

From: Dominika Phillips [mailto:DOMPH@orsted.co.uk]
Sent: 08 February 2019 21:06
To: KJ Johansson; Kay Sully; Hornsea Project Three
Cc: Andrew Guyton; Stuart Livesey
Subject: Hornsea Project Three (UK) Ltd response to Deadline 6 (Part1)

Dear Kay, K-J

We are pleased to enclose Ørsted Hornsea Project Three (UK) Ltd (“the Applicant”) response to Deadline 6, Friday 8th Feb 2019. 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”).

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



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



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Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three Offshore Wind Farm

Written summary of Applicant's oral case put at Issue Specific
Hearing 5 (29th Jan 2019)

Date: 8th February 2019

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 5 (29th Jan 2019)		
PINS Document Number	n/a		
Version History			
Date	Version	Status	Description / Changes
08/02/2019	A	Final	Submitted at Deadline 6 (8 th Feb 2019)

Ørsted

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1. **INTRODUCTORY REMARKS**

- 1.1 Issue Specific Hearing 5 ("ISH") on Offshore Ecology was held at 09:30am on 29 January 2019 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 ExA on 21 January 2019 (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 and further written questions (the "**Response to Further Written Questions**") [REP4-012] 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: - Richard Turney (Counsel at Landmark Chambers) and Gary McGovern (Partner at Pinsent Masons LLP).
- 2.2.2 Present from the Applicant: - Stuart Livesey (Project Development Manager), Andrew Guyton (Consents Project Manager) Felicity Browner (Lead Offshore Environment Manager for Hornsea Three) and Gareth Parker (Electrical Project Manager).
- 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);
 - (b) Benthic Ecology – Dr Kevin Linnane (Principal Marine Ecologist at RPS Group plc); and
 - (c) Marine Mammals – Carol Sparling (SMRU Consulting) and Pete Gaches (GoBe Consultants Ltd).
- 2.3 The following parties participated in the ISH:
- 2.3.1 Natural England ("**NE**");
- 2.3.2 Marine Management Organisation ("**MMO**"); and
- 2.3.3 The Wildlife Trust ("**TWT**").
- 2.4 In response to comments on volume of documents by Natural England ("**NE**"), Richard Turney for the Applicant, noted that there was a large amount of information, but some, particularly relating to ornithology, was provided not due to it being part of the Applicant's case, but to explore factors in issue, and NE's position. Material is intended to assist so that the scope of dispute is narrowed.
- 2.5 In response to the ExA's suggestion of an adjournment for NE to review materials they had not yet reviewed, Mr Turney stated that the Applicant is mindful of pressure on NE but the situation is unsatisfactory, particularly in relation to Deadline 4, which had passed two weeks ago. He added

that whilst the volume of submissions for Deadline 5 was large, the substance could be understood within a short period. As a way forward, the Applicant was prepared to talk through any documents either directly to NE or in the hearing. NE could then provide its comments at the next deadline. Mr Turney emphasised the point that the examination time was running short - another hearing would only be five weeks away so there was not much time for NE to present its position. He added that at this stage in the examination there is a need to be effective and make progress.

- 2.6 In response to an ExA question, Mr Turney accepted that SNCB advice in relation to other offshore wind farm projects does not constitute legal precedent. Dr Kevin Linnane, for the Applicant, confirmed that the Applicant had discussed NE's advice on matters such as baseline data throughout the pre-application phase (through the Evidence Plan Expert Working Groups). Dr Linnane stated that the Applicant had thought that most of the issues had been resolved during expert working groups, and that some issues had not been raised prior to examination.
- 2.7 Mr Turney responded to an ExA question that some matters had not been raised previously but that the Applicant had tried to deal with them during the examination. It is the Applicant's view that the submissions provide an adequate answer to the NE's points raised.
- 2.8 Dr Linnane responded to ExA question and NE remarks on the point that the original expert working group discussions covered the original cable route, stating that the Applicant was aware that NE had residual concerns in relation to characterisation data used for the nearshore re-route and therefore survey data were collected in this area to validate the characterisation on which the ES and RIAA were based. This was presented via a clarification note supplied at Deadline 1 [REP1-140] and confirmed the characterisation presented in the ES and RIAA. It is noted that the re-route was proposed in response to comments raised during the Expert Working to address NE concerns. Dr Linnane confirmed that there was surprise around NE's comments on the baseline characterisation of other areas, including the North Norfolk Sandbanks and Saturn Reef SAC and Markham's Triangle, although as stated by Mr Turney, the Examination submissions to date have sought to resolve these points.
- 2.9 Mr Turney agreed to provide copies of papers that NE had not provided due to concerns over copyright.

3. AGENDA ITEM 3 – BENTHIC ECOLOGY

- 3.1 **Additional commitments Cable protection**
- 3.2 Discussing an ExA question on cable installation and decommissioning impacts, Dr Linnane confirmed that the Applicant would provide at Deadline 6 (Appendix 4) information on the feasibility of removing cable protection. He highlighted, responding to NE, that this was based on current technology and drew on experience from oil and gas, and offshore wind, as to the terms of effects of dredging on interest features and impact assessment effects relating to removal of cables during decommissioning, including tools which remove some sediment. Dr Linnane stated that it was expected that if a small amount of sediment was removed, the interest features would recover within the same timescales described as for the construction phase. Dr Linnane also noted that as Hornsea Three would be decommissioning in about 35 years, technological advances in the intervening period would occur, with technological advances expected to make decommissioning more efficient than that assessed.
- 3.3 Responding to an ExA question on dredging in the decommissioning period and inclusion of removal of cable protection, Dr Linnane advised that this was only in relation to cable removal. Activities such as jetting would disturb sediment and the assessment of effects of decommissioning was predicted to affect a corridor of up to 30 metres width (i.e. identical to construction phase impacts) but the width of cable protection would be much narrower and therefore within this disturbance corridor. Dr Linnane stated that the point of decommissioning is to reverse the long term habitat loss associated with cable protection, so there would not be a loss of the interest feature. Clarifying in reply to an ExA question, Dr Linnane added that the interest features were sand and gravel which would recover if cable protection could not be removed without removing a limited amount of sediment during decommissioning of rock. This is supported by evidence from the aggregates industry (i.e. when sand and gravels are removed, the seabed recovers over a period of

- years), which was used to inform the benthic ecology impact assessment (e.g. see paragraph 2.11.1.28 of Volume 2, Chapter 2: Benthic Ecology; APP-062; see also response to ExA question Q1.2.10; REP1-122).
- 3.4 Following a comment from NE regarding the Waddenzee case, Dr Linnane advised that current techniques could allow for cable protection to be removed, as per details to be supplied at Deadline 6, so there was no lack of certainty in the assessment as the Applicant was not relying on future technology, only that the current methods may have improved.
- 3.5 Mr Turney added that the Applicant's assessment is that in the total habitat loss scenario, there could still reach the conclusion of no adverse effect on site integrity, so the application would not hinge on the question of removal of the cable protection. Nonetheless this is considered a beneficial mitigation measure. Mr Turney summarised that while NE have doubts on efficacy, this would not affect the Applicant's case on adverse effects on integrity.
- 3.6 Addressing an ExA question on the 25% replenishment rate, Dr Linnane advised that the 25% replenishment figure was considered in the long term habitat loss numbers in the Environmental Statement ("**ES**") and Report to Inform Appropriate Assessment ("**RIAA**"). He advised that the assessment was based on the maximum design scenario, in terms of footprint and volume of cable protection. On the point around decommissioning, Dr Linnane said that it would be equally feasible to decommission cable protection that has been replenished. In terms of adverse effects on integrity, Dr Linnane stated that the scenario of replenished cable protection was fully assessed, should that be required. In response to an ExA point, Dr Linnane added that replenishment would be within the limits of the maximum design scenario (for footprint and volume) assessed within the ES and the RIAA. He stated that the outline in cable protection plan (within the outline Cable Specification and Installation Plan; "**CSIP**"; REP5-011) would outline the maximum design scenarios for footprint and volume for each designated site, to ensure this is clearly auditable in the post consent phase, and that the 25% amount was already secured in the draft deemed marine licences ("**DMLs**").
- 3.7 Responding to NE's question on the justification for the 25% figure, Dr Linnane advised that the justification for this is outlined in the Applicant's Deadline 4 and 5 responses (response to ExA question Q2.2.53 (REP4-012) and comments on Natural England's response to ExA question Q2.2.60; REP5-008), although it should be noted it is a developing issue, but that this was considered to be adequately conservative. The point of including the figure was to avoid future amendments to the DMLs.
- 3.8 Gareth Parker, on behalf of the Applicant, added that previous submissions had provided papers on scour protection, outlining developments in science around rock design and how it could be mitigated. Mr Parker stated that these provide justification on use of contingency (Rouland et al, 2018 (a) and (b) submitted at Deadline 4 (REP4-069 and REP4-070)).
- 3.9 Dealing with NE's request for clarity on the reason for 25%, Mr Parker advised that the figure was remedial, so over a 35 year period it would depend on the specific metocean conditions and the likelihood of storm events, which cannot be clarified now. 25% was selected as reasonably conservative based on the Applicant's experience of other projects.
- 3.10 In response to a question of the ExA, Mr Parker confirmed that the trenching assessment was not intended to identify where cable protection would be required, but to characterise the site, and to set out trenching solutions. Mr Parker stated that when cable protection is designed, it is designed to build in hydraulic stability so that it will not disperse in storm events.
- 3.11 Mr Turney advised in reply to a comment from the ExA, that page 30 onwards of the Preliminary Trenching Assessment [REP5-010] contained a note on lessons learned from other projects that could be supplemented if the ExA had detailed questions. Dr Linnane added that the Applicant's experience across its portfolio would have projects with similar sediments and wave exposure to Hornsea Three (e.g. see REP1-138 and REP1-183 for comparisons with other relevant projects in relation to marine processes, including sediment transport).
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- 3.12 Mr Turney responded to a query from NE that the 25% replenishment figure in the DCO was 25% of the 10% of the cable route that was assessed to have cable protection in the assessments and forms the envelope. The 10% may be during construction but could also be laid later. He clarified that this is the assessment but that the Applicant would always aim to minimise the need for cable protection.
- 3.13 Dr Linnane confirmed that the environmental statement (“ES”) and report to inform appropriate assessment (“RIAA”) had assessed cable protection being in place for 35 years, being the maximum design scenario.
- 3.14 Mr Turney advised that the RIAA included the envelope that was assessed and as described at the hearing. Dr Linnane added that the maximum design scenario is up to 10% of the export cables installed within each designated site, for example, only 1 km of the offshore cable corridor would be within the Cromer Shoal MCZ (with up to six cable circuits), so 10% would related to the total cables in that MCZ i.e. 0.6km across the six cables. The DCO includes a total cable protection volume figure which includes the 25% replenishment. Within the RIAA and the MCZ Assessment, the maximum design scenario assessed for cable protection includes the 25% replenishment assumption; the maximum volume of cable protection (for the DCO as a whole and for the individual designated sites) therefore incorporates any additional volume of cable protection where replenishment may be required during the operation and maintenance phase.
- 3.15 In reply to a query from NE asking if the HVDC option was pursued and fewer cables were laid, Mr Turney confirmed that the worst case option HVAC option had been assessed. The Applicant would reiterate that the assessments undertaken within the ES and the RIAA were based on a maximum design scenario which, for rock protection, assumed maximum design parameters including up to 10% of export cables requiring cable protection and up to six export cable circuits installed. The conclusion of the Applicant’s RIAA is that this maximum design scenario will not lead to an adverse effect on integrity of either the SACs considered. There are many circumstances whereby habitat loss impacts to individual receptors would be less than the maximum design scenario, including lower numbers of turbines and substations, smaller foundation footprints of offshore structures (e.g. using foundation types which are smaller than the maximum design scenario), reduced numbers of cables, proximity to assets during detailed design at crossings, achievement of target burial depths for electrical cabling etc.
- 3.16 As outlined in the outline CSIP, the Applicant will specify within the CSIP the maximum design scenarios for cable protection measures (i.e. footprints and volumes, which includes replenishment) for each designated site as assessed within the RIAA and MCZ Assessment. As set out in the outline CSIP, the Applicant will work with the MMO and SNCBs to ensure that these are minimised, where possible, and to ensure clarity and auditability on the amount of such infrastructure placed within designated sites, within the limits of the DCO as assessed within the RIAA. Due to the conclusions with respect to adverse effects on integrity, it would not be appropriate at this stage to speculate on how changes to the wide range of project design parameters, including transmission systems, could affect the volumes of rock protection and associated footprints within the DCO boundary.
- 3.17 Responding to an NE request for clarity on the reasons for comparing to Sheringham Shoal and Dudgeon rather than Race Bank, Dr Linnane stated that the comparison is primarily in relation to requirement for cable protection and ability to install without cable protection. In terms of concerns on pre-construction data, the outline CSIP and monitoring require all activities in SACs and MCZs to be reported to NE as soon as possible. Dr Linnane advised that the comparison of Sheringham Shoal and Dudgeon is about ability to install cables without protection.
- 3.18 Mr Parker answered an ExA question on the substrate being harder at Sheringham Shoal and Dudgeon and the comparison not being valid by stating that while he could not comment on the conditions relating to those projects due to lack of ground surveys, the Applicant did have geophysical and geotechnical surveys for the proposed cable route which are characterised in the preliminary trenching assessment which suggests that it is eminently feasible to install in ground conditions using the tools in that report.
- 3.19 Mr Turney responded to NE's concerns over lack of information regarding to cable protection and
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amount of sandwave levelling, by suggesting that NE review and digest the Applicant's submissions. He added that there was nothing in Waddenzee or the Habitats Directive that required all uncertainties to be resolved. The core requirement was to proceed on the basis of the best scientific evidence, and to deal with matters of doubt on a precautionary basis. Mr Turney stated that it was wrong to state the approach was one of great flexibility – a maximum design envelope had been assessed and mitigation measures had been proposed.

3.20 Addressing NE concerns over past projects, Mr Turney stated that it had to be remembered that many of those projects had been consented a long time before, and the Applicant has demonstrated that it has learnt lessons from them. He stated that the key point is that the Applicant has proposed and assessed a design envelope. If the Applicant stepped outside this, it would need fresh consents and potentially further appropriate assessment. Mr Turney continued that it was deliberate to consider cable protection in the DCO to ensure those eventualities are assessed at development consent stage. This has been designed by the Applicant based on lessons learnt from previous offshore wind development rounds. This is to ensure all impacts are considered as part of the consent application and appropriate assessment at this stage.

3.21 In response to comments from NE that the worst case scenario was not the worst in other projects, Dr Linnane advised that a control not to go beyond this is in the Outline CSIP and the Applicant would welcome feedback from NE and the MMO on this.

3.22 **Special Areas of Conservation**

3.23 Mr Turney stated that the Applicant would invite the ExA to accept the conclusions of its RIAA, as NE had doubts but offered no conclusion. He added that it was a very surprising position if NE were saying that as they had doubts but no conclusion and could not advise on the RIAA and necessary stages of assessment, the application for a nationally significant project would have to be refused. He reiterated that the Applicant's conclusion on its precautionary assessment on a worst case envelope was that there will be no adverse effects on integrity.

3.24 Dr Linnane added that the geophysical and geotechnical data, including publicly available data sets on designated sites in the preliminary trenching assessment provides enough data to produce an initial ground model. He added that further information from the oil and gas industry would not affect that confidence.

3.25 In response to a statement from The Wildlife Trusts in relation to the updated condition assessment for the Wash and North Norfolk Coast SAC (updated on the NE website 28 January 2019), Dr Linnane stated that the Applicant would review this and provide a response at Deadline 6 (presented at Appendix 5 to the Applicant's response to Deadline 6).

3.26 **Marine Conservation Zones**

3.27 Dr Linnane agreed to take away a point raised by the ExA on the implications of the reduction in the maximum design scenario for Markham's Triangle rMCZ from 24% of array infrastructure placed in this area to 10.5%, and how this was assessed. The reduction in the maximum design scenario for Markham's Triangle as set out in the Applicant's responses to Deadline 2 [REP2-004] and Deadline 3 [REP3-023] does not have any influence on the other assessments or the project design parameters within the DCO application. With respect to the project design, including turbine layout, the Hornsea Three array area can accommodate the remaining infrastructure outside Markham's Triangle rMCZ without affecting any of the other design parameters (e.g. minimum spacing between offshore structures).

3.28 The assumption of 24% of infrastructure placed within the rMCZ was considered to be the absolute maximum design scenario for the rMCZ as a receptor. This assumed the maximum number of turbines (assuming the minimum possible spacing between turbines of 1 km) which could be placed within the part of the rMCZ which overlaps with the Hornsea Three array area. None of the other topic chapters included the specific assumption of 24% of array infrastructure being placed within the boundary of the Markham's Triangle rMCZ, although some of the parameters on which the rMCZ maximum design scenario was based, would have been considered within those

assessments within other topic chapters (e.g. minimum spacing of 1 km between turbines for commercial fisheries receptors).

3.29 The reduction in the maximum design scenario for the rMCZ therefore has no implications for any of the other assessments within the offshore topic chapters of the Environmental Statement.

3.30 Mr Turney advised in response to comments from NE and the MMO that the Applicant's position was that there is no need to go down the measures of equivalent environmental benefit route, but if NE considers it necessary, then the Applicant would need advice at the next deadline as to whether what has been proposed is appropriate.

3.31 Following comments from the ExA, Dr Linnane advised that the Sotheran report was not made available during the pre-application phase via the expert working group, and it was published towards the end of the pre-application phase. The Applicant was therefore not aware of it until NE's relevant representation. Dr Linnane clarified that the Applicant did consider the raw data that underpins it in Volume 5, Annex 2.1: Benthic Ecology Technical Report [APP-102], and that he understood that JNCC had concerns about how the data has been analysed. However, the Applicant's overall conclusions would not be affected as set out in the Applicant's Deadline 5 response (Applicant's comments on Natural England response to Q2.2.56; REP5-008).

3.32 **Cumulative effects**

3.33 Dr Linnane confirmed that he had reviewed the updated Annex 1 reef layer, and the Applicant had set out its position on NE's Deadline 3 submissions in its Deadline 4 response (see Applicant's response to ExA question Q2.2.54; REP4-012). Dr Linnane stated that the Applicant's position is that pre-construction surveys would identify the areas of high confidence reef (following the definition provided by NE at Deadline 3). He added that the justification for a 500 metre buffer is based on fisheries management and uncertainty over where reefs may develop over time. Dr Linnane confirmed that in order to resolve NE's concerns, the Applicant is considering amending the temporary work areas within Work No 4 to allow cable works to be undertaken in these areas, which are within the order limits. He indicated that that the northern temporary working area is feasible and would avoid the precautionary buffers that NE have included in the GIS layer. Dr Linnane stated that the Applicant would provide a report on the feasibility of this at Deadline 6 (see Appendix 24 to the Applicant's response to Deadline 6).

4. **AGENDA ITEM 4 – MARINE MAMMALS**

4.1 **Baseline survey**

4.2 Dr Carol Sparling for the Applicant advised the ExA on a question on the observed gaps in the values of the acoustic surveys, and how many samples were taken that she would seek further clarity on this from the contractor who had undertaken the surveys. Dr Sparling confirmed that an extensive hydrophone survey of the whole Hornsea Zone plus a 10km buffer had been undertaken. The gap in acoustic survey coverage was a relatively small part of the southern area within that zone.

4.3 **Site Integrity Plan**

4.4 The ExA asked NE how the Piling Protocol could be updated in the absence of updated guidance from the SNCBs. Peter Gaches, for the Applicant, responded to the response from NE requesting a range of mitigation measures within the Site Integrity Plan ("SIP"), advising that this was a conflation between the Marine Mammals Mitigation Protocol ("MMMP"). Mr Gaches clarified that the MMMP is a means to control the potential impact of auditory injury, in the form of Permanent Threshold Shift ("PTS") on individual animals, whereas the SIP is the control mechanism to ensure that the Project cannot come forward until it has demonstrated that there is no risk to site integrity to the SNS SCI. Where necessary this process will ensure mitigation is applied to reduce the residual risk to acceptable levels. Mr Gaches advised that the structure was based on other examples, and included everything that NE requested in its Deadline 4 list has been provided for.

- 4.5 In terms of agreements on the SIP, Mr Gaches advised the ExA that the Applicant was in agreement on the content and process with the MMO, and the same should apply to NE, save for some issues on regulatory matters which are outside the scope of this project.
- 4.6 Mr Gaches, for the Applicant stated that NE's concerns related to the regulatory mechanism for managing multiple projects' SIPs to manage cumulative effects to ensure no adverse effect, under a scenario where various projects undertake noisy activities at once. He advised that although the Applicant considers it highly unlikely that such a construction scenario would occur, there are a suite of mitigation options which could be put in place under the SIP, if needed, that offer a range of noise reduction, noting that some of which can remove the impact of noise completely.
- 4.7 Responding to a question from the ExA in relation to the table of harbour porpoise return times submitted at Deadline 4, Dr Sparling agreed to supply a copy of the underlying studies (Graham et al, Brasseur et al) for the return times provided.

5. AGENDA ITEM 3 – OFFSHORE ORNITHOLOGY

5.1 Roadmap

- 5.2 Felicity Browner, for the Applicant, confirmed that the Applicant had received some brief feedback from NE on the roadmap, which was considered as part of a resubmitted version for Deadline 5. Ms Browner added that NE had provided an extensive list of data required, which the Applicant was considering to ascertain which had been provided already, and if not, whether and when it could be provided. She confirmed that the Applicant would provide an updated roadmap for Deadline 6.
- 5.3 Mr Turney advised that the Applicant's position is that there will be no adverse effect, and are content with the basis of the assessment. During the examination process there have been changes to the way that data is processed and analysed, for example regarding the boat based data, which has been excluded on NE's advice so that the Applicant's recent analysis relies solely on digital aerial data. Further, Mr Turney highlighted that the Applicant has incorporated new information on flight speeds and avoidance rates. Now, he advised, the Applicant has reached the point where it can present an alternative analysis in recent submissions which takes NE's point on apportioning range and analyses that through the lens of different corrections such as flight speed and avoidance rate, as summarised in the tables presented to the ExA. Mr Turney stated that now the Applicant needed NE to engage with that, and NE should advise the Applicant where they are on that analysis, and make comments on population viability and explain its conclusions, and a conclusion on adverse effects on integrity. Mr Turney emphasised that this needs to be done promptly, in a matter of weeks so that when the ExA advises the Secretary of State, it can be assisted by having NE's view on ecology impacts. Critically, Mr Turney stated, if NE consider there to be adverse ecology impacts, there must be a debate sooner rather than later on mitigation. Mr Turney emphasised that the Applicant considered that NE, although were requesting new material, had sufficient information to make a determination on adverse effects, and mitigation.
- 5.4 Responding to NE comments on being unable to rule out adverse effects on integrity, Mr Turney reiterated that it was deeply unsatisfactory for NE to be taking such a position. He highlighted that NE had made its points on baseline in the last ISH and in writing, and this point had now run its course. Mr Turney stated that the question is whether NE would not present their opinion on the figures, as if they did not, the ExA would have to consider the issue based on the information presented, building in normal precautions. Mr Turney advised that the Application's position is that NE should say that it has made its point on baseline, but will now engage in modelling not withstanding its points on baseline. If NE did not engage meaningfully on mitigation, the ExA would have to report on the information as it stands. He invited the ExA to advise whether the roadmap process should continue without NE engagement, or if NE should be asked to engage with it.
- 5.5 Following comments from NE, Mr Turney reiterated the need for their comments on the numbers, as without those the ExA was no further forward than when it received the RIAA, as it does not have NE's technical input. Responding to NE's concerns that its position could set a precedent for future projects, he stated that this was not a risk if NE say that they assume the figures are correct, then the ExA can when reporting to the Secretary of State either side with NE on baseline, or the Applicant, and then consider no adverse effect, or on mitigation. Mr Turney requested a further

hearing on ornithology.

5.6 **Collision Risk Model**

5.7 **General**

5.8 Dr Tim Norman, for the Applicant, responded to comments from NE on the Collision Risk Analysis for gannet and kittiwake presented at Deadline 4 [REP4-049] that the summary tables at the beginning of the document include all model options and avoidance rates. He asked that NE extract the rows that relate to their position.

5.9 Ms Browner confirmed that the Applicant had held a call with NE and given an overview and signposting of the document.

5.10 Dr Norman stated that the Applicant's intention was to provide clarity, and an alternative analysis based on a different set of assumptions, not to set out NE's position. Following ExA clarification on its request, Dr Norman advised that the numbers in the table would be the same, but it would have fewer rows. He had sought to show for the different avoidance rates under discussion what difference this would make to the collision risk. Alternative analysis includes positions presented by NE, but it has not been presented in the table in this way. Following a request from the ExA, Dr Norman agreed to provide for Deadline 6 a more direct comparison of the Applicant's and NE's positions.

5.11 Matthew Hazleton, for the Applicant, confirmed in response to an ExA question that the adjustment in paragraph 55 of the Band model for large arrays had not been applied, and he was not aware of a project that had done so. He confirmed that, when applied, the large array correction results in a slightly lower predicted collision rate, although the difference is unlikely to be significant. As it stands, the Applicant's collision modelling slightly over-estimate collision risk (as a consequence of not applying the large array correction factor).

5.12 Mr Hazleton responded to an ExA question on migratory waterbird species confirming that a suite of such species was considered in Appendix C of Annex 5.3 of the application [APP-109]. Dr Norman added that these species potentially at risk had been decided following pre-application discussions, based on a list from Hornsea Project Two, but there is no statement of all species excluded. He confirmed that the process was consistent with 2.6.59 of National Policy Statement EN3.

5.13 **Flight height**

5.14 Mr Hazleton advised that Johnson et al was an update on Cook et al. He confirmed that Johnson is the accepted paper on flight height distribution data. Dr Norman added that Johnson provides the best generic information on flight height distributions, but site specific information must be considered.

5.15 Dr Norman advised the ExA that Skov et al had not been used to inform flight heights in the collision risk model as the ORJIP bird collision avoidance study was configured to measure bird avoidance behaviour around an operational wind farm, not an attempt to provide a flight height distribution as Johnson et al was. He added that there were other factors around it at that location but that the study did not record flight height and distribution in a way that could directly be used in collision risk modelling.

5.16 Responding to NE comments, Dr Norman stated that the Band model is imperfect but it is the best tool available to quantify risk. The ORJIP study shows that it is very precautionary.

5.17 A question was asked about how appropriate it is to use the extended version of the Band model with flight data obtained from boat-based surveys combined with density observations from aerial survey data. Dr Norman advised that the intention in Johnson and Cook was to provide generic

flight height distributions for use in the extended model. Flight heights and densities can be obtained separately using different methods. Dr Norman agreed to provide a copy of this paper.

- 5.18 On the use of LiDAR, Dr Norman responded to NE comments, to confirm that the Applicant has good information on flight height from boat-based surveys for the project site. Lidar is not relied upon to provide flight height distributions but to confirm and contextualise those obtained from the boat-based method.
- 5.19 Dr Norman highlighted in response to NE points on the use of Option 1, that NE's position in Hornsea Project Two was to use Option 1 on the basis of the site-specific flight height data that was available. The data on flight heights available for Hornsea Project Three were collected using the same methodology. The Applicant considers that the data available on flight heights for Hornsea Project Three obtained from those boat-based surveys are more than sufficient to inform the use of Option 1 of the model. Natural England has previously advised a threshold of 100 discrete site-specific flight height observations for this purpose. In this case, the Applicant has more than 100 site-specific records per species, save for Herring Gull, which exceeds that number data from the wider Hornsea Zone are included.
- 5.20 Answering a question from the ExA, Dr Norman confirmed that Lidar is not just another form of generic data, it provides highly accurate measurements of the flight heights of birds (probably to within 3 centimetres). The generic data included in Johnson et al., which are used in Option 2 and 3 of the model, are based on an aggregation of observations from boat-based surveys. Those surveys typically do not precisely measure the height of birds but rather categorise them into flight height 'bands'. In this case, the Applicant has site specific data (from boat-based surveys) which have been contextualised using the most accurate method available (LiDAR). On this basis, the Applicant prefers the use of Option 1 as this makes best use of these data.
- 5.21 Mr Hazleton advised the ExA that the methodology applied to obtain flight height data through the use of Lidar had been validated by Marine Scotland through a trial in the Forth and Tay (i.e. the Applicant was not relying on the Marine Scotland data for the flight heights in its assessment, but using that material to demonstrate the reliability of LiDAR for assessing flight heights). Dr Norman advised that given that the data was from outside the breeding season this is why it is used as a support for boat based data to contextualise, and provide support for the overlapping data point of September.
- 5.22 **Flight speed**
- 5.23 Dr Norman stated that, in the absence of any specific guidance, it is practitioners of collision risk modelling that typically identify appropriate information on bird characteristics for use in modelling, including flight speeds. As Skov et al (2018) now demonstrably represents the best source of empirical data on flight speeds, those data have been used in this case. Responding to a criticism that the data obtained in the ORJIP study (reported on by Skov et al. (2018)) are site specific, Dr Norman pointed out that ORJIP had been the most detailed and extensive exploration of bird behaviour at an operational wind farm undertaken to date. In the unlikely event that it would ever likely to be replicated (given the considerable cost involved), then no doubt the results obtained from any future study would also be site specific. Indeed the same criticism that could be applied to flight speed data obtained from sources such as Alerstam et al (2007) and Pennycuick (1987) which were based on an extremely small set of observations. By any objective measure, he advised, Skov et al is the best evidence available on the flight speeds of the birds at risk at Hornsea Three. Dr Norman confirmed that using Skov would lead to a lower predicted collision risk than would be the case if values derived from, for example, Alerstam et al (2007) and Penycuick (1987) were used.
- 5.24 Mr Turney advised NE that whilst the Applicant was happy on position in RIAA it recognised the need to update it. The position in the RIAA was that there would be no adverse effect even without updates and corrections. Mr Turney stated that the exercise to update the RIAA needs to be done on best available evidence, which in respect of flight speeds was Skov. Mr Turney confirmed that the Applicant had applied that flight speed data in the table as one correction so it can be seen how that data affects the collision risk numbers on each modelled scenario. He reminded NE that it was still open to them to accept the RIAA analysis, or if they want to depart, to do so on basis of more

up to date information. Mr Turney stated that the Applicant could present the change from Skov data in a way that would assist NE.

5.25 **Avoidance Rates**

5.26 Dr Norman stated that avoidance numbers used in the Application were those typically applied for collision risk impact assessment. Dr Norman stated that the application highlighted that data obtained from ORJIP, however, pointed to higher avoidance rates (and hence lower risk) than was currently being used in collision risk modelling. ORJIP was the largest and most sophisticated study of its kind and Natural England were involved in the project. Dr Norman stated that it was his understanding that JNCC wanted to understand the implications of ORJIP (as reported in Skov et al) for collision risk modelling and had commissioned a review. That review is now published (Bowgen and Cook 2018) and, therefore, represented JNCC's view on appropriate avoidance rates for use in collision risk modelling.

5.27 Responding to a comment by NE that collision risk modelling should be undertaken using the new 'stochastic' model, Dr Norman stated that this directly contradicted NE's advice at the previous ISH.

5.28 Dr Norman stated that regarding the collision rate for kittiwake, that the Applicant had presented a range of values for each species and explained why 99.2% is better than 98.9% and drawn conclusions based on the full range. Adding to this, Mr Hazleton confirmed that the Applicant had considered the uncertainty in the ES and RIAA and included the 98.9% and 99.2% for kittiwake. In response to an ExA query he confirmed that using a 99.2 avoidance rate over 98.9% lead to a 27% reduction in collisions and that an avoidance rate of 99.5% over 98.9% for lesser black backed gull would lead to a 60% reduction. Answering an ExA question, Mr Hazleton advised that if the ExA disagreed with the underlying empirical avoidance rates then the ExA does not have to find that the Applicant underestimated collision risk rates in the ES and RIAA as the Applicant had used a wide range of avoidance rates and model options and incorporated all figures. Dr Norman added that the publication of Bowgen and Cook (2018) could help to reach conclusion on all avoidance rates.

5.29 Responding to a query on assignment of kittiwake to the large gull category, and the impact on the collision risk assessment, Dr Norman advised that 98.9% is the value associated with large gulls. Whilst Cook et al recommended 99.2% (on the basis of kittiwake being a small gull, which it is), there was a question about how precautionary that was for kittiwake. The SNCBs decided to use 98.9% because they felt that this was more precautionary for kittiwake.

5.30 On the question of whether Bowgen and Cook been recommended for use in the collision risk at other offshore wind farms, Dr Norman advised that he was not aware of it being so applied, due to the recent nature of the publication.

5.31 Dr Norman was asked by the ExA whether the SMartWind and Forewind report, reference by the Applicant, was published. Dr Norman confirmed that it was not, but has been prepared in support of Applications made for Hornsea and Dogger zones. The reason for referencing that report was to highlight its recommendation for the use of 98% in the extended model. The Cook et al (2014) study discussed earlier on this agenda item did not provide an avoidance rate for kittiwake and gannet for use with the extended model.

5.32 **Nocturnal activity factors**

5.33 Mr Hazleton advised in response to NE points that the Applicant accepted that daylight activity may vary, but is of the view that nocturnal activity does not. He advised that Furness et al (2018) report on gannet nocturnal factors sought to take this into account.

5.34 The ExA highlighted that NE have mentioned a variation in the empirically derived nocturnal activity factors for gannet and kittiwake with no consistency amongst papers. Dr Norman responded that any consistency would be a surprise, given the variability in methods et cetera, however, the figures quoted were all consistently low (<10%).

- 5.35 Regarding nocturnal activity factors for gannet, Mr Hazleton confirmed that in Appendix 28 for Deadline 4 [REP4-049] NE's proposed nocturnal activity factors had been used.
- 5.36 Dr Norman advised in reply to an ExA question that the ORJIP study recorded by far the largest set of data on nocturnal activity for an operational wind farm and represents a significant body of data. The issue is that it has yet to be analysed in any detail as it was not a primary focus of the study. Mr Hazleton clarified that the data was used contextually not as a quantitative figure, as the authors (Skov et al) suggested.
- 5.37 **Cumulative Assessment**
- 5.38 Dr Norman stated in response to NE questions that the Applicant's Appendix 62 submission at Deadline 4 [REP4-081] is a summary and that he was unaware of other features that would be part of the likely significant effects screening. The Applicant stands by the conclusion in the assessment and there was no evidence that a significant effect had been missed.
- 5.39 Responding to a point by NE on potential headroom from other projects, Mr Hazleton advised that Appendix 4 to Deadline 1 [REP1 -148] provided a review of other projects and identified projects where no future development would be possible based on the consents for those projects.
- 5.40 Following comments from NE seeking confirmation from a regulator, Mr Turney advised that NE had the information for some time. There would be no means to get such confirmation from the regulators, and it seemed to be an attempt to retain a degree of uncertainty when it could be closed down. Mr Turney stated that NE should either say that the document is wrong, and why, or agree it.
- 5.41 Mr Hazleton, responding to NE, advised that the Applicant was pointing out the discrepancy between the scale of impacts predicted in Applications (based on worst case scenarios) and those that were likely to arise from the schemes actually built as a source of uncertainty. Although the application documents had sought to quantify, where possible and reasonable, these differences, the information was used qualitatively in the impact assessment. Mr Hazleton confirmed that this type of uncertainty has been accepted by ExAs before, and all the Applicant had done was to quantify how much uncertainty there is. He confirmed that all of the quantification is based on a consented scenario where the project has been built and cannot be built out further.
- 5.42 Mr Hazleton responded to NE's point on differing sizes of turbines being an amendment that this has been taken into account, as evidenced by the treatment of the Dogger Bank, where the original envelope was retained, so the original consented scenario has been used. In relation to previous projects not having undertaken such corrections, Mr Hazleton pointed to Hornsea Project Two, which did this and it was accepted by NE, and East Anglia Three, the consent for which was based on a lower collision risk estimate for East Anglia One based on commitments from that project.
- 5.43 Dr Norman advised that it is possible to correct the predicted collision rates for projects that are not constructed according to their assessed scenarios. For example, where there is a simple reduction in number of turbines, the model will produce a predictable reduction in number if all other elements of the assessed scenarios stay the same. He stated that projects, almost without exception, are not built to the worst case parameters, and the Applicant is seeking to address this where it is possible to confidentially predict the effect.
- 5.44 **Biological seasons**
- 5.45 Mr Hazleton responded to an ExA question on the use of density estimates from other offshore wind farms stating that the Applicant had also used other data for bird movements as set out in Annex 3 of the RIAA [APP-054].
- 5.46 The Applicant had indicated that it had looked at the timing of movements of birds offshore using data from Hornsea Three and other offshore wind farms. The ExA asked if those other wind farms were further away from Hornsea Three than the Flamborough and Filey Coast SPA (i.e. 150km). Mr Hazleton advised that Hornsea Project One, Hornsea Project Two and likely one of the Dogger Bank projects were closer than 150 km, but this can be clarified after the hearing. Dr Norman pointed out that proximity to the breeding colony (which is an important considering the behaviour

of individuals from that colony) is a different matter to the issue being made offshore which was to do with the wider movements of migratory birds which is observed over a larger spatial scale. The Applicant was looking for evidence of those wider movements through the North Sea from the data available from wind farms situated in offshore settings.

- 5.47 Dr Norman confirmed that all boat-based observations within the Hornsea Zone were undertaken using a standard transect based survey methodology. Flight heights had been recorded to the nearest 5m.
- 5.48 With respect to the definition of the season, Dr Norman agreed with NE that it is an issue of the apportioning values applied in the different seasons. NE felt that categorising some months as non-breeding would lead to an underestimation of the collisions apportioned to the breeding colony. The Applicant argued the opposite, that there was a risk of apportioning impacts to the colony when there were few breeding birds present at the wind farm site and hence over-estimating the impact on that colony. Dr Norman pointed out that a shoulder period, with intermediate apportioning rates, for the disputed months was a reasonable compromise, but NE had not accepted this approach when it was suggested.
- 5.49 Following comments from NE, Dr Norman advised that the tracking data used in the best available evidence, and that it has been analysed and published. He confirmed that the applicant was not arguing that there was no connectivity, but took a precautionary view on the apportioning values, which, in light of those tracking data, now look high. He added that the data demonstrates that the approach is logical and precautionary.
- 5.50 Regarding a request from NE for displacement mortality rates, Dr Norman advised that the Applicant had presented the data by seasons and these could easily be combined by NE to provide an annual figure if they wished to do so. He pointed out, however, that this approach is arbitrary and does not reflect the likely annual mortality due to displacement. The annual mortality predicted using this method simply depends on how the year is divided into seasons. If you subdivide it further the annual mortality rate appears to increase.
- 5.51 Ms Browner highlighted that an issue on interpretation of NE's request had arisen as NE had not engaged to discuss a clarification on presentation.
- 5.52 Dr Norman responded to a query from the ExA on using Furness would cause an increase in collision risk, accepting that a change in seasons would make a difference. Mr Hazleton added that the percentage change would depend on the apportioning value applied.
- 5.53 **Apportioning rates**
- 5.54 Answering a query from NE on a difference in digital aerial data between this presented at the expert working group and now relied upon, Dr Norman agreed to take this away. Mr Hazleton added that any age class data should be considered alongside additional information such as Cleasby and the Langston report. He also highlighted that the approach for kittiwake and puffin was accepted by NE on Hornsea Project Two.
- 5.55 Regarding the Applicant's reference to the shoulder season, Dr Norman advised that this had been proposed but rejected. He advised that elsewhere partial months had also been used to account for months where there was likely presence of migratory birds, but this was difficult to calculate in practice as survey data (collected monthly) were not easy to separate for partial months (i.e. you wouldn't have a count for both parts of the month).
- 5.56 **Population viability analysis**
- 5.57 Dr Norman responded to comments from NE on population viability analysis (PVA) confirming that demographics change periodically. The Applicant had sought the response of the model author who had provided a response on the way the models work and what to include in them. Dr Norman explained that the applicant is not trying to simulate the population, not day to day or year to year, but to understand, comparatively, what difference additional mortality makes to growth rates and final population size. The updated parameter on productivity is a relatively weak contributor and

likely to affect impacted and unimpacted population trajectories in a similar way; therefore, it is not essential to use the most up to date model on this parameter. There was no reason to expect that using an updated value for this parameter would lead to a significantly different outcome.

- 5.58 Replying to NE's point on the number of runs undertaken, Dr Norman confirmed that 1,000 was used in the report by Cook, and that number is seen as a reasonable number of runs for this type of Monte Carlo analysis. Using more would produce a different result but Dr Trinder had recommended 1,000 runs.
- 5.59 Responding to a point made by NE on the way the density dependent version of the model had been constructed, Dr Norman asked whether this was worth addressing as NE have previously expressed scepticism about the inclusion of density-dependent compensatory factors in PVA modelling.
- 5.60 **Any other matters**
- 5.61 Dr Norman confirmed that the co-efficient variation information for aerial surveys would be submitted for Deadline 7.
- 5.62 Responding to discussions with NE on quantification of coefficient variation, Mr Turney advised that analysis has been provided in response to written questions, but that a further submission will be made to NE.
- 5.63 Mr Turney stated that the Applicant did not think it reasonable for NE to complain about receiving data but keep asking for more. He stated that the Applicant is willing to provide data, but NE need to respond and close down areas of debate rather than starting new ones. The Applicant needs to understand the outstanding points.