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Sent: 08 February 2019 21:10
To: KJ Johansson; Kay Sully; Hornsea Project Three
Cc: Andrew Guyton; Stuart Livesey
Subject: Hornsea Project Three (UK) Ltd response to Deadline 6 (Part 3)

Dear Kay, K-J

Please find attached the 3rd instalment of documents.

Best regards,
Dr Dominika Chalder PIEMA
Environment and Consent Manager



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Hornsea Project Three Offshore Wind Farm

Appendix 6 to Deadline 6 submission - Offshore
ornithology Hearing Clarifications: cumulative and in-
combination assessment methods and age class data

Date: 8th February 2019

Document Control			
Document Properties			
Organisation	Ørsted Hornsea Project Three		
Author	NIRAS		
Checked by	Felicity Browner		
Approved by	Andrew Guyton		
Title	Appendix 6 to Deadline 6 submission - Offshore ornithology Hearing Clarifications:cumulative and in-combination assessment methods and age class data		
PINS Document Number	n/a		
Version History			
Date	Version	Status	Description / Changes
08/02/2018	A	Final	Submitted at Deadline 6 (8 th Feb 2019)

Ørsted

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1. Introduction

- 1.1 At Issue Specific Hearing Five (29th January 2018) for Hornsea Three, the Examining Authority requested that the Applicant provide some clarifications in relation to offshore ornithology. These included:
- Corrections to account for differences between assessed and consented/as-built turbine scenarios; and;
 - Alleged discrepancies in age class data highlighted by Natural England.
- 1.2 These clarifications are provided in this report in the following sections.

2. Corrections to account for differences between assessed and consented/as-built turbine scenarios

Introduction

- 2.1 At the second Issue Specific Hearing (29th January 2018) for Hornsea Three, in relation to ornithology, the Examining Authority requested clarification of the approach taken by the Applicant to adjust the assumed impacts of other projects included in cumulative / in-combination impact assessment.
- 2.2 Specifically, further information was requested about those projects that were adjusted on the basis of a change in design between consent and operation. This issue arises because the impact assessments for most offshore wind farm projects are based on a design ('Rochdale') envelope and within this the worst case scenario is assessed. In some cases, during the determination of the application, changes may be made to the design in order for the consent to be made. In addition, as it is an envelope that is consented, the final built design may not reflect the worst case scenario assessed.
- 2.3 If these changes are not considered, then cumulative and in-combination impacts will be over-estimated. The Applicant has recommended adjustments to a number of existing projects and these can be categorised as follows:
- Those projects where the consented design differs from that which was assessed at application; and/or,
 - Those projects where the final built configuration ('as built') differs from the worst case ('as assessed') scenario that was assessed at application.
- 2.4 Some projects may sit in both categories as it is possible that the as built design for a scheme still differs from the consented scheme which was itself revised from that which was applied for.

- 2.5 Throughout the application the Applicant sought to follow the agreements reached at previous projects, especially those reached with Natural England at Hornsea Project Two. The approach applied in Volume 2, Chapter 5: Offshore Ornithology (APP-065) and the RIAA (APP-051) is identical to the approach applied at Hornsea Project Two with the suite of projects for which correction factors were applied agreed with Natural England during the examination of Hornsea Project Two. Collision risk estimates calculated using these correction factors were incorporated into the assessments undertaken by both the applicant for Hornsea Project Two (see SMartWind, 2015a and 2015b) and Natural England (see Natural England 2015a and 2015b) with Natural England altering one of the correction factors as they did not agree with the correction factor applied by the applicant for Hornsea Project Two. A number of the associated correction factors were also applied as part of the assessments produced for the Dogger Bank Creyke Beck A&B offshore wind farms.
- 2.6 Volume 2, Chapter 5: Offshore Ornithology (APP-065) and the RIAA (APP-051) also looked at the differences between assessed and as-built turbine scenarios for certain projects which could result in a significant over-estimate of the impacts assumed in cumulative and in-combination assessments. MacArthur Green (2017) identified these differences and calculated a correction factor for each. This information was reviewed to identify projects where it would be reasonable to apply a correction factor, a key consideration being whether the design scenarios applied by MacArthur Green (2017) were appropriate and reflected current understanding. Where appropriate, therefore, the correction factors recommended in that study were applied to help quantify the likely over-estimation of cumulative and in-combination impacts. This information was used qualitatively in the assessments presented in Volume 2, Chapter 5: Offshore Ornithology (APP-065) and the RIAA (APP-051) to highlight the precaution in those assessments.
- 2.7 At Deadline 1 the Applicant submitted Appendix 4 (REP1-148) which provided updated information in relation to the differences between assessed and as-built turbine scenarios building on the approach considered qualitatively in the Hornsea Three application (APP-051 and APP-065).
- 2.8 These analyses illustrated that there are significant reductions in cumulative and in-combination collision risk totals even when including only the reductions at those projects at which future / further development is not possible (see Table 2.1). As there is no longer any potential for those projects for which a reduction was applied to be built out to the extent of the worst case associated with the assessed turbine scenario, it is incorrect to continue using collision risk estimates associated with the assessed scenario unless due consideration is given to the reductions presented in this and associated reports.
- 2.9 The projects and the corrections made are described in the following sections. Annex A lists all the projects for which an adjustment is proposed, the nature of that change and the rationale.

Amended consent

- 2.10 In Volume 2, Chapter 5: Offshore Ornithology (APP-065) and the RIAA (APP-051) the Applicant applied correction factors to a number of projects to account for differences between the assessed and consented turbine scenarios at those projects. These projects were:
- Beatrice (gannet = 142 to 125 turbines; other species = 277 to 125 turbines. These turbine scenarios represent the worst case scenario for each species);
 - Dudgeon (168 to 77 turbines);
 - East Anglia One (325 to 240 turbines) (note the correction factor used in for assessments was for a HVDC transmission option whereas the wind farm has opted to use a HVAC option (750 MW using 150 turbines));
 - Moray East (339 to 186 turbines); and
 - Neart na Gaoithe (128 to 75 turbines).
- 2.11 The application for Beatrice included an assessment for turbine scenarios using 277 or 142 turbines. The consent however was granted for 125 turbines. Consequently in this case a correction factor was applied in the cumulative and in-combination assessments undertaken for Hornsea Three (APP-051 and APP-065) to account for this difference. It is important to note that the project constructed at Beatrice comprises only 84 turbines but this has not been taken into account in the cumulative and in-combination assessments produced for Hornsea Three (APP-051 and APP-065) because further development up to the consented maximum, if unlikely, might theoretically still occur.
- 2.12 The application for Dudgeon included an assessment for turbine scenarios using 168 turbines. The consent however was granted for 77 turbines. Consequently, in this case a correction factor was applied in the cumulative and in-combination assessments undertaken for Hornsea Three (APP-051 and APP-065) to account for this difference. This correction factor was identical to that applied in the cumulative and in-combination assessments produced for Hornsea Project Two. It is now clear that the final as-built design at Dudgeon comprises 67 turbines with no further development predicted. The likely collision risk arising from this as-built scheme has therefore been estimated in Appendix 4 (REP1-148) and was found to be similar to that estimated for the 77 turbine scheme (when taking into account specific turbine parameters for the as-built scheme).
- 2.13 The application for East Anglia One included an assessment for turbine scenarios using 325 turbines. The consent however was granted for 240 turbines. Consequently, in this case a correction factor was applied in the cumulative and in-combination assessments undertaken for Hornsea Three (APP-051 and APP-065) to account for this difference. This correction factor was identical to that applied in the cumulative and in-combination assessments produced for Hornsea Project Two. It is now clear that the final as-built design at East Anglia One comprises 102 turbines with no further development predicted. The likely collision risk arising from this as-built scheme has therefore been estimated in Appendix 4 (REP1-148) and was found to be lower than that estimated for the 240 turbine scheme (when taking into account specific turbine parameters for the as-built scheme). The scaling applied in the Hornsea Three application (APP-051 and APP-065) therefore over-estimates the collision risk likely at East Anglia One.

- 2.14 The application for Moray East included an assessment for turbine scenarios using 339 turbines. The consent however was granted for 186 turbines. Consequently, in this case a correction factor was applied in the cumulative and in-combination assessments undertaken for Hornsea Three (APP-051 and APP-065) to account for this difference. This correction factor was identical to that applied in the cumulative and in-combination assessments produced for Hornsea Project Two. Subsequently Moray East have proposed a revised scheme comprising 100 turbines for which they have undertaken a new collision risk assessment. Appendix 4 to Deadline 1 (REP1-148) therefore presents this revised collision risk estimate.
- 2.15 The application for Neart na Gaoithe included an assessment for turbine scenarios using 128 turbines. The consent however was granted for 75 turbines. Consequently, in this case a correction factor was applied in the cumulative and in-combination assessments undertaken for Hornsea Three (APP-051 and APP-065) to account for this difference. This correction factor was identical to that applied in the cumulative and in-combination assessments produced for Hornsea Project Two. It is now clear that the final as-built design at Neart na Gaoithe comprises 56 turbines with no further development predicted. The likely collision risk arising from this as-built scheme has therefore been estimated in Appendix 4 (REP1-148) and was found to be lower than that estimated for the 75 turbine scheme (when taking into account specific turbine parameters for the as-built scheme). The scaling applied in the Hornsea Three application (APP-051 and APP-065) therefore over-estimates the collision risk likely at Neart na Gaoithe.

‘As built’ design differs from previously ‘assessed’ design

- 2.16 Further information continues to come to light about the designs and likely impacts of other projects, Appendix 4 to the Applicant’s submission at Deadline 1 (REP1-148), therefore, provided further consideration of the differences between assessed (i.e. the position assessed in the relevant Environmental Statement submitted with the application for the other project) and as-built scenarios, utilising further project-specific information that had been obtained subsequent to the application for Hornsea Three. As above, and only where appropriate, the approach used in MacArthur Green (2017) was applied.
- 2.17 Table 2.1 identifies those projects for which a difference exists between their assessed position (at the point of their application) and as-built turbine scenarios. Annex A identifies the approach applied for each project in Appendix 4 of the Applicant’s submission at Deadline 1 (REP1-148) with Table 3.1 summarising those projects at which the as-built scenario, and therefore the collision risk estimates calculated in REP1-148 represents the absolute worst case scenario, taking account of the theoretical likelihood of potential future development.

Table 2.1: Projects for which there is a difference between the assessed and as-built/planned turbine scenarios as identified in REP1-148.

Project	Is there any theoretical scope for further development/increase in collision risk?
Aberdeen (European Offshore Wind Development Centre)	No
Beatrice	Yes
Dogger Bank Creyke Beck A&B	Yes

Project	Is there any theoretical scope for further development/increase in collision risk?
Dogger Bank Teesside A&B (now Dogger Bank Teesside A and Sofia)	Yes
Dudgeon	No
East Anglia One	No
Galloper	Yes
Greater Gabbard	No
Humber Gateway	Yes
Inch Cape	Yes
Kentish Flats Extension	No
Lincs	No
London Array;	No
Moray East	No
Neart na Gaoithe	No
Race Bank	No
Seagreen Alpha	Yes
Seagreen Bravo	Yes
Sheringham Shoal	No
Teesside	Yes
Thanet	No
Triton Knoll	No
Westermost Rough	Yes

2.18 There are significant reductions in cumulative and in-combination collision risk totals even when including the reductions at only those projects at which future development is not possible (see Table 2.1).

3. Age class data

3.1 At Deadline 4, Natural England requested that the Applicant explain the apparent discrepancies between age class data collected as part of aerial surveys (submitted as Appendix 17 at Deadline 3 (REP3-026)) and age class data that had previously been presented to Natural England as part of the Evidence Plan process specifically in relation to the proportion of unaged birds presented in each of these sources.

- 3.2 The Applicant has attempted to investigate this alleged discrepancy but has been unable to identify a discrepancy. The document referenced by Natural England (Hi Def 23 May 2017, HC00002-002) does not appear to present any information in relation to the proportion of birds that were unaged during aerial surveys and it is therefore unclear to the Applicant that a discrepancy exists. The Applicant requests that Natural England identify those tables in the Hi Def 23 May 2017, HC00002-002 report that they believe contain unaged age class data from aerial surveys so that the Applicant may further investigate any potential discrepancy.

Annex A. List of projects for which adjustments are proposed

Project	Assessed turbine scenario	Consented scenario	As-built scenario	Approach applied in REP1-148	Do collision risk estimates associated with as-built scenario represent the worst case scenario?
Aberdeen (European Offshore Wind Development Centre)	11 x 7 MW	Total capacity = 100 MW No. of turbines = 11	11 x 8.4 MW	The project is now operational and uses higher capacity turbines than those assessed. The turbine parameters presented in MacArthur Green (2017) are different to those actually assessed and therefore a revised correction factor was calculated	Yes. Project is operational and no further development is possible
Beatrice	142 x 7 MW	Total capacity = 750 MW No. of turbines = 125	84 x 7 MW	Collision risk estimates for the as-built turbine scenario are presented in the Scoping Opinion Addendum produced for the alternative design application for Moray East and in the application for Moray West.	No. Although collision risk estimates for the as-built scenario provide an accurate representation of the likely collision risk associated with the project, further development is possible and therefore these may represent an underestimate if further development occurs
Blyth Offshore-Demonstration Extension	15 x 8 MW	Unavailable	5 x 8 MW	No information available	No change proposed
Dogger Bank Creyke Beck A & B	400 x 6 MW	Total capacity = 2400 MW No. of turbines = 400	400 x 6 MW / 176 turbines / 140 turbines	The project has recently submitted a non-material amendment which would alter the design envelope and potentially lead to a project with fewer, higher capacity turbines. This amendment does not remove the original turbine scenario and has not yet been authorised and therefore no quantitative change is considered in this report.	No change proposed

Project	Assessed turbine scenario	Consented scenario	As-built scenario	Approach applied in REP1-148	Do collision risk estimates associated with as-built scenario represent the worst case scenario?
Dogger Bank Teesside A and Sofia	400 x 6 MW	Total capacity = 2400 MW No. of turbines = 400	200 x 6 MW (Teesside A) 66 – 200 turbines of varying capacity (Sofia)	The Sofia project has recently submitted a non-material amendment which would alter the design envelope and potentially lead to a project with fewer, higher capacity turbines. This amendment does not remove the original turbine scenario and has not yet been authorised and therefore no quantitative change is considered in this report. No updated information is available for the Dogger Bank Teesside A project.	No change proposed
Dudgeon	168 x 3 MW	Total capacity = 560 MW No. of turbines = 77	67 x 6 MW	The project is now operational and uses fewer, higher capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	Yes. Project is operational and updated collision risk estimates represent the as-built scenario and therefore provide an accurate representation of the likely collision risk associated with the project. Further development is considered to be unlikely as operational capacity equals CfD limits
East Anglia One	325 x 3.6 MW	Total capacity = 750 MW No. of turbines = 150	102 x 7 MW	The project is currently under construction and is deploying fewer, higher capacity turbines than those assessed. The turbine parameters presented in MacArthur Green (2017) are different to those actually assessed and therefore a revised correction factor was calculated	Yes. Project is operational and updated collision risk estimates represent the as-built scenario and therefore provide an accurate representation of the likely collision risk associated with the project. Further development is considered to be unlikely as remaining capacity is limited.

Project	Assessed turbine scenario	Consented scenario	As-built scenario	Approach applied in REP1-148	Do collision risk estimates associated with as-built scenario represent the worst case scenario?
East Anglia Three	172 x 7 MW	Total capacity = 1200 MW No. of turbines = 172	Unknown	Project recently consented, no further information, no change made	No change proposed
Seagreen Alpha	75 x 7 MW	Total capacity = 525 MW No. of turbines = unavailable	120 turbines	Project submitted a revised application in 2018 proposing the use of fewer, higher capacity turbines. Revised collision risk estimates are presented for gannet and kittiwake. However, consent remains for original consented scenario and therefore no change was made	No change proposed
Seagreen Bravo	75 x 7 MW	Total capacity = 525 MW No. of turbines = unavailable			
Galloper Wind Farm	140 x 3.6 MW	Total capacity = 504 MW No. of turbines = 140	56 x 6.3 MW	The project is now operational and uses fewer, higher capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	No. Although updated collision risk estimates calculated using the correction factor are considered to provide an accurate representation of the as-built scenario however, further development is possible
Greater Gabbard Wind Farm	140 x 3.6 MW	Unavailable	140 x 3.6 MW	The project is now operational, with the as-built turbine scenario having different turbine parameters to those originally assessed. The turbine parameters presented in MacArthur Green (2017) are different to those actually assessed and therefore a revised correction factor has been calculated	Yes. Project is operational and no further development is possible
Hornsea 1	240 x 5 MW	Total capacity = 1200 MW No. of turbines = 120	174 x 7 MW	No change necessary. Collision risk estimates used in the Hornsea Three assessments were calculated using the planned turbine scenario	No change required

Project	Assessed turbine scenario	Consented scenario	As-built scenario	Approach applied in REP1-148	Do collision risk estimates associated with as-built scenario represent the worst case scenario?
Hornsea 2	300 x 5 MW	Total capacity = 1800 MW No. of turbines = 300	92-231 turbines	No change. Although the project is expected to construct fewer, higher capacity turbines, no information is available in relation to updated collision risk estimates or potential turbine parameters for the planned turbine scenario	No change proposed
Humber Gateway	83 x 3.6 MW	Total capacity = 300 MW No. of turbines = 83	73 x 3 MW	The project is now operational and uses fewer, lower capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	No. Although updated collision risk estimates calculated using the correction factor are considered to provide an accurate representation of the as-built scenario however, further development is possible
Hywind	5 x 6 MW	Total capacity = 30 MW No. of turbines = unavailable	5 x 6 MW	No difference between assessed and as-built turbine scenarios	No change proposed
Inch Cape	213 turbines	Unavailable	72 turbines	A Section 36 consent variation was authorised in 2015 with the project committing to reduce the number of turbines from 213 to 110 whilst also reducing the total generating capacity of the wind farm. In addition, the project submitted a revised application in 2018 proposing the use of fewer, higher capacity turbines. Revised collision risk estimates are presented for gannet and kittiwake. However, consent remains for original consented scenario and therefore no change was made and the revised collision risk estimates were not considered quantitatively	New application submitted in 2018, however original consent still valid and therefore any changes in the new application should only be considered qualitatively
Kentish Flats Extension	17 x 3 MW	Total capacity = 51 MW No. of turbines = unavailable	15 x 3.3 MW	The project is now operational and uses fewer, higher capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	Yes. Project is operational and no further development is possible

Project	Assessed turbine scenario	Consented scenario	As-built scenario	Approach applied in REP1-148	Do collision risk estimates associated with as-built scenario represent the worst case scenario?
Kincardine	8 x 6 MW	Total capacity = 50 MW No. of turbines = unavailable	7 turbines	Although the proposed number of turbines has reduced, the turbine parameters for the as-built turbine scenario are unknown. No change was therefore made.	No change proposed
Lincs	83 x 3 MW	Total capacity = 250 MW No. of turbines = 83	75 x 3.6 MW	The project is now operational and uses fewer, higher capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	Yes. Project is operational and no further development is possible
London Array	271 x 3 MW	Total capacity = 1000 MW No. of turbines = 341	175 x 3.6 MW	The project is operational and has deployed fewer, higher capacity turbines than those assessed. The turbine parameters presented in MacArthur Green (2017) are different to those actually assessed and therefore a revised correction factor was calculated	Yes. Project is operational and no further development is possible
Methil	1 turbine	Unavailable	2 turbines	No difference between assessed and as-built turbine scenarios identified	No change proposed
Moray East	339 (139 x 3.6, 100 x 5 and 100 x 5 MW)	Total capacity = 1116 MW No. of turbines = 186	100 x 9.5 MW	Project submitted an application for a revised project design incorporating fewer, higher capacity turbines. This was supported by collision risk modelling incorporating four turbine scenarios. The collision risk estimates associated with the worst case scenario have been used in this report.	Yes. Project is operational and updated collision risk estimates recommended for use in in-combination assessments in Scotland represent the as-built scenario and therefore provide an accurate representation of the likely collision risk associated with the project. Further development is considered to be unlikely as operational capacity equals CfD limits

Project	Assessed turbine scenario	Consented scenario	As-built scenario	Approach applied in REP1-148	Do collision risk estimates associated with as-built scenario represent the worst case scenario?
Neart na Gaoithe	128 x 3.6 MW	Total capacity = 450 MW No. of turbines = 75	56 x 8 MW	Collision risk estimates for the consented scenario were presented for gannet and kittiwake as part of a consent variation submitted in 2015 and these were therefore been used. Collision risk estimates were not presented for lesser black-backed gull or great black-backed gull, however, the turbine parameters for the associated turbine scenario are known and therefore a correction factor was derived. The project also submitted a revised application in 2018 proposing the use of fewer, higher capacity turbines. Revised collision risk estimates are presented for gannet and kittiwake. However, consent remains for original consented scenario and therefore no change was made	Yes. Collision risk estimates representing the as-built scenario (derived from project-specific documentation or through the application of a correction factor) are considered to provide an accurate representation of the likely collision risk associated with the project.
Race Bank	206 x 3 MW	Total capacity = 580 MW No. of turbines = unavailable	91 x 6.3 MW	The project is now operational and uses fewer, higher capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	Yes. Project is operational and no further development is possible
Sheringham Shoal	108 x 3 MW	Total capacity = 316.8 MW No. of turbines = 108	88 x 3.6 MW	The project is now operational and uses fewer, higher capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	Yes. Project is operational and no further development is possible
Teesside Offshore Wind Farm	30 turbines	Total capacity = 100 MW No. of turbines = 30	27 x 2.3 MW	The project is now operational and uses fewer turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	No. Although updated collision risk estimates calculated using the correction factor are considered to provide an accurate representation of the as-built scenario however, further development is possible

Project	Assessed turbine scenario	Consented scenario	As-built scenario	Approach applied in REP1-148	Do collision risk estimates associated with as-built scenario represent the worst case scenario?
Thanet	60 x 5 MW	Total capacity = 300 MW No. of turbines = unavailable	100 x 3 MW	Collision risk estimates for the as-built turbine scenario are available in project-specific documentation. These were used in the original assessments for Hornsea Three and were also used in the report.	No change proposed
Triton Knoll	288 x 3.6 MW	Total capacity = 900 MW No. of turbines = 90	90 x 9.5 MW	The project is consented and has committed to constructing fewer, higher capacity turbines than those originally assessed. The turbine parameters presented in MacArthur Green (2017) are different to those actually assessed and therefore a revised correction factor was calculated	Yes. Collision risk estimates derived using the correction factor are considered to provide an accurate representation of the likely collision risk associated with the project. No further development is possible with proposed as-built scenario
Westermost Rough	50 x 3.6 MW	Total capacity = 245 MW No. of turbines = 80	35 x 6 MW	The project is now operational and uses fewer, higher capacity turbines than those assessed. The turbine parameters for these scenarios match those used in MacArthur Green (2017) to calculate a correction factor.	No. Although updated collision risk estimates calculated using the correction factor are considered to provide an accurate representation of the as-built scenario however, further development is possible

