From:	Dominika Phillips
To:	Hornsea Project Three; KJ Johansson; Kay Sully
Cc:	Andrew Guyton; Stuart Livesey
Subject:	Hornsea Project Three (UK) Ltd response to Deadline 4 (Part 16)
Date:	15 January 2019 23:24:43
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Dear Kay, K-J

Please find attached the 16th instalment of documents.

Best regards,
Dr Dominika Chalder PIEMA
Environment and Consent Manager

[redacted]

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

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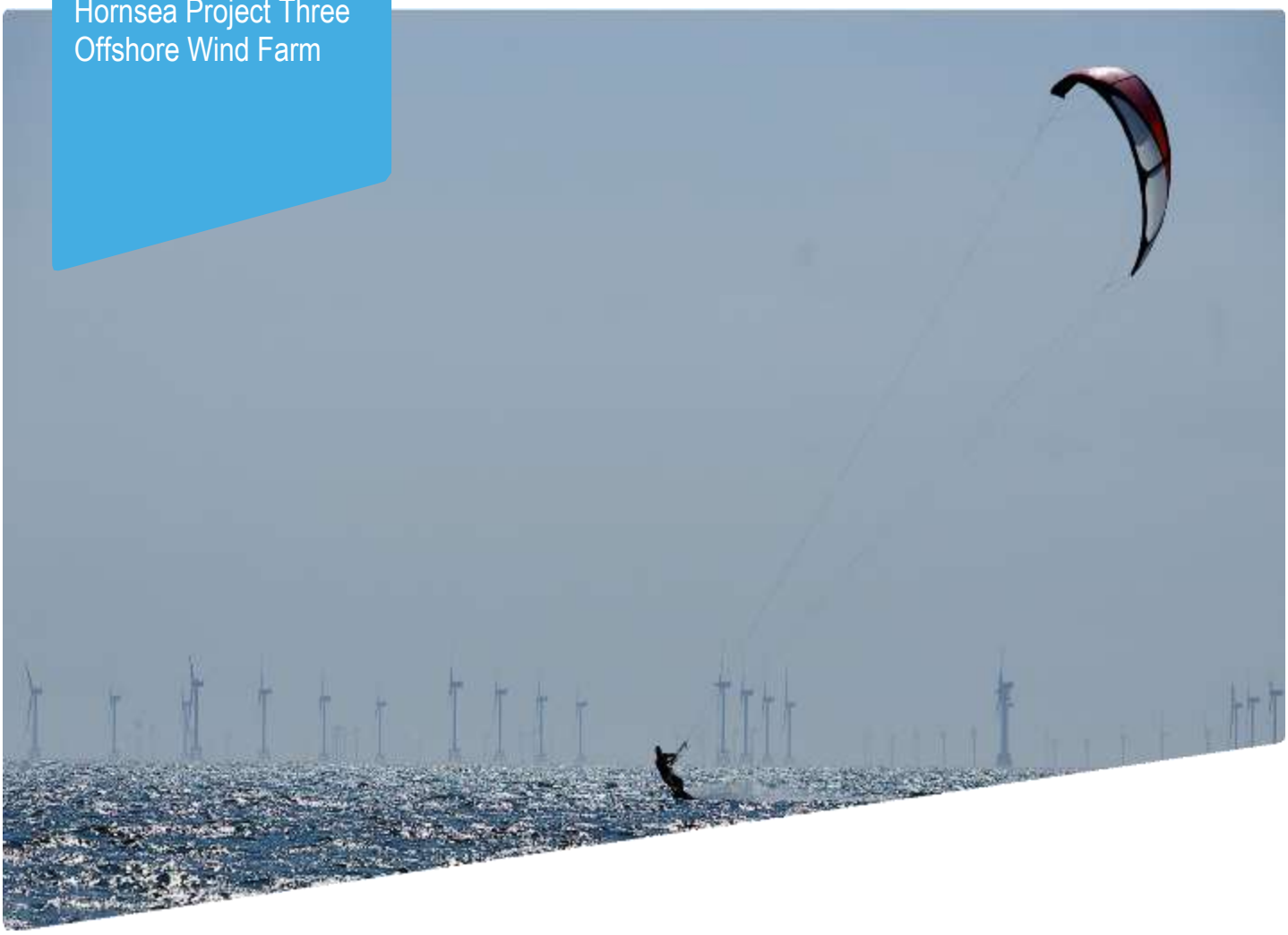
Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Appendix 77 to Deadline 4 Submission – Detailed response to the ExA Q2.2.3: IROPI case

Date: 15th January 2019

Hornsea 3
Offshore Wind Farm

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Front cover picture: Kite surfer near a UK offshore wind farm © Ørsted Hornsea Project Three (UK) Ltd., 2019.

Table of Contents

1. Introduction

1.1 This Appendix (77) provides the Applicant's response to Ex.A second written question ("**SWQ**") 2.2.3 which is as follows:

No.	Question
2.2.3	The HiDef contractor methodology indicated that a 10% coverage (using two cameras) is generally sufficient for achieving a coefficient of variation of 16% or better for abundance estimates. In evidence submitted at Deadline 3, NE has highlighted that the coefficient of variation is greater than 16% for most months and for most species. You highlighted in ISH2 that 10% coverage had been sufficient in other projects. What evidence do you have that the coefficient of variation was actually 16% or less in aerial surveys for those other projects to justify the use of two cameras instead of four? Are there any reasons, other than cost, that led you to analyse 50% of the data? Please provide copies of any publications you wish to rely upon in evidence that have not already been provided.

What evidence do you have that the coefficient of variation was actually 16% or less in aerial surveys for those other projects to justify the use of two camera instead of four?

1.2 To the Applicant's knowledge, a target level of precision (in the form of a specific Coefficient of Variation (CoV)) has never been required as part of the surveys undertaken for any offshore wind farm project. In addition, such a high level of precision is rarely achieved with the results from boat-based surveys highly unlikely to have reached this level of precision. The precision associated with abundance estimates from site-specific surveys are not routinely reported as part of application documents however, for those that have been reported the results of the aerial surveys conducted for Hornsea Three have a comparable, or in many cases a better, level of precision.

1.3 It is important to understand that 16% is a level of precision that has no specific meaning in terms of the assessments required as part of EIA or RIAA. The target of 16% CoV is sometimes used in monitoring studies, because, when comparing population change between two years, if there is a CoV value of 16% then it should be possible 80% of the time to detect a statistically significant change in abundance between the two samples with 95% confidence. This has no meaning in a characterisation survey where an assessment will be based on an average measure of abundance and the confidence limits of that average measure with no requirement to consider the level of change between datapoints.

1.4 The Applicant has collated CoVs for other offshore wind farms, where available. As precision metrics are not routinely the Applicant has only been able to obtain data from two other projects. The graphs presented below provide CoVs for Moray East (boat-based) and East Anglia Three (aerial) on a monthly basis for gannet, kittiwake, guillemot, razorbill and puffin.

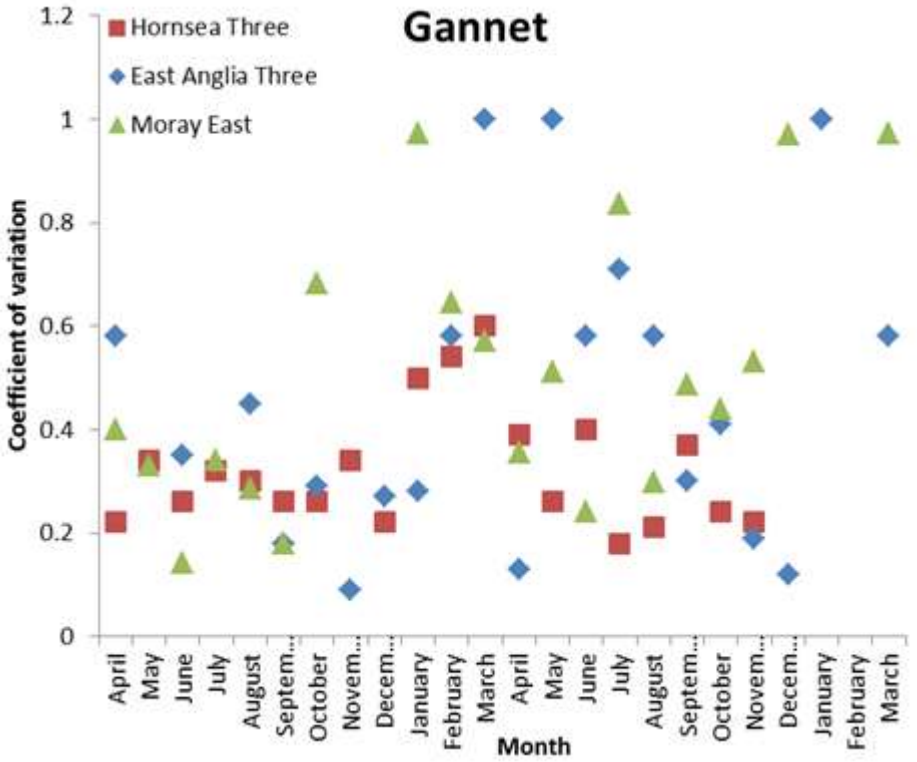

Figure 1: CoVs for Moray East, East Anglia Three and Hornsea Three on a monthly basis: Gannet

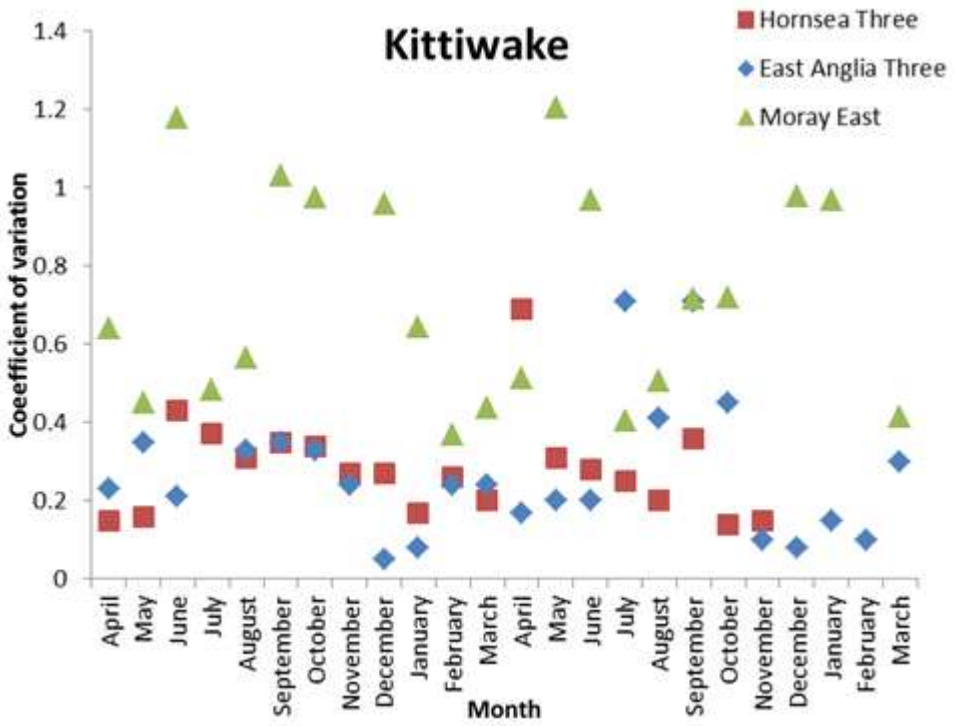

Figure 2: CoVs for Moray East, East Anglia Three and Hornsea Three on a monthly basis: Kittiwake

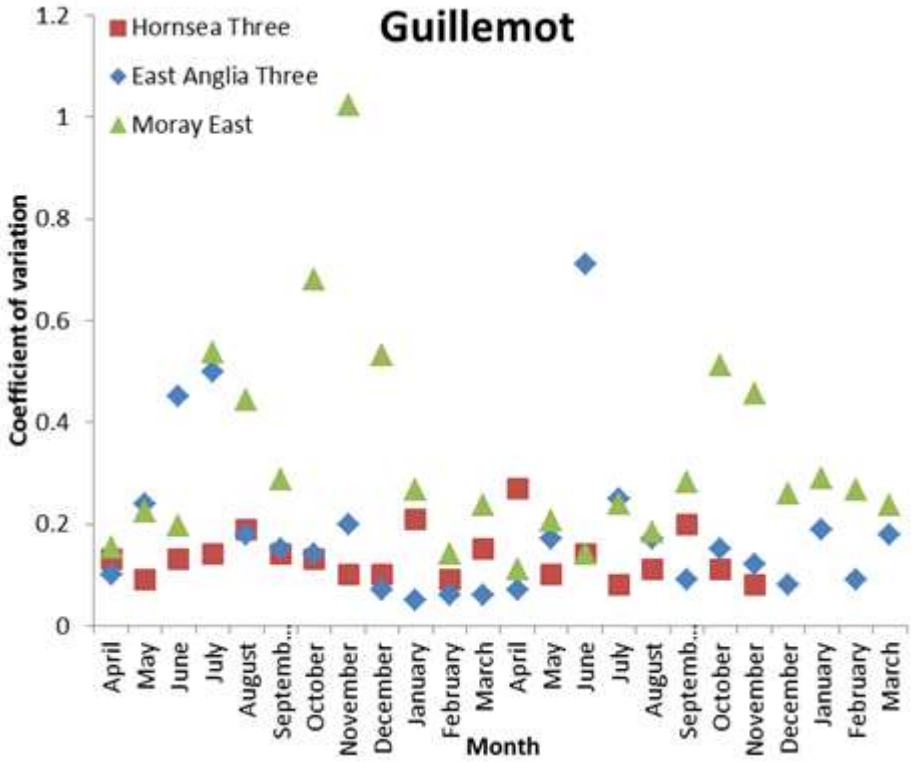

Figure 3: CoVs for Moray East, East Anglia Three and Hornsea Three on a monthly basis: Guillemot

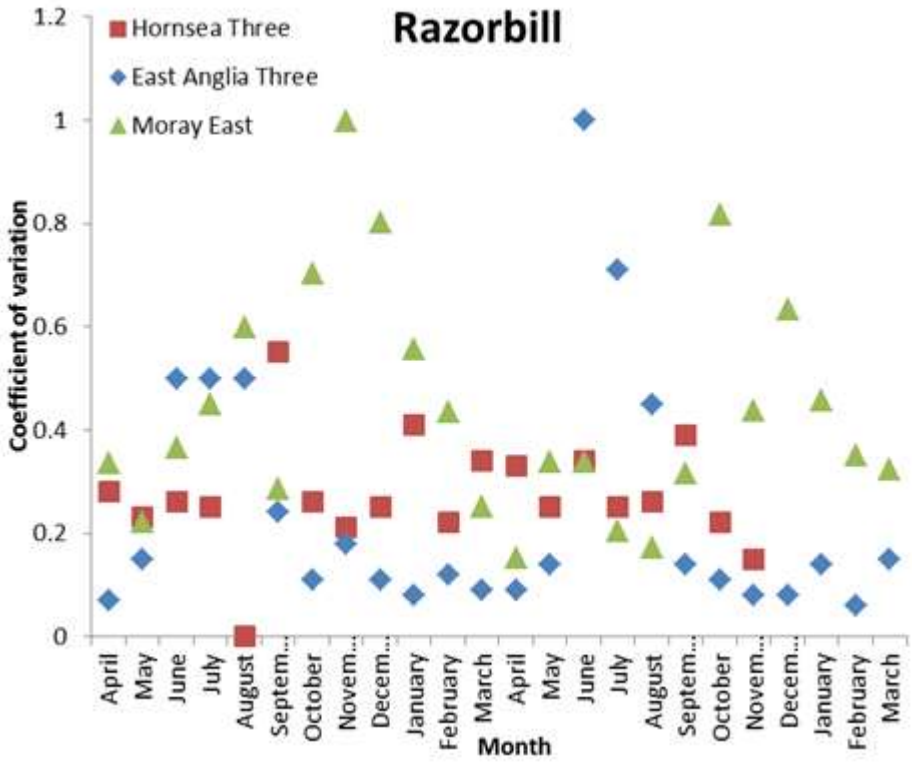

Figure 4: CoVs for Moray East, East Anglia Three and Hornsea Three on a monthly basis: Razorbill

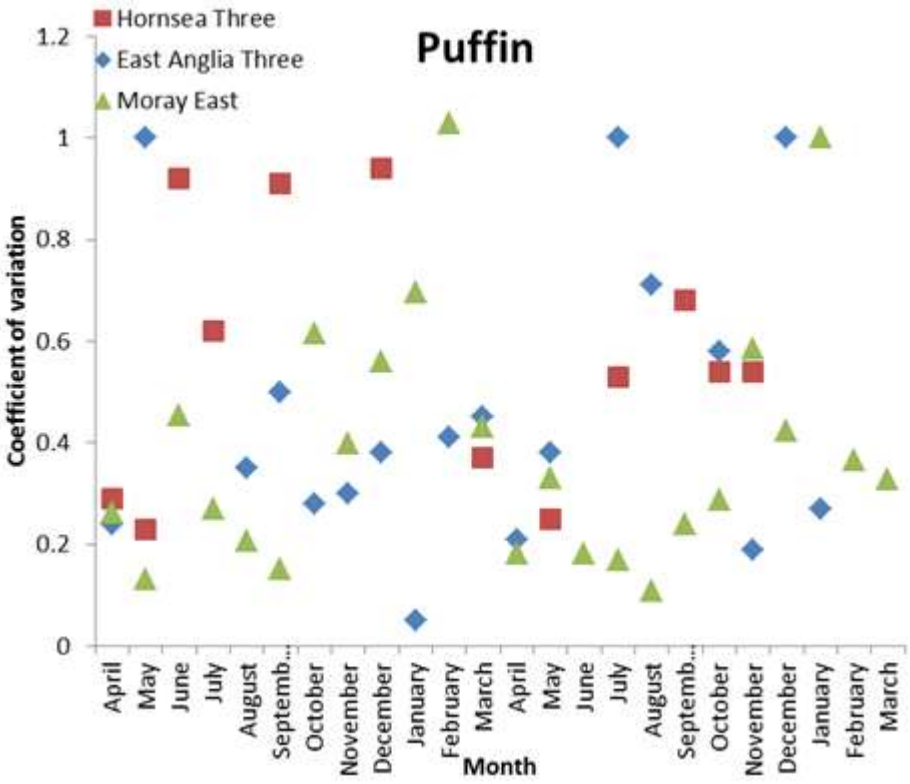

Figure 5: CoVs for Moray East, East Anglia Three and Hornsea Three on a monthly basis: Puffin

1.5 These figures illustrate two points. First, the CVs recorded are highly variable by species and month. Consistently achieving a target CV is extremely difficult, if not impossible, in practice and it is necessary to make a judgement at the outset of the survey programme about a strategy that is likely to deliver sufficient precision for the purposes of impact assessment. Second, the values achieved for Hornsea Three are similar to and, in many cases superior, to those achieved at other projects.

Are there any reasons, other than cost, that led you to analyse 50% of the data?

1.6 The level of survey coverage applied for a given project is a judgement that is made by developers in the absence of any clear guidance from SNCBs. The decision to analyse survey data from 2 cameras was made at the outset of the survey programme. It was a decision based on the level of coverage likely to deliver results of sufficient precision for the purposes of impact assessment. This judgement was based on the results of previous, similar survey campaigns undertaken at other offshore wind farms and the results of previous surveys completed within the Hornsea zone.

1.7 There was no indication that the species present at Hornsea Three were likely to be very highly aggregated (as would, say divers or seaducks) and that 10% coverage would be sufficient to provide a representative baseline with similar precision to that achieved at other offshore wind farms. The extent of coverage required to achieve a higher level of precision could have been raised at any stage through the Expert Working Group, but was not, indeed the level of precision being achieved during aerial surveys was reported to the EWG as part of the Evidence Plan process through the work conducted as part of the meta-analysis and the EWG did not recommend taking steps to improve the precision.

1.8 All ecological sampling methods involve a consideration of the cost versus the benefit. There is a diminishing return of increasing survey coverage, particularly for more evenly dispersed species where information about the size of the population is quickly acquired. An informed judgement was made that 10% would be sufficient to provide a representative baseline, comparable to that obtained for other similar projects and appropriate for impact assessment. As can be seen from the analysis above, this judgement was reasonable.

Provide further documents

1.9 The Applicant has no further documents to submit at this stage of the examination in relation to this question.