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Subject: Hornsea Project Three (UK) Ltd response to Deadline 6 (Part 7)

Dear Kay, K-J

Please find attached the 7th instalment of documents.

Best regards,

Dr Dominika Chalder PIEMA

Environment and Consent Manager



Environmental Management UK| Wind Power
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Appendix 22 to Deadline 6 submission -
Marine Mammal Hearing Clarifications

Date: 8th February 2019

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Table of Contents

Responses to ExA questions on marine mammals during ISH 5 Tuesday 29 th January 2019	1
Baseline Survey	1
Harbour Porpoise Return times.....	1
Update to Appendix 44 as submitted at Deadline 4 submission (REP4-064).....	2

Responses to ExA questions on marine mammals during ISH 5 Tuesday 29th January 2019

Baseline Survey

- 1.1 The ExA asked a question about the extent of the 'gap' in the acoustic survey design that had been highlighted by WDC in their written representation submitted at Deadline 1 (REP1-022).

The total survey design of the boat based surveys of the Hornsea Zone plus 10 km buffer included a total of 2,600 km of line transects which were covered monthly between March 2010 and February 2013. The survey was carried out using visual observers only between March and Jun 2010. Towed hydrophones to detect vocalising cetaceans underwater were added to the survey in July 2010. The entire survey design was covered for a period of nine months with a total of 4,186 acoustic detections of harbour porpoises across the whole survey area over this time (623 of these detections were recorded across the Hornsea Three site). After March 2011, a portion of the southern edge of the survey design was not covered regularly due to concerns about entanglement of the towed hydrophones with fishing gear, although sporadically parts of this area were covered (a small number of acoustic detections were recorded in this area in the months of April 2012, July 2012, November 2012 and February 2013). The gap in survey effort as a result of this missed area represented 13% of the total survey effort. The gap in survey effort within the Hornsea Three area represented 3% of the total survey effort. During the period where the whole area was covered (July 2010 to March 2011) the number of acoustic detections recorded in the area subsequently missed represented 17% of all detections (varying on a month to month basis between 8% and 26%). Over the whole survey period, a total of 10,706 acoustic detections were recorded over the entire zone. Assuming a constant proportion of detections between the whole area and the 'missed' area, it could be assumed that the total number of missed detections was ~1027, approximately 10% of the total sample size.

Given the sample size for the area that was not covered on all surveys, and the small extent of the missed area relative to the whole survey area, the Applicant maintains that the interpolated modelled density surface (which uses data collected across the whole zone, from both the acoustic survey and the visual survey to correct for missed animals and indicates high densities of harbour porpoises across the whole Hornsea Three array area) provides a conservative density estimate for incorporation into the quantitative impact assessment.

Harbour Porpoise Return times

- 1.2 The source material for the table of return times submitted at Deadline 4 (REP4-064) are provided:
- **Graham et al., 2018** is a copy of a power point presentation given at the Impulsive Noise Impacts on Porpoises and Seals (INPAS) International symposium held in Amsterdam in June 2018. On further investigation of these data, the Applicant has noted that the return times presented were actually in relation to harbour porpoise responses to Acoustic Deterrent use during the construction of the Beatrice Offshore Wind farm (BOWL), therefore an updated version of REP4-064 excluding these data has also been provided alongside this submission. However, although the data presented on slide 8 and slide 16 clearly demonstrate that harbour porpoises were not excluded from the vicinity of the pile driving during the construction period. The seasonal pattern in porpoise activity as seen in the Control

block is also evident in the BOWL site with relatively high levels of porpoise detections occurring in August, after several months of piling activity.

- **Brasseur et al., 2015** presents data on seal responses to pile driving at the Gemini wind farm in the Netherlands but was cited as an additional reference in the porpoise return times table as it includes the detail on the duration of pile driving at Gemini. The paper which includes the information on harbour porpoise return times at Gemini (Nabe-Nielsen et al. 2018) did not include the specific information on the duration of pile driving at Gemini.

Update to Appendix 44 as submitted at Deadline 4 submission (REP4-064)

- 1.3 The Applicant has provided the Graham *et al* (2018) paper as requested by the ExA at the Issue Specific Hearing of 29th January 2019 (see Appendix 20 to the Applicant’s response to Deadline 6). In providing this paper, the Applicant noted a minor error in its original submission (Appendix 44 to Deadline 4 response REP4-064) that referenced this paper. This Appendix therefore, provides an update to that Deadline 4 submission. The change relates to the consideration of how return times were reported in Graham *et al* (2018), the changes are marked in tracked changes and the Applicant can confirm that they do not result in any different conclusion being drawn with regard to return times. This Appendix provides a summary of the return time of porpoises to sites of offshore wind farm construction after the end of pile driving activity in support of the Applicants response to the Ex.A’s 2nd Question 2.2.68 (REP4-064). Also provided is detail on the scale and duration of each wind farm project. Only projects that did not use noise reduction mitigation are included.

Site	Number of turbines	Duration of pile driving activity	Harbour porpoise ‘return time’	Any other observations
Beatrice (Graham et al. 2018)	84 jacket foundations (336 pile installations)	9 months	No return times after piling noted but porpoise detections occurred throughout construction period and seasonal pattern of detections similar to control site.	There was a reduction in the distance that porpoises responded at response over the period of pile driving. Both in terms of spatial extent of response and return time
Horns Rev II Brandt et al. (2011)	91 monopile foundations	7 months	24-72 hours at 2.5 km from piling	The duration of response was less than this at distances beyond 2.5 km
Gemini (Brasseur et al. 2015, Nabe-Nielsen et al. 2018)	158 monopile foundations	4 months (2 vessels operating simultaneously)	6-10 hours	
Egmond an Zee (Scheidat et al. 2011))	36 monopile foundations	4 months	No monitoring during or immediately after construction	Porpoise encounter rates increased during operation relative to baseline (pre-construction) and were

Site	Number of turbines	Duration of pile driving activity	Harbour porpoise 'return time'	Any other observations
				significantly higher inside the wind farm than in reference areas outside
BARD Offshore I (Brandt et al. 2018)	81 monopile foundations	Intermittent over 3 years	16 hours	

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