

**From:** [Dominika Phillips](#)  
**To:** [Hornsea Project Three](#); [Kay Sully](#); [KJ Johansson](#)  
**Cc:** [Andrew Guyton](#); [Stuart Livesey](#)  
**Subject:** Hornsea Project Three (UK) Ltd response to Deadline 3 (Part1)  
**Date:** 14 December 2018 20:45:56  
**Attachments:** [image003.png](#)  
[D3\\_HOW03\\_Cover\\_Letter.pdf](#)  
[D3\\_HOW03\\_IP\\_WR.pdf](#)  
[D3\\_HOW03\\_ISH1.pdf](#)  
[D3\\_HOW03\\_ISH2.pdf](#)  
[D3\\_HOW03\\_ISH3.pdf](#)  
[D3\\_HOW03\\_ISH4.pdf](#)  
[D3\\_HOW03\\_SoCG\\_RSPB\\_Dec\\_signed.pdf](#)  
[D3\\_HOW03\\_SoComm.pdf](#)  
[HOW03 Guide to the application.pdf](#)

---

Dear Kay, K-J

We are pleased to enclose Ørsted Hornsea Project Three (UK) Ltd ("the Applicant") response to Deadline 3, Friday 14 December 2018. These documents have been prepared by the Applicant and have been produced in response to the Examining Authority's (ExA) letter of 9 October 2018 ("the Rule 8 letter") as well as the Hearings (03-07 December 2018). The documents are pursuant to Rules 10(1) and (2) of the Infrastructure Planning (Examination Procedure) Rules 2010 and are in connection with the Development Consent Order application for the proposed Hornsea Project Three Offshore Wind Farm (hereafter referred to as "Hornsea Three").

These documents are being issued over a series of emails, each email containing a pdf file or files. The **last** email to be issued by the Applicant will contain a supporting file tracking sheet – to help the ExA ensure that it has received each email transmission.

Please acknowledge safe receipt of these documents. If we can be of any assistance in that regard, please do not hesitate to contact myself or Andrew Guyton.

Best regards,  
**Dr Dominika Chalder PIEMA**  
Environment and Consent Manager

+44 (0) 7767 007 815

Environmental Management UK | Wind Power  
5 Howick Place | London | SW1P 1WG



Please consider the environment before printing this e-mail

\*\*\*\*\*

This communication contains information which is confidential and is for the exclusive use of the addressee(s).

If you are not a named addressee, please inform the sender immediately and also delete the communication from your system.

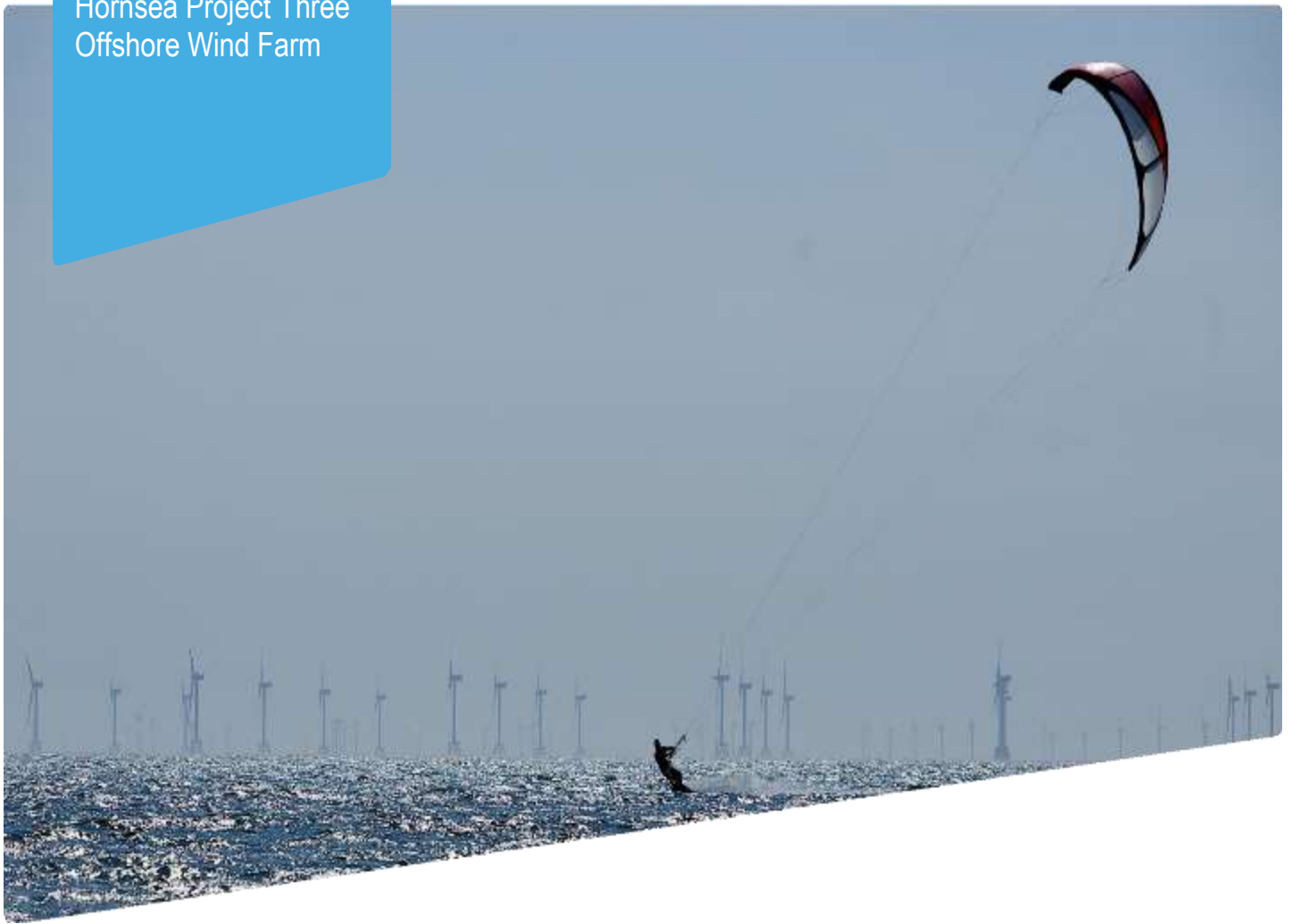
Ørsted Power (UK) Limited is registered in England  
Registered number: 04984787  
Registered Address: 5 Howick Place, London, SW1P 1WG  
The Company is a wholly owned subsidiary of Ørsted A/S (a company registered in Denmark)  
More information on the business of the Ørsted group can be found at [www.oredsted.com](http://www.oredsted.com)  
Disclaimer version 1.1

---

This email has been scanned by the Symantec Email Security.cloud service.  
For more information please visit <http://www.symanteccloud.com>

---

Hornsea Project Three  
Offshore Wind Farm



## Hornsea Project Three Offshore Wind Farm

---

Written summary of Applicant's oral case put at Issue Specific  
Hearing 2 (5<sup>th</sup> Dec 2018)

---

Date: 14<sup>th</sup> December 2018

| Document Control     |                                                                                                     |        |                                      |
|----------------------|-----------------------------------------------------------------------------------------------------|--------|--------------------------------------|
| Document Properties  |                                                                                                     |        |                                      |
| Organisation         | Ørsted Hornsea Project Three                                                                        |        |                                      |
| Author               | Pinsent Masons                                                                                      |        |                                      |
| Checked by           | Andrew Guyton                                                                                       |        |                                      |
| Approved by          | Andrew Guyton                                                                                       |        |                                      |
| Title                | Written summary of Applicant's oral case put at Issue Specific Hearing 2 (5 <sup>th</sup> Dec 2018) |        |                                      |
| PINS Document Number | n/a                                                                                                 |        |                                      |
| Version History      |                                                                                                     |        |                                      |
| Date                 | Version                                                                                             | Status | Description / Changes                |
| 14/12/2018           | A                                                                                                   | Final  | Submitted at Deadline 3 (14/12/2018) |
|                      |                                                                                                     |        |                                      |
|                      |                                                                                                     |        |                                      |
|                      |                                                                                                     |        |                                      |
|                      |                                                                                                     |        |                                      |
|                      |                                                                                                     |        |                                      |

Ørsted

5 Howick Place,

London, SW1P 1WG

© Orsted Power (UK) Ltd, 2018. All rights reserved

Front cover picture: Kite surfer near a UK offshore wind farm © Ørsted Hornsea Project Three (UK) Ltd., 2018.

## Table of Contents

|    |                                                           |    |
|----|-----------------------------------------------------------|----|
| 1. | INTRODUCTORY REMARKS                                      | 2  |
| 2. | AGENDA ITEM 1 – INTRODUCTION OF THE PARTICIPATING PARTIES | 2  |
| 3. | AGENDA ITEM 3 – PROGRESS ON STATEMENTS OF COMMON GROUND   | 2  |
| 4. | AGENDA ITEM 4 – ORNITHOLOGY                               | 3  |
| 5. | AGENDA ITEM 5 – BENTHIC ECOLOGY                           | 12 |

1. **INTRODUCTORY REMARKS**

- 1.1 Issue Specific Hearing 2 ("ISH") on Offshore Ecology was held at 09:30am on 5 December 2018 at the Mercure Norwich Hotel, 121-131 Boundary Road, Norwich, NR3 2BA.
- 1.2 The ISH took the form of running through items listed in the agenda published by the Examining Authority ("ExA") on 27 November 2018 (the "**Agenda**"). The format of this note follows that of the Agenda and refers to the Applicant's Response to the first written questions ("**FWQ**") (the "**Response to First Written Questions**") [REP1-122] numbers where relevant. The Applicant's substantive oral submissions commenced at item 3 of the Agenda, therefore this note does not cover items 1 and 2 which were procedural and administrative in nature.

2. **AGENDA ITEM 1 – INTRODUCTION OF THE PARTICIPATING PARTIES**

- 2.1 The ExA: - David Prentis (Lead Panel Member), Guy Rigby, David Cliff and Dr Roger Catchpole.
- 2.2 The Applicant:
- 2.2.1 Speaking on behalf of the Applicant: - Gary McGovern (Partner at Pinsent Masons LLP).
- 2.2.2 Present from the Applicant:- Stuart Livesey (Project Development Manager), Andrew Guyton (Consent Manager) Felicity Browner (Lead Offshore Environment Manager for Hornsea Three), Gareth Parker (Electrical Project Manager for Hornsea Three) and Laurence Cross (Lead Geotechnical Engineer for Hornsea Three);
- 2.2.3 The Applicant's legal advisors:- Claire Brodrick (Pinsent Masons LLP) and Peter Cole (Pinsent Masons LLP).
- 2.2.4 The Applicant's environmental consultants (listed alongside their relevant environmental topic area):
- (a) Offshore Ornithology – Dr Tim Norman (Managing Director at NIRAS Consulting Ltd) and Matthew Hazleton (Senior Ornithologist at NIRAS Consulting Ltd); and
- (b) Benthic Ecology – Dr Kevin Linnane (Principal Marine Ecologist at RPS Group plc) and Alun Williams (Director, RPS Group plc).
- 2.3 The following parties participated in the ISH:
- 2.3.1 Natural England ("**NE**") represented by Charles Forrest;
- 2.3.2 Marine Management Organisation ("**MMO**"); and
- 2.3.3 Eastern Inshore Fisheries and Conservation Authority ("**EIFCA**").

3. **AGENDA ITEM 3 – PROGRESS ON STATEMENTS OF COMMON GROUND**

- 3.1 In response to a request from the ExA for a progress update on statements of common ground ("**SoCG**"), Felicity Browner explained that a SoCG with NE relating to ornithology and benthic ecology had not yet been agreed. A SoCG with NE relating to other matters was submitted at Deadline 1 [REP1-218]. The Applicant had sent a draft SoCG relating to ornithology to NE on 13 August 2018. Clarification notes were then provided to NE in September and early October 2018 in response to comments made by NE in its relevant representation. These clarification notes were submitted into the Examination at Deadline 1. Ms Browner explained that NE had informed the Applicant that NE is unable to commit to any meetings so the Applicant has been unable to progress the SoCG to date. Ms Browner confirmed that the Applicant was keen to progress matters and reiterated the Applicant's request for a meeting with NE.

- 3.2 In respect of benthic ecology, Ms Browner confirmed that the Applicant was still waiting for feedback on the draft SoCG. On 4 October 2018, the Applicant had provided three clarification notes to NE in response to comments made by NE in its relevant representation. Ms Browner noted that NE had made comments on the clarification notes in its written representation but NE had not committed to a meeting or progressed the SoCG.
- 3.3 The Applicant notes that the ExA suggested that it would be useful if a meeting between the Applicant and NE could take place sooner rather than later to assist the ExA.
- 3.4 Ms Browner confirmed that in respect of the other SoCGs relating to offshore ecology, the status of the SoCGs remained the same as set out in the Statement of Commonality of Statements of Common Ground submitted at Deadline 2 [REP2-010].

#### 4. **AGENDA ITEM 4 – ORNITHOLOGY**

##### 4.1 **Baseline characterisation:**

- 4.2 The ExA referred to FWQ 1.2.38 and noted that there was clearly a difference of opinion. The ExA referred to the lack of 2 years' survey data for from a single source for the December to March period to inform the baseline. The ExA queried how the Applicant had fulfilled its duties in relation to paragraph 2.6.102 of NPS-EN3.
- 4.3 Dr Tim Norman explained that the overall approach taken during the evidence plan process for Hornsea Three was to maximise the use of the existing evidence base whilst also taking into account the approach agreed with stakeholders on Hornsea Project Two. Dr Norman confirmed that Hornsea Three is located in a well understood area. Due to the adoption of a zonal approach, this is a well understood corner of Southern North Sea and not a new territory.
- 4.4 Dr Norman explained that the Applicant had initially undertaken 12 months of digital aerial surveys (**DAS**) which was then extended to cover two breeding seasons (18 months). This was subsequently extended to provide 20 months of DAS covering the breeding season. Dr Norman confirmed that the method and application of the surveys, and the use of existing data, was discussed at length at the ornithology Expert Working Group during the evidence plan process. Dr Norman acknowledged that NE and the Royal Society for the Protection of Birds (**RSPB**) had made it clear that their preference was for 2 years of aerial surveys. However, the Applicant had also made it clear that it wished to agree a method for incorporating the existing data obtained for the Hornsea Zone.
- 4.5 Dr Norman considered that the issue was whether there was sufficient data available to provide an understanding of the density of birds that should be assumed for the purpose of risk assessment for those four months (Dec – March) where there was data from only one year. Dr Norman explained that the meta-analysis provides a comprehensive review of the available data. Dr Norman confirmed that in his professional opinion the data provided a sufficient and representative baseline for the purposes of carrying out an EIA.
- 4.6 Dr Norman confirmed his opinion that the primary issue is whether the data is representative of the variability that you would expect to see. Dr Norman confirmed that the Applicant had analysed all of the available data in various ways but remained open to other suggestions from NE. However, in Dr Norman's opinion it was important to make use of all of the available data. Dr Norman confirmed that it was not normally the case to have so much data available and the question was how best to use that data to understand the variability.
- 4.7 NE acknowledged that other offshore wind projects have also had less than 2 years of surveys, but suggested those cases were different as there was an intention to collect 2 years' worth of data. In response Gary McGovern stated that the reason why less than 2 years of surveys had been obtained was irrelevant. It did not matter whether the Applicant had intended to get the surveys or not, the same issue arose as to the adequacy of the baseline. Mr McGovern confirmed that the Applicant had always been transparent about the surveys it was proposing to undertake. The issue here is the same as in other cases, understanding and addressing any resulting uncertainty over the baseline.

- 4.8 In response to a suggestion from the ExA that the Applicant hadn't followed the policy set out in NPS-EN3, Mr McGovern confirmed that there have been discussions with NE. Mr McGovern explained that paragraph 2.6.102 of NPS-EN3 does not require the scope and methods of the surveys to be agreed by NE. The Applicant has been very transparent and sought to narrow the outstanding issues. Mr McGovern added that the Applicant would have liked to have reached agreement with NE but it has not been possible. However, Mr McGovern reiterated that the test in NPS-EN3 has been met as extensive discussions with NE have taken place.
- 4.9 Mr McGovern stated that 24 months of surveys is not a "minimum" in any true sense. NE does not normally ask for and offshore wind developers do not typically provide more than 24 months of site specific survey data. NE did not dispute this. Mr McGovern stated no evidence is presented by NE for their assertion that Hornsea Three is a "high risk" project relative to other offshore wind projects. Different projects affect different species to different extents. Mr McGovern noted that NE acknowledged that in respect of other extension projects it may be appropriate to have less than 24 months data given the scope to use data from the original project. Mr McGovern explained that conceptually that was exactly what has happened here as Hornsea Project Three can be regarded as an extension of Hornsea Project One and Hornsea Project Two. As part of the EIA, the Applicant has utilised the wide collection data available for the entire Hornsea Zone.
- 4.10 In response to comments made by NE on whether less than 24 months of surveys undermines cumulative impact assessment (**CIA**) undertaken at other projects, Mr McGovern made it clear that the Applicant does not accept the suggestion that the CIA is undermined.
- 4.11 Dr Norman added that in respect of the CIA, he was unaware of issues relating to baseline data ever having been raised previously by NE as a concern. Dr Norman explained that methodologies for establishing the baseline and risk assessment have evolved over the years and it is these changes that can affect the comparability of the effects of projects for the purpose of CIA. However, NE's criticism of the CIA is not due to an issue with the input data.
- 4.12 In response to comments made by NE relating to the need to ensure that the data is accurate and precise to inform future CIA for other projects, Dr Norman explained that for the purposes of future monitoring, further pre-construction surveys are typically undertaken. The purpose of baseline surveys is to inform EIA. Dr Norman confirmed that the Applicant is making the best use of data that is available in order to undertake an EIA.
- 4.13 In response to a query from the ExA relating to why 2 years of surveys has been adopted as an industry standard, Dr Norman explained that the 2 year period dates back to the Round 1 offshore wind farms. In light of the vacuum of information available at that time, the COWRIE initiative commissioned a study that suggested methods for carrying out surveys to inform EIA. It was recognised that at that time there was no ornithological information available regarding the areas involved in Round 1. The guidance document produced at that stage (Camphuysen et al., 2004<sup>1</sup>) recommended 2 years of boat based or visual aerial surveys. At the time the issue of inter-annual variability was acknowledged, however, 2 years was an appropriate compromise between the need for data and not delaying projects unduly or indefinitely given the urgent need for renewable energy, and consequently represents a proportionate approach.
- 4.14 Dr Norman explained that inter-annual variability was an inherent feature of birds at sea. In that sense, the fact the Applicant has access to data obtained over a longer period of time than 2 years is useful when considering how density can change. Dr Norman reiterated that it was appropriate for the Applicant to look at all the data that is available. Dr Norman explained that the data showed that variability is higher in the breeding season than in the non-breeding season. For the months where there is not 2 years' DAS data, Dr Norman confirmed that there is a lot less variability as this period is less important for these species. The data available is sufficient for the Applicant to have a reasonably good understanding of the typical variability in the densities of birds at this time of year. Dr Norman reiterated that in his professional opinion a reasonable data point was available for the Applicant to use that was appropriate for the assessment the Applicant was trying to undertake.

---

<sup>1</sup> Camphuysen, K. J., Fox, A. D., Leopold, M. F. and Petersen, I. K. (2004). Towards standardised seabirds at sea census techniques in connection with environmental impact assessments for offshore wind farms in the U.K.: a comparison of ship and aerial sampling methods for marine birds, and their applicability to offshore wind farm assessments (PDF, 2.7 mb), NIOZ report to COWRIE (BAM – 02-2002), Texel, 37pp.

- 4.15 In response to comments made by NE indicating that the non-breeding season was an important part of the year, as birds moult following breeding and may be more susceptible to disturbance impact, Dr Norman confirmed that the relevant period, December to March, was not a moulting period for these species.
- 4.16 Dr Norman clarified that he was not saying that this period is unimportant. However, the relative contribution of effects in this period to the overall impact on the populations of interest is less than at other times of year, particularly during the breeding season when a high proportion of any impact is assumed to be attributable to local breeding colonies. Dr Norman explained that the issue was the quantification of the overall annual impact as the collision risk assessment was intended to be representative. Dr Norman noted that it was disappointing that NE had not considered the Applicant's Response to NE's Written Representation [REP2 -004]. However, Dr Norman reiterated that the Applicant is simply trying to understand the input variable.
- 4.17 **Designated features:**
- 4.18 In response to a query from the ExA regarding the North Norfolk Coast (**NNC**) SPA and why Montagu's harriers were not screened in, Dr Norman confirmed that the Applicant would confirm in writing which features were considered.
- 4.19 The ExA suggested that the key species of concern appear to be kittiwake, gannet, puffin and razorbill. Subject to their points regarding the baseline characterisation, NE acknowledged other species are not in the territory of an adverse effect on integrity. The Applicant agrees these four species are the key species for consideration.
- 4.20 In response to a query from the ExA relating to the response to FWQ 1.2.96 and the RSPB position that populations of kittiwake have fallen relative to the population numbers in the citation, Dr Norman explained that the Applicant has been referring to NE's recent monitoring data. Matthew Hazleton explained that the RSPB may be referring to the productivity of kittiwake not the population. The issue is well rehearsed and relates to the figures for the 1970s and 1980s.
- 4.21 Dr Norman explained that the Applicant would defer to NE to provide an official response on the current population. Dr Norman confirmed that more recent data shows a stable or slightly increasing population. The Applicant notes that NE agreed that more recent colony counts identified that the kittiwake population was stable or slightly increasing.
- 4.22 In response to FWQ 1.2.96 and comments made by NE relating to LSE screening, Dr Norman noted that at later agenda item may cover this topic and confirmed that it would be helpful if NE could set out its position in respect of each species identified.
- 4.23 **DAS coverage:**
- 4.24 In response to a query from the ExA relating to the existing DAS coverage of 10% and whether greater coverage (20%) would give more certainty, Dr Norman explained that a decision as to how to configure the DAS was made at an early stage when the Applicant appointed its contractor. The standard aerial survey rig has four high definition video cameras mounted. The marginal cost of turning on all four cameras is effectively zero. However, Dr Norman explained that, typically only the data from two cameras is analysed. Analysing the data is a time-consuming task and Dr Norman explained that 10% coverage is a reasonable and appropriate standard for this type of survey. Dr Norman added the methodology was agreed at the ornithology Expert Working Group during the evidence plan process and the issue was not raised by stakeholders again until after submission of the application.
- 4.25 In response to a query from the ExA relating to whether it would be possible to add in the data from the other two cameras now, Dr Norman explained that whilst the data is still available it is not in a readily useable form and would need to be manually processed before it could be utilised.
- 4.26 Dr Norman explained that the data from the video cameras is used to undertake a sampling exercise which will generate a mean estimate of population with confidence intervals. Increasing the amount of data will typically increase the confidence of mean estimate. However, the improvement will depend on the population and whether the species is grouped together, for example sea ducks. If the species is not
-

highly clumped and is dispersed over a large area not near to breeding ground, an increase in data coverage (e.g. 20% instead of 10%) will only have a small effect on improving the precision of the mean. Dr Norman added that additional data coverage (i.e. over 10%) might be useful in other contexts, for example for undertaking monitoring to see if certain bird populations are changing over time due to the presence of the wind farm. However, Dr Norman confirmed that the Applicant is trying to establish the characterisation for purposes of undertaking an EIA and 10% is sufficient for that purpose. Dr Norman added that the Applicant's contractor for the DAS had surveyed many offshore wind farm sites and it was not aware of this issue being raised before.

4.27 In response to comments made by NE relating to the precision levels discussed during the evidence plan process, Dr Norman confirmed that he had reviewed the minutes of the meetings of the ornithology Expert Working Group and couldn't see any reference to a commitment to precision levels of 16%. Dr Norman explained that 16% is an extremely high precision level to meet and most wind farms fall short of that. In that sense it is an aspiration or target, not a minimum requirement. Compared with other offshore wind farms, the Applicant's approach was either equivalent or better. For example, the precision levels for Hornsea Three were higher than for East Anglia Three or Moray. Dr Norman added that 16% might be an appropriate target for certain types of survey (e.g. population monitoring) but for the purposes of the EIA the Applicant should not be judged to a higher standard than other projects.

4.28 **Hierarchical data selection:**

4.29 The ExA referred to FWQ 1.2.42 and the geospatial issues relating to the data integration exercise. The ExA referred to Annex C of NE's Written Representation [REP1-211] where it provided a range of views on the boat and DAS data.

4.30 Dr Norman explained that the Applicant had undertaken meta-analysis and this was discussed at the ornithology Expert Working Group as part of the evidence plan process. The Applicant had consulted on the method to be used to make the best use of the data available. The method of meta-analysis had taken into account points raised by stakeholders where it could. Dr Norman added that the Applicant was open to how the method could be improved but NE had not made any suggestions as to how it should be done instead.

4.31 In response to a comment from NE that boat data could not be integrated, Dr Norman explained that boat data was adequate for Hornsea Project One and Hornsea Project Two. Dr Norman confirmed that the boat data was not fundamentally flawed and the issue was how it should be used. Dr Norman added that boat data and DAS are two methods of observing the same things. For Round 2 projects, it was usually the case that a combination of boat surveys and aerial visual was used. Dr Norman reiterated that it was not satisfactory for NE to dismiss a whole set of data.

4.32 In response to comments made by NE relating to the integration of the data, Dr Norman referred to the Applicant's Deadline 1 submission: Appendix 8 Baseline Characterisation Sensitivity Testing [REP1-141]. Dr Norman reiterated that the Applicant was very willing to have conversation with NE about how best to incorporate the boat data but it appears that the NE's position is that the boat data cannot be integrated.

4.33 **Temporal and spatial statistics:**

4.34 In response to a query from the ExA relating to FWQ 1.2.115, Dr Norman confirmed that it would provide the further details requested by NE in its Written Representation relating to age classes at Deadline 3. This is provided as Appendix 17 to the Applicant's response to Deadline 3.

4.35 In response to a query from the ExA relating to FWQ 1.2.43, Dr Norman confirmed that the formula is talking about mean densities where there are two data points. Dr Norman confirmed that the Applicant would provide further details on how dispersion is measured in writing. It is proposed that this will be provided at Deadline 4.

4.36 In response to a query from the ExA as to why a range was not used, Dr Norman explained that the Applicant had presented mean or maximum likelihood collision risk estimates with associated confidence intervals. The collision risk model requires density input, which is typically a mean monthly value. However, it is possible to use upper or lower confidence intervals to provide consideration of the variability associated with the mean value. Dr Norman confirmed that the Applicant has followed the

relevant guidance Band (2012) relating to input data for collision risk assessment and it is the model input requirements that are driving the statistics. The Applicant agreed to provide the relevant guidance document. This is provided as Appendix 12 to the Applicant's response to Deadline 3.

- 4.37 In response to comments made by NE relating to a need to see further details of the values used for each month in the model, Dr Norman confirmed that the Applicant can produce the requested output so long as NE clarifies precisely what is required and why. Dr Norman explained that calculations have already been undertaken using the upper and lower confidence levels in addition to mean monthly density collision rate. The Applicant notes that NE requested that the figures are provided using the DAS data only.
- 4.38 Dr Norman added that it was still unclear as to why NE required this data as the standard approach for assessment is to use the mean as it takes into account the higher or lower levels.
- 4.39 In response to a query from the ExA relating to sample sizes, Dr Norman confirmed that the sample sizes were high and that the Applicant would provide a figure for each species. Dr Norman also confirmed that the Applicant would provide a written response in respect of the standard error used for boot strap estimates. It is proposed that this will be provided at Deadline 4.
- 4.40 In response to comments made by NE as to why it had not engaged in all the documents and NE's position that, regardless of changes made to the modelling, it couldn't rule out adverse effects on species due to the baseline, Mr McGovern reiterated that the Applicant was happy to provide further analysis that would be constructive and could provide further advice. The Applicant understood NE's concerns with the baseline but could not see why NE could not carry out assessment or provide its advice without prejudice to its position on the baseline. Mr McGovern noted that the Secretary of State may conclude that the baseline is adequate and it would then be helpful for the Secretary of State to have NE's advice on the assessment in that scenario. Mr McGovern reiterated that the Applicant disagreed with NE's position on the baseline and that it was open to the ExA and Secretary of State to conclude that the assessment was adequate.
- 4.41 In response to a query from the ExA regarding the 'stochastic model', Dr Norman confirmed that the model referred to is McGregor and that this model was published after the application had been submitted. It is noted by the Applicant that the ExA put it to NE that raising the prospect of using a different CRM model post-submission could be viewed as 'moving the goalposts'.
- 4.42 In response to a query from the ExA relating to FWQ 1.2.43 and pooled variances and whether the variances are assumed to be equal, Dr Norman confirmed that the Applicant would respond in writing. This will be provided at Deadline 4.
- 4.43 In response to a query from the ExA relating to FWQ 1.2.47 and whether the density levels implied an even distribution across the wind farm area, Dr Norman explained that the model assumes equal risk across windfarm and that is the standard practice. There have, in other projects, been attempts to calculate the risk for sub-components of sites, but this requires further treatment of the survey data to generate meaningful densities for those sub-components which may be problematic as that is not how the survey was designed.
- 4.44 In response to a query from the ExA as to whether the band modelling could take into account a disproportionate impact, for example, if there is a greater collision risk due to foraging behaviour or transiting of the site, Dr Norman confirmed that the assumption is that you take it in the round. It is assumed that the site-wide data on density and flight height distribution take account of these different types of use. Dr Norman added that the model calculates the collision risk probability and looks at the entire swept area of the proposed wind farm. Both the Band and MacGregor models take the same approach in these respects.
- 4.45 The Applicant notes that the ExA requested that copies of Band 2012 and MacGregor 2018 were submitted into the Examination. These are provided as Appendix 12 and 9 to the Applicant's response to Deadline 3.
- 4.46 In response to a query from the ExA as to whether there is a greater collision risk for any one turbine, Dr Norman explained that this was likely to be the case, as the distribution and abundance of birds was

unlikely to be homogenous across such a large area. However, the distribution and abundance of birds within the wind farm area may also change over time. However, the tools used for undertaking the EIA do not provide that level of detail.

4.47 Dr Norman confirmed that the Applicant had not assessed different layouts as it was not standard practice.

4.48 **Collision risk modelling:**

4.49 In response to a query from the ExA relating to FWQ1.2.61 and migratory sea birds, the Applicant notes that NE confirmed that it did not consider it to be a high-risk aspect but it was not clear what species were put into modelling and rationale. Dr Norman explained that the method used was based on the agreed approach for Hornsea Project Two. It was not therefore clear to the Applicant why NE was reaching a different conclusion for an adjacent site located further out to sea. Dr Norman confirmed that the Applicant had undertaken a robust process and considered it highly relevant to use an adjacent project as starting point. However, Dr Norman confirmed that the Applicant would provide a list of the species included for other projects in the same migratory path and the reasons why such species had not been included.

4.50 In response to a query from the ExA relating to differences in relation to the avoidance rates advised by the SNCBs (which are taken from Cook et al 2012 with the exception of kittiwake) and those recommended in Cook et al (2018) Mr Hazleton confirmed that those for kittiwake and lesser black backed gull were different. Recent evidence now tended to align with that recommended in the Cook et al report. Notwithstanding this, the Applicant had provided a range to include the avoidance rates advocated by the SNCBs and those recommended by Cook et al (2012). Dr Norman confirmed that due to the uncertainty, a precautionary approach is taken in respect of avoidance rates.

4.50.1 **Band options:**

4.50.2 In response to a query from the ExA relating to using the model with all the band options, Dr Norman confirmed that the Applicant had presented options 1, 2 and 3.

4.50.3 The Applicant notes that NE stated that it would not comment on the impacts or any other aspects of the collision risk modelling due to its concerns relating to the baseline.

4.50.4 **Mean estimate/maximum likelihood:**

4.50.5 In response to a query from the ExA relating to the NE's position it was well documented that there is no basis for selecting single value for risk modelling, Dr Norman explained that the standard practice is to use the mean value then calculate confidence levels. Dr Norman confirmed that fundamentally the predicted risk is based on the mean. Dr Norman added that the Applicant had not deviated from standard practice and a value has to be chosen at the end of the day.

4.50.6 Mr McGovern reiterated that it would be helpful if NE could provide advice on the other aspects of the assessment as the Secretary of State may consider that the baseline is adequate and will then be in the position that it doesn't have advice from NE on other issues. Mr McGovern added that it did not seem helpful for the ExA if NE won't comment at all.

4.50.7 **Nocturnal activity factors:**

4.50.8 The ExA referred to FWQ1.3.49 and asked whether using Furness 2018 would change the outcome.

4.50.9 Dr Norman explained that Furness 2018 is a peer reviewed paper which identifies nocturnal activity factors expressly for use in the Band (2012). The original band model included an assumption about flight activity at night due to 24 hour prediction of effect. The question was how much activity to assume. Dr Norman confirmed that the model allowed for the input of a correction factor. Dr Norman referred to the paper by Garthe and Huppopp (2004) and the relative activity of birds at night. There was a five point scale of activity and this had been

translated into a set of values for use in the Band model, though not based on any specific evidence. Dr Norman confirmed that it was a practical solution to the problem, however, the Garthe and Huppopp (2004) scale didn't reflect activity in percentage terms. As better information has come to light (i.e. Furness 2018), the Applicant has sought to make use of it.

- 4.50.10 Mr Hazleton added that in the Applicant's Deadline 1 submission: Appendix 10 Collision risk modelling Updates to species-specific parameters (REP1-188) the Applicant had updated the figures previously used. For example, for gannet the Applicant had included an increase in nocturnal activities based on information presented in Furness et al 2018. In respect of kittiwake, the Applicant's Deadline 1 submission: Appendix 10 Collision risk modelling Updates to species-specific parameters (REP1-188) included a decrease to the figure previously used. Mr Hazleton confirmed that whilst data for kittiwake was currently unpublished it had been presented in the Norfolk Vanguard application.
- 4.50.11 In response to a query from the ExA relating to the zero activity listed for the gannet, Mr Hazleton explained that the evidence shows limited activity at night. Garthe and Huppopp (2004)'s five point scale ranks each species in relative terms from 1 – 5, with 1 denoting hardly any flight activity at night, which for the purposes of Band (2012) was converted into percentage activity of 0%, 25% etc. However, it is possible to change the band to individual percentages. The Applicant notes the comments made by NE in respect of the studies and that NE accepted that there is variability across studies but that does not preclude reaching agreement on NAF.
- 4.50.12 In response to a query from the ExA relating to whether tagging has shown flight at night for the gannet, Mr Hazleton explained that the Applicant had accepted that and incorporated the figures into the Applicant's Deadline 1 submission: Appendix 10 Collision risk modelling Updates to species-specific parameters (REP1-188). Mr Hazleton confirmed that the model can easily be changed by correcting the factor used, for example 0.8 instead of 1. The study specifically addresses issues with the Band model. In the Band model the values 1 to 5 were not originally meant to be quantified. For example 1 is just indicating less night activity in relative terms than 2. Mr Hazleton added that all of the issues are explained in the Furness paper.
- 4.50.13 In response to a query from the ExA regarding the use of DAS, Mr Hazleton explained that the DAS does not inform the nocturnal activity factor.
- 4.50.14 In response to comments made by NE relating to daytime and night time activity and tagging, Mr Hazleton confirmed that the Furness paper takes these issues into account and acknowledged that daytime activity does not determine night time activity.
- 4.50.15 In response to comments made by NE relating to the length of the breeding seasons and their preference to use colony data, Dr Norman explained that the impact is happening at the site of the windfarm array so that is the relevant place to consider the impacts. There are different conditions at the array site and at the colony. Dr Norman added that if NE is concerned about breeding birds from the colony, then this is less likely to be the case in the disputed months. Dr Norman confirmed that the Applicant had started with the agreed position for Hornsea Project Two and it was not clear why NE had changed its position.
- 4.50.16 In response to comments made by the NE relating to further evidence having been obtained relating to the colonies from the colony managers (RSPB), Dr Norman requested that the evidence be provided to the Applicant. Dr Norman added that the Applicant was open to all new evidence and if the new evidence has led to change in position then the Applicant needs to see it. Nevertheless, Dr Norman confirmed that the Applicant's position is that the assessment relates to impacts at the array site as opposed to at the colony.
- 4.50.17 In response to a query from the ExA relating to the Applicant's ability to rerun the modelling with different colony data so as to use longer seasons for gannet and kittiwake, Dr Norman explained that the assessment presented monthly calculations so the information is currently available to calculate what difference a longer season makes (Volume 5, Annex 5.3 of the Environmental Statement, Collision Risk Modelling (APP-109)). However, Dr Norman

confirmed that the Applicant can provide further information if it will assist reaching agreement with NE. Dr Norman clarified that this related only to collision risk and there was not a seasonal peak value for displacement.

4.50.18 The Applicant notes that in response to a query from the ExA as to whether it would be useful for the Applicant to rerun the modelling, NE confirmed that it could see value in re-running the model as it could allow NE to advise the Secretary of State broadly on the risk of adverse effects on integrity.

4.50.19 In response to the comments made by NE, Dr Norman reiterated that the Applicant had been trying to engage with NE for some time on the issues relating to the raw data and the methodology for the assessment. Dr Norman confirmed that where there are disputes between the Applicant and NE in respect of the figures to be used, the Applicant has included a range. Dr Norman added that if NE is actually requesting a copy of the raw data then the Applicant would need to consider this request further as it is not usual. It is noted that NE commented it is not their role to do the assessment so it is not clear what the raw data would be used for.

4.50.20 Dr Norman reiterated that the Applicant was willing to assist NE and the ExA and would rerun the modelling to include the additional seasons if this would be helpful and allow NE to advise. It would also be useful to understand the maximum value that can be used before the outcome of the assessment is changed to try to address NE's concerns.

4.50.21 The Applicant and NE agreed that it would be useful to produce an ornithological road map as per Hornsea Project Two.

4.51 **Cable corridor displacement:**

4.52 In response to a query from the ExA relating to FWQ 1.2.53, the Applicant notes that NE confirmed that it has no issues regarding the use of Lawson et al. (2015).

4.53 In response to a query from the ExA relating to the RSPB's response to FWQ1.2.67 and RSPB's view that 4km is more appropriate than 2km, Dr Norman explained that the Applicant had followed the relevant guidance for vessel laying cables and had taken a consistent approach to other projects. The Applicant notes that NE confirmed that 2km is adequate.

4.54 **Maximum kittiwake foraging distance:**

4.55 In response to a query from the ExA relating to FWQ 1.2.75 and evidence from the RSPB regarding the adverse impacts on the kittiwake, Dr Norman explained that the Applicant was aware of data and refer to it in the assessment. The outstanding issue was the degree of connectivity due to the distance. Dr Norman confirmed that the Applicant does not dispute that the birds can fly that distance but the Applicant's position is that they are likely to be non breeding birds. The tracking data provided by the RSPB demonstrated that there is relatively low use of the site of the array.

4.56 Mr Hazleton referred the ExA to Cleasby et al which was referred to and submitted as part of the Applicant's Deadline 1 submission: Appendix 42 Paper by Cleasby I.R. et al. (RSPB Research Report no. 63.) (REP1-144).

4.57 Dr Norman explained that the issue related to the use and interpretation of tracking data. Dr Norman confirmed that the Applicant has acknowledged connectivity and assumed a precautionary degree of connectivity and appropriate apportionment.

4.58 The Applicant notes that NE confirmed that its view was that it was more appropriate to use colony specific data than general tracking data.

4.59 **LSE screening issues:**

4.60 In response to concerns raised by NE relating to LSE and the cumulative and in combination effects, Dr Norman confirmed that the Applicant had produced a matrix for each feature. If Hornsea Three has no

effect then the Applicant's position was that there was no in combination effect. The features that have substantive connectivity with site of the array have been screened in. In respect of common tern and little tern associated with the North Norfolk Coast SPA, Dr Norman confirmed that the Applicant's view was there was no likelihood of significant effect, either alone or in combination.

4.61 Dr Norman confirmed that the Applicant would respond in writing on the residual effect point being made by NE.

4.62 Dr Norman confirmed that the Applicant had used the information that underpinned the SPA designations but had also considered foraging distances. This was the best available information on at sea distribution. Dr Norman was not aware of any better data that could be used.

4.63 Mr Hazleton referred the ExA to the fact that the data was obtained from the Parsons et al 2015 and Wilson et al 2014 reports and these would be submitted into the Examination at Deadline 3. This is provided as Appendix 10 and 11 to the Applicant's response to Deadline 3. Mr Hazleton confirmed that the foraging data have been obtained from JNCC.

4.64 Dr Norman explained that in respect of non-breeding auks, the Applicant's approach was to understand the magnitude of likely non-breeding effects. Dr Norman referred to Annex 2 – Additional Special Protection Areas Screening Exercise Report to Inform Appropriate Assessment [APP-053].

4.65 **Guillemot, razorbill & herring gull:**

4.66 In response to a query from the ExA as to whether herring gull had been screened in, Mr Hazleton confirmed that the Applicant had submitted a clarification note for herring gull at Deadline 1 Appendix 12 Collision risk modelling – herring gull (REP1-189). The RSPB was in agreement with this approach.

4.67 In respect of guillemot and razorbill and whether there was a need to conclude that there would be adverse effects if it was too complicated, Dr Norman explained that whilst it is complicated it was possible to reach a view. The features are evidence based and through using a suitably precautionary approach the Applicant considers that it is possible to reach a conclusion on those species.

4.68 The Applicant notes that NE agreed with the Applicant that while there were complexities they should be able to make an assessment of impacts for these species.

4.69 In respect of the points made by NE relating to apportionment and connectivity, the Applicant notes the ExA's suggestion that this should be a matter for the Ornithological Roadmap, a first version of which has been provided as Appendix 16 to the Applicant's response to Deadline 3.

4.70 The ExA referred to an 'apportioning tool' used by Scottish Natural Heritage as mentioned in the RSPB's written submission. Mr Hazleton confirmed that the tool was not available yet but the Applicant was happy to explore the scope to use the underlying methodology for immature auks.

4.71 In response to a query from the ExA relating to FWQ 1.2.97 as to how far a juvenile and non-breeding bird would travel, Mr Hazleton explained that the activities of these types of birds are not well understood and different species have different strategies. For example, the puffin disperses more. The Applicant had incorporated this into the assessments presented in the application (APP-065 and APP-051).

4.72 Dr Norman added that the Applicant had addressed these points in its assessment and that it was not a matter of disagreement.

4.73 **Population viability analysis**

4.74 In response to a query from the ExA relating to FWQ 1.2.117 and whether the Applicant can justify the approach set out in Green et al and Cook and Robins. Dr Norman explained that the initial approach was to use the PVA models produced for Hornsea Project Two. The Applicant and NE had exhaustively discussed the issues and there was a degree of consensus. Dr Norman confirmed that the models indicate the population's response to given level of impact. The duration of model was also an issue and it was agreed to extend the duration for Hornsea Project Three to 35 years as that was considered to be more realistic. In respect of issues relating to how to deal with running match pairs, Dr Norman confirmed

that the Applicant had taken advice from the model author. Dr Norman considered that the model provided a robust outcome.

- 4.75 In response to feedback provided by NE during the hearing on the model, Dr Norman confirmed that the Applicant was unaware of these points as they had not been previously raised. However, they could be considered further and the Applicant can respond in writing if the points are made clear by NE.
- 4.76 In response NE's response to a query from the ExA relating to FWQ 1.2.65 and what additional factors may need to be considered, Dr Norman explained that habitat loss had been considered. The Applicant's ES concluded that there were no predicated significant effects on fish and therefore if there was no significant effect on the prey itself then the Applicant's position was that there cannot be a significant effect on birds.
- 4.77 In respect of whether the impacts of lighting on birds could be mitigated, Dr Norman confirmed that the Applicant would respond in writing however Dr Norman understood that the lighting requirements were driven by other factors such as navigation. The Applicant stated that clarification in relation to this point would be provided in writing.
- 4.78 Mr McGovern added that in light of the oral submissions made today it would be helpful if the Applicant and NE could meet at the earliest opportunity to discuss the Ornithological Roadmap.

## 5. AGENDA ITEM 5 – BENTHIC ECOLOGY

### 5.1 Baseline characterisation:

- 5.2 Regarding the nearshore cable re-route and with reference to FWQ1.2.13, the ExA queried why the Applicant did not undertake grab samples of the nearshore re-route.
- 5.3 Dr Kevin Linnane confirmed that the general approach to baseline characterisation of benthic receptors was discussed with stakeholders such as NE, the Wildlife Trust, and JNCC through the evidence plan process as outlined in the benthic ecology ES Chapter [APP-062] at seven meetings of the relevant expert working group. The approach to establishing the baseline, as agreed at the EWG meetings, was to make the best use of existing information for the Hornsea Three array area and offshore cable corridor (including data from JNCC and CEFAS), identify data gaps and then fill in those gaps with site specific data (i.e. grab and video data). Dr Linnane explained the context to the approach to the re-route: it was during section 42 consultation that NE provided feedback on the effects on the Cromer Shoal MCZ, advising that the marine interest features in the Wash near Weybourne were potentially less sensitive, which subsequently led to the Applicant's decision to re-route the offshore cable corridor in the nearshore area. At that stage, consistent with the general approach outlined above, the Applicant used desk based information from historic grab samples within and around the Hornsea Three cable corridor to characterise the habitats within the rerouted cable corridor. The Applicant extended the biotope map using data from a range of sources including NE data from the Wash and North Norfolk Coast SAC ("WNNC"), data from the Cromer Shoal Chalk Beds MCZ and the Sheringham Shoal and Dudgeon offshore wind farms. Dr Linnane explained that all of this data confirmed that the broad scale sediment types were consistent across many data sets covering up to ten years. The Applicant extended the biotope maps generated by site specific data with this data, and used this for the characterisation (as presented in the Benthic Ecology ES chapter) to inform the EIA and RIAA.
- 5.4 In order to validate this in response to comments in Natural England's Relevant Representation (RR-097), the Applicant considered it appropriate and proportionate to undertake drop down video sampling to "ground-truth" the existing data rather than undertake further grab sampling because the volume of grab data already available was considered sufficient and to show a consistent picture..
- 5.5 Dr Linnane responded to NE points on the baseline characterisation discussed in the additional Deadline 2 submissions by the Applicant, highlighting that there is a large amount of data, over a long period in the nearshore area in the vicinity of the Hornsea Three offshore cable corridor and that these show the same patterns giving confidence to the baseline presented. This includes a large dataset from the Cromer Shoal Chalk Beds MCZ, which is immediately adjacent to the part of the WNNC SAC which the offshore cable corridor passes through. The baseline characterisation presented within the EIA and RIAA combined with the validation survey in the Wash and North Norfolk Coast SAC clarification note,

submitted at DL1 (REP1-140), is sufficient. There is agreement on the characterisation with MMO, EIFCA and TWT as recorded in Statement of Common Grounds between the Applicant and these parties (REP1-224, REP1-201 and REP1-227, respectively).

- 5.6 NE were asked by the ExA about their concerns over cable burial in the SAC in light of the Applicant's submissions at DL1 and DL2 (see REP1-140 and Applicant's response to FWQ 1.2.14 (REP1-122)) which provide some detail as to equipment deployed and type of sediments present. NE acknowledged that the Applicant's assumption of 10% cable protection in the SAC is reasonable and it is noted this justification was also acknowledged by the MMO as appropriate in their Written Representation (REP1-095).
- 5.7 Dr Linnane responded to NE's comments on the cable protection clarification note. On mixed and coarse sediments the Applicant has classified this as mixed sediment and notes that they do have diverse communities. In relation to this, as an Annex I sandbanks feature, the Applicant clarified in its Deadline 1 and Deadline 2 responses that have assumed that they are sub features of the Annex I feature. On the Shallow Inlets and Bays Annex 1 feature, Dr Linnane explained that the Applicant screened this out of RIAA on the basis that this only applies to the Wash part of the WNNC SAC. This was discussed and agreed to be screened out at the expert working group (see meeting minutes 4 December 2017; Consultation Report Annex 1 – Evidence Plan; APP-035). Notwithstanding this, the mixed sediments habitats were still considered as a sub feature of the Annex I sandbanks feature.
- 5.8 Laurence Cross for the Applicant responded to comments from NE on the extent to which it will be possible to burial the cable within the WNNC. NE made reference to experience on Race Bank offshore wind farm. Mr Cross stated he was not aware that NE had specific evidence to support their contention that cable burial will not be possible or particularly challenging for Hornsea Three. Regarding points by NE on the Race Bank offshore wind farm, Mr Cross confirmed that approximately 15km of cable had been installed in chalk. The further marine licence application for that project was, in part required due to the particular nature of the sub-cropping chalk encountered in that case, which has caused issues in respect of trenching and reduced burial. Mr Cross explained that the Applicant aware that the cables for Hornsea Three would also, in part, be installed in chalk. To gain understanding of the composition of the chalk at HOW03, targeted site investigations have been undertaken for Hornsea Three. The Applicant is therefore confident that cable burial will be less challenging than for Race Bank. The Applicant agreed to consider possible commercial confidential issues to determine if would be possible to provide any of this data.
- 5.9 **Designated features:**
- 5.10 In response to assertions by NE as to the condition of parts of the WNNC and the North Norfolk Sandbanks and Saturn Reef SAC, Mr McGovern stated that supporting evidence relating to the assessment of the WNNC and the North Norfolk Sandbanks and Saturn Reef SAC ("NNSSR") must be provided by NE to both the Applicant and ExA and the Applicant must be afforded the opportunity to comment if it is to be given any weight by the ExA.
- 5.11 The ExA referred to FWQ 1.2.100 regarding cable installation risks to the WNNC. The ExA stated that the Applicant had confirmed that lessons were learnt from previous projects and safeguards are now in place and asked NE how it would respond to additional information supplied at DL1 from the Applicant.
- 5.12 Dr Linnane responded to points by NE in replying to this question. On the cable paper that NE provided (REP1-207), Dr Linnane stated that the understanding of the industry has developed over past 10 to 15 years and the Applicant is of the view that lessons have been learned and applied to Hornsea Three. Recommendations made in the NE paper, for example sandwave clearance, remedial burial operations, and realistic assumptions for cable protection have been used in the Hornsea Three application and assessed in the ES and RIAA (see paragraph 2.85 to 2.95 of the Applicant's Deadline 2 response (REP2-004) to the Natural England cable paper).
- 5.13 Dr Linnane confirmed that the assessment presented in Volume 2, Chapter 2, Benthic Ecology of the Environmental Statement (APP-062) and the RIAA do not assume a long term temporary impact; the operation phase has been assessed as long term, with the maximum design scenario for the decommissioning phase assuming that cable protection will be left in situ, with all other scenarios

(including removal) resulting in a lesser impact. A decommissioning plan based would be developed at time of decommissioning based on relevant policy at that time.

- 5.14 Regarding points raised by NE on removal of the cable protection, Felicity Browner on behalf of the Applicant advised that NE had appeared to confuse Hornsea Three with Race Bank, where the project developer had committed to remove cable protection on decommissioning.
- 5.15 Regarding micro siting around Annex I reefs, Dr Linnane confirmed that prior to construction a further detailed survey would be undertaken of the extent and condition of Annex I reefs within the cable corridor and primary mitigation will be to avoid those reefs in the WNNC. This is standard industry practice to ensure that direct impacts on biogenic reef features are avoided, based on the extents and distribution at the time of construction (pre-construction data would normally be collected within 18 months of construction) to account for the natural variability in extents and distributions of these features. Desktop data (including from the adjacent Cromer Shoal Chalk Beds MCZ) and Hornsea Three site specific survey data indicate that Annex I reefs have not been recorded in the part of the SAC historically. To account for the potential for the reefs' extent and distribution to vary, primary mitigation would be based on pre-construction surveys and the extents of any potential reefs at the time of construction, and not extents mapped during the baseline characterisation.
- 5.16 Dr Linnane confirmed in relation to sand wave clearance and where areas will be dredged and deposited, the EIA assumed 30m clearance disturbance corridor along the cable corridor. Because sand waves are mobile features, the Applicant has taken a conservative approach in assuming the 30m wide corridor. Deposit of dredged material was assumed to be within the offshore cable corridor or temporary working areas. Removal from the SAC has not been assumed. Dr Linnane also explained that, from a practical perspective, a contractor would prefer to deposit the material close to the dredging area too.
- 5.17 The ExA raised a query related to FWQ 1.2.101 on Annex I sand bank recovery, seeking NE's views on evidence cited by the MMO and the Applicant's response to NE's written Representation.
- 5.18 In response to points on sand wave clearance and recoverability made by NE with reference to the Sandwave Clearance clarification note provided at Deadline 1 (REP1-183), Dr Linnane clarified that Race Bank information was also referred to within the ES. The Sandwave Clearance clarification note (REP1-183) provided more detail around the Race Bank monitoring data and applicability of it to Hornsea Three's cable corridor based on the information available at the time of writing. The conclusion of the note is that recovery will occur over time, with some variability around the rate depending on the specific environmental conditions. At Deadline 2 the Applicant had presented the second batch of Race Bank monitoring data (REP2-020), which was referred to in NE's Written Representation. This monitoring data covers a longer period and showed the same pattern of recovery. The Applicant considers that all of this data clearly supports the conclusion in the ES and RIAA: recovery of sand waves does occur. The evidence presents a consistent picture.
- 5.19 In response to NE comments on the applicability of the Race Bank monitoring data to Hornsea Three site, Alun Williams on behalf of the Applicant confirmed that the Race Bank data had been reviewed carefully for applicability to Hornsea Three in relation to water and wave direction and wave periods and therefore sediment conditions, with the finding of good similarity. The main difference is the greater water depths at the Hornsea Three site. Mr Williams explained this meant that the wave stirring will be less frequent and the sediment mobility lower, however the governing processes remain the same and therefore the same outcome can be expected. Therefore, the recovery might be slightly slower, but recovery will occur. Within the Sandwave Clearance Clarification Note (REP1-183), the Applicant has tested and robustly established that the Race Bank monitoring data is an appropriate analogue for sandwave recovery at Hornsea Three. The Applicant has also committed to pre- and post-construction monitoring following sandwave clearance operations, as outlined in the updated in-principle monitoring plan (REP1-180).
- 5.20 **Benthic sample size:**
- 5.21 Responding to an ExA question Dr Linnane agreed to provide the exact proportion of the study area that was grab-sampled as additional information. The Applicant confirms that 394 grab samples (using a 0.1 m<sup>2</sup> Hamon grab sampling) from Hornsea Three site specific surveys and historic surveys undertaken across the former Hornsea Zone represents 0.000007% of the Hornsea Three benthic ecology study

area. This sampling strategy provided representative sampling of all the broadscale sediment types to provide a robust characterisation, in line with industry best practice. As outlined below, the sampling strategy was based on the best available industry guidance and feedback from stakeholders, including benthic ecology advisors at Cefas, Natural England and JNCC.

- 5.22 The ExA raised a question on the scientific literature on how benthic sampling is undertaken, and how it deals with the spatial domain of sea habitats to determine how many samples to take in order to characterise a certain pattern variation on the sea bed.
- 5.23 Dr Linnane referred to Davis et al. (2001, JNCC Marine Monitoring Handbook), CEFAS (2011) and Ware and Kenny guidelines (2011), which are standard guidelines around benthic ecology sampling for extraction areas and offshore wind farms. The Applicant's survey methodology was in line with these sources and agreed with the expert working group (see Statement of Common Ground with the MMO; REP1-224). These were referenced in the ES, and have been submitted by the Applicant to the ExA for inclusion in the examination library (see Appendices 6, 7 and 8 to the Applicant's response to Deadline 3, respectively).
- 5.24 In response to points by NE on the location of the samples, namely that there were 9 samples, none of which interact with the cable corridor crossing of the WNNC, Dr Linnane agreed to check the sample locations referred to. Dr Linnane made the point that there is extensive grab sample and seabed imagery data within the Cromer Shoal MCZ and given that this site is immediately adjacent to the eastern boundary of the WNNC, it is reasonable to make assumption that habitats in the WNNC are similar as in the MCZ. This was not disputed by NE. Other data sets, such as from Dudgeon and Sheringham Shoal wind farms and NE's evidence all point to same broad pattern, which is supported by the Applicant's validation survey.
- 5.25 **Cable protection measures:**
- 5.26 With reference to FWQ 1.2.5, the ExA sought further comment on the assumed extent of cable protection. Dr Linnane confirmed that remedial cable protection measures are required as a last resort and that so far as possible the cable will be buried. Burial provides the best protection for the asset and it is in the Applicant's interests to bury the cables. Dr Linnane explained that the cable burial risk assessment does not allow determination of the need for, location and extent of cable protection, but rather advises on the depths that cabling should be buried to, to adequately protect the cable.
- 5.27 Gareth Parker for the Applicant expanded on this, stating that an allowance of 10% of the route to require cable protection has been included in the project envelope for the instance where a cable cannot be buried, as it is acknowledged that cable burial is not always possible for an entire cable route. The amount assessed is considered conservative, with Mr Parker pointing to Table 3.1 of the Cable Protection and Designated Sites Clarification Note [REP1-138] which refers to the Race Bank project which had 6.3% of the cable length requiring protection. In addition, he clarified that a range of cable laying techniques are within the project envelope, which should maximise the chance of burial. In this respect the Applicant would draw attention to the Applicant's Deadline 2 comments (REP2-004) on The Wildlife Trust Written Representation (REP1-023), which confirms the Applicant's understanding that the adjacent Sheringham Shoal export cables have not required any cable protection, while the Dudgeon export cables required only 70 m of cable protection between the horizontal directional drilling (HDD) ducts, which may represent more comparable examples to Hornsea Three than Race Bank.
- 5.28 In responding to an ExA query on whether these methods were informed by a geophysical assessment and whether the same tools were used for Race Bank, Mr Cross confirmed the tools were similar, but that the chalk structure was different, with the chalk being weaker for Hornsea Three. Mr Cross added that in respect of the cable risk assessment it would not be possible to provide specific locations of cable protection, as requested by NE, as it is a function of several factors that cannot be predicted. For example, mechanical wear and break down and weather as well as ground conditions. At the request of the ExA, Mr Cross gave an example of mechanically cutting soil with a mechanical breakdown due to chain wear, where it may not be possible to continue burial. The cable would be graded out, the chain repaired, then grade back potentially leaving a standing bite on or near the seabed. Mr Cross added that our preferred measure for protecting the cable in these areas would be additional burial (where possible) prior to secondary protection measures.
-

- 5.29 In response to NE queries on the amount of cable protection in the designated sites, Dr Linnane confirmed that the 10% maximum design scenario applied to the length of the cable within each of the SACs. In terms of proportions within the WNNC, 0.004% of Annex I sandbank feature, and within the NNSSR, 0.01% of Annex I sandbank feature, noting that this is the maximum design scenario and in reality the areas affected are expected to be less than this. Dr Linnane offered to provide breakdowns for each sub-feature within the WNNC, whilst making the conservative assumption that the full 10% is within each sub-feature. This clarification has been provided at Appendix 15 to the Applicant's response to Deadline 3.
- 5.30 Responding to further comments from NE on the geogenic reef feature, Dr Linnane confirmed the Applicant had not seen evidence of this and would welcome receipt of it from NE. He referred to the proposed standard, primary mitigation to avoid impacts, using micro-siting to avoid direct impacts on reef features. If Annex I geogenic reef features are avoided during construction, it follows that they will not be affected by placement of cable protection (as their extent and distribution is not variable).
- 5.31 In responding to a point made by NE regarding the HVAC/HVDC technology choice, the procurement timelines for each and concerns over the availability of cable for micrositing, Mr Parker explained that NE had misunderstood the procurement process for HVDC technology and clarified that whether or not HVAC or HVDC is used, sufficient cable would be procured with sufficient time to allow for micrositing.
- 5.32 Dr Linnane confirmed in response to a query from NE regarding limitations on information to inform micrositing, that evidence is available from historic desktop sources, including (but not limited to) the adjacent Cromer Shoal Chalk Beds MCZ where extensive data are available, and there is nothing to suggest that the site would be dramatically different as Annex I reefs are not very prevalent in the area. Additionally, Dr Linnane confirmed that in his professional experience the mitigation proposed is tried and tested and standard for offshore wind, oil and gas and interconnectors.
- 5.33 Mr Parker responded to concerns from NE on the grain size and mobility of cable protection by highlighting that the Applicant has committed to restrictions on the cable protection in the nearshore MCZs, to use rock grading similar to cobbles with a mean grain size of 100mm, and a maximum grain size of 250mm. The mean grain size quoted was also verified by NE. Mr Parker stated that in engineering terms, this is equivalent to CP63/180 armour stone grading, a standard grading widely deployed on projects or protection works, including the Applicant's own projects. Mr Parker added that there are several design methods to rock design height, slope, width and density. Modelling of storm events have shown that the rock might reshape but will not be dispersed. In response to questions from NE on the Race Bank project's use of cable protection, Mr Parker advised that as far as he was aware, the average of 100mm up to 250mm max had been used on that project too. He confirmed that the Applicant's opinion was that this was sufficiently durable in the dynamic nearshore environment, and he was not aware of issues regarding dispersal.
- 5.34 **Biogenic reef issues:**
- 5.35 In response to an ExA question, Dr Linnane confirmed he was not aware of peer reviewed evidence on the success of micrositing, noting that this standard industry methodology would not typically be reported in peer reviewed literature. He explained to the best of his knowledge this has been standard mitigation to avoid impacts on Annex I reefs, including biogenic reefs, for offshore wind farms over the last ten years, and has been included in every application, as well as being standard in the oil and gas industry. In particular, the York to the Easington Terminal pipeline on the Yorkshire coast was effectively micrositied around mapped cobble reefs. The Saturn pipeline, which originally identified the Saturn Reef, was routed around the Saturn *Sabellaria spinulosa* reef and there are many oil and gas activities (including exploration drilling) within the NNSSR SAC which would have avoided Annex I reef features. In addition, micrositing was referred to and accepted as a valid and appropriate mitigation for avoiding Annex I reefs in the NNSSR conservation objectives with regard to aggregate extraction operations.
- 5.36 Dr Linnane replied to comments by NE regarding examples of micrositing in designated sites, clarifying that although it is more important in a designated site, the process of micrositing is the same whether undertaken inside or outside of a designated site, or whether the micrositing is around a sensitive habitat, or an unexploded ordnance or archaeological feature.
-

- 5.37 Dr Linnane responded to NE's comments around feasibility of micro-siting, citing the core reef assessment within Volume 2, Chapter 2, Benthic Ecology of the Environmental Statement (APP-062). This assessment was undertaken to test the possibility that *Sabellaria* reefs could develop across the cable corridor between characterisation and construction and validate the confidence in micro-siting as primary mitigation. That assessment demonstrates that the cable corridor is wide enough to allow micro-siting around Annex I features should they form in the intervening period. The impact assessment considered a range of scenarios from zero to six cables being installed through mapped reef features. This exercise demonstrated that avoidance was the most likely scenario due to adequate space between the edge of the mapped reefs and the edge of the offshore cable corridor. The scenarios of a large number of cables passing through Annex I reef is highly unlikely. The conclusion of the assessment was minor adverse significance at worst in the ES, and no adverse effect on integrity in the RIAA given the space provided for micro-siting.
- 5.38 Referring to an Annex I reef layer produced by JNCC that NE had provided, Dr Linnane confirmed that the Applicant is aligned with NE on reducing the harm to high confidence or established reef but the Applicant does not agree that the latest JNCC mapping demonstrates an increased risk to areas of established or high confidence reef.
- 5.39 Dr Linnane explained this particularly the case for those new locations where JNCC recorded reef to the east of Areas E to G (referring to Figure 2.9 of the Benthic Ecology ES chapter). He noted these areas were not recorded either in Hornsea Three site specific surveys, or in historic JNCC data, and would not qualify as high confidence or established reef. Where the latest JNCC Annex I reef layer shows records of reef in the vicinity of Areas D and A and B, Dr Linnane agreed that these areas are more akin to high confidence or established reef because reef has historically been recorded in this area, however, the assessment presented in the Benthic Ecology ES chapter demonstrates sufficient space to route around these features.
- 5.40 The Applicant also questioned NE's proposed application of 500m buffers (which are understood to be a management measure) around point data locations as indicative of reef extent, given the data point may or may not indicate reef and this approach invalidates JNCC's Gubbay Guidelines (2007), meaning that all reef areas would be classified as medium to high quality reef just based on extent. The Applicant has provided these guidelines for the examination library (see Appendix 7 to the Applicant's response to Deadline 3), and awaits sight of the JNCC data from NE.
- 5.41 **Assessing Markham's Triangle:**
- 5.42 Dr Linnane confirmed that the Applicant had followed the approach to assessment of the pMCZ as recommended by Natural England and JNCC, with no objectives set of following a higher level assessment.
- 5.43 In relation to this site, Dr Linnane drew attention to the reduction in the maximum design scenario, which started off as assessing 24% of infrastructure (i.e. interconnectors, turbines and foundations) being in Markham's Triangle, but has now been reduced to 10.5%. The Applicant's Deadline 2 response provided a breakdown of the temporary and long term habitat loss on a feature by feature basis. This is provided in the Applicant's Deadline 2 comments (REP2-004) on Annex D6 to Natural England's Written Representation (REP1-125). The Applicant has also presented a narrative on the project lifetime effects on the features of the Markham's Triangle pMCZ, in response to Natural England's Written Representation and this is presented at Appendix 14 to the Applicant's response to Deadline 3.
- 5.44 In response to a question from the ExA regarding what evidence has been provided if the ExA were to conclude there were significant effects, Mr McGovern agreed to confirm this in writing.
- 5.45 In this regard the Applicant advises that its evidence for the purposes of a MCZ assessment is principally collated in Appendix 2.3 (Marine Conservation Zone Assessment) of the Environmental Statement [APP-104] as re-iterated in the Applicant's Deadline 2 comments (REP2-004) to Annex D6 of Natural England's Written Representation (REP1-125).
- 5.46 The Ex.A, Natural England and the MMO discussed the responsibilities for undertaking the MCZ Assessment and the MMO highlighted that guidance on MCZ Assessment is available on the MMO website. The Applicant would note that the MCZ Assessment presented at Volume 5, Annex 2.3; MCZ
-

Assessment (APP-104) has been undertaken with reference and due regard to the MMO guidelines (2013). This is considered to include all the relevant information required for the Secretary of State and/or the MMO to discharge their responsibilities at the time of undertaking the MCZ Assessment.

- 5.47 The MMO guidelines recommend a staged approach to the assessment, with three stages: Screening, Stage 1 assessment and Stage 2 assessment. The Applicant's Screening and Stage 1 assessment conclusions can be found in Appendix 2.3. The Applicant has concluded that Hornsea Three does not represent a significant risk to hindering the conservation objectives for Cromer Shoal Chalk Beds MCZ or Markham's Triangle pMCZ. The Applicant does not agree that a 'Stage 2' assessment is required.
- 5.48 It is noted that the MMO guidance suggests that the Stage 1 assessment consider the condition in section 126(7)(a) of Marine and Coastal Access Act 2009 ("**MCCA**"), that is whether there are other means of proceeding which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the relevant MCZ. Full details of the iterative process followed by the Applicant in considering alternatives including the rationale for the Hornsea Three offshore cable corridor and landfall point is in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the Environmental Statement [APP-059], Volume 4 – Annex 4.1 – Grid Connection and Refinement of the Cable Landfall [APP-092] and Annex 4.2 - Selection and Refinement of the Offshore ECR and HVAC Booster Station [APP-093].
- 5.49 At a high level, offshore cable routing is an exercise in seeking to find the shortest route between two fixed points: the offshore Agreement for Lease to a chosen landfall site to facilitate the contracted grid connection point, having regard to constraints dictated by engineering limitations, physical, third party and environmental constraints and seabed use.
- 5.50 National Grid Electricity Transmission's ("**NGET**") response to FWQ 1.1.11 explains alternative grid connection locations (e.g. Necton) considered and discounted and why Norwich Main was chosen as the preferred connection option. Landfall locations were in turn constrained by the chosen grid connection location at Norwich Main. Again Volume 4 – Annex 4.1 – Grid Connection and Refinement of the Cable Landfall [APP-092] explains the basis for the landfall location.
- 5.51 Due to the position of the array area and landfall location, avoiding designated sites including the MCZs completely is not considered feasible. Careful consideration was given to minimise the extent of the corridor within sensitive areas such as the Cromer Shoal Chalk Beds MCZ and the WNNC SAC amongst others. At this stage, consistent with paragraph 5.3.9 of NPS EN-1, which identifies International Sites as the most important for biodiversity, preference was given to reducing overlap of European designated sites (SAC) over nationally designated sites (MCZ). However, stakeholder feedback influenced the later re-route in the nearshore to reduce the length of cable within the MCZ.
- 5.52 The Hornsea Three offshore cable corridor assessed in the PEIR and consulted on during section 42 consultation had a greater overlap and degree of impact on the Cromer Shoal Chalk Beds MCZ, including the potential for direct cabling impacts on designated features with no recovery potential (i.e. clay exposures). By comparison, the re-routed Hornsea Three offshore cable corridor has a much smaller impact on the Cromer Shoal Chalk Beds MCZ and avoids direct impacts on features with no recovery potential and considerably reducing the impact from cable protection (see Appendix 6 to the Applicant's response to Deadline 1; REP1-138). Through an iterative design process and consideration of alternatives, the combined impact on the two nearshore marine protected areas (i.e. the Cromer Shoal Chalk Beds MCZ and WNNC SAC) has been substantially reduced from that associated with the offshore cable corridor proposed within the PEIR.
- 5.53 As noted at the ISH and in the Applicant's Deadline 2 response, having noted Natural England and JNCC's comments on the extent of infrastructure within Markham's Triangle pMCZ, the Applicant has managed to reduce the maximum design envelope substantially. As a result, the maximum infrastructure within Markham's Triangle pMCZ has been reduced from 24% (which represented an absolute maximum amount of infrastructure which theoretically could be placed within this area) to 10.5% (a more realistic maximum design scenario for array infrastructure). The implications of this reduction in design envelope are substantial for the predicted extents of temporary and long-term/permanent habitat loss within Markham's Triangle pMCZ. The Applicant will commit to this limit by adding an appropriate condition to the deemed marine licences attached to the draft DCO to be submitted at Deadline 4.

- 5.54 Therefore having considered alternatives including routing/ siting options, the Applicant's position remains that Hornsea Three does not represent a significant risk to hindering the conservation objectives for Cromer Shoal Chalk Beds MCZ or Markham's Triangle pMCZ as stated in Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement and re-iterated in the Applicant's Deadline 2 comments (REP2-004) to Annex D6 of Natural England's Written Representation (REP1-125). There is no requirement for any 'stage 2' MCZ assessment.