From: Dominika Phillips
To: Kay Sully; KJ Johansson; Hornsea Project Three
Cc: Andrew Guyton; Stuart Livesey
Subject: Hornsea Project Three (UK) Ltd response to Deadline 5 (Part 4)
Date: 23 January 2019 21:57:18
Attachments: image003.png
D5_HOW03_Appendix 8_VISSIM_Modelling.pdf
D5_HOW03_Cover Letter.pdf
D5_HOW03_IP_ExASecondWQ.pdf

Dear Kay, K-J

Please find attached the 4th and the final instalment of documents for Deadline 5 submission. Please note that due to file size Appendix 8 was split and Annex A of Appendix 8 was sent in Part 2 of Deadline 5 e-mail submission and Appendix 8 with Annexes B and C is attached in this part 4 of Deadline 5 submission.

I also attach below the document register for Deadline 5:

File name	Document Title	Send on 23/01/2019 in e-mail Part <no.>
D5_HOW03_Cover Letter	Covering Letter to Deadline 5 submission	**P4**
HOW03 Guide to the application	Applicant's Guide to the Application	**P1**
D5_HOW03_IP_WR	Applicant's comments on Written Representations and Responses submitted by Interested Parties at Deadline 4	**P1**
D5_HOW03_IP_ExASecondWQ	Applicant's comments on responses to the ExA's Second Written Questions submitted by Interested Parties at Deadline 4	**P4**
D5_HOW03_SoComm	Applicant's Statement of Commonality of Statements of Common Ground (SoCG)	**P1**
HOW03_SoCG_NNDC_January 2019_D5 version	Statement of Common Ground between Hornsea Project Three (UK) Ltd. And North Norfolk District Council	**P1**
HOW03_Shell_Position Statement	Position Statement between between Hornsea Project Three (UK) Ltd. and Shell UK Ltd.	**P1**
HOW03_SOCG_MCA V1.3	Statement of Common Ground between Hornsea Project Three (UK) Ltd. and Maritime Coastguard Agency	**P1**
D5_HOW03_Appendix 1_Transport Assessment _Appendix G	Appendix 1 to Deadline 5 submission - Appendix G to the Transport Assessment	**P1**
D5_HOW03_Appendix 2_Preliminary Trenching Assessment	Appendix 2 to Deadline 5 submission - Preliminary Trenching Assessment	**P1**
D5_HOW03_Appendix 3_OCSIP	Appendix 3 to Deadline 5 submission - Outline Cable Specification and Installation Plan	**P1**
D5_HOW03_Appendix 4_ISH2_ornithology_clarifications	Appendix 4 to Deadline 5 submission - Second Issue Specific Hearing clarifications in relation to offshore ornithology	**P1**
D5_HOW03_Appendix 5_Migratory Seabirds Clarification	Appendix 5 to Deadline 5 submission - Migratory Seabirds Clarification	**P1**
D5_HOW03_Appendix 6_Immature apportioning	Appendix 6 to Deadline 5 Submission - Apportioning Immature Auks to Colonies	**P3**
D5_HOW03_Appendix 7_IOGP AMG	Appendix 7 to Deadline 5 submission - Aircraft Management Guidelines, Version 2	**P3**
D5_HOW03_Appendix 8_VISSIM Modelling_VerB	Appendix 8 to Deadline 5 submission - Main Construction Compound Access Strategy VISSIM Modelling Update	**P2 - Annex A, P4 - Appendix 8 with Annexes B and C**
D5_HOW03_Appendix 9	Appendix 9 to Deadline 5 submission - Summary of Array Layout Position and Applicants response to Interested Parties answers to ExA Q2.5.1, Q2.5.6 and Q2.5.7	**P3**
D5_HOW03_Appendix 10_Article 6(4) Guidance	Appendix 10 to Deadline 5 submission - Habitats and Wild Birds Directives: guidance on the application of article 6(4)	**P3**
D5_HOW03_Appendix 11_MarLIN	Appendix 11 to Deadline 5 submission - MarESA Summaries EpusOborApri and PoVen biotopes	**P3**
D5_HOW03_Appendix 12_NE_Ornithology Roadmap_vB	Appendix 12 to Deadline 5 submission - Ornithology roadmap with Natural England for the examination phase ver B	**P3**
D5_HOW03_Appendix 13_ Anatec	Appendix 13 to Deadline 5 submission - Statement of Experience - Anatec	**P3**
D5_HOW03_Appendix 14_HCA_BeatriceA	Appendix 14 to Deadline 5 submission - Beatrice A Platform Helideck Information Plate	**P3**

Best regards,
Dr Dominika Chalder PIEMA
Environment and Consent Manager

[redacted]

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Hornsea Project Three
Offshore Wind Farm

Hornsea Project Three

Offshore Wind Farm

Applicant's Comments on Interested Parties' Responses to the ExA's Second Written Questions submitted at Deadline 4

Date: 23rd January 2019

Hornsea 3
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1. Applicant's responses to Interested Parties response to Second Written Questions

1.1.1.1 Following the publication of Interested Parties responses to Second Written Questions by the Examining Authority submitted to the ExA at Deadline 4 (15/01/2019) the Applicant has subsequently provided comments below to each of those responses provided by Interested Parties.

1.1 Written Question 2.1 Alternatives and Design Flexibility

No Applicant response required.

1.2 Written Question 2.2 Ecology – Offshore

Ornithology

PINS Ref. No.	Question is addressed to:	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
Q2.2.2	NE, Royal Society for the Protection of Birds (RSPB)	Notwithstanding the use of two out of four cameras, do you agree that the digital aerial survey data forms an adequate ornithological baseline for the months where data were collected over two separate years?	Data collected to inform baseline characterisation should allow the production of the most reliable, precise and accurate estimates possible of bird numbers at the Hornsea Three project site. In regards precision, survey designs should carefully consider the target precision and devise sampling strategies that collect sufficient samples to deliver this for all focal species and for all relevant seasons. As previously noted in our written representations (REP1-211, section 2.20) the Applicant indicated during the Evidence Working Group process that the proposed coverage of 10% would be sufficient for achieving a CV of 16% or better for abundance estimates. Thus indicating that the target precision is a CV of 16%. Natural England has not seen information on the precision of the estimates for the final digital aerial survey dataset (using just two cameras) as the Applicant has not presented these data in the Application	The Evidence Plan process was undertaken in order to agree the baseline data for use in analyses and assessments to be conducted for Hornsea Three. Through this process the baseline was agreed for the months April to November (paragraph 4.3.2.3 in Annex 5.1.1: Consultation Report Annex 1 - Evidence Plan (APP-035)). Natural England highlight in their response that they have had previous opportunity to view the aerial data and associated Coefficients of Variation through the Evidence Plan process. The Applicant would highlight that, at that stage, and also throughout the Evidence Plan process, the PEIR and the draft Environmental Statement, Natural England did not raise any issues in relation to the precision

			documents, but the levels of precision achieved for the population estimates that Natural England have seen via Evidence Working Group reports have typically been considerably lower, with CVs greater than 16% (and in many cases much higher). Natural England are not in a position to comment as to whether the analysis of all four cameras would achieve the target level of precision. However, in principle, if the analysis of the data from the all four cameras demonstrates that the target levels of precision in the derived population estimates are attained (for focal species in all relevant seasons) then the digital aerial surveys for the months where data were collected over two separate years forms an adequate baseline to quantify bird abundance and distribution. Natural England also advise that site-specific flight height data for those species at risk of collision should be obtained as part of the baseline characterisation. The original intention was to utilise flight height data collected as part of the digital aerial surveys for Hornsea Three, however it came to light during the data analysis period that there were errors within the flight height calculation method used by the Digital aerial surveyor, and therefore could not be used to provide flight height data. See APP-109, sections 1.3.4.4-1.3.4.5 (6.5.5.3 ES Volume 5 - 5.3 - Collision Risk Modelling). This eventuality was beyond the control of the applicant, however, for completeness it should be noted that the digital aerial data collected for Hornsea Three does not form a complete ornithological baseline, as there is a lack of site specific flight height data.	of abundance estimates derived from digital aerial surveys. Similarly, Natural England did not raise any issues in relation to the use of two cameras of data. The Applicant is unaware of Natural England having ever required a target level of precision for any surveys (aerial or boat-based) covering an offshore wind farm. Natural England's response in relation to the flight height data collected during aerial surveys is correct with these data not having been used in any of the documents produced for the Hornsea Three application or through the examination. However, the Applicant would highlight that Natural England's statement that there is no site-specific flight height data is incorrect. Flight height data was collected as part of boat-based surveys undertaken between 2010-2013 with these covering all of Hornsea Three. These data, are considered by the Applicant to represent the best available evidence for flight height data at Hornsea Three as they are site-specific. In addition, Appendix 5 to the Applicant's submission at Deadline 2 (REP2-017) provides the results of Lidar surveys which collected flight height data across Hornsea Three plus a 4 km buffer. The flight height data collected during these surveys produced similar flight height distributions and PCH values to those derived from the boat-based survey data. The Applicant would therefore contend that, in relation to flight height data, Hornsea Three is one of the most extensively surveyed areas of the North Sea.
Q2.2.4		It was highlighted at ISH2 that you have assessed the likely significant impact of other offshore wind farm (OWF) projects	NE Response: Natural England's advice to developers when planning baseline surveys for offshore wind farms or extension projects, and for decision-makers to determine whether surveys have been carried out to an acceptable standard is that, as a minimum, offshore ornithology survey programmes should provide 24 consecutive months of full survey coverage. This is because there can be considerable variability in the numbers of	The Applicant highlights the following in relation to the bullet points provided in Natural England's response which seek to imply that Hornsea Three is in some way unique: *In relation to 'the pattern and extent of missing data':*

		with less than two years baseline data. How were you able to advise on potential adverse effects on European sites under these circumstances? If you were able to do this for previous projects why are you unable to provide the necessary advice in this instance?	birds present in an offshore area between months and between years, and therefore characterising the use of a project area by a species requires multiple years of data. Prior to the commencement of the Hornsea Project Three baseline surveys, Natural England advised the Applicant that two complete years of monthly surveys was the minimum required for quantifying the ornithological baseline for the Project. Previously, Natural England has been required to provide advice on potential ornithological impacts for a limited number of Offshore Wind Farms (OWFs) where a developer has collected/analysed, less than 24 consecutive months of baseline survey data. In each case, Natural England raised concerns that a baseline of less than 24 months was not adequate for these OWFs, and would make it difficult for us to draw any conclusions regarding EIA or HRA based on these data. However, Natural England made a case specific assessment for each of these OWFs, taking account of: The pattern and extent of missing data. In the majority of cases the collection of less than 24 months of data was not a planned survey decision – missing coverage generally occurred as a result of poor weather conditions preventing individual surveys from taking place, or being completed, and in many instances additional surveys were then undertaken to compensate for a missed survey (for example 2 surveys taken during the month following a missed survey. Missing survey coverage did not typically affect a block of consecutive months or a complete season for a key species; • The applicability of additional sources of distribution and abundance data available. Where additional contemporaneous and/or historical datasets were available Natural England agreed these could either be included in the assessment, or used to contextualise the OWF survey data and assessment conclusions. • The species and SPAs involved and the level of impact that would be required to reach AEoSI. On the whole when Natural England provided advice on these cases, none of the species and SPAs included in the	Regardless of intention, the relevant issue is that there are many projects (including Burbo Bank Extension Galloper, Hornsea Project Two, Hywind, Moray West, Seagreen and Walney Extension listed in Table 1.3 of Appendix 8 to the Applicant's submission at Deadline 1 (REP1-141)) where a 'block' (defined as at least two consecutive months) of months was missed and yet where it was still possible to perform a risk assessment on the features of European sites and to reach an agreed conclusion. In relation to inter-annual variability the Applicant has provided consideration of the likely inter-annual variability that would occur at Hornsea Three, in those months for which only one aerial survey was conducted, in Appendix 8 to the Applicant's submission at Deadline 1 (REP1-141). It is concluded that the likely level of inter-annual variability was unlikely to have any material effect on the assessments presented for Hornsea Three. No evidence has been presented to suggest significantly higher levels of inter-annual variability in the densities of key species at Hornsea Three in the months December to March than those assumed and explored by the Applicant throughout this process. *In relation to 'the applicability of additional sources of distribution and abundance data available':* The former Hornsea Zone, in which Hornsea Three is located, is one of the most surveyed offshore areas in UK waters with the data collected representing an extensive dataset undertaken across large spatial and temporal scales. This dataset is considered to be more robust and relevant to the project being assessed than datasets that have been used at other consented offshore wind farms which also relied on a variety of data sources to inform assessments (e.g. Burbo Bank Extension, East Anglia One, Moray West and Walney Extension). The contextual data available for Hornsea Three is considerably better than those datasets incorporated into assessment at consented

			assessments had ALREADY reached a point where Natural England could not rule out AEoSI (at an in-combination level, based on previous OWF assessments); In these cases Natural England felt able to advise that either: it was satisfied that reliance on the available data did not present a risk of underestimating the project's effects; or that even with the most precautionary assumptions regarding potential impact levels, that the impact would not reach a level that would be considered AEoSI for the species and SPAs in question. As the level of potential impact to seabird populations has increased, and our understanding of seabird abundance and distribution data has evolved, the need for adequate evidence to inform assessments has been further emphasised. In considering the specific case of Hornsea Project Three, based on the impact assessment presented by the Applicant, and the data and information provided in the application documents, Natural England are unable to advise on potential adverse effects on European sites for some species and SPAs. While our concerns about the Applicant's assessment are not exclusively as a result of the incomplete baseline data, this is a significant component, and Natural England initially highlighted to the Applicant in March 2016 that the incomplete baseline would increase the risk that we would not be able to reach conclusions regarding the impact assessment. In regards Hornsea Project Three the following applies: ▯ The pattern and extent of missing data. The incomplete baseline dataset is not the result of individual survey dates being missed due, for example, to poor weather conditions. It has arisen from a decision taken by the developer to not collect 24 months of survey data for Hornsea Project Three. Furthermore, the original intention of the Applicant was to only collect 12-18 months of data, and Natural England were asked to comment on assessments at PEIr that were based on only 11 months of survey data. result of the planned nature of the missing survey months (rather than a	offshore wind farm projects that have used multiple datasets. *In relation to 'The species and SPAs involved and the level of impact that would be required to reach AEoSI':* It is frequently the case that DCO Applications for offshore wind farms are considered in the light of their potential effects on European sites, often where there are concerns about the aggregate effect on specific features. At Burbo Bank Extension and Galloper offshore wind farms, for example, where 'blocks' of surveys were missed, there was considerable attention given (respectively) to the likely impacts (alone and in-combination) on the red-throated diver feature of Liverpool Bay SPA and lesser black-backed gull feature of the Alde-Ore Estuary SPA. It is the Applicant's position that most if not all projects are subject to data limitations to one degree or another for impact assessment. In these circumstances projects seek to make the best use possible of all the data that are available to them and to account for any residual uncertainty through precautionary assumptions and consideration of realistic worst case scenarios. In this case there is an extensive set of additional data that were also collected specifically for the purpose of characterising the zone within which Hornsea Three is located, using survey methods that were considered appropriate for compiling the impact assessment baselines for two previous DCO Applications (both now consented). The important point is that an assumption about the density of key species present at Hornsea Three can be made, that is reasonable in light of the evidence from the available survey data, to inform a risk assessment. The Applicant has sought to use the available data to understand the densities of key species present at Hornsea Three throughout the year and over the several years for which survey data are available. Furthermore, the Applicant

			non-systematic pattern of missing data resulting from surveys missed due to poor weather, for example), is that there is a block of consecutive months where there is only one year of survey data. For some species, this coincides with the whole of a particular assessment season being un-surveyed (for example, the pre-breeding seasons for gannet, kittiwake and razorbill) While we have advised in previous cases that two complete years of baseline survey data are required, our advice regarding the methodologies for baseline surveys has evolved over time as more empirical evidence has become available – for example, regarding the levels of inter-annual variability in bird numbers at offshore sites, distribution patterns, behaviour, survey methods. In particular there is now a considerable body of evidence from offshore sites regarding the spatial and temporal variability in seabird numbers, including variability between years. This includes information from the Hornsea Zone that indicates that there is significant inter-annual variability in numbers of the key receptor species that we are interested in at Hornsea Project Three. The applicability of additional sources of distribution and abundance data available. While there are historical datasets available for the Hornsea Zone, that can provide useful contextual information and could have been used to inform the survey design for Hornsea Project Three, Natural England do not consider that these datasets can be integrated with the Hornsea Three baseline data, as the Applicant has done. Natural England has set out the reasons for this in REP1-211. These include the incompatibility of the datasets dues to different survey platforms being used (boat-based versus digital aerial), spatial coverage, age of data and sample size issues. Since the Applicant's assessment is based on survey data that integrates historical data with the Hornsea Project Three data, Natural England is unable to provide advice based on these assessments. The species and SPAs involved and the level of impact that would be required to reach AEoSI. Finally, in the case of Hornsea Project Three Natural England is in a position where we consider cumulative and in-combination totals of key seabird species to have reached levels which we	has analysed those data to understand variability and to inform the selection of reasonable input variables for risk assessment using various methodologies and in consultation with other parties. These data and analyses do not indicate a high variability for the months in question (which aligns with our general understanding of the biology, ecology and phrenology of the species concerned) and that the assumptions about densities used by the Applicant in its risk assessments are reasonable. It also indicates that the conclusions of the impact assessment are not sensitive to those assumptions and this should provide confidence that, to the extent that there is any risk of Adverse Effect on the Integrity of any feature, it does not derive from uncertainty about the density of those features at Hornsea Three during the months December to March. The Applicant's submission at Deadline 4 (REP4-049) applied an alternative analysis based upon that advocated by Natural England in their submissions and as a result is considered to have addressed the issue in relation to data for December to March.

			consider to be significant (and in some cases have been unable to advice no AEoSI) and therefore it is increasingly important that subsequent project assessments that contribute to the in-combination totals are as precise and accurate as possible, with every effort taken to reduce the uncertainty in the impact assessment. Accurate information about the cumulative and in-combination impacts will be important to inform consideration of mitigation (or where applicable compensation) measures.	
Q2.2.6	RSPB, NE	The Data Hierarchy Report [APP-110] indicates that more limited variation in bird density was observed between December and March. Is it reasonable to assume that missing data for this period would have less impact on the confidence in the modelling than missing data from other months? As the principal ornithological issue relates to the effect of the project on the breeding bird assemblage at the Flamborough and Filey Coast Special Protection Area (SPA), why does it matter if there is missing data between December and March?	NE Response: The Data Hierarchy report presents a number of partial datasets relevant to the 'data hierarchy' method described (Natural England to do accept this method, please refer to extensive comments in regards the data hierarchy method in our Relevant Rep [RR-097] and Written Rep [REP1-213, REP1-211].) The report presents, for each focal species some or all of the following: bird densities, flying bird densities, population estimates and mean of seasonal peaks derived from the digital aerial survey data, and from some (but not all) boat based survey data sets. The report does not present a comparison of within month (or season) inter-annual variation, indeed it would not be possible to compare levels of inter-annual variation for Dec-March using the digital aerial data, as only one year of data exists. While it may be possible to conduct an analysis of the level of inter-annual variation in bird densities derived from boat based survey data collected in the Hornsea Zone, and compare Dec-March to other months, this is not something presented within the report. As such, Natural England does not agree that referenced report demonstrates that 'more limited variation in bird density was observed between December and March'. Confidence in modelling outputs is closely linked to the level of uncertainty in key modelling inputs, missing data increases uncertainty. In the case of collision risk modelling, one of the key input parameters is the density of birds in flight, and collision risk is calculated on a monthly basis (using monthly densities). As such we have substantially reduced confidence in the modelled outputs for the months where only one year of data exists (Dec-March).	Appendix 8 to the Applicant's submission at Deadline 1 (REP1-141) provides consideration of inter-annual variability by utilising the following information and analyses: • Collision risk modelling and displacement analyses conducted using an alternative hierarchical approach which was understood at the time to be Natural England's preferred interpretation of the hierarchical approach; • Distribution maps presented in the Hornsea Project Two Technical Report (SmartWind, 2015) presenting sightings from boat-based surveys undertaken across the former Hornsea Zone between March 2010 and February 2013; • WWT Consulting and MacArthur Green (2013), which presents densities for English waters for a summer (April to September) and winter (October to March) season calculated using boat-based and aerial data collected between 1979 and 2011; and • Stone et al. (1995), which presents the density of seabird species for north-west European waters, concentrating on the UK for differing temporal extents, calculated using ESAS data collected between 1980 and 1993. A lack of inter-annual variability in the abundance of many seabird species is to be expected as these birds move out of UK waters at the end of the breeding season to wintering areas far beyond UK waters (e.g. into the Atlantic off the

		In practical terms, how is the additional information you are seeking likely to alter the conclusions of the Environmental Statement (ES) and Habitat Regulations Assessment (HRA)?	Whether these months are more or less important in the final assessment of impact depends on the population scale/legislation (see below). In the case of displacement assessment (presumed to be included as 'modelling'), the impact of having four consecutive months missing (irrespective of when they fall in the year) as opposed to four non-consecutive months results in a greater impact to the confidence of the assessment. This is due to the use of seasonal mean of peaks in the calculation of displacement figures, and the need to have sufficient data points within a 'season' to make the analysis meaningful. The principle ornithological issues relate to the effect of the project on the qualifying features (breeding gannet, guillemot, kittiwake, razorbill and the breeding seabird assemblage) of FFC SPA. It should be noted that Natural England advise that March is considered part of the breeding season for Kittiwake, Gannet and Guillemot. The seabird populations breeding at FFC SPA are protected throughout the year, and hence a proportion of the potential effects of Hornsea Project Three are apportioned to these populations throughout the year. It is true to say that in the non-breeding months the level of apportioning is substantially lower (than in the breeding season), and therefore the relative contribution of these months to the overall impact is decreased. The principle ornithological issues are at an in-combination level and so while the contribution of the non-breeding season may be less than the breeding season, it is the combination of all seasons and projects that need to be considered. Conducting robust incombination (or cumulative) assessments is extremely challenging, as more and more uncertainties combine. One of our key aims is to increase certainty (and hence decrease the need for precautionary assessments), and the introduction of additional, avoidable uncertainty (e.g. due to the planned failure to collect sufficient data to inform the baseline characterisation) is unacceptable. In practical terms, the effect of the missing data on the impact assessment will depend on the nature of the impact being assessed.	west coast of Africa, the east coast of Brazil or the northern Atlantic). The Applicant's submission at Deadline 4 (REP4-049) applied an alternative analysis based upon that advocated by Natural England in their submissions and as a result is considered to have addressed the issue in relation to data for December to March. Collision risk assessment undertaken using the Band (2012) CRM does not require 24 months of data rather it requires a single monthly density value. How input data is derived (e.g. average of two data points for each month or a single estimate for each month) is separate to the modelling process.

			In the case of displacement impacts the assessment depends on being able to select a peak abundance estimate for each season, and there being at least two years of data for a particular season to allow a mean peak across the years to be calculated. This is clearly not possible where there are only data for a particular season from one year. Even where there are data from some months within a defined season across two consecutive years, there is the possibility that the peak count may have occurred in the missing month/s and so the calculation of a mean peak of counts will be an underestimate. For collision estimates the effect of the missing data is difficult to predict as collision risk assessment relies on having density data from 24 months to use in the calculation of collision values. Missing months could result in higher or lower collision predictions compared to a full 24 month dataset. As such, it is not possible to comment on how the conclusions may be altered within the ES and HRA if the additional data had been collected (i.e. 24 months of consecutive survey data, notwithstanding queries over the precision of the data/the analysis of all four cameras). The collection of the additional data may result in an increase or decrease in the calculated collision risk and displacement effects, and may result in an alteration to the conclusions (either of greater or lesser impact).	
Q2.2.8	NE	Given your stated position in relation to the baseline characterisation and the fact that you are unable to conclude beyond reasonable scientific doubt that the integrity of European sites would not be affected by the proposal, please suggest any feasible compensation measures that would	Although it is acceptable to discuss compensation measures in principle and without prejudice prior to an Appropriate Assessment (AA) or Habitats Regulations Assessment (HRA), it is important to recognise that **Compensatory measures** can only be *formally* considered after a negative assessment under regulation 63* and where in the absence of alternatives and there are imperative reasons of overriding public interest (regulation 64*), and the competent authority is minded to approve the plan or project (*Regulation 25 and 26 in Offshore Regs).	The Applicant notes and welcomes the willingness on the part of Natural England to engage with the Applicant to discuss compensatory measures in principle and will seek to organise a discussion at the earliest opportunity.
			In this scenario it is the duty of the relevant Secretary of State to secure such compensatory measures as is necessary to ensure the overall coherence of Natura 2000 is protected. The relevant SNCB(s) role is to advise on the effectiveness of the proposed compensatory measures and whether they are likely to achieve the objectives.	The Applicant agrees that it is ultimately the duty of the relevant Secretary of State to secure any compensatory measures necessary to ensure the overall coherence of Natura 2000. However, as the appropriate nature conservation body with expertise in this area, the Secretary of State is entitled to

		be needed for Flamborough and Filey Coast SPA.		seek and NE has a duty to provide full and open advice and proactive support on all aspects of the process. As a statutory nature conservation body under the Habitats Regulations, NE has a legal duty to exercise its functions so as to secure compliance with the requirements of the Habitats Directive. If the Secretary of State were to determine there are IROPI and no alternative solutions such that development consent should be granted subject to compensatory measures, the Applicant submits that NE is obliged to assist the Secretary of State in finding a way to ensure the coherence of Natura 2000. This is very clearly the expectation of the Government, as explained in the 2012 DEFRA guidance* (Appendix 10 to the Applicant's response to Deadline 5), which says that NE and other SNCBs are expected to proactively assist the Secretary of State and applicants to identify compensatory measures. Paragraph 9 says (our emphasis): *"Government expects SNCBs to have a role in helping applicants and competent authorities to **identify** and assess the adequacy of compensatory measures".* The same expectation is repeated at paragraph 30. It is considered that Natural England's role therefore necessarily extends beyond that commenting upon the effectiveness of measures proposed by others and includes helping to identify compensatory measures. ** Habitats and Wild Birds Directives: guidance on the application of article 6(4): Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures, published December 2012:* Habitats and wild birds directives: guidance on the application of article 6(4) - GOV.UK

			Compensation should not be confused with mitigation measures which aim to avoid or reduce the extent of harm and form part of the plan or project and/or are directly connected with its implementation. Compensatory measures therefore need to be independent of the proposed project.	The Applicant agrees that it is necessary to distinguish compensation from mitigation measures for the purposes of the Habitats Regulations Assessment.
			In order to ensure the overall coherence of the Natura 2000 Network (and comply with EC guidance), Natural England advises that: - It should be possible to draw on empirical evidence to demonstrate a reasonable expectation of success within a reasonable timeframe. - There should be a clear plan for undertaking the compensation and subsequent management to ensure that objectives are met. - Compensation should be in comparable proportions to those habitats and species that are adversely affected. They should be within the same biogeographical region in the territory of the same Member State and should provide functions comparable to those that had justified the selection criteria of the original site. - Compensatory measures should be completed and land designated (where applicable) before work on the consented plan or project commences. It should be noted that there are very few cases that have reached the IROPI stage within the marine environment, and of those cases there is limited commonality with this project. As such Natural England is unable to provide examples of suitable compensatory measures at this stage. Natural England reference a report commissioned and published by CEFAS titled: ' Evidence Review to support the identification of potential conservation measures for selected species of seabirds' (MacArthur Green 2013) (submitted with this response). The report seeks to identify measures that could be implemented either at protected sites or elsewhere with a view to informing considerations around the mitigation or compensation of predicted impacts from offshore marine developments.	The Applicant has noted and carefully considered NE's comments with regard to how compensatory measures should be approached in general terms. The Applicant considers it is important to be clear as to the legal requirements and precise terms of the guidance relating to the approach to compensatory measures. The Applicant therefore wishes to clarify the following matters: <u>Requirement for empirical evidence</u> The Applicant would agree that measures for which there is no reasonable prospect of success should not in general be considered and that evidence would need to be provided as to the technical feasibility. However, it is not the case that there must be <u>empirical</u> evidence as suggested. It is recognised that compensatory measures may by their nature be novel. <u>Location of compensation</u> It is not the case that compensation in all cases must be in the same biogeographical region. MN 2000 notes (pages 62/63) that the Birds Directive does not provide for biogeographical regions, or selection at EU level. However by analogy, it gives an example that *the overall coherence of the network* may be ensured if compensation fulfils the same purposes and function along the same migration path; and compensation areas are accessible with certainty by the birds usually occurring on the site affected by the project. <u>Timing</u> It is not the case that any compensatory measures must always be completed before any work on the plan or project

			It should be noted that compensatory measures were not discussed as part of the Evidence Plan Process and therefore this matter is yet to be explored with the applicant.	may proceed. In some cases damage to European sites may necessarily occur before the compensatory measures are fully functioning. The DEFRA guidance also recognises that there may also be circumstances where the compensatory measures will take a long time to become fully-functioning. This is set out at paragraph 36 of the DEFRA guidance.
			An additional factor for consideration in relation to this particular project is that deficiencies in the baseline data mean that it is difficult to have certainty over the nature and extent of the impacts and consequently it will be difficult to determine the nature and extent of the compensatory measures that may be required. Natural England are happy to engage in informal discussions regarding compensatory measures at this stage, but in the absence of previous examples to draw upon we would look to the applicant to propose options supported by empirical evidence as a starting point.	The Applicant does not agree that the baseline data is deficient and relies on its previous submissions in this regard. In any event, the Applicant considers that it is possible to account for any uncertainty and uncertainty does not preclude reaching any conclusion on the nature and extent of compensatory measures. As set out above, the Applicant notes the willingness on the part of Natural England to engage informally with the Applicant to discuss compensatory measures in principle and the Applicant will seek to organise a discussion at the earliest opportunity.
Q2.2.14	RSPB, NE	The Applicant has advised that the nocturnal activity factors (NAF) historically used for collision risk modelling are not taken directly from Garthe and Hüppop (2004) but are instead based on an incorrect representation of the scores by Band (2012). The Applicant goes on to state that Band (2012)	NE Response: Band recommends that "*Flight activity estimates should allow both for daytime and night-time activity. Daytime activity should be based on field survey. Night-time flight activity should be based if possible on night-time survey; if not on expert assessment of likely levels of nocturnal activity*." It is therefore correct that Band (2012) recommends that night-time survey data (or other records of nocturnal activity) should be used if available and Natural England agrees with this recommendation. Band (2012) recommends that "where there is no night-time survey data available, or other records of nocturnal activity, for the species in question, (or for other sites if not at this site), it should be assumed that the Garthe and Hüppop/ King et al 1-5 rankings apply.	Although it is correct to say that the nocturnal activity factors used in collision risk modelling are taken directly from Garthe and Hüppop (2004), the quantification of these values, as conducted in the Band (2012) CRM, was not the intended use of these factors. The Applicant would highlight that the empirical nocturnal activity factors which have been derived solely for the use in the Band CRM by Furness (2018) and Furness (unpub) use (as part of the evidence base), the same studies used by Garthe and Hüppop (2004) when defining nocturnal activity factors.

		recommends that empirical data should be used when available, as has been the case for gannet and kittiwake. Please comment on these views and the empirical robustness of the studies that were used to justify the use of different NAF by the Applicant, as set out in [REP1-188]. Please provide copies of any publications you wish to rely upon in evidence that have not already been provided.	Band acknowledges that the translation of the factors to percentages of daytime activity is simplistic and may be precautionary. In REP1-188 the Applicant has presented actual percentages of nocturnal activity relative to daytime activity rather than factors (1-5) for gannet and kittiwake. Further the Applicant has presented different percentages for the breeding and non-breeding seasons. The Applicant uses 8% nocturnal activity relative to daytime activity for the breeding season and 3% for the non-breeding season for gannet and 20% for the breeding season and 17% for the nobreeding season for kittiwake. These figures are taken from Furness et al (2018) for gannet [REP1-143] and MacArthur Green (2018) for kittiwake. Natural England does not agree that the empirical data on nocturnal activity for gannet and kittiwake that the Applicant has used is sufficient to justify the NAFs proposed by the Applicant for CRM as set out in REP1-188. Natural England also note that the NAFs presented in REP1-188 are not the same as those used for the collision risk assessments in the Applicant's ES and RIAA which are presented in [APP-109]. Sections 3.9-3.13 of REP1-211 and Q1.2.59 of ExA Q1 sets out our views on the robustness of the studies used to derive NAFs in REP1-188 (Garthe and Hüppop (2004) / Furness et al. (2018) / MacArthur Green (2018), but some additional key points are: **Source Data** • The percentages of night-time flight activity relative to daytime flight activity presented in REP1-188 (Furness et al 2018, MacArthur Green 2018) have been derived from an analysis of data from a number of different tagging studies for gannet and kittiwake; • The original tagging studies were mostly not designed to measure nocturnal activity levels, and information on nocturnal activity is not always presented in the source papers cited in REP1-143 (Furness et al 2018) and MacArthur Green (2018) – or if it is presented it is not in a format applicable to the calculation of nocturnal activity levels for CRM; • The nocturnal activity factors presented in Garthe and Huppop (2004), were derived from consideration of empirical data from tracking studies –	The Applicant would also highlight that Furness (2018) is a peer-reviewed paper that included Natural England amongst its reviewers. The Applicant's submission at Deadline 4 (Appendix 28; REP4-049) applied an alternative analysis which included the use of a range of nocturnal activity factors as advocated by Natural England in their submissions. This is considered to have addressed the issue in relation to nocturnal activity factors.

			some of which are the same studies that have been used to derive the nocturnal activity percentages presented in REP1-188; **Interpretation of data and sources of variability** • Nocturnal activity levels are not measured directly in the tagging studies. In order to derive information on nocturnal activity levels (which Furness et al 2018 define as flight activity), REP1-143 (Furness et al 2018, cited in REP1-188) makes assumptions about how parameters derived from tags on birds translate into flight activity. • The types of tags used varies across the studies as do the parameters that can be used to derive flight activity information. For example, some studies used internal and external temperature monitors – where for example temperature is used to indicate whether a bird is sitting on the water or not or has ingested food, others used accelerometer data to estimate flying activity, others saltwater immersion sensors to indicates periods resting on water etc. Different models, methods and assumptions need to be made to derive estimates of flight behaviour from the tag data. • There are also differences in sample sizes and location of colonies between the studies etc. Therefore there are a number of sources of variability and uncertainty in the measures of percentage night-time activity levels presented in REP1-188. These account for some of the differences in nocturnal activity rates between different publications (e.g. between REP1-188 and MacArthur Green (2018)*) as different datasets are included; • Table 1 in Furness et al 2018 [REP1-143] presents "*Flight activity from sunset to sunrise as % of flight activity during day*" derived from 11 publications and it is an average of these percentages that is used to denote nocturnal activity levels for CRM in REP1-188 for gannet. However it is not clear where the % figures in Table 1 come from or how they have been calculated as they are not generally presented in the publications cited. For example, according to Table 1, night time flight activity was 20.9% of the daytime levels based on the Garthe et al (1999) study. Garthe et al (1999) does not include this percentage. Figure 3 in Garthe et al (1999) shows the diel pattern of activity of tagged birds which includes percentage of time birds were flying. Based on Figure 3, flight activity from sunset to sunrise as a % of flight activity during day appears to be greater	

			than 25% whether calculated using all activity data (including time birds spent at the colony), or if calculated using only the data for when birds were at sea. • Further, Figure 3 in Garthe et al (1999) shows that birds were in flight less during the period during the core daylight hours away from sunrise and sunset (when at sea surveys typically take place) and therefore calculating nocturnal flight activity from sunset to sunrise as a % of flight activity during the day should be higher if compared to activity in these core daytime hours. This is also evident from Figures 2 and 3 in REP1-143 (Furness et al 2018) where activity levels were generally lower in the middle of the day. This is relevant because the percentage nocturnal activity used in collision risk modelling (e.g. at Hornsea Three) is applied relative to the activity level measured during day-time by the snapshot of birds in flight from the digital aerial surveys. If a digital aerial survey records 100 birds of which 30 are in flight, then applying a nocturnal activity percentage of 8% (as proposed in REP1-188 for gannet in the breeding season) translates into 2 birds at night. This means that CRM will be applied to 30 birds in the daytime and 2 during the night – i.e. 2% of the birds recorded at sea on surveys, which given that night-time includes periods of twilight has the potential to be underestimating nocturnal activity levels. It is therefore Natural England's view that there is considerable variability and uncertainty about the appropriate activity level to use in CRM when applied relative to a daytime activity level that is estimated from an at sea survey. The calculated empirical NAFs presented within REP1-188 (Furness et al 2018 and MacArthur Green 2018) do not present any variability measure or confidence intervals to reflect this. We consider that appropriate nocturnal activity factors to use for gannet are 1-2 (ie 0-25% of daytime activity as measured from an at-sea survey) and 2-3 for kittiwake (i.e. 25-50% of daytime activity as measured from an at-sea survey), and consider that these rates are likely to better reflect the variability in nocturnal activity than the single figures proposed by the Applicant. Furthermore, we do not consider that there is sufficient evidence to apply different rates to the Hornsea Three data for the breeding season and non-breeding seasons for kittiwake and gannet as proposed in REP1-188.	

			Band (2012) points out that "*Levels of activity may vary from season to season, and activity at sea may in any case differ from the levels of activity in breeding colonies for which the rankings have been formulated. Some species are particularly active during dawn and dusk or extended twilight periods, or in locations where there is ambient windfarm lighting. When expressing the output of the collision risk assessment, the uncertainty surrounding flight activity should reflect the degree of confidence (or lack of confidence) in the flight activity information.*"	
Q2.2.18	RSPB, NE	Cook et al (2018) recommends avoidance rates for kittiwake and lesser blackbacked gull that are different to those proposed by JNCC et al (2014) and the RSPB. Please comment on the results of the additional modelling, its empirical basis and the implications for the ES and HRA as set out by the Applicant in Appendix 10 at Deadline 1[REP1-188].	NE Response: Cook et al (2018) recommend avoidance rates (Basic Band Model) of 0.998 for lesser black-backed gull and 0.992 for kittiwake. Cook et al (2014) recommend avoidance rates of 0.995 for lesser black-backed gull and 0.992 for kittiwake. JNCC et al (2014) advise that an avoidance rate of 0.995 (+/- 0.001) and 0.989 (+/-0.002) are used for lesser black-backed gull and kittiwake respectively with the Basic Band Model (Band 2012). Cook et al (2014) is the report of work carried out by the British Trust for Ornithology in collaboration with the Environmental Research Institute for a Marine Scotland Science project to derive avoidance rates for use in collision risk models at offshore windfarms. Cook et al (2018) is a paper based on the Cook et al (2014) work that was published in the journal Marine Environmental Research, and so is based on the same empirical data and analyses of avoidance rates. Cook et al (2014) concluded that whilst it was possible to derive a species-specific within-windfarm avoidance rate for lesser blackbacked gull (0.998), it was based on limited data and Cook et al (2014) recommended that the within-windfarm avoidance rate for "large gulls" (a dataset that included the lesser black-backed gull data) was more appropriate for use for this species – i.e. a total avoidance rate of 0.995 for use with the basic Band model. Subsequently, Cook et al (2018) recommended use of a 0.998 avoidance rate for lesser black-backed gull. This rate is not based on any additional data or analysis compared to Cook et al (2014) and therefore since the lesser black-backed gull species specific within windfarm avoidance rate was based on data from only two sites, and has lower confidence	At Deadline 4 (REP4-035) the Applicant submitted Bowgen and Cook (2018) which provides the most recent evidence on avoidance rate. The Applicant's view on these avoidance rates is provided in their response to Q2.2.18 of the Applicant's response to the Examining Authority's second questions (REP4-012). The Applicant's submission at Deadline 4 (Appendix 28; REP4-049) applied an alternative analysis which included the use of a range of avoidance rates including those advocated by Natural England (i.e. JNCC *et al*., 2014) and those recommended by Bowgen and Cook (2018).

			associated with it compared to the "large gull" avoidance rate (which had a higher confidence level), Natural England continue to recommend an avoidance rate of 0.995 for use with the Basic Band Model (as per recommendations in Cook et al 2014 and JNCC et al 2014). Cook et al (2014) concluded that it was not possible to derive species-specific within-windfarm avoidance rates for black-legged kittiwake. However, on the basis of black-legged kittiwake having similar flight characteristics to black-headed and common gulls (which contributed the majority of records for the small gulls group), the within-windfarm avoidance rates derived for the small gulls group was considered appropriate for this species. A total avoidance rate of 0.992 was therefore recommended for the basic Band model which is the "small gull" avoidance rate. JNCC et al (2014) did not agree with the use of the small gull avoidance rate for kittiwake as considered appropriate by Cook et al (2014, 2018). The rationale for this is set out in JNCC et al (2014), but in summary it was considered that the more marine nature of the species compared to the other small gulls meant that there was considerable uncertainty around appropriate avoidance rates to use for kittiwake and that as a result a more precautionary approach should be adopted and the more generic "all gull" category avoidance rate of 0.989 should be used. The implications of using an avoidance rate of 0.992 over an avoidance rate of 0.989 with the Basic Band Model (i.e. the difference between the Applicant's approach and Natural England advice for kittiwake) is that the number of predicted collisions will be around 27% lower with the 0.992 avoidance rate compared to a 0.989 avoidance rate. Therefore the effect of applying a 0.992 avoidance rate across all projects would result in the predicted impact both at HRA and EIA being 27% lower than if an avoidance rate of 0.989 were used. The implications of using an avoidance rate of 0.998 rather than 0.995 with the Basic Band Model would be a 60% reduction in the number of predicted collisions. The effect of applying a 0.998 avoidance rate across all projects	

			would result in the predicted impact both at EIA being 60% lower than if an avoidance rate of 0.995 were used.	
Q2.2.19	RSPB	The Applicant has stated [REP1-122] that no colony specific data from Flamborough and Filey Coast SPA were made available and that it is, in any event, irrelevant to the seasons in the array area. Bearing in mind the typical foraging distances of breeding birds from this colony, why are the colony specific seasons relevant to what happens 150km away in the array area? How many breeding individuals have been tracked and shown to be entering the array area each year? Please provide copies of any publications you wish to rely upon in evidence that have not already been provided.	The RSPB consider that the kittiwake and gannet recorded at the array area during the breeding season are most likely to have originated from the Flamborough and Filey Coast SPA. For HRA the impacts specific to this SPA must be considered for a likely significant effect, and so the colony represented by this SPA is the most relevant to define breeding seasons. The RSPB tracked kittiwake from sites at Bempton and Filey within the SPA from 2010 to 2015. The details of the numbers of breeding individual entering the array area are given below. [TABLE – *Not duplicated here*] The RSPB will provide a breakdown of more recent tagging and overlap with the array area for Deadline 5.	RSPB have tabulated in their response to the Examining Authority (REP4-137) the details of the numbers of breeding individuals entering the array area of 154 breeding kittiwakes tracked from Flamborough & Filey Coast SPA. Six of the 154 birds (3.9%) were recorded as entering the array area. It should be noted that the information provided indicates a level of activity considerably lower than that which is assumed by the Applicant when apportioning impacts on kittiwake to FFC SPA. The risk of collision is further influenced by the bird's behaviour e.g. commuting, resting and foraging which influences flight height, and the frequency and duration of the interaction with Hornsea Three which themselves are related to the former. The presentation of such data without further interpretation may provide a misleading assumption that birds travelling out to the array is compatible with bringing enough food back to keep a chick alive with the relationship between foraging range and breeding productivity having been discussed by the Applicant in RIAA Annex 3: - Phenology, connectivity and apportioning for features of FFC pSPA (APP-054) (see paragraph 1.3.3.10 for a summary of that discussion). The behaviour of those few birds that do appear to interact with Hornsea Three should, therefore, also be considered in relation to the breeding status (before and after tracking) of those tagged individuals. It is understood that the RSPB's tracking programme at the SPA from 2010 to 2015, attached GPS loggers (I-gotU GT-120, Mobile Action Technology) which necessitated the re-catching of the bird to remove the tag between one and five

				days after attachment. This recapture event was invariably at the nest where the bird had originally been marked when a breeding individual, though could also be from the recovery of a dead bird. The potential exists for the recapture of a bird following breeding failure, as the adults do not necessarily vacant the nest site. Upon breeding failure, the bird is not constrained when foraging by the need to be in attendance at their breeding colony. In such circumstances, a bird may travel beyond the maximum foraging range for a breeding kittiwake, estimated by Thaxter et al. (2012) as 120 km. In circumstances where birds feeding young are unable to find food locally, because food supply has collapsed or competency of the individual, longer trips may be made such that it is incompatible with bringing enough food back to keep a chick alive. In such cases breeding failure, may occur during or after tag recovery.
Q2.2.28	RSPB	You state that the correct manner in which to deal with uncertainties is through a properly quantified precautionary approach and not the qualitative approach taken by the Applicant [REP1-111]. The Applicant has set out the detail of the assessment from 5.9.2.24 in the ES [APP-065]. How should the quantitative approach you advocate be carried out?	Uncertainty is inherent in scientific assessment and need not be detrimental but should always be described either quantitatively where possible or qualitatively, to provide a measure of confidence in the data which underpin decisions. In the assessment, where an estimate for a parameter is cited, a measure of uncertainty should be given with this estimate. The uncertainty associated with underlying modelling should also have been assessed. For example, the Skov *et al.,* 2018 report has been cited widely by the Applicant, but they have omitted to mention that analysis of this work suggested that: - Underpinning the Band (2012) collision risk model is the calculation of pColl, the probability of collision of birds passing through the rotor swept area of a turbine. The ORJIP BCA study was the first time that it has been possible to validate this calculation with empirical data. This showed that the calculation of probability of collision by the Band model may underestimate collision by a factor of four (Bowgen & Cook, 2018). - Avian flight heights recorded during the ORJIP study were considerably higher than those previously estimated, and included in the assessment (Bowgen & Cook, 2018).	In addressing the difficulties of evaluating the cumulative effects on the non-breeding component of the North Sea razorbill population (Paragraph 5.13.3.29 of the ES [APP-065]), the Applicant is unaware of numerical data that would enable a quantitative methods for calculating and expressing uncertainty as suggested by RSPB. A qualitative approach was therefore applied by the Applicant consistent with that used in EIAs when addressing comparable such scenarios with an absence of quantitative data. The Applicant notes that the response provided by the RSPB to this question is in relation to collision risk modelling. This is not relevant to the assessments conducted for immature guillemot, razorbill or puffin as these species are not considered vulnerable to collision risk impacts. The Applicant would take this opportunity to address RSPB's use of Skov *et al.* (2018) as an example when making the point that to facilitate a full assessment with consideration of uncertainty details of confounding factors

		Why is the assessment set out in the ES [APP-065] not adequate? Please provide copies of any publications you wish to rely upon in evidence that have not already been provided.	- Calculation of Avoidance Rates for the Skov *et al.,* (2018) report neglected to consider the influence of fishing vessels on bird distributions. To facilitate a full assessment with consideration of uncertainty details of confounding factors such as these should be presented clearly. There are well-established quantitative methods for calculating and expressing uncertainty, such as confidence limits which may be estimated directly or by techniques such as bootstrapping. These metrics present a measure of confidence in the data which is unambiguous and therefore should be presented where possible. Sensitivity analyses should also be carried out to identify the potential effect of any uncertainty and to show how potential variation in key results should information or data in the study be incorrect. There is precedent for such analysis in wind farm assessment, for example, sensitivity analyses were used to assess the effects of data uncertainty in a population viability analysis of the north Norfolk Sandwich tern population related to wind farm developments (Mackenzie, A. & Perrow, M.R. (2009) Population viability analysis of the north Norfolk Sandwich tern *Sterna sandvicensis* population. Report for Centrica Renewable Energy ltd and AMEC Power & Process).	should be presented clearly. The Applicant has used the Band model when undertaking collision risk modelling to inform this assessment as was agreed by the Expert Working Group (paragraph 4.3.2.12 of Annex 5.5.1: Consultation Report (APP-035)) and presented collision risk estimates incorporating the variability associated with density data, flight height distribution and avoidance rate in Volume 5, Annex 5.3: Collision Risk Modelling (APP-109). The Applicant has not made any recommendation for the empirical avoidance rates (EARs) calculated by Skov *et al.* 2018 to be used with the Band model in the assessment of Hornsea Three. This is because the EARs are not directly comparable in terms of what is being accounted for by the avoidance rates required of the Band model e.g. model error, as discussed by Bowgen & Cook (2018). Given it is the consensus of all stakeholders that the EARs of Skov *et al.* (2018) are inappropriate for use with the Band model, the Applicant considered it would serve as a distraction for the assessment to have discussed the analysis undertaken by Skov *et al.* (2018) to calculate EARs. Discussion in relation to differences in avian flight heights between ORJIP and that previously estimated, and the influence of fishing vessels on bird distribution only have relevance when the EARs presented in Skov *et al.* (2018) are used with the Band (2012) CRM. As the Applicant has not applied the Skov *et al.* (2018) EARs, these discussion points have no relevance for Hornsea Three. Irrespective of this response, the Applicant considers it unhelpful to state that Skov *et al.* (2018), in using empirical data, calculated pColl values higher than that used in the Band model, without including the caveat that this difference is negated by a commensurate difference between EARs and that of the avoidance rates used with the Band model. Moreover, in their analyses of how best to use the findings of Skov *et al.* (2018), Bowgen and Cook (2018) suggested

				that the Band model may give a misleading impression of absolute collision risk, with the Band model potentially providing collision rates higher than those observed, even after accounting for avoidance behaviour.
Q2.2.32	RSPB	You stated that the apportioning of impacts on kittiwake to the Flamborough and Filey Coast SPA was scientifically unjustified [REP1-111]. The Applicant has requested that you provide any information to the contrary to support a different apportioning rate. Is there any empirical evidence to the contrary to suggest the use of different values would be more robust? Please provide copies of any publications you wish to rely upon in evidence that have not already been provided.	The RSPB advocate the use of the theoretical approach as laid out in SNH guidance (SNH 2018) amended, as per the guidance, to take into account tracking data from Flamborough and Filey Coast SPA. This theoretical approach is based on foraging range and three colony-specific weighting factors: colony size, distance of colony from site and the areal extent of the open sea within the foraging range of the relevant species. Marine Scotland have been developing a tool that uses the information from Wakefield *et al*., (2017) to apportion birds to colonies. This is currently under internal review at Marine Scotland and is likely to be available soon. Once available it is likely to provide the best method for apportioning, for some species, including kittiwake.	The Applicant notes that for the theoretical approach as laid out in SNH guidance (SNH 2018) to be used, it requires an agreed foraging range value for kittiwake (from which the proportion of sea area within foraging range will be calculated) that encompasses Hornsea Three. This is required irrespective of whether the theoretical approach is amended, as per guidance, to take into account tracking data from Flamborough and Filey Coast SPA. To determine the SPAs for which there may be connectivity, SNH (2018) recommend using the single mean maximum value from Thaxter *et al.* (2012). Whether using the mean maximum value ± 1 standard deviation (60.0 ± 23.3) or the maximum value, the foraging range does not encompass Hornsea Three at 150 km. In extending the foraging range to encompass Hornsea Three on the basis of the tracking data from Flamborough and Filey Coast SPA, it is only reasonable to do so if those individuals commuting to Hornsea Three were bringing enough food back to keep a chick alive which has yet to be confirmed by RSPB (see response to Q2.2.19). The Applicant notes that Hornsea Three lies east and outside of the seabird hotspots based on the distribution of breeding kittiwakes from Flamborough and Filey Coast SPA irrespective the method used by Cleasby *et al.* (2018). If the SNH approach were to be applied, utilising a foraging range that would not be consistent with the findings of Cleasby *et al.* (2018), it is considered highly unlikely that any resulting apportioning value would be higher than that applied by the Applicant.

Q2.2.36	NE	In [REP3-075] you stated that no clear audit trail is present showing how the figures presented in [REP1-148] were derived. Could you confirm if the type of information you are requesting here has been made available for the cumulative/in combination assessments for previous offshore wind farm projects?	This type of information has not been made available for the cumulative/in-combination assessments for previous windfarm projects. Natural England also note that previous windfarm projects have either not presented revised collision figures for windfarms as per REP3-075, or Natural England has not accepted such changes to the collision figures.	The Applicant would highlight that Natural England have previously accepted changes to collision risk values at other projects. At Hornsea Project Two, correction factors were applied to account for differences between assessed and consented turbine scenarios. These were agreed with Natural England as part of the application and examination process at Hornsea Project Two and were subsequently incorporated into the assessments conducted by Natural England (see for example Appendix N and P of the Hornsea Project Two applicant's submission at Deadline 2a of the examination of Hornsea Project Two and Appendix 2 and 3 of Natural England's submission at Deadline 3 of the Hornsea Project Two examination). The planning consent for the East Anglia Three offshore wind farm was secured, partly due to a reduction in the number of turbines at the East Anglia One offshore wind farm. This was introduced during the examination of the project and the reduction at East Anglia One was accepted by Natural England (see Table 5, row 4d of the Statement of Common Ground submitted at Deadline 7 of the East Anglia Three examination). The Applicant would also highlight that this source of over-estimation has previously been highlighted by the Examining Authority for the Hornsea Project Two offshore wind farm (see paragraph 6.4.78 of the Hornsea Project Two Examining Authority's recommendation report (Appendix 66 to the Applicant's submission at Deadline 4 – REP4-085)).

Benthic

PINS Ref. No.	Question addressed to:	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
Q2.2.45	NE	Given your stated position in relation to the baseline characterisation and the fact that you are unable to conclude beyond reasonable scientific doubt that the integrity of European sites would not be affected by the proposal, please suggest any feasible compensation measures that would be needed for the North Norfolk Sandbanks and Saturn Reef SAC and The Wash and North Norfolk Coast SAC.	Although it is acceptable to discuss compensation measures in principle and without prejudice prior to an Appropriate Assessment (AA) or Habitats Regulations Assessment (HRA), it is important to recognise that Compensatory measures can only be formally considered after a negative assessment under regulation 63* and where in the absence of alternatives and there are imperative reasons of overriding public interest (regulation 64*), and the competent authority is minded to approve the plan or project.(*Regulation 25 and 26 in Offshore Regs). In this scenario it is the duty of the relevant Secretary of State to secure such compensatory measures as is necessary to ensure the overall coherence of Natura 2000 is protected. The relevant SNCB(s) role is to advise on the effectiveness of the proposed compensatory measures and whether they are likely to achieve the objectives. Compensation should not be confused with mitigation measures which aim to avoid or reduce the extent of harm and form part of the plan or project and/or are directly connected with its implementation. Compensatory measures therefore need to be independent of the proposed project. In order to ensure the overall coherence of the Natura 2000 Network (and comply with EC guidance), Natural England advises that: • It should be possible to draw on empirical evidence to demonstrate a reasonable expectation of success within a reasonable timeframe.	The Applicant notes that Natural England's response to Q2.2.45 is in very similar terms to their response to Q2.2.8 and the Applicant therefore refers the Ex.A to the Applicant's response to Q2.2.8 above, which applies equally to Natural England's response to this question. However, with respect to baseline characterisation, in this context, the Applicant would additionally note that on Page 11 of Natural England's Deadline 3 response (REP3-077), Natural England noted that the characterisation of The Wash and North Norfolk Coast SAC is sufficient. With respect to the characterisation of the North Norfolk Sandbanks and Saturn Reef SAC, the Applicant would further note that the approach to characterisation was agreed through the Marine Processes, Benthic Ecology and Fish Ecology EWG, via the use of desk based datasets (including JNCC/Cefas data for the SAC) and site specific sampling to fill data gaps identified in the desktop study. It is the Applicant's understanding that the residual concerns with respect to characterisation relate to how these data were analysed and the biotopes identified from these analyses. With a view to resolving these outstanding areas of disagreement, the Applicant has provided a technical note, presented at Appendix 78 to the Applicant's response to Deadline 4 (REP4-097) which re-examines the biotope classifications within the SAC and the implications of any potential biotope re-classifications on the conclusions of the RIAA and the Environmental Statement.

			• There should be a clear plan for undertaking the compensation and subsequent management to ensure that objectives are met. • Compensation should be in comparable proportions to those habitats and species that are adversely affected. They should be within the same biogeographical region in the territory of the same Member State and should provide functions comparable to those that had justified the selection criteria of the original site. • Compensatory measures should be completed before work on the consented plan or project commences. It should be noted that there are very few cases that have reached the IROPI stage within the marine environment. Of those cases there is limited commonality with this project, and there are no examples in within Offshore SACs. As such Natural England and JNCC are unable to provide specific examples of suitable compensatory measures at this stage. An additional factor for consideration in relation to this particular project is that deficiencies in the baseline data mean that it is difficult to have certainty over the nature and extent of the impacts and consequently it will be difficult to determine the nature and extent of the compensatory measures that may be required. Natural England are happy to engage in informal discussions regarding compensatory measures at this stage, but in the absence of previous examples to draw upon we would look to the applicant	
Q2.2.47	NE,MMO	If the Secretary of State were to conclude that there may be harm to the Cromer Shoal Chalk Beds MCZ and/or the Markham's Triangle pMCZ, what measures of equivalent environmental benefit to the	MMO: There is currently no standardised approach defined to identify Measures of Equivalent Environmental Benefit (MEEB) for Marine Conservation Zones (MCZ) due to a lack of guidance from the Department for Environment, Food & Rural Affairs (Defra). Without guidance, the MMO is unable to recommend any measures that could be taken, other than early engagement with Defra, Natural England and the MMO. In any case, the MMO recommend	The Applicant would direct the ExA to the Applicant's response to Q2.2.46 and the Defra (2010) guidance on the duties of public authorities in relation to MCZs which is referred to within this response and was presented at Appendix 51 to the Applicant's response to Deadline 4 (REP4-071).

		harm that might be caused could be provided?	that any impact on MCZs should be minimised as far as possible, prior to any such measures being required.	
			NE: Although there is guidance on the process for assessing the impacts on Marine Conservation Zones, there is currently no Government guidance in relation to Measures of Equivalent Environmental Benefit (MEEB) and there and there have been no other cases that have reached this stage. Therefore, should the SoS conclude that MEEB are required, this case would be precedent setting. In the absence of guidance/experience to draw upon, we would recommend that discussions relating to MEEB include input from the SNCBs, Regulatory Agencies (i.e. MMO and BEIS) and Defra.	
Q2.2.48	NE	You questioned the conclusions of the MCZ assessment for the Cromer Shoal Chalk Beds in [REP1-125] and believe there is sufficient uncertainty to have limited confidence in the Stage 1 conclusion that there would be no significant risk to delivering the site conservation objectives. The Applicant maintains in [REP2-004] that a Stage 2 assessment is not required due to the "very small proportion of designated features affected". The Applicant also highlights the fact that the majority of impacts would be temporary	In their MCZ assessment for Cromer Shoal Chalk Beds the applicant has assessed trenching as a worst case scenario. Natural England is of the view that there is limited certainty regarding the scale of the impacts associated with the use of HDD and associated construction of 8, 50x20m cofferdams within the MCZ to conclude that the trenching option would be the worst case. From our experience of similar developments which have used the HDD method, the sediment that is excavated from the exit pits becomes destabilised such that when it is returned it either leaves a depression or is elevated compared with the surrounding habitat. This change in sediment composition may alter the biological communities thus not maintaining the habitats and hindering the conservation objectives for the site. Based on the current assessment there is no certainty of the depth of the sand at this location and depth of any excavation required for the exit pits so potentially there may be interest features affected beyond those considered in the current assessment. Additionally there is likely to	The Applicant can confirm that trenching and HDD options have both been assessed. As outlined in paragraph 5.1.2.2 and Table 5.2 of Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement (APP-104), the maximum design scenario with regard to the greatest area of disturbance was identified as the open cut scenario. However, due to the differing effects of a HDD installation (e.g. compression of sediment due to jack up vessels, effects on marine processes), the MCZ Assessment also fully considered the effects of HDD operations. This included consideration of compaction of sediments (e.g. due to jack up footprints) with evidence from other offshore wind farm sites considered in the assessment (see paragraph 5.1.2.8 to 5.1.2.11 of Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement), with the conclusion that sediments from within these and the surrounding area would be reworked through tidal and wave action and the infilling of any depressions. The seabed would be expected to return quickly

		and reversible and that longer lasting effects would affect a very small (i.e. <0.02%) proportion of the Subtidal Sand feature of the MCZ and only where cable protection is required. What are your views on these matters?	be compaction of sediment within the cofferdam areas from use and storage of associated equipment and/or the location and impacts from storing excavated sediment. It is Natural England's view that the combination of these impacts associated with the HDD option have the potential to impact on different features of the site in different ways to that of the trenching option which has been assessed. Consequently as the preferred option, we believe that this option warrants consideration within the MCZ assessment. In relation to the MCZ assessment as it stands, given our uncertainty that the HDD impacts have been captured within the parameters of the WCS assessment we advise that a more precautionary approach is taken at this time in order to future proof the project and avoid delays at the time of construction. Natural England would also highlight that the impacts should be considered at a feature level, and that there should be consideration of all attributes of that feature. As set out in Natural England PEIr response (point 2.3.15) and highlighted during the evidence plan process, the Humber gateway cable installation demonstrates that impacts to some features are unlikely to be reversible.	to a baseline state due to the mobile nature of the sediments in the area. This conclusion is supported by monitoring data of jack up footprints from geotechnical investigations within the Cromer Shoal Chalk Beds MCZ (see paragraph 3.20 *et seq*. of The Wash and North Norfolk Coast SAC clarification note; REP1-140) which showed infilling of all but two of the 24 jack up footprints within two months of completion of the survey. The jack up footprints associated with the survey were comparable with those proposed for Hornsea Three HDD operations. The Applicant would also note that both Sheringham Shoal and Dudgeon export cables were also installed via HDD within the same part of the MCZ as the Hornsea Three offshore cable corridor. No evidence of depressions associated with HDD operations were recorded in Hornsea Three geophysical survey data for Sheringham Shoal (which was entirely within the data coverage) and for Dudgeon (noting that the HDD exit pits may not have been entirely within the Hornsea Three survey area; see Figures 3.5 and 3.8 of The Wash and North Norfolk Coast SAC clarification note). The Applicant has collected a considerable amount of site specific survey data in this part of the MCZ (see paragraph 4.2.1.2 of Volume 5, Annex 2.3: MCZ Assessment), including detailed geophysical data, geotechnical data, grab sampling and drop down video data which consistently shows subtidal sand sediments within the area of the MCZ where HDD operations may occur. Further detail on the depth of sediment is provided in the Preliminary Trenching Assessment (presented at Appendix 2 to the Applicant's Deadline 5 response), noting the Applicant's comments above in relation to the recovery of sediments in this area following HDD operations associated with Sheringham Shoal and Dudgeon export cables.

				The Applicant would note that the MCZ offers protection to surface sediment features and does not protect subsurface geology. The MCZ assessment has considered the implications on all attributes for the features with the potential to be affected by the impacts identified. As outlined above, the only broadscale habitat feature predicted to be directly affected by Hornsea Three being Subtidal Sand, which has been confirmed via numerous site specific and desktop data sources. The Humber Gateway monitoring is referred to in paragraph 5.1.2.6 of Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement, with this monitoring reporting recovery of sediments and communities within soft sediment habitats following cable installation, although clay exposures and cobble reefs were damaged with no signs of recovery. The Applicant would note that the decision to take forward the nearshore re-route of the offshore cable corridor was influenced by the potential for irreversible effects on clay exposures (the MCZ feature Peat and Clay Exposures) which were recorded by the Applicant during surveys along the previous alignment of the offshore cable corridor (i.e. the offshore cable corridor presented at Section 42 consultation; see Applicant's response to the Eastern IFCA Relevant Representation at Deadline 1; REP1-131).

Q2.2.50	NE, MMO	Paragraph 2.87 of [REP2-004] states that a Cable Burial Risk Assessment would be produced post consent and paragraph 2.88 goes on to state that this would be secured as part of the Cable Burial Plan through Schedule 11, Condition 13(1)(h) (generation assets DML) and Schedule 12, Condition 14(1)(h) (transmission assets DML) of the dDCO. You highlighted the lack of adequate sampling along the inshore cable corridor re-route in relation to MPAs in ISH2 and the need for an early Cable Burial Risk Assessment to avoid problems that have arisen elsewhere.	MMO: The MMO is aware of significant issues following cable installation for Race Bank Offshore Wind Farm. Following publication of 'Natural England' Offshore wind cabling: ten years of experience and recommendations' (Rep 1-208), the MMO consider that Natural England is better suited to elaborate on these issues. The MMO therefore defer to Natural England on this matter. As practical step to be taken in the future, early engagement with the MMO and Natural England is recommended, together with submission of a cable risk assessment. This should include sufficient information on substrates, based upon detailed geotechnical surveys together with a realistic assessment of the effectiveness of cable burial tools. In principle, the MMO is content that the use of a Cable Burial Risk Assessment would be an appropriate tool for mitigation to be secured through the dDCO. The MMO considers that the Cable Burial Risk Assessment should be submitted 6 month prior to the commencement of construction activities to enable sufficient time for discussions and consultation between the Applicant, the MMO and Natural England in the run up to the start of construction.	The Applicant notes the responses from the MMO and Natural England and is pleased to be able to present a Preliminary Trenching Assessment, which includes a preliminary ground model for the offshore cable corridor within the Cromer Shoal Chalk Beds MCZ, The Wash and North Norfolk Coast SAC and the North Norfolk Sandbanks SAC. This is presented at Appendix 2 to the Applicant's response to Deadline 5. This document also outlines how experience from Race Bank and other relevant offshore wind farm projects, will be used to inform cable installation for Hornsea Three. With respect to the comments from Natural England on Race Bank, as set out in the Applicant's Deadline 2 comments on Natural England's written representation (REP2-004), the Applicant has sought to learn lessons from previous offshore wind development rounds and has applied these to the Hornsea Three DCO application. As set out in REP2-004, many of the activities which were not considered in earlier development rounds (e.g. sandwave clearance, boulder clearance, cable protection) have been included within the project description and fully considered within the

		Please elaborate on the problems that have occurred elsewhere. What practical steps could be taken to avoid such problems in this project? How could adequate mitigation be secured through the dDCO?	NE: The Applicant's proposal at Para 2.87, would essential mean that the full assessment of impacts associated with cable installation would be considered and addressed post consent. Whilst this approach may be acceptable outside of designated sites, based on Natural England's experience of previous projects we would no longer consider this a suitable option for addressing impacts on designated sites, and we would expect to see a cable burial risk assessment based on data from a recent comprehensive geotechnical survey campaign to underpin the assessment of impacts on designated sites. We advise that this evidence is required prior to consent to address scientific doubt in relation to the Habitat Regulations Assessment/ MCZ Assessment. This should in part avoid the issues that have occurred during several cable installation operations which have caused not only delays to the project, cost considerable amount of money and resources, but still resulted in significant environmental damage. Most notably of these is Race Bank OWF which is also located within the Wash and North Norfolk Coast SAC. <u>Race Bank example:</u> *Background* Race Bank followed the approach that is currently proposed for Hornsea Project 3 (i.e. a high level assessment at the consenting stage with a commitment to undertake detailed surveys post consent and agree appropriate mitigation prior to construction). As has been the case with many projects, once the geotechnical and geophysical investigations had taken place and a contractor was on board, it was apparent that the installation techniques assessed within their environmental statement would not appropriate. The cable installation techniques consented were either no longer feasible, or required significant seabed preparation activities. This lead to a further 32 consultations with Natural England (via the MMO) over an 18 month period which were required to discharge the marine licence conditions. This also included (but not exclusively) new applications and variations for repeated sandwave	Environmental Statement and RIAA to ensure that the application reflects current best practice. As outlined in the Applicant's response to the ExA's second written questions on the Benthic Ecology topic, the outline Cable Specification and Installation Plan (CSIP; and the cable protection plan and sandwave clearance plans within this) will clearly set out the limits of the DCO within designated sites and how these relate to the RIAA, to ensure auditability throughout the pre-construction, installation and post construction phases. This is now presented at Appendix 3 to the Applicant's response to Deadline 5. With respect to Natural England's comments on assessing the maximum design scenario, the clarification notes provided in the Applicant's Deadline 1 response (i.e. REP1-183 and REP1-138) show that there is adequate precaution in both the sandwave clearance volumes and the cable protection assumptions to have confidence in the maximum design scenario assessed within the Environmental Statement and RIAA. As set out in the Preliminary Trenching Assessment, the ground model and cable burial risk assessment will be developed via an iterative process with future geophysical and geotechnical data providing further, fine scale detail on the ground model to allow the most appropriate installation tools to be selected during the procurement process. Consultation with SNCBs via the Ecological Clerk of Works (ECoW) as set out in the outline CSIP will ensure effective communication with SNCBs, consideration of SNCB concerns during the design and procurement phases of the project and timely communication of activities within marine protected areas. In relation to timescales, the outline CSIP provides a draft consultation process with regard to the cable installation process (including cable protection) within marine protected areas. Within the CSIP, the Applicant proposes early and

			levelling, use of mass flow excavator, and cable protection, all of these had additional protracted documentation sign off processes including separate Appropriate Assessment (AAs) due to the potential to significantly impact the features of the designated sites. Options to take the project forwards needed to take into account NEs ongoing advice since 2009 that no cable protection should be placed in the Wash and North Norfolk Coast SAC, due to the likely hindrance of the conservation objectives for the site and risk of Adverse Effect on Integrity. Furthermore the discussions around potential solutions were constrained by the original consent resulting in novel (untested) and expensive resolutions being found. The result of this was that even prior to the commencement of any cable installation works, the project design had dramatically changed from the original consent, and the resulting impacts were demonstrably greater than those assessed in the Appropriate Assessment at the time of consent (2012). Example outcome: Even with the geotechnical information to inform the post consent discussions, unexpected issues arose during the installation and additional marine licences/variations were required. This included a requirement to increase the amount of sandwave levelling by 7 times the amount permitted in the additional post consent marine licence, and the length of cable requiring levelling increased by over 30 times the length, than that assessed in the associated AA. There were also impacts that were never anticipated including dredging below the seabed level which has resulted in impacts from which the site has not yet recovered. Additionally, despite use of several different techniques it was not possible to reach sufficient burial depth for around 12,370m of export cable. Of this area 9,072m was believed to be able to meet burial depth with use of a mass flow excavator (MFE) and that	proactive engagement with the MMO and SNCBs, via the ECoW, including early discussion of the cable burial risk assessment, SNCB feedback to inform the procurement process and input into contractor briefings prior to cable installation. The Applicant is confident that this approach will facilitate an efficient approval process once the final CSIP document is submitted to the MMO for formal discharge of the relevant dML conditions.

			cable protection was only required along 1,022m of export cable and not within the Wash and North Norfolk Coast SAC. However, the cable remediation works were not fully effective in burying the cables. In May 2018 NE and MMO were informed that further applications would be required to deploy cable protection including deployment of further cable protection within the Race Bank sandbank and along the export cable, but outside of The Wash and North Norfolk Coast. (A separate Marine Licence Application for cable remediation and cable protection works within The Wash and North Norfolk Coast SAC is currently under the consideration of the MMO). In conclusion, the approach of providing a high level assessment at the application phase with a view to addressing the impacts post consent (used in this example and others) has proved highly problematic and has resulted in significant cost both environmentally and economically (i.e. to the project). This has served to highlight the importance of assessing the impacts as fully as possible at the application stage. The piecemeal changes made to the cable installation for Race Bank we piecemeal, and as such, the impacts were never satisfactorily assessed at a combined level, and as a result the impacts to the site have not been fully captured within the parameters of the individual appropriate assessments, and therefore the true extent of the impact has never been fully captured. Mitigation Natural England advises it is vital that prior to consent, the worst case scenario is fully assessed, based on detailed geotechnical and geophysical data. The Race Bank project highlights that even when this data is available the challenging environmental conditions result in the cable installation operations rarely occurring as predicted.	

			Therefore it is also important to build these lessons learnt into the worst case scenario assessment. Natural England is of the view that there is insufficient data and/or information for Hornsea Project 3 to support the conclusions of their RIAA (and to a lesser extent their MCZ assessment). Additionally, based on our experience of other projects (including Race Bank cable installation), we do not feel that the WCS has been considered. At this time, we do not believe that there are sufficient mitigation measures that could be secured in dDCO to remove the risk Adverse Effect on Integrity for the Wash and North Norfolk Coast and North Norfolk Coast Sandbanks and Saturn Reef SAC beyond reasonable scientific doubt. <u>For your information - timeframes</u> The time taken to sign off the Race Bank pre-construction document ranged from 1 to 11 months. With 13 of 30+ documents taking longer than the 4 months suggested by the licence conditions. Many of the documents signed off quickly were requirements such as notifications of vessels, or the names of liaison officers, notification of start date or notice to mariners. Which require little or no consultation. While the more complex documents such as monitoring plans, installation methodologies and mitigation plans often took longer than the 4 months provided for within the licence. While the fact that simple documents were processed quickly and more complex documents took longer is hardly surprising, this does call into question the logic of a one size fits all approach of 4 months prior to construction. This is especially relevant to a project like Race Bank located within designated sites and with a significant monitoring effort aimed at validating decisions on the acceptability of impacts to those sites. For the post consent/construction variation requests the timeline agreed for consultation, required NE and MMO to consider documentation and provide responses within 2 weeks. For NE it	

			also required review and response to an AA within 2 weeks as well, instead of the standard 4.	
Q2.2.51	TWT	Your representation [RR-047] states that more realistic expectations of cable burial and protection within The Wash and North Norfolk Coast SAC are required. Does the information submitted by the Applicant at Deadline 1 [REP1-138] and Deadline 2 [REP2-004] give you the clarity you are seeking on the potential effect of cable burial on the SAC?	TWT is concerned after reviewing Natural England's "Post hearing submissions including written submissions of oral cases - Issue Specific Hearing 2 Part 2 – Benthic Site" (REP3-077) that The Wash and North Norfolk Coast SAC has been reclassified to unfavourable declining condition due to ongoing cable installation activities and a lack of management/restoration plan to allow recovery. Further assessment is required in line with Article 6(2) and 6(3) to understand if the installation of the Hornsea Three cables can go ahead whilst allowing the recovery of the site, or if the alone and in-combination effects will result in further decline. We are ingoing discussion with the applicant on this issue. We welcome that the condition assessment for The Wash and North Norfolk Coast SAC will soon be published and we are happy to make further comments once we have reviewed this information.	The Applicant notes the response from the Wildlife Trusts and would again request sight of the updated condition assessment for The Wash and North Norfolk Coast, with evidence that the site is now in unfavourable condition if that is to be relied upon by Natural England and other parties.
Q2.2.56	NE	Paragraph 5.4.11 of your representation [RR-097]	Our three main concerns were as follows:	The Applicant is however pleased that Natural England are content with their point in REP1-131 that the Sotheran et al.

		stated that the benthic analyses were not appropriate for characterising the Markham's Triangle pMCZ. The Applicant concluded in [REP1-122] that only minor differences in the biotope classifications exist between those mapped in Sotheran et al. (2017) and the ES. Are you satisfied with the Applicant's response to this issue, as set out in [REP1-122], [REP1-131] and [REP3-023]? If not, why not? Please provide copies of any publications you wish to rely upon in evidence that have not already been provided.	The Cefas/Defra evidence for Markham's Triangle was not used in the characterisation of the Hornsea Project Three array area. The Applicant refers us to their previous answers in REP1-122 and REP1-131. The reasons for including and excluding Cefas / Defra evidence within various infaunal analyses are discussed further in REP1-131. We remain unsure that Cefas / Defra data was used in the best manner to inform characterisation of the pMCZ. The biotopes provided in JNCC Report 608 (Sotheran et al., 2017) were not used in the analyses, instead considering only suggested biotopes for the survey points within the pMCZ We are content with the response in REP1-131. Suggested biotopes for the Cefas / Defra data are quite dissimilar to the biotopes within JNCC Report 608 We continue to disagree that the biotopes interpreted by the Applicant are similar to those of previous surveys. For example, Sotheran et al (2017) notes that "Of the 50 samples analysed within this analysis, 38 (76%) were found to support the presence of 'Subtidal sand' in the area, having been allocated the biotope SS.SSa.CFiSa.EpusOborApri or habitat SS.SSa.CMuSa". The Applicant recorded neither in their Markham's Triangle dataset.	(2017) report had not been available to the Applicant at the time that the DCO application was made. With regard to Natural England's third point regarding differences in the biotopes mapped by the Applicant and those set out in the Sotheran et al. (2017) report, as set out in the Applicant's comments on the Natural England Relevant Representation (REP1-131), section 2.7.6 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement (APP-062) outlines that one of the limitations of biotope classification is that the underlying data is a snapshot of the benthic community collected at a given survey location and assignment of a code is somewhat subjective and open to interpretation. However, it is important to note that while the SS.SSa.CFiSa.EpusOborApri biotope (hereafter EpusOborApri) was assigned by Sotheran *et al.* (2017) to the majority of the Cefas/Defra sampling locations, most of these were in the east of the pMCZ and not within the western part of the pMCZ which overlaps with the Hornsea Three array area (see Figure 20 of Sotheran et al. 2017; Appendix 26 to the Applicant's response to Deadline 4 – REP4-047). The SS.SSa.CMuSa biotope identified by Sotheran *et al.* (2017) was only assigned to locations in the east of the pMCZ, outside the Hornsea Three array area. The Applicant accepts that some of the sampling stations which do overlap with the Hornsea Three array area were assigned as the EpusOborApri biotope by Sotheran et al. (2017) and this does not align with the biotopes shown in Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement; APP-104 (i.e. primarily the SS.SMx.OMx.PoVen biotope; hereafter PoVen). However, as outlined in the Applicant's comments on Natural England's Relevant Representation, it is important to note that the implications of this difference in biotope classification would not affect the overall conclusions of the MCZ Assessment due to

				the similarities in the biotope sensitivity, including recovery potential following disturbance. For example, for temporary habitat loss/disturbance, paragraph 5.2.2.10 of Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement discusses the resistance, resilience and overall sensitivity of the PoVen biotope to this impact, drawing on evidence for equivalent physical pressures (i.e. 'Habitat structure changes - removal of substratum (extraction)', 'abrasion/disturbance of the surface of the substratum or seabed', 'penetration or disturbance of the substratum subsurface' and 'smothering and siltation rate changes (heavy)') from the Marine Evidence based Sensitivity Assessment (MarESA) on the Marine Life Information Network (MarLIN) website for this biotope (Tillin, 2016a). The MarESA for the EpusOborApri biotope shows that the overall sensitivity (considering resistance and resilience to each impact) is identical to that of the PoVen biotope for the same impacts (Tillin, 2016b). When considered alongside the other information on sensitivity and recoverability of sediment and communities associated with the Subtidal Coarse Sediment, Subtidal Sand and Subtidal Mixed Sediment broadscale habitat features (e.g. paragraph 5.2.2.11 to 5.2.2.18 of Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement), this shows that the minor changes in biotope classifications have no material effect on the overall conclusions of the MCZ Assessment with respect to temporary habitat loss/disturbance during the construction phase. This applies equally well to other impacts considered within the MCZ Assessment. The full MarESA summaries for the PoVen and EpusOborApri biotopes are available at the links provided in the reference list below. However, the Applicant has also provided relevant extracts of these at Appendix 11 to the Applicant's response to Deadline 5 with expanded sections covering impacts relevant

				to the MCZ Assessment e.g. *Habitat structure changes - removal of substratum (extraction)*, *Abrasion/disturbance of the surface of the substratum or seabed* etc. for the ExA's information. Tillin, H.M. (2016) Polychaete-rich deep Venus community in offshore gravelly muddy sand. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 18-01-2019]. Available from: https://www.marlin.ac.uk/habitat/detail/1117 Tillin, H.M. (2016b) Echinocyamus pusillus, Ophelia borealis and Abra prismatica in circalittoral fine sand. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 18-01-2019]. Available from: https://www.marlin.ac.uk/habitat/detail/1131
Q2.2.58	NE	You representation [RR-097] states that the features of the Markham's Triangle pMCZ should be assessed separately rather than by using one feature as a proxy. The Applicant has since presented habitat loss numbers in tabular format, as set out in [REP2-004] and a supplementary assessment in [REP3-023]. Does this enable you to reach a conclusion on the assessment that has been undertaken?	We continue to believe that the Applicant has not undertaken their assessments in a way to allow best scientific understanding of impact. However, we do understand that much of the uncertainty over impact distribution between broad scale habitats will remain until firmer understanding of turbine placements in pre-construction.	The Applicant notes the response from Natural England, but wishes to clarify that the approach to the MCZ Assessment was developed in consultation with the MCZ Working Group (including Natural England, JNCC, The Wildlife Trusts and the MMO) during the pre-application process. As outlined in Table 1.1 of Volume 5, Annex 2.3: Marine Conservation Zone Assessment of the Environmental Statement (APP-104), this included discussion of the approach to the MCZ Assessment and consultation on two separate draft MCZ Assessments during and immediately after the Section 42 consultation to gain feedback on the methodology. The Applicant has adopted the feedback received on the MCZ Assessment from the MCZ Working Group including: • Discussion of sensitivity of biotopes recorded within MCZs to relevant impacts, rather than sensitivity of the broader VERs used in Volume 2, Chapter 2:

		In your view, are there any outstanding matters regarding the Marine Conservation		Benthic Ecology of the Environmental Statement (APP-062); • Removal of EIA conclusions from the Stage 1 Assessment; • Use of the "Advice on Operations" information for the Thanet Coast MCZ Conservation Advice Package; • Use of the Cromer Shoal Chalk Beds draft conservation advice package (provided to the Applicant during pre-application consultation) for the Markham's Triangle pMCZ; • Assumption of a general management approach of "recover to favourable condition". In addition, as part of the Applicant's Deadline 3 response a lifetime effects assessment for Markham's Triangle pMCZ has also been produced (REP3-023) with the aim of allowing Natural England and JNCC to have a fuller understanding of the impacts on the pMCZ. The Applicant has undertaken the MCZ Assessment based on the Rochdale Envelope approach, with the assessment undertaken on a suitably conservative maximum design scenario for all impacts identified. The Applicant is therefore confident that the precise impacts (i.e. following detailed design) within each of the broadscale habitat features will be within the limits of the DCO, as assessed within the MCZ Assessment and as a result, there is no uncertainty with respect to impacts on the features of the pMCZ.
Q2.2.59	NE	Paragraph 4.4.5 of your representation [RR-097] stated that the consideration Natural England believes that there are two aspects to this question a) the combined	Natural England believes that there are two aspects to this question a) the combined repetitive impact to the same footprint area over different stages of installation and b) the combined impact to a feature in a phased build scenario.	<u>Part a:</u> The implications of repeat disturbance during the individual phases of development were fully considered within the Applicant's response to the ExA question Q1.2.103 at Deadline 1 (REP1-178). Within this note it was clarified that full recovery of the communities would not occur between seabed

		repetitive impact to the same footprint 39 of each phase in isolation failed to consider cumulative impacts over time. The Applicant has concluded in [REP2-005] that a phased build would not affect recoverability of the relevant features as it would not result in repeat physical disturbance of the same area of seabed across different phases, due to the risk this would pose to the integrity of installed export cables. It is said that the operation and maintenance activities would be highly localised and intermittent. Can you list which impacts are most likely to have a residual effect between each phase, the species and sites affected and your degree of certainty? Are you suggesting that the Applicant has failed to meet the requirements of paragraph 2.6.64 of National Policy Statement (NPS) EN-3? Does this apply to any other cumulative effects? Are you satisfied that the information supplied by the Applicant at Deadline 2 is	a) *the combined repetitive impact to the same footprint area over different stages of installation* Often impacts from one phase of installation (i.e. preparation, installation and operation) persist into the next phase especially where recoverability is hindered by the different activities. By considering each of these phases in isolation, the applicant is making the underlying assumption that both impact and recovery occur at each phase, whereas in reality, the impacts of preparation activities may persist into the construction and operational phase and so on. This persistent impact over time could result in additional impacts which would prevent a feature meeting its conservation objectives. This approach therefore fails to capture the cumulative impact on a feature throughout the lifetime of a project. *b) the combined repetitive impact to a feature over different phases* While the proposed two phase build to this project is unlikely to directly have the same physical disturbance to a particular area; the impacts are still to the same feature of the site. Therefore the phase build will extend the timeframe of impacts on the feature and overall recoverability of said feature. For example, the first phase of a project could result in impacts on a sandbank feature that result in that feature being in unfavourable recovering condition, with full recovery expected within 6 years. Within the second phase of the project, a different area of that same sandbank could be impacted, therefore resulting in that feature being in unfavourable condition for a further 6 years. Depending of the timing between phases this could mean that the feature is affected for 10+ years. Therefore the phased approach may mean impacts that are considered short term/temporary when considered in the context of a single phase, persist in the medium to longer term. This should be fully assessed including the implications for the site potentially being in unfavourable condition for 10+ years when considering impacts to sandbanks.	preparation activities and cable installation, but only following cable installation (for the majority of the offshore cable corridor). The Applicant agrees that the impact of construction could extend into the operation and maintenance phase due to the recovery timescales for some habitats/communities (e.g. up to 5 years following cable installation). With respect to repeat disturbance due to cable repair or maintenance, this would result in repeat disturbance, although only a very small proportion of the offshore export cables would be subject to this over the lifetime of the project (and therefore would affect a very limited area of designated feature). As set out in the response ExA question Q1.2.103, any maintenance works during the O&M phase would be reversible, with only cable protection resulting in more persistent effects. Even where cable protection measures are deployed, the proportion of the features affected will be small in the context of the broadscale nature of the features and some ecological functioning would continue in these areas through the use of appropriately sized rock protection (see cable protection clarification note: REP1-138). <u>Part b:</u> The Applicant notes the response made by Natural England on this point and would clarify that the implications of a phased build have been assessed within Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and the RIAA (see the Applicant's response to ExA question Q1.2.103 at Deadline 1). The Applicant accepts that the construction scenario outlined in the Natural England response to this question is within the range of possibilities considered within the maximum design scenario for a phased build. The Applicant would, however, note that the activities are unlikely to prevent restoration of the site, due to the very small proportion of the SAC features affected (in the context of the broadscale nature of the features) and the recoverability of the features affected, leading to reversible effects (evidence for this is summarised below). In

		sufficient or do you still maintain your original position?	Conclusion: As we have limited survey data from with the MPAs, the proposed techniques are fairly new for offshore windfarm developments and yet to be deployed on the scale proposed for this project there is uncertainty in relation to WCS because the actual scale of the works required is unknown and the likely level of success. Therefore the timeframes for any recovery are also uncertain. We therefore that believe that NP EN-3 to consider different stages of the lifespan have been met but not considered cumulatively. *2.6.64 Assessment of offshore ecology and biodiversity should be undertaken by the applicant for all stages of the lifespan of the proposed offshore wind farm and in accordance with the appropriate policy for offshore wind farm EIAs.* N.B. At Deadline 3 Natural England provided further comments on the information provided by the applicant at Deadline 2, in which we retain our original position.	a two phase construction scenario, the proportion of the features affected would be smaller still during each phase, with seabed disturbance affecting only a small proportion of the total area of temporary habitat loss/disturbance at any one time. It is the Applicant's understanding that the restore objective advised by JNCC for the NNSSR SAC was based on expert judgement and that confidence in the objective would be improved by access to better information within the site. The Applicant has proposed a number of measures which would help with this objective and is willing to discuss with Natural England and JNCC how these could be tailored to aid in the management of SACs, to achieve the conservation objectives for these sites. With respect to recovery of features, although full recovery may take a period of years following certain activities (e.g. recovery of sandwave features following clearance may occur over a period of years), it should be noted that while recovery of the bathymetric feature is occurring (e.g. as sand is accumulating within the dredged area), there will be recolonisation of the communities associated with these sediments, meaning that there will be continued ecological function of the affected area during the recovery period. Within the sandy sediments characterising much of the NNSSR SAC, the communities are generally characterised by relatively impoverished communities (see Appendix 78 to the Applicant's response to Deadline 4; REP4-097). The characterising species are generally subject to and therefore relatively tolerant of, natural physical disturbance (e.g. due to wave or tidal action) and will therefore recover into areas where sand accumulates following sandwave clearance, but where the bathymetric profile has not yet fully reached a new equilibrium. This is similarly the case for higher trophic levels, with sandeels readily colonising suitable sediments (i.e. predominantly sandy sediments which will infill areas recovering from sandwave clearance) and therefore these would also be expected to colonise areas affected by sandwave clearance, even where the bathymetric profile has

				not yet fully recovered. Recoverability of sandeels following cable installation (and other construction related impacts) is presented at paragraph 3.11.1.12 of Volume 2, Chapter 3: Fish and Shellfish Ecology of the Environmental Statement (APP-063). <u>Conclusion:</u> The Applicant would like to note the following in response to the Natural England response: *Limited survey data*: As indicated the Applicant's comments on the Natural England response to Q2.2.45 above, the characterisation is agreed on the WNNC and the Applicant has sought to clarify its position on the NNSSR. The Applicant would note that there is considerable desktop data from this part of the southern North Sea over a long time series (e.g. see Section 2.3 and Figure 2.1 of Volume 5, Annex 2.1: Benthic Ecology Technical Report; APP-102), including within the relevant marine protected areas and this was supplemented by geophysical survey datasets and site specific sediment sampling and seabed imagery surveys within the Hornsea Three offshore cable corridor. *Proposed techniques are fairly new for offshore windfarm developments and yet to be deployed on the scale proposed*: The proposed techniques for Hornsea Three cable installation are not new in offshore industries: • Sandwave clearance is routinely used in the oil and gas industry prior to pipeline burial; • The aggregates extraction industry is highly analogous with many the techniques used for the activities associated with cable installation being identical to those used in the aggregates industry (e.g. extraction of sediment). The aggregates industry operates in similar areas of the southern North Sea and at similar scales, for example in 2017,

				the Area 484 within the NNSSR SAC was granted a licence to extract up to 9 million tonnes of sediment (4.5 million m^3) over a 15 year licence period; • Sandwave clearance has been successfully used on other offshore wind farm projects (e.g. Race Bank, Hornsea Project One and NEMO Link interconnector) with monitoring at Race Bank showing recovery occurring quickly following cable installation (see Sandwave Clearance Clarification Note and Race Bank Sandwave Recovery Report; REP1-183 and REP2-020, respectively). *there is uncertainty in relation to WCS because the actual scale of the works required is unknown*: As set out in the Applicant's comments on the Natural England response to Q2.2.50 above, there is confidence that the maximum design scenario for cable protection requirements and sandwave clearance volumes are adequately conservative (see Sandwave Clearance Clarification Note and Cable Protection Clarification Notes; REP1-183 and REP1-138, respectively). More generally, the Applicant has learned lessons from previous offshore wind development rounds to ensure an accurate and appropriately conservative project description, with a clearly defined maximum design scenario which has been assessed within the Environmental Statement and the RIAA. Impacts on designated features will be within the limits of the maximum design scenario assessed. *the timeframes for any recovery are also uncertain*: As set out in previous submissions by the Applicant, there is confidence that full recovery will occur following cable installation and there is also robust evidence around the timescales of recovery for impacts associated with cable installation. This is based on a combination of theoretical understanding of the impacts (as set out in Volume 2, Chapter 1: Marine Processes and Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement

				and the RIAA; APP-061, APP-062 and APP-051, respectively) empirical evidence from published literature (e.g. see Applicant's response to Q1.2.10; REP-122) and from relevant monitoring studies from similar environments (REP1-183; REP1-210). The monitoring proposed for Hornsea Three will provided site specific empirical data on the recovery rates following sandwave clearance within the two SACs.
Q2.2.60	NE	Paragraph 2.12.2.3 of the ES [APP-062] identifies a number of impacts that have been scoped out of the cumulative impact assessment. You have stated in [REP1-212] that seabed disturbance from maintenance activities should not have been scoped out of the cumulative assessment as up to 25% of the cable corridor may need protective measures. How was this figure derived and what empirical evidence to you have to substantiate this point? Please provide copies of any publications you wish to rely upon in evidence that have not already been provided.	NE Response: For clarification the 25% figure in relation to the Operation and Maintenance (O&M) deposition of cable protection was provided by the applicant in 5.2 Report to inform Appropriate Assessment (APP – 051 Page 30). The applicant considers this to be a 'replenishment' of rock armouring over the life time of the project that was deposited as part of the construction (i.e. 2.5% of the original cable length). However, it is not clear if the 2.5% relates length or volume. If it is volume then there is every probability the discrete areas may have a larger footprint than the original cable protection. In addition, the RIAA doesn't account for the spreading of cable protection over time, which could lead to the requirement for additional cable protection and therefore potentially greater impact footprint. In any case, this requirement would result in additional rock armouring within the marine environment, which is likely to have a persistent impact and could hinder the effectiveness of any removal activities. For NE to consider supporting this being scoped out there would need to be a marine licence condition which stipulates the following:- a) No new locations can have rock armouring installed to those areas installed as part of the construction b) The dimensions of area of impact are limited to the footprint listed in the application document i.e. no wider c) The 25% is more clearly defined i.e. a quarter of the cable protection length/volume installed during construction only, not of the total amount permitted. Noting that if volume only is considered	For the avoidance of any doubt, the replenishment of cable protection has been considered under long term habitat loss (see paragraph 2.11.2.3 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement; APP-062) and was therefore considered in the cumulative impact assessment (paragraphs 2.13.2.3 et seq. of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement) and has not been scoped out of the cumulative impact assessment in paragraph 2.12.2.3 of that chapter. The Applicant would refer the ExA to its response to Q2.2.53 at Deadline 4 (REP4-042) which provides the justification for why replenishment of rock protection has been included in the project description. As set out in that response, this is an emerging area of study and the maximum design scenario is considered to be realistically conservative given the evidence currently available. By including replenishment of rock protection, the Applicant is seeking to futureproof the development to reduce the potential need to request variations to the dML in the future. The Applicant recognises the potential for cable protection to reshape slightly under designed storm events. This phenomenon was referred to in both in oral hearings (REP3-004, paragraph 5.33) and within the technical paper submitted at Appendix 49 to the Applicant's response to Deadline 4 (REP4-069) and is relevant to the detailed design of rock berm hydraulic stability. It is not expected that this reshaping will result in a further need for additional rock protection over and

			by the engineers /contractors then the area of impacts could be much greater and therefore should be avoided as per point (a) above d) If the replenishment is within designated sites then further sign off is required with the MMO and Natural England before works are undertaken.	above the maximum design scenario (i.e. for volume and footprint) assessed within the Environmental Statement, nor would reshaping hinder its removal. With respect to the Natural England requests for a marine licence condition, the Applicant would direct Natural England and the ExA to the outline CSIP presented at Appendix 3 to the Applicant's Deadline 5 response, and the draft cable protection plan included within this. One of the aims of this document would be to ensure that all cable protection measures are within the limits of the DCO and the RIAA (including both footprint and volume) and that these are discussed with the relevant SNCBs prior to installation and reported in a clear and timely manner post installation, via an Ecological Clerk of Works (EcoW). This is intended to be a live document which would be used both pre-construction, during construction, post-construction and during the operation and maintenance phase of the project. This would be updated as required to support approvals for any additional cable protection replenishment, should this be required. The Applicant would also clarify that the assumption that 10% of cables may require remedial protection applies to both the construction phase and the operation and maintenance phase, e.g. cables installed during construction may become exposed over time, potentially requiring reburial (as assessed in Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and the RIAA). However, as outlined above, the draft cable protection plan will ensure that any such requirements (e.g. reburial or cable protection) are clearly communicated in a timely manner to the relevant SNCBs.
Q2.2.61	MMO	Paragraph 4.6 of your representation [RR-085] stated that the valued ecological receptors would respond differently to the impacts	Paragraph 4.6 questioned whether the assessment had considered the sensitivity of the different habitats to the different types of temporary disturbance separately. The MMO wanted clarification on whether the assessment had taken into account that some habitats may be more impacted by certain activities than others.	The Applicant welcomes the response from the MMO and has nothing further to add.

		arising from sediment disturbance, Sandwave removal and smothering. The Applicant has stated in [REP1-131] that the assessment of the overall significance of the effect of temporary habitat disturbance/loss to Habitats A-E was based on an appraisal of how each of the habitats would individually respond to the impacts of sediment disturbance, Sandwave removal and smothering. Individually and overall, the significance of effects was considered to be of minor significance. The Applicant maintains that the assessment would have highlighted where there was an exception to this conclusion for a particular habitat. Are your concerns addressed by this clarification and if not, why not?	The Applicant has subsequently confirmed that the effects of temporary disturbance/loss to Habitats A-E was based on an appraisal of how each of the habitats would individually respond to the impacts of sediment disturbance, sandwave removal and smothering. The MMO confirms that our concerns have been addressed by this clarification.	

Marine Mammals

The Applicant has provided a detailed response to only those stakeholder responses that, at this stage, it considers critical to provide a response on, but notes the following:

- Agreement with Natural England on disturbance from and in-combination effects associated with vessels (Q2.2.69 and Q2.2.70);
- Agreement with Natural England that the Applicant has followed the current SNCB advice on the approach to the RIAA for the SNS SCI (Q2.2.76);
- Agreement with Natural England and the MMO on the approach to assessing TTS (Q2.2.77);
- The Applicant can confirm that the updated version (V2.0) of the SIP (as submitted at Deadline 4 – REP4-066) includes consultation timeframes in line with those requested by Natural England, and also the framework for the requisite content required by Natural England (Q2.2.80);
- In relation to the point raised by WDC in response to Q.2.2.82, the Applicant provided a response on the inclusion of the information that is now available from Norfolk Boreas at Deadline 4 (REP4-012). This highlighted that the inclusion of Norfolk Boreas did not results in a material change to the conclusions of the assessment; and
- In relation to the point raised by TWT in response to Q.2.2.65, The Applicant has provided a summary of the results at Deadline 4 (REP4-065). A report describing the process for the model update and the associated evidence is currently being finalised after receipt of BEIS comments and is expected to be available for submission in time to be considered within the Examination.

PINS Ref. No.	Question is addressed to:	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
Q2.2.73	NE	You stated in [REP1-212] that where there is ongoing fishing activity on the site, it is appropriate to consider the effects of the plan or project that is the subject of the assessment in the context of those prevailing	Where there is ongoing fishing activity in the site it is important that the impacts of the activity are captured within the assessment in the context of the conservation objectives of the affected designated site(s). This assessment will likely take place as part of the baseline characterisation of the development area, however, as fishing activity is mobile, variable and subject to change, there may be instances whereby fishing impacts are not adequately captured in the baseline characterisation and therefore may need to be considered as part of the in-	The Applicant welcomes the agreement from Natural England on two key points: • That as fishing is an ongoing activity, the impacts of the activity will likely take place as part of the baseline development area, unless there is available information on which to base a prediction of a change from baseline levels.

		conditions, of which fishing impact may be one. Does you consider that fishing should have been included in the ES as an in combination effect?	combination assessment. This could be due to a change in effort; change in management; or a change in legislation amongst other things, and fishery managers (i.e. MMO and IFCAs) would be best placed to advise on this. There may also be occasions whereby there are plans for new fisheries, or changes to existing fisheries which could be captured in-combination. Again the fishery managers would be able to advise on this. In relation to the assessment of impacts on the SNS SCI, Natural England would consider that the impact of ongoing fishing activity in the context of the draft conservation objectives for the site, has been adequately captured for the purposes of the HRA. We are not currently aware of anything that would have significantly altered the levels of fishing activity within the site; any current plans for new fisheries, or changes to existing fisheries that have not been captured, but we would look to fisheries managers to advise more definitively on these points.	• That the impact of ongoing fishing activity in the context of the draft conservation objectives for the site, has been adequately captured for the purposes of the HRA
Q2.2.74	NE	In [RR-097] you stated that you did not agree with the approach of averaging the number of piling days per season when considering effects on the Southern North Sea candidate SAC (cSAC). You went on to suggest that work is more likely to occur during the summer months. The Applicant has since clarified in [REP1-131] that construction activity is likely to occur throughout the year	In [RR-097], Natural England was seeking to highlight the disparity between the scenario considered in the assessment and that which would potentially be permitted under the proposed DML condition i.e. the assessment assumes that piling is split equally across all months and does not assess the worst case scenario of more piling in the summer season (which would be permitted the proposed licence condition). Natural England acknowledged the Applicant's clarification in [REP1-131], however, this does not necessarily rule out a worst case scenario of more piling taking place in the summer months. In Natural England's experience, construction activity doesn't always happen as scheduled, and this is precisely the reason that applicants seek flexibility within their DML conditions.	The Applicant can confirm that due to the consideration of a worst case return time of 72 hours (3 days), the worst case scenario assessed included the assumption of piling activity occurring on all 183 days of the 'summer' period, therefore the worst case of continual piling throughout the summer season has been adequately assessed.

		and noted that the most weather sensitive component of the installation process is the blade lift with foundation installation commonly scheduled during the winter months to ensure that the installation of blades can occur during calmer, summer conditions. Please comment on the Applicant's response. Do you have any evidence to the contrary?		
Q2.2.78	WDC & TWT	The Applicant has submitted a Site Integrity Plan for the Southern North Sea SCI [REP1-181] that would be secured via Condition 13(5) in the generation assets DML and 14(5) in the transmission assets DML. The Applicant goes on to state [REP2-005] that the final assessment of the effectiveness of the various mitigation options can only be carried out once the final design is decided. The Applicant notes that the MMO is now satisfied that	<u>WDC</u> WDC welcome the inclusion of the Site Integrity Plan (SIP). WDC were sent a copy of the SIP for comment by the Applicant, the response is in annex 1, and includes our full comments on the SIP. In summary, WDC are pleased to see the SIP and recognise that there is a lack of detail on the final project design which makes it difficult to commit to specific mitigation measures. However, there is a lack of commitment to use proven mitigation measures, or an assessment of the effectiveness of mitigation measures proposed. As a result the SIP is little more than a commitment to use mitigation methods and therefore cannot remove all reasonable scientific doubt as to the effects of the project on the SNS SCI. WDC's recommendations on what to include in the SIP for it to address our concerns, and ensure no adverse effect on site integrity beyond scientific doubt, are in the SIP response - annex 1	The Applicant has considered the points raised by WDC and TWT in this submission and provided a response to the headline matters raised (in line with the WDC Annex which captures points raised by TWT as well). ***Lack of certainty that no AEoI conclusion can be reached with this SIP*** The Applicant confirms that a conclusion of no AEoI either alone or in-combination has been reached within the RIAA for the SNS SCI. Within the in-combination assessment the conclusion of no AEoI was reached based on what, based on the Applicant's experience, is considered to represent the most realistic construction scenario. Notwithstanding this, and in recognition of the lack of absolute certainty as to what other activity may come forward at what time and in what form, it has committed to a SIP that will be developed further and finalised at the earliest possible juncture with interested parties. This SIP will provide contemporary information on the final scheme design and timing of construction activity for the Project

		this approach will provide appropriate control measures to mitigate effects on marine mammals when used alongside the Marine Mammal Monitoring Plan which would also be secured via the dDCO. Is there now sufficient detail to address your concerns on this matter? If not what changes do you suggest?	<u>TWT</u> No, TWT require further details to alleviate our concerns. In its current form the SIP lacks detail on the effectiveness of the proposed mitigation methods. Therefore, TWT does not consider it adequate to ensure no adverse effect on the SNS SCI beyond reasonable scientific doubt. To achieve this, more evidence is required to detail the effectiveness of the proposed mitigation. This should include referenced examples of how the implementation of mitigation will reduce underwater noise disturbance impacts within the SNS SCI. Noise modelling should also be undertaken to demonstrate the degree of noise reduction which could be achieved through mitigation[6] The following text of the European Commission Article 6 Habitats Directive Guidance from 21 November 2018[7] (page 52) establishes the obligation to detail the effectiveness of mitigation measures. *"For the competent authority to be able to decide if the mitigation measures are sufficient to remove any potential adverse effects of the plan or project on the site (and do not inadvertently cause other adverse effects on the species and habitat types in question), each mitigation measure must be described in detail, with an explanation based on scientific evidence of how it will eliminate or reduce the adverse impacts which have been identified."*	along with clarity as to what other activity is going to overlap with these activities in order to allow selection of an appropriate mitigation option commensurate to the confirmed level of impact. In the unlikely event that thresholds for the SCI may be reached then appropriate mitigation measures will be deployed within the framework prescribed by the SIP to reduce that risk to the extent that the regulatory authority can be confident that AEoI will not occur. A number of potential measures that could be considered, if necessary, are set out within the existing In-Principle SIP. Those measures included are commensurate with other SIP examples to date, provide a comprehensive suite of mitigation options, afford the flexibility to ensure that the measure selected (if necessary) would be commensurate to the scale and nature of any risk that needed mitigation. Some of these options (such as non-piled foundation solutions or scheduling) could effectively remove any contribution from Hornsea Three to an in-combination effect. The Applicant is entirely confident therefore, that a conclusion of no AEoI can be reached and that the SIP commitment provides further assurances on this. ***Lack of commitment to a proven method or evidence that method would work & and modelling of effectiveness of any mitigation*** With specific regard to the proven nature of the mitigation options, the Applicant can confirm that options within Measures 1, 2 and 3 (as identified in Section 6.3 of the outline SIP V2.0) have been used in practice as detailed below: <u>Scheduling of Piling</u> A number of offshore wind farm consents (particularly for nearshore projects that sit in proximity to sensitive fish spawning grounds) have had temporal periods within which no piling activity can take place. For example, Rampion, Walney Extension, Gwynt-y-Mor, Race Bank, Burbo Bank Extension, had piling restrictions imposed on their licences. <u>Non-percussive piled foundations</u> There are a number of built projects within the North Sea that have deployed alternative foundation solutions to piled foundations,

				including the Aberdeen demonstrator by Vattenfall that is a suction bucket solution, and gravity base solutions that have been deployed on the Blyth demonstrator, and also a number of European projects including but not limited to; Rodsand 2 (Denmark), Vindeby (Denmark), Karehamn (Sweden). Noise mitigation systems As WDC and TWT have cited within their submissions to date on the HOW03 project, some European countries (such as Germany where they have been used on projects since 2008) have strict underwater noise limits imposed on their licences. This is managed by projects through the adoption of bubble curtains to ensure underwater noise from piling remains within the required limits. Examples of projects that have deployed such technology include, but are not limited to FINO 3, Borkum West II, Nordsee Ost, Global Tech 1, Dan Tysk, Meerwind Südost. The SIP also makes recognition (in Measure 4) that as yet to be proven measures should remain under consideration, as these may come forward (and prove themselves) as suitable options in the intervening period between now and the period prior to Hornsea Three finalising construction contracts, and therefore, whilst not currently as demonstrably proven as the other measures, it is important not to rule them out at this stage. As identified above, it is necessary to keep the mitigation options open and flexible at this stage given the uncertainty as to what extent and or purpose any mitigation would need to achieve and or serve (if required at all). In the unlikely event that any such measures were required then it would need to be evidenced within the SIP how the chosen measure would reduce the contribution of Hornsea Three to acceptable levels. The Applicant considers that the level of evidence required would depend on the type of mitigation selected. For example, if noise attenuation measure was selected, then it would be reasonable to assume that this would need to be accompanied by empirical or modelled evidence to demonstrate the level of reduction

				in effect this would afford. If however, the mitigation related to a timing or non-piled solution, then the reduction in effect may be self-evident as require less supporting "evidence". In light of the above, and at this stage, the Applicant considers that the Ex.A and SoS can have complete confidence that a range of mitigation options are available if required (as detailed within the SIP) that can ensure any level of mitigation necessary can be achieved. ***MMMP guidance is outdated and guidance only & methods within the guidance are "widely criticised"*** As made clear within its Deadline 1 and 2 submissions, the Applicant has committed to a robust MMMP that will ensure PTS effects mitigated to negligible levels and will be informed by the most up to date guidance (noting that the Applicant is aware that JNCC are updating the current extant guidance (JNCC 2010) but that this will not be done in the timeframe of the Hornsea Three examination). ***Effectiveness of bubble curtains in reducing disturbance area*** The Applicant notes that at source noise reduction measures (including options such as bubble curtains) are one of the mitigation options contained within the SIP and therefore, the Applicant has not ruled out its potential use at this stage. ***WDC wish to be a consultee in the development of the SIP*** The Applicant can confirm that WDC are a named consultee in the latest version of the In-Principle SIP that the Applicant has submitted at Deadline 4 – REP4-066. ***WDC wish for a more integrated approach to noise related plans (UXO MMMP, Piling MMMP, SIP)*** The Applicant considers that all three commitments and associated documents need to be kept separate at this stage and notes that the piling MMMP is a standalone commitment in the dMLs that is required irrespective of the SNS SCI, therefore, this must remain its own document. The same applies for the UXO MMMP (further noting that UXO clearance is not being licenced at this stage and

				therefore, it has to remain separate from the piling MMMP at this juncture).
Q2.2.81	WDC	You stated in [REP1-022] that the CEA did not consider concurrent piling at two locations and that you do not agree that minor adverse impacts would result. The worst case scenario as set out in paragraph 4.13.1.5 of the ES [APP-064] is based on two concurrent piling events. Please clarify your position in the light of this.	WDC Paragraph 4.13.1.5 in the ES [APP-064] is just a statement that during the construction of Hornsea Project Three, that cumulative impacts of piling at more than one location have been considered. In the ES there is no detail of the methodology used, the locations considered, or the results of this assessment. As a result there is no information provided to demonstrate the Applicants claims that there will only be minor adverse impacts from concurrent piling.	The Applicant can confirm that the approach to the assessment of concurrent pile driving at two locations is presented in paragraphs 4.11.1.35-36 of the Environmental Statement (APP-064). The locations modelled are presented for all species considered in the assessment in Figures 4.17, 4.22, 4.27, 4.33 and 4.37. and the results are presented in the relevant tables in Section 4.11: (Tables 4.34, 4.38, 4.43, 4.46 and 4.49.
Q2.2.79	NE MMO	WDC have pointed out [REP1-022] that an EPS license would be required for any pile-driving Activity. With the Morge case in mind, is the project likely to infringe Article 12 of the Habitats Directive? If so, is it likely that a derogation, in the form of an EPS licence, would be granted?	NE As this question related to the granting of an EPS licence in relation to marine mammals, Natural England would respectfully defer to our colleagues the MMO to answer this point. MMO The MMO confirms that, should pile driving activities be required for Hornsea 3 which could result in disturbance likely to infringe Article 12 of the Habitats Directive for features of the Southern North Sea SCI, the Applicant would need to apply for an EPS licence for those activities. Determination of an EPS licence would depend upon the proposed activities and the potential mitigation measures available to the Applicant to reduce the impact of pile-driving activities at the time of submission. It is not possible for the MMO to comment on the determination of an EPS licence prior to such an application, however the MMO	The Applicant maintains that, based on the assessment of the design envelope presented in the ES, the level of predicted impact would not have a detrimental effect on the Favourable Conservation Status of any cetacean species, therefore passing the critical test in the provision of a disturbance EPS licence. This position is strengthened as a result of the additional protection provided by the SIP to ensure that worst case scenarios of impact will not be realised.

			would be able to provide pre-EPS licence application advice to the applicant following agreement of a design plan.	
Q2.13.23	NE, MMO	The MMO has commented [REP3-092] that it has received reports on Offshore Wind Farms (OWF) under construction which have cast doubt over the efficacy of soft-start mitigation measures relating to piling. In Condition 18, the MMO (supported by NE) suggests an amendment to the effect that, if monitoring shows significantly different impacts to those assessed in the ES, piling activity should cease until an update to the marine mammal monitoring plan and further monitoring requirements have been agreed. Please provide evidence of the need for this approach.	NE In the case the MMO are referring to in [REP3092], the Initial noise monitoring report submitted to the MMO by the developer indicated that the soft start mitigation was not effective. (At this stage it is important to note that after subsequent investigations it was concluded that the original results were likely due to defective monitoring equipment and that the soft start procedures were actually operating as they should have been so the efficacy of this procedure is no longer in doubt.) This case has cast doubt over the efficacy of this condition in such circumstances. In a scenario whereby the noise monitoring is indicating a difference to the modelled noise levels, this could indicate that the mitigation in place is not effective. This could in turn indicate that there is a risk of injury to Marine Mammals. In all offshore windfarm cases, we seek to mitigate for injury, so the efficacy of the mitigation is called into question, then there may be a need for the developer to seek an EPS licence to ensure that their construction activity remains lawful. Although the applicant has previously highlighted (DCO hearing) that the MMO have the ability stop construction work, upon submission of a monitoring report to the MMO it can take several weeks for the MMO to consult with their advisers, and to receive that feedback. This could therefore mean marine mammals are injured and the conservation objectives of the SAC are hindered in the intervening period. It could also mean that the developer is operating without the appropriate licensing and therefore committing an offence. (N.B In the case the MMO refer to, the developer was late submitting their report, so it was actually several months before the issue came to light). In light of this, Natural England strongly supports the MMOs proposed changes to the wording of Condition 18. The key point being that any discrepancies need to be reported directly to the MMO (not hidden in a report) and work should cease until it can	The Applicant reiterates it position made at ISH 3 and Deadline 3 that it considers the MMO to have the necessary powers to manage this perceived risk without the need for further conditions imposed on the licence.

			be confirmed that sufficient mitigation is in place or an appropriate course of action is determined. This not only seeks to safeguard EPS, but also safeguards the applicant from committing an offence. MMO The MMO would like to highlight that the request for condition 18 to be amended has arisen from concerns around the condition wording previously used in DMLs being fit for purpose. The MMO is of the opinion that there is the potential or situations where a stop to piling is required where impacts through monitoring are found to be greater than those assessed in the ES. A stop would therefore be required to ensure that the Applicant is compliant with current legislation which may require a new EPS licence under such circumstances. As such, the MMO considers that the DML condition should be amended to reflect this.	

1.3 Written Question 2.3 Marine Processes

No Applicant response required.

1.4 Written Question 2.4 Ecology – Onshore

No Applicant response required.

1.5 Written Question 2.5 Navigation and other offshore operations

Summary

1.1 Expert Evidence

Please see the Applicants response at Deadline 4 (Appendix 72 to the Applicants response to Deadline 4 (REP4-091) and Appendix 13 of the Applicants submission to deadline 5) in regard to the experts that have contributed to the Applicant's responses with regards to aviation and shipping and navigation.

1.2 Questions the Applicant wishes the ExA to address to the MCA

Reference to MCA response at deadline 4:

The Applicant notes that a submission relating to MCA's intent to comment on the dDCO has not yet been made and would ask that this is made as soon as possible so that the MCA's views may be reviewed and responded to.

Reference to Q2.5.7 The Applicant would like clarification from the MCA on what is the purpose of the HRA?

Reference to Q2.5.7 The Applicant would like to confirm whether the MCA agree that the Applicants technical evidence demonstrates that the helicopter can turn within 1km, if not, please can that evidence be provided?

1.3 Questions the Applicant wishes the ExA to address to Spirit Energy

Reference to Q2.5.8: The Applicant would like to confirm DNV were satisfied that its marine navigation specialist, Anatec, answered all their questions at the technical meeting on 16th January 2019 in Aberdeen, and if this alters their views on the issues?

Reference to Q2.5.16:	The Applicant is aware that faults do happen at offshore facilities but is of the understanding that an unplanned shut down is very rare (possibly of the order of once every three years) and therefore the Applicant wishes to understand from Spirit Energy the actual number of times this event is likely to arise.
Reference to Q2.5.16:	The Applicant notes that Spirit Energy has recently invested in lighting at the Grove platform, and that they state that they are in the process of fitting lighting at the Chiswick platform and fire fighting equipment at the Chiswick and Grove platforms. The Applicant wishes to know if these improvements are for operations or are actually an ALARP requirement? Further, the Applicant would like confirmation (e.g. certification) of when the lighting at the Chiswick platform and the fire fighting equipment at the Chiswick and Grove platforms will be fully operational.
Reference to Q2.5.16:	The Applicant is in agreement with Spirit Energy that there will be incidents on a platform which are not an emergency but that require evacuation. The Applicant would like to know how many times this has actually happened at Spirit Energy platforms, when persons could not be taken back by an in-field shuttle flight to the J6A platform, in order to understand the risk of such an event occurring.
Reference to Q2.5.21:	The Applicant wishes to verify, with greater certainty, the radar system in use on the J6A and has proposed a meeting with the radar operator of this platform. The Applicant is presently awaiting a response from Spirit Energy in this regard and would like to ensure such a meeting is progressed.

PINS Ref. No.	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
1.2 of Spirit Energy's response at Deadline 4 (REP4-138)	N/A	The Applicant refers the ExA to Section 1.2 of Spirit Energy's Introduction to response to ExA second written questions at Deadline 4 (REP4-138) concerning the significance of impact and the EN-3 ALARP tests for affects and risks.	Please see the Applicants response to ExA Q2.5.13 submitted at Deadline 4 (REP4-012) in regard to the application of EN-3 and the application of As Low As Reasonably Practicable (ALARP). Spirit Energy have made a statement that the Applicant has not consulted with the CAA in regard to changes to operational procedures. The Applicant has not made a request to a helicopter operator to change an operational procedure at this point and in the event that a procedure is changed, it is not the responsibility of the Applicant to consult on this with the CAA. The maintenance of the operation's manual lies with the helicopter operator. The Applicant has consulted with the CAA in the appropriate capacity as a statutory consultee (see Table 8.4 of volume 2, Chapter 8: Aviation, Military and Communication of the Environmental Statement; APP-068). The Applicant notes that the reference to paragraph 1.22(4) of section Approvals for Equipment and Service Provision of CAP 764 cited by Spirit Energy is in regard to the provision of Air Traffic Services (ATS). The Application has duly consulted with the ATS provider NATS, who advised they have no objection and anticipate no impact on their own infrastructure and operations (see table 8.4, Volume 2, Chapter 8: Aviation Military and Communication of the Environmental Statement).
1.3 of Spirit Energy's response at Deadline 4 (REP4-138)	N/A	The Applicant refers the ExA to Section 1.3 of Spirit Energy's Introduction to response to ExA second written questions at Deadline 4 (REP4-138), concerning Protective Provisions.	Please refer to the Applicants response to ExA Q2.5.17 (REP4-012) in regard to the overall assessment of the impact of any restrictions on helicopter flights on Spirit Energy's operations in the Markham field. With regards to co-existence, the Applicant has submitted a proposal in this regard to Spirit Energy (see paragraph 1.5.1.2 of the Applicants response to the ExA's Second Written Questions, presented at Deadline 4 (REP4-012).

Q2.5.1 Maritime & Coastguard Agency (MCA)	The Applicant [REP2-005] and the MCA [REP3-084] disagree as to whether the Design Principles should require at least two lines of orientation. Please explain why you come to different conclusions on this matter. Are there examples of comparable OWFs which do not have at least two lines of orientation? If so, what is the typical spacing of Wind Turbine Generators (WTG) in those examples?	MCA currently requires as per MGN 543 a minimum of two lines of orientation unless a suitable safety case can be demonstrated to justify one line of orientation. The applicant has therefore incorporated just one line of orientation as the worst-case baseline for assessment in the NRA. However, where it is possible for a developer to incorporate two lines of orientation, it is our strong preference that they do so, despite any views on potential low levels of traffic in the area. The necessity for at least two lines of orientation is not only for search and rescue helicopter purposes; multiple lines of orientation provide alternative options for vessel passage planning. We know that by far the safest way to navigate through a windfarm is when the turbines are in straight lines, with multiple lines of orientation, which gives a clear line of sight of entry and exit. Vessels may transit a windfarm through choice or they may unexpectedly find themselves in the vicinity of the offshore windfarm in poor conditions or in an evolving emergency situation, and two lines of orientation would make navigation through the windfarm much safer. Although there are some examples of existing offshore windfarms which do have just one line of orientation, we made it clear at the time that these were certainly not desirable. They were also approved on a case by case basis, considering the cumulative impact and well as many other factors at the time. As our experience in this field has evolved, and as more applications for new developments are being received, there is a clear need to adapt to ensure that, as our seas become increasingly busy with sea space competition, particularly as we enter Round 4 of the Crown Estate's new leasing opportunities, the safety of navigation is preserved for shipping, recreation, and fishing. Ensuring multiple lines of orientation as we go forward will significantly contribute to safety and this approach has been discussed and supported by our key stakeholders at the UK's Safety of Navigation Committee (UKSON) comprising a wide range of experts in the marine environment.	The Applicant would direct the ExA to the Applicants submission at deadline 4 (REP4-012) and Appendix 9 of the Applicants response at deadline 5.

Q2.5.6 To MCA	The Applicant's Appendix 11 (to Deadline 2 submissions) SAR Technical Note [REP2-022] suggests that your analysis of the searchable area is overly pessimistic due to the various navigational systems that the SAR helicopters are fitted with. Your submission for Deadline 3 [REP3-084] states that a wider spacing would not affect the area impeded by the development lane. Given the typical spacing between WTG referred to at ISH1, would it be possible for SAR helicopters to operate within a development lane? What is your response to the Applicant's point that the navigational systems fitted to SAR helicopters would enable safe operation within the array?	The proposed development lanes could have turbines placed at irregular intervals and as such, it can't be guaranteed whether a SAR helicopter could operate within one. The minimum spacing to allow an aircraft to enter, in reduced visibility, is 500m which is greater than the spacing of the development lane. Depending on the weather conditions and the overall layout of the windfarm, it may be possible for a SAR aircraft to fly through areas of the development lane. However, this could not be guaranteed, particularly in poorer visibility. As discussed in our previous submission, the navigation systems within SAR helicopters all assist the crew to enable them to operate in hostile environments. However, any SAR helicopter operation within an array has associated dangers, particularly in reduced visibility and/or poorer conditions. We see this question in two ways though. The SAR lanes within the array should allow a SAR helicopter access in most weather conditions. This would be using a mixture of visual identifiers as well as navigational systems. The crew would be prepared for system failures and have preferred escape routes. The second element is concerned with the development lane and restrictions on searching. The navigational systems on the SAR helicopter are only limited use in these circumstances. Using the camera to search along the development lane may be possible but would time consuming and not effective in moisture.	The Applicant would direct the ExA to the Applicants submission at deadline 4 (REP4-012) and Appendix 9 of the Applicants response to deadline 5.

Q2.5.7 To MCA	The Applicant's Appendix 11 (to Deadline 2 submissions) SAR Technical Note [REP2-022] states that in an emergency a SAR helicopter could climb out of the array within 2.5nm. Consequently, it is said that any refuge would need to be relatively close to the location of an emergency to be of any assistance. What is your response to this comment?	We do not completely agree with this statement. A refuge area is not all about an escape route though it does form an important part of the justification. While uncommon, aircraft failures are always discussed by the crew and plans determined before conducting any flight. This was no different when entering a windfarm. Failures can be wide ranging in type and consequence, but the main ones considered were engine, GPS or radar failure, or a combination. Each crew may have differing plans, but the exercises showed that while climbing may be a suitable option, the preference would be to follow a SAR lane out of the windfarm. The SAR lane is known to have no fixed obstructions and may present less risk than climbing vertically (with engine, GPS or radar failure) out of the lane given the aircraft will be in a relatively stable condition. It was only when multiple failures were considered e.g. GPS and radar, that a vertical climb may be preferred. When SAR lanes are long, a refuge area may provide a quicker option for an aircraft to get to safe airspace in the event of a technical failure.	The Applicant would direct the ExA to the Applicants submission at deadline 4 (REP4-012) and Appendix 9 of the Applicants response to deadline 5.

Q2.5.8 to Spirit Energy	At ISH1 you expressed a concern that shipping movements in the vicinity of your installations may be increased by vessels on broadly north/south passages diverting around the northern and eastern side of the array in order to join the traffic separation scheme. The baseline shipping routes are shown in figure 3.3 of the Applicants Appendix 13 (to Deadline 1 submissions) Racon and AIS Review J6A Platform Technical Note [REP1-177]. Having regard to that plan it is not clear why such vessels would not pass to the west of the array, in the lane between Hornsea Project Two (not shown on that figure) and Hornsea Project Three. Your Deadline 3 submission [REP3-060] states that ships may divert to the east of the array during a westerly gale. Is your concern on this matter specific to periods of westerly gales? In conditions where there is not a westerly gale, what is your evidence that significant numbers of north/southbound	The situation summarised by the ExA is not limited to periods of westerly gales (namely Force 8 on the Beaufort Scale or 17 to 21 metres per second) - see Figure 1 below. Whenever the wind is from the west, vessels may prefer to follow this track to avoid the risk of drifting into the array (e.g. should they experience a loss of power). Passing through the channel would involve running along a long line of turbines (approx. 20 miles) immediately to the east on to which they would be set by the prevailing wind. A vessel passing through the gap in the array, and thence to the TSS 'Off Botney' would have to steam for over 20 miles with the turbines effectively being a lee shore on to which they could be set, the situation being exacerbated in the event of breakdown, hence the imperative to use the route to the east of the array. This would also apply to north bound vessels however these have been omitted for the sake of clarity. Figure 2 illustrates how vessels routing to the east of the Array (as shown by the green arrow in Figure 1) may interface with the Traffic Separation Scheme "Off Botney". For example, vessels heading to Antwerp may join the Traffic Separation Scheme at an appropriate angle (green arrow, Figure 2) while vessels crossing the Traffic Separation Scheme may do so along the route indicated by the red arrow on Figure 2. Figure 4 is extracted from the Block 6a of the Metocean Data (relied upon by DNV GL having been provided by Spirit Energy. The data was prepared on Spirit Energy's behalf). It summarises wind speeds and directions on an annual basis. It can be seen from the diagram in Figure 4 that the predominant wind directions are from the west and south west (from which the wind blows approximately one third of the time, which is significant) giving rise	The Applicant refers to its response to Q2.5.8 submitted at Deadline 4 (REP4-012) and notes that the volume of north-south traffic referred to by Spirit Energy is relatively low with an average of 4-5 vessels per day anticipated to pass through the navigational corridor designed for it between Hornsea Two and Hornsea Three. This traffic primarily consists of offshore oil & gas industry support vessels visiting other gas platforms in the Southern North Sea from a base in Great Yarmouth. For this traffic to go east of Hornsea Three would represent an unnecessary and inefficient detour. The navigational corridor is intended for use in all weather conditions and was designed in consultation with relevant stakeholders and regular operators in the area and agreed with the MCA and Trinity House. It is accepted that there may be a particular set of circumstances when an individual Master chooses to pass east of the array. However, this is not expected to be a common occurrence, and any Master planning such a passage would take into account the Spirt Assets, as well as the wind farm, to ensure a safe minimum passing distance to all hazards, as pointed out by DNV with reference to the IMO and MCA passage planning guidelines. It is illegal for any third-party vessel to pass within 500m of an oil & gas platform with potential penalties including imprisonment for up to two years. Therefore, Masters are expected to exhibit prudence if planning such a passage. It is reiterated that the overall change in passages following Hornsea Three is predicted to yield a net increase in passing distances to the Spirit Assets (and reduction in allision risk) due to the shielding effect of the wind farm. Anatec had a productive meeting with DNV GL on 16th January 2019 in Aberdeen to discuss the routeing and emphasised the evidence-based approach which is used to produce the

	vessels would divert around the eastern side of the array? Please provide illustrative vessel tracks to demonstrate how/why shipping would take the route you suggest.	to the conditions where vessels passing between the arrays may be set down onto the Hornsea 3 array and may then choose to pass to the east of the array. However, Figure 4 does include considerable seasonal variation as discussed in the Response to Question 2.5.9 below. Prudent Masters will select an optimum course based on a number of factors, specifically adapted for the environmental conditions expected at the time of transit. Generally the Master will seek the most economically advantageous route, which can be safely navigated. Factors considered will include: • Distance; • Speed expected to be achieved; • Proximity to navigational hazards, dependent on environmental conditions expected; • Depths of water available compared with vessel draft (i.e. depth of keel below water line); • Proximity to, and the rules governing the use of, traffic separation schemes; • Weather including wind direction and speed, sea and swell directions and heights, visibility expected; • Tidal stream direction and speed; • Current direction and speed; • Traffic density expected, including likely proximity to fishing vessels. A full list of factors can be found in IMO and MCA guidelines for passage planning. (Ref IMO Res 893(21), MGN 166) Given the range of factors which may influence choice of route, it is considered possible that masters of vessels may choose to follow the track shown by the green arrow in Figure 1 at any time. The information currently made available by the Applicant on displacement is not considered sufficiently robust to rule this out.	anticipated routes post wind farm construction. This approach includes consultation with regular operators in the area, use of traffic data for the current scenario and use of historical routeing data for the North Sea collated over the past 12 years. All DNV's questions were answered at the meeting and they appeared to be satisfied.

		Spirit Energy has not claimed that significant numbers of north/southbound vessels would pass east of the array, other than in westerly gales. However, to date, the Applicant has not provided details of expected traffic in the vicinity of Spirit Energy installations other than claiming that it will be reduced. No detailed evidence has been provided on the level of traffic expected in the vicinity of the installations. The Applicant's marine advisors, Anatec, have agreed to meet with Spirit Energy's marine advisors, DNV GL, to review the modelling undertaken by Anatec. This meeting is scheduled to take place after Deadline 4 and Spirit Energy may have further comments after this meeting has taken place. At the present time Spirit Energy is of the view that Anatec's predictions are primarily the result of input assumptions rather than providing an evidential basis for future traffic movement. As is set out in the Introduction of this document, national policy EN-3, paragraph 2.6.183 and 2.6.184, require that the risk of allision by commercial vessels with Spirit Energy's assets (here, the NUIs Chiswick and Grove and in due course C6) is reduced by the Applicant to ALARP. "**Risk"** is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be[3]. The catastrophic consequences of such allision (see Table 4.1 in DNV GL Report – Document 16, Full Written Representation) are such that even low probability scenarios should be the subject of mitigation because the consequence remains catastrophic and there is no robust evidence to show that fewer vessels are likely to pass close to the infrastructure with the Array than without it. The identified risk should be reduced to ALARP whether or not significant numbers of vessels are likely to take this route. The prospect of even relatively low numbers of vessels routing to the east of the proposed windfarm, where such a situation is not currently present, generates a risk to safe operation of the existing infrastructure from	

		allision in the sense that such vessel routing cannot be excluded and so the risk is changed and remains.	

Q2.5.9 Spirit Energy	At ISH1 you expressed a concern that shipping movements in the vicinity of your installations may be increased by ferry traffic diverting around the south eastern corner of the array then altering course to the north east in order to cross the traffic separation scheme at an appropriate angle. This would appear to be a longer and more complex route that diverting to the north of the array as predicted in figure 3.4 of the Applicants Appendix 13 (to Deadline 1 submissions) Racon and AIS Review J6A Platform Technical Note [REP1-177]. Your Deadline 3 submission [REP3-060] refers to potential diversions to the south during a northerly gale. Is your concern on this matter specific to periods of northerly gales? In conditions where there is not a northerly gale, what is your evidence that significant numbers of eastbound ferries would divert around the south eastern corner of the array and, having done so, alter course towards your installations?	The situation is not limited to periods of northerly gales (namely Force 8 on the Beaufort Scale or 17 to 21 metres per second) – see Figure 5. Whenever there are northerly winds, vessels passing to the north of the array would be at risk of drifting into the array. By passing south of the array, vessels would avoid running along a long barrier of turbines (c. 40 miles) on to which they would be set by the prevailing wind. The two green arrows on Figure 3 illustrate routes which masters might reasonably take to avoid the Traffic Separation Scheme – in both instances bringing the vessel in close proximity to Grove. This situation would be exacerbated in the event of a loss of power. Given the range of factors which may influence the choice of route set out in answer to Question 2.5.8, it is considered possible that masters of vessels may choose to follow this route in other conditions at any time. Despite the predominant winds being from the west/south west, the wind rose depicted at Figure 5A illustrates the seasonal variations which can and do occur, with northerly winds being more frequent than usual in June (approximately 15 per cent of that month). This frequency is considered important. However, it should be noted that these presentations are long term averages and that periods of exceedance can occur at any time, from any direction. Spirit Energy have not claimed that significant numbers of eastbound vessels would pass around the south eastern corner of the array, other than in northerly gales. However, to date, the Applicant has not provided details of expected traffic in the vicinity of Spirit Energy installations other than claiming it will be reduced. No detailed evidence has been provided on the level of traffic expected in the vicinity of the installations. The Applicant's marine advisors, Anatec, have agreed to meet with Spirit Energy's marine advisors, DNV, to review the modelling undertaken by Anatec. This meeting is scheduled to take place after Deadline 4 and Spirit Energy may have further comments after this meeting has taken place. At the present	The Applicant refers to its response to Q2.5.9 submitted at Deadline 4 [REP4-012] and notes that the illustrative vessel tracks shown by Spirit Energy are not reflective of the anticipated routeing post wind farm, which was informed by consultation with regular ship operators during the Navigational Risk Assessment (NRA) (APP-112), such as DFDS Seaways. Firstly, no consultees indicated that vessels would transit within the array. Secondly, the alternative of passing south of the array and then turning north east to avoid the Traffic Separation Scheme (TSS) is not reflective of the stakeholder feedback. Existing traffic does utilise the TSS (as shown in the NRA (APP-112)) and may continue to do so. A sharp turn north-east (towards Grove) after passing south of the array would not be an efficient change of passage. It is anticipated that such traffic would not generally deviate south of the array in the first instance but rather deviate north. Again, it is reiterated that the overall change in passages following Hornsea Three is predicted to yield a net increase in passing distances to the Spirit Assets (and reduction in allision risk) due to the shielding effect of the wind farm. Some east-west traffic in the baseline surveys passed close to Grove, but is expected to be re-routed several miles farther away. Anatec had a productive meeting with DNV GL on 16th January 2019 in Aberdeen to discuss the routeing and emphasised the evidence based approach which is used to produce the anticipated routes post wind farm. This approach includes consultation with regular operators in the area, use of traffic data for the current scenario and use of historical routeing data for the North Sea collated over the past 12 years. All DNV's questions were answered at the meeting and they appeared to be satisfied. Finally, with respect to the consequences of an allision with a platform, these will remain the same since they are based on

	Please provide illustrative vessel tracks to demonstrate how/why ferries would take the route you suggest.	time Spirit Energy is of the view that Anatec's predictions are primarily the result of input assumptions rather than providing an evidential basis for future traffic movement. As is set out in the Introduction of this document, national policy EN-3 requires that the Applicant reduce the risk of allision by commercial vessels with Spirit Energy's assets (the NUIs Chiswick and Grove and its assets) to ALARP. The catastrophic consequences of such allision (see Table 4.1 in DNV GI Report, Document 16, Full Written Representation) are such that even low probability scenarios should be the subject of mitigation. The identified risk should be reduced to ALARP whether or not significant numbers of vessels are likely to take this route. The prospect of even relatively low numbers of vessels routing to the south of the proposed windfarm is material in the context of this Application and its determination.	impact energies (vessel sizes and speeds) which have not changed. The probability of an allision is predicted to reduce due to displacement of traffic away from the wind farm and the Spirit Energy assets. Hence, the risk of allision (i.e., probability x consequence) is also expected to reduce overall.

Q2.5.10 to Applicant & Spirit Energy	At ISH1 the Applicant referred to 10 years of traffic surveys which indicated that commercial ships do not generally pass through OWF arrays. Spirit Energy has pointed out that MCA advice does not preclude vessels from navigating through OWF arrays and that this may become more common in future [REP1-102]. Please can the Applicant provide further detail as to when and where these surveys were carried out and what the results were? Does Spirit Energy have any evidential basis for the suggestion that commercial ships (other than fishing vessels) would pass through the array?	MGN 372 clearly indicates that passing through a wind farm, with caution, is one of three options open to mariners when planning a passage (see Figure 7 below, extract from MGN372. To date, many of the wind farms in operation are of a small scale when compared to the combined effect of the Hornsea 3 development (as illustrated by Figure 2.2 in the ES Volume 4, Annex 5.3 – Location of Cumulative Projects, Plans and Activities). Consequently, diversions around the current wind farms may not add a substantial penalty in terms of distance and hence time for commercial vessels. Accordingly, vessel tracks in the vicinity of existing windfarms are not reliable evidence as a predictor of tracks that will be followed by vessels affected by the Project. Whilst it is accepted that array transits may not currently be common practice in the UK sector, as the area of sea subsumed into windfarms increases there is an increasing likelihood that vessels will adopt this practice, especially as it is promoted as one of three options for vessels by the Marine Coastguard Agency (MCA). Smaller, short sea, vessels are already well used to navigating inland channels and canals and already cross the southern north-sea in considerable numbers between the UK and the near continental ports. It is considered that the list of factors (see answer to Question 2.5.8) likely to influence masters of vessels when choosing the most appropriate route would also influence the decision of a master to transit through an array or not. Whilst it is accepted that in future, the largest vessels may not choose to transit wind farm arrays, and that fishing vessels will transit arrays, it is highly likely that a range of intermediate vessels may opt to do so, as outlined in MGN372 and as they remain entitled to do so. The southern North Sea, and associated ports and river systems, are served by large numbers of such vessels, mainly coastal trading vessels. Many of these vessels are owned by single vessel companies or family concerns, akin to the structure of the fishing industry. These vessels trade extensively between east coast UK ports	The Applicant refers to its response to Q2.5.10 submitted at Deadline 4 (REP4-012) and reiterates that all the evidence to date, i.e., real-time tracking of vessel movements in the vicinity of UK wind farms, indicates that commercial ships choose to route around rather than through wind farm arrays. This is expected to be the case at Hornsea Three where there is sufficient sea room to avoid the area completely, following the prudent option in the MCA MGN 372 guidance. Following investigation, there is no evidence of the example vessel cited by Spirit Energy passing through an existing offshore wind farm. There is no evidence to suggest that such a vessel will transit through the array, and on the contrary, extensive consultation undertaken by the Applicant found that commercial vessels would choose not to transit through the array. It is again noted the anticipated displacement of east-west traffic around the wind farm will increase average passing distances of ships to Spirit's Assets. At present ships can pass through the sea area of the proposed array leading to much closer passages to the platforms.

		and continental ports (to their east) carrying a range of cargoes including bulk cargoes (grain, coal and ore) containers, general cargo and hydrocarbon products. By way of example, at 10.12 am on 11th January, a vessel of this type passed through the area in which the array will be situated. Photographs of the vessel are shown below in Figure 7. At that time, there were three similar vessels in the area – two east bound and one west bound (Source: Marinetraffic.com). This vessel is a bulk carrier and was on a voyage between the Humber (Goole) and Delfzjil in Holland. The vessel has a retractable bridge to enable passage through the European and UK river systems and a brief analysis of previous ports shows that it trades extensively between the UK and European ports. Such vessels are well used to navigating in close proximity to navigational hazards and may well opt to pass through arrays as the area subsumed by windfarms increases. The vessel has a deadweight in excess of 3000te and was steaming in excess of 10 knots at the time of observation. There is no prohibition on such a vessel routing through the proposed array, nor routing between the south- east corner of that array and the TSS "Off-Botney". If such a vessel collided with a gas platform the impact energy would be around 50 mega joules, the limit at which total collapse of the platform could be expected, with concomitant catastrophic consequences (see Table 4.1 in DNV GL Report, Document 16, Full Written Representation). That risk is neither excluded nor reduced to ALARP by the Applicant.	

Q2.5.11 Applicant & Spirit Energy	At ISH1 Spirit Energy accepted that an estimated speed of 4 knots for a drifting vessel (not under command) would be an extreme situation. The Applicant's Deadline 3 submission [REP3-003] stated that the drift time from the eastern edge of the array to the nearest platforms would be 30 minutes to 2 hours. Spirit Energy's Deadline 3 submission [REP3-060] gave an example of a vessel drifting at 9 knots (albeit in a location where tidal conditions may be different). Specifically in relation to windfarm support vessels, what would be the likely speed of a drifting vessel driven by wind and tide? Specifically in relation to a construction barge, which may be loaded with large WTG components, what would be the likely speed of a drifting vessel driven by wind and tide? vessel driven by wind and tide? Specifically in relation to a construction barge, which may be loaded with large WTG components, what would be the likely speed of a drifting vessel driven by wind and tide?	It is difficult to generalise as windfarm related vessels are many and varied. In the case of jack up crane vessels, if disabled with legs extended in the air, the considerable windage (air resistance of moving vessel) could lead to wind driven speeds of three to four knots. However, the calculation of drift speeds is not an exact science and, as the example of Saga Sky in the recent MAIB Report shows (MAIB Report No 03/2018 of March 2018 – ISH1 Submission, Appendix U), even setting anchors and colliding with an anchored barge did not stop the drift until after the combined vessel/barge had severed the main electricity interconnector. **Construction Barges** In such a situation, with a dumb (i.e. not powered) barge being towed by a tug, with the tow line parting the drift, speed will depend on the barge draft (i.e. the depth of the barge's keel below the water line), current, windage (i.e. air resistance of moving vessel) and wind speed. The relatively shallow drafts of such barges means that they will be under greater influence of the prevailing wind than tide. In effect, transition pieces (i.e. the top part of the foundation), turbine towers carried vertically, or tripod foundations will act like a sail, increasing the speed. Bearing in mind the speeds attained by Saga Sky in the recent MAIB report, 4 knots is not unreasonable and speeds well in excess of this are certainly possible. The risk posed by a drifting construction barge would be worse in winds from the south west / west i.e. the predominant wind directions, as illustrated by Figure 4 – wind blows from the west/south west approximately one third of the time. In such circumstances, at around four knots drift speed, a drifting barge would drift to Chiswick and or Grove in between thirty to forty minutes. No tide has been allowed for. Where the tide is working with (rather than against) the drifting barge, the effect of the tide may be to add another 1 to 2 knots to the speed of the drifting barge.	The Applicant refers to its response to Q2.5.11 submitted at Deadline 4 [REP4-012]. It is reiterated that a 4 knots drift speed is not typical but extreme (very high winds acting on high windage vessels). In the case of wind farm vessels, operations in extreme weather that could generate such potentially high drift rates are not likely to be allowed according to Adverse Weather policies. Spirit Energy have indicated that collision avoidance procedures are initiated when a vessel is on a collision course within 20 minutes of a platform. We agree with Spirit Energy's response that vessels will be greater than this time away if they started to drift at 4 knots from the extreme eastern edge of the wind farm. Any drifting vessel would be outside of the wind farm (i.e., closer to Chiswick and Grove) when a platform alarm is initiated at 20 minutes. Again, starting engines, anchoring and using rudder are mitigation measures in such a scenario.

	How long would it take for such vessels to drift from the eastern edge of the array to the Chiswick or Grove Platforms? How long would it take for such vessels to drift from the eastern edge of the array to the Chiswick or Grove Platforms?		

Q.2.5.14 Application & Spirit Energy	The ES [APP-068] states that helicopter flights are conducted using instrument approaches to oil and gas platforms 5% of the time. Spirit Energy's Deadline 3 submission [REP3-069] states that instrument approaches would be required on 88 days per year. Please can the Applicant explain the basis for the figure of 5% in the ES? Please can the Applicant and Spirit Energy explain why their respective assessments differ so significantly? Please can Spirit Energy confirm whether Chiswick and Grove platforms have any restrictions in terms of instrument approaches at present?	In Spirit Energy's Deadline 3 analysis of actual meteorological data, 88 days per year (equivalent to 24%) were expected to be in Instrument meteorological conditions ("IMC"). This analysis was based on a pilot's review of the weather forecasts at J6-A on each day. Spirit Energy also undertook an analysis of a dataset made up of metocean data at the location of J6-A (near to Chiswick and Grove NUIs) comprising data for every 3 hours (see ISH 1 Submission, Appendix ZN). In this analysis it was assumed that IMC would apply whenever the cloud base is <1000' or visibility is <5km. This analysis concluded that IMC conditions would apply 31% of the time. Further discussions with the Applicant revealed that the Applicant's contention that IMC apply 5% of the time is based on the anecdotal evidence from an informal discussion with a single pilot and not on metocean data. The Applicant also performed an analysis of their dataset for a different location (Schooner) to the west of the Chiswick NUI. In that analysis the Applicant assumed that IMC would apply whenever cloud base is <600' or visibility is <4km. This analysis generated the result that IMC conditions occur 15% of the time at that location. A review of the CAA authorised operating procedures of North Sea helicopter operators shows a difference in the day VFR visibility criteria as shown in Table 1, below. Also included in the table are the International Association of Oil and Gas Producers ("IOGP") minima to which helicopter operators servicing oil and gas operators operate also unless the helicopter operator minima is more restrictive as is the case for the night cloud base. Based on Table 1 below, Spirit Energy and the Applicant should both have assumed that, during daylight hours, IMC would occur whenever cloud base is <600' or visibility is <5.55km and outside of daylight hours (from half an hour after sunset to half an hour before sunrise IMC would occur whenever cloud base is <1200' or visibility is <5.55km). Spirit Energy have re-	The Applicant submits that the assumptions used by Spirit Energy are incorrect and notes that Spirit Energy also agree that the assumptions used to define IMC were incorrect (see this response). The Applicant submits that they have not based their aviation assessments on an informal discussion with a single pilot as stated by Spirit Energy. The assumptions used (and the application of 5%) are clearly defined in the Applicants response to the ExA Q2.5.14 submitted at Deadline 4 (REP4-012). The Applicant is willing to consider the dataset submitted by Spirit Energy for the calculation of IMC conditions in order to be able to facilitate agreement on the aviation assessments. The Applicant is willing to proceed with verification of this data and will progress discussions with Spirit Energy on this basis, but the Applicant also reiterates the need for agreement of the assumptions used in the assessments (as per the table of aviation assumptions to be used as a comparative tool against the assumptions used by Spirit Energy in each party's respective assessment, and as agreed at the aviation meeting with Spirit Energy on 17 December, and previously provided to Spirit Energy; Appendix 54 to the Applicant's response to Deadline 4 (REP4-074)) in order to be able to reach agreement on the output from this dataset. The Applicant notes that Spirit Energy have amended the IMC conditions used by their aviation consultants. The Applicant notes however that Spirit Energy have submitted further incorrect aviation assumptions at Figure 10 of their submission at Deadline 4 (REP4-138). The IOGP AMG night cloud base criteria is not 1200 ft but is in fact 1000 ft (Table 2 of section 1.7.3 of IOGP AMG in Appendix 7 of Applicants submission at deadline 5). On this basis, the calculation of the number of days (and percentage of time) that IMC conditions may occur provided by Spirit Energy have been and continue to be incorrect.

		run their analysis on this basis and conclude that IMC apply 30% of the time. **Table 1: Comparison of VFR Limits for Day and Night** | Company	Day Cloud Base	Day VFR Visibility	Night Cloud Base	Night VFR Visibility
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IOGP	600 ft	5.55km	1200 ft	5.55km
NS Operator 1	600 ft	4 km	1200 ft	5 km
NS Operator 2	600 ft	2 km	1200 ft	5 km
NS Operator 3	600 ft	4 km	1200 ft	5 km
NS Operator 4	600 ft	2 km	1200 ft	5 km	 Other reasons for differences between the Applicant's and Spirit Energy's analyses based on weather data are: - The Applicant and Spirit Energy used different datasets. Spirit Energy has provided its data to the Applicant. Spirit Energy requested the Applicant's data after the 14th December 2018 ISH 1 but has yet to receive it (as at 15th January 2019). - The Applicant's stated that its data had been based on a ten-year period at the Schooner platform location whereas Spirit Energy's data is based on a one-year period at the Markham J6-A platform location. Spirit Energy would be happy to repeat the analysis process carried out previously using the Applicant's dataset (on the condition that the Applicant has not used averaged data) in order to allow for meaningful comparison with Spirit Energy's dataset. - Averaging. Spirit Energy's data is presented at 3 hourly intervals with no averaging. The frequency of the Applicant's data and any inherent averaging therein has yet to be determined or disclosed. The most representative dataset would involve no averaging	It therefore follows that the calculations presented by Spirit Energy of the number of days IMC conditions may occur on both an annual basis and on a month by month basis in this submission, are incorrect. The Applicant also submits that the number of days that IMC conditions may occur does not, in itself, relate to restricted access to the Spirit Energy operated platforms, as incorrectly presented by Spirit Energy. Spirit Energy have failed to apply wind direction criteria to this data, and they have not considered alternative approaches which are available to these platforms (see the Applicants response to the ExA Q2.5.14 submitted at Deadline 4 (REP4-012)). The Applicant has responded in regard to the present restrictions at the Chiswick and Grove platforms (REP4-012). The analysis presented by Spirit Energy in this submission is based on incorrect assumptions and takes no consideration of the alternative approaches that are, and can, continue to be available to these platforms (REP4-012). The Applicant's position is that the overall impact of Hornsea Three will not have a significant effect on the operational requirements to the Spirit Energy operated platforms (see the Applicants response to ExA Q2.5.17 submitted at Deadline 4 (REP4-012)) and therefore will not prejudice Spirit Energy's ability to fulfil its obligations under the MER UK Strategy.

		The percentage of times IMC occur referenced in the above discussion are all annual averages. There is substantial month to month variability and this appears to reflect the actual variability of weather conditions. In Spirit Energy's revised analysis, the annual average occurrence of IMC is 30% but there are substantial month to month variations with IMC conditions occurring 55% of the time in April. Chiswick and Grove have both been equipped with circle and "H" lighting enabling flight operations in both daylight and at night. The lighting on Grove has been commissioned and is fully operational. The lighting on Chiswick has not yet been commissioned as there is no need for it whilst the drilling rig is located there. Once commissioned no restrictions due to light will apply to IMC flights at either Chiswick or Grove. Both platforms are restricted due to firefighting equipment to 120 unattended landings per year irrespective of weather. This analysis demonstrates the substantial prejudice which will be suffered by Spirit Energy if the Application is granted without appropriate protective provisions. This would be contrary to the provisions of EN-3 as outlined in the Introduction and would also prejudice Spirit Energy's ability to fulfil its obligations under the MER UK Strategy.	

Q2.5.15 Spirit Energy	Your submission for Deadline 3 [REP3-061] refers to the importance of stabilised helicopter approaches both in poor visibility and in good weather. Do you consider that the proposed array would compromise stabilised approaches to your platforms in good weather? If so, why?	Stabilised helicopter approaches are required in all weather conditions. Spirit Energy is concerned that the effects of turbine induced turbulence have not been considered by the Applicant. The real extent of such turbulence from large arrays is still a matter of debate in the scientific literature but there appears to be general agreement that turbines induce turbulence and in offshore arrays where topography cannot disperse the turbulence the effects may be significant some distance from the array (for example see para 7.5 of ISH 1 Submission, Appendix ZE – Addendum to AviateQ Report dated December 2018 which refers to such effects up to 14km from the array). If correct, such turbulence would compromise a stabilised approach in good or bad weather conditions	Please refer to the Applicants response to the ExA Q2.5.15 submitted at Deadline 4 (REP4-012). The Applicant notes that turbulence was considered in Volume 2, Chapter 8: Aviation military and Communication of the Environmental Statement (APP-068) and that it was screened out of the assessments based on CAP764, as there were no Mandatory Occurrence Reports (MOR) of such incidents (paragraph 2.54 of CAP 764), and the fact that the Hornsea Three array area would not be in the vicinity of an aerodrome and at a distance offshore not to anticipate light sport aviation (paragraph 2.57 of CAP 764) (see Table 8.9 of Volume 2, Chapter 8: Aviation military and communications of the Environmental Statement (APP-068)). The Applicant is seeking guidance on turbulence from their internal aviation experts who have considerable experience of operating in and around wind farms. In addition, and in order to provide further assurance to Spirit Energy in this regard, the Applicant is progressing a meeting with a leading academic on this subject and will provide further assurance following this meeting.

Q2.5.16 Spirit Energy	Your Deadline 3 submission [REP3-061] explains why, in your view, certain helicopter operations could not be carried out safely. At ISH1 you explained that, typically, personnel are taken to/from Grove and Chiswick Platforms during the same day. On the assumption that you would not carry out flights assessed to be unsafe, is it reasonable to assume that the main impact would be on your ability to access Grove and Chiswick platforms rather than an impact on the safety of personnel? Is it reasonable to assume that you would not transfer personnel to Grove and Chiswick platforms if you were not confident that they could be transferred back to J6-A later that day?	Spirit Energy's first priority is always safety and no operations will be undertaken or requested of others where the risks to personnel have not been reduced to as low as reasonably practicable (ALARP). It is therefore correct to conclude that the main concern, but not the only, impact of the Applicant's proposals would be a very considerable reduction in available opportunities to access the Grove and Chiswick platforms. These platforms operate 24/7/365 and are situated in the dynamic marine and air environment of the North Sea. When faults occur on a platform (which by their very nature are unplanned) the platforms will not be allowed to become unsafe and instead production will be curtailed or shut-in completely until personnel can be mobilised to the platform to effect a remedy. In these circumstances, it is important that access may be taken as soon as possible. Faults will also occur more frequently as facilities age. Thus, restrictions on the currently available opportunities to access Spirit Energy's assets would adversely affect production and impact the economics and viability of the facilities. When considering the NUI status of Chiswick and Grove, it is important to note that "NUI" does not mean unmanned at all but it means not with people *resident* on such infrastructure. With drilling ongoing at Chiswick, flights in relation to these NUIs currently take place twice a day (to and from daily). It is worth noting that Spirit Energy has recently made further investments in equipment (lighting and firefighting equipment) on both Chiswick and Grove in order to facilitate greater ability to fly personnel to these installations. Spirit Energy acknowledge that helicopter operations are not possible 24/7/365.	Please refer to the Applicants response to the ExA Q2.5.16 submitted at Deadline 4 (REP4-012). The Applicant notes that Spirit Energy has advised that when faults occur on platforms they are not allowed to become unsafe and instead production will be curtailed. This is in accordance with the position put forward by the Applicant that Spirit's concerns surrounding access is in regard to loss of operation (economic concern) and not one of safety. The Applicant is aware that faults do happen at offshore facilities but is of the understanding that an unplanned shut down is very rare (possibly of the order of once every three years) and therefore wishes to understand from Spirit Energy the actual number of times this event is likely to arise. The Applicant notes that Spirit Energy has recently invested in lighting at the Grove platform, and that they state that they are in the process of fitting lighting at the Chiswick platform and fire fighting equipment at the Chiswick and Grove platforms. The Applicant wishes to know if these improvements are for operations or are actually an ALARP requirement? Further, the Applicant would like confirmation (e.g. certification) of when the lighting at the Chiswick platform and the fire fighting equipment at the Chiswick and Grove platforms will be fully operational. The Applicant notes Spirit Energy's statement that restrictions imposed on their NUIs are different in nature to the wind farm as they are fixed, certain and manageable. The Applicant advises that Hornsea Three infrastructure will be fixed and any restrictions imposed upon Spirit Energy will therefore also be fixed, certain, and therefore also manageable. The Applicant understands that it is common practise for such fixed restrictions to be placed on individual helidecks, due, for example, to the presence of cranes requiring access from certain directions only. The Applicant is in agreement with Spirit Energy that there will be incidents on a platform which are not an emergency but that

		Flights are not possible when the sea state has an elevation of >6m or the wind is in excess of 60kts (which occurs on ~16 days/year – i.e. 4% of the time). Until the recent installation of circle and "H" lights, flights were restricted to daylight hours. (This restriction was different in nature to the flight restrictions consequent upon the proposed wind farm, as the former were fixed and certain, and therefore manageable). As Chiswick and Grove are NUIs, being not normally manned, there are also restrictions to the number of flights based on the firefighting equipment on each platform. Spirit Energy has also recently invested in an upgrade of automated firefighting and foam equipment to an H1/H2 compliant system (in accordance with CAA CAP437) now allowing up to 120 unattended landings per year (and an unlimited number of attended landings).These investments are a reflection of the economic importance to Spirit Energy of minimising restrictions to helicopter access to these fields. Subject to sea state and weather, there is no restriction on when those 120 landings may be applied on any given day in a year or at any time in addition to those landings where personnel are on each NUI (i.e. attended landings). Although, as noted above, the main impact of the proposed array would be upon the ability to access the Grove and Chiswick platforms, there would also be consequent impacts on economics and their viability. Unacceptable safety impacts are only mitigated by Spirit Energy's own intervention (restricting its own activities). The policy implications of this are discussed below. Remaining safety impacts are discussed below. As stated in earlier submissions, the safety cases for both the manned installations and the NUIs are predicated upon helicopters as the primary means of evacuation. Helicopters are preferable to lifeboats and other escapes to water as they allow for a controlled transfer of personnel to a safe haven (often a nearby vessel or installation) whereas, whilst boarding a lifeboat can be accomplished easily, there are significant risks of injury when a free-fall lifeboat launches (whiplash injuries and even broken limbs are not	require evacuation. The Applicant would like to know how many times this has actually happened at Spirit Energy platforms, when persons could not be taken back by an in-field shuttle flight to the J6A platform, in order to understand the risk of such an event occurring.

		uncommon when the lifeboat impacts the water) and recovery of personnel from a lifeboat is an operation with inherent risks to personnel. Other means of escape to water carry even greater risks and recovery of personnel in the water places them and their rescuers at heightened risk. In an extreme situation, such as a major fire on the platform, the risks of such secondary means of evacuation are minor relative to the risks of remaining and helicopter evacuation may not be safe or practicable. There are however many evacuation scenarios which do not involve such immediate danger to personnel and where helicopters offer by far the safest means of evacuation. By way of example, an incident experienced by Spirit Energy's consultant Max Rowe in his then role as on call Emergency Response Director at another company (see relevant experience at paragraph 1.1.5 of Introduction) illustrates the point. An incident occurred necessitating the evacuation of 150 personnel from an offshore installation – an operation subsequently described by offshore workers as a text-book evacuation. An explosion occurred on an offshore installation. Production was shut-down automatically, and all personnel went to their muster stations. Dr Rowe was called by the installation manager. Whilst he sought to account for all personnel and managed the immediate risks, Dr Rowe mobilised the onshore emergency response team, contacted the Maritime Coastguard Agency and had his logistics team member establish the whereabouts of helicopters that may be able to be mobilised to the platform. The Offshore Installation Manager (OIM) soon advised that all personnel were accounted for and there had been no injuries. There was no fire or gas leak and all systems were shut-down. A small team went out from the temporary safe refuge to assess the damage and reported back that there was extensive localised damage around one of the generators and extending several hundred feet up over higher decks. Personnel were in no immediate danger but having 150 people in the temporary safe refuge (on this platform, a set of locker rooms close to the control room	

		situated at the opposite end of the platform from hydrocarbon processing equipment and protected from it by two blast walls) with only emergency lighting was not a situation to be prolonged. Accordingly, with the assistance of other oil & gas operators and helicopter operators who suspended some of their flights, Dr Rowe was able to coordinate the evacuation of personnel from the platform using helicopters and, with the cooperation of a hotel close to the airport, provide them with overnight accommodation. A team were mobilised to the airport to meet arriving personnel, offer support or counselling and deal with any concerns. This was all unplanned. Had helicopter access not have been possible in this situation, due to a restriction on helicopter access, and lifeboats been used instead, personnel would then have had to be recovered from the lifeboats to other vessels, not only would personnel have been exposed to greater risks during the course of the evacuation, but the evacuation itself would have contributed to the stress of the experience (some of the personnel involved chose never to return to offshore work) and it would have been far more difficult to provide timely and consistent support to those affected as there would not have been a single arrival point. Unplanned situations requiring a controlled evacuation of one or more personnel are not uncommon in the North Sea offshore infrastructure industry - recent industry examples include: medical evacuations, platforms becoming uninhabitable due to problems with power or drinking water supplies, bomb scares, and discovery of unexploded ordnance. It is correct to assume that Spirit Energy would not transfer personnel to Grove or Chiswick platforms unless there was confidence that met-ocean conditions would enable them to be transferred back to J6-A later that day. However, such a restriction derives from the natural dynamics of the weather and sea conditions and not from the presence of intervening artificial obstacles between land and offshore infrastructure that result in affects on safety.	

		In light of the above, to correctly assess the impact of the Project upon flights to Chiswick and Grove, it is not sufficient to consider how often conditions would prevent flights. Instead it is necessary to consider whether flights would be undertaken. This would require a forecast showing that current met-ocean conditions and those 9 hours later would allow flights for both the outward and return journeys. This is the basis of revised analysis provided in response to Q2.5.17 below. In light of this revised analysis, it is considered that the impact on Spirit Energy is considerable and adverse. As is discussed in the Introduction, policy EN-3 is clear that an Applicant is required to minimise negative impacts of its proposals upon offshore infrastructure and activities to ALARP, and that site selection and design should be made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety. This is consistent with the principle of successful co-existence, and is intended to ensure that the burden of "adapting" does not fall wholly or to an undue extent on existing operators. Applying EN-3 to the matters discussed in this Response, it would be contrary to policy to expect Spirit Energy (instead of the Applicant) to bear the burden of the flight restrictions without looking to matters of siting and design of the proposed windfarm (as Spirit Energy have sought to do in their proposed protective measures). arising from the Applicant's proposals for its scheme. There is no mandate in EN-3 for attributing primacy to wind energy over safety considerations. Indeed, EN-3, paragraphs 2.6.184, 185 and 186, support the contention that ensuring safety is ALARP and that there are no unacceptable risks remains the priority. Separately, the flight restrictions resulting from the array (in the absence of the draft protective provisions) would adversely affect Spirit Energy's ability to comply with the MER UK Strategy.	

Q2.5.17 Applicant & Spirit Energy	Please provide an update on your discussions regarding helicopter operations. Please provide your respective assessments of the number of days per year helicopters can (or could) serve Grove and Chiswick platforms now and with the proposed array in place. Having regard to the fact that Grove and Chiswick platforms are not routinely staffed, what is your overall assessment of the impact of any restrictions on helicopter flights on Spirit Energy's operations in the Markham field?	On 17th December, Spirit Energy and its expert advisors met with the Applicant and their advisors to discuss both helicopter operations and marine operations. The meeting was constructive and cooperative. Whilst a number of actions were agreed at the meeting and progress has been made on some of these, the Applicant and Spirit Energy have not yet been able to reach agreement on appropriate helicopter operations. Spirit Energy and its advisors have based their assessment of the impact of the Project on helicopter operations upon the existing procedures used by helicopter operators in serving North Sea oil & gas installations. The Applicant on the other hand is proposing significant changes in procedures, which whilst compliant with legal limits imposed by EASA, are not compliant with guidelines published by IOPG or indeed the CAA approved Operations Manuals of the helicopter operators serving the North Sea. It is worth noting that, in the same way as a 30 mile per hour speed limit on a road limits drivers to 30mph but the Highway Code outlines situations where a lower speed may be advisable, the EASA limits are the legal limits whilst the IOPG guidelines take into consideration the nature of regular travel to/from offshore platforms with live hydrocarbons. Spirit Energy is not itself a helicopter operator and takes its lead from (i) the helicopter operators and (ii) oil & gas industry standards developed in consultation between major international oil & gas operators such as Shell and BP. These recommendations are published by the International Association of Oil and Gas Producers (IOGP) (see IOGP Aircraft Management Guidelines, Version 2, Report No. 590 (2017)). Ørsted is proposing that helicopter operators should change their operating procedures to reduce the footprint required for approaches and departures from Spirit Energy's facilities.	Please refer to the Applicants response to the ExA Q2.5.17 submitted at Deadline 4 (REP4-012). The Applicant notes that Spirit Energy has chosen to cite IOGP AMG guidelines, however they have not been cited correctly (see the Applicants response at Q2.5.14 in this submission). The Applicant reiterates that they are not proposing significant changes in procedures but asking Spirit Energy to be cognisant of other available regulated approaches. The Applicant notes that it has led consultation with the helicopter operators within the pre-application phase of the project (see Table 8.4 of Volume 2, Chapter 8: Aviation, Military and Communication of the Environmental Statement; APP-068). The Applicant is progressing a meeting with CHC, Spirit Energy's helicopter operator to the Markham Complex and has invited Spirit Energy to attend this meeting (date to be confirmed subject to Spirit Energy availability). The Applicant has not agreed to the questions drafted by Spirit Energy as they are not applicable or appropriate to the Application. The Applicant is of the opinion that consultation is required to be in regard to access to the Chiswick and Grove platforms and is not an industry-wide issue. The Applicant notes CAA Policy on wind energy in this regard (paragraph 1.4.2 of CAP 764), that all potential impacts on aviation operations must be considered on a case by case basis. The Applicant refers the ExA to the Beatrice A platform for example, which on consideration on an individual basis is able to operate within 1 nm of two wind turbines (see the Beatrice A platform Helideck Information plate submitted at Appendix 14 to the Applicant's response to Deadline 5). The Applicant understands that Spirit Energy wish to discuss aviation proximity issues at an industry wide level, and the

		It was highly recommended by Spirit Energy that the helicopter operators be approached on the matter to obtain their formal feedback since they are responsible for establishing their Standard Operating Procedures (SOPs) and how they train to them. If the helicopter operators support these changes in standard practice then the proposals could be made to the IOGP for their consideration. Spirit Energy is following through with its recommendation and will be contacting the aircraft operators regarding the close proximity of the wind turbines to the production platforms. Spirit Energy has drafted a set of questions to be sent to be to helicopter operators, which are not yet agreed by the Applicant. The aim will be to determine: • If there are any operation restrictions operating to the Chiswick and the Grove platforms based on current aircraft operator SOPs and if so what are they; • Is there potential to revise the aircraft operator SOPs and could these revisions be adopted by all North Sea helicopter operators; • If the SOPs are revised and changes implemented across the industry would there still be operational restrictions operating to the Chiswick and the Grove platforms and if so what are they. In the light of discussions with the Applicant and as noted in the answers to Questions Q2.5.14 and Q2.5.16 above, Spirit Energy has revised its assessment of the number of days per year that helicopters would be able to access Grove and Chiswick taking into account: i. VFR minima as given in Table 1 ii. Availability of day and night flying now that lighting has been installed on both NUIs. iii. Current standard operating procedures	Applicant supports this initiative in order to facilitate co-existence between the wind and oil and gas sectors. The Applicant submits however that any such forum is not applicable to the Hornsea Three Examination. The Applicant fundamentally disagrees with the number of days that Spirit have stated that they will be able to continue to access the Chiswick and Grove platforms. The number of days will be different for each NUI (Grove is 0.9 nm further away from Hornsea Three). The number is based on incorrect criteria (see the Applicants response at Q2.5.14 in this submission). Spirit Energy have not, in any part of their response, taken into consideration that in addition to unrestricted flight in VMC, there are alternative approaches such as En Route descents and Shuttle flights which can continue to be flown to the NUIs and must be taken into consideration in any discussion and calculation on the overall effect on Spirit Energy operated platforms.

		This leads to the conclusion that currently it is possible to fly personnel to the NUIs and collect them 9 hours later on 150 days per year. With the windfarm in place, this number would reduce to 24 days per year. • A significant reduction in the ability to transport personnel by helicopter to and from Grove as required by operational needs may lead to a premature cessation of production and thus a failure to maximise economic recovery from the field. A significant reduction in the ability to transport personnel by helicopter to and from Chiswick as required by operational needs will reduce revenues from productionand increase unit costs thus reducing margins and negatively impacting Spirit Energy's financial performance. Such a reduction would not be consistent with coexistence, a principle that Spirit Energy is firmly committed to. It would also prejudice Spirit Energy's ability to comply with its obligations under the MER UK Strategy. As is discussed in the Introduction, policy EN-3 is clear that an applicant should minimise negative impacts to offshore infrastructure and activities to ALARP, and that site selection and design should be made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety. This is consistent with the principle of co-existence, and is intended to ensure that the burden of "adapting" does not fall wholly or to an undue extent on existing operators. Applying EN-3 to the matters discussed in this answer, it would be contrary to policy to expect Spirit Energy to bear the burden of the flight restrictions without looking to matters of siting and design of the proposed windfarm (as Spirit Energy is seeking to do in the process of refining their proposed protective measures). As noted in response to Q2.5.16, the greater possibility of not being able to collect personnel working on the NUIs at the end of their work shift would expose personnel to additional risk and would therefore not be consistent with keeping such risks ALARP.	

Q2.5.18 Spirit Energy	Your written representation [REP1-041] refers to well-developed plans for 2 subsea wells 2nm west of Chiswick platform. At ISH1 the Applicant stated that it was not aware of these plans before Deadline 1 (7 November 2018). Please set out a timeline for these proposals including necessary surveys, consents, investment decisions, design development, procurement and construction. What information is there in the public domain which provides evidence of your progress towards realising these proposals?	A detailed timeline for proposal C6 is contained within the Appendix to this document. By way of commentary, the spreadsheet shows that information, including in relation to the opportunities known as C5, C6 and C7 was presented to the Oil and Gas Authority in 2014, 2015 and 2016. Opportunity C6 is currently being evaluated by Spirit Energy. That evaluation is dependent upon the results of ongoing drilling operations at C5. Accordingly C6 will not progress to Spirit Energy's "Define" phase until the C5 results have been evaluated and reviewed. It is anticipated that, subject to that review, C6 would progress to the Define phase in Q4 2019. During the Define phase, details of the well are designed. Subject to the outcome of each phase, it is anticipated that C6 would progress to Final Investment decision in Q4 2020 with Authority for Expenditure being given in Q4 2021. It is anticipated that drilling would commence in Q4 2021/ Q1 2022. Opportunity C7 is dependent on the results of the drilling operations at C6. If the results from C6 become available in 2021, it is anticipated that drilling at C7 would not commence until 2025, subject to the outcomes of the various phases set out in the spreadsheet. Apart from the submissions made to PINS in connection with the Project, Spirit Energy has not released information into the public domain concerning its future drilling plans on Chiswick beyond the C5 well (refer to January 2018 press release included as Document 7, Full Written Representation). The January 2018 press release includes a statement that "Spirit Energy Limited is a leading independent oil and gas operator in Europe, with 2017 production of around 50mmboe, and 2P reserves of 409mmboe and 2C resources of 216mmboe as at the end of 2016." The 2P reserves of 409mmboe	Please refer to the Applicants response to the ExA Q2.5.18 submitted at Deadline 4 (REP4-012). The Applicant notes the timeline provided by Spirit for the proposed C6 and C7 wells. The Applicant does not consider the proposed timeline is in the spirit of co-existence as it seeks to curtail development and sterilise an area of sea bed, where this could be avoided. The Applicant has provided an offer to Spirit Energy of a buffer around the proposed C6 and C7 wells (see the Applicants response to Section 1 of ExA Second Written Questions Submitted at Deadline 4 (REP4-012)). This will enable the Applicant to be able to design the final layout with certainty and would provide Spirit Energy with access for their drilling activities. The Applicant considers that if the need for C6 and C7 is material, and if Spirit are considerate of the need to meet their obligations under the MER UK Strategy, these well programmes should be brought forward. The Applicant considers it reasonable that an accelerated programme is proposed by Spirit Energy and that this accords with MER policy and the principles of coexistence. Such policy does not enable Spirit Energy to progress plans in its own time, regardless of other offshore development proposals. Coexistence requires reasonable adjustments to development programmes. It is not reasonable or the requirement of policy that an area of seabed should be sterilised from offshore wind development indefinitely whilst an oil and gas operator develops its plans. The NPS set out an urgent need for energy, including offshore renewable energy, and that cannot be undermined by undefined oil and gas proposals. In terms of commercially sensitive information, both the ExA and SoS will be aware of the need for transparency and openness in the NSIP process under the PA08. Any and all evidence Spirit Energy wishes the ExA and SoS to have regard to must be submitted to the examination.

		and 2C resources of 216mmboe are numbers taken from the company's (confidential) internal year-end reserves statement which documents in some detail how these figures have been arrived at. The 2C resource of 216mmboe includes a contribution from C6 and this is set out in the document. Some industry analysts, such as Woodmac, have recognised the potential for further exploration in the vicinity. It is not normal practice for proposals for any well to be in the public domain and where a well is considered particularly commercially sensitive (for example the results of the well may make it desirable to secure additional acreage with similar opportunities and so it would not make commercial sense to provide potential competitors for that acreage with this information), no public domain information is available until some time after completion of drilling and analysis of results. Proposals have (confidentially) been presented to the Oil & Gas Authority (OGA) at various stages (as shown on the above timeline). The Secretary of State will therefore be in a position to verify Spirit Energy's statements concerning its future plans for drilling the two subsea wells C6 and C7.	The Applicant remains of the view that the proposed wellheads at C6 & C7 are highly speculative and limited, if any, weight should be attributed to them. Even so, the Applicant has put forward a solution to this regard that would allow buffers around those locations provided that steps are taken by Spirit Energy to firm up its proposals in good time and before the detailed design of Hornsea Three is completed. That provides Spirit Energy with over two years to advance its proposals. The Applicant submits that is more than reasonable in the circumstances.

Q2.5.19 Spirit Energy	Your suggested protective provisions [REP1-032] include an exclusion zone of 2nm and a further exclusion zone of 7.5nm (subject to consultation). Do these suggested provisions seek to preserve the ability to make instrument flight approaches to all of your assets at all times? Is it your intention to preclude all WTG within the 7.5nm zone or to ensure that they are restricted in height?	As outlined in answer to Q2.5.17 any significant reduction in the number of days flights can be conducted should be avoided where possible. The proposed protective provisions are based upon: o preserving the same aviation access as currently available; o ensuring that vessel access, although restricted, can be managed safely and with the ability to meet operational requirements; and o ensuring the same level of early warning of potential vessel allision as currently exists. As indicated in Spirit Energy's written representation (see ISH 1 Submission, Appendix ZB - Spirit Energy's Proposed Protective Provisions), there may be some flexibility to accept limited restrictions to helicopter operations where it can be shown that these conditions would rarely occur. For example, although J6-A is 6.9nm from the eastern edge of the proposed array, there would only be a small sector of wind directions under which a straight line 7.5nm ARA could not be executed and thus Spirit Energy has been happy to accept that there would not be a material impact on helicopter flights to and from J6-A. The 7.5nm zone is based upon the worst case assumption of a turbine height of 325m and is a zone within which there should be no such turbines. Should the Applicant install smaller turbines towards the eastern boundary of the array then, as indicated in Spirit Energy's written representation, the radius of the zone could be reduced. For example, for 250m high turbines, the zone with no turbines would only need to extend 6.88nm around each installation in order to allow unimpeded helicopter operations. As discussed in the Introduction, refinements to the proposed protective provisions will be lodged on behalf of Spirit Energy in due course.	Please refer to the Applicants response to the ExA Q2.5.19 submitted at Deadline 4 (REP4-012). The Applicant will wait for Spirit Energy to lodge their refined proposed protective provisions before the Applicant makes comment on this response. The Applicant welcomes Spirit Energy's submission that there may be some flexibility to accept limited restrictions to helicopter operations, the 7.5nm is based on a worst case assumption, and that there would only be a small sector of wind directions under which a straight line 7.5nm ARA could not be executed. As per the Applicant's evidence, more realistic and pragmatic assumptions demonstrate that access to platforms will not be significantly affected. That has been the Applicant's position all along – yes, there may be an effect on operations, but no it is not significant.

2.5.21 Spirit Energy	Your suggested protective provisions [REP1-032] include upgrading the current warning systems on the J6-A platform to a radar early warning system. Is the need for this suggested protective provision dependent on the Secretary of State concluding that the proposed OWF would be likely to result in a material increase in shipping in the vicinity of your assets?	If, as Spirit Energy understand would be the case, it would not be possible using the existing system to reliably detect vessels approaching through the windfarm or, in the case of Grove, coming around the southeast corner of the array within 20 minutes of their expected arrival at the platform, then a system upgrade would be required in order to protect the integrity of the platform. Such an upgrade would be required irrespective of whether the Secretary of State concludes that the proposed OWF would be likely to result in any increase (material or otherwise) in shipping in the vicinity of Spirit Energy's assets.	The Applicant wishes to set out the issues that are being addressed in this response. A radar early warning system (REWS) is primarily used to detect and track vessels navigating within the vicinity of offshore oil and gas assets and provide collision warning when vessels are in breach of defined Closest Point of Approach (CPA) and Time to Closest Point of Approach (TCPA) parameters. There is the potential for Hornsea Three to have an effect on the radar on the J6A platform however due to conflicting information in this regard there is insufficient information to make this assessment at this submission (see below and the Applicant's response to the ExA Q2.5.21 submitted at Deadline 4 (REP4-012)). Once more information is known about this radar, consideration must then be given to how this radar operates with the other systems in use on the J6A platform (i.e. the AIS and RACON as previously assessed by the Applicant, see the Applicant's response at Deadline 1; REP1-117) in order to understand the overall effect on the anti-collision safety systems in use on the J6A, Chiswick and Grove platforms. The number of CPA and TCPA alarms that are triggered is dependent on the level of vessels within the vicinity of the platforms. It is the Applicant's position that there will be fewer vessels in the vicinity of the Spirit Energy platforms due to the vessel rerouting as a result of Hornsea Three, and so fewer CPA and TCPA alarms will be triggered (see below). The Applicant has received conflicting information in regard to the radar system used on the J6A platform (see the Applicants response to section 6.4 of Sprit Energy's Written response at the Applicants comments on written representations and responses submitted at Deadline 4 (REP4-011)).

			The Applicant submitted an assessment of a Radar Early Warning System (REWS) located on the J6A platform (Volume 5, Annex 11.1: Radar Early Warning System Technical Report of the Environmental Statement; APP-119). However, the Applicant was then advised by Spirit Energy (email of April 2018) that there was in fact no REWS on the J6A platform and that there was a RACON and AIS system on the platform. Further information was provided by Spirit Energy (July 2018) which included the specifications of the equipment on board the J6A platform and a document regarding ship collision. The equipment specifications only included the RACON system and no additional radar or ARPA definitions. The ship collision study advised that the J6A platform had an ARPA provided by DECCA, which is a display and data processing technology. No specifications of radar were provided however it stated that the ARPA alarm range was limited to 4 nm, and so not within the range of potential effect from Hornsea Three. The Applicant conducted an additional assessment on the RACON and AIS system which was submitted at Deadline 1 (REP1-117). The Applicant notes that Spirit Energy submitted new information at Deadline 3 (section 9.2 of Appendix ZG of Spirit Energy submission at Deadline 3; REP3-063). The Applicant has progressed a comparison of this model and operational coverage with that of the REWS originally assessed in Volume 5, Annex 11.1: Radar Early Warning Technical Report of the Environmental Statement. The specifications of the radar are very similar to those originally assessed as shown below.

Modelling parameter	Modelled REWS	J6A Radar
Gain	30 dB	31 dB
Transmitter Power	25 kW	10 or 25 kW
Frequency	9.411 GHz	9.411 GHz
Pulse Width	250 ns	250 ns
Rotation Rate	25 RPM	28 RPM
Pulse Repletion Frequency	2.0 KHz	1.8 or 3.0 KHz
Noise Figure	5.5 dB	5.0 dB
Dissipative Losses	1.0 dB	-
Beam-shape Losses	0.6 dB	-
Azimuth beam width	0.7° (nominal)	1° (maximum)
Elevation beam width	23.0°	24.0°
Antenna Height	50 m (AMSL)	Approx 44m

The Applicant advises that whilst they are making progress in understanding the system being used, uncertainty remains in regard to its operational use. The information provided by Spirit Energy in July 2018, as advised above, stated the radar coverage

			was to 4 nm and more recent email correspondence with Spirit Energy advises this is 24 nm. The Applicant therefore wishes to verify, with greater certainty, the radar system in use. Upon verification of the radar, the Applicant will submit an updated position on the effect of Hornsea Three on the radar system on the J6A platform. This process has been initiated by submitting a request to Spirit Energy in this regard. It is the intention of the Applicant to be able to provide an updated position to the ExA as soon as possible The Applicant has not assessed the effect of Hornsea Three on the CPA and TCPA alarms to the Spirit Energy platforms as it is the Applicant's position that there will be fewer vessels passing within proximity of the Spirit Energy assets due to the rerouting of vessels around Hornsea Three (see paragraph 7.4.1.2 of volume 5, Annex 11.1 Radar Early Warning Systems Technical Report of the ES (APP-119)). The Applicant advises however that, upon reaching agreement with Spirit Energy on the rerouting of vessels due to Hornsea Three, the Applicant will then also be in a position to provide an assessment on the effect of Hornsea Three on the CPA and TCPA alarms. This assessment proposed will be carried out as per that presented for the ConocoPhillips operated platforms presented in Section 6, Volume 5, Annex 11.1: Radar Early Warning Technical Report of the Environmental Statement (APP-119). The assessment will consider the number of alarms that are currently raised by passing vessels, with the number of alarms that will potentially be raised due to the rerouting of vessels as an effect of Hornsea Three.

1.6 Written Question 2.6 Commercial fishing

PINS Ref. No.	Question is addressed to:	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
Q2.6.1	Applicant, National Federation of Fishermen's Organisations (NFFO)	Your Statement of Common Ground [REP1-220] notes that the ES approach to cumulative effect assessment is under discussion. Please provide an update on those discussions.	The cumulative effects assessment issues remain under discussion and will be updated via the Statement of Common Ground which we expect will be submitted in time for deadline 5.	The Applicant concurs with the NFFO's response; agreement on the updated SOCG was reached during a call between the parties on the 22nd January. Unfortunately, a signed version was not ready in time for deadline 5, but will be submitted at deadline 6.
Q2.6.3	Applicant, NFFO	Please provide an update on the way in which the mitigation of risks to fishing vessels from exposed cables would be secured in the dDCO.	We understand that Orsted will provide an updated outline Fisheries Coexistence and Liaison plan and that will among other amendments include clarification that exposed cables will be reported. Whilst we welcome the clarification, we maintain that the matter should be explicitly secured via the DCO/DML as detailed in our response to deadline 3.	The Applicant has provided an updated FCLP to the NFFO which includes specific reference to notify fishers of exposed cables. It is the Applicant's opinion that the need for a specific dML condition to notify exposed cables is not required as this is now sufficiently captured in the newest amendments to the FCLP.

1.7 Written Question 2.7 Landscape, seascape and visual impacts

PINS Ref. No.	Question is addressed to:	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
2.7.3	SNC	The design parameters of the onshore HVDC converter/HVAC substation set out in table 3.63 of the ES [APP-058] include a proposed maximum height of 25m. The maximum height of the	SNC continues to maintain that the maximum height of 25m and its impacts cannot be mitigated against by planting/landscaping. Therefore, to answer the question SNC does not consider that the ExA can	The Applicant would note that in addition to the landscape planting, impacts on the setting of heritage assets would also be mitigated through design.

		onshore booster station set out in table 3.62 of the ES [APP- 058] would be 12.5m. From the information provided by the Applicant, what confidence can the ExA have that the proposed woodland planting would reach a height where it would achieve the levels of mitigation required in relation to both landscape/visual impacts and the impacts upon the setting of heritage assets? Based on the minimum size of trees to be planted (set out in Appendix A of the first iteration of the Outline Landscape Management Plan [APP -181] for the HVDC converter/HVAC substation), the Applicant is requested to provide evidence of the expected rate of growth that would be achieved throughout the anticipated lifetime of the development for the woodland planting areas.	have confidence that the proposed woodland planting would reach a sufficient height to achieve the levels of mitigation that would be required in terms of the landscape/visual impacts or the impacts on the setting of Keswick Hall.	Design objectives and principles for the buildings of the onshore HVDC converter/HVAC substation are set out in Appendix 5 of the Applicant's submission at Deadline 4. These principles will be applied during detailed design to mitigate potential landscape, visual and heritage impacts. In accordance with Requirement 7 of the draft DCO (REP4-004) details including the layout, scale, finished ground levels, external appearance, materials, access and circulation areas at the HVDC converter/HVAC substation, which must be substantially in accordance with the Design Objectives and Principles, will be submitted to the relevant planning authority for approval prior to commencement of construction. As set out in the Statement of Common Ground with SNC (REP4-020), it has been agreed that any harm caused to Keswick Hall, its setting, and other designated heritage assets would be less than substantial. In accordance with paragraph 5.8.15 of NPS EN-1, the Applicant considers that the public benefits of Hornsea Three outweigh the less than substantial harm that may be caused to Keswick Hall.
	NNDC		NNDC have previously set out in its Local Impact Report [REP1-062] and Statement of Common Ground [REP2-011] that it supports the principle of early implementation of sections of mitigation planting in relation to the booster station. NNDC also set out that it would like to see more evergreen species added into the mix, e.g. include trees such as Holm Oak and Scots Pine and a percentage of Holly into the Woodland Edge mix. NNDC also commented that the proposed Woodland Edge planting around the booster station should be planted at a higher density than 1m centres to create	The Applicant notes NNDC support for the early planting at the onshore HVAC booster station, and would refer to the Applicant's response to the Local Impact Report (REP2-008) which states that further details of the mitigation planting, including species selection and planting densities will be provided in the final LMP to be developed in consultation with the relevant local authorities' post-consent (Requirement 8 of the draft DCO). As part of the discussions with the relevant planning authorities, consideration will be given to the suitability of higher densities of 50 cm centres. In respect to the request for a 10-year replacement requirement for new planting, the Applicant would refer to

			denser cover more quickly. 50cm centres would be more appropriate. Whilst NNDC have made reference to generally slower growth rates in North Norfolk and has requested a 10-year replacement requirement for new planting, subject to the above and NNDC being party to approval of the final LMP, it is considered that the landscape impact of the booster station would, on balance, be acceptable. In any event it would not be required if HVDC transmission is utilised.	its comments on NNDC's Deadline 3 submission (REP4-011).

1.8 Written Question 2.8 Historic environment

No Applicant response required.

1.9 Written Question 2.9 Land use and recreation

No Applicant response required.

1.10 Written Question 2.10 Socio-economic

No Applicant response required.

1.11 Written Question 2.11 Transport and highway safety

No Applicant response required.

1.12 Written Question 2.12 Living conditions for local residents

No Applicant response required.

1.13 Written Question 2.13 Content of the DCO

PINS Ref. No.	Question is addressed to:	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
2.13.8	NNDC	Your submission for Deadline 3 [REP3-103] includes a hyperlink to evidence in support of your argument that the maintenance period specified in Requirement 9 (implementation and maintenance of landscaping) should be 10 years. Please provide evidence which does not rely on a hyperlink.	Unfortunately, due to the nature of the document, it is not possible to provide a non web-based version. The ExA is advised to refer to the Forest Research section of the Forestry Commission website and to utilise the Ecological Site Classification Decision Support System. This is a map-based system which factors in climatic data and soil type to advise which species are suitable for a given location along with the likely yield class as an indicator of growth rate. NNDC regularly imposes a condition requiring a 10-year plant replacement period as standard practice on developments where the soft landscape element is a key component of a successful scheme.	In respect to the request for 10 year planting replacement, the Applicant considers it appropriate to manage any new or replacement hedgerows planted for a period of 5 years beginning at the point of planting. The management period would commence at the culmination of the planting works. At the onshore HVAC booster station, the Applicant would inform the relevant planning authority (NNDC) when such planting was complete. Along the onshore cable corridor, the Applicant would inform the relevant planning authority once all replacement planting was complete within their local authority boundary. Wording will be incorporated into the Outline LMP to clarify this and submitted at Deadline 6. Based on the species and age of the woody species selected (as noted in the outline LMP, REP4-025), this would give time for a hedge to establish to a height of approximately 2m (accounting for 40-60cm high whips planted and 30cm average growth per year for the first 5 years, according to the EIA quality mark article from the Institute of Environmental Management and Assessment, REP4-060) which would provide full landscape mitigation. The Applicant would refer to its response to the ExA's second written questions Q2.7.3,

				which discusses plant growth rate, which is of direct relevance to this point. As the species-rich mix of hedgerow plants would be established at this point, this would also be full ecological mitigation. After 5 years, for all locations where hedges may be removed as part of Hornsea Three construction works, failure is very unlikely and the hedges will be restored back to an improved baseline status (species rich and gap filled). Any ongoing maintenance would be comparable to that existing prior to construction and therefore does not need to be secured through the DCO. This is in line with the arrangements in place for restored agricultural land – the responsibility passes back to the landowner. Notwithstanding the above, the Applicant would note that, for the woodland planting at the above ground permanent infrastructure (onshore HVDC converter/HVAC substation and onshore HVAC booster station), the Applicant has committed to replace all plants that die annually at the end of each growing season during the first five years, or when it is agreed that the woodland has established effectively and individual plant replacement is unnecessary. Thus, although the Applicant maintains that failures after the five-year period is unlikely, the provisions for the replacement of any failed plants may extend to the requested ten years, or beyond, at these locations. This is to maintain the level of mitigation provided by the woodland planting at the onshore HVDC converter/HVAC substation, and onshore HVAC booster station. The Applicant has made the following amendments to the Outline LMP, to be submitted before the end of Examination, to clarify the position in respect to maintenance of landscaping associated with the permanent above ground infrastructure (onshore HVDC converter/HVAC substation, and onshore

				HVAC booster station), as well as the onshore cable corridor and site access – new text shown in underline. ***"5.3 Woodland and Woodland Edges*** *5.3.1.1 Woodland is a key component of the landscape proposals for the onshore HVAC booster station and onshore HVDC converter/HVAC substation. The aim of the management prescriptions is to guide the creation of a well-balanced, naturalistic woodland, with a dense and varied woodland edge and a dense canopy to provide screening. The woodland and woodland edges would be managed as described below.* *[…]* *xiv. Replace all plants that die annually at the end of each growing season during the first five years, or when it is agreed that the woodland has established effectively such that ~~and~~ individual plant replacement is unnecessary to maintain the agreed level of mitigation for the lifetime of the operation of the component."* ***"5.4 Hedges*** *5.4.1.1 New and replacement hedges along the onshore cable corridor and at site accesses, and existing hedges with gaps planted with new hedge plants and trees, will be managed as described below.* *5.4.1.2 The objective is to increase the habitat potential of the hedges, some of which may also have mature trees in them, whilst maintaining them as key features of the surrounding landscape~~, and to provide screening of Hornsea Three~~.* *[…]* *xxvii. Replace all plants that die annually at the end of each growing season during the first five years.* *xxviii. Remove stakes and ties in year 5, or when the trees are deemed firm and self-supporting.*

				xxix. If used, plant shelters and guards should be removed in year 5 or once the trees/shrubs reach a level of maturity where they can withstand browsing wildlife. *xxx. Cut hedges annually during the first five years (between September and February) to approximately 2m height, or the height of existing hedges as appropriate. The hedgerows should be managed to create a thick base with a good density of stems."*
2.13.10	NCC	Requirement 22 (local skills and employment) states that a skills and employment plan shall be submitted to the relevant planning authority for approval. A) Given that the skills and employment plan would potentially relate to a wide area comprising the East Anglia and/or Humber regions, is it appropriate for it to be considered for approval by the relevant planning authority? B) Would it be more appropriate for it to be considered by NCC in consultation with the relevant planning authorities and Local Enterprise Partnerships? C) Who would be the appropriate determining authority in the Humber region? D) As the determining authority in the Humber region may not be an Interested Party, has there been any consultation to establish whether the authority	A) The onshore infrastructure works covers a wide geographic area as set out in the DCO and the economic consequences will potentially extend well beyond the onshore cable route and the construction of the necessary substation/s. The economic benefits could potentially include much of Norfolk particularly in and around Great Yarmouth i.e. in the event that the Port facilities are used both during construction and Operations & Maintenance. On this basis it may be more appropriate for the Skills and Employment Plan to be "considered for approval" by Norfolk County Council. B) The County Council agree that it would probably be more appropriate for the Skills and Employment Plan to be "considered for approval" by NCC. The County Council along with the relevant Local Planning Authorities and the New Anglia LEP would still need to be formal consultees during the preparation of the Plan by applicant. C) This is a matter for the relevant local authorities covering this area to decide. D) This is a matter for the applicant to address. E) It is assumed that by "approval" this is referring to the approval of the Skills and Employment Plan. It is felt that the approval should be undertaken either by the relevant planning authority or the County Council (Norfolk). The following amendments to Requirement 22 are therefore sought (in red): **Local skills and employment**	The Applicant notes the points raised in A – E, as well as the proposed amendments to Requirement 22. The Applicant's response to the ExA's second written questions provided at Deadline 4 notes that Requirement 22 has been amended in the dDCO (REP4-004) so that the approving authority for the Skills and Employment Plan covering East Anglia would be NCC. Although the wording used differs from that set out by NCC, it is considered to adequately address NCC's representation. The Applicant notes that Article 37 of the draft DCO modifies the TCPA appeal provisions so that they apply to the discharge of Requirements, as they do in respect of the discharge of planning conditions. Thus, the same mechanism applies as set out in the TCPA.

		would wish to have a determining role? Are there any other means for determining an application for approval under this requirement?	**22.**(1) Prior to commencement a skills and employment plan shall be prepared in relation to the authorised development and submitted to (delete "the") Norfolk County Council (delete "relevant planning authority") for approval. *NB the County Council would not object if part (1) of the requirement continued to refer to the relevant planning authority for approval.* (2) The skills and employment plan shall be prepared by the applicant in consultation with Norfolk County Council (NCC), the relevant local planning authorities, New Anglia Local Enterprise Partnership and the Humber Local Enterprise Partnership, or such other body as may be approved by NCC (delete "the relevant planning authority.") *NB the County Council would not object if part (2) of the requirement continued to refer to the relevant planning authority for approval.* (3) The skills and employment plan shall identify opportunities for individuals and businesses based in the regions of East Anglia and the Humber to access employment opportunities associated with the construction, operation and maintenance of the authorised development. (4) The skills and employment plan shall be implemented as approved. Notwithstanding the above comments, the County Council feels that there needs to be some clarification in the "requirement" as to what would happen in the event that approval is not given to the Skills and Employment Plan (whether by NCC or the relevant planning authority) i.e. it is felt that there ought to be some sort of independent arbitration process built into the "requirement".	
Q2.13.7	Applicant	The Applicant has agreed to include Historic England as a consultee for Requirement 8 (provision of landscaping). Please	We note that this question is directed to the applicant, and we welcome further involvement in the preparation of the OLMP.	Acknowledged.

		review the outline Landscape Management Plan with a view to ensuring that it captures any objectives which relate to mitigating impacts on heritage assets.		
2.13.12	Historic England	In Part 1 should the definition "statutory historic body" refer to the Historic Buildings and Monuments Commission for England (rather than Historic England)?	We note that this question is directed to the applicant, but it is relevant in this instance that we clarify how our official title under the National Heritage Act 1983 is the Historic Buildings and Monuments Commission for England, and therefore this name should be used in all legal documents, such as the draft Development Consent Order.	The Applicant confirms that amendments were made to the draft DCO submitted at Deadline 4 (REP4-004) such that all references are to the Historic Buildings and Monuments Commission for England.
2.13.19	Historic England	Hist E has suggested [REP3-102] an additional paragraph (vii) in Condition 13(1)(d) relating to spatial data for Archaeological Exclusion Zones and application of a Protocol for Archaeological Discoveries. Condition 13(2)(h) relates to a protocol for reporting archaeological discoveries. Would the wording suggested by Hist E result in duplication? Would the submission of spatial data relating to the Archaeological Exclusion Zones be covered by Condition 13(2)(d)? Are any amendments to Condition 13(2) needed to ensure that submission of spatial data is secured?	Our recommendation in regards to additional text as provided within our further written representation [REP3-102] relates to the need for archaeological considerations to be included within a project management and monitoring plan, as referenced within the DCO. This is to provide clarity for post-consent project staff and any contractors (and/or subcontractors), to ensure that official project documentation, produced as a condition of consent, includes all necessary requirements to avoid, minimise and mitigate impacts to the marine historic environment, by creating stronger links between documents. The inclusion of these provisions within the project management and monitoring plan should ensure that a single document references all consent requirements and therefore prompt referral to an archaeological WSI (to be produced post-consent in reference to the outline WSI provided within the Application) for further detail. As such, we do not have any amendments to Condition 13(2) to suggest at this time, as we recommend the addition to Condition 13(1)(d) in its place. Furthermore, we wish to highlight the disparity between the reference within the DCO to a project management and monitoring plan within Condition 13(1), and the submission, as a part of the applicant for consent, of an "In Principle Monitoring Plan" by the Applicant. We	In response to the query raised by HE, the Applicant would like make clear the role of the In-Principle Monitoring Plan (IPMP) and the commitment to the "project management and monitoring plan" as cited within the dMLs. The IPMP is a certified document produced during the pre-consenting phase by an Applicant in consultation with relevant stakeholders and the MMO to set out and agree the form and function of any environmental monitoring to be undertaken by the Project following consent award. The intention of the document is for it to serve as a reference point when drafting the formal monitoring plans (required under Conditions 17, 18 and 19 of the Generation Assets dML and 18, 19 and 20 of the Transmission Assets dML (see REP4-004)) at the appropriate juncture prior to commencement of works, thus ensuring a more efficient approval process for these plans. The IPMP does not act as a live document that is updated or re-submitted following completion of the examination. It should be noted that the Applicant included (at conditions 17/18(2)(e) and 19/20(2)(f) of the generation assets and transmission assets dMLs respectively) a commitment to monitoring of AEZs and therefore, a plan for this monitoring will be submitted to the MMO (in consultation with HE) for approval prior to the commencement of works. The monitoring within

			recommend that a clear explanation is provided if two separate plans are to be produced to prevent any further.	this plan will be informed by the final version of the IPMP as a starting point. The project management and monitoring plan is one of the formal submissions required under the suite of pre-commencement documents named under Condition 13 (generation assets) and 14 (transmission assets) of the dMLs. This submission will comprise a number of plans, management documents & procedures and also the provision of archaeology information, as included at condition 13 (Generation Assets dML) and 14(d) (Transmission Assets dML). The management and monitoring plan does not relate to the monitoring set out under Conditions 17-19 (Generation Assets dML) and 18-20 (Transmission Assets dML) (nor therefore the IPMP).
2.13.26	Historic England	Given that cable installation may require foreshore excavation, should Condition 14(2)(f) include reference to the Relevant Local Authority?	We appreciate that this question is directed to the Applicant, but we offer the advice that for any part of the Development Order area that falls within the jurisdiction of a terrestrial planning authority, that reference is made to the Relevant Local Authority.	The Applicant has amended Condition 14(2)(f) of the Transmission Assets dML in the draft DCO submitted at Deadline 4 (REP4-004) to include reference to the relevant local authority.

1.14 Written Question 2.14 Compulsory Acquisition

No Applicant response required.

1.15 Written Question 2.15 General

PINS Ref. No.	Question is addressed to:	ExA Question	Interested Parties (IP) Response at D4	Applicant's Comments on IPs Response
2.15.5	Historic England	The Applicant has submitted a revised Outline Code of Construction Practice (CoCP) [REP1-142]. Are there any further revisions or additions that you consider should be made to this document? If there are, please provide justification for this and suggest any new/amended wording that may be required.	We note that this question is directed to the applicant, Nature England, and relevant Local Planning Authorities, but we recognise that this topic has relevance to our interests. Historic England requests that the Outline Code of Construction Practice includes reference to the importance and significance of the Historic Environment, the need for mitigation and specific reference to the onshore and offshore WSI.	The Applicant would refer to section 6.6 of the Outline CoCP (REP4-023), which sets out the objective to minimise the impact of construction works on buried archaeology, heritage assets and their settings. Specific reference to the Written Scheme of Investigation (WSI) is included within paragraph 6.6.1.3. The Applicant also refers to Requirement 16 of the dDCO and conditions 13(2) and 14(2) of the deemed marine licences which require a WSI to be submitted and approved prior to the commencement of construction/licensed activities.
	NNDC		NNDC welcomes revisions made to the Outline Code of Construction Practice (CoCP) but has identified three areas of the document where further discussion or amendment may be required as follows: Para 4.1.1.5 – the running of support generators or emergency backup supplies. NNDC consider that the applicant should provide details of the equipment and noise control measures for this aspect of continuous working so that there is clarity from the outset. Para 4.1.1.1 / Para 6.1.1.5 – NNDC would welcome further discussion with the applicant about HGV waiting areas outside of designated arrival times / working hours to ensure there is no adverse noise impacts from waiting vehicles in the vicinity of work areas near noise sensitive receptors.	In respect to NNDC's point on paragraph 4.1.1.5, the Applicant would refer to section 6.2 of the Outline CoCP (REP4-023), which sets out the management measures to control and limit noise and vibration levels, so far as is reasonably practicable, to minimise disturbance to sensitive receptors. Text included in the final bullet point of paragraph 6.2.1.3 sets out specific measures where the use of generators is proposed. In respect to NNDC's point on paragraph 4.1.1.1 and 6.1.1.5, the Applicant would refer to paragraph 2.1.4,1 of the Outline CTMP (REP4-024) which states that "All HGV movements which are not planned to arrive at site after any time restrictions would be required to park at an

				appropriate Approved Lorry Park, Motorway Services and other designated overnight parking locations." This is considered to be an appropriate control measure to avoid noise impacts from vehicles waiting in the vicinity of work areas.
2.15.6	NNDC	The Outline CoCP [REP1-142] includes several matters where agreement is required between the Applicant and other parties. For example, paragraph 4.1.1.6 requires that certain activities may take place on a continuous working basis subject to obtaining agreement with the relevant local authority Environmental Health Officer. Should details be provided within the Outline CoCP of what the procedure and timescales should be for the matters where such agreements are required?	NNDC understands that it is the intention of the applicant to submit details for prior notifications under the Control of Pollution Act 1974. For day to day activities this process may be appropriate. However, for more complex matters and those involving continuous working which may be expected to have a greater impact on the community, this may take longer than afforded under the Act. Additional consultation time would be requested and 56 days is suggested by NNDC as a reasonable timeframe within which to undertake this task.	The Applicant considers that suitable mechanisms exist under extant legislation, such that specific procedures and timescales for Hornsea Three are not required. Examples of such legislation are the Control of Pollution Act 1974 and Highways Act 1980 as set out in the Applicant's response to the ExA's second written questions Q2.15.6 at Deadline 4. The Applicant has updated paragraph 4.1.1.6 of the CoCP (REP4-023) to clarify that details of how noise is to be managed on-site, predicted noise levels at sensitive receptors (if applicable), total length of period over which continuous works are requested for and the anticipated length of time any noise generating equipment is to be used to be submitted with any request for approval. The activities proposed within paragraph 4.1.1.6 are not considered to be of a complexity or to have such an impact on the community which would warrant the need for an extended consultation period. Whilst it is accepted that there may be a number of applications for consent, many of the applications will be for works of a similar nature. The Applicant refers to is response to Q2.12.7
	SNC		SNC agrees that details should be provided within the Outline CoCP to give us certainty particular in terms of time scales.	

				(REP4-012) which sets out further details of the anticipated activities and duration.