Hornsea Project Three
Offshore Wind Farm

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Appendix 14 to Deadline I Submission – A review of precaution in the marine mammal assessment

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

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1. Introduction

This clarification note has been prepared to provide information demonstrating the conservative assumptions used within the Hornsea Project Three marine mammal assessment in its worst case design envelope assumptions for the purposes of EIA (and HRA), and draws on evidence from Hornsea Project One to inform this.

1.1 Purpose of this document

This note has been produced in response to the Relevant Representations submitted by Natural England and The Wildlife Trusts (TWT) on marine mammals.

Natural England have identified that they cannot yet agree to the conclusions of the cumulative impact assessment (that there will be no long term significant effect on harbour porpoise at a population level) due to perceived uncertainty as to what activities may overlap in time with the Hornsea Three construction period.

The Wildlife Trust (TWT) have raised comments in relation to certain worst case assumptions (for both the Project alone and cumulatively). Specifically, TWT have raised comments on a) the potential for the disturbance effect from the project alone to span over a significant time period, and b) the potential number of individual harbour porpoise that could (theoretically) be exposed to disturbance effects if all activities across all Tiers of the cumulative assessment overlap in time.

Hornsea Project Three has sought to provide further context on the levels of precaution within the existing assessments (for both the project alone and cumulatively) using direct experience from the Hornsea Project One development that is currently in advanced stages of construction to inform this. It is noted that the contingency built in to both the assessment for Hornsea Project One and Hornsea Three is typical to ensure that the worst-case scenario is assessed and that any impacts are not under-assessed. Accordingly, this note comprises two key components:

1: A review of the worst case design envelope in relation to key piling parameters and construction programme as set out in the Hornsea Project One Environmental Statement (ES) submitted to the Planning Inspectorate in support of a Development Consent Order (DCO) application in comparison to the final scheme design. The aim of this component is to demonstrate the typical level of precaution used within project EIAs in defining a worst case design envelope.

2: A comparison of the cumulative assessment outlined in the Hornsea Project One ES, which considered a number of projects that, at the time of production, had proposed construction windows that could theoretically overlap or abut with the construction window of Hornsea Project One with the knowledge of what has actually overlapped with the Hornsea Project One piling window in reality. The aim of this component is to demonstrate the merit in the Tiered approach to the assessment and the risk of compounding precaution if adding Tiers of cumulative projects together.

1.2 Background to Hornsea One

Hornsea Offshore Wind Farm Project One ("Hornsea Project One") was awarded consent by the Secretary of State (SoS) on 10 December 2014. In February 2015, DONG Energy Wind Power A/S (now Ørsted A/S) took full ownership of Hornsea Project One. The Development Consent Order (DCO) was subsequently amended on 30 April 2015 by the Hornsea One Offshore Wind Farm (Correction) Order 2015 and on the 31 March 2016 by the Hornsea One Offshore Wind Farm (Amendment) Order 2016. The Hornsea Project One DCO grants development consent for, and authorises Hornsea One Ltd to construct, operate and maintain a 1,218 Megawatt (MW) offshore wind farm project located 120km off the Yorkshire coast, covering an area of approximately 407 square kilometres. The Hornsea Project One DCO also grants four deemed Marine Licences (dMLs) for the marine licensable activities, these being the deposit of substances and articles and the carrying out of works involved in the construction of the generating station and associated development. Although some licence conditions are relevant only to one of the dMLs, a number are relevant to both.

2. Part 1: Refinement of Key Hornsea One Piling Parameters

Following issue of the DCO in December 2014 Hornsea One undertook a rigorous design optimisation exercise taking into consideration detailed ground investigation works, as well as technical engineering and commercial constraints to refine the key piling parameters for the final project design. This process is deemed typical of the refinements undertaken by offshore wind development at this pre-construction stage and therefore, provides a good analogy for Hornsea Project Three. Table 2.1 sets out the consented project parameters as detailed in the Hornsea One ES, unless superseded by the dMLs, against the optimised design case. Piling commenced at Hornsea One in January 2018 and is currently scheduled for completion in February 2019 (noting that there was a substantive gap in activity in mid 2018 due to piling vessel availability).

Table 2.1: Comparison of the worst case design envelope and optimised design case key piling parameters.

WTG Foundations (as per dMLs 1 – 3)			
Parameter	**dMLs Parameter or ES Worst Case**	**Optimised design case (ODC)**	**% change from ES**
Foundation Type	Monopile	Monopile	n/a
Number of monopile foundations (WTGs)	240 (consented maximum) 332 was assessed in the Environmental Statement (ES)	174	~ 47%% reduction from assessed maximum, 27.5% from consented maximum
Maximum piling duration per pile (hours)	6	4	A minimum of ~ 33 % reduction
Piling Window	36 months phased over the five year construction window	• 14 months; Q2 2018 to Q2 2019	~ 61 % reduction

As can be seen from Table 2.1 for the monopile foundation assumptions, there was a highly significant reduction in a number of the parameters that fed into the impact assessment from the worst case scenario assessed.

The key uncertainties within the assessment related to the consequence of disturbance, particularly linked to the duration of the behavioural effects. The impact assessment gave consideration to the duration of time over which animals may be exposed to behavioural effects and established a prediction on the likely consequence (in EIA terms) from this disturbance. As can be seen from the evidence presented above, the duration of disturbance will be significantly less than was predicted in the ES (due to a 47% reduction in the number of foundations, a 33% reduction in the pile installation duration, and a 61% reduction in the overall construction window).

Therefore, whilst uncertainty was identified within the original Hornsea One ES in relation to the population consequences of disturbance, the high levels of precaution that has been identified in the worst case assumptions of the ES (when compared to the final scheme design) provides greater confidence to be held in the assertion that significant behavioural effects would not occur.

3. Part 2: Hornsea One Cumulative Assessment

The Hornsea One EIA considered the potential effects of cumulative increase in subsea noise arising from piling at offshore developments that had the potential to cause disturbance to marine mammals. The assessment considered the effects of piling from projects across the North Sea. The cumulative assessment identified 15 projects that had construction windows that could overlap (in theory) with the proposed Hornsea One construction window and a further two projects with construction windows that had the potential to overlap in the event of a delay to the respective projects. Table 3.1 presents those projects considered within the Hornsea One cumulative impact assessment.

In reality percussive piling does not occur throughout the entire construction window (as identified above) and so the anticipated periods of overlap reported in the Hornsea One ES were considered conservative at that time and this is now substantiated by evidence to date. Hornsea One piling is currently underway and scheduled for completion in Q1 2019. Of the projects named in the Hornsea One ES only one has an overlapping piling window, that being East Anglia ONE, which commenced piling in Q2 2018 and is scheduled to continue into Q3 2019. Table 3.2 provides an update of the piling windows associated with the projects named in the Hornsea One ES.

Original Hornsea One ES application 2013	Table 3.1: Projects considered within the Hornsea One cumulative impact assessment (Grey cells indicate stated construction windows).									
Tier	**Project**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
N/A	Hornsea Project One										
2	Triton Knoll										
2	London Array Phase II										
2	Galloper										
2	Westermost Rough										
2	Dudgeon										
2	Kentish Flats Extension										
2	Race Bank										
2	Dogger Bank Creyke Beck A and B										
2	East Anglia ONE										
2	Neart na Gaoithe										
2	Seagreen A and B										
2	Moray East										
2	Beatrice										

Original Hornsea One ES application 2013	Table 3.1: Projects considered within the Hornsea One cumulative impact assessment (Grey cells indicate stated construction windows).										
2	Aberdeen Offshore Wind Farm										
2	Cygnus										
3	Hornsea Project Two										

Table 3.2: Most recent available piling information for projects considered within the cumulative impact assessment within the Hornsea One ES (Grey cells indicate stated construction windows).

Project	2016				2017				2018				2019				2020				2021				2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Hornsea Project One																												
Triton Knoll																												
East Anglia ONE																												
Beatrice																												
Moray East																												
London Array Phase II	Agreement for lease relinquished in 2014																											
Galloper	Construction completed in Q1 2017																											
Westermost Rough	Piling completed in May 2014, with turbine installation completed in March 2015.																											
Dudgeon	Construction completed in 2016																											
Kentish Flats Extension	Piling completed in 2015																											
Race Bank	Construction completed in Q1 2017																											
Creyke Beck A and B	Project does not currently have a CFD. The project is currently preparing for the next round of bidding for CFD scheduled to commence in May 2019. Construction window assumed to be between 2021 – 2024.																											
Neart na Gaoithe	Project delayed due to Judicial Review challenge of consents. The project currently has a CFD. Construction likely to commence between 2020 / 2021.																											
Seagreen A and B	Project delayed due to Judicial Review challenge of consents. The project does not currently have a CFD. Construction will not overlap with Hornsea One.																											

Table 3.2: Most recent available piling information for projects considered within the cumulative impact assessment within the Hornsea One ES (Grey cells indicate stated construction windows).	
Aberdeen Offshore Wind Farm	Construction completed in 2018. Foundations utilised a suction bucket solution with no piling undertaken.
Cygnus	Construction completed in 2016
Hornsea Project Two	Construction scheduled for 2020 / 2021

As a worst-case scenario, the Hornsea One EIA considered the cumulative maximum number of harbour porpoise displaced by piling noise for all projects within the planning system that had the potential to overlap concurrently with the Hornsea One construction window (as presented within Table 4.52 of the marine mammal chapter of the ES (Application Doc Ref: 7.2.4) and reproduced in Table 3.1 above). Given the uncertainties relating to when projects may come forward (and in what form) the assessment did not combine Tier 2 and Tier 3 outputs (noting that only Hornsea Project Two was cited within Tier 3). This was (and remains) in line with standard industry practice so as not to compound precaution within the assessments.

Table 4.52 identified that under the scenario where all activities overlapped, a maximum of up to 37,619 individuals could be exposed to behavioural effects. Based on the reality of what actually overlapped with Hornsea One (as identified in Table 3.2 above) it can be seen that a realistic assessment (not factoring into account the refinements made at a project specific level, which would further reduce each individual projects effect as described in Section 2) would have generated a figure of up to 7,437 individuals. The difference between the worst possible case outcome taken from the ES (and in line with the concerns raised by TWT) and what actually happened in reality is a difference of 30,181 individuals (or approximately 80% of the total theoretical effect). It is noted that for the Hornsea One cumulative assessment only projects from within a single Tier were combined. All projects excluding Hornsea Project Two fell into Tier 2 and therefore, the actual difference between actual construction scenario and ES realistic worst case scenario was a 78% overestimate in numbers.

It is acknowledged that there can be no absolute certainty as to whether there will be an equivalent level of reduction in the theoretical project overlap compared to the actual project overlap for Hornsea Project Three (as was observed for Hornsea One). The current CfD regime is one of the key controlling factors in determining how many projects may realistically come forward at the same time. It is recognised that the CfD regime has recently been refined in that there are now anticipated to be an auction every two years (commencing in 2019). This broadly aligns with CfD rounds to date (2014, 2015 and 2017), and whilst the available funds within each round is not clear it would be reasonable to assume that the level of build out will remain broadly as seen to date (i.e., between one and three projects in construction per year). Other influencing factors include supply chain and project pipelines (parent companies typically tend to stagger project developments that they control due to financial constraints). To date the CfD, supply chain and pipeline development approach has meant that the scenario observed on Hornsea One is reasonably typical of development within the North Sea, and there is nothing to suggest that this is likely change in the timeframe over which Hornsea Three is likely to construct. Irrespectively of the precise level of activity per year, what is absolutely clear is that the theoretical worst case scenarios (created through assuming all possible projects will overlap in time) is not credible and will radically overestimate the potential level of effect at a cumulative level.

4. Summary

The above analysis (using Hornsea One as a case study) has identified that there are significant levels of precaution built into both the Project alone and cumulative assessments. From the Hornsea One case study it has been demonstrated that:

- Project alone parameters have seen to contain between 33 to 61% over precaution in some areas of the maximum design scenario that has underpinned the assessments.
- For the cumulative assessments, as a result of differences in predicted versus actual project overlap, an over estimate of up to 78% was made and up to 80% could have been made under a theoretical worst case scenario.

An additional note of caution needs to be applied with regard to cumulative assessments in that they are likely to compound precaution through the assumption that construction will occur throughout the whole of the stated windows, rather than only in the much more likely shorter periods within these periods. The evidence presented within this note has identified that each individual project will likely have applied significant precaution to the level / extent / duration of effect, and this is then added to a likely overestimation of the number of projects that may overlap, to generate an extremely precautionary assessment.

It is considered that the information presented within this note should provide sufficient comfort (to Natural England and TWT) that the cumulative assessment conclusions for disturbance to marine mammals are highly precautionary and that there will not be a risk of significant cumulative effects occurring.