied to the densities of active birds derived from offshore surveys within the CRM.

4.151 The Applicant said Furness explores this issue.

(iv) *Biological Seasons*

4.152 The Examiner asked why there was higher emphasis on colony-specific data (representation 97) in Natural England's written representation.

4.153 Natural England said they had provided a response regarding seasons. Furness states which months should be included in breeding and non-breeding seasons; although data from a specific colony is the best approach. Natural England's evidence was provided following discussion with colony managers. Breeding season length is important as it defines the level at which you you apportion birds back to a colony. Consequently, if the applicants (shorter) breeding seasons are used the impacts to the Flamborough colony may be underestimated because birds are apportioned to the colony at a lower rate in the non-breeding seasons. There remains a difference in opinion between Natural England and the Applicant on this issue.

4.154 The Examiner asked whether an additional month either side would make a difference.

4.155 Natural England confirmed that it would. If we add a month either side of the season then the numbers of birds apportioned (and hence impact) becomes higher. This would result in a greater impact to the Flamborough population

4.156 The Applicant said the wind farm was 150 km from the cliffs. They questioned if breeding birds from this colony were being impacted by wind turbines. They drew parallels with Hornsea 2. The applicant questioned what has changed.

4.157 Natural England stated this is an evolving issue, and that the Applicant did not accept the seasons that we advised at Hornsea Two. Natural England have based our advice on seasons to use at Hornsea Three on the best available evidence. Natural England has provided a summary explanation in their written representation on Table 7.1.

4.158 Applicant requested the new evidence to be submitted.

4.159 Natural England noted that the evidence was predominantly based on pers comm from RSPB, they can submit an email chain confirming this. There is also an RSPB-authored report, this is for the RSPB to advise as to whether they can release it

4.160 The Examiner asked as to the difference between Hornsea 2 and Hornsea 3.

4.161 In both cases Natural England sought the best evidence on site sensitivity and colonies (especially Kittiwake). Colony managers were advised and more detailed studies undertaken – especially in light of incoming wind farm projects. This accounts for slight differences with the previous assessment.

(v) *Seasonal Mortality Rates*

4.162 The Examiner commented that it seemed like a case of evolving issues and evidence, but asked why RSPB data was not given to the Applicant.

4.163 Natural England provided the Applicant with a summary in their written representation (Table 7.1); although the RSPB may be able to provide a more detailed report.

4.164 The Examiner confirmed that empirical evidence can change.

4.165 Natural England highlighted the Applicant had changed definitions of breeding season for Puffin.

4.166 The Examiner asked whether there should be longer seasons for Gannet and Kittiwake in particular.

4.167 The Applicant said the calculation is a collision risk estimate by month. They're willing to explain areas of uncertainty. It will make no difference to their Displacement assessment, however collision risk may be effected.

4.168 Natural England said the Applicant doesn't need to re-run the Collision Risk Modelling data. Rather, it's about apportioning the collisions at a different rate.

4.169 The Examiner mentioned a table with a seasonal breakdown.

4.170 Natural England need a monthly breakdown of the Collision Risk Estimate to inform baseline values.

4.171 The Examiner attempted to clarify what Natural England needed.

4.172 Natural England's stated it is not part of its role to undertake assessment on behalf of the Applicant.

4.173 The Applicant said their original monthly data submission was provided in document 109.

4.174 Natural England require data in addition to this document. The format was satisfactory but the inclusion of boat based density data was the issue.

4.175 The Examiner seeks clarification that Natural England require DAS data only.

4.176 Natural England’s barrister reiterates that the concerns with baseline characterisation. They will not be able to change their advice on adverse effect on integrity, but admit

the Secretary of State may accept the Applicant's baseline. Natural England's advice is based on best practice methodology and following this would ensure the assessment was as robust as possible. There seems no value in the Applicant providing additional output where Natural England's advice remains fundamentally unchanged.

4.177 The Examiner asked if standing advice is the only methodology Natural England would accept. In other words, you would advise the Secretary of State that there's a fundamental issue at the baseline. The Examiner asked if anything will alter that opinion.

4.178 Natural England stated that the baseline remains a fundamental concern and this view will not alter without additional data. Natural reiterated that they have provided detailed advice on methodologies and would urge the applicant to follow this advice. Whilst Natural England are not able to conclude 'no adverse effect on integrity' beyond reasonable scientific doubt, they feel that a more robust assessment would enable them to better indicate to the examiner the level of risk for each feature.

(vi) *Correction Factors*

4.179 The Examiner asked what needed to be done for Natural England to advise on risk.

4.180 The Applicant should provide evidence against each agenda point. Then we could provide further context.

4.181 The Examiner asked if Natural England had not engaged with supplementary analysis.

4.182 Natural England confirmed that have not commented on supplementary information where the Applicant is not meeting the advice set out in our written representation.

4.183 Natural England stated that the Applicant presented their analysis and Natural England does not agree with most of its findings. Some outputs in their annex do meet with Natural England advice, but a number of elements do not. Natural England requested the Applicant provide data outputs with version clarity. Subsequent to that further advice can be provided. It would be good practice to have that information in the ES.

4.184 The Examiner asked whether there were gaps across the board.

4.185 Natural England said the issue remains that the Applicant has not followed Natural England's advice across the whole impact assessment and has not presented data that allow an assessment that follows Natural England's advice. Natural England require a complete set of figures generated in relation to Natural England advice. Therefore while the Applicant has presented some outputs that do follow aspects of Natural England's advice, because other elements of the analysis do not align with Natural England advice, we are unable to evaluate the impact assessment as presented.

4.186 The Examiner said there was an interdependency. In other words, all advice should be followed rather than just doing so ad-hoc.

4.187 Natural England agreed.

4.188 The Applicant said this was why they were trying to engage with Natural England.

4.189 The Examiner asked whether Natural England were suggesting a complete re-run of the ES.

4.190 Natural England stated that these are not new issues and have existed throughout pre Application process and were raised during the Evidence Working Groups, and are the reason why we don't have a SoCG on ornithology.

4.191 Natural England reiterated that elements of the Collision Risk Modelling outputs do not align with Natural England advice. A re-run of the whole ES is not needed.

4.192 The Examiner queried if Natural England wanted Collision Risk Modelling in line with their advice.

4.193 Natural England confirmed this and stated it would be useful if it included Band Model spreadsheets for each species (with flight height data and other input parameters clearly presented).

4.194 The Applicant said they were willing to do so if that meant progress. They added that disagreement over parameters is not new.

4.195 The Examiner noted that Hornsea 2 utilised an ornithological road-map and asked if something similar would be helpful.

4.196 Both the Applicant and Natural England agreed it would be.

g) *Cable Corridor Displacement*

4.197 The Examiner referencing Q1.2.53 (Effects) noted Natural England questioned the use of Lawson et al. Applicant stated that Natural England now accepts this as cable corridor displacement.

4.198 Natural England confirmed they are now satisfied it met with their advice after clarification with applicant.

4.199 The Examiner commented regarding the 2km argument for divers and sea ducks RSPB suggested 4km may be more appropriate.

4.200 The Applicant commented that there are various papers suggesting different distances and effects and we are satisfied they have assessed the distance (2km) correctly.

4.201 Natural England confirmed that in the context of the cable corridor assessment 2km is adequate.

h) Mean Seasonal Peaks

4.202 Written representation not discussed.

i) Maximum Kittiwake Foraging Distance

4.203 The Examiner: RSPB slightly revised the distances. Compelling evidence as to adverse impact? Q1.2.75.

4.204

4.205 The Applicant commented that RSPB paper interpreting FAME and STAR (submitted at deadline 1) tracking data saying there is a very low usage of the area.

4.206 The Applicant commented that with respect to tracking data the issue is the degree of connectivity between the project site and the colony. Also an issue with extreme distances. The degree of reliance the colony has on Hornsea 3 wouldn't make biological sense. According to the RSPB there's relatively little use of that area.

4.207 The Applicant continued: Interpretation of tracking data in the paper by Cleasby et al. gives insight into foraging data. Connectivity drives the apportioning rates.

4.208 Natural England referenced Thaxter et al. and stated its view is that colony specific data is the more robust data for looking at issues and apportioning assumptions in relation to a specific colony.

j) LSE Screening Issues

4.209 The Examiner commented that screening issues mentioned earlier in the day had been deferred to this agenda point.

4.210 Natural England's barrister highlighted that certain things have been screened out as no 'likely significant effect' (LSE) alone however not stated if there is a possible in-combination or cumulative effect. This relates back to the lack of reliability of the baseline data under-pinning the assessment and insufficient variability. Therefore difficult for Natural England to conclude if there will be adverse effects.

4.211 The Examiner clarifies that Natural England's concern is features have been screened out due to baseline data and the baseline is not robust enough to make these conclusions.

4.212 Natural England confirmed that screening out features based on the baseline data is part of the issue but also highlighted that the approach to screening was also a concern.

4.213 The applicant has screened out impacts deemed to be of low significance based on the conclusion that they are not leading to Adverse Effect on Integrity alone, without considering the potential for impacts in-combination.

4.214 The Applicant queried with which species were there issues. The applicant explained that they had produced a matrices to display how species were assessed. All the features that are affected in the SPA are screened in, with only a few species relating to North Norfolk Coast SPA not screened in. Natural England's view does not change the Hornsea 3 position that there is no LSE.

4.215 The Applicant stated it looked at likely significant effect (in combination) of all features relevant to the Flamborough coast were screened-in (e.g. Little Tern and Common Tern). There was some certainty, but not much. We concluded there were no likely significant effects for this project.

4.216 Natural England stated that best practice would be for all species to be screened in to the appropriate assessment where there is an impact pathway to enable full consideration of the impacts alone and in-combination, and to fully explore mitigation options. However, in this assessment species were screened out too early without full consideration. Natural England does not have a species list but can provide examples such as that Applicant has not considered the breeding season impacts that could cumulatively affect colonies along the Northumberland coast in relation to Auk species and that tern species have been screened out on the basis of assumptions as the cable route is not known. These discussions should have taken place at the Appropriate Assessment stage.

4.217 The Examiner asked about screening matrixes.

4.218 Natural England stated the Applicant has screened out auk species features on the Farne islands and Scottish SPAs when there will be non –breeding season impacts.

4.219 The Applicant commented that with respect to terns they used information that underpinned the Greater Wash SPA as they wanted to understand the impact of Hornsea 3.

4.220 The Applicant is not aware of any better data as this was sourced from Wilson et al. (or Parsons et al) report, obtained from JNCC dealing with common tern.

4.221 Natural England stated that there is a likely significant effect as it's a "low bar". This analysis would have been better at the AA stage.

4.222 The Examiner queried the In-combination as well, where you have residual impacts.

4.223 Natural England explained the Applicant should consider impacts alone and in-combination with other plans and projects.

k) Guillemot, Razorbill & Herring Gull

4.224 The Examiner asked if Herring Gull were screened-in.

4.225 The Applicant commented that the RSPB said no further work required on this.

4.226 The Examiner: Regarding Guillemot and Razorbill, is there uncertainty as to adverse effects.

4.227 Natural England commented on the Applicant describing it as a complex issue, but specified they should be able to gather information for assessment.

l) *Apportioning Rates*

4.228 The Examiner: RSPB suggested an apportioning tool.

4.229 Natural England haven't used an apportioning tool, but note there are several options.

4.230 Examiner queried Q 1.2.97 why is it logical to presume that the non –breeding portion of auks are not relevant to the assessment. The Examiner queried their location if not around the array area. How far would non-breeding populations go from the Filey Coast.

4.231 The applicant commented that it's not well understood were these species go (guillemot, razorbills and puffin).

4.232 The Examiner then queried the movement patterns of individuals during the non-breeding season.

4.233 Natural England commented that during the non-breeding season it is known there is a lot more mixing between individuals from different colonies and different age-classes. There are likely to be non-breeding birds near the colony during the breeding season, some information on this is provided from ring recovery data. Immature birds can disperse widely from the colony but as they approach breeding age they may start to return to the colony or close to the colony even though they are not yet breeding.

4.234 The Examiner asked in Natural England could provide any published empirical evidence, in addition to the tagging data, for guillemots and razor bills.

4.235 Natural England mentioned the Migration Atlas and papers by John Coulson on Kittiwake as sources of information regarding the distribution of birds of different age-classes at different times of the year

4.236 The applicant stated that they don't see this as a point of disagreement.

m) *Population Viability Analysis*

4.237 The Examiner made reference to Q1.2.117 and several papers including Green et al. 2014, and Cook and Robinson 2017.

4.238 The Applicant said this was exhaustively discussed during H2.

4.239 The initial approach was to draw on PVA model from H2. There was a degree of consensus that these models were suitable. However there were two issues regarding the models.

4.240 The model for Hornsea 2 was run for 25 years whereas Hornsea 3 has been run over 35 years as more realistic duration of the life of the OWF. Also the Hornsea 2 models were run as matched pairs.

4.241 The Examiner: Re-run of model?

4.242 Natural England appreciates that the model has now been run over a 35-year period and that outputs from a matched pairs approach are presented. However the new model outputs have thrown up some issues regarding the method used by the Applicant for running the model with matched pairs and the calculation of the metrics. The updated models do make a difference to the counterfactuals metrics calculated. Natural England have only recently seen the details of the updated PVA models; although the final population size doesn't have confidence intervals. Natural England has some queries in relation to the population models, for example confidence intervals are only presented around growth rate metrics and not around the population size metrics.

4.243 The Examiner queried if Natural England can provide feedback on population models.

4.244 Natural England confirmed it would provide feedback on the PVA model.

4.245 The Examiner queried in relation to Q1.2.65 what additional factors might need to be considered.

4.246 Natural England commented this had nothing to do with baseline data and listed two factors regarding habitat loss and lighting issues.

4.247 Applicant has indicated that they will apply mitigation to minimise lighting impacts to birds.

4.248 Natural England pointed out the applicant’s reference Civil Aviation guidelines and not environmental guidelines. Highlighting that there is no reason Civil Aviation guidelines would minimise impacts on birds.

4.249 Natural England also points out that the Applicant states that there is no impact to seabirds from habitat loss or changes to the distribution of prey (for seabirds) on the basis that in the benthic and fisheries chapters no impacts on benthic habitat or fisheries were concluded. However this does not necessarily connect to impacts on

ornithology and Natural England considered that these potential impacts on seabirds need to be covered directly in ornithological chapter.

4.250 The Applicant refers to the OSPAR guidance on lighting referring to Oil and Gas guidance.

4.251 Natural England indicated that the OSPAR guidance does relate directly to OWFs but that it provides advice on reducing lighting impacts on birds.

4.252 The Applicant states they will return with more information on this.

Appendices

Appendix 1: NE Comments on Applicant's Deadline 1 and 2 Ornithology Clarification Notes.

Clarification Note	NE Comments
Appendix 1 to Deadline I submission – Habitats Regulations Assessment Screening and integrity matrices	The Applicant has presented screening matrices that summarise the likely significant effects of the project on European sites and integrity matrices that summarise the information required for the appropriate assessment. Natural England does not agree with the Applicant's assessment of "*no direct or indirect effects anticipated on the SPA*", and therefore no LSE for features and SPAs where there is an impact pathway between Hornsea Three and the SPA feature in the non-breeding season (even if there is no impact pathway in the breeding season), this includes, for example the seabird features of Northumberland Marine, Farne Islands, Coquet, East Caithness Cliffs SPAs (noting that this is not an exhaustive list). Natural England considers that the Applicant should take SPAs and features through to Appropriate Assessment if there could be an LSE in-combination and not conclude no LSE on the basis of project alone figures. Further since we are not agreed on project alone figures it is premature to conclude no LSE for features and SPAs and not take through to Appropriate Assessment on this basis. Natural England does not agree with the Applicant's conclusion of no LSE on the basis of potential impacts from Hornsea Three not overlapping with the distribution of species <u>within</u> SPA boundaries – that more detailed assessment should be done within an Appropriate Assessment. If there is a potential for the project to impact on an SPA and feature then more detailed discussion regarding the nature of that interaction needs to be in an Appropriate Assessment. For example, Natural England do not agree with the conclusions of no LSE for the common tern and little tern features and the Greater Wash and North Norfolk Coast SPAs.
Appendix 3 to Deadline I submission – Age class data Clarification Note	Natural England requested age class data, as detailed in our Written Representation (Annex C, sections 7.16-7.17). We note that this clarification note supplies some of the requested data, but is lacking a substantial data sets. Specifically: Digital aerial age class data for puffin, kittiwake, gannet, razorbill and

	guillemot, and boat based age class data for guillemot and razorbill. We re-iterate our request for this information.
Appendix 4 to Deadline I submission – Analysis of precaution in cumulative and in-combination assessments – as-built scenarios – Clarification Note	Natural England note that this is not a clarification note, but is a new assessment of cumulative and in-combination collision risk totals based on an new assessment by the Applicant of differences between the consented, planned or built turbine design layouts and the design layouts used in the original collision risk assessment for projects. Natural England do not accept the collision risk figures presented in Appendix 4 for a number of reasons including: • There is no clear audit trail to show where the figures presented by the Applicant come from or how they have been derived. This includes data on the turbine specifications used (e.g. original design layouts used for CRM in Environmental Statements for projects, layouts assessed and updated during project Examinations, consented layouts and built layouts), the collision risk modelling data and parameters (bird as well as turbine parameters) that have been applied/used, the correction factors calculated (in particular those in Table 1.6) or the collision totals presented in the Tables; • As a result of the above point, we are unable to determine whether the collision figures presented are "correct" or have used appropriate parameter values; • We do not agree that all the revised turbine design parameters presented by the Applicant can be considered "legally secured" as stated; • We do not have evidence to show that for projects that are not currently built, the consented design envelopes proposed by the Applicant in Appendix 4 are the worst case scenario envelope for collisions for each species; In order for Natural England to be able to consider retrospective changes to the collision figures for projects in the cumulative and in-combination assessments the Applicant needs to: • Provide documentary proof that the design envelope used to calculate new collision figures is 1) legally secured with no further change possible (i.e. written confirmation from the appropriate Regulator provided); 2) in addition, for projects that are not built, demonstration that the design parameters proposed for the 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 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;
Appendix 7 to Deadline I submission – Alternative approach to sourcing cumulative and in-combination collision risk estimates – Clarification Note	Natural England acknowledge this submission which presents cumulative and in-combination figures for gannet, kittiwake, lesser black-backed gull and great black-backed gull using Basic Band Model Options and the avoidance rates as recommended by the SNCBs (JNCC et al. 2014). Natural England does not agree with the scaling reductions that the Applicant has applied to the collision figures for some projects (e.g. Beatrice, Dudgeon, East Anglia One, Moray East and Neart na Gaoithe) based on design layout changes that the Applicant states are "legally secured". Natural England does not agree with the retrospective changes to SPA apportioning percentages that the Applicant has applied to some projects. Natural England note that this assessment does not include collision figures for Norfolk Vanguard, Thanet Extension or Moray East although as indicated in Appendix 16 (Applicant's response to ExA question 1.15.3) these should be included and Natural England note that the Applicant has now undertaken an assessment for these three projects in Appendix 49. Natural England notes that the in-combination totals will also be affected by seasonal definitions as this affects apportioning, and notes that there are differences between Natural England's advice on seasons and the Applicant's approach (see Section 7 of

	Natural England's WREPS and Natural England's response to ExA question 1.2.51).
Appendix 8 to Deadline I submission – Baseline Characterisation Sensitivity Testing Clarification Note	Natural England has provided comments on the baseline characterisation, including the hierarchical approach for integrating boat based and digital aerial datasets in Section 2 of our WREPS and in our response to ExA Q 1.2.42. Our position remains as set out in our WREPs. Natural England do not accept inclusion of boat-based data in the assessments as presented in the "alternative hierarchical approach" presented Appendix 9 (either using the Applicant's "hierarchical approach" (Environmental Statement: Volume 5, Annex 5.4 – Data Hierarchy Report) or their "alternative hierarchical approach as presented in Appendix 8. While Natural England consider that the boat based data from the whole Hornsea Zone is a statistically more robust dataset compared to the subset of data that overlaps the Hornsea Three project, we do not consider that any of the Applicant's hierarchical approaches to integrating the boat and digital aerial data are appropriate. We do not agree that Appendix 8 addresses the issue of whether "*there is likely to be significant inter-annual variation in those months for which there is only one year of aerial survey data*" as stated by the Applicant. The Applicant has presented a qualitative assessment of variability between seasons (i.e. intra-annual variability) by reference to distribution maps from Hornsea Two, distribution maps for densities of birds in English Waters (WWT Consulting and MacArthur Green 2013) and densities of birds in NW European Waters in Stone et al (1995) – however there is no assessment of variability between years i.e. inter-annual variability. The two publications cited do not provide information on inter-annual variability in numbers and the Applicant is conflating comparison of the relative abundance of birds between seasons (e.g. breeding versus non-breeding seasons) with the issue of variability in numbers of birds between years for each season. The Applicant makes qualitative conclusions about the significance of inter-annual variability in numbers during December to March based on whether the Applicant considers it to be a period of peak abundance for the species (see also comment below). Natural England does not agree that these conclusions are robust or based on the evidence available. For example, the Applicant could have quantified the potential inter-annual variability that might be typical of the area by comparing

	the existing boat-based survey data across years for the months where only one year of Hornsea Three survey data have been collected. Natural England also disagrees with the Applicant's assessment that densities of birds are typically lower in the months December to March. For the year that the Applicant has a complete set of monthly data, the peak count of gannet was in December, the second highest count of razorbill was in December, and the third highest in March, the peak count of guillemot was in December, the third highest count of kittiwake was in December, the highest count of great black-backed gull was in December. Natural England notes that there is a difference between Projects that designed their baseline survey programme to collect two years of survey data, but had to change survey timings or coverage for individual surveys due to weather conditions and Hornsea Project Three where the Applicant never had any intention of collecting two years of baseline survey data for the site "*DONG stated that due to Crown Estate milestones the intention was to complete 12-18 months of surveys, aiming to start surveys in April 2016*" (EWG Meeting March 2016).
Appendix 9 to Deadline I submission – Population Viability Analysis	See Annex 2.
Appendix 10 to Deadline I submission –Collision risk modelling Updates to species-specific parameters – Clarification Note	The Applicant provides an assessment of collision estimates using an alternative set of collision model parameters relating to bird flight speed, nocturnal activity factors and avoidance rates. These parameters have been derived from information in several publications and documents that have become available since submission of the Hornsea Three application (notably Skov et al 2018, Furness et al 2018 and MacArthur Green 2018). Natural England have commented on the nocturnal activity factors in our WREPS (section 3.9-3.13) and in response to ExA question 1.2.59. We recognise the need to review the evidence base for flight speeds and we welcome new studies that seek to provide empirical data to support collision risk assessments.

	However Natural England do not agree that the collision model parameters presented by the Applicant in Appendix 10 can be applied to Hornsea Project Three for a number of reasons. The estimates of parameters such as flight speed and height presented in (Skov et al. 2018) come from a single site during the non-breeding season (Thanet Offshore Windfarm). Given the influence of site-specific data on the estimated collision rates, such data may not be directly transferable to other sites or, to the breeding season. The flight speeds in Skov et al (2018) were markedly lower than the generic speeds typically used in CRM derived from published literature such as Alerstam et al., 2007 and Pennycuick 1997. Flight heights of birds were markedly higher in the Skov et al (2018) study than the Johnston et al (2014) modelled distributions. This would result in higher numbers of collisions being predicted. It is not clear whether the differences were a result of the technology used in the Skov et al (2018) study (lasers and cameras) or whether they were site or situation specific differences (e.g. due to time of year or weather conditions). However the Applicant does not mention the flight height data presented in Skov et al (2018) or use these data in the updated collision risk assessment in Appendix 10. There is likely to be a relationship between flight speed and height and therefore this undermines confidence in the applicability of the flight speeds collected at Thanet for use in CRM at other projects. The avoidance rates in Skov et al (2018) were estimated as an overall empirical avoidance rate, combining macro-, meso- and micro-avoidance. These values are above the avoidance rates presently recommended (JNCC et al 2014). However, the values from the Skov et al (2018) study and existing guidance (JNCC et al 2014) are not strictly comparable as they were derived in different ways. The avoidance rates recommended in existing guidance are derived by comparing observed and predicted collision rates (Cook et al. 2014). As the predicted collision rates are based on estimates from the Band model, they incorporate elements of model error arising as a result of the assumptions made (Band 2012). The empirical avoidance rates derived from the Skov et al

	(2018) project do not incorporate this model error and, consequently, are likely to be higher than those used at present. The Applicant also does not mention that the Skov et al (2018) work provides some evidence that the Band Model (Band 2012) may be underestimating the probability that a bird will collide when crossing the rotor-swept area (PColl). While the Skov et al (2018) data are a small sample size, the report concludes that "*the probability of colliding while crossing the rotor-blades is likely to be higher than assumed".* Given the above points, Natural England advises that the collision modelling at Hornsea Three is undertaken as set out in Section 3 of our WREPS.
Appendix 12 to Deadline I submission – Collision risk modelling – herring gull – Clarification Note	Natural England welcome the provision of collision risk modelling outputs for Herring gull. Note that our comments regarding parameterisation of the collision models will be the same as for other species (see Section 3 of our WREPS and also responses to Appendix 10 in this document. Natural England also request that a cumulative assessment is undertaken for Herring gull.
Appendix 16 to Hornsea Three Deadline I Submission: Applicant's Response to Ex.A Question Q1.15.3	Natural England agrees with the Applicant's assessment that Norfolk Vanguard, Thanet Extension and Moray West should be considered as Tier 2 projects within the Hornsea Three offshore ornithology CEA, (not Tier 3 projects as previously assessed by the Applicant) and quantitative information on the potential magnitude of collision risk and displacement impacts from these projects should be included in the cumulative and in-combination assessments for ornithology.
Appendix 39 to Deadline I submission – Ornithology Survey Data Coverage Figures	Natural England have no comment on this document.
Appendix 40 to Deadline I submission – Paper by Furness R.W et al. (Environmental Impact Assessment Review 73, 2018, 1-6)	Natural England have no specific comments on this document, but see our comments on nocturnal activity factors in Section 3.9-3.13 of our WREPS and our response to ExA question 1.2.59.

Appendix 41 to Deadline I submission – Paper by Skov H. et al. (ORJIP Bird Collision and Avoidance Study. Final report – April 2018)	Natural England have no comment on this document.
Appendix 42 to Deadline I submission – Paper by Cleasby I.R. et al. (RSPB Research Report no. 63.)	Natural England have no comment on this document.
Appendix 43 to Deadline I submission – Paper by Trinder M. (The Crown Estate 2017)	The headroom project was work commissioned by The Crown Estate as an exploration of how much headroom there could potentially be between collisions calculated during consenting process and collisions based on what is actually built. It was not intended to be published or to be used for individual project consenting decisions, but The Crown Estate circulated it to some developers as well as the SNCBs. Subsequently, Royal Haskoning took over maintenance and updating of the database which is hosted on the Marine Data Exchange. The method for "correcting" collision figures requires information on the turbine specification and numbers of turbines used in the original CRM and the turbine specifications and numbers of turbines for what is actually built. These are then used to calculate the probability of collision with a single turbine for a particular species for a) the original turbine spec and b) the built turbine spec and a calculation of total rotor area for the consent versus built layout. This allows a scaling ratio to be calculated between collisions for the original design layout versus the built design layout. This ratio is applied to the original collision mortality presented e.g. in the ES to calculate what the new collision total would be. Natural England have not checked the details of the calculation, but in principle the approach is valid. However there are a number of issues which mean that the results obtained will not always be accurate: 1. The method requires the details of the turbine specifications used in the original CRM and also the turbine specifications that has been built. This is not always available so

	MacArthur Green in a number of cases had to "guess" the turbine spec (e.g. they used information from other similar projects). 2. The method requires the collision figures from the original CRM to be the ones that match the turbine parameters used to calculate P.collsion – this isn't always straightforward as there are often updates to collision figures following discussion about densities of birds, flight heights, etc. If the original collision figures are incorrect the recalculated collisions will be incorrect. 3. The method uses information on the number of turbines and rotor radius in the original CRM assessment and the number of built turbines and rotor radius to calculate a ratio of rotor frontal area for the original:built layout – this is part of the scaling ratio so errors in these numbers or use of turbine numbers that are not legally secured is also an issue. 4. We do not agree that all of the changed turbine specs in MacArthur Green can be viewed as legally secured; 5. There is not sufficient confidence or transparency in the figures in the TCE database that it can be used with any degree of confidence. The same applies to the recalculations that the Applicant has undertaken; The Applicant noted in Appendix 4 that there were discrepancies between some of the turbine parameter information in the MacArthur Green (2017) report and their understanding of turbine parameters and they have recalculated the "correction" ratios and derived new CRM figures for consented projects. There is no clear audit trail for the data used in the TCE report, or in the database that resides on the Marine Data Exchange and now the Applicant is making further changes. Note also the method only applies to Option 1 and Option 2 of the Band Model (2012).
Appendix 49 to Hornsea Three Deadline I Submission: Applicant's Response to ExA Question Q1.2.79	This Appendix is in response to the ExA request for the Applicant to provide an updated CEA that takes into account the Norfolk Vanguard and Thanet Extension offshore wind farms as Tier 2 projects. Natural England welcome the inclusion of impacts from these projects (and also Moray West) to the CEA, however note that the updated CEA does not take account of any of the methodological and assessment issues raised in our WREPS.

	Natural England further note that although the Applicant has presented Hornsea Three Project figures for Herring gull, the species is not included in the CEA.
Applicant's Comments on Relevant Representations submitted to Deadline I	Natural England have no comment on this document.
Applicant Responses to the ExA's First Written Questions Deadline I: 7th Nov 2018	Natural England have no comment on this document.
Appendix 5 to Deadline 2 Submission – Seabird Flight Height Trial Report	Natural England have no comment on this document.
Appendix 6 to Deadline 2 Submission – Estimating Seabird Flight Height Using LiDAR (Cook et al, 2018)	Natural England have no comment on this document.
Appendix 7 to Deadline 2 Submission – RSPB Seabird Tracking Study at the Flamborough and Filey Coast	Natural England have no comment on this document.
Applicant's comments on responses to the ExA's Written Questions submitted by Interested Parties at Deadline 1	Natural England have no comment on this document.
Applicant's comments on Written Representations and Responses submitted by Interested Parties at Deadline 1	Natural England have no comment on this document.

Appendix 2: Natural England Comments on Appendix 9 to Deadline I submission – Population Viability Analysis.
6 December 2018.

Natural England note that the Applicant has updated the PVA models at Deadline 1, from those used in the Hornsea Three Environmental Statement submission which were the MacArthur Green (2015) models submitted as part of Hornsea Project Two application.

The updated PVA models use:

- Matched runs for the impacted versus un-impacted scenarios;

Model runs over 35 years rather than 25 years (to reflect 35 year operational lifetime of Hornsea Three);

The MacArthur Green report that is attached to Appendix 9 as an Annex (A) provides further details of the PVA modelling. Natural England requests clarification on a number of points relating to the updated PVA models and outputs:

- Natural England understand that the models have been parameterised using the same two demographic "rate sets" (Rate Set 1 and Rate Set 2) that were used for the original (MacArthur Green (2015)) PVA models. Rate Set 1 uses demographic parameters from Horwsill and Robinson (2015); Rate Set 2 uses productivity data from Aitken et al (2014) where available (selected for the period 2009-2014) and data from Horswill and Robinson (2015). Based on the understanding that the Applicant has retained these two rate sets in the updated PVAs, Rate Set 2 will relate to Flamborough/Bempton productivity for 2009-2014, however there will be more up to date productivity data available which may be more appropriate to use for colony PVA models now. In section 1.2 of the main Appendix the Applicant states "*As none of the assumed values for all key model input parameters (including population size, survival rates and productivity) have changed since that Original PVA Model was produced and examined, it was considered appropriate to use it for the assessment of Hornsea Three*". Although the use of counterfactual metrics should reduce the sensitivity of the model outputs to misspecification of demographic rates, Natural England advise that it would be best practice to use the most accurate estimates of demographic rates in the models.

- Natural England also requests that all the information on parameters used in the models is presented in the document for clarity, rather than referring to previous reports submitted to PINs for other projects.

- There is no information about starting population sizes used in the models or what the growth rates of the projected populations in the different models were. Natural England requests that these are presented.

- For the density dependent stochastic models (where density dependence is applied to productivity and not survival rates) the Applicant could not match reproductive rates between impacted and un-impacted runs so only survival rates were matched between the impacted and un-impacted pairs. This issue was not raised in the Cook

et al (2016) report where the metrics were calculated using a matched pairs approach for density dependent stochastic versions of the models. Natural England therefore requests clarification on this issue – in particular if it is possible to configure the models such that matched pairs can be run for the stochastic density dependent models and whether the Applicant's models have been parameterised in a different way from those in Cook et al (2016) and Jitlal et al (2017) where matched pairs were run for the stochastic density dependent models.

- Please can the Applicant confirm that the density independent versions of the models have been run with both the survival and reproductive rates matched between the impacted and un-impacted pairs in each stochastic simulation.

- The previous PVAs (MacArthur Green 2015) used 5000 simulations for the stochastic models whereas the PVA models presented in Annex 2 have used 1000 simulations. Natural England requests that the Applicant demonstrates that using 1000 simulations does not affect the outputs of the models compared to the previous use of 5000 simulations, as it is possible that more than 1000 simulations might be needed to generate reliable results.

- Annex A presents tables that give metrics across a range of impact levels as requested by Natural England in our Written Reps. However the impacts are presented in 50 bird increments. In our Written Reps we requested a higher resolution of impact levels were presented (we suggested 5 bird increments) and we consider that increments less than 50 birds would be more informative when considering alternative predictions of impact levels.

- Both the Counterfactual of Growth Rate (CGR) and Counterfactual of Population Size (CPS) Metrics should be presented as a median value of the metric with 95% confidence intervals. The CPS metrics tables do not provide any confidence intervals. The CGR tables do give 95% confidence intervals for the metric. Natural England request that the 95% confidence intervals for the counterfactual of final population size metrics are also presented.

- It is not clear how the median and confidence intervals around the counterfactual of growth rate metrics have been calculated for both the matched runs and the un-matched runs approach (see below for more details). Although there are no confidence intervals presented for the counterfactual of final population size metrics the same query applies to this metric. Natural England requests that the Applicant sets out how they have calculated the metrics for the matched and un-matched runs approaches. A worked example would be useful.

- Natural England advises that with a matched pairs method the metric should be calculated for each of the individual matched pairs and then (given there are 1000 simulations in the Applicant's models) there will be 1000 metric calculations from which a median value of the metric and the 95% CIs can be derived.

- Natural England also requests details of how the counterfactual metrics have been calculated for the un-matched pairs runs. A worked example would be useful.

- Natural England note that the models still add mortality impacts in adult currency which remains an unresolved issue if impacts are assumed to occur on non-adult component of the population only.

Appendix 3: Personal Communications from RSPB colony managers regarding Flamborough and Filey Coast SPA breeding seasons.

From: Allen, Sophy (NE)
Sent: 07 November 2018 21:32
To: 'Alison Barratt' <Alison.Barratt@rspb.org.uk>; Michael Babcock <Michael.Babcock@rspb.org.uk>; Keith Clarkson
Cc: Kerby, Martin G (NE) <Martin.Kerby@naturalengland.org.uk>; 'Aly McCluskie' <Aly.McCluskie@rspb.org.uk>
Subject: RE: Hornsea 3 NE submission - your 'pers comm'

Hi Ali,

Thanks for talking to Keith about this. I've amended your joint pers comm to try and reflect this (see below) which I hope captures what you observe to be the situation.

At this stage, NE are continuing to advise the breeding season for gannet at FFC SPA is March – Sept, however this pers comm will assist in both supporting this, and illustrating that March to Sept is not overly precautionary (which is the criticism normally levelled at us by developers).

Thanks again for all your help to date on this

Sophy

'RSPB reserve managers advise that numbers of gannet inshore start to increase from mid-January, with birds prospecting on the cliffs from February onwards, with the majority returning by late March. A high proportion of birds have departed the colony by the end of September, though some presence on the cliffs is expected throughout October and into November. The last juveniles on the cliffs are usually in early November.'

(K Clarkson, A Barratt, M Babcock pers comm)

From: Alison Barratt [mailto:Alison.Barratt@rspb.org.uk]
Sent: 26 October 2018 09:58
To: Michael Babcock <Michael.Babcock@rspb.org.uk>; Allen, Sophy (NE) <Sophy.Allen@naturalengland.org.uk>; Keith Clarkson

Cc: Kerby, Martin G (NE) <Martin.Kerby@naturalengland.org.uk>
Subject: RE: Hornsea 3 NE submission - your 'pers comm'

I chatted with Keith and he agrees that attendance should be March to October, but there is a high presence of gannets in the SPA in February, as noted previously.

Keith also asked why razorbill and guillemot attendance is not included, but puffins are?

From: Michael Babcock
Sent: 24 October 2018 08:49
To: Alison Barratt <Alison.Barratt@rspb.org.uk>; Allen, Sophy (NE) <Sophy.Allen@naturalengland.org.uk>; Keith Clarkson
Cc: Kerby, Martin G (NE) <Martin.Kerby@naturalengland.org.uk>
Subject: RE: Hornsea 3 NE submission - your 'pers comm'

As of yesterday there is one Gannet chick left on the cliffs we can see on the Reserve – and from the plumage it looks likely to be there for another week at least - but of course we can't see the core of the colony on the high cliffs at Speeton where there may be a few more. So attendance into early November is probably correct – but for a very small proportion of the colony.

Best wishes

Mike

From: Alison Barratt
Sent: 23 October 2018 16:34
To: Allen, Sophy (NE) <Sophy.Allen@naturalengland.org.uk>; Michael Babcock <Michael.Babcock@rspb.org.uk>; Keith Clarkson

Cc: Kerby, Martin G (NE) <Martin.Kerby@naturalengland.org.uk>
Subject: Re: Hornsea 3 NE submission - your 'pers comm'

That seems fair to me, but would like to hear Dr. Clarkson's opinion!

From: Allen, Sophy (NE) <Sophy.Allen@naturalengland.org.uk>
Sent: 23 October 2018 16:28
To: Alison Barratt; Michael Babcock; Keith Clarkson
Cc: Kerby, Martin G (NE)
Subject: RE: Hornsea 3 NE submission - your 'pers comm'

Thanks Ali, that's great.

Are you saying you think we should be advising a breeding colony attendance season of March –October for gannets?

Cheers

Sophy

From: Alison Barratt [mailto:Alison.Barratt@rspb.org.uk]
Sent: 23 October 2018 15:47
To: Allen, Sophy (NE) <Sophy.Allen@naturalengland.org.uk>; Michael Babcock <Michael.Babcock@rspb.org.uk>; Keith Clarkson
Cc: Kerby, Martin G (NE) <Martin.Kerby@naturalengland.org.uk>
Subject: Re: Hornsea 3 NE submission - your 'pers comm'

Hi Sophie,

I'm ok with this and think we are right to note that gannets are present throughout October.

Until Saturday morning, there were still many adult gannets on the lower levels of Staple Newk (the most visible section of the gannet colony from the cliff tops). By afternoon they were all gone from the ledges and have not returned to the cliffs since. But, we are still seeing them rafting at sea, and in flight along the cliff tops. So while they're no longer on the cliffs, they are still present in the FFC SPA.

Ali

From: Allen, Sophy (NE) <Sophy.Allen@naturalengland.org.uk>
Sent: 23 October 2018 15:23
To: Michael Babcock; Keith Clarkson; Alison Barratt
Cc: Kerby, Martin G (NE)
Subject: Hornsea 3 NE submission - your 'pers comm'

Hi Mike, Keith and Ali,

I am currently in the process of finalising our ornithological representation on the Hornsea 3 OWF planning application. One of the points we are keen to represent is the selection of appropriate breeding seasons for the species that we have yet to reach agreement with the applicant on. I had a chat with Mike earlier about how best to use/reference the information you provided on the July 8th telecall (and the subsequent analysis that Mike conducted).

I have summarised the relevant breeding season information in a table (attached), in which there are a number of statements that I have referenced as 'K Clarkson, A Barratt, M Babcock, pers comm'. Would you be able to check that you are happy

that this is a faithful representation of the information you provided us on the telecall? (I've **bolded** the relevant text).

Evidence base for breeding season de

Ideally I would like to get a response from you this week, but at the latest by the 5th November would be great.

Many thanks

Sophy

Sophy Allen

Senior Ornithologist

Specialist Services and Programmes Team, Chief Scientist Directorate

Natural England

[redacted]

[redacted]

Please note I normally work Monday - Wednesday.

http://www.naturalengland.org.uk/

We are here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

In an effort to reduce Natural England's carbon footprint, I will, wherever possible, avoid travelling to meetings and attend via audio, video or web conferencing.

Appendix 4: Clarification of SPA Features Requested at ISH 2

Overarching site:	Flamborough Head European Marine Site EMS
Site name:	Flamborough and Filey Coast SPA
Designation type:	SPA
Site identification:	UK9006101
Qualifying features (click to see site specific description):	Gannet, (Morus bassanus) Guillemot, (Uria aalge) Kittiwake, (Rissa tridactyla) Razorbill, (Alca torda) Seabird assemblage
Designated area (ha):	7857.99

Component Sites of Special Scientific Interest (SSSI):	Flamborough Head SSSI

Site name:	Greater Wash SPA
Designation type:	SPA
Site identification:	
Qualifying features (click to see site specific description):	Common scoter (Melanitta nigra), Non-breeding Common tern (Sterna hirundo), Breeding Little gull (Hydrocoloeus minutus) - Breeding Little tern (Sternula albifrons), Breeding Sandwich tern (Thalasseus sandvicensis), Breeding Red-throated diver (Gavia stellata), Non-breeding.
Designated area (km²):	c. 3,536
Component Sites of Special Scientific Interest (SSSI):	N/A

Overarching site:	The Wash and North Norfolk Coast EMS
Site name:	The Wash SPA
Designation type:	SPA
Site identification:	UK9008021

Qualifying features (click to see site specific description):	Bar-tailed godwit (Limosa lapponica), Non-breeding Bewick's swan (Cygnus columbianus bewickii), Non-breeding Black-tailed godwit (Limosa limosa islandica), Non-breeding Common scoter (Melanitta nigra), Non-breeding Common tern (Sterna hirundo), Breeding Curlew (Numenius arquata), Non-breeding Dark-bellied brent goose (Branta bernicla bernicla), Non-breeding Dunlin (Calidris alpina alpina), Non-breeding Gadwall (Mareca strepera), Non-breeding Goldeneye (Bucephala clangula), Non-breeding Grey plover (Pluvialis squatarola), Non-breeding Knot (Calidris canutus), Non-breeding Little tern (Sternula albifrons), Breeding Oystercatcher (Haematopus ostralegus), Non-breeding Pink-footed goose (Anser brachyrhynchus), Non-breeding Pintail (Anas acuta), Non-breeding Redshank (Tringa totanus), Non-breeding Sanderling (Calidris alba), Non-breeding Shelduck (Tadorna tadorna), Non-breeding Turnstone (Arenaria interpres), Non-breeding Waterbird assemblage, Non-breeding Wigeon (Mareca penelope), Non-breeding
Designated area (ha):	62211.66

Component Sites of Special Scientific Interest (SSSI):	The Wash SSSI

Overarching site:	The Wash and North Norfolk Coast EMS
Site name:	North Norfolk Coast SPA
Designation type:	SPA
Site identification:	UK9009031
Qualifying features (click to see site specific description):	Avocet (Recurvirostra avosetta), Breeding Bittern (Botaurus stellaris), Breeding Common tern (Sterna hirundo), Breeding Dark-bellied brent goose (Branta bernicla bernicla), Non-breeding Knot (Calidris canutus), Non-breeding Little tern (Sternula albifrons), Breeding Marsh harrier (Circus aeruginosus), Breeding Montagu's harrier (Circus pygargus), Breeding Pink-footed goose (Anser brachyrhynchus), Non-breeding Sandwich tern (Thalasseus sandvicensis), Breeding Waterbird assemblage, Non-breeding Wigeon (Mareca penelope), Non-breeding
Designated area (ha):	7886.79
Component Sites of Special Scientific Interest (SSSI):	Morston Cliff SSSI North Norfolk Coast SSSI

Overarching site:	The Wash and North Norfolk Coast EMS

Site name:	North Norfolk Coast Ramsar
Designation type:	Ramsar
Site identification:	UK11048
Qualifying features (click to see site specific description):	Avocet (Recurvirostra avosetta), Breeding Bittern (Botaurus stellaris), Breeding Common tern (Sterna hirundo), Breeding Dark-bellied brent goose (Branta bernicla bernicla), Non-breeding Knot (Calidris canutus), Non-breeding Little tern (Sternula albifrons), Breeding Marsh harrier (Circus aeruginosus), Breeding Montagu's harrier (Circus pygargus), Breeding Pink-footed goose (Anser brachyrhynchus), Non-breeding Sandwich tern (Thalasseus sandvicensis), Breeding Waterbird assemblage, Non-breeding Wigeon (Mareca penelope), Non-breeding
Designated area (ha):	
Component Sites of Special Scientific Interest (SSSI):	North Norfolk Coast SSSI

Appendix 5: Hornsea Project Three (HOW03) – method statement for ornithological, marine mammal and marine megafauna survey April 2016.

(sent as a separate attachment).