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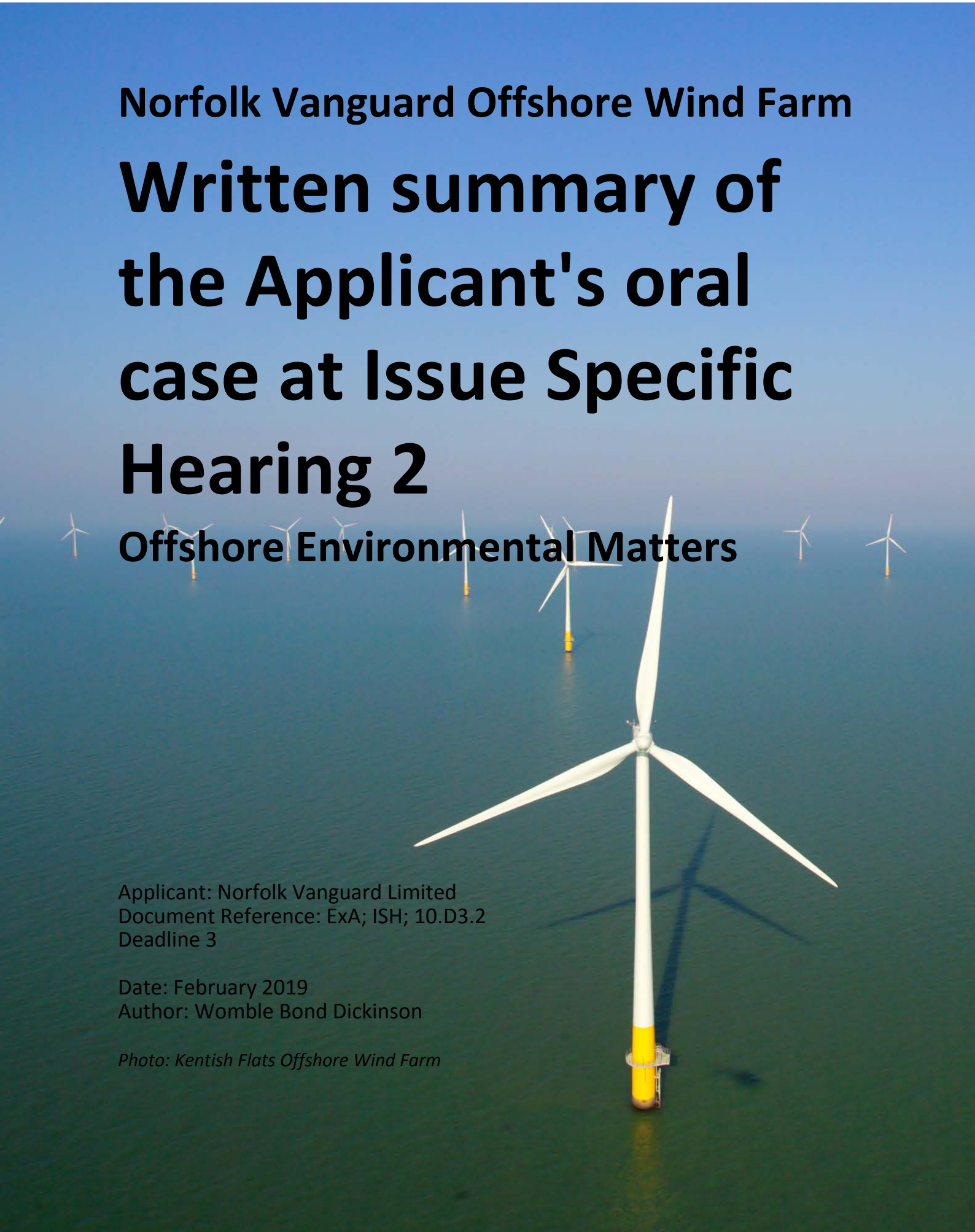
Norfolk Vanguard Offshore Wind Farm

Written summary of the Applicant's oral case at Issue Specific Hearing 2

Offshore Environmental Matters



Applicant: Norfolk Vanguard Limited
Document Reference: ExA; ISH; 10.D3.2
Deadline 3

Date: February 2019
Author: Womble Bond Dickinson

Photo: Kentish Flats Offshore Wind Farm

Glossary

ADD	Acoustic Deterrent Device
AEOI	Adverse Effect on Integrity
CRM	Collision Risk Modelling
DCO	Development Consent Order
DML	Deemed Marine Licence
EA3	East Anglia THREE
EPP	Evidence Plan Process
ES	Environmental Statement
ESCA	European Subsea Cables Association
ExA	Examining Authority
FLCP	Fisheries Liaison and Co-Existence Plan
FLO	Fisheries Liaison Officer
HHW	Haisborough, Hammond and Winterton
HRA	Habitats Regulations Assessment
IFCA	Inshore Fisheries Conservation Association
IPMP	In Principle Monitoring Plan
ISH	Issue Specific Hearing
MCA	Maritime and Coastguard Agency
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MPA	Marine Protected Area
MSS	Marine Scotland Science
NE	Natural England
NFFO	National Federation of Fishermen's Organisation
OREI	Offshore Renewable Energy Infrastructure
OWF	Offshore Wind Farm
RHDHV	Royal HaskoningDHV
RoC	Review of Consents
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SIP	Site Integrity Plan
SNCB	Statutory Nature Conservation Body
SoCG	Statement of Common Ground
TWT	The Wildlife Trusts
UKHO	United Kingdom Hydrographic Office
VMS	Vessel Monitoring System
WDC	Whale and Dolphin Conservation

1. Introduction

1.1 Issue Specific Hearing 2 (**ISH**) on offshore environmental matters took place on 6 February 2019 at 10:00am at Blackfriars Hall, The Halls, St Andrew's Plain, Norwich, NR3 1AU.

1.2 A list of participants that engaged in the ISH on behalf of the Applicant can be located at Appendix 2 of this note.

1.3 The broad approach to the ISH followed the form of the agenda published by the Examining Authority (the **ExA**) on 29 January 2019 (the **Agenda**).

1.4 The ExA, the Applicant, and the stakeholders discussed the agenda items in turn which broadly covered the areas outlined below.

ExA Question / Context for discussion	**Applicant's Response**
AGENDA ITEM 2 (Preliminary Matters)	
The ExA confirmed that Natural England (**NE**) could not attend the ISH. The ExA also stated that they did not yet have confirmation of whether NE could attend the relevant hearings at the end of March and/or April.	The Applicant expressed some concern in relation to NE's non-attendance at the hearings, given NE's important role as the Government's statutory advisor on matters concerning nature conservation. Whilst the Applicant confirmed its commitment to engaging with NE to progress matters, the Applicant noted that attendance at hearings was a necessary part of this engagement that enables direct discussions between the parties in the presence of the ExA. The Applicant feels that this would assist the ExA to clarify NE's position on outstanding matters, which would enable the ExA to refine the focus of their further written questions. It would also enable the Applicant to further understand any rationale and justification for NE's approach, which could then be addressed by the Applicant in order to progress to a swift resolution on outstanding matters where possible.
AGENDA ITEM 3 (Offshore ornithology and benthic ecology)	
The ExA asked the Applicant for a brief update with discussions on offshore ornithology.	The Applicant has been engaging in a constructive dialogue with NE and the Royal Society for the Protection of Birds (**RSPB**) for a period of almost three years (dating back to March 2016). These discussions are ongoing with the most recent exchange with NE by means of a conference call on 23 January 2019. Since the application for Norfolk Vanguard was submitted (in June 2018), and following submission of NE's and the RSPB's Relevant Representations, discussions have been focused primarily on resolving methodological issues. In particular, this has concentrated on the determination of the appropriate parameter values to use in the modelling in order to provide a clear presentation of the underlying uncertainties in the data. The Applicant is keen to reach resolution on these matters in order for a common currency on impact magnitudes to be reached which reflects the final position of the Applicant, NE and the RSPB. Notwithstanding this, the Applicant considers that the

	methods used to date are appropriate, that the impact assessment results are robust and that the conclusions of no significant ornithological impacts due to the project alone or cumulatively remain valid. In relation to the key specific concerns that have been raised, these are primarily in relation to collision risk modelling (**CRM**) and displacement. With respect to CRM, during the Evidence Plan Process NE requested that separate tables of results should be presented that included those obtained using upper and lower confidence intervals for several model input parameters. This was requested to provide a measure for how uncertainty in those parameters affected the collision predictions. The Applicant proposed that the assessment would be simplified if the uncertainty in these parameters was incorporated simultaneously by running the Band (2012) CRM as a simulation. This involves running the CRM multiple times, with input parameter values for each parameter drawn at random from appropriate probability distributions for each run of the model. The distribution of results obtained, which capture all the uncertainties in the data, can then be considered. This work pre-empted the development of a Marine Scotland Science (**MSS**) commissioned project to produce a stochastic version of the Band CRM, and therefore was considered to be appropriate given the expected advice from statutory agencies that such simulation methods should be used. It should be noted that the MSS commissioned model only became available very shortly (c. two weeks) before the Norfolk Vanguard application was submitted in June 2018. However, the Applicant still considered that presenting stochastic CRM outputs was appropriate. A key aspect of the Applicant's work to run the Band CRM as a simulation was to ensure the model calculations were identical to those in the Band model, and this was tested thoroughly prior to use of the model for the assessment. In their Relevant Representations, NE and the RSPB raised the concern that the simulation model was untested, and that two peripheral CRM input parameters were omitted from the assessment, which prevented NE and RSPB from undertaking their own comparison (although it should be noted that these missing parameters were wind farm altitude and wind farm width, which have a very minor influence on the results obtained). The Applicant responded to these comments by producing an update and clarification note on the CRM which was submitted as Appendix 3.2 to the Applicant's responses to the Examiner's first written questions (ExA; WQApp 3.2;10.D1.3). This provided considerable extra detail and model outputs in order to address the concerns that had been raised, including comparisons of the simulation model with the original Band (2012) model and also the newly available MSS commissioned model, and presentation of outputs using alternative parameter values. This demonstrated that when the same input parameters are used all the models generate the same results. A key area of disagreement for the CRM assessment relates to the most appropriate measure of central tendency used to summarise the collision mortalities, with these outputs closely related to the seabird density inputs. Given the highly skewed nature of the seabird density input data, the Applicant considers that the median density is more appropriate than the mean (which is NE and the RSPB's preferred metric) as the latter can be strongly influenced by isolated outliers in the data. The stakeholder preference for the mean appears to be on the grounds that this is the value that has been used in (deterministic) CRM for previous offshore wind farm applications. However, the Applicant has presented graphical outputs of the monthly seabird density values used in the CRM and the monthly mortality predictions obtained, and considers these provide robust support for the Applicant's position (ES Chapter

	13 Offshore Ornithology Appendix 13.1 Annex 3 and Annex 6, with further discussion on this matter provided in Appendix 3.2 to the Applicant's response to the first written questions (ExA ; WQApp 3.2;10.D1.3)). The Applicant notes that the question of how to appropriately represent uncertainty in CRM is one which has not received much attention to date since this is a new approach for presenting CRM outputs. Therefore, the Applicant considers that further discussion is needed with NE and the RSPB on these matters, with relevant experts providing input from all parties to ensure that the technical details are fully discussed and agreement is reached. The Applicant has not received any comments from NE on the CRM update note as submitted at Deadline 2 to date and has been informed that NE intends to provide comments at Deadline 3. The RSPB has provided a response to this note, much of which reiterated the same comments made in their Relevant Representation submitted at Deadline 1. However, the Applicant disagrees with the RSPB's conclusions and considers that the RSPB's comments have been addressed through the provision of further detail and additional model outputs as set out above. The other methodological aspect on which the Applicant hopes to reach agreement with NE and the RSPB relates to the potential for displacement from the wind farm. The method structure is agreed, however the species-specific displacement and mortality rates used by the Applicant have been raised as areas of disagreement by NE and the RSPB. The Applicant has used an evidence-based approach to estimating the appropriate percentages to use, based on reviews of studies conducted at other offshore wind farms and other relevant literature. Two notes providing additional assessment and clarification on the displacement assessment were submitted at Deadline 1 as Appendix 3.1 (ExA; WQApp 3.1;10.D1.3 Red-Throated Diver Displacement) and Appendix 3.3 (ExA; WQApp 3.3;10.D1.3 Auk and gannet displacement update and clarification). The Applicant is awaiting NE's response to these notes which is expected at Deadline 3. The RSPB has provided a response to these notes at Deadline 2. With respect to red-throated diver, the RSPB's response has sought to question the conclusions on the evidence reached by the Applicant and subsequently reverts to a position that the approach used by the Applicant is not sufficiently precautionary. However, the RSPB's response is brief and provides little evidence to justify the RSPB's approach or contradict the validity of the Applicant's conclusions. Therefore, the Applicant considers that the evidence provided is robust and remains an appropriate basis for assessment. With respect to displacement of guillemot, razorbill and gannet, the RSPB has not commented on the evidence provided to support the Applicant's approach, and only notes that if the assessment is conducted using their preferred (highly precautionary) rates of displacement and mortality, the outputs are of concern. However, since the RSPB provides no response to the evidence review (which further supports that the RSPB's preferred approach is highly precautionary), the Applicant considers that no further assessment is necessary and the assessment conclusions are robust. In addition to the main points discussed above, further responses and clarifications on the ornithology assessment, addressing the first written questions and the Relevant Representations from both NE and the RSPB were provided in the Applicant's responses to written questions at Deadline 1 (document reference: ExA; WQApp 3.2;10.D1.3). These responses, and the Applicant's approach throughout, reflect the underlying approach to the

	assessment adopted by the Applicant; that it is conducted to ensure that the degree of precaution in the assessment is supported by available evidence. Additional work to address outstanding aspects is underway and the Applicant will submit updates for future deadlines as appropriate. A non-seabird migrant collision risk assessment, as requested by NE in their Relevant Representation is underway and the Applicant expects to submit this at Deadline 4.
The ExA asked the Applicant for a brief update regarding discussions on benthic ecology.	The Applicant has been engaging with NE in relation to the Project since 2016. This has included a series of written exchanges to develop the Statement of Common Ground (**SoCG**) (Rep1 - SOCG - 13.1) and most recently a conference call with NE on 22 January 2019 in relation to cable protection and Annex 1 reef. In summary, the Applicant maintains that the assessments provided in the Environmental Statement (document 6.1) and the Information to Support HRA report (document 5.3) present a conservative worst case scenario and conclude that this would result in no Adverse Effect On Integrity (**AEOI**) due to the temporary and localised nature of the effects of the Project. The Applicant also maintains that the draft Development Consent Order (**DCO**) provides various safeguarding mechanisms, in particular that the following must be agreed with the Marine Management Organisation (**MMO**) prior to construction: • **Requirement and details of cable protection**: to be agreed under the Scour Protection and Cable Protection Plan (Condition 9(1)(e) of the Transmission Deemed Marine Licences (**DMLs**)); • **Cable route and micrositing**: to be agreed under the Cable Specification, Installation and Monitoring Plan (Condition 9(1)(g) of the Transmission DMLs); • **Methods for cable installation**: to be agreed under the Cable Specification, Installation and Monitoring Plan (Condition 9(1)(g) of the Transmission DMLs)); and • **Approach to sediment disposal** (if required): to be agreed under the Cable Specification, Installation and Monitoring Plan (Condition 9(1)(g) of the Transmission DMLs)). These mechanisms provide the MMO and their statutory advisors with certainty that there would be no AEOI on the Haisborough, Hammond and Winterton Special Area of Conservation (**SAC**). A fuller note of the update provided by the Applicant at ISH2 is included at Appendix 1 to this document.
AGENDA ITEM 4 (Shipping and navigation)	
The ExA, referring to the Royal Yachting Association's (**RYA**) Written Representation, questioning how any operational safety zones would be demarcated and enforced in practice.	As per the Applicant's Deadline 1 response to Question 8.1 (ExA; WQ; 10.D1.3), the Applicant is not proposing to apply for operational safety zones for any of the wind turbine foundation types. As stated in Section 4.6 of Environmental Statement (**ES**) Chapter 15 Shipping and Navigation (document reference 6.1), an application will be made for the following standard safety zones (to be submitted post consent and as detailed in the Safety Zone Statement (document reference 7.2)):

	• A 500 metre radius around individual Offshore Renewable Energy Infrastructure (**OREI**) and their foundations whilst work is being performed as indicated by the presence of construction vessels; • A 500 metre radius around all major maintenance works being undertaken around the wind turbines and their foundations; and • A 50 metre radius around individual OREI and associated foundation structures prior to wind farm commissioning. As stated in the SoCG with RYA (Rep1 - SOCG - 14.1), the Applicant may also seek 500m operational safety zones around manned accommodation platforms. As noted in the SoCG, the RYA does not generally support operational safety zones, however they do not object to their use around permanently manned accommodation platforms. No other operational safety zones are being considered once the wind farm is operational.
The ExA questioned whether the currently proposed aids to navigation are considered to be satisfactory.	As per the SoCG with the Maritime and Coastguard Agency (**MCA**) (Rep1-SOCG-30.1), the Applicant and the MCA have agreed that all lighting and marking arrangements will need to be agreed with the MCA and Trinity House in accordance with DML Conditions 10 and 11 of the Generation DMLs (Schedule 9-10) and Conditions 5 and 6 of the Transmission DMLs (Schedule 11-12). The Applicant notes that the historic process for agreeing lighting and marking specifications for an offshore wind farm in English waters, including discharge of the Generation DML Conditions 10 and 11 and Transmission DML Conditions 5 and 6, includes the development of a lighting and marking plan. The Conditions themselves do not explicitly require a lighting and marking plan document to be produced, however this has historically been the route through which developers have discharged the associated Conditions. Given the number of stakeholders involved and the guidance documents and requirements that exist for the development of lighting and marking for an offshore wind farm, it is the Applicant's opinion that the development of a lighting and marking plan should continue to be dealt with in the existing way. The lighting and marking plan will need to be maintained as a live document allowing for consultation with a number of stakeholders. Formalising this process would limit the ability to respond to consultation in a fluid manner, which is necessary in order to effectively meet guidance requirements whilst balancing the concerns of various stakeholders. It is noted, as agreed within the SoCG between the Applicant and Trinity House (Rep1-SOCG 31.1), that there are no outstanding issues (matters not agreed) pertaining to the DCO conditions with regards to lighting and marking. Condition 15(5) of the Generation DMLs and Condition 10(5) of the Transmission DMLs also require the Applicant '*so far as is applicable'* to have '*adequately addressed MCA recommendations contained within MGN543 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response Issue and its annexes'*. MGN543 and its annexes include the MCA's specific requirements for lighting and marking of structures within an offshore wind farm and, to that extent, these matters are already adequately secured.

The ExA questioned whether there is a difference, in principle and effect, between (Generation) DML Condition 16 and Condition 20.	As per the Applicant's Deadline 1 response to Question 20.94 (ExA; WQ; 10.D1.3), DML Condition 16 relates to the Applicant's requirement to submit hydrographic data to the MCA and the United Kingdom Hydrographic Office (**UKHO**) as part of their Civil Hydrographic Programme. DML Condition 20 is a separate Condition which relates to data required as part of the MMO's remit in discharging Condition 14(b) - Construction Programme and Monitoring Plan. In the interests of clarity, the Applicant feels it is therefore appropriate to separate these obligations into different Conditions; the former relates to matters concerning navigation, whereas the latter is a more detailed condition relating to the construction programme and monitoring plan and which falls within the primary jurisdiction of the MMO. The Applicant is content to submit Hydrographic surveys as per the requirements of MGN543 and its Annexes.
In reference to the SoCG with the MCA, the ExA questioned whether a Search and Rescue (**SAR**) checklist would be required post-consent and how, if at all, it would be secured in the DCO.	The Applicant does not consider it reasonable or appropriate to include a SAR checklist in the DCO. Norfolk Vanguard would be the first offshore windfarm required to comply with a Condition for the implementation of a SAR checklist as part of its DMLs. As per the Applicant's Deadline 2 response to Question 20.103 (ExA; WQR; 10.D2.3), a final SAR checklist has not yet been published by the MCA. The Applicant considers that it would be unreasonable to require it to comply with a checklist which has not been finalised or published. The version of the draft checklist that the Applicant has been sent by the MCA contains a list of mitigation measures that are designated as essential requirements (e.g. agreement on layout), but also contains mitigations measures designated as optional features (such as provision of radar). Where relevant, these items are in themselves already consent conditions such as layout, and lighting and marking. The Applicant is therefore concerned that such duplication could lead to unnecessary confusion. For example, the Applicant considers that the current process where mitigation measures are identified and agreed as part of the layout sign off process (pursuant to Condition 14(1) of the Generation DMLs and Condition 9(1) of the Transmission DMLs) is sufficient and there is no reason to formalise this through an additional Condition. The Applicant also notes the following text as per MGN543 Annex 5 (MCA, 2018): • *During pre-construction conversations with developers, the MCA will request a SAR checklist is completed. The SAR checklist is a record of discussions regarding the requirements, recommendations and considerations outlined in this document and should be agreed by the developer and MCA on a case by case basis.* • *The content of the SAR checklist will apply throughout the life-cycle of the development and will be used by the MCA to ensure actions agreed pre-construction, are correctly implemented. There are no additional requirements contained within the checklist other than a reflection of this document, or those which are agreed at the time with the developer.*

	Accordingly, it is the Applicant's position that the requirement to complete a SAR checklist is already secured through compliance with MGN543 and its annexes, noting that Condition 15(5) of the DMLs also requires the Applicant '*so far as is applicable'* to have *'adequately addressed MCA recommendations contained within MGN543 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response Issue and its annexes'*. The Applicant considers that it is more appropriate to secure a checklist by reference to MGN543, so that should any changes or updates to the checklist (or the approach) be considered appropriate in the future, these can also be captured through relevant changes and updates to MGN543. As noted in the SoCG with the MCA (Rep1-SOCG-30.1), the Applicant is content to submit a completed SAR checklist post consent. However, as per the Applicant's response to Q20.103 and noted above, there are currently some outstanding points of clarification required.
AGENDA ITEM 5 (Fisheries and fishing)	
The ExA questioned the National Federation of Fishermen's Organisation (**NFFO**) and the Applicant on the outstanding matters between the parties in relation to the assessment methodologies and project design.	The Applicant acknowledged the preference expressed by the NFFO and VisNed in relation to minimum spacing between turbines to allow fishing activity to resume during the operational phase for Norfolk Vanguard (1 km for beam trawlers and 2 km for seine netters). However, the Applicant noted as follows: 1. Floating foundations have been removed from the project design envelope and there is potential for fishing operations to be resumed within the operational wind farm. 2. The current worst case minimum spacing between wind turbine generators is 680m. The Applicant acknowledged that modifications to existing operating patterns of the fishing industry may be required due to the presence of the infrastructure. However, the Applicant's view that fishing operations can be resumed within the offshore site is supported by the NFFO and VisNed's agreement that this is possible in the SoCGs for other offshore wind farm projects in the area, including East Anglia ONE and East Anglia THREE. For East Anglia ONE, it was agreed in the SoCG with VisNed and NFFO that fishing would be able to resume in safe conditions assuming a spacing of at least 675m and a linear arrangement of turbines. Similarly, for East Anglia THREE, it was noted in the SoCG with NFFO and VisNed that Dutch fishermen would be able to fish within the turbine corridors in safe conditions for a minimum spacing of 675m within rows and 900m between rows. 3. There is currently no legislation in the UK which prevents fishing from occurring in operational wind farms. The level of activity that resumes within the operational wind farm would ultimately depend on the varying perception of risk by each individual skipper. 4. The Applicant has committed to promote co-existence with the fishing industry; this is exemplified through the outline Fisheries Liaison and Co-Existence Plan (**FLCP**) (document reference: 8.19) which was

	produced in advance of the stipulated timeframe for production and approval as a result of a request from the NFFO and VisNed (evidenced through the SoCG with NFFO/VisNed (Rep1 - SOCG - 26.1)). Further detail with regards to the approach to liaison and co-existence strategies will be provided within the final FLCP to be produced post-consent. The Applicant referred to the Applicant's comments on the Written Representations (ExA; WRR; 10.D2.2, section 2.4) in relation to the assessment of impacts on commercial fisheries as presented in ES Chapter 14 Commercial Fisheries. The Applicant explained that this follows an impact significance matrix approach taking account of receptor sensitivity and impact magnitude. This is in line with standard environmental impact assessment methodologies (as outlined in ES Chapter 6 EIA Methodology). The Applicant also explained that the methodology used for assessment of impacts on commercial fisheries is in line with that used previously for other offshore wind farm projects in the area, and that it is also in line with that used in other offshore wind farm projects currently in the application phase. The Applicant noted that no concerns had been raised by other stakeholders with an interest in impacts on commercial fisheries, such as the MMO or the Eastern Inshore Fisheries Conservation Association (**IFCA**), with regards to the methodological approach used for assessment of impacts on commercial fisheries. The Applicant explained that the identification of sensitivity is based on parameters such as the operational range and versatility of fleets (i.e. the ability to deploy various gears/target various species) and availability of grounds. The evaluation of sensitivity levels using these parameters is informed by information gathered during consultation with fisheries stakeholders (i.e. vessel specifications, gear used, extent of grounds) as well as fisheries data (landings, Vessel Monitoring System (**VMS**) data, etc.). Taking account of these parameters, and given the wide operational range and fishing opportunities of the beam trawl and seine net fleets relevant to Norfolk Vanguard, their sensitivity to loss of grounds was assessed as low in Chapter 14. In defining impact magnitude, consideration is given to the area affected by the potential impact and the duration of the impact. The Applicant notes that the extent of area affected needs to be considered in context; that is the level of fishing activity that the area of the project sustains needs to be considered relative to the importance of this area in the context of the overall extent of the grounds that the fleet is able to exploit, and the levels of fishing that these grounds sustain. In the particular case of beam trawling, the Applicant noted the large extent of grounds that the fleet can exploit and referred to Chapter 14 Figure 14.4 and Figure 14.5, which shows annual VMS data (average 2012 -2016) by value and effort respectively, for Dutch beam trawlers. These figures indicate that Dutch beam trawlers exploit fishing grounds over a very large area of the Southern North Sea (ICES Division IVc) and that activity occurs across this large area consistently at relatively high levels. In addition, significant fishing activity is also undertaken by these vessels in wide areas of the Central North Sea (ICES Division IVb), albeit at relatively lower levels. In the case of seine netters, the Applicant also noted the large extent of the grounds these exploit. Their fishing activity extends over grounds north of Denmark, south to the English Channel and Western Approaches (Figure 14.7 and Figure 14.8). The Applicant highlighted that in the particular case of this fishing method, the majority of

	fishing activity takes place in the English Channel, with activity in the North Sea and in the area of the Project taking place at comparatively low levels.
The ExA asked the Applicant, and the other stakeholders, to expand on their position in relation to impacts on fishing interests including cumulative impacts.	With regards to the assessment of displacement of fishing activity into other areas, the Applicant noted that the level of potential displacement would be a function of the potential effect of loss of grounds. The assessment of loss of grounds presented in Chapter 14 did not identify significant impacts (i.e. any impacts above minor). Consequently, significant impacts with regards to displacement were also not identified. In this context, the Applicant highlighted that the assessment presented in Chapter 14 took a conservative approach based on concerns raised by the NFFO and VisNed associated with the use of floating foundations and assumed that skippers of towed gear vessels would elect not to fish within the operational wind farm. However, as noted above, since this assessment the Applicant noted that floating foundations had been removed from the project design envelope and it could therefore be assumed that some level of fishing activity would resume within the wind farm area once operational (particularly in the case of beam trawling). Accordingly, the impact of loss of grounds and associated potential displacement would be lower than that identified in the ES. The Applicant highlighted that the assessment of cumulative impacts presented in Chapter 14 was based on best available information at the time of writing and that it included a comprehensive range of project activities. This included consideration of other offshore wind farms and aggregate dredging activity as well as the potential implementation of areas closed to fishing within marine protected areas (**MPAs**). The Applicant noted that the assessment methodology used for the purposes of the cumulative assessment is in line with that used for assessment of the project alone. The Applicant therefore maintains the position that existing projects should not be included in the cumulative assessment. As described in the Applicant's comments to Written Representations (ExA; WRR; 10.D2.2, section 2.4) and in the SoCGs with the NFFO/VisNed (Rep1 - SOCG - 26.1) and Eastern IFCA (Rep1-SOCG-27.1), existing projects are considered to form part of the existing baseline. The Applicant contends that their inclusion in the cumulative assessment would result in double counting their effect. The cumulative assessment for beam trawlers and seine netters identified impacts of minor significance in relation to loss of grounds (and associated displacement). The Applicant noted that for beam trawlers the assessment recognised the increased potential loss of grounds in a cumulative context, and particularly that associated with offshore wind farm projects in countries where fishing is not permitted within operational wind farms such as Belgium and the Netherlands, and resulting from the potential implementation of restrictions on towed gear fishing in MPAs. However, considering the large extent of fishing grounds and the intensity of fishing activity by the beam trawl fleet, particularly across the Southern North Sea, the magnitude of the impact was assessed as medium. This, in combination with the low sensitivity of the fleet to loss of grounds, results in a cumulative impact of minor significance. Further, the Applicant noted that with the removal of floating foundations from the project design envelope for Norfolk Vanguard and the potential for some levels of fishing activity to resume within the operational wind farm, the contribution of the project to the overall cumulative impact would be lower than that identified in the ES.

	With regards to the cumulative assessment on the seine net fleet, the assessment recognised the potential for other projects to contribute to loss of grounds in a cumulative context. The assessment also recognised that in the case of offshore wind farm projects, there would be little potential for seine netting to be able to resume within the operational wind farms, given constraints in relation to spacing between turbines and the dimensions of the gear used by these vessels. Considering this, but recognising the extent of fishing grounds and the location of other projects, the magnitude of the impact was assessed as medium. This in combination with the low sensitivity of the fleet resulted in a cumulative impact of minor significance. In the context of the cumulative assessment on seine netters, the Applicant highlighted the high levels of activity of this fleet in the English Channel and the lack of projects/activities which could contribute significantly to loss of grounds for this fleet located in this area. The Applicant noted that engagement with the NFFO is on-going; following a meeting with the NFFO to discuss the SoCG on 16 November 2018, the NFFO provided the Applicant with various files and reports with information on potential proposals of areas closed to fishing within MPAs in Germany, the Netherlands and the UK. The Applicant is in the process of reviewing this information and has engaged, and will continue to engage with the NFFO to seek agreement on the nature of the information provided and the current state of the proposals. Where further progress can be made an updated SoCG with the NFFO will be submitted at Deadline 4.
The ExA asked the Applicant to explain the recently submitted FLCP alongside comments from the NFFO on matters such as a community benefit fund.	The Applicant referred to their comments on Written Representations (document reference: ExA; WRR;10.D2.2, section 2.4) with regards to proposals suggested by the NFFO and VisNed (i.e. funding arrangements, adoptions of the Fish Safe device). The Applicant noted that the potential for a community benefit fund is out-with the DCO consenting regime and therefore wider community benefits should not be taken into account when determining the Application. Notwithstanding this, the Applicant has and will continue to engage in relevant wider industry initiatives as appropriate. For example, Vattenfall is a member of European Subsea Cables Association (**ESCA**). In line with their Written Representation, the NFFO and VisNed requested that a Condition be included in the DMLs covering the reporting of potential cable exposures. As noted in the Applicant's response to Written Representations (ExA; WRR; 10.D2.2), in the event that cables become unburied during the operational phase this would be communicated to the fishing industry through the use of a dedicated Fisheries Liaison Officer (**FLO**) and appropriate channels such as the Kingfisher Information Service. This requirement has been included in the outline FLCP as submitted by the Applicant at Deadline 2 and further detail will be provided within the final FLCP to be produced post-consent. The FLCP will include detailed information on liaison and co-existence strategies and will be updated through the life of the project as required. NFFO/VisNED and other relevant stakeholders will be consulted on the FLCP. As stated in Schedule 9 and 10, Condition 14(d)(v) (Generation DMLs) and Schedule 11 and 12, Condition (9)(d)(v) (Transmission DMLs), a FLCP must be submitted and approved by the MMO. The Applicant therefore considers that there is adequate commitment to communication of hazards in the draft DMLs.

	The Applicant outlined the role of FLOs in respect of offshore wind farm projects. The Applicant noted that the level of involvement of FLOs at different stages of offshore wind farm projects varies depending on project specific requirements.
The ExA explored EIFCA's SoCG comments in relation to gaps in literature on electromagnetic fields (**EMF**) in relation to fisheries and fishing.	The Applicant is not aware of any significant new developments in the outcomes of ongoing research on the effects of EMF on fish and shellfish species. The assessment presented in Chapter 11 Fish and Shellfish Ecology, as agreed with Eastern IFCA in the SoCG (Rep1 –SOCG -27.1), is based on best available information to date.
AGENDA ITEM 6 (Marine mammals)	
The ExA questioned which method of foundation installation would be the most intrusive – gravity base foundation, or pile driving.	The Applicant noted that the full range of potential impacts from all foundation types within the design envelope for Norfolk Vanguard has been assessed, including underwater noise during pile driving and potential impacts on prey resource. The worst case scenario for impacts on prey is associated with gravity anchors for floating foundations which has been assessed in ES Chapter 10 Benthic Ecology and Chapter 11 Fish and Shellfish Ecology (document reference: 6.1). The conclusions of these chapters informed the assessment of the impact of changes to prey resource on marine mammals, assessed in Chapter 12 Marine Mammals. It is uncertain whether larger spatial scale impacts which are short term (i.e. pile driving) represent a worse case over small scale localised, long term impacts (i.e. habitat loss for prey) and therefore the worst case for each impact has been assessed in order to provide a conservative approach.
The ExA asked the Applicant to comment on The Wildlife Trusts' (**TWT**) suggestion for noise limits (as with the example reference from the German industry).	As the Applicant outlined in section 6.1.2 of the In Principle Site Integrity Plan (**SIP**) (document 8.17), the use of noise reduction systems is being considered by the Applicant. The In Principle SIP provides a framework for agreeing appropriate mitigation measures and this will be updated with additional details prior to construction, taking into account the final build scenario and best available scientific understanding and guidance at the time.
The ExA invited the Applicant to respond on TWT's and Whale and Dolphin Conservation's (**WDC**) comments on the assessment of effects on the Special Area of Conservation (**SAC**)/Site of Community Importance threshold which is included in the Statutory Nature Conservation Body (**SNCB**) guidance.	The Applicant has followed the latest SNCB guidance with regards to the assessment of effects on the Southern North Sea Site of Community Importance (**SCI**). The Applicant notes that TWT does not agree with the SNCB advice with regards to the management of the SCI. The In Principle SIP is based on currently available information, including latest SNCB guidance. The final SIP will provide additional details and project-specific mitigation which will take account of final design build scenarios / programmes for the Project and any relevant updates to the guidance. This highlights the importance of having the framework approach provided by the SIP.

	It should also be noted that the Applicant included population assessments beyond those required by the SNCB assessment, at the request of TWT during the Evidence Plan Process (**EPP**). This information is provided in Appendix 8.1 of the Information to Support Habitats Regulations Assessment (**HRA**) report (document 5.3.8.1).
The ExA explored whether fishing should be included in the in-combination assessments.	By-catch from commercial fisheries is recognised as a historic and continuing cause of harbour porpoise mortality in the Southern North Sea. The available prey resource for harbour porpoise has also been influenced by historic and continuing commercial fishing. As a result, the ES (document 6.1) and Information to Support HRA report (document 5.3) consider commercial fisheries to be part of the baseline environment for marine mammals, including harbour porpoise. The Applicant noted that commercial fisheries impacts have been included in the recent draft HRA for the Review of Consents (**RoC**) (which was consulted upon in November 2018) (section 19, page 2018). The RoC HRA states: "*19.152 There have been no quantified assessments undertaken on the extent impacts from commercial fishing may have within the SCI and therefore information to inform this assessment is not available.* *19.154 Without knowing the extent of impact on the seabed arising from the fishing industry and aggregate extraction it is not possible to undertake an in-combination assessment that addresses all the potential impacts on the habitats within the SCI"* With regard to direct effects on harbour porpoise the draft RoC HRA states that: *"19.213 Commercial fishing has occurred within the SCI for many years and has had, and will continue to have, direct and indirect impacts on harbour porpoise, their habitat and prey within the SCI. As the conservation status of harbour porpoise in UK waters and the SCI is considered favourable (JNCC 2016, 2017a) current and historical levels of fishing in the SCI are not considered to have affected the conservation status of the species.* *19.214 There are no known plans to suggest that the level of fishing within the SCI will significantly increase over the period the consented wind farms are planned to be constructed, such that, it is predicted that the current level of impacts from fishing on harbour porpoise within the SCI will not increase*." Therefore, the implication from the draft RoC HRA is that the inclusion of commercial fisheries would have no effect on the conclusions reached in the in-combination assessments in the Information to Support HRA report (document 5.3). The draft ROC HRA has been submitted by the Applicant at Deadline 3 (document reference: ExA; ISH; 10.D3.2A). The Applicant also notes the following from NE's Deadline 4 Response to the Further Examiners' Questions and Requests for information for Hornsea Project Three Examination (15th January 2019) (page 46, Q 2.2.73): "*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-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. *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."* The Applicant notes that part of NE's position for Hornsea Project Three was quoted by TWT during this ISH2, however the wider context provided here is important. In particular, NE's suggestion that commercial fisheries would usually be captured as part of the baseline unless the activity is too variable to be adequately reflected, and that NE are not aware of any significant changes to fishing activity within the Southern North Sea SCI. The Applicant therefore maintains the position that the inclusion of commercial fisheries as part of the baseline is appropriate.
The ExA questioned how the Applicant can conclude that impacts on marine mammals will be adequately mitigated.	The draft Marine Mammal Mitigation Protocol (**MMMP**) (document 8.13) follows a relatively standard approach to that of other offshore wind farms (**OWF**) (for example, the most recently consented OWF, East Anglia THREE). The draft DCO (at Schedules 9 and 10, Condition 14(f); and Schedules 11 and 12, Condition 9(f)) requires that a MMMP, based on the draft MMMP (document reference 8.13) must be agreed with the MMO prior to construction. This provides the framework to identify appropriate and effective marine mammal mitigation based on the best available information and guidance at that time. Developing the MMMP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time and once the final design and layout of the Project is known. The use of a MMMP to provide the framework for agreeing mitigation has been agreed through the following SoCGs: • MMO (document reference Rep 1-SOCG-11.1); • TWT (document reference Rep 1-SOCG-20.1); • WDC (document reference Rep 1-SOCG-16.1); and • Largely agreed with NE, as noted in NE's SoCG (document reference Rep 1 SOCG-13.1).
The ExA asked the Applicant to comment on TWT's and WDC's wish to	The Applicant has engaged with TWT and WDC throughout the EPP, commencing in February 2017 for marine mammal ecology matters, and has welcomed their input.

be listed as consultees for the SIP and MMMP.	The Applicant proposes that TWT and WDC do not need to be formally named in the DCO for consultation to continue. The Applicant notes that there are fundamental disagreements between TWT/WDC and NE regarding the approach to assessment, including the thresholds to determine AEOI of the Southern North Sea SCI. The Applicant would therefore be concerned that should these disagreements be on-going, this could delay the discharging of consent conditions for the project, should further commitments to consultation with TWT and WDC be made. The Applicant suggests that it is for TWT, WDC and NE to resolve these issues outside the forum of the Applicant's DCO. Table 2.1 of the In-principle SIP (document 8.17) outlines indicative milestones in the development of the SIP which clearly states that TWT and WDC would be engaged through-out the development of the SIP. The Applicant has committed to consulting with TWT and WDC in the initial review of the SIP and to provide the updated plan to TWT when it is submitted to the MMO and Natural England for review and approval. At that stage, it is at the MMO's discretion which stakeholders to consult.
Mitigation, Protocols and Plans: The ExA requested that the Applicant and stakeholders expand on the concept of bubble curtains and acoustic deterrents; as well as explain the proposed mitigation methods.	Chapter 12, Appendix 12.2 of the ES summarises the effectiveness of Acoustic Deterrent Devices (**ADD**)s as mitigation to prevent auditory injury in marine mammals as a result of underwater noise. The principle behind the use of ADDs is that they produce an aversive signal that causes a marine mammal to move away and out of the zone of potential permanent auditory injury. The review indicates that ADDs would be effective for the marine mammal species (harbour porpoise, grey seal and harbour seal) relevant to Norfolk Vanguard. As outlined in section 6.1.2 of the In Principle SIP, the use of noise reduction systems is being considered as an option for marine mammal mitigation. The Applicant noted that the suitability of any noise mitigation system is dependent on a number of factors including pile parameters, ground conditions, water depth and currents. These factors will be considered in any assessment of the efficacy of the mitigation measure during the development of the final SIP, prior to construction. Noise reduction methods that are currently being adopted in other relevant developments or are in the process of being developed include various types of bubble curtain (compressed air released from a submerged, perforated tubing to create a bubble air barrier), hydro sound dampers (net with foam and gas filled balloons / bladders), screens or tubes (foam or inflatable air sleeves) and cofferdams (rigid steel casing surrounding the pile from seabed to surface). With regards to other mitigation options, the Applicant is exploring a range of possibilities (within the design envelope) for the foundation types, as is detailed in ES Chapter 5 Project Description. Piled foundations are one of the more likely options for the final project design and the traditional way to install these is percussive piling, however the Applicant is also investigating alternative installation methods for piled foundations. Developments are

	ongoing within the industry in relation to pile installation methods, such as vibro-piling[1] and the Blue Hammer[2], which have the potential to reduce the underwater noise from pile driving. In relation to operational noise impacts, the assessment of operational noise provided in ES Chapter 12 Marine Mammals and the Information to Support HRA report indicates no potential significant impacts or effects relating to underwater noise from operational wind turbines for the Project.
Underwater noise levy: the ExA asked the Applicant to comment on the principle of a levy (as suggested by TWT).	As stated in the Applicant's response to written question 20.70 (document reference ExA; WQ; 10.D1.3), there is currently no mechanism for a levy to deliver strategic mitigation. This is a recent draft proposal by TWT that has not yet been fully consulted on or agreed with the Industry, Regulators or SNCBs. Therefore, it is not considered appropriate to include this as a Condition within the DMLs for Norfolk Vanguard. The Applicant is willing to consider the potential for strategic monitoring as demonstrated in Section 4.5 of the In Principle Monitoring Plan (**IPMP**) (document 8.12). The final Monitoring Plan must be agreed with the MMO as required by Condition 14(1)(b) and Condition 19 of the Generation DMLs (Schedules 9-10) and Condition 9(1)(b) and Condition 14 of the Transmission DMLs (Schedules 11-12).
Scheduling of piling and cumulative impacts: how would one offshore project liaise with the other.	Scheduling of piling is one of the options presented in the In Principle SIP (document 8.17) to mitigate disturbance of harbour porpoise associated with the Southern North Sea SCI. The In Principle SIP provides a framework for agreeing appropriate mitigation measures and this will be updated with additional details prior to construction, taking into account the final build scenario and best available scientific understanding and guidance at that time. The final SIP must be agreed with the MMO prior to construction in accordance with DCO Schedules 9 and 10, Condition 14(1)(m) and Schedules 11 and 12, Condition 9(1)(l). The Applicant notes that further information is to be provided by the Applicant and the MMO regarding the consideration of cumulative impacts on marine mammals from the potential construction of multiple projects at Deadline 4.
AGENDA ITEM 7 (Offshore construction and physical processes)	
Disposal of inert materials and cable protection figures – the ExA requested an explanation of the figures presented in the DCO including why the figures are substantially different from those	The Applicant has taken a highly conservative approach to assessment given the uncertainty around survey data at this stage. The Applicant has assessed a worst case scenario of pre-sweeping the whole of the length of the array cables, which may differ from the approach taken by EA3. The Applicant does however recognise the difference in figures compared to that of EA3 and, to a lesser degree, Hornsea Project Three; the Applicant will

[1] Vibro-piling = an 'oscillator' causes the pile to resonate as it is lowered into the seabed. The oscillatory movement of the pile wall disturbs and softens the surrounding seabed material, which can allow the required insertion depth to be achieved without the need for pile-driving.

[2] Blue Hammer = the pile is driven with gas combustion that accelerates a large column of water https://fistuca.com/blue-piling-technology/technology/

mentioned in East Anglia THREE (**EA3**).	endeavour to provide a breakdown of how the figures are derived in relation to the foundation structures and pre-sweeping of the array cable. The Applicant will provide this information for Deadline 4.

APPENDIX 1 – BENTHIC UPDATE

1. INTRODUCTION

1.1 The Applicant has engaged with Natural England since 2016 in relation to benthic matters, through the extensive and voluntary Evidence Plan Process (**EPP**), and has taken various aspects of their advice into consideration.

1.2 Since submission of the DCO Application in June 2018, the Applicant has had a series of written exchanges with Natural England to develop the first draft of the SOCG (Rep1 - SOCG - 13.1) as submitted at Deadline 1.

1.3 In addition, the Applicant also had a conference call with Natural England on 22 January 2019. This discussion covered cable protection and Natural England's comments and concerns regarding the methods used for assessment in relation to Annex I reef.

1.4 The Applicant also reviewed Natural England's Deadline 2 submission in preparing this update.

2. OVERVIEW OF KEY ISSUES

2.1 The Applicant noted that any issues raised regarding benthic ecology have been focussed solely on the Haisborough, Hammond and Winterton (**HHW**) Special Area of Conservation (**SAC**). No issues have been raised in relation to the offshore wind farm sites or the offshore cable corridor out with the HHW SAC.

2.2 Natural England provided detailed comments on benthic ecology in relation to the HHW SAC in Annex C of their Deadline 1 submission and the Applicant provided a detailed written response to this at Deadline 2 (Appendix 1 of the Applicant's response to Written Representations (ExA; WRR; 10.D2.2))

2.3 The key outstanding issues include:

- Cable protection;
- Mapping of *Sabellaria spinulosa* reef;
- Micrositing around *S. spinulosa* reef; and
- Evidence regarding sandbanks and sandwave levelling.

3. CABLE PROTECTION

Introduction

3.1 Cable protection will be required in the HHW SAC at locations where the Norfolk Vanguard export cables will have to cross existing cables and pipelines. Based on feedback from Natural England and discussions to date, the Applicant understands this is accepted by Natural England, noting that their preference would be for sections of disused cables to be cut and removed rather than crossed. This is also the Applicant's preference, but its feasibility is subject to agreements with the owners of the existing cables.

3.2 The key issues with regards to cable protection that have been raised by Natural England have therefore focussed on a contingency for cable protection that has been included in the assessments and the draft Development Consent Order (DCO).

3.3 The requirement for a contingency was identified during the EPP by Natural England based on their experience of another offshore wind farm project. Natural England and the Marine Management Organisation (MMO) stated a preference that the Environmental Impact

Assessment (EIA) and DCO avoid the need for additional licensing or variations where possible.

3.4 The Applicant has therefore adopted a contingency based on 10% of the total offshore cable length requiring protection (which is relatively standard across the offshore wind industry) in order to reflect the uncertainty in the exact geology across the whole of the cable route prior to completion of the pre-construction surveys. However, only cable protection which is actually required by the Applicant would be used. The need, type, sources, quantity and installation methods for cable protection would be agreed with the MMO through the Scour Protection and Cable Protection Plan (required under Condition 9(1)(e) of the Transmission Deemed Marine Licences (DMLs)). The Applicant notes however that Natural England does not accept that this commitment is sufficient to ensure that only essential cable protection is installed.

Cable Protection Areas

Total area of cable protection in the SAC

3.5 The total area of cable protection within the HHW SAC would be up to 0.05km^2, which represents 0.003% of the 1468km^2 SAC area. The Applicant maintains the position presented in the Information to Support Habitats Regulations Assessment (HRA) report (document 5.3), that such a small proportion would not have an Adverse Effect on Integrity (AEOI) on the HHW SAC and should therefore be permissible.

3.6 Natural England has stated they are uncomfortable with this value, however they are also unable to advise what would be acceptable from their perspective.

3.7 The conflicting messages from Natural England regarding promoting a contingency but not being comfortable with up to 10% of the cable length potentially requiring protection (in addition to crossings) and not being able to advise on what they would be comfortable with is limiting the Applicant's ability to reach common ground with Natural England on this point.

Colonisation

3.8 The Applicant maintains the position presented in the Information to Support HRA report, that cable protection could become colonised by species that are associated with the HHW SAC, such as S. *spinulosa* reef.

3.9 The Applicant notes that Natural England state in paragraph 3.7.2 of Annex C submitted at Deadline 1, that they "*agree that potential beneficial effects may occur from introduction of hard substrate into a soft substrate system. However, within MPAs, this must be considered secondary to the requirement to recover or maintain the features for which the site is designated.*"

3.10 In addition, Natural England states in paragraph 3.5.9 of Annex C that "*Between the SNCB's there is ongoing discussions in relation to the Annex I status of any Sabellaria spinulosa reef growing over artificial substrate such as cable protection.*"

3.11 The Applicant maintains the position that S. *spinulosa* reef would provide the same benefits in terms of biodiversity, regardless of what it is growing on.

4. MAPPING OF S. *SPINULOSA* REEF

Introduction

4.1 The benthic survey methodology was agreed with Natural England and the MMO through the EPP in 2016. The method included geophysical data collection with ground truthing by grab sampling and drop down video where necessary. Fugro (on behalf of the Applicant) then produced a biotope habitat map, primarily using the geophysical data. The biotope of S. *spinulosa* on stable *circalittoral* mixed sediment was identified as potentially being present.

4.2 However, the Applicant and Natural England agreed during the EPP that the potential presence of a *Sabellaria* biotope does not determine that the biogenic reef may be present, as S. *spinulosa* is common in its individual worm form and is not always reef forming.

4.3 The Applicant therefore commissioned Envision, as leading experts in the field of S. *spinulosa*, to undertake further investigation of the potential extent of S. *spinulosa* reef.

4.4 Examples of Envision's experience includes:

- A.Benson, B. Foster-Smith, S. Gubbay & V. Hendrick (2013) OSPAR Background Document for *Sabellaria spinulosa* reefs
- Limpenny, D.S., Foster-Smith, R.L., Edwards, T.M., Hendrick, V.J., Diesing, M., Eggleton, J.D., Meadows, W.J., Crutchfield, Z., Pfeifer, S., and Reach, I.S. (2010). Best methods for identifying and evaluating Sabellaria spinulosa and cobble reef. Aggregate Levy Sustainability Fund Project MAL0008. Joint Nature Conservation Committee, Peterborough, 134 pp., ISBN - 978 0 907545 330

Norfolk Vanguard S. *spinulosa* reef mapping

4.5 Natural England states in their Relevant Representation [RR-106] that *"Some complex methods have been employed, but it is not always clear why these methods have been used, and what advantage they have over standard methods, such as those described in Limpenny et al. 2010."* The Applicant also responded to this point at Deadline 1 (Written Question 5.15 (ExA; WQ; 10.D1.3).

4.6 It should be noted that the methodology adopted by Envision considers the Limpenny *et al.,* 2010 method as a starting point and then builds on this with ensemble mapping which uses various data sources to establish confidence in the potential presence of S. *spinulosa* reef. The Envision S. *spinulosa* reef mapping study is presented in Appendix 7.2 of the Information to Support HRA report.

4.7 Limpenny et al 2010 summarised the best techniques at that time to identify and evaluate *S. spinulosa* reefs and the majority of the findings are still valid, however there have also been advances in the mapping techniques which Envision has adopted. The mapping techniques within Limpenny et al 2010 are based on interpretation of datasets collected for a 'one-time' mapping process.

4.8 Mapping techniques have since developed, in particular those identified during the JNCC workshop "Standardising the production of habitat maps in the UK" (Lillis *et al,* 2016) which discussed mapping processes and procedures. Ensemble mapping (Diesing & Stephens , 2015) was highlighted as having potential to combine different mapping techniques and methods to produce maps based on a 'weight of evidence' and therefore this approach has been adopted for Norfolk Vanguard. Envision has used Ensemble mapping techniques to produce habitats maps for several Marine Protected Areas around the UK which used a variety of data sources collated from different times and surveys.

4.9 The use of Ensemble mapping is a similar concept to the core reef index that Natural England state in their Written Representation that they disagree with, although it should be noted that the Applicant has not used this core reef approach specifically.

4.10 Annex C of Natural England's Deadline 1 submission (paragraph 3.1.1) refers to "*flawed methods used for assessment*" and states as a result of this "*Natural England cannot currently provide an evidence based opinion on the actual scale of impacts*". The Applicant discussed this statement with Natural England on a call on 22nd January, and Natural England confirmed that this comment refers to the S. *spinulosa* reef mapping approach.

4.11 As stated in Appendix 1 of the Applicant's Deadline 2 submission[3], and as also shown in the Statement of Common Ground (SOCG) with Natural England submitted at Deadline 1 (document reference Rep1-SOCG-13.1), irrespective of the methodology used the Applicant and Natural England agree on the general extent and location of S. *spinulosa* reef. The outputs of the Envision mapping correlate closely with maps produced by Natural England which identify areas to be managed as S. *spinulosa* reef, as shown in Figure 1.

4.12 The Applicant has recognised and assessed the potential that the location and extent of *Sabellaria* reef is subject to change, as the species is ephemeral in nature and therefore the extent at the time of construction is unknown. The Applicant suggests that this ephemeral characteristic is the key limitation with regards to Natural England providing an evidence-based opinion on the actual scale of the potential impacts to S. *spinulosa* reef and as such, the Applicant has committed to undertaking pre-construction surveys (as required by dDCO Schedules 11 and 12 Part 4 Condition 13(2)(a)) and to agree cable installation methods and routing with the MMO through the Construction Method Statement (required under dDCO, Schedules 11 and 12, Part 4 Condition 9(1)(c)) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)).

4.13 During the conference call with Natural England on 22 January, in response to the Applicant's position that the focus should be on the commitment to determining actual reef presence and extent prior to construction, Natural England felt it was important for Natural England to note any disagreement of the mapping method only to avoid setting a precedent. On this basis, the Applicant suggests this should not remain a key issue for the examination and will seek to agree this with Natural England through the SOCG. In terms of not setting a precedent, the Applicant notes that the methodology Natural England has used to determine S. *spinulosa* reef extent in the SAC is unclear and would welcome further details on this.

[3] which provides the Applicant's written response to Natural England's Annex C

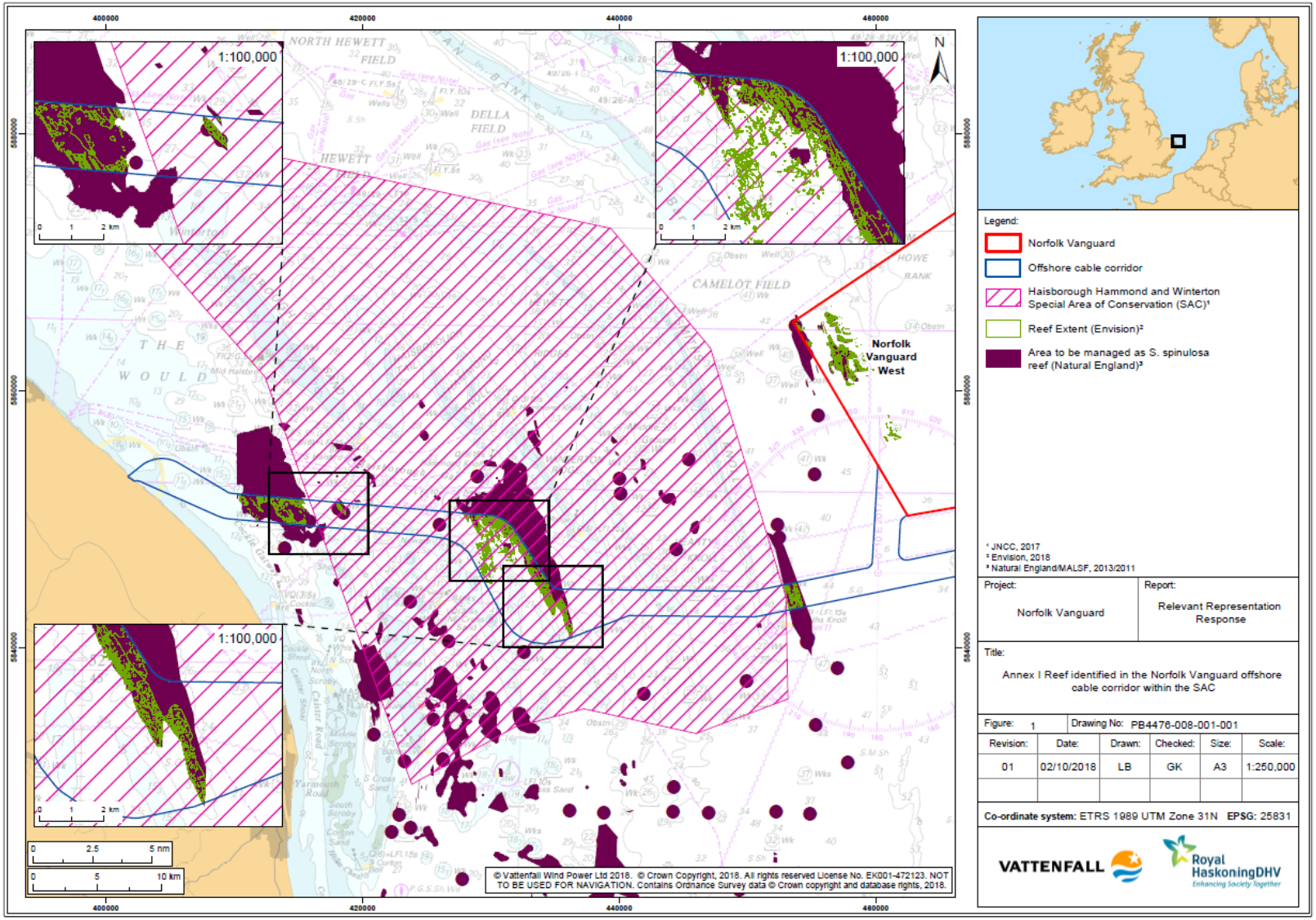


Figure 1 Sabellaria spinulosa reef mapping by the Applicant and Natural England

5. MICROSITING

Introduction

5.1 During the discussions on 22 January, Natural England suggested that micrositing of cables around Annex I Reef is an area on which it is agreed to disagree, however the Applicant remains keen to engage further with Natural England on this.

5.2 In particular, the Applicant suggests there is inconsistent messaging from Natural England on this issue which is limiting the potential to reach common ground, including:

- Natural England state that micrositing should be undertaken around all reef due to the 'recover' element of the conservation objectives;
- However Natural England state in Annex C of their Deadline 1 submission that "*Using the Applicant's survey data and the recent site survey data it is highly probable that the area to be managed as a fisheries byelaw area for the recovery of reef could straddle the cable route. We therefore advise that this leaves insufficient space in the proposed cable corridor to micro-route around the byelaw area and any additional reef feature. Whilst we continue to advocate that the standard mitigation measure/marine licence conditioned to avoid reef features should be included in the Projects DML, it may not be feasible to do so.*"
    - The Applicant notes that if reef has recovered to such an extent that it is not possible to route two 30m swathes for Norfolk Vanguard and a further two for Norfolk Boreas through the 2 to 4km wide offshore cable corridor, then this would be an extremely large reef and the Applicant would propose that this would no longer require a restoration target.
    - The Applicant also notes that the proportion of temporary disturbance to such a reef would be very small.
- It should also be noted that Natural England has stated they are not confident that reef will recover following the localised and short term temporary cable installation or maintenance works (e.g. paragraph 4.1.5 of Natural England's Annex C).
    - However the Applicant proposes that this position is disproportionate and inconsistent when Natural England also feel that micrositing will not be possible due to significant recovery following around 100 years of extensive and repeated commercial fisheries dredging in the HHW SAC.

5.3 Therefore, the Applicant maintains that a conservative but proportionate approach to the assessment of potential impacts, if micrositing is not possible, has been presented in the Information to Support HRA report (document 5.3) and the conclusion of no Adverse Effect on Integrity (AEOI) remains valid.

5.4 The Applicant suggests that this position is further safe-guarded through the commitment to agreeing the Cable Specification Installation and Monitoring Plan with the MMO prior to construction, as required under Condition 9(1)(g) of the Transmission DMLs (Schedules 11 and 12 of the draft Development Consent Order (DCO)).

6. SANDWAVE LEVELLING

Introduction

6.1 Sandwave levelling is an option the Applicant is considering as part of the installation strategy for offshore cables.

6.2 This would entail dredging of sandwaves to allow cables to be buried within the stable layer of sediment below the mobile sandwaves. The advantage of this is that there would be less risk of cables becoming unburied during the life of the Project. The potential disadvantage is that it

would result in more disturbance during installation and the dredged sediment needs to be deposited.

6.3 The Applicant's understanding is that Natural England are aware of these potential advantages and disadvantages and are not currently able to determine a preference, noting that there is uncertainty due to a lack of long term evidence to prove the effects of sandwave levelling. Appendix 7.1 of the Information to Support HRA report provides a detailed assessment of the potential effects and recovery from sandwave levelling which Natural England has welcomed. The Environmental Impact Assessment and Information to Support HRA report considers the worst case scenario for construction on the basis of sandwave levelling as well as the worst case scenario with regards to potential reburial during Operation and Maintenance on the basis that sandwave levelling was not undertaken.

6.4 On the basis that Natural England does not appear to have a clear preference at this stage with regards to the potential advantages or disadvantages of pre-sweeping as outlined above, the Applicant proposes that it is beneficial for both parties for the option of sandwave levelling to be maintained and note again that a detailed cable laying plan would be agreed with the MMO through the Cable Specification Installation and Monitoring Plan required under condition 9(1)(g) of the Transmission DMLs.

Approach to sediment disposal

6.5 Natural England has also raised queries with regards to the methods for sediment disposal including:

- Whether sediment is released in the water column or near the seabed;
- Where the sediment is deposited within the HHW SAC to allow it to be incorporated back into the Sandbank system that supports the HHW SAC; and
- Where sediment is deposited in relation to *S. spinulosa* reef

6.6 Appendix 7.1 of the Information to Support HRA report outlines a range of scenarios regarding sediment deposition, whether released at the surface or the seabed (discussed further in the Applicant's response to Written Question 5.2). This characterises the worst case scenario which has been used in the assessment.

6.7 The details of the approach regarding the location and method for sediment disposal will be agreed with the MMO through the Cable Specification Installation and Monitoring Plan (required under Condition 9(1)(g) of the Transmission DMLs) once further details are known as the final design of the Project develops following the pre-construction surveys.

7. CONCEPTS NOT APPLICABLE TO NORFOLK VANGUARD

7.1 The Applicant notes that there are a number of issues raised in Natural England's Written Representation that do not relate to Norfolk Vanguard. This was raised with Natural England during discussions on 22 January and Natural England indicated that these points apply to the Hornsea Project Three Examination and advised that these points had been raised on Norfolk Vanguard to be "pre-emptive".

7.2 The concepts that are not applicable to Norfolk Vanguard include:

- Natural England state that the use of "Sensitive cable protection" is unlikely to be effective
  - The Applicant has not proposed any kind of "Sensitive cable protection"
- Natural England state that the historic presence of hard substrate in the North Sea does not justify cable protection
  - The Applicant has made no reference to this concept
- Natural England refer to beneficial effects from the introduction of hard substrate (i.e. cable protection) and state that this does not justify cable protection in the SAC

    - While the Applicant has noted the potential for cable protection to become colonised (as a factor in the assessment of the potential for AEOI of the SAC), no attempt has been made to assess this as a beneficial impact.
- Natural England raise concerns regarding whether it will be possible to decommission cable protection
    - The Applicant has stated that cable protection is expected to be left in situ at decommissioning and has assessed this as a permanent impact where relevant.
    - The Applicant notes that lifting of cable protection may be unfeasible and could have H&S risks.
- Natural England also state that cables should not be routed through low quality reef
    - The Applicant has committed to micrositing around all reef where possible and has provided an assessment of the potential effect if this is not possible, as presented in the Information to Support HRA report.

8. SUMMARY

8.1 In summary, the Applicant maintains that the assessments provided in the Environmental Statement (document 6.1) and the Information to Support HRA report (document 5.3) present a conservative worst case scenario and conclude that this would result in no AEOI due to the temporary and localised nature of the effects.

8.2 The Applicant also maintains that the draft DCO provides various safeguarding mechanisms, such that the following must be agreed with the MMO prior to construction:

- Requirement and details of cable protection;
    - To be agreed under the Scour Protection and Cable Protection Plan (Condition 9(1)(e) of the Transmission DMLs)
- Cable route and micrositing;
    - To be agreed under the Cable Specification, Installation and Monitoring Plan (Condition 9(1)(g) of the Transmission DMLs)
- Methods for cable installation; and
    - To be agreed under the Cable Specification, Installation and Monitoring Plan (Condition 9(1)(g) of the Transmission DMLs))
- Approach to sediment disposal (if required).
    - To be agreed under the Cable Specification, Installation and Monitoring Plan (Condition 9(1)(g) of the Transmission DMLs)).

8.3 These mechanisms provide the MMO and their statutory advisors with certainty that there would be no AEOI on the Haisborough, Hammond and Winterton SAC.

APPENDIX 2: THE APPLICANT'S LIST OF APPEARANCES

1. **John Houghton**, Senior Counsel, **Womble Bond Dickinson**; and **Victoria Redman**, Partner, **Womble Bond Dickinson**

   Speaking on behalf of Norfolk Vanguard Limited:
   - In response to the Examining Authority's questions and for general advocacy

2. **Gemma Keenan**, Senior Marine Biologist/ Project Manager, Royal HaskoningDHV **(RHDHV)**; and **Mark Trinder**, Principal Ornithologist, **MacArthur Green Limited**.

   Speaking on behalf of Norfolk Vanguard Limited on:
   - Offshore ornithology
   - Benthic ecology

3. **Sam Westwood**, Principal Risk Analyst, **Anatec Limited**

   Speaking on behalf of Norfolk Vanguard Limited on:
   - Shipping and navigation
   - Layout of turbines, lighting and marking
   - Post-construction surveys, including the SAR checklist

4. **Sara Xoubanova**, Senior Consultant **Brown and May Marine Ltd**; **Jonathan Keer**, Senior Consultant, **Brown and May Marine Ltd**; and **Jake Laws**, Commercial Fisheries, **Vattenfall**

   Speaking on behalf of Norfolk Vanguard Limited on:
   - Fisheries and fishing
   - Fisheries assessment methodology and project design
   - Impacts on fishing interests, including cumulative impacts
   - Fisheries Liaison and Co-existence Plan

5. **Gemma Keenan**, Senior Marine Biologist/ Project Manager; and **Jen Learmonth**, Principle Marine Mammal Ecologist, **RHDHV**
   Speaking on behalf of Norfolk Vanguard Limited on:
   - Marine mammals
   - Assessment findings, including cumulative impacts
   - Mitigation, Protocols and Plans, including the underwater noise levy.

6. **Rob Driver**, Offshore Grid Manager, **Vattenfall** and **Dr Dave Brew**, Principal Marine Geomorphologist, **RHDHV**

   Speaking on behalf of Norfolk Vanguard Limited on:
   - Offshore construction and physical processes

7. **Rebecca Sherwood**, Consents Manager, **Vattenfall**; and **Ruari Lean**, Senior Development Manager, **Vattenfall**

   Speaking on behalf of Norfolk Vanguard Limited on:
   - Any other matters.