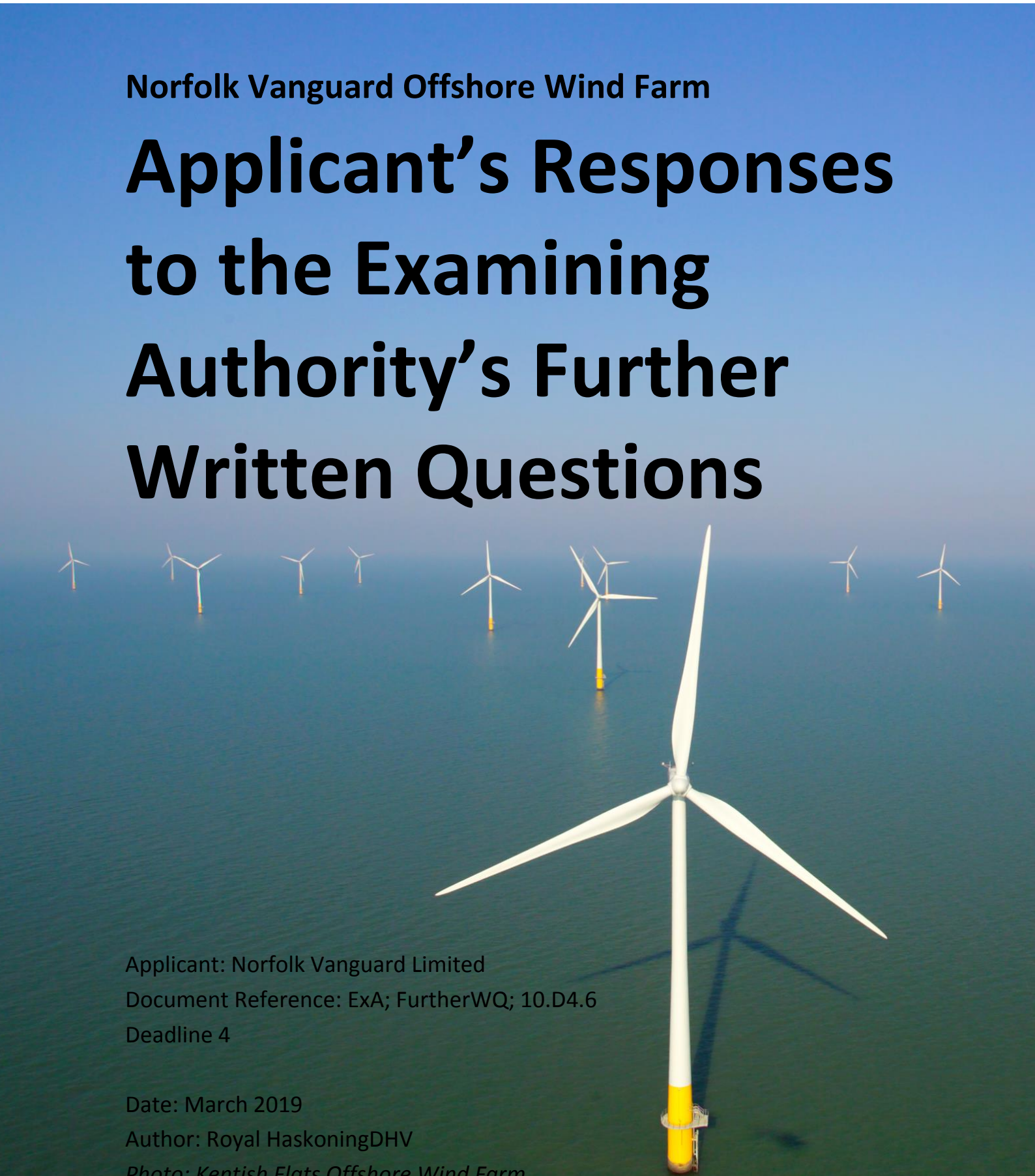
Norfolk Vanguard Offshore Wind Farm

Applicant's Responses to the Examining Authority's Further Written Questions



Applicant: Norfolk Vanguard Limited

Document Reference: ExA; FurtherWQ; 10.D4.6

Deadline 4

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Photo: Kentish Flats Offshore Wind Farm

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Glossary

ADR	Air Defence Radar
AEoI	Adverse Effect on Integrity
ALO	Agricultural Liaison Officer
BC	Breckland Council
BCT	Bat Conservation Trust
BDC	Broadland District Council
BDMPS	Biologically Defined Minimum Population Scales
CfD	Contract for Difference
CIA	Cumulative Impact Assessment
CNMP	Construction Noise Management Plan
CoCP	Code of Construction Practise
CRM	Collision Risk Modelling
cSAC	Candidate Special Area of Conservation
DCO	Development Consent Order
dDCO	Draft Development Consent Order
DML	Deemed Marine Licence
EA1	East Anglia ONE Offshore Wind Farm
EA3	East Anglia THREE Offshore Wind Farm
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Ecological Management Plan
ES	Environmental Statement
ETG	Expert Topic Group
ExA	Examining Authority
FID	Financial Investment Decision
FLCP	Fisheries Liaison and Co-existence Plan
FFC	Flamborough and Filey Coast
HDD	Horizontal Directional Drilling
HE	Highways England
HGV	Heavy Goods Vehicle
HHW	Haisborough Hammond and Winterton
HoTs	Heads of Terms
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPC	Infrastructure Planning Commission
IPMP	In Principle Monitoring Plan
JNCC	Joint Nature Conservation Committee
km	Kilometres
LiDAR	Light Imaging, Detection and Ranging
LIG	Land Interest Group
LSE	Likely Significant Effect
LVIA	Landscape and Visual Impact Assessment

MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MSS	Marine Scotland Science
NCC	Norfolk County Council
NE	Natural England
NFFO	National Federation of Fishermen's Organisations
NFU	National Farmers' Union
NNDC	North Norfolk District Council
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OCoCP	Outline Code of Construction Practise
OFTO	Offshore Transmission Owner
OLEMS	Outline Landscape and Ecological Management Strategy
OTMP	Outline Traffic Management Plan
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PRoW	Public Rights of Way
pSPA	potential Special Protection Area
PVA	Population Viability Analysis
REACT	Respect our Environment and Coastal Tourism
RPA	Relevant Planning Authority
RR	Relevant Representation
RSPB	Royal Society for The Protection of Birds
SAC	Special Area of Conservation
SCI	Site of Community Importance
SIP	Site Integrity Plan
SNCB	Statutory Nature Conservation Body
SoCG	Statement of Common Ground
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SWDP	Surface Water Drainage Plan
TH	Trinity House
TMP	Traffic Management Plan
TWT	The Wildlife Trusts
UK	United Kingdom
UKCP	United Kingdom Climate Projections
UXO	Unexploded Ordnance
WDC	Whale and Dolphin Conservation
WSI	Written Scheme of Investigation

1 APPLICANT'S RESPONSES TO THE EXAMINING AUTHORITY'S WRITTEN QUESTIONS

1. Following the issue of Further Written Questions by the Examining Authority (ExA) on 27 February 2019 to the Applicant and other Interested Parties, the Applicant has subsequently responded to each of those relevant questions. Details of Applicant's responses are set out within this document in subsequent sections below.

1.1 General

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
1.6	Applicant	Paragraph 2.6.71 of National Policy Statement for Renewable Energy Infrastructure (EN-3) states that ecological monitoring is likely to be required during both the construction and operational phases. Whilst noting that Requirement 14(1)(l) of the dDCO and the 'In Principle Monitoring Plan (Offshore)' [APP-036] respectively require the submission of an ornithological monitoring plan and monitoring primarily during the pre-construction and construction phases, with much of the post-construction monitoring to be agreed, please set out how any other long-term ecological monitoring during the operational phase is to be secured in the dDCO.	Paragraph 2.6.71 of the National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) relates to Biodiversity, which includes the following (as stated in paragraph 2.6.59 of EN-3): • Fish; • Seabed habitats; • Marine mammals; and • Birds. As stated in the Norfolk Vanguard In Principle Monitoring Plan (IPMP) (document 8.12), the aims of project monitoring are to address significant evidence gaps or uncertainty and/or to monitor potentially significant impacts. <u>Fish</u> Environmental Statement (ES) Chapter 11 Fish and Shellfish Ecology concludes that impacts would be non-significant (negligible or minor). As a result, no fish monitoring for construction or operation is proposed. This is now agreed with the Marine Management Organisation (MMO) as shown in the Statement of Common Ground (SOCG) (document reference Rep1 - SOCG - 11.1). Condition 19(3) of the Generation Deemed Marine Licence (DML)'s (Schedules 9 and 10) and Condition 14(4) of the Transmission DMLs (Schedules 11 and 12) requires monitoring of noise generated by the installation of the first four piled foundations of each piled foundation type (in the event that driven or part-driven pile foundations are proposed). Version 3 of the draft development consent order (dDCO) (submitted at Deadline 4) states that "*If, in the opinion of the MMO in consultation with Natural England, the assessment shows significantly different impacts to those assessed in the environmental statement or failures in mitigation, all piling activity must cease until an update to the MMMP and further monitoring requirements have been agreed*."

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			Although it has been agreed that specific fish monitoring is not required, if required, the monitoring secured under Condition 19(3) of Schedules 9 and 10 and Condition 14(4) of Schedules 11 and 12 will also be relevant to fish ecology. Seabed habitats ES Chapter 8 Marine Geology, Oceanography and Physical Processes and ES Chapter 10 Benthic and Intertidal Ecology conclude that impacts would be non-significant (negligible or minor). The IPMP identifies a likely requirement for targeted monitoring of Annex I habitats before and after construction. The Applicant acknowledges that as a European site, the Haisborough Hammond and Winterton (HHW) Special Area of Conservation (SAC) has a special environmental status. For this reason, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with Natural England (NE) as to the precise wording of the condition and content for the plan. This would include proposed monitoring in the HHW SAC. The IPMP states that if significant impacts are observed, the potential requirement for further surveys will be agreed with the MMO following review of the post-construction survey results. With regards to the impact of temporary seabed disturbance from maintenance operations, the disturbance would be on a much more localised scale than construction operations. Therefore, the Applicant maintains that the proposed monitoring is appropriate to address any uncertainty regarding recovery and no monitoring for maintenance operations is proposed. Marine mammals ES Chapter 12 Marine Mammals concludes that impacts would be non-significant (negligible or minor). Condition 14(1)(b) of the Generation DMLs (Schedules 9 and 10) and Condition 9(1)(b) of the Transmission DMLs (Schedules 11 and 12) requires a construction programme and monitoring plan (which accords with the

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			offshore IPMP) to be agreed with the MMO. The IPMP identifies a likely requirement for monitoring of marine mammals during construction if pile driving is undertaken. The Marine Mammal Mitigation Protocol (MMMP) for piling (required under dDCO Condition 14(1)(f) of Schedules 9 and 10 and Condition 9(1)(f) of Schedules 11 and 12) will detail monitoring during piling, in accordance with the draft MMMP (document 8.13) and the IPMP (document 8.12). In addition, monitoring of noise generated by the installation of the first four piled foundations of each piled foundation type (in the event that driven or part-driven pile foundations are proposed) is required in accordance with Condition 19(3) of the Generation DMLs (Schedules 9 and 10) and Condition 14(4) of Transmission DMLs (Schedules 11 and 12). With regards to operational noise, and as stated during the offshore issue specific hearing (ISH2), the assessment of operational noise provided in ES Chapter 12 Marine Mammals and the Information to Support Habitats Regulation Assessment (HRA) report indicates no potential significant impacts or effects relating to underwater noise from operational wind turbines for the Project. Disturbance values have been assessed for a range of 0%-100% disturbance from the Offshore Wind Farm (OWF) sites, noting that there is currently no evidence of any significant disturbance of harbour porpoise or seals from operational wind farm sites and therefore it is highly unlikely that underwater noise from operational wind turbines could result in 100% disturbance. Even taking into account this uncertainty, and therefore taking a highly conservative approach on the basis of 100% disturbance, the magnitude of effect would be negligible or low and therefore the Applicant suggests that a monitoring requirement during operation would be disproportionate. <u>Birds</u> As noted in the ExA's question, the Applicant has committed to agreeing an Ornithological Monitoring Plan with the MMO in consultation with the relevant Statutory Nature Conservation Bodies (SNCBs) (Condition 14(1)(l) of the Generation DMLs (Schedule 9 and 10 of the Development Consent Order (DCO))). This will state the timeframe over which ornithological monitoring is considered

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			necessary and appropriate. As stated in the IPMP(document 8.12), aspects for consideration in the Ornithological Monitoring Plan will include collision risks, displacement and improving reference population estimates and understanding of colony connectivity.
1.7	NE, RSPB, MMO, TWT, WDC		
1.8	Applicant	As you have stated in the Planning Statement [APP-026] decision making in relation to NSIP projects in English waters should have regard to the appropriate marine policy document be it the MPS or an adopted marine plan. The ExA notes that the project is said to be in general accordance with the objectives and policies set out in the MPS (para 81), but it is not apparent where the East Inshore and East Offshore Marine Plans, adopted on 2nd April 2014 is dealt with in similar terms. Please identify where the EIEOMP has been submitted to the ExA or supply a copy thereof and explain how relevant policies in EIEOMP are complied with in respect of the Project.	A checklist showing how Norfolk Vanguard complies with each relevant objective of the East Inshore and Offshore Marine Plans has been completed and agreed with the MMO. This document is provided in Appendix 1.1 (document reference ExA; FurtherWQApp1.1; 10.D4.6). In addition, the East Inshore and Offshore Marine Plans are provided in Appendix 1.2 (Parts 1 and 2; document reference ExA; FurtherWQApp1.2; 10.D4.6).

1.2 Principle and Nature of the Development

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2.4	Applicant	Paragraphs 4.8.5 and 4.8.6 of the Overarching National Policy Statement for Energy (EN-1) state that applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning	Paragraph 4.8.5 of the Overarching NPS for Energy (EN-1) states: '*New energy infrastructure will typically be a long-term investment and will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate,*

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		of new energy infrastructure, setting out how the proposal will take account of the projected impacts of climate change. Please explain or direct the ExA to the relevant section of the application to demonstrate how the above has been addressed in the design, including appropriate mitigation and adaptation measures, of both onshore and offshore infrastructure for Norfolk Vanguard.	*decommissioning of new energy infrastructure. The ES should set out how the proposal will take account of the projected impacts of climate change. While not required by the EIA Directive, this information will be needed by the IPC.'* **Offshore Infrastructure** Projected impacts of climate change which could affect the offshore infrastructure are rises in sea level and increased storm events. Chapter 8 of the ES (document 6.1.8) discusses storm surges, wave heights and sea levels with respect to climate projections. The turbine interface level (elevation of the platform above the substructure) and other relevant parameters for turbines and platforms (such as clearance of blade tip from highest astronomical tide and platform height) have been calculated based on latest climate change projections and will be confirmed at the detailed design stage to ensure that values allow for projected sea level rise. Offshore decommissioning is described in Section 5.4.19 of ES Chapter 5 Project Description. This notes that the scope of decommissioning will be determined at the time of decommissioning, however this is likely to include removal of all of the wind turbine and offshore platform components. Decommissioning works will be determined by the relevant planning and guidance at the time and therefore any necessary consideration of the impacts of climate change will be accounted for. Offshore cables and subsea infrastructure would not be influenced by sea level changes, so increased storm events is the only element of climate change that may apply to this infrastructure. The offshore export cable will be buried at a suitable depth (where possible), reducing the likelihood of exposure due to scouring of the sediment by waves created by storms. Additional detail regarding the resilience of offshore infrastructure to storm events is covered in the Applicant's response to Question 2.5 below. **Onshore Infrastructure** 1. Landfall

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			The location and design of the landfall infrastructure and construction methods include embedded mitigation taking into account projected impacts of climate change. The Coastal Erosion Study (Appendix 4.3 of the ES – Document reference 6.2.4.3) was completed to inform site selection of the landfall, which resulted in Happisburgh as the chosen location. Mitigation at landfall includes the employment of long Horizontal Directional Drilling (HDD) as the landfall duct installation method, avoiding interaction with the cliffs and ensuring cables would be installed at sufficient depth below the coastal shore platform and cliff base to avoid significant effects on coastal erosion. An HDD feasibility study was undertaken (ES Appendix 4.1 – Document reference 6.2.4.1) to show that HDD would be possible at landfall. Landfall design and mitigation in relation to climate change is described in more detail in Consideration of EN-1 Climate Change Policy in the Application, submitted at Deadline 3 (document reference ExA; ISH; 10.D3.1D). The detailed design of decommissioning activities at the landfall will depend on the coastal geography and topology at that time. A full decommissioning plan (and associated Environmental Impact Assessment (EIA)) will be developed prior to undertaking any such activities and is secured by Requirement 29 of the dDCO. 2. Cable route UK Climate Projections indicate increased rainfall in winter, resulting in higher surface and groundwater flows. Section 20.6.5 of Chapter 20 Water Resources and Flood Risk of the ES (document reference 6.1.20) describes the anticipated trends and notes that a greater number of rain storms is likely as a result of climate change. As a result of the site selection process undertaken for the Project as described in ES Chapter 4 Site Selection and Assessment of Alternatives, the majority of the onshore cable route is located within an area of low flood risk (Flood Zone 1) according to the Environment Agency flood zone maps. Flood Zone 1 is defined as land having a less than 1 in 1000 annual possibility of river flooding (<0.1%). This embedded mitigation ensures that, where possible, the onshore cable route is located away from areas more likely to be impacted by the projected increased rainfall. The Flood Risk Assessment

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			(document reference 6.1.20.1) provides a detailed description of the baseline flood risk of the study area. During construction, the onshore cable route will be bounded by drainage channels to intercept drainage from within the working corridor. Additional drainage channels will be installed to intercept water from the cable trench. A Surface Water and Drainage Plan (SWDP) (Requirement 20 (2)(i) of the dDCO) will be developed, agreed with the relevant regulators and implemented to minimise water within the cable trench and other working areas and ensure ongoing drainage of surrounding land. Following construction, field drainage systems and ditches would be fully reinstated where possible in consultation with landowners / occupiers. Reinstatement of ditches and culverts that were removed or disturbed during construction would also be undertaken. See section 11 of the Outline Code of Construction Practise (OCoCP) for more detail (document reference 8.1). 3. Onshore project substation and National Grid substation extension Siting of the onshore project substation avoids high flood risk areas. Prior to the onshore construction works, surface water drainage requirements would be dictated by the final drainage study and designed to meet the requirements of the National Planning Policy Framework. The onshore project substation SWDP will have sufficient storage / attenuation volume to ensure that during the 1 in 100 year rainfall event, plus an allowance for climate change. As the operational life of the project is approximately 30 years, the relevant flood risk epoch is 2040 to 2069 using the Environment Agency's Climate Change Allowance Guidance. This identifies an allowance of 20% for climate change. The design will ensure that there will be no increase in surface water runoff from the site, taking into account climate change, during the operational life of the substation. The climate change allowance to be incorporated into the design is agreed with Norfolk County Council (NCC) as the Lead Local Flood Authority, as noted in the SOCG with NCC (document reference Rep1 – SOCG – 15.1). The full specification for the attenuation pond and drainage strategy would be addressed as part of detailed design post-consent. Operational flood

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			risk at the onshore project substation will be managed through the operational SWDP, secured in an update to the Construction Practice, or another DCO document, and will be secured in an update to the DCO. It is agreed with NCC, and noted in the SOCG, that the proposed mitigation for managing flood risk is appropriate and adequate. Chapter 29 of the ES (document reference 6.2.29) states that mitigation measures at the onshore project substation have taken into account the 'Statements of Environmental Opportunity' as set out in NE's 'National Character Area Profiles'. These statements include a requirement to address the impacts of climate change, which is addressed through the mitigation measures noted above and those described in the Outline Landscape and Ecological Management Strategy (OLEMS) (document reference 8.7) including avoiding main rivers where possible during site selection, use of trenchless crossings at carefully chosen locations, and reinstatement of soils and ponds as well as hedgerows following construction. Paragraph 4.8.6 of the Overarching NPS for Energy (EN-1) states: '*The IPC should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure. Should a new set of UK Climate Projections become available after the preparation of the ES, the IPC should consider whether they need to request further information from the applicant*.' The UK Climate Projections (UKCP) 2009 were the latest projections available at the time of the Norfolk Vanguard application. The parameters in UKCP (2009) which are most applicable to the project relate to rainfall, storms and sea level rise. Section 8.6.6 in Chapter 8 of the ES (document reference 6.2.8) outlines the projected sea level rise on the UK coastline according to the UKCP09. Consideration of EN-1 Climate Change Policy in the Application, submitted at

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			Deadline 3 (document reference ExA; ISH; 10.D3.1D) provides detail on the mitigation at the landfall against projected coastal change. Rainfall events and associated flooding are taken into consideration in ES Chapter 20, and consideration of this is described earlier in this response. Storm surges and the resilience to storms is addressed in the Applicant's response to question 2.5. Since the application was submitted, the UKCP18 has been published. The implications of this are addressed in the Applicant's response to question 16.30.
2.5	Applicant	Paragraph 2.3.4 of NPS (EN-3) states that applicants should set out how a proposal would be resilient to storms. Please explain or direct the ExA to the relevant section of the application documents to show how this has been addressed in the design of offshore infrastructure for Norfolk Vanguard.	Paragraph 2.3.4 of NPS (EN-3) states: *'Offshore and onshore wind farms are less likely to be affected by flooding, but applicants should particularly set out how the proposal would be resilient to storms.'* Detailed design of the project infrastructure will be finalised post consent based on the best available information at the time however, various measures have been embedded into the design of the offshore infrastructure which will ensure that the project is resilient to storms. These are outlined below and detailed in Chapter 5 of the ES (document reference 6.1.5): • Turbine and offshore electrical platform foundations will be suitable for the size of the turbine/platform, to ensure stability and robustness. • Long HDD will be employed at landfall. Use of long HDD allows the cable to be buried at a suitable depth below the beach and cliffs, as well as the shallow subtidal zone, so that the risk of exposure due to storms is minimised. The long HDD would exit in water depth beyond 5.5m below lowest astronomical tide (LAT), where cable protection would be installed. This would protect the exit point from exposure due to storm-related turbulence. • The offshore export cable will be buried at a suitable depth (where possible), reducing the likelihood of exposure due to scouring of the sediment by waves created by storms. Additionally, an offshore cable monitoring plan will be produced post consent, as part of the Cable

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			Specification, Installation and Monitoring Plan secured under Condition 14(1)(g)(iii) of Schedules 9 and 10, and Condition 9(1)(g)(iii) of Schedules 11 and 12 in the DCO. This monitoring plan would ensure that the cable remains buried throughout its lifetime and any need for reburial would be identified. In this way, although unlikely, any exposure of the cable due to storms would be addressed and the cable reburied as necessary.
2.6	Applicant	Paragraph 4.5.3 of EN-1 seeks to ensure that energy infrastructure developments are sustainable and as attractive, durable and adaptable as they can be, taking into account both functionality (including fitness for purpose and sustainability) and aesthetics. Please explain, in relation to fitness for purpose, sustainability, durability and adaptability, how Norfolk Vanguard has demonstrated good design.	Paragraph 4.5.3 of EN-1 states: "*In the light of the above and given the importance which the Planning Act 2008 places on good design and sustainability, the IPC needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable and adaptable (including taking account of natural hazards such as flooding) as they can be. In so doing, the IPC should satisfy itself that the applicant has taken into account both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located) as far as possible. Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, landform and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area*." The Applicant considers that the site selection process, design development, design parameters (and embedded mitigation) and construction methodology for Norfolk Vanguard are the primary mechanisms by which the Project has demonstrated good design and sustainability in accordance with paragraph 4.5.3 EN-1. The site selection process is set out in detail within ES Chapter 4 Site Selection and Alternatives. A detailed summary of the site selection process was previously provided in the Applicant's response to Q2.1 at Deadline 1, which

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			demonstrated how good design had been taken into account in terms of the siting of infrastructure relative to existing landscape character, landform and vegetation. The design and construction methodology for Norfolk Vanguard is set out in detail within ES Chapter 5 Project Description. The offshore and onshore elements of Norfolk Vanguard are defined as far as they can reasonably be at this stage in order to inform the worst-case scenarios within the EIA. The components of the authorised development (as defined in Schedule 1 of the dDCO) have been selected to ensure that Norfolk Vanguard will be functional and fit for purpose for delivering renewable energy, while retaining the necessary degree of flexibility at this stage in the delivery of the project. The design life of the project is approximately 30 years and the installed infrastructure will be designed with this understanding to ensure that it is durable and fit for purpose. Embedded mitigation measures that form part of the design include: • Strategic approach to delivering Norfolk Vanguard and Norfolk Boreas, which reduces impacts associated with two separate duct installations; • Commitment to high voltage direct current (HVDC) technology – minimising land take and avoiding additional above ground infrastructure associated with a cable relay station; and • Long HDD at the landfall to reduce potential interaction with the cliff and associated coastal erosion projections. The final design of the onshore project substation and National Grid substation extension are subject to detailed design post-consent. In order to minimise visual impacts as far as possible, the appropriate building design and materials will be considered, to ensure blending with the local environment and minimisation of impacts as far as possible. The Design and Access Statement (document reference 8.03) includes a set of Design Principles for the onshore project substation and National Grid substation extension (Table 5.3) which will set out the process to develop the final design.

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			The concept of sustainability and sustainable energy production is the driving principle underpinning the Project; Norfolk Vanguard would be one of the largest offshore wind projects in the world and would make a large contribution to the achievement of national and global renewable energy targets. Norfolk Vanguard has the potential, at today's level of UK carbon emissions from the power sector, to prevent more than 2,000,000 tonnes of CO2 from entering the atmosphere. Norfolk Vanguard therefore represents a significant beneficial impact in terms of the UK's contribution to global efforts to reduce the effects of climate change. Adaptability relates to the siting of the offshore and onshore infrastructure, and choice of materials, taking into account natural processes such as coastal erosion, flooding and storm surges. These are all directly linked to climate change and a full response is provided on this at Q2.4. The key areas where adaptability to climate change has influenced the design (as described in more detail in the Applicant's response to Q2.4) include: • The design of the landfall infrastructure and construction methods allowing for coastal erosion projections; • Allowing sufficient room within the design at the onshore project substation for surface water attenuation taking into account climate change plus an allowance of 20%; and • Accounting for sea level rise in the turbine and offshore platform foundation design.
2.7	Applicant	At ISH1 [EV-006 and EV-007] the Examining Authority (ExA) asked about the contention of some interested parties that the deliverability of HVDC technology was questioned by the promotors of the Hornsea Three Project. Please comment upon these representations and explain any differences in approach between the Norfolk Vanguard project and the Hornsea Three Project. Please explain the	Since many local residents and stakeholders regard the use of HVDC technology as being more suitable for the Project, and with fewer impacts than the use of a High Voltage Alternating Current (HVAC) solution, it is understandable for these Interested Parties (IPs) to seek assurances that the HVDC solution is deliverable, both technically and commercially. The fact that Hornsea Three (H3) is taking a different approach on the HVAC/HVDC question is clearly contributing to the need for further assurances on these points. At project scoping and Preliminary Environmental Information Report (PEIR), the Applicant described both HVAC and HVDC transmission solutions. During

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		reasons behind the Applicant's confidence that HVDC can be delivered for this project.	pre-statutory consultation, strong feedback was received favouring the HVDC solution from a range of stakeholders. Although as noted in response to q20.121, it is the physical structures (e.g. cable relay station and increased number if cables requiring an increased land take), as opposed to the nature of the Alternating Current (AC), that is the principal issue for IPs in this respect. Vattenfall undertook a technology assessment exercise in late 2017 to establish whether there was a real benefit to the Project in retaining the HVAC option and on the commercial and technical viability of the HVDC solution. Following this assessment, a decision was made to rule out the HVAC option. The Applicant announced this decision in early 2018, and the HVAC solution was not included in the ES and dDCO at submission (June 2018). As a result of ongoing collaboration with the HVDC supply chain, the Applicant has a high degree of confidence in the ability to procure a cost-effective HVDC transmission solution in the timescales required for the Project. This confidence is supported by the fact that there are already a number of offshore HVDC 'hubs' in the German sector of the North Sea, through which multiple OWFs export power into the onshore transmission system of that country. Secondly, the supply chain for offshore HVDC solutions is becoming more mature – there are now three suppliers of HVDC converter technology who have experience of designing and delivering offshore HVDC converter platforms, and several cable suppliers who can manufacture and install suitable HVDC cables. The approach being taken by the H3 project is somewhat different to Norfolk Vanguard; H3 have opted to retain both HVAC and HVDC transmission solutions within the envelope of their DCO consent and they contend that this is necessary in order to maximise the range of supply chain options and secure the most cost-effective transmission solution for their project (in order to minimise cost to consumers). This position is set out in section 5 of the H3 document "Appendix 22 to Deadline 1 submission – Transmission System (HVAC/HVDC) Briefing Note" available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-001131-DI_HOW03_Appendix%2022.pdf).

1.3 Ecology Offshore - Ornithology

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
3.19	RSPB		
3.20	Applicant	Further to your response to ExQ1 3.3 a) please provide an update on the ongoing discussions regarding the use of potential biological removal versus population viability analysis modelling.	As noted in response to Q3.3 a), the Applicant's intention is to address the question of the most appropriate methods for estimating population consequences of OWF impacts following agreement on impact magnitudes with Natural England (NE). Following the additional work submitted by the Applicant at Deadlines 1 and 3 and the responses to these from NE and the Royal Society for the Protection of Birds (RSPB), the Applicant considers that these agreements are now close for many of the previously outstanding aspects, and therefore population modelling will be one of the next aspects considered. It should be noted that while the Applicant made reference to the results of Potential Biological Removal (PBR) presented for past offshore wind farm applications, where relevant and informative, there is no intention to produce updated PBR. If any additional population modelling is required, it will be in the form of Population Viability Analysis (PVA).
3.21	Applicant	In response to ExQ1 3.3 j) you stated that an update on apportioning rates will be provided as necessary. Please set out when this update will be provided, having regard to NE's comments in its response to ExQ's [REP2-036] in which it requested clarification on how the rates were calculated.	This update will be provided for Deadline 6.
3.22	Applicant	In response to ExQ1 3.3 l) [REP1-007] please indicate the timescale for the presentation of the results that incorporate the kittiwake tracking data supplied by the RSPB.	The results of this analysis and the assessment it will inform will be provided at Deadline 6.
3.23	Applicant	Please respond to 'Natural England's comments on Appendix 3.3 – Operational Auk and Gannet Displacement: update and clarification' [REP3-051] in which NE maintains its concerns regarding the cumulative operational displacement for auks.	Natural England's concerns about cumulative auk displacement are a combination of uncertainty about projects currently in Examination (e.g. Hornsea Project THREE and Thanet Extension), determination of which figures to use for other projects (e.g. Seagreen Alpha and Bravo) and the origin of

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			reference nonbreeding population sizes for guillemot and puffin. These are discussed in turn below. 1. Figures for projects which are also currently in Examination and for which the relevant applicant and NE remain in disagreement can only be presented on the basis of the best available understanding, and this approach has been applied by the Applicant in the current case. As noted in response to Q14.32, the Applicant will maintain an overview of these projects and will consider the requirement to update the Cumulative Impact Assessment (CIA) following any significant updates to these projects during examination, however it should be noted that this cannot be an open-ended process and 'final' values for other projects will need to be agreed with NE within the near future. 2. NE has recommended that the Applicant should use a different set of tables of auk displacement for the Thanet Extension than those used by the Applicant. The Applicant used those presented in the project's ES ornithology chapter (Thanet Extension Offshore Wind Farm Environmental Statement Volume 2 Chapter 4: Offshore Ornithology, e.g. for razorbill Table 4.17 project alone and Table 4.18 buffer only) and summed the figures for the project alone and buffer as presented in the assessment. NE has advised that the figures should be those presented in a technical annex to the ES (Thanet Extension Offshore Wind Farm Annex 4-3: Range of Displacement Matrices for Seabird Species Recorded in Thanet Extension), again with project and buffers summed. The Applicant will review NE's preferred outputs and update the Norfolk Vanguard cumulative assessment as appropriate. With respect to the population estimates for the Seagreen Alpha and Bravo projects, the Applicant has used figures reported in the 2018 assessment, however these were estimates using data collected between 2009 and 2011 (used in the 2012 assessment) and also additional surveys conducted in 2017. Thus, these are considered to be robust values for use in the cumulative assessment. 3. NE has queried the nonbreeding reference populations for guillemot and puffin used by the Applicant. The estimates presented by the Applicant were those reported by NE for the Hornsea Project TWO wind farm (Natural England 2015, Written Submission for Deadline 6, 26th Nov 2015, Table 2). These figures

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			were used in the Norfolk Vanguard ornithology chapter of the ES (Table 13.68) and repeated in the Applicant's submission at Deadline 1 (Appendix 3.3 – Operational Auk and Gannet Displacement: update and clarification' [REP3-051]). As these figures were those supplied by NE for the cumulative assessment for Hornsea Project TWO, the Applicant assumed these were appropriate to use. This was discussed with NE during a call on the 8th March following which NE will review these figures and advise on their suitability.
3.24	Applicant	In its comments on Appendix 3.3 [REP3-051] NE notes that although it agrees with the overall conclusions, Table 3 of Appendix 3.3 contains an incorrect figure for the mean peak winter abundance for razorbill for Vanguard East. Please clarify this.	NE is correct that this figure was incorrectly entered, using that for November (279) instead of that for December (491). Inclusion of the additional 212 (491-279) individuals at risk of an effect, following application of the displacement rates used, increases the total annual displacement mortality summed across Norfolk Vanguard East and Norfolk Vanguard West as follows: Total annual displacement mortality increases from 9.9 to 10.5 (at the lower estimate of 30% displaced, 1% mortality), from 16.6 to 17.6 (at the Applicant's evidence-based rates of 50% displaced and 1% mortality) and from 230.7 to 245.7 (at the upper estimate of 70% displaced and 10% mortality). As well as noting this error, NE noted that inclusion of this adjustment was expected to result in them agreeing with the Applicant's conclusion of a minor adverse impact on razorbill from operational displacement from the project alone.
3.25	Applicant	Please provide the specific timings for when the bird surveys were conducted in each year.	These have been submitted in an appendix to this WQ response (ExA; Further WQApp3.1; 10.D4.6).
3.26	Applicant	Please respond to the RSPB's contention that as the data in Figure 1 of Appendix 3.2 are binomial then a mean of bird densities is more appropriate than using a median approach.	The specific distributions presented in Figure 1 of Appendix 3.2 were intended to be considered alongside those in Figure 2, to illustrate that using the mean and standard deviation (as suggested by the RSPB) from binomially distributed data generates a poor representation of the original sample (as can be seen in the difference between Figure 1 and Figure 2). This was presented in support of using the bootstrap samples (i.e. data as per Figure 1) instead of random values generated from summary statistics which are a poor representation of the data (as per Figure 2). The most appropriate means to present the outputs from the stochastic model using these data is graphically (as provided in the ES, Technical Appendix 13.1

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			Annex 6) by means of box and whisker plots. As can be seen from these graphical outputs, the collision estimates are generally highly skewed (i.e. most simulations result in lower values, with high values present as outliers) and as such the median is a better measure of central tendency. The above considerations notwithstanding, following further discussions on this topic with NE during a call on the 8th March, further collision modelling updates will use input values, and present outputs, which include those preferred by the RSPB and NE. It is anticipated that additional collision modelling assessment will be submitted at Deadline 6.
3.27	Applicant	In its Deadline 3 (D3) response [REP3-051] NE maintains the concerns raised in its Relevant Representation (RR) and Written Representation (WR) [RR-106 and REP1-088] regarding the seasonal definitions for lesser black-gulled gull and gannet. Please respond to these concerns.	NE has maintained this concern because no further updates to the final assessments for these species have yet been provided by the Applicant to date. This is because the focus for additional work has been on the technical details of the assessments and therefore there has been no further presentation of results in relation to biological seasons. This aspect will be addressed by the Applicant in submissions at future deadlines.
3.28	Applicant	In its comments [REP3-051] on the Appendix 3.1 red-throated diver displacement that you have submitted at D1, NE advocated an approach similar to that taken by the Thanet Extension project and has commented that at present it is not in a position to reach any conclusion regarding the level of cumulative impact on red-throated diver from the operational phase of Norfolk Vanguard. Please respond to this.	The Applicant has reviewed the cumulative red-throated diver assessment submitted for the Thanet Extension project. This assessment has demonstrated that when a like-for-like approach is applied for offshore wind farm projects in the southern North Sea, those currently in Examination (Norfolk Vanguard, Hornsea Project THREE and Thanet Extension) contribute a very small amount to the predicted cumulative effect, with over 95% of the total effect attributed to existing, operational wind farms. The Applicant does not consider there to be any requirement to repeat the analysis and reporting undertaken for Thanet Extension as this would present the same information and reach the same conclusions. The Applicant discussed this with NE during a call on the 8th March and it was agreed that this was an appropriate approach. The cumulative and in-combination assessment will be updated with reference to the work presented for Thanet Extension. This will be submitted for Deadline 6.
3.29	Applicant	In its comments on Appendix 3.3 [REP3-051] NE notes that the figures cited for guillemot and puffin do not correlate with the largest BDMPS figures for	The guillemot and puffin population estimates used by the Applicant in the assessment (2,045,078 for guillemot and 868,698 for puffin) which NE has suggested are incorrect are ones which NE proposed for the Hornsea Project

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		the UK North Sea and Channel BDMPS in Furness (2015). Please clarify this.	TWO assessment (Natural England 2016. Hornsea Offshore Wind Farm - Project TWO Application Written Submission for Deadline 6 Dated 26th November 2015). As these figures were those supplied by NE for cumulative assessment for Hornsea Project TWO the Applicant assumed these were appropriate to use. This was discussed with NE during a call on the 8th March following which NE will review these figures and advise on their suitability.
3.30	Applicant	Please provide the gannet cumulative impact assessment by Deadline 4.	The Applicant notes that, to the best of its knowledge, gannet cumulative displacement is not an impact which has been required for previous OWF applications, and as a consequence there are no previous assessments on which this can build (this aspect was discussed with NE during a call on the 8th March). Instead it is necessary to review the original applications for each project to be included. This work to collate abundance estimates for North Sea OWFs is underway, however it will not be completed for submission at Deadline 4. The Applicant will endeavour to provide this by Deadline 5.

1.4 Ecology Offshore – Marine Mammals

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
4.8	TWT, WDC		
4.9	Applicant, NE, MMO, TWT, WDC	At the offshore environmental matters Issue Specific Hearing 2 (ISH2) [EV-009 and EV-010] the Applicant stated that other offshore construction techniques, such as vibration or downward impulses, were being considered. At present Condition 14(f) of Schedules 9 and 10 and Condition 9(f) of Schedules 11 and 12 of the dDCO only requires the submission of a Marine Mammal Mitigation Protocol (MMMP) in the event that driven or part-driven piles are proposed	The Site Integrity Plan (SIP) condition relates to mitigating effects on the Southern North Sea Site of Community Importance (SCI). Advice from the SNCBs states that the following impact ranges should be used in assessing effects on the SCI: • 26 km percussive piling; and • 26km unexploded ordnance (UXO) detonation; and • 10km for seismic surveys[1].

[1] Geophysical surveys and UXO detonation do not form part of the Norfolk Vanguard DCO and would be licenced separately, as required.

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		to be used. Furthermore, Conditions 14(m) of Schedules 9 and 10 and 9(l) of Schedules 11 and 12 contain similar wording in relation to the submission of a Site Integrity Plan (SIP). In the event that the Applicant proposed to utilise any other construction techniques, instead of driven or part-driven piling, do you consider that a MMMP and SIP should still be submitted? Please justify your answer.	Based on this guidance, there is no mechanism to consider any alternative activities in relation to the spatial thresholds advised by the MMO and SNCBs and therefore alternative techniques such as vibration are not included in the SIP requirement. However, it should be noted that the use of an alternative technique such as vibro-piling, may be mitigation identified as a result of the SIP and these are identified as potential mitigation measures in the In Principle SIP (document reference 8.17). The Marine Mammal Mitigation Protocol (MMMP) condition relates to mitigating potential auditory injury as a result of percussive pile driving. Therefore, if an alternative method is adopted to reduce noise levels this would negate the need for a MMMP.
4.10	WDC		
4.11	Applicant, MMO, NE, WDC, TWT	A maximum hammer energy of 5,000kJ has now been specified in condition 14(1)(n) of Schedules 9 and 10 of the dDCO [REP2-017]. However, please comment on whether or not there would be any benefits in having a range of maximum hammer energies being specified in the dDCO, for example the 2,700kJ figure that relates to the worst-case scenario for a 9MW pin pile structure?	5,000kJ is the worst case scenario for auditory injury and spatial effects on marine mammals at any one time and has therefore been included in the dDCO. Consideration is also given to disturbance and temporal effects associated with pin-piles in ES Chapter 12 Marine Mammals. A number of methods are used to assess the potential effects, including: • Underwater noise modelling based on a 2,700kJ hammer and various hearing thresholds (e.g. NOAA criteria for temporary threshold shift/fleeing response and possible behavioural responses based on Southall *et al.,* 2007 and Lucke *et al.,* 2009); and • Assessment of disturbance based on the 26km range advised by SNCBs (which does not take account of underwater noise modelling, pile size or hammer energy). Given the range of options for assessing behavioural effects, the Applicant considers that it is not appropriate to define parameters associated with this (e.g. 2,700kJ) in the DCO.

1.5 Ecology Offshore - Other

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
5.24	NE		
5.25	Applicant	Please comment on NE's concerns in Annex C of its WR [REP1-088] about the use of the caveat 'where possible' in regard to micro-siting to avoid areas of *Sabellaria spinulosa.* How would any disagreements over the final cable route and what is 'possible' be resolved?	The Applicant acknowledges that as a European site, the HHW SAC has a special environmental status. For this reason, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include proposed mitigation measures and agreement processes associated with the micro-siting of cables within the HHW SAC.
5.26	Applicant	In Annex C of its WR [REP1-088] Natural England advises that a pre-construction sandwave levelling report and assessment is required. Do you consider that this is adequately secured in the dDCO, for example in the wording of Condition 13 of Schedules 11 and 12? If not, then suggest additional wording that you consider should be included.	The Applicant acknowledges that as a European site, the HHW SAC has a special environmental status. For this reason, the Applicant agrees that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan.
5.27	Applicant	Further to your response in Appendix 1 [REP3-004] please provide more details regarding what you consider to be the unfeasibility and potential health and safety risks for the removal of cable protection at the decommissioning stage of the project that you have referred to.	Types of cable protection considered as part of the project design are presented in section 5.4.14.1 of ES Chapter 5 Project Description. Based on industry evidence, there are two common forms of surface protection for subsea cables: • Concrete mattressing – Each 'mattress' comprises a rectangular array of concrete blocks or tiles, which are held together by synthetic rope. Mattresses are typically 6m x 3m, and roughly 0.5m thick. They are flexible, and can be laid over the cable (e.g. to provide additional protection where it has not been possible to protect the cable adequately through burial alone) or draped over features such as pipelines or rock outcrops, so that the cable can be laid on top and additional protection applied over it. The placement of mattresses is slow and as such is only used for short sections of cable. • Rock placement – Rock berm can be placed over the cable in the form of loose rock or 'rock bags'. Loose rock would typically be lifted and placed using a 'grab' attached to a hoist or a hydraulic arm; the grab

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			releases the rock close to the seabed in order to achieve accurate placement, and to avoid impact damage to the cable. As the name suggests, rock bags are bags (formed of synthetic rope netting) containing rocks. Each bag would typically cover an area of roughly 3m x 3m with a thickness of roughly 1m. As with mattresses, rock bags can be lifted and then lowered to the seabed using a hoist with a release mechanism. At the point of project decommissioning, cable surface protection would typically have been installed on the seabed for a period of more than 30 years, in line with the approximate design life of the Project. Over this time, it is likely that any synthetic fibres would have degraded and become brittle. This makes the task of removing 'old' mattresses and rock bags difficult and potentially hazardous. While it may be feasible to deploy a Remote Operated Vehicle to attach a lifting line to a mattress or rock bag, the subsequent lifting operation will impose stresses on the degraded synthetic ropes that hold it together and it is possible that some of the ropes will fail at this point, resulting in an uncontrolled cascade of rocks or concrete tiles. Loose rock could be recovered from the seabed using a grab, however this would be a difficult and expensive operation. By the time decommissioning takes place, some of the rock will have become embedded within the sedimentary structure of the seabed. Therefore, although it might be feasible to recover a proportion of the placed rock, 'full recovery' would likely result in extensive disturbance to the seabed. Chapter 5 of the ES (paragraph 224) also refers to other protection options. Sand bags, grout bags and Uraduct-like systems are mainly used to support and protect cables at the entry to J-tubes or landfall ducts. Removal of frond mattresses presents the same problems as non-fronded mattresses. Offshore decommissioning will be undertaken in accordance with the decommissioning programme to be produced in accordance with Requirement 14 of the dDCO. The scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning.

1.6 Construction - Offshore

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
6.13	Applicant	Further to your responses to the ExQ1 6.1 and 6.2 [REP1-007], and to the discussions in this regard at the offshore environmental matters ISH2 [EV-009 and EV-010], please set out a summary of the key differences to account for the significant range of predicted for inert material to be disposed of and cable protection required for Norfolk Vanguard, Hornsea Project Three and East Anglia THREE.	In response to the offshore Issue Specific Hearing (ISH2) Action Point 5, a comparison of the Norfolk Vanguard sediment disposal and cable protection volumes with those of Hornsea Project Three and East Anglia THREE is provided at Deadline 4 (document reference ExA; ISH2; 10.D4.5).

1.7 Offshore Archaeology and Cultural Heritage

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
7.6	HE, MMO		
7.7	HE		

1.8 Shipping and Navigation

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
8.8	NFFO, VisNed		
8.9	Applicant	Please respond to the comments made by the Eastern Inshore Fisheries and Conservation Authority (EIFCA) [RR-180 and REP1-040] and the	The Applicant 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

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		NFFO/VisNed [REP1-088] that cumulative impact assessment should take into account already installed infrastructure and licensed activities.	the SoCGs with National Federation of Fishermen's Organisations (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 notes that their inclusion in the cumulative assessment would result in a double count of their effect.
8.10	Applicant	Further to the comments made by the NFFO at ISH2 [EV-009 and EV-010] and in [REP1-089] please expand on your views regarding the use of finding arrangements, such as the West of Morecambe Fisheries Fund.	As noted in the SoCG with NFFO/VisNed (Rep1 - SOCG - 26.1) both parties agree that community funding arrangements are outwith the DCO consenting regime. Consultation by the Applicant with the fishing industry is ongoing and will continue post-consent. This may include engagement with regards to potential funding opportunities or wider industry initiatives which the Applicant may support in the future. The Applicant has also prepared an Outline Fisheries Liaison and Co-existence Plan (FLCP) (document reference 8.19) which demonstrates the co-existence procedures which the Applicant has committed to. The FCLP is secured through Schedules 9 and 10, Part 4, Condition 14 (d)(v) and Schedules 11 and 12, Part 4, Condition (9)(d)(v) of the draft DML.

1.9 Marine Geology, Oceanography and Physical Processes, Marine Water and Sediment Quality

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
No questions at this time.			

1.10 Construction Onshore

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
10.2	NCC		

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
10.3	Applicant	Please comment on the concerns raised within REP3-060 in relation to Rural Dark Landscapes and light pollution during the construction phase.	REP3-060 is related to potential effects of the Project on holiday let businesses in the Happisburgh area. The specific reference to Rural Dark Landscapes within REP3-060 is *"Norfolk County Council's Environmental Lighting Zones Policy and Maps gives protection to Rural Dark Landscapes and recognition of their importance to the character of Norfolk for the benefit of both residents and visitors. Fully shielded 'cut off lamps' will be used on all lighting schemes in areas classified as Rural Dark Landscape. The policy applies to all street lights that are the responsibility of the County Council and is also advisory in respect to non-County Council lighting."* The Environmental Lighting Policy quoted is specifically in relation to public street lighting and safeguarding rural dark landscapes where new street light installations are proposed. The construction and operation of Norfolk Vanguard would not lead to any changes to existing public street lighting and so the policy does not directly apply to the Norfolk Vanguard application. However, the potential effects of artificial lighting during construction and operation have been considered fully within the application. The impacts of construction lighting are considered within the Chapter 29 Landscape and Visual Impact Assessment and specifically under Section 29.7.5.1. Mitigation measures identified to manage emissions from artificial light include the use of directional beams, non-reflective surfaces and barriers and screens to avoid light nuisance whilst maintaining safety and security obligations. With these measures in place no significant impacts related to construction lighting have been identified. An Artificial Light Emissions Management Plan will be prepared in advance of construction which will be submitted to the relevant planning authority (RPA) for approval prior to works commencing. The Artificial Light Emissions Plan will detail the location, height, design and luminance of all artificial lighting to be used during the construction of the project, together with measures to

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			limit obtrusive glare to nearby residential properties. The approved scheme will be maintained throughout the construction of the relevant works. These commitments are captured within the OCoCP Section 3.7 (DCO Document 8.1) and secured through Requirement 20(2)(c) of the dDCO. With specific reference to the landfall works in proximity to Happisburgh, these are programmed to take 20 weeks based on the normal working hours set out in DCO Requirement 26, i.e. 07.00 to 19.00 on weekdays and 07.00 to 13.00 on Saturdays with no working on Sundays or bank holidays, i.e. works would be predominantly limited to daytime hours. Should evening / night time working at the landfall be agreed with the RPA, then the landfall construction programme would be reduced to 14 weeks in total. The lighting required during any 24 hour working will adhere to the approved Artificial Light Emissions Plan described above. There will be no operational lighting associated with the cable route, landfall or onshore project substation.
10.4	Applicant	Please provide a detailed response to the questions in relation to the timeline/timings of construction and the provision of link boxes set out in the written representations of the NFU submitted at deadline 3. [REP3-049]	The Applicant refers to the Norfolk Vanguard Project Presentation presented by the Applicant at ISH1 and available on the Planning Inspectorate website (https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-002501-Norfolk%20Vanguard%20Project%20presentation_Feb%202019.pdf) and the Written summary of the Applicant's oral case at ISH1 (ExA; ISH; 10.D3.1) which outlined the programme for onshore works, the duct installation method and the subsequent cable pulling works. Further detail on the onshore works and timeline/timings is provided in response to Q18.27. The Applicant's response with respect to the provision of link boxes is provided in response to Q18.29.

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			The Applicant has also provided this information directly to the National Farmers Union (NFU) / Land Interest Group (LIG) through on-going discussions on the SoCG (Rep1 - SOCG - 5.1), as submitted at Deadline 4.
10.5	Applicant, NNDC	Clarification Note on Landfall 24-hour vehicle requirements: the Applicant asserts that any 24-hour working which may be needed at the landfall will be agreed with the relevant planning authority in advance of construction in accordance with requirement 26 DCO. However requirement 26 provides that '*outside the hours specified in paragraph (1), construction work may be undertaken for essential and non-intrusive activities, including but not limited to…….(c) onshore transmission works at the landfall……..*' Please comment on whether or not requirement 26 would offer any limitation upon or sufficient control in relation to the hours of working for landfall transmission works.	All construction works within the landfall compound have been fully assessed on a worst case for 24 hour, seven days a week operation within the ES. Additionally, and as the Applicant outlines in response to the ExA's Q20.59 at Deadline 1 (document reference: ExA; WQ; 10.D1.3), certain works - mainly attributable to their specific engineering needs - may necessitate hours of work beyond the standard construction hours outlined in Requirement 26(1) of the dDCO. For example, once concrete pouring, such as that required at the onshore project substation, has begun for the basis of foundations or other related works, it will be necessary to complete those works in a continuous period as dictated by aspects such as concrete curing requirements. The Applicant considers that the drafting of Requirement 26 could be clarified by separately listing essential non-intrusive activities. It is proposed that, save for emergency works, the timing and duration of any essential works would be subject to further approval by the relevant Local Planning Authority (LPA). The onshore transmission works at the landfall are listed as 'essential' works and would therefore be subject to further approval in relation to the specific duration and timing of the works to be undertaken. Given the nature of the non-intrusive activities (as described below), it is proposed that these works may proceed outside of the specified times without further LPA approval. The Applicant proposes to amend the dDCO as set out below, which will be submitted at Deadline 4, to reflect this change: *"**Construction hours*** ***26.**–(1) Construction work for the onshore transmission works must only take place between 0700 hours and 1900 hours Monday to Friday, and 0700 hours to 1300 hours on Saturdays, with no activity on Sundays or bank holidays, except as specified in paragraphs (2) to (4).*

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			(2) Outside the hours specified in paragraph (1), construction work may be undertaken for essential activities including but not limited to– *(a) continuous periods of operation that are required as assessed in the environmental statement, such as concrete pouring, drilling, and pulling cables (including fibre optic cables) through ducts;* *(b) delivery to the onshore transmission works of abnormal loads that may cause congestion on the local road network;* *(c) works required that may necessitate the temporary closure of roads;* *(d) onshore transmission works requiring trenchless installation techniques;* *(e) onshore transmission works at the landfall;* *(f) commissioning or outage works associated with the extension to the Necton National Grid substation comprised within Work No. 10A;* *(g) commissioning or outage works associated with the overhead line modification works comprised within Work No. 11 and Work No. 11A;* *(h) electrical installation; and* *(i) emergency works.* *(3) Outside the hours specified in paragraph (1), construction work may be undertaken for non-intrusive activities including but not limited to–* *(a) fitting out works within the onshore project substation buildings comprised within Work No. 8A; and* *(b) daily start up or shut down.* *(4) Save for emergency works, the timing and duration of all essential construction activities under paragraph (2) and undertaken outside of the hours*

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			specified in paragraph (1) must be agreed with the relevant planning authority in writing in advance, and must be carried out within the agreed time."
10.6	Applicant	In relation to the above clarification note: please explain the figure of 20 personnel vehicles per day in the site mobilisation phase and 10 personnel vehicles per day in the drilling phase. Is this 20 personnel vehicles, with each vehicle performing 2 movements per day (to and from the site)? Does it relate to 20 personnel being required on site at any given time? What would the total vehicle movements be over a 24-hour period assuming shift change-overs and counting journeys to the site and from the site as separate movements?	With reference to the Clarification Note on landfall 24 hour vehicle requirements (ExA;AS(ISH1 Action);10.D3.7), regarding the site mobilisation and demobilisation works periods, it is 20 personnel vehicles with each vehicle performing 2 movements per day (to and from site), therefore 40 separate movements. This does not necessarily relate to 20 personnel being on site at any one time as different activities during these works periods may require personnel for shorter periods during the day. Regarding the drilling phase, it is 10 personnel vehicles with each vehicle performing 2 movements per 24 hour period (to and from site), therefore 20 separate movements. This includes allowance for shift change-overs.
10.7	Applicant	The Hornsea Project Three HGV Haul Road Reduction Report has been submitted. It is noted that the reduction in HGV movements arises as a result in the reduction of the depth of the haul roads to no more than 500mm depth. Please indicate the assumed depths of the haul roads for the Norfolk Vanguard project or confirm where the relevant information can be found.	ES Chapter 24 Traffic and Transport (document reference 6.1.24) Appendix 24.5, details the forecasted traffic movements associated with the expected quantity of materials, plant and total HGV deliveries for each of the components of the onshore project area, including running track stone (aggregate). The assumption is for a 60km length x 6m width x 0.3m (300mm) depth.
10.8	Applicant/NCC	The report referred to in the previous question explains the basis on which generated traffic was assigned onto the highway network in terms of traffic flows and using a sensitivity methodology. Is this distribution methodology and the assumptions applied consistent with those applied in the Transport Assessment for the Norfolk Vanguard project? It is noted that the outline CTMP in relation to The Street and the B1145 at Cawston will be revisited in light of the updated data in this report. Please	ES Chapter 24 (document reference 6.1.24), Section 24.7.2.5 sets out the traffic distribution methodology for Norfolk Vanguard. As set out in Section 24.3, this methodology has been discussed, refined and agreed with NCC and Highways England (HE) via Expert Topic Group (ETG) meetings as part of the Evidence Plan Process. This is confirmed in the Statements of Common Ground submitted at Deadline 1 with HE (ref: Rep1- SOCG 7.1) and Norfolk County Council (ref: Rep1 SOCG 15.1). Hornsea Project Three has a different construction methodology (provision of a single main compound) and they have also taken a different approach to how traffic is distributed on the network. Both project approaches have been accepted by HE and NCC.

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		provide the ExA with an update as to progress in relation to these matters	Norfolk Vanguard and Hornsea Project Three are working closely together to ensure that the outputs of each project's cumulative traffic impact assessment are consistent with each other, and that any identified mitigation measures are appropriate and fit for purpose. Hornsea Project Three has recently submitted updated construction traffic numbers to their examination, which has enabled the Applicant to progress the CIA work for Norfolk Vanguard along these shared road links. The Norfolk Vanguard cumulative traffic impact assessment (taking into account Hornsea Project Three updated traffic numbers) is due to be submitted to the Norfolk Vanguard examination at Deadline 5. The Applicant is reviewing the mitigation schemes proposed by Hornsea Project Three along The Street and the B1145 at Cawston and further engagement has been undertaken with Hornsea Project Three and NCC to inform the scale and extent of the mitigation schemes for the Norfolk Vanguard project alone and cumulatively. The outputs from this review will form part of the cumulative traffic impact assessment to be submitted to the Norfolk Vanguard examination at Deadline 5. Where additional mitigation is identified this would be captured within an update to the outline Traffic Management Plan (OTMP) (document reference 8.8) and secured through Requirement 21.

1.11 Traffic, Transport and Highway Safety

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
11.33	Applicant/NCC	Cumulative impacts with Hornsea Three Project (H3) To the Applicant: the ExA refers to your comments in [REP3-003] confirming that you will review the position with regard to cumulative impacts of both projects in light of the revised traffic generation figures submitted to the H3 examination. You	The Applicant confirms that the mitigation scheme proposals currently being developed in consultation with Hornsea Project Three and NCC (refer to the Applicant's response to Q10.8) will cater for all Project sequencing scenarios including those raised by NCC [REP3-053] and those raised by the ExA.

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		confirm that you will include consideration of different scenarios in terms of the sequencing of the two projects. Please confirm that you will cater for the situations outlined in Norfolk County Council's RR [REP3-054]. In addition please confirm that you will cater for the mitigation measures needed in a scenario in which H3 does not proceed and Norfolk Vanguard proceeds on its own. To the County Council: please confirm your position in relation to the mitigation measures necessary should Norfolk Vanguard proceed in isolation.	
11.34	NCC		
11.35	Applicant	If the ExA comes to the view that trenchless crossings are necessary on the B1149 - can this be catered for in the application? Does the Rochdale Envelope include sufficient land to cater for this eventuality? If not, why not, and how much additional land would be needed/how could this matter be addressed?	The roads that are proposed to be crossed by trenchless crossing techniques and those that are proposed to be crossed by open cut trenching were discussed and agreed with NCC as part of the Norfolk Vanguard Evidence Plan Process. Trenchless crossings were proposed where it would necessary mitigate traffic impacts that would otherwise occur using an open cut trenching solution. The B1149 was not identified as a road that required a trenchless crossing based on existing and proposed traffic flows and the DCO application was submitted on this basis. NCC has subsequently identified that as this road will be used by both Norfolk Vanguard and Hornsea Project Three construction traffic that it should now be crossed by trenchless techniques. The Applicant has agreed to undertake an exercise reviewing the proposed traffic flows on that link to inform whether an open cut trench solution is still appropriate in this location. This exercise also considers the design specification of the reinstated road taking into account the temporary increase in cumulative construction traffic on the reinstated surface, which was also raised as a concern by NCC. The Applicant is engaging NCC's Pavement Laboratory to analyse the current condition of the B1149 to inform a specification for future reinstatement. It should be noted that the Applicant is also undertaking further work at the crossing of the A1067; these updated traffic count surveys have been requested

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			by NCC to inform whether an open cut trench solution is still appropriate at this location. Plate 5.18 and Section 5.5.3.6.3 of Chapter 5 Project Description of the ES illustrates an indicative trenchless road crossing and details associated temporary works areas, including dimensions. Where trenchless drilling activities are to be conducted along the onshore cable route, temporary works areas of approximately 100m x 50m for the drive side and 50m x 50m on the reception side are required to accommodate the potential for auger boring / micro-tunnelling trenchless methods. These temporary works areas are required to store drilling equipment, welfare facilities, ducting and water for the drilling process. If it was determined as part of the cumulative traffic assessment that a new trenchless crossing was required, and needed to include a stop end to prevent onward traffic crossing the B1149 along the running track, the indicative temporary land requirements would be up to 150m x 50m for the drive side and 100m x 50m on the reception side. This additional land is required to provide a turning area for vehicles at the trenchless crossing site where onward travel across the feature being crossed is restricted. A stop end has been included in all other onshore trenchless crossings as part of embedded mitigation with the exception of Wendling Carr at Bushy Common. Determination of the drive and reception sides would be taken at detailed design stage post-consent. The Order limits do not include the indicative areas identified for trenchless crossing as set out above. The proposed crossing method for this location is detailed within Section 5.5.3.3 of Chapter 5 Project Description of the ES such that the works will be conducted within the onshore cable route (45m working width as illustrated in Plate 5.15 of Chapter 5 Project Description of the ES), with no additional land requirements. It should also be noted that widening the Order limits at this location to accommodate a further trenchless crossing would reduce the distance of separation between the construction works and the nearest noise sensitive receptor (currently 140m from the works). The potential increases in

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			construction noise to this receptor (residential property) would need to be assessed and taken into consideration if a trenchless crossing was to be considered at this location. If additional land was required in this location, further negotiations with the landowners either side of the B1149 would be required. The inclusion of additional land would require a further change to the Land Plans and Book of Reference and, to the extent possible, consent would need to be obtained from the affected landowners to include this extra land (and compulsory powers over it) in the application accordingly.
11.36	NCC		
11.37	Applicant	Having regard to the response to Q11.36 above, please provide a detailed response at deadline 5.	A detailed response will be supplied by the Applicant at deadline 5.
11.38	Applicant	Please respond to Norfolk County Council's comments in RR [REP3-053] in relation to requirement 16 of the dDCO constituting a closed list of trenchless crossing points and the counter-arguments supporting the contention that requirement 16 should be amended to make it clear that the list is not a closed list of trenchless crossing.	Requirement 16(17) is intended to ensure that trenchless installation techniques are used in the locations where trenchless installation has been assessed in the ES as part of the embedded mitigation for the Project. Requirement 16(17) does not preclude the use of trenchless installation techniques in other locations, to the extent that this is subsequently agreed with NCC through the Traffic Management Plan (pursuant to Requirement 21 of the dDCO). The Applicant understands that it is NCC's position that certain additional crossings (such as the B1149 and the A1067) should be undertaken by trenchless techniques and should therefore be included in this list. As noted in response to Q11.35, the roads that are proposed to be crossed by trenchless crossing techniques were agreed with NCC as part of the Norfolk Vanguard Evidence Plan Process. Trenchless crossings were proposed where necessary to mitigate traffic impacts that would otherwise occur using an open cut trenching solution. The B1149 was not identified as a road that required a trenchless crossing based on existing and proposed traffic flows. The Applicant's approach to traffic management when crossing roads by open cut trenching is set out in section 1.7.2 of the OTMP, which states that *"single lane operation of roads would be utilised during installation with signal controls to allow movements to continue… The detailed installation method for each crossing utilising traffic management would*

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			be agreed with the relevant highways authority or landowner prior to works beginning." In any event, it is also necessary to consider the feasibility and suitability of trenchless installation techniques at these additional locations. It would not be appropriate to include a Requirement for the use of a trenchless crossing which was dependent on third party land outside of the Order limits, or where the environmental effects of the trenchless crossing had not first been assessed.
11.39	Applicant	The Applicant is referred to the RR from Oulton Parish Council [REP 3-057]. It is noted that further work is to be done in relation to cumulative impacts. In the meantime please respond to the following issues raised in that RR: - Link 68: traffic generation for all types of vehicles in relation to the Cable Logistic Area - Link 75: the concerns raised in relation to the use of the Blickling-Saxthorpe Road for HGV traffic The routing of construction traffic through the northern end of the Oulton Street.	<u>Link 68</u> The Applicant refers to its response to first written questions Q11.25 (ExA; WQ; 10.D1.3) which details the purpose of the Cable Logistics Area. It is the Applicant's preferred strategy to deliver cable drums and associated materials directly to the joint locations from the supplier, and that the cable logistics area will seek to provide 'buffer' storage only should delivery or installation issues arise. For context, if 100% of the cable drums had to be delivered to the Cable Logistics Area prior to installation, and all cables are installed within a single year (single phase cable pulling as the worst case), this would represent an average of two cable drum deliveries per day (four HGV movements). The Cable Logistics Area will also include a temporary site office, welfare and space for the storage of other materials associated with cable jointing such as cable joint kits and cement bound sand. For the cable pulling phase, a conservative assumption of three HGV deliveries per day (six HGV movements) is considered for these requirements. Therefore, for context, the total daily HGV deliveries (cable drums and associated material) based on a conservative worst case can be considered to be up to 5 per day (10 HGV movements per day). A conservative assumption of up to 20 employee vehicles per day at the Cable Logistics Area is also provided for context. The peak traffic demand on Link 68 associated with Norfolk Vanguard remains the 96 daily HGV movements associated with the duct installation phase. The CIA work to be submitted at Deadline 5 will assess the impact of the peak traffic demand associated with Norfolk Vanguard and the peak traffic demand associated with Hornsea Project Three. Where additional mitigation is identified

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			this would be captured within an update to the OTMP (document reference 8.8) and secured through Requirement 21. The peak HGV traffic demand for Norfolk Vanguard alone associated with the cable duct installation and the cable pulling phase is contained in the OTMP (document reference 8.8). <u>Link 75</u> The OTMP (document reference 8.8), Section 1.7.1. sets out the principles for managing construction HGVs on minor routes where two-way HGV traffic is constrained. Link 75 (B1354 – Blickling) is identified as one of these constrained routes and a 'pilot vehicle' strategy is identified to manage the peak demand of 4 HGV movements an hour. The final traffic management plan (TMP) will be produced post-consent which will accord with the principles set out in the OTMP. This is secured through Requirement 21. <u>North end of The Street, Oulton</u> No construction traffic associated with Norfolk Vanguard will be routed along Oulton Street (residential area north of the junction between The Street and Heydon Road).

1.12 Air Quality and Human Health

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
12.10	Applicant/National Grid	In relation to the Norfolk Vanguard and Hornsea 3 crossing point, at the Open Floor Hearing the Applicant stated that if different technologies were used (HVDC and HVAC) the magnetic fields would not interact with each other and can therefore be considered separately. At the Open Floor Hearing, Mr Pearce put forward a conflicting argument that	Appendix 12.1 to the Applicant's submission to Deadline 1 (ExA;WQApp12.1;10.D1.3) consists of an independent report, authored by National Grid, and commissioned by the Applicant and the Hornsea Project Three which evaluated the electromagnetic field (EMF)'s at the proposed point of their crossing under a number of conservative design scenarios. The study advises that if both cable routes that cross use the same power transmission technology, i.e. HVAC and HVAC or HVDC and HVDC, the fields can combine to

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		HVAC cables would induce currents in HVDC. In his response submitted at Deadline 3 he refers to National Grid information and research carried out by Andrew Goldsworthy that supports his assertion. Please comment on the concerns raised by Mr Pearce and provide further information on any effects that would result from HVAC and HVDC cables crossing, including effects on both people and the environment i.e. geology, hydrology and ecology. Would any effects vary dependant on which cables go over or under each other? The cables have a minimum and maximum depth for heat dissipation, what would be the maximum depth required to achieve adequate separation between the two cables?	add or subtract from one another. However, if different technologies are used, i.e. AC and DC, the magnetic fields can be considered separately in their effects. Following the Applicant's commitment to HVDC technology, reference can be made to the calculated DC magnetic fields for Norfolk Vanguard and Norfolk Boreas as illustrated in Appendix 12.1. These indicate a peak magnetic field of less than 1% of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) exposure guidelines, and that under all scenarios (i.e. if Hornsea Project Three use AC or DC), the cumulative calculated fields are compliant with relevant UK policy which is set out in the Written Ministerial Statement of 2009 and namely refers to compliance with the 1998 ICNIRP exposure guidelines. Electromagnetic induction is a phenomenon that can be treated separately in this context. Where a HVDC cable (or indeed, any metallic object such as buried pipelines) passes through an HVAC magnetic field, a small voltage can be induced, and where a continuous current path exists, a current may flow because of this induced voltage. This effect only becomes pronounced for longer, parallel runs of cables, rather than 90 degree crossings such as the Norfolk Vanguard, Norfolk Boreas and Hornsea 3 crossing, and even then the magnitude of induced current is such (relative to the primary current) that the resultant fields are negligible in human health terms. The potential effects on the local geology, hydrology and ecology, related to the operation of the two buried cable systems as they cross each other in this location has been specifically considered in relation to impacts to the nearest water dependent designated site - Booton Common Site of Special Scientific Interest (SSSI) (part of Norfolk valley Fens SAC). A detailed response to this is provided at Q23.106. EMFs at ground level will be largely dictated by the upper set of cables. However, irrespective of which cables go over or under each other, it has been demonstrated that EMFs at the crossing will remain well within the 1998 ICNIRP exposure guidelines and therefore no further consideration of effects is necessary.

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			The upper cables have a minimum depth for installation of 1.05m to limit impacts to land use during operation (see paragraph 122 of Chapter 21 Land Use and Agriculture of the ES). There is no maximum depth required to achieve adequate separation between the two cables for heat dissipation and separation between projects will be determined in the detailed design phase. The Applicant refers to response to Q22.47 with respect to the principles of the crossing construction.
12.11	Applicant	How will the actual EMF figures be checked/monitored when the project is complete? Should monitoring be secured? In a scenario where the figures are more than predicted what action could be taken? Please provide draft wording for the dDCO to secure appropriate measures to cater for such a scenario.	The Applicant is not proposing to monitor EMF levels following construction of the Project. The Applicant refers to Appendix 2.1 (ExA; FurtherWQApp2.1;10.D4.6) which outlines a voluntary Code of Practice for demonstrating compliance with EMF public exposure guidelines. With respect to the specific evidence of compliance required, a calculation has been provided of the maximum fields which will be experienced directly above the onshore cables (see Appendix 12.1). This has shown that for a highly conservative assessment considering Norfolk Vanguard, Norfolk Boreas and Hornsea Project Three, the peak magnetic field value is significantly less than the ICNIRP guideline levels and therefore it may be assumed that all fields and exposures from that source will be compliant and measurement of EMFs is not required. Accordingly, it is not considered necessary to secure monitoring or corrective action in the dDCO.
12.12	Breckland Council (BC)		
12.13	MoD		
12.14	BC		
12.15	Applicant	Your post hearing submissions refer to delivery vehicles being turned away if they arrive at a locked compound before the consented hours of 0700 till 1900. What measures would be in place to ensure that construction vehicles that are turned away do not congregate in the local area which could lead to potential increases in pollutant concentrations for local residents?	The consented working hours are 7am to 7pm Monday to Friday, and 7am to 1pm on Saturdays. Outside of these hours, compounds (mobilisation areas) will effectively be locked. To prevent HGVs arriving at a locked compound (outside of the consented hours) control of HGV deliveries is set out at Section 1.6.3 of the OTMP (document reference 8.8). Control measures include: HGV booking system - the booking system will enable a daily profile of deliveries to be maintained and allow the contractor to ensure that the required deliveries are regularly forecast and planned. Suppliers will be informed of the working

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			hours and their booking slot and their supplier contracts will be based on adhering to these conditions. • Suppliers will be warned that HGVs will be refused access and turned away if they arrive outside of their allocated time slot. This is proposed as a deterrent to ensure suppliers adhere to this control mechanism. • A small number of daily slots will be reserved to accommodate any unplanned deliveries. • The contractor will be required to keep an up to date record of deliveries and exports from the project, this will take the form of delivery receipts. This information will be retained to be provided to the relevant local authority, NCC andHE upon request. • Supply chain vehicles will display a unique identifier in the cab of the vehicle. Should there be any occasion where a supplier does not adhere to these requirements then enforcement action, through the supplier's contract, will be taken to prevent any further breach. The Applicant has identified these control measures to give suppliers clear instruction that they are not to attempt to deliver to site outside of the consented working hours. The control measures are to ensure that delivery profiles remain within the agreed assessed parameters to manage construction traffic flows on the road network. The Applicant does not propose identifying alternative locations for HGVs to congregate outside of the consented working hours as this may encourage suppliers to ignore consented working hours in the knowledge that they can wait nearby. If there are reports of vehicles arriving at site early and waiting nearby then enforcement action, through the supplier's contract, will be taken with that supplier. This procedure is set out in section 1.9.4 (Potential Plan Breaches) and section 1.9.5 (Corrective Process) of the OTMP, which is secured through Requirement 21 of the dDCO. Beyond this, the Applicant has also committed to a communications plan and a local liaison officer for any local residents who wish to raise concerns in relation

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			to traffic and construction management. This is set out at Section 2.4 of the OCoCP (document reference 8.1) and is mirrored in section 1.9.2 of the OTMP. This identifies a mechanism by which complaints received during construction related to HGV deliveries can be responded to and, where required, enforcement action taken, through the supplier's contract. The commitment to a communication plan states that: "Communications will be co-ordinated on site by a designated member of the construction management team. A proactive public relations campaign will be maintained, keeping local residents informed of the type and timing of works involved, the transport routes associated with the works, the hours of likely construction traffic movements and key traffic management measures that would be provided. A combination of communication mechanisms such as posters and parish meetings will be employed to keep local residents informed. A designated Norfolk Vanguard Limited local community liaison officer will respond to any public concerns, queries or complaints in a professional and diligent manner. Enquiries will be dealt with in an expedient and courteous manner. Any complaints will be logged, investigated and, where appropriate, rectifying action will be taken."

1.13 Noise and Vibration

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
13.13	Applicant	Your post hearing submissions refer to delivery vehicles being turned away if they arrive at a locked compound before the consented hours	Please refer to the Applicant's response to Q12.15.

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		of 0700 till 1900. What measures would be in place to ensure that construction vehicles that are turned away do not congregate in the local area which could lead to potential noise and disturbance for local residents?	
13.14	Applicant	Daily start up or shut down would take place outside the hours specified in Requirement 26(1) of the DCO. Please set out what daily start up and shut down would include. Should this be included within the Outline Code of Construction Practice (OCoCP)?	Daily start up and shut down would include non-intrusive activities which are focused around maintaining good site management. Such activities would include site inspections, safety checks, briefings and housekeeping which does not require the use of plant or machinery. These activities will be conducted prior to and post daily construction works to maximise the works which can be completed during construction hours. For clarity the Applicant will specify these start up and shut down activities in an amended OCoCP.
13.15	Applicant, Broadland District Council (BDC)	What implications does Appeal Ref: APP/K2610/A/14/2212257 have for the proposed development? Was the impact of noise and vibration on the Old Railway Gatehouse taken into consideration?	The main issues identified for the dismissal of the identified planning appeal were: (a) impacts upon highway safety and convenience; and (b) impacts upon the living conditions of neighbouring residents at The Old Railway Gatehouse with reference to noise and disturbance; in each case arising from the proposed vehicular movements to and from the site. It should be noted that the proposed operational traffic for that development was 112 daily HGV movements (based on a 14-hour working day) which would occur throughout the operational life of that development (assumed to be approximately 25+ years). Operational traffic associated with that development would also unavoidably occur during the peak background traffic period, associated with harvest time. In comparison, the peak construction traffic demand for Norfolk Vanguard in proximity to The Old Railway Gatehouse is 96 daily HGV movements, during a 16 week period in 2022 and a further 6 weeks at 88 daily HGV movements also in 2022. During the cable pull, peak traffic demand is 64 daily HGV movements for approximately 20 weeks during 2024.

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			Noise and vibration effects have been taken into consideration as part of the application for Norfolk Vanguard; based on Norfolk Vanguard alone no significant noise and vibration effects were identified at the Old Railway Gatehouse. Following submission of the Application for Norfolk Vanguard, Hornsea Project Three has subsequently submitted updated construction traffic numbers to their examination which have enabled the Applicant to undertake CIA work in this location, including an updated noise impact assessment of the cumulative traffic impacts. This assessment has identified a potential significant cumulative noise impact at The Old Railway Gatehouse associated with the peak construction traffic for both Norfolk Vanguard and Hornsea Project 3. The Applicant has reviewed the package of measures proposed by Hornsea Project 3 along The Street at Oulton for cumulative noise and vibration and intends to put forward the same package of measures in order to reduces potential noise impacts from moderate adverse (significant) to negligible (refer to response to Q13.16). The cumulative traffic impact assessment and associated noise and vibration impact assessment (and mitigation) will form part of the Applicant's submission at Deadline 5.
13.16	Applicant/NCC	At ISH1 Norfolk County Council stated that a package of measures was being considered by Hornsea 3 in relation to mitigating the impact on the occupiers of The Old Railway Gatehouse. Please provide details of the package of measures being considered by Hornsea 3 and comment on whether a similar package of measures should be secured for Norfolk Vanguard?	The potential impacts identified for The Old Railway Gatehouse relate to noise and vibration effects as vehicles cross a hump in the road in the location of a historic level crossing. The mitigation proposed by Hornsea Project 3 is to regrade the carriageway across this hump and to introduce a temporary 30mph speed limit. The Applicant has reviewed the package of measures proposed by Hornsea Project 3 along The Street at Oulton and has undertaken a noise impact assessment of the cumulative traffic. Based on the cumulative noise modelling undertaken by the Applicant, the mitigation proposed by Hornsea Project 3 at The Old Railway Gatehouse reduces potential noise impacts from moderate adverse (significant) to negligible. On this basis, the Applicant intends to put forward the same package of measures in order to achieve the same outcome. Norfolk Vanguard and Hornsea Project 3 will coordinate the delivery of these

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			measures and this will be captured in updates to each project's respective OTMPs. The cumulative traffic impact assessment and associated noise and vibration impact assessment (and mitigation) will form part of the Applicant's submission at Deadline 5. Any mitigation measures identified within that assessment will be captured within an updated OTMP and secured through Requirement 21 of the dDCO.
13.17	Applicant	Please explain what would comprise the 'significantly noisy construction activities' referred to in paragraph 173 of ES chapter 26. What is meant by 'relatively short duration'? Would any of these activities be carried out under the continuous periods of operation referred to in Requirement 26(2)(a)? Should additional restrictions be in place to prevent continuous working at the weekend and on public holidays?	The reference to 'significantly noisy construction activities' is given at paragraph 172 of ES Chapter 26 Noise and Vibration. All noisy activities associated with each of the project elements are set out in Tables 25.9 to 25.14 of Chapter 26. All of these activities are considered to potentially generate significant noise during construction. The reference to significantly noisy activities was not intended to imply that there is a subset of these activities that are considered noisier, that is all of the activities identified in Tables 25.9 to 25.14 represent the "significantly noisy construction activities". The worst case scenario adopted for the assessment assumes that all the noisy activities associated with that stage of the works occur at the same time at the closest point to each receptor. The reference to a relatively short duration is specifically discussing the onshore cable duct installation works and reflecting that works occur in a sectionalised approach with construction teams working on a short length (approximately 150m section) at a time. The time from topsoil strip to reinstatement would typically be two weeks in each 150m section. It is this two weeks that is referred to as a 'relatively short duration'. The landfall works have been assumed to require evening and night time working as a worst case. An assessment of the predicted construction noise levels at the landfall covering evening, night time and weekend periods has been included within section 25.8.5.2 of ES Chapter 25. The distance of the noise sensitive receptors to the landfall works are representative of the distance of separation elsewhere along the cable route. Under the worst-case scenario, no residual impacts were predicted at the nearest residential receptors to the landfall during the evening and weekend time period after

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			incorporation of standard and enhanced construction noise mitigation. Standard mitigation (best practicable means) coupled with more site-specific solutions such as the use of screening such as temporary noise barriers and/or temporary spoil bunds, would be applied as appropriate. A Construction Noise Management Plan (CNMP) will be produced as part of the final code of construction practise (CoCP) for each stage of the works. This will include the updated understanding of the expected noise levels based on the final project design (rather than worst case assumptions presented in the ES) and site specific enhanced measures, where required, based on the actual known plant and equipment. This is secured through Requirement 20(e) of the dDCO. Save in emergencies, the duration and timing of any essential works which require out of hours working will be subject to prior agreement with theRPA. This is secured through Requirement 26(3) of the dDCO (as amended). In agreeing timing and duration for essential out of hours working it would be necessary to demonstrate expected noise levels at the nearest residential properties and appropriate mitigation as required. On this basis, it is not necessary to include additional restrictions to prevent continuous working at the weekend and on public holidays.
13.18	Applicant	Paragraph 5.11.8 of NPS (EN-1) states that a project should demonstrate good design, including through selection of the quietest cost-effective plant available, containment of noise within buildings wherever possible and the optimisation of plant layout to minimise noise emissions. Please explain, in the context of Work No. 8A and Work No.10A, how the proposal complies with this paragraph.	As noted in the question, Paragraph 5.11.8 of NPS (EN-1) states that: *"The project should demonstrate good design through selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission."* With regard to Work No. 8A (the onshore project substation), the detailed design and layout of the substation have yet to be defined. The Applicant will consult the relevant Local Planning Authority during the detailed design process (e.g. to review the results of noise modelling work; to explain how the proposed design meets the requirements of para 5.11.8 of NPS (EN-1) and meets the noise rating levels set out in Requirement 27(1) and (2) of the dDCO. The

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			findings of the operational noise impact assessment are presented in ES Chapter 25 Noise and Vibration. Providing that noise levels attributable to the operational substation at the nearest noise sensitive receptors do not exceed the noise levels set out in Requirement 27, noise impacts will be negligible. A scheme for monitoring compliance under Requirement 27(3) of the dDCO will also be implemented. In addition, approval of the layout, scale, and external appearance of the onshore project substation is required under Requirement 16(2) of the dDCO. Work No. 8A already incorporates two key decisions which accord with the requirements of para 5.11.8: 1. The selection of the proposed site for the substation – Minimising noise impacts at nearby residential receptors was one of the key considerations in the selection of the proposed site for the substation as presented in ES Chapter 4 Site Selection. The proposed location was chosen in part because it is located more than 700m from the nearest residential properties. Furthermore, the local landform and presence of existing woodland around the site also help to reduce transmission of noise to nearby receptors. 2. The decision to use HVDC transmission technology – With HVDC technology, the onshore project substation contains relatively little outdoor equipment; the main noise-emitting items will be the (outdoor) converter transformers. The HVDC converter equipment is all housed in buildings, so noise emissions from this equipment are largely contained. With reference to Table 25.32 of Chapter 25 Noise and Vibration of the ES, as part of embedded mitigation, the Applicant will apply the principles of Best Available Technology (BAT) when designing the onshore infrastructure for any sound emitting mobile and fixed plant. Where necessary, noise reduction technology, such as noise enclosures will be incorporated, as assessed in Section 25.8.6.2 of Chapter 25 Noise and Vibration of the ES. With regard to Work No. 10A (extension to the 400kV substation), it should be noted that the substation extension will not include any noise-emitting plant such as transformers (see paragraph 98 of Chapter 25 Noise and Vibration of

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			the ES). The siting, design and layout of the proposed substation extension are largely defined by its relation to the existing 400kV substation.
13.19	BC		
13.20	BC		
13.21	BC		
13.22	Applicant	Please comment on NNDCs request for a mechanism to be secured to enable the relevant local authority to be made aware of complaints and for the relevant local authority to make the contractor aware of any complaints that come direct to the local authority.	As part of the communication liaison process set out in the outline CoCP (section 2.4) a complaints procedure will be established. Any complaints will be logged, investigated and, where appropriate, rectifying action will be taken. The details of the complaints procedure, including the mechanism for informing NNDC when complaints are received and to enable North Norfolk District Council (NNDC) to make the contractor aware of complaints coming directly to the local authority will be agreed through the production of the final CoCP produced post-consent. The final CoCP would be submitted to, and approved by, the RPA prior to any works commencing for that stage. For works in North Norfolk District the RPA will be NNDC. This has been agreed in the updated SoCG between the Applicant and NNDC submitted at Deadline 4 (ref: Rep1 - SOCG - 17.1 version 2).

1.14 Landscape and Visual Impact

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
14.26	Applicant	Please provide paper copies of the additional photomontages showing a 19m box indicating the onshore converter station which were submitted at deadline 3.[REP3-024 to REP3-030 inclusive]	The Applicant has provided paper copies of these photomontages as part of Deadline 4 at full scale, as well as smaller-scale for the purposes of the ASI.
14.27	Applicant	You are referred to the further evidence of North Norfolk District Council [REP3-055] in support of its contention that there should be a 10-year	The evidence that NNDC submitted to the examination at Deadline 3 to justify a 10 year period of aftercare for replacement planting is based on the soil

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		maintenance period for all planting. Please comment further upon the evidence submitted by NNDC at deadline 3.	properties in North Norfolk and the potential success of woodland planting in North Norfolk District. For example: Section 4.2 "The system is designed to match key site factors with the ecological requirements of different tree species and woodland communities" Section 4.6 "A period of 10 years aftercare and replacement provides for greater formal protection when establishing tree stock. At 10 years growth, a tree will have reached a size where it would be subject to Forestry Commission Felling Licence Regulations (i.e. 8cm girth at 1.3m above ground level). After only 5 years, as proposed by the Applicant, trees would not have reached sufficient maturity…" In addition, 'Appendix 1 Examples from Establishment Management Information System' only lists tree species. Within North Norfolk District the Applicant is not proposing any tree planting. There are no wooded areas that will be directly affected by the onshore cable route in North Norfolk District. The onshore cable route crosses a number of hedgerows, some of which will have occasional individual trees. The Applicant has committed to micrositing the onshore cable route to avoid individual trees in hedgerows where possible – the width of the hedgerow crossings are reduced from 45m to 20m to achieve this, which is captured within the outline CoCP and secured through Requirement 20 of the dDCO. Due to the nature of the installed infrastructure it is not possible to replace individual trees on top of the buried cables. The replacement planting within North Norfolk District is therefore limited to replacement hedgerows only. Hedgerow planting will typically mature within 3-5 years. On this basis, the Applicant is confident that 5 years aftercare is appropriate. The evidence provided by NNDC is focussed on woodland planting in North Norfolk District. The soil conditions described relate to freely draining nutrient poor soils nearer the coast. Whilst these are the predominant soil types in North Norfolk, they are not representative throughout the rest of Norfolk. The

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			woodland planting that is proposed at the onshore project substation will be in soils that are classed as Grade 2 and 3 under the agricultural land classification system (very good and good growing conditions). Whilst this classification is primarily related to agricultural crops it provides evidence that the land around the onshore project substation falls within the best and most versatile land, with the best growing conditions, and would not be classed as nutrient poor.
14.28	NNDC		
14.29	Applicant	In your LVIA assessment of potential impacts during construction and operation you categorise the significance of effect as 'significant' or 'not significant' with no further quantification of significant effects. Please explain the reason for this and comment upon how the cumulative assessment has been undertaken in light of this. [APP-315]	EIA Regulations require the identification of likely significant effects and the methodology adopted within the Landscape and Visual Impact Assessment (LVIA) complies with this requirement. There is no requirement for significant effects to be broken down into degrees of significance, and therefore these are not included in the LVIA. This methodology was agreed through the Evidence Plan Process (for LVIA the stakeholders included NCC, Breckland Council, NNDC and Historic England) and is consistent with the approach undertaken for other relevant projects, for example East Anglia ONE and East Anglia THREE. An indication of the degree of significance can, however, be extrapolated from the assessment of the sensitivity rating and the assessment of the magnitude of change rating. For example, if both of these criteria are rated as high, then the effect would be at the upper end of a significant effect, and conversely if both are rated as medium then the effect would be at the lower end of a significant effect. The same principle applies for the CIA in terms of defining the effect as either significant or not significant, without attributing degrees of significance. Again, the sensitivity and cumulative magnitude of change ratings can be used to indicate at which end of the scale of cumulative significance the assessment lies.
14.30	Applicant	LVIA methodology [APP-315]: are there definitions provided for receptor value, susceptibility to change and overall sensitivity?	Value, susceptibility and sensitivity are difficult to condense into a concise definition owing to the complexity of criteria considered. There are no set definitions, but the criteria used are based on Guidelines for LVIA Third Edition (GLVIA3) criteria combined with professional judgement, which is consistent with the approach taken for other projects. The criteria upon which value, susceptibility and sensitivity have been assessed for Norfolk Vanguard, are set out in Sections 29.4.2.3 to 29.4.2.5 and 29.5.1.2

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			to 29.5.1.4 of ES Appendix 29.1 Landscape and Visual Impact Assessment Methodology.
14.31	Applicant	In the LVIA post-construction mitigation has been taken into account when reaching a conclusion that there are no likely significant effects. How can the ExA be assured that this does not result in the significance of construction effects not being fully taken into account? [APP-353]	The effects during the construction phase are assessed without post-construction mitigation planting. The assessments presented in Tables 29.9, 29.10 and 29.11 of ES Chapter 29 Landscape and Visual Impact Assessment include a column for "significance of effect" which is the assessment of construction impacts in the absence of mitigation planting. There is a further column in each of those tables titled "duration of effect" which reports the residual impact in relation to the time it will take for the mitigation to take effect (rather than simply call it residual effect). This has been presented in this way to be more transparent regarding the length of time planting takes to mitigate effects.
14.32	Applicant	Please confirm what efforts you have made in monitoring the examinations of other projects in the wider area (such as Hornsea Three Project and Thanet) and any actions you have taken in terms of updating the cumulative effects assessment.	As stated in response to the ExA's First Written Questions (Q23.45), the Applicant has and will continue to monitor the examinations of Thanet Extension and Hornsea Project THREE by reviewing examination submission documents and attending hearings where possible. The Applicant also has regular meetings with Hornsea Project THREE (UK) Ltd and the Thanet Extension team within Vattenfall. The Applicant will consider the requirement to update the CIA following any significant updates to these projects during examination. The Applicant also expects that NE would identify potential required updates (e.g. in relation to offshore ornithology in-combination effects) through their direct involvement in the examination of each project.
14.33	BC		
14.34	BC, Necton Parish Council		

1.15 Onshore Archaeology and Cultural Heritage

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
15.12	Applicant	Please provide an update on your discussions regarding HE's concerns raised in their letter dated 17 January 2019 in relation to the definition of 'commence'.	As the Applicant outlined in the comments on Written Representations submitted at Deadline 2 (document reference: ExA; WRR: 10.D2.2): • Condition 14(2) of the Generation DMLs (Schedule 9-10) and Condition 9(2) of the Transmission DMLs (Schedule 11-12) stipulate that pre-construction archaeological investigations and pre-commencement material operations which involve intrusive seabed works must only take place in accordance with a specific written scheme of investigation, which is itself in accordance with the details set out in the outline offshore Written Scheme of Investigation (WSI) (document reference 8.06), and which has been submitted to and approved by the MMO; and • In an onshore context, Requirement 23(5) states that any pre-commencement archaeological investigations must only take place in accordance with a specific WSI which is in accordance with the details set out in the outline written scheme of investigation (onshore) (document reference 8.05), and which has been submitted to and approved by the relevant local authority. It is for these reasons that the Applicant considers that the currently drafted definition of 'commence' in the dDCO is suitable. Notwithstanding the above, the Applicant has since discussed this matter with Historic England on a conference call on 5 March 2019 and the Applicant has included further wording within Requirement 23(5) to make clear that pre-commencement surveys and site preparation works (in addition to the archaeological investigations) must also take place in accordance with the relevant WSI. These changes have been incorporated in the revised dDCO submitted at Deadline 4, although Historic England's comments on the revised wording are awaited.
15.13	HE		
15.14	Applicant	In its Local Impact Report Broadland Council raise concerns regarding the increase in traffic within the	The potential impacts are assumed to be related to noise and vibration effects associated with an increase in Heavy Goods Vehicles (HGVs) accessing the

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		Cawston Conservation Area and the potential detrimental impact that heavy goods vehicles could have on listed buildings along the High Street. Could the Applicant please address these concerns and provide an assessment of potential impacts and any mitigation that may need to be included in the OCoCP.	works along Cawston High Street in proximity to these listed buildings. Cawston High Street is a road link that is required by both Norfolk Vanguard and Hornsea Project 3, so impacts related to Norfolk Vanguard alone and in combination with Hornsea Project 3 are relevant. Noise and vibration effects were taken into consideration as part of the Norfolk Vanguard application, which is reported in ES Chapter 25 Noise and Vibration. Based on Norfolk Vanguard alone no significant noise and vibration effects were identified along Cawston High Street, and therefore no mitigation is required for Norfolk Vanguard alone. Hornsea Project Three has recently submitted updated construction traffic numbers to their examination, which has enabled the Applicant to progress the CIA work for Norfolk Vanguard along this shared road link. The Norfolk Vanguard cumulative traffic impact assessment (taking into account Hornsea 3 updated traffic numbers) is due to be submitted to the Norfolk Vanguard examination at Deadline 5. An updated noise and vibration impact assessment of the cumulative traffic will form part of this Deadline 5 submission. The Applicant is aware that Hornsea Project Three has also recently undertaken vibration monitoring along Cawston High Street, which has not yet been submitted to their examination. The Applicant is currently engaging with Hornsea Project Three and hopes to have an opportunity to review the outputs from this additional vibration monitoring to inform the CIA that will be submitted at Deadline 5. Should the cumulative noise and vibration impact assessment identify a requirement for additional mitigation measures along Cawston High Street, either for the Project alone or cumulatively, these would be captured in updated plans as appropriate – either an update to the OTMP or an update to the OCoCP depending on the nature of the required measures (if any) that are identified.
15.15	Applicant	Please comment on NCC's Deadline 1 submission [REP1-130] that Requirement 23(3) is superfluous.	At Deadline 1 NCC commented that Requirement 23(3) may not be needed as it was duplicated by Requirement 23(4). The Applicant's view is that, as currently drafted, Requirement 23(3) and Requirement 23(4) serve different purposes. Requirement 23(3) deals with 'archaeological works' and 'watching

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			briefs', whereas Requirement 24(4) deals only with the programming and the dissemination of results of 'site investigation and post investigation assessment'. In that sense Requirement 23(3) is wider than Requirement 23(4) and should therefore remain. However the Applicant agrees that Requirement 23 could be clarified by deleting Requirement 23(4) and broadening Requirement 23(3) as follows (new wording in red): *(3) Any archaeological site investigations, archaeological works or watching brief must be carried out in accordance with the approved scheme.* If Requirement 23(3) is broadened in this way, it is clear that the programme of investigation and requirements for dissemination which were secured by Requirement 23(4) will continue to be secured. These matters are specifically listed to be contained in the scheme at Requirement 23(2)(b) to (f), and Requirement 23(3) now requires archaeological site investigations to be carried out in accordance with the scheme. The dDCO has been updated for D4 accordingly.

1.16 Geology, Ground Conditions, Drainage, Pollution and Flood Risk

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
16.30	Applicant	The UK Climate Projections 2018 (UCKP18) was published on 26 November 2018. Do the projections have any implications for the conclusions drawn in chapters 4 and 8 of the ES or on the risk of the development being affected by coastal change?	The emphasis of the UKCP18 marine projections is on changes in coastal sea level, including extreme water levels that arise from storm surges and surface waves. It is noted that the scope of work is different to that presented in UKCP09 (the latest UKCP projections at the time of the application and therefore those which helped inform the assessments, as referenced within the application documents). The UK Climate Projections 2018 (UCKP18) predictions for sea level rise are higher than the previous UKCP09 projections for similar emissions scenarios at 2100.

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			UCKP18 predictions for sea level rise are estimated up to 2100, and although this is beyond the design life of the project, the project is designed considering these projections. There is no increase beyond these conservative projections in the UKCP18 projections within the design life of the project, and as such there is no increase in the potential associated risks. ES Chapter 4 describes the site selection of the landfall infrastructure. Embedded design mitigation measures at the landfall to account for projections on changes in coastal sea level include: • Landfall location being set back beyond the maximum predicted erosion levels at 2105, as shown on Figure 2 of Document ExA; ISH; 10.D3.1D, submitted at Deadline 3; • Landfall compound zone extending a further 200m inland to allow for flexibility as more up to date information and forecasts on erosion levels become available; and • Use of long HDD. Owing to this conservative approach to the landfall site selection and design, the UKCP18 projections do not alter the conclusions drawn in Chapters 4 and 8 of the ES. Document ExA; ISH; 10.D3.1D provides a detailed explanation of considerations of coastal change with regard to the landfall infrastructure. Figure 2 of Document ExA; ISH; 10.D3.1D shows the predicted beach levels until 2105 with indicative cable depth and angle, which shows that the cables at landfall will remain buried throughout the 30 year design life of the project despite increased projections in UKCP18. Appendix 4.3 provides an assessment of the predicted coastal change and erosion levels for up to 100 years, with sea level rise around Bacton estimated to be approximately 42 cm. However, allowance was made for the potential that projections could change to nearly double that value at 77cm. As sea level rise projections for London (for the high emissions scenario) are 25cm higher for UKCP18 than UKCP09, this is within the allowance of change in Appendix 4.3. As

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			such, the estimates remain conservative with no increased risk to the development due to the new projected rates of coastal change. Chapter 8 of the ES (Marine Geology, Oceanography and Physical Processes) (document reference 6.1.8) details the assessment of potential construction, operation and decommissioning impacts on coastal change in sections 8.7.7.5 and 8.7.8.6. Increases in sea level and storm surges are estimated up to 2100, and although this is beyond the design life of the project, the project is designed considering these projections. There is no increase beyond these conservative projections in the UKCP18 projections within the design life of the project, and as such there is no increase in the potential associated risks. Overall, as the design of the project and associated environmental assessments have taken into account projections far beyond the design life of the project, and conservative embedded mitigation measures have been incorporated into the design, there will be no implications for the conclusions drawn in Chapters 4 and 8 and no increased risk of the project being affected by coastal change as a result of the UKCP18 projections.
16.31	Applicant	In the event that cables were to become exposed due to coastal erosion what mitigation or remediation measures may be required? How would this be monitored? Paragraph 5.510 of (EN-1) seeks to ensure that proposed developments will be resilient to coastal erosion and deposition, taking account of climate change, during the project's operational life and any decommissioning period. How has the resilience to costal erosion during the decommissioning period been addressed?	Paragraph 5.510 of (EN-1) states that: *"The IPC should be satisfied that the proposed development will be resilient to coastal erosion and deposition, taking account of climate change, during the project's operational life and any decommissioning period."* The design of the landfall infrastructure and construction methods (secured under Requirement 17 of the dDCO) includes embedded mitigation taking into account the potential effects of coastal erosion during the design life of the project, and seeks to minimise the likelihood that these effects will result in exposure of the landfall ducts. Embedded design measures include the landfall being set suitably further back from the maximum predicted erosion at 2105, as shown on Figure 2 of Document ExA; ISH; 10.D3.1D, submitted at Deadline 3, with the compound zone extending a further 200m inland to allow for flexibility as more up to date information and forecasts are produced.

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			Given the criticality of the landfall infrastructure to the Applicant's proposed wind farm project, the rate and extent of coastal erosion at the landfall location will be closely monitored throughout the operation of the project. If the rate and extent of cliff retreat indicates that the landfall ducts could become exposed during operation, the owner of the offshore transmission asset will be able to anticipate this event several years in advance, and take appropriate actions to mitigate any risks to both the project and the public. Possible mitigating actions at this stage may include: • Measures aimed at reducing the ongoing rate of cliff retreat e.g. construction of groynes and/or other defensive structures on the beach or structural reinforcement of sand. If successful, these measures would delay the date at which the ducts were projected to become exposed; or • At the time that ducts to become exposed, to undertake engineering works designed to protect the exposed ducts from the direct effects of wave action while also ensuring that potential hazards to users of the beach are effectively eliminated e.g. rock placement around and over exposed duct sections, at foot of sand cliffs or construction of timber or concrete structure(s) around exposed duct sections, at foot of sand cliffs. Given the degree of uncertainty associated with these scenarios and the extent of coastal erosion, it is not considered appropriate to specify in detail at this time the measures that might be undertaken to mitigate the risks to the project. The detailed design of decommissioning activities at the landfall will depend on the coastal geography and topology at the time; these factors will be taken into account in the onshore decommissioning plan submitted under requirement 29 of the dDCO.
16.32	Applicant	Please provide an update on your discussions regarding the potential options for Cart Gap sea wall.	As stated in response to the ExA's First Written Questions (Q16.29), post-consent the Applicant is open to discussing the feasibility of providing spoil to NNDC, should NNDC wish to proceed with seeking a licence to infill the Cart Gap seawall. NNDC has indicated that are happy to work with the Applicant and relevant land owners to take forward this opportunity although discussions have yet to take

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			place. This position is now documented SOCG with NNDC (document reference Rep2-SOCG-17.1).
16.33	Applicant, NCC	Please provide an update on your discussions regarding Norfolk County Council's request that the surface water drainage scheme should be subject to a separate requirement.	The Applicant met with NCC on 26th February 2019 to discuss the request for a surface water drainage scheme requirement. The Applicant is happy to accept the wording requested by NCC and it was agreed that this wording would be captured within a plan to be secured through the dDCO requirements. Discussions as to the precise plan and DCO Requirement through which this will be secured are ongoing. The principle of this change has been agreed within the updatedSoCG between the Applicant and NCC submitted at Deadline 4 (ref: Rep1 - SOCG - 15.1 version 2).
16.34	Applicant, EA	Please provide an update on your discussions regarding the storage of spoil within the floodplain	After further consideration, the Applicant is now able to commit to not storing spoil within the functional floodplain as requested by the Environment Agency and NE. Where a topsoil strip is required within existing grassland located within the functional floodplain, this will be undertaken using a turf cutter. Turf rolls will be retained and reinstated after the works to maximise the potential for reinstatement / restoration to be effective. Removed topsoil and turf will be stored outside of the functional floodplain. The OCoCP will be updated to reflect this updated commitment and will be secured through Requirement 20. This has subsequently been agreed within the updated SoCG between the Applicant and the Environment Agency submitted at Deadline 4 (ref: Rep1 - SOCG - 6.1 version 2)

1.17 Aviation and Radar

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:

1.18 Land Use and Recreation

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
18.27	Applicant	Table 5.3.6 included in ES Chapter 5: Project Description, is very high level and provides no detail of how construction will take place. You clarified at ISH3 that pre-construction works could start in 2020 and take two years, followed by duct installation which takes a further two years and then a further two years for the cable pull, joint and commission. Please amend the Table to include a key to the diagram and provide detail as to what Phase 1 and 2 is referring to. Do you agree that given the timeline it is possible that agricultural land could be taken out of production for 6 years?	Phase 1 and Phase 2 reflect the potential annual subdivisions of the up to 2 year 'cable pull, joint and commission' works at the landfall and onshore cable route and 'electrical plant installation and commission' works at the onshore project substation, as shown in Table 5.36 of Chapter 5 Project Description of the ES. As noted in Section 5.5.8.5 and 5.5.8.6, the onshore cables and onshore project substation electrical plant would be supplied and installed in up to two phases, in line with up to two phases of offshore development. Works across the onshore project area will occur over a 6 year period, however works in any specific location will be for much shorter periods within that timescale, such that individual agricultural land parcels are unlikely to be taken out of production for this entire duration. The Applicant refers to paragraph 134 of Chapter 21 Land Use and Agriculture of the ES which notes that *"during construction it is unavoidable that land along the onshore cable route would temporarily be taken out of its existing land use, however the embedded mitigation measures reduce the potential impacts as far as practicable."* The following outlines the construction methods and works associated with each element of the 6 year construction programme and outlines how impacts on a single location will be limited to short periods within the overarching 6 year programme. - 2 year pre-construction: During this period, works will only be conducted where required and as required based on the types of works as detailed in Section 5.5.8.1. Any works at a single location during this period are likely to be completed within short periods of time (in the order of weeks). The 2 year elapsed period for pre-construction allows consideration that some of the works can only be conducted in specific seasons. - 2 year duct installation: During this period, excavations to install the ducts will advance from mobilisation areas at a rate of approximately 150m/week including reinstatement of subsoil and topsoil, with

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			exception to the running track and any associated temporary drainage channels. The running track will be retained between the workfront and mobilisation area for access until duct installation for that section (notional duct installation sections are illustrated in Figure 24.07a of Chapter 24 of the ES) is complete. The running track will then be removed and the land reinstated. In some locations, isolated sections of the running track could be left in place to support the cable pulling works (see below) or be reinstated at the time of the cable pulling works. - Up to 2 year cable pulling: During this period works will be limited to joint pits (notionally 800m separated) and the temporary access to the joint pits (through reinstatement of short sections of running track and/or construction accesses). As detailed in Section 5.5.2.4.1, any one joint pit could be open for up to 10 weeks per annum. The Applicant has also provided this information directly to the NFU/LIG through on-going discussions on the SoCG (Rep1 - SOCG - 5.1), as submitted at Deadline 4.
18.28	Applicant	It is understood that you intend to lay the ducts and reinstate approximately 150m sections at a time such that areas of land may be able to come back in to agricultural use within the second two-year period when ducting is carried out. Please: (i) detail how field drainage will be reinstated before the sub and top soil is reinstated on these 150m sections; (ii) explain when the joint bays will be constructed and what is the land area required for this construction; (iii) explain what happens if there is a fault on the cables during testing; and	i) The most appropriate reinstatement method and timing will be dependent on the type of field drainage in question, however subsurface drainage will likely be reinstated as part of the subsoil reinstatement process as the corresponding 150m section of the onshore cable route is being completed. ii) Joint bays will most likely be constructed at the time of the cable pulling phase of the works (post duct installation) to maximise the flexibility in their location. With reference to Table 5.33 of Chapter 5 of the ES, a joint bay is a concrete floor of up to 6m x 15m installed at a depth of up to 2m under the ground surface and serves as a stable platform for cable pulling and jointing activities. Joint bays are not required for duct installation activities. iii) Cables will be installed in the two year period post duct installation. If there is a fault on the cables during testing the

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		(iv) confirm when the cables for the Boreas project will be pulled through the ducts and the joint bays for this project be constructed?	faulted cable section can be cut and pulled from the duct and a new cable section pulled into the duct and jointed. Norfolk Boreas cables would be pulled through the pre-installed ducts in a subsequent up to two year period after Norfolk Vanguard's up to two year cable pulling period. Joint bays for Norfolk Boreas would be constructed at the time of the Norfolk Boreas cable pulling.
18.29	Applicant	Please provide further information on: (i) How and when would discussions will take place with landowners and occupiers on the location of the link boxes; (ii) What the configuration will be if link boxes are grouped together; (iii) Whether all link boxes will be manhole covers and confirm that no cabinets above ground will be installed.	i) Discussions on siting of link boxes will take place post-consent following a cable contractor being appointed by the Applicant, and once the design of the cable specifications has been confirmed. This will include details on the length of cables, location of joint pits and technical requirements for link boxes, and therefore allowing indicative siting of link boxes to be determined. ii) The configuration of the link boxes could be discussed with the landowner/occupier on any preferences of configuration once detailed design is completed and in accordance with engineering requirements. A cabinet design has been included within the design envelope of the ES (see paragraph 333 of Chapter 5 Project Description) as this may be preferential to some landowners. A final decision will be made post detailed design.
18.30	Applicant	Taking account of the NFU/LIG's submissions at [REP3-049] including the Appendices thereto, please provide an update on drafting an outline soil management plan which includes details of the Agricultural Liaison Officer (ALO) and the role that will be undertaken, general principles of how soil will be treated and aftercare carried out and for the main principles of how field drainage will be reinstated to be clarified. Please provide an indicative timetable for agreeing an outline soil management plan, linked to the CoCP such that it is binding under the DCO and gives assurance to landowners and occupiers.	The Applicant has reviewed the Deadline 3 submission and appendices provided by the NFU/LIG (REP3-049) and has committed to capturing the principles set out in those documents within an update to the OCoCP. The updated OCoCP will include a new section setting out the proposed content of the Soil Management Plan, details of the role of the ALO, how soil will be treated, aftercare carried out, and how field drainage will be reinstated. The principles of the SMP will be captured within the OCoCP and will be secured through DCO Requirement 20(2)(f). This is reflected in the updated SoCG with NFU/LIG submitted at Deadline 4 (Rep1 - SOCG - 5.1).

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
18.31	Applicant	Please comment on the wording that the NFU and LIG would like to see being included in the soil management plan to cover how field drainage and irrigation systems will be treated pre and post construction as set out in [REP3-049] at Appendix B.	The Applicant has reviewed the Deadline 3 submission and appendices provided by the NFU/LIG (REP3-049) and has committed to capturing the principles set out in those documents, including how field drainage and irrigation systems will be treated pre and post construction, within an update to the OCoCP. The principles of the SMP will be captured within the OCoCP and will be secured through DCO Requirement 20(2)(f). This is reflected in the updated SoCG with NFU/LIG submitted at Deadline 4 (Rep1 - SOCG - 5.1).
18.32	Applicant	Please comment on the wording that the NFU and LIG would like to see being included in the soil management plan/CoCP to cover pre-construction survey of soils and the detail to be included in a record of condition, and soil storage and treatment as set out in [REP3-049] at Appendices C and D.	The Applicant has reviewed the Deadline 3 submission and appendices provided by the NFU/LIG (REP3-049) and has committed to capturing the principles set out in those documents, including pre-construction survey of soils, and details of soil storage and treatment, within an update to the OCoCP. The principles of the SMP will be captured within the OCoCP and will be secured through DCO Requirement 20(2)(f). This is reflected in the updated SoCG with NFU/LIG submitted at Deadline 4 (Rep1 - SOCG - 5.1).
18.33	Applicant/Relevant Planning Authorities	Horizontal Directional Drilling is not proposed at the crossings of two further Norfolk Trails, the Wensum Way and Weaver's Way, nor the majority of the crossing points of the general Public Rights of Way (PRoW) network. Do you agree that the County Council as the Highways Authority should be the relevant local authority to agree the management of PRoW's including the Trails network?	Within the NCC Local Impact Report, the County Council state that "in matters relating to Public Rights of Way (PRoW) and Trails, it is felt that the County Council as the Highways Authority should be the relevant local authority to agree the management of PRoW." The Applicant is content that the County Council would be the RPA. Mitigation related to PRoW is captured in the OCoCP and secured through Requirement 20. Requirement 20 has been updated in the dDCO submitted at Deadline 4 to confirm that the final CoCP must be submitted to and approved by the RPA, in consultation with NCC.
18.34	NNDC, Happisburgh PC		
18.35	NFU, LIG		

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
18.36	Applicant	In the section of the SoCG with NFU [REP1-051] relating to access to land and the haul road you refer to a commitment of no more than 20% of the haul road that will need to be left in situ or reinstated during the construction phase of the Project. Please provide more detail as to how this figure is arrived at, whether this takes into account all works that may be necessary to the land due to the Boreas project and how the commitment would be secured within the DCO or elsewhere.	The up to 20% of running track to be required for the cable pulling phase of construction is outlined in Table 5.31 of Chapter 5 Project Description of the ES in relation to the route sections as illustrated in Figure 24.07a of Chapter 24 Traffic and Transport of the ES. The running track requirement has been derived from a transport assessment of accessibility to the cable route for the purposes of cable pulling. In some locations, due to public highway restrictions or other constraints, sections of running track may be required to be reinstated or retained to allow cross field access to potential joint bay locations. This assessment is conservative as it assumes that joint bays could be located anywhere feasible along the onshore cable route. However, the siting of joint bays during detailed design will look to locate joint bays in the most accessible locations, typically near field boundaries, which will minimise the running track requirement identified. The same quantity of running track would be required to support the Norfolk Boreas cable pulling construction phase of up to a further two years after Norfolk Vanguard cable pulling construction phase. This commitment is secured in the dDCO under Requirement 20 through the OCoCP under Section 2.5.5. This sets out that during the cable pulling phase, a reduced 12km by 6m strip along the onshore cable route (representing the total coverage of the retained/reinstated running track across multiple locations) is anticipated to be required. At each location where the running track is retained or reinstated during the cable pull, this would only be required for up to approximately 16 weeks.
18.37	Necton Parish Council		
18.38	Breckland Parish Council		

1.19 Socio-economic, Including Tourism

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
19.29	Applicant, NCC, RPAs	In the Applicant's response to NCC's LIR [REP2-005] you state that the decision to establish a Community Benefit Fund (CBF) would be made post Financial Investment Decision (FID) and the potential for a CBF is outwith the DCO consenting regime and therefore wider community benefits should not be taken into account when determining the application. If a development plan policy relating to the provision of a community benefit appears to you to be relevant to development proposed within the Order limits what is your view as to the applicability of the policy in light of the DCO consenting regime? Please list any such policies.	The Applicant is not aware of any policies on community benefit included in the development plan policies for the RPAs and/or NCC. The Applicant has provided a detailed response in relation to the concept of community benefit in response to the ExA's Written Questions (Q19.8) submitted at Deadline 1 (document reference: ExA; WQ; 10.D1.3). The Applicant notes that only mitigation which addresses impacts directly associated with the Project should be considered in the planning and DCO process; wider community benefits should not be taken into account. The Applicant is, and continues to, address these wider benefits and is in discussions with the RPA and NCC, however this will be undertaken separately and outside of the DCO process. The Applicant also draws the ExA's attention to the response to Q20.155 below which explains that the Applicant is working with NCC to provide an appropriate response to NCC's request for a firm commitment for a skills requirement in the dDCO.
19.30	Applicant	In Chapter 31 ES, Socio-economics [APP-355] you state your key challenge is that the resident workforce is ageing, low skilled and low paid and as a result, many of the available high value jobs go to an imported workforce. You have committed to procuring 50% of your supply chain from the UK, however you state "at present some technologies and skillsets relating to offshore wind development are not available in the UK market and must therefore be procured externally. In light of a Brexit outcome that may remove freedom of movement of persons and/or place obstacles on supply chains, please provide an update of your workforce strategy, explaining how you propose to overcome difficulties in managing a flexible workforce that can be transferred as	The Applicant would like to note that the quoted text *"Our key challenge is that our resident workforce is ageing, low skilled and low paid. As a result, many of the available high value jobs go to an imported workforce"* is a quote from the New Anglia Strategic Economic Plan. This is referenced in Table 31.2 of Chapter 31 Socio-Economics in relation to relevant regional and local policy documents and the Applicant responds in Chapter 31 that *"Norfolk Vanguard project is engaging with local supply chains and educational facilities with the aim of enhancing local procurement and the development of a local employment pipeline"*. ES Chapter 31, and Appendix 31.2 considers the supply chain according to elements and sub-elements required for the development, construction and operation of an OWF, and assesses the probability of those elements being procured in the UK and in New Anglia Local Enterprise Partnership (NALEP)

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		required from one project to another within Europe."	based on NALEP's assessment work with Renewable UK and other OWF developers. The purpose of the assessment was to explore what proportion of the supply chain might be procured within the NALEP, and what proportion within the UK, giving a realistic indication of the benefits that might be realised within the UK and NALEP. The assessment adopts a conservative approach. Procurement specialists within Vattenfall on behalf of the Project have, and continue to, work with industry specialists and with the supply chain and support organisations, including NCC, East of England Energy Group (EEEGR) and NALEP to understand constraints and opportunities which might improve the proportion of works for the Project that can be achieved within the UK (and specifically the NALEP region). Based on the assessment and engagement to date, the Applicant is confident that it can achieve 50% of the supply chain from the UK with a reasonable degree of flexibility, as required by the Contracts for Difference process. If consented, the Applicant will be applying for a Contract for Difference (CfD) for Norfolk Vanguard at the first subsequent opportunity, which requires a Supply Chain Strategy, in accordance with Supply Chain Plan Guidance (provided in Appendix 19.1 (document reference ExA; FurtherWQApp19.1; 10.D4.6.)) and assessed by Government according to the extent to which plans: • Support the development of competition in supply chains (the 'competition' criteria); • Support innovation in supply chains (the 'innovation' criteria); and • Support the development of skills in supply chains (the 'skills' criteria). In line with requirements, as stipulated by the CfD process and Project needs, Vattenfall has been exploring the local skills landscape in collaboration with relevant stakeholders (as noted above) and piloting skills development works over the development phase of the project. To this end, the Applicant is currently piloting several STEM-related skills programmes aimed at

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			complementing STEM curricula at primary, secondary and tertiary education levels. Furthermore, several supply chain events are programmed to be delivered by Vattenfall in Norfolk over 2019 in relation to Norfolk Vanguard and Norfolk Boreas. These events will build on the engagement gained from two highly successful exploratory and planning events hosted by the Applicant in 2018. The Applicant is committed to early preparation and collaboration with the supply chain in order to enable local stakeholders to capitalise on the opportunities ahead. Finally, the Applicant has identified elements of the supply chain requirements for the Project where there is realistic potential to push for additional UK content, noting the ambition expressed in the recently published Offshore Wind Sector Deal (march 2019) towards 60% UK content for UK projects. One such opportunity is to enhance local content during project Operations and Maintenance (O&M). In terms of O&M personnel including site management, technicians and vessel crews, the trend observed (and which Vattenfall are already working to support and drive forward) is new entrants into the workforce, and those with relevant skills (coming from other industries e.g. Oil & Gas, Armed Forces) gaining skills and re-training / refreshing their capabilities, targeted to the offshore wind industry's needs. Vattenfall's strategy is to establish and nurture a local workforce where it operates. For example the existing operations base in Ramsgate, which services Vattenfall's Kent Cluster of OWFs comprises 100% personnel with a local crew (Crew Transfer Vessels) and local personnel from the town managing the base and all its operations.

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			Therefore, based on current experience, the Applicant is confident of meeting both the 50% local content requirement and wider supply chain requirements and does not anticipate long term impacts as a result of Brexit.

1.20 Content of the draft DCO (dDCO)

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20.119	Applicant	Please consider and comment briefly on the additional wording provided by Trinity House related to Article 38, as set out in [REP3-062], in particular the circumstances in which it would accept the wording including any amendment thereto which it considers expedient to make.	The Applicant has considered the amendments suggested by Trinity House (**TH**) and proposes the following wording (with additional text in red): ***Arbitration*** *38.—(1) Subject to Article 41 (saving provisions for Trinity House), any difference under any provision of this Order, unless otherwise provided for, must be referred to and settled in arbitration in accordance with the rules at Schedule 14 of this Order, by a single arbitrator to be agreed upon by the parties, within 14 days of receipt of the notice of arbitration, or if the parties fail to agree within the time period stipulated, to be appointed on application of either party (after giving written notice to the other) by the Secretary of State…* The intention of this amendment is to make it clear that the arbitration Article (at Article 38) does not overrule TH's saving provision (at Article 41). This therefore means that the arbitration article cannot be relied upon by the Applicant against TH if it would prejudice or derogate from any rights, duties or privileges of TH. The Applicant has amended the dDCO submitted at Deadline 4 in this respect. It should also be noted that the Applicant has amended Article 38 in light of the MMO's submissions at Issue Specific Hearing 3 and Deadline 3. The Applicant

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			explains the rationale and implications of these changes further within Q.20.139 below.
20.120	BDC		
20.121	Applicant	"Drafting Suggestions for the dDCO" have been submitted by NNDC at [REP3-055]. Please comment on these including with reference to: i) The HVDC export system; ii) The amendments proposed to R18, R19 and R20; iii) Schedule 15, including the tracked changes version of the whole schedule provided at Appendix 5. Given that AC cables are required offshore, as well as between the onshore substation and the existing National Grid substation extension, and this needs to be permitted within the dDCO, how might the dDCO be amended to provide for the necessary savings in that regard, if it is recommended that the use of a HVDC system within the works description is to be explicitly secured within the DCO?	**i) HVDC export system** The Applicant maintains its position as outlined at Issue Specific Hearing 1 (ExA; ISH; 10.D3.1) and Issue Specific Hearing 3 (ExA; ISH; 10.D3.3), that is it is the physical structures (e.g. cable relay station and increased number of cables requiring an increased land take), as opposed to the nature of the Alternating Current (AC), that is the principal issue for Interested Parties in this respect. It should also be noted that: (1) The ES does not assess the additional infrastructure associated with HVAC; (2) The Order limits do not include the additional land which would be required to construct and operate the additional infrastructure; and (3) The works description contained within the dDCO does not consent the additional infrastructure which gives rise to the concerns (e.g. the cable relay station and the additional number of cables which would be required). Therefore, to the extent that the additional infrastructure was subsequently proposed as part of an HVAC solution, this would require a material amendment to the DCO on the basis that new environmental impacts would need to be assessed, additional land take would be required, and significant local concern would be raised. Importantly, and as previously set out by the Applicant, if technological advancements enable the future use of an HVAC system to be optimised within the parameters assessed and secured by the dDCO (i.e. without additional above ground cable relay stations and further land take), the Applicant should not be restricted to the use of HVDC technology along the cable route. It is noted that NNDC are concerned to ensure the Applicant uses an efficient export system, however this is a matter for the Applicant to determine, provided it remains within the parameters assessed and consented.

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			In summary, the Applicant's position remains that because the dDCO does not consent the additional infrastructure required for HVAC it is not necessary to stipulate HVDC through a Requirement or further secure the use of a HVDC system within the works description. Notwithstanding this, the EExA has asked for the Applicant's views on drafting in the event that the ExA considers that a HVDC export system should be secured. This could be secured through the following changes to the works description: *Work No. 4A – up to four subsea HVDC export cables and fibre optic cables between Work No. 2 and Work No. 4B consisting of subsea HVDC cables and fibre optic cables along routes within the Order limits seaward of MLWS including one or more offshore cable crossings;* *Work No. 4B – up to four subsea HVDC export cables and fibre optic cables between Work No. 4A and Work No. 4C consisting of subsea HVDC cables and fibre optic cables along routes within the Order limits between MLWS and MHWS at Happisburgh South, North Norfolk;* *Work No. 4C – the onshore transmission works at the landfall consisting of up to two transition jointing pits and up to four HVDC cables to be laid in ducts underground and associated with fibre optic cables laid within cable ducts underground from MHWS at Work No. 4B to Work No.5;* *Work No. 5 – onshore transmission works consisting of up to four HVDC cables to be laid in ducts and up to four additional cable ducts for the Norfolk Boreas offshore wind farm laid underground and associated fibre optic cables laid underground within cable ducts from Work No. 4C to Work No. 6;* *Work No. 6 – onshore transmission works consisting of up to four HVDC cables to be laid in ducts and up to four additional cable ducts for the Norfolk Boreas offshore wind farm laid underground and associated fibre optic cables laid underground within cable ducts from Work No. 5 to Work No. 7;*

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			Work No. 7 – onshore transmission works consisting of up to four HVDC cables to be laid in ducts and up to four additional cable ducts for the Norfolk Boreas offshore wind farm laid underground and associated fibre optic cables laid underground within cable ducts from Work No. 6 to Work No. 8A. Article 2 (Interpretation) would also need to be amended to include a definition of HVDC as 'high voltage direct current'. This drafting would allow AC interface cables as required between the onshore project substation and the National Grid extension (Work No. 9) and also offshore AC cables (Work Nos. 1 to 3). The transmission would change to HVDC for the export cables at the offshore electrical platforms. **ii) Requirements** The Applicant agrees with the proposed changes to Requirement 18 and Requirement 20 and these changes are reflected in the dDCO submitted at Deadline 4. The Applicant does not agree with the suggested change to Requirement 19(2) to amend the replacement planting to a 10 year period. The evidence that NNDC submitted to the examination at Deadline 3 to justify a 10 year period of aftercare for replacement planting is based on woodland planting. As the Applicant outlined at Issue Specific Hearing 1 and has also stated in response to q14.27, the five year period for replacement planting reflects the industry standard and covers the critical initial period during which the majority of plant failures would occur. In relation to NNDC's specific local authority area, the replacement planting in this area would be limited to hedgerows only. The Applicant is not proposing any tree planting within North Norfolk District and there are no wooded areas that will be directly affected by the onshore cable route in North Norfolk District. On this basis, 5 years of post-planting monitoring is considered to be appropriate across the entire route and, in particular, for planting within NNDC's boundary. **iii) Schedule 15**

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			In relation to Schedule 15, the Applicant considers that the majority of amendments are reasonable and, for those amendments considered reasonable, these are included in the revised dDCO submitted at Deadline 4.
20.122	MMO		
20.123	Applicant	Have you considered further the drafting of the definition to specifically restrict the reference to further associated development to that development listed at paragraphs (a) to (p) and (a) to (b) in the description of the authorised development at Schedule 1 Part 1 (after the Works descriptions and before paragraph 2)? If so, please provide any proposed change to the dDCO.	The definition of "onshore transmission works" in the dDCO has been amended as follows: *"onshore transmission works" means Work Nos. 4C to 12 and any related further associated development and ancillary works described in Schedule 1 part 1 and Schedule 1 part 2 respectively.* It is not considered appropriate to refer only to the lists of onshore further associated development at (a) to (p) and (a) to (b) in Schedule 1, Part 1 because these lists are expressed to be inclusive rather than exhaustive.
20.124	RPA's		
20.125	Applicant	Requirement 12 relates to Ministry of Defence (MoD) requirements to maintain defence aviation safety. Please provide an update as to whether timescales for complying with any direction have been agreed with the MoD such that any lighting considered necessary for aviation safety is in place and operational for the wind turbines and any other relevant structures during and after construction.	As noted in the Written summary of the Applicant's oral case at ISH3 (ExA; ISH; 10.D3.3), some amendments to Requirement 12 of the dDCO have been agreed with the MoD, which enabled the MoD to require lighting considered necessary for aviation safety which was not captured by the Air Navigation Order and also to provide that such lighting should remain operational for the life of the authorised development. Following the ExA's comments as to whether timescales for complying with any direction should be included, a further amendment has been proposed to the MoD and this had been agreed by the MoD and is included in the dDCO submitted at D4 accordingly. *"12 (1) The undertaker must exhibit such lights, with such shape, colour and character and at such times as are required in writing by Air Navigation Order 2016(a) and/or determined necessary for aviation safety in consultation with the Defence Infrastructure Organisation Safeguarding and as directed by the CAA.*

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			It should be noted that a further amendment has been requested by the MoD to Requirement 12 and the Applicant remains in discussions with the MoD in relation to this.
20.126	Applicant	Requirement 13 secures technical mitigation for impacts on Air Defence Radar (ADR). Please provide an update on discussions with the MoD as to including reference to timescales for implementation of the approved mitigation prior to the first use of the wind turbines.	As noted in the Written summary of the Applicant's oral case at ISH3 (ExA; ISH; 10.D3.3), there is a two stage process for agreeing mitigation under Requirement 13. The mitigation would be approved by the Secretary of State following consultation with the MoD, and following this the mitigation would be implemented. Timescales for implementation of the approved mitigation would be detailed in the Radar Mitigation Scheme. However, following the ExA's request, the Applicant has proposed a further amendment to the drafting to clarify this. This amendment has been agreed by the MoD and has been included in the dDCO submitted at D4, together with some updates to other minor typing errors. *13(2)(b)"approved mitigation" means the detailed Radar Mitigation Scheme (RMS) that will set out the appropriate measures and timescales for implementation as agreed with the Ministry of Defence at the time the Secretary of State confirms satisfaction in writing in accordance with sub-paragraph (1);*
20.127	NCC		
20.128	Applicant	Please provide an update as to what further revisions have been agreed with the Relevant Planning Authorities, or are now proposed as to Requirement 20, Code of Construction Practice, in particular: (i) the extent to which pre-commencement works are adequately secured, and (ii) whether to include reference to 'vibration' at	The Applicant has revised the wording of Requirement 20 which is included in the dDCO submitted for Deadline 4 and which reads as follows (with new additions in red text): *"**20.**–(1) No stage of the onshore transmission works may commence until for that stage a code of construction practice has been submitted to and*

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		Requirement 20(2)(e)	*approved by the relevant planning authority, in consultation with Norfolk County Council and the Environment Agency.* *(2) The code of construction practice must accord with the outline code of construction practice and include details, as appropriate to the relevant stage, on–* *(a) relevant health, safety and environmental legislation and compliance;* *(b) local community liaison responsibilities;* *(c) artificial light emissions;* *(d) contaminated land and groundwater;* *(e) construction noise and vibration;* *(f) soil management;* *(g) construction method statements;* *(h) site and excavated waste management;* *(i) surface water and drainage;* *(j) materials management;* *(k) screening, fencing and site security;* *(l) air quality;* *(m) invasive species management; and* *(n) proposals for managing public rights of way.* *(3) The code of construction practice approved in relation to the relevant stage of the onshore transmission works must be followed in relation to that stage of the onshore transmission works.* *(4) Pre-commencement screening, fencing and site security works must only take place in accordance with a specific plan for such pre-commencement works which must accord with the relevant details for*

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			screening, fencing and site security set out in the outline code of construction practice, and which has been submitted to and approved by the relevant local authority." The first change to the Requirement 20(1) has been requested by, and agreed with, NCC. NNDC requested that vibration is included within Requirement 20(2)(e). Reference to managing PRoW has been included at new paragraph (n) given that this is also included within the OCoCP. The addition of a new paragraph (4) has been made to address theExA's question at Issue Specific Hearing 3 as to whether the details within Requirement 20(2)(k) (screening, fencing, and site security) were excluded from the definition of commencement. The Applicant has therefore included this paragraph to enable the RPA to approve pre-commencement screening, fencing, and site security works. The Applicant is also in discussions with NCC regarding the operational elements of surface water and drainage at the onshore substation site; it is agreed that the Applicant will meet NCC's request and the Applicant is currently reviewing the necessary updates to the Requirements and any associated plans. The Applicant expects to be able to submit an update in this respect by Deadline 5.
20.129	Applicant	Please provide an update on discussions as to who is to take the lead in relation to discharge of R21 (traffic matters), R22 (highway accesses), R23 (archaeological WSI) and R25 (watercourse crossings).	Further discussions have been held with NCC and it has been agreed that the lead discharging authorities will be as follows: • Requirement 21: the relevant planning authority (in consultation with the highway authority); • Requirement 22 (which links with Requirement 21): the relevant planning authority (in consultation with the highway authority); • Requirement 23: the relevant planning authority (after the Applicant has consulted with Historic England and NCC); • Requirement 25: the relevant planning authority (in consultation with NCC, the Environment Agency, relevant drainage authorities, and NE).

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			The Applicant has submitted a revised dDCO which reflects this at Deadline 4.
20.130	Applicant	What amendment is proposed if any as to R21 to secure pre-commencement mitigation referred to in the relevant plans?	The plans referred to within Requirement 21 are the OTMP, the outline Travel Plan and the outline Access Management Plan. Pre-commencement mitigation and surveys will not generate significant traffic that would be subject to the control measures outlined in these plans. However, pre-commencement archaeological investigation, whilst not generating large numbers of associated traffic, will require heavy plant to be delivered to various (yet to be determined) locations along the onshore Order limits. This is associated with undertaking trial trench excavations once those required locations have been confirmed post-consent. In order for heavy plant to reach some of these locations it may be necessary to introduce a number of the construction accesses ahead of the main onshore construction works. On this basis, Requirement 21 has been amended with the inclusion of a new paragraph (3) which identifies that if there is the need for any of the construction accesses to be introduced ahead of the main onshore construction works in order to facilitate the pre-commencement archaeological investigation, a specific plan for such accesses will be produced. The plan must accord with the relevant details set out in the outline Access Management Plan and must be submitted to and approved by the RPA, in consultation with the highway authority, prior to the construction and use of such accesses. The accesses identified must be constructed and used in accordance with the details contained in the specific plan so approved. This amendment to Requirement 21 has been included in the updated dDCO submitted at Deadline 4.
20.131	RPA's		
20.132	Applicant	What is understood by the term "non-intrusive" and is it intended to exclude activities that would have some limited but adverse impact? Is there merit in	The Applicant agrees that there is merit in separating out essential and non-intrusive activities within Requirement 26 of the dDCO. The Applicant has included revised drafting in the dDCO, submitted at Deadline 4 to reflect this

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		separating out the "essential" and "non-intrusive" activities in R26?	change; the matters outlined in (the revised drafting of) Requirement 26(3) are examples of non-intrusive activities, as shown below: *"**Construction hours*** ***26.**–(1) Construction work for the onshore transmission works must only take place between 0700 hours and 1900 hours Monday to Friday, and 0700 hours to 1300 hours on Saturdays, with no activity on Sundays or bank holidays, except as specified in paragraphs (2) to (4).* *(2) Outside the hours specified in paragraph (1), construction work may be undertaken for essential activities including but not limited to–* *(j) continuous periods of operation that are required as assessed in the environmental statement, such as concrete pouring, drilling, and pulling cables (including fibre optic cables) through ducts;* *(k) delivery to the onshore transmission works of abnormal loads that may cause congestion on the local road network;* *(l) works required that may necessitate the temporary closure of roads;* *(m) onshore transmission works requiring trenchless installation techniques;* *(n) onshore transmission works at the landfall;* *(o) commissioning or outage works associated with the extension to the Necton National Grid substation comprised within Work No. 10A;* *(p) commissioning or outage works associated with the overhead line modification works comprised within Work No. 11 and Work No. 11A;* *(q) electrical installation; and* *(r) emergency works.*

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			(3) Outside the hours specified in paragraph (1), construction work may be undertaken for non-intrusive activities including but not limited to– *(c) fitting out works within the onshore project substation buildings comprised within Work No. 8A; and* *(d) daily start up or shut down.* *(4) Save for emergency works, the timing and duration of all essential construction activities under paragraph (2) and undertaken outside of the hours specified in paragraph (1) must be agreed with the relevant planning authority in writing in advance, and must be carried out within the agreed time."* By their very nature, the non-intrusive activities are not considered to be impactful from a noise or environmental perspective; it is therefore proposed that these works may proceed outside of the specified construction hours without further LPA approval. The Applicant also refers the ExA to the response to Question 10.5 above for a further explanation of the rationale for this change.
20.133	NNDC		
20.134	Applicant	Please provide an update as to whether the relevant planning authority should be notified of cessation of commercial operations and to include reference to the timing for implementation of the decommissioning plan at R29(2), supplying any proposed amendments to the dDCO.	As the Applicant outlined in response to the ExA's question 20.61 at Deadline 1 (document reference: ExA; WQ; 10.D1.3), the decommissioning process is largely governed by Ofgem and will be dictated through the length of the fixed term transmission licence. Notwithstanding this, the Applicant agrees that it is appropriate to include wording within Requirement 29 to notify the RPA of cessation of commercial operations, and has amended the dDCO for Deadline 4 as follows: *"**29.**—(1) Within six months of the permanent cessation of commercial operation of the onshore transmission works an onshore decommissioning plan must be submitted to the relevant planning authority for approval.* *(2) The onshore decommissioning plan must be implemented as approved*.

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			(3) The undertaker must notify the relevant planning authority in writing of the permanent cessation of commercial operation of the onshore transmission works within 28 days of such permanent cessation." In addition, an amendment has been made to the dDCO to include the following definition: "*onshore decommissioning plan" means a plan to decommission Work No. 4B to Work No. 12 which includes a programme within which any works of decommissioning must be undertaken*" This is included to clarify that the decommissioning plan must include the intertidal area and to ensure that a timetable for implementation of the decommissioning works is included as part of the decommissioning plan. This amendment has been included in the updated dDCO submitted at Deadline 4.
20.135	Applicant	In relation to the discharge of consents set out in R31, please explain in more detail why the principle of minimising delays post consent is particularly important for offshore wind projects in the context of meeting Contract for Difference milestones.	It is Norfolk Vanguard Ltd's intention to bid for a CfD at the earliest opportunity following a successful DCO Consent decision. In July 2018 UK Government announced future CfD Auction Rounds in 2021 and 2023. Successful CfD award will enable Vattenfall to progress future investment decisions that will realise the construction onshore and offshore and subsequent commissioning of the windfarm. If successful, the CfD will contain a number of key contractual milestones which must be met by the developer. These Milestone Delivery Requirements are designed to demonstrate commitment and progression of the projects to achieve generation by the dates stated in the CFD contract. By 12 months of signing a CfD, generators must meet the Milestone Delivery Date criteria. These evidence commitment to a project by either spending 10% of pre-commissioning costs or taking a Financial Investment Decision (FID). It would not be possible to evidence these requirements without minimising post-consent delays.

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			Discharging the consent conditions for Norfolk Vanguard at the earliest opportunity and minimising delays post consent is therefore imperative to meet the Milestone Delivery Date of a CfD in order to make a FID and fulfil other subsequent contractual obligations (e.g. the Operational Conditions Precedent, commissioning during the Target Commissioning Window, meeting obligations before the Longstop Date) associated with the construction and operation of the wind farm.
20.136	Applicant	Do you agree with the MMO's understanding that notwithstanding the intended inclusion of the intertidal area within R29, there will still be a need for permission from the MMO for the decommissioning stage and that a marine licence will be required for decommissioning including the intertidal area?	The Applicant agrees that the intertidal area is within the MMO's jurisdiction and, subject to the nature of the decommissioning works to be undertaken, a separate marine licence may be required for the intertidal decommissioning works. The Applicant has submitted a revised draft of the DCO at Deadline 4 to incorporate the intertidal area within the remit of Requirement 29.
20.137	MMO		
20.138	Applicant	Please comment on the MMO's proposed wording at 3.2.1 of [REP3-046] of a cooperation condition within the Schedule 1, Part 3, Requirements, and in relation to the DMLs at Schedules 9, 10, 11, and 12.	The Applicant has reviewed the MMO's proposed Offshore Co-operation condition included in the MMO's Deadline 3 submission. The Applicant notes that a similar condition was included in the East Anglia Three Offshore Wind Farm Order (EA3). However, this was necessary due to the overlap in Order limits for EA3 and East Anglia ONE (EA1), as well as a need to co-operate during the pre-construction phase because EA1 had not been constructed at the point of EA3 consent. The Norfolk Vanguard Order limits do not encroach on the Order limits of another made DCO and the Applicant understands the purpose of the condition would be to manage co-operation between future operators following a transfer of benefit post-construction (rather than pre-construction). The Applicant therefore considers that this condition is not necessary and can be distinguished from the condition included in the EA3 Order. As previously stated, the Applicant considers that this is best dealt with through commercial arrangements at the point of transfer of benefit, especially given that the nature and extent of any co-operation required is not yet known.
20.139	Applicant	Conditions 14 (1) and 15 (2) set out the requirements for the Applicant to submit all	The Applicant notes NE's and the MMO's comments. The Applicant, however, believes that the four month time frame conditioned within the DMLs is

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		preconstruction documentation at least 4 months prior to the commencement of the construction works. The MMO has provided detailed reasoning [REP3-046] in particular at points 1.2.6 and 4.1.2, as to why the timescales should be set at least 6 months to allow sufficient time for repeat rounds of stakeholder consultation if required. Please review, including the representations about this matter by NE at Deadline 3, and confirm whether the timescales proposed are acceptable or list any of the points with which you take issue and explain why.	appropriate and proportionate to allow the MMO, in consultation with NE where relevant, sufficient time for stakeholder consultation and the provision of comments, whilst ensuring no unnecessary delay to the commencement of development and completion of construction works. This four month time period is contained on a number of other OWF DCOs (including The East Anglia Three Offshore Wind Farm Order 2017 and Hornsea Two Offshore Wind Farm Order 2016) which are not dissimilar in size and principle to Norfolk Vanguard. Four months is well-established as an appropriate time frame for OWF schemes and one that ensures a balance is struck between the expedient discharge of the relevant conditions attached to the DML whilst allowing a reasonable period of time for consideration by the MMO and relevant consultees. The importance of minimising delays post consent for offshore wind projects in the context of meeting Contract for Difference milestones is explained in more detail in response to q20.135. The MMO states, at paragraph 1.2.6 of their Deadline 3 submission, that it is very common that documents require multiple rounds of consultation to address stakeholder concerns. In this respect, the Applicant envisages that discussions will be held with the MMO, and NE where relevant, once the final Project design has been agreed and in advance of seeking formal discharge of conditions, which would reduce the need for multiple rounds of consultation post submission. The In Principle SIP (document reference 8.17) contains an indicative timeline for consultation and agreement of the SIP post-consent and includes several rounds of consultation with the MMO prior to the formal submission of the final SIP four months in advance of construction. It is expected that other key plans would follow a similar consultation and approval process. Furthermore, it will be in the Applicant's interest to engage the MMO, and NE, at an early stage in this way to ensure the discharge process is as efficient as possible. In practice the Applicant will have engaged in consultation activities with the MMO and NE well in advance of submission of the final version for approval; this means that the relevant stakeholders should be very

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			familiar with its terms and effect at the point an application for discharge is made. The Applicant acknowledges that it has, in some recent cases, taken much longer than 4 months for the MMO to discharge certain DML conditions on other OWF projects and it should be acknowledged that with no mechanism to encourage the MMO to determine applications within a reasonable period (such as arbitration or appeal) the developer is then left in a position which is wholly unsatisfactory. With such highly competitive and fixed CfD milestones, and where offshore construction can only be undertaken in safe and optimal weather conditions, wind farm developers need the certainty and confidence of a reliable and consistent approval process. This is one reason why the Applicant sought to clarify the arbitration provisions in the dDCO. By its own admission at paragraph 2.2.1 of its Deadline 3 submission, the MMO states that the emphasis of the MMO's duties lies in the fact that Parliament has vested public law functions such as discharging marine licence conditions upon the MMO. It should therefore naturally follow that the MMO does indeed reach a decision on the discharge of a condition, with justifiable reasons (for approval or disapproval), within the timeframes stipulated in a (deemed) marine licence. The MMO has a public duty to do so. This is increasingly pressing in the case of offshore wind. There is a strong public interest argument in favour of timely approvals in order to ensure that nationally significant infrastructure projects (NSIP) are not unduly delayed. Accordingly, the Applicant considers that the dDCO strikes the balance between allowing the MMO (and Natural England) to properly discharge their statutory duties whilst ensuring development is unlocked in a timely manner. However, and notwithstanding the Applicant's view that the MMO should be subject to arbitration for the reasons previously identified, the Applicant is keen to agree a pragmatic solution which is workable for the Applicant and the MMO. Therefore, to the extent that the MMO is willing to agree to the

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			inclusion of a deemed discharge provision in the DMLs, the Applicant will agree to remove the MMO from arbitration under the dDCO. This drafting has been reflected in article 38 (Arbitration) and conditions 15 (Generation DMLs) and condition 10 (Transmission DMLs) of the dDCO submitted at Deadline 4 to allow further discussion on this basis. It will be noted that in applying the deemed discharge period, the Applicant has sought to include drafting which ensures that the MMO is only required to determine the application once it has received all necessary information to do so. The drafting also allows the MMO to request further information from the Applicant within one month of receiving the application. This would extend the period to determination to at least 5 months, and longer once an allowance is made for the Applicant to prepare and provide the information sought. This is considered a reasonable and pragmatic approach given the points identified above.
20.140	Applicant	Do you agree the addition to condition 19 recommended by the MMO at 4.1.3 of [REP3-046]? If not please explain why not, adding any alternative wording and any desired response to the reasoning adopted in the second paragraph of 4.1.3.	The Applicant considers that the timings, methodologies, and details of further actions in the event of unacceptable levels of noise could be included in the construction programme and monitoring plan, which must accord with the offshore IPMP, provided pursuant to Condition 14(1)(b) (Generation DMLs) and/or Condition 9(1)(b) (Transmission DMLs) and which would be approved by the MMO. However, the Applicant has discussed this matter with the MMO and is willing to include the revised wording to Condition 19(3) of the Generation DMLs (Schedule 9-10) as requested by the MMO. Condition 14 of the Transmission DMLs has also been updated accordingly. This is included in the revised dDCO submitted at Deadline 4.
20.141	Network Rail		
20.142	Applicant	Please provide an update as to whether the position regarding insurance and surety provisions affecting Cadent Gas and as referred to in their D3 submissions [REP3-040] has now been agreed and if not explain the nature of any outstanding dispute.	The Applicant has been in ongoing discussions with Cadent regarding insurance and surety provisions, and these provisions are now agreed. The parties are yet to finally agree the timescales under the "retained apparatus" provisions. The Applicant is content with the 56 day notice period for the Applicant to provide plans, sections and details under paragraph 8 of the protective provisions (retained apparatus). However, the Applicant wishes

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			Cadent to commit to providing its reasonable comments (if any) on the plans, sections and details on a timescale that would more easily allow the period between the Applicant first giving notice and then subsequently commencing works to keep within a 56 day period. The Applicant has been in discussions with Cadent on this point. The Applicant is confident that it can be resolved or a compromise position reached shortly.
20.143	National Grid		
20.144	Applicant	"In Table 5.6 of Chapter 5, Project Description, relating to the infrastructure seabed footprint, a figure of 157m2 is presented for LiDAR for 2 x monopiles + scour protection. The description of parameters in dDCO/DML as currently worded in R10 and Schedules 9 and 10, Part 4, 7(2) allows for 157m2 per foundation. Should this be amended, as suggested by NE in its submissions at D3, [REP3-051], to reflect the figures presented in the ES, i.e. 157m^2 in total for both LiDAR measurement buoys, and if not why not?"	The dDCO submitted at Deadline 4 has been updated to include a seabed footprint of 79m^2 per Light Imaging, Detection and Ranging (LiDAR).
20.145	Applicant	Do you agree with NE's comments in [REP3-051] that Schedules 11 and 12, Part 4, 3(1)(b) should be amended to reflect the lower maximum amount of scour protection for the offshore electrical platforms presented in the ES, namely 35,000m3 as in Table 5.15 and Table 5.6 rather than up to 100,000 m3? If not please explain why not.	Table 5.6 and 5.15 refer to an area of 35,000m^2 for the total footprint of two offshore electrical platforms with scour protection based on the following: • The footprint per platform without scour protection is 7,500m^2 (Table 5.15) i.e. 15,000m^2 for two platforms without scour protection • The total area of scour protection is therefore 20,000m^2 (35,000-15,000). A conservative assumption of 5m height of scour protection has been adopted in calculating the volume (i.e. 20,000m^2 x 5m = 100,000m^3). 20,000m^2 and 100,000m^3 are reflected in the dDCO (Schedules 11 and 12, Part 4 Condition 3(1)(b). It is acknowledged that there is a typing error in Table 5.15 and the maximum area of scour protection per platform (m^2) should be 10,000m^2 rather than 17,500m^2

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20.146	Applicant	Regarding NE's comments in [REP3-051] as to Schedule 1, Part 1, should disposal volumes be split according to type of material, for example drill arisings, boulders, sand and mud? If not please explain why not. Please comment on the recommendation that the maximum volumes taken within the Haisborough, Hammond and Winterton SAC should be detailed separately to ensure the impacts to the designated site remain within the impacts assessed, and whether the wording should also limit the area of impact from removal of substances for disposal to the area assessed."	Disposal volumes have been separated into drill arisings and dredged sediment in the dDCO. Any boulders of significant size would be relocated as assessed in the ES. These would not be lifted to the surface and are therefore not considered in the volumes for disposal. The Applicant considers that it is not practicable or necessary to distinguish between sand and mud volumes. As discussed above, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include proposed mitigation measures and agreement processes associated with sediment disposal within the HHW SAC.
20.147	NE		
20.148	Applicant	Schedule 1, Part 1 & Schedules 9-12 Part 3 1(f): please clarify the apparent discrepancy between the total of 414,762m^3 included in the Change Report and a value of 414,761m^3 listed in the draft DCO /DML.	The value should be 414,761m^3 as listed in the dDCO.
20.149	Applicant	Schedule 1, Part 3, Requirement 2(b) Schedules 9 and 10, Part 4, Condition 2(1)(b): please confirm the maximum height of a wind turbine generator to the centreline of the generator shaft (when measured from HAT) will be revised in the next dDCO from 200m to 198.5m, in accordance with the parameter assessed in the ES."	This has been updated in the dDCO submitted at Deadline 4.
20.150	Applicant	Schedule 1, Part 3, Requirement 5; Schedule 9 & 10, Part 4, condition 3; and Schedule 11 & 12, Part 4, condition 2: please clarify why the ES includes a figure of 222,086m2 for the export cable whereas a total figure of 122,086m^2 has been included in draft	In response to ExA's First Written Questions (Q6.11), the Applicant identified an error in Table 5.23 of ES Chapter 5. The length of export cable protection for potentially unburied cables should be 20km rather than 40km.

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		DCO.	The removal of 20km length of cable protection equates to 100,000m^2 based on a cable protection width of 5m and therefore explains the difference between 222,086m^2 and 122,086m^2. The values in Revision 2 of the dDCO submitted at Deadline 2 reflect this correction.
20.151	Applicant	Natural England note that, for the total amount of scour protection for the offshore infrastructure a figure of 53,095,038m^3 is included in the updated draft DCO, but a figure of 53,195,398m^3 is included in the Explanatory Memorandum. Please clarify the difference.	53,195,398m^3 is the total for the whole project comprising: • 53,095,398m^3 is the total for the generation assets • 100,000m^3 for the transmission assets Schedule 1 of the dDCO has been amended to reflect the total scour protection volume of 53,195,398m^3. The revised dDCO has been submitted at Deadline 4.
20.152	Applicant	Schedule 14 (paragraph 7(2)). Please comment on the particular status of NE pointed out in its objections to the arbitration provisions in the dDCO [REP3-051] as to whether they affect your position and if not why not.	The Applicant maintains its position as submitted in response to the ExA's question 20.109, and 20.110 at Deadline 1 (document reference: ExA; WQ; 10.D1.3), and as summarised in the Applicant's response to Issue Specific Hearing 3 (document reference ExA; ISH; 10.D3.3). In short, the Secretary of State has already considered the applicability of arbitration to NE as a result of the Triton Knoll Offshore Wind Farm Order 2013 and the Burbo Bank Extension Offshore Wind Farm Order 2014. In both cases, the Secretary of State considered that it was appropriate for arbitration to apply to NE/SNCBs. The Applicant notes NE's comment regarding confidentiality, and the Applicant considers that the revised wording within Schedule 14 of the dDCO (submitted at Deadline 2) will enable NE to comply with their statutory obligations. In this regard, the Applicant also notes that public bodies, such as local planning authorities, are regularly subject to arbitration clauses through mechanisms such as section 106 agreements under the Town and Country Planning regime. In any event, it is considered unlikely that matters between NE and the Applicant will result in a dispute to be referred to arbitration given that NE's

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			role under the DCO is as a consultee rather than an approval body. The arbitration provisions would not prevent NE from providing its advice, or from meeting its responsibilities when consulted on matters by the MMO, for example. It is therefore considered appropriate that the arbitration article and schedule should apply to NE and other SNCBs.
20.153	NCC		
20.154	Applicant	Please provide an update as to whether Condition 12(5) could be clarified to provide that materials other than inert materials of natural origin must be screened out before the inert materials are disposed of at the site and supply any proposed amended wording to Condition 12(5) of Schedule 9 and 10, and Condition 7(5) of Schedule 11 and Schedule 12.	The Applicant has updated the wording to address this concern and the condition now reads as follows: *"(5)The undertaker must ensure that only inert material of natural origin, produced during the drilling installation of or seabed preparation for foundations, and drilling mud is disposed of within site disposal reference [XX] within the extent of the Order limits seaward of MHWS. Any other materials must be screened out before disposal of the inert material at this site."* This wording is duplicated in the respective DMLs at Schedule 9, 10, 11, and 12 of the dDCO submitted at Deadline 4.
20.155	Applicant	Please provide an update as to the consideration being given to the request from NCC for a skills requirement to be included in the dDCO. In this connection please explain in further detail the statement in your note of ISH3 that CfD eligibility requires Vattenfall to produce a Supply Chain Plan assessed and marked by the Secretary of State for Business, Energy and Industrial Strategy.	As noted in ExA Q. 19.30, the Applicant is working towards the development of a Supply Chain Strategy as required by the CfD process (which is outwith the DCO process). See response to q19.30. Development of the strategy is guided by the BEIS Supply Chain Plan (SCP) guidance (Appendix 19.1 (document reference ExA; FurtherWQApp19.1; 10.D4.6) necessary for the CfD auction process. This guidance comprises specific requirements relating to skills, competition and innovation. Developers must demonstrate adequate scores across the three sections of the SCP in order to be eligible for the bidding process for CfD.

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			The Applicant is committed to collaboration on skills, including with local organisations and establishments whose sole purpose is skills development, in order to maximise the potential of any investment in this area. The Applicant is currently in discussion with NCC regarding their request for a Requirement covering the need for a Skills and Employment Strategy as noted in the SoCG with NCC submitted at Deadline 4 (Rep1 - SOCG - 15.1).
20.156	Applicant	NCC proposes a surface water and drainage requirement but you consider that, to the extent that this was not already dealt with by R20, it would be preferable to include any further detail in the outline CoCP. Please give an update on the position with regard to NCC's proposed wording in its Additional Submission - Accepted at the discretion of the Examining Authority.	The Applicant met with NCC on 26th February 2019 to discuss the request for a surface water drainage scheme requirement. The Applicant is happy to accept the wording requested by NCC and it was agreed that this wording would be captured within a plan to be secured through the dDCO requirements. Discussions as to the precise plan and DCO Requirement through which this will be secured are ongoing. The principle of this change has been agreed within the updated SoCG between the Applicant and NCC submitted at Deadline 4 (ref: Rep1 - SOCG - 15.1 version 2).
20.157	Applicant NFFO	Please provide an update as to discussions and any changes agreed to Condition 20(2) and Condition 9(9) and 9(11) which relate to the monitoring of cables and notification of exposed cables.	In order to address the request made by the NFFO and VisNed in their Relevant Representation, the Applicant is currently discussing amendments to Condition 9(11) under the Generation DMLs (Schedule 9 and 10) and Condition 4(11) under the Transmission DMLs (Schedule 11 and 12) with the MMO, TH and the Maritime Coastguard Agency. This amended wording has been included in the dDCO submitted at Deadline 4.

1.21 Monitoring, Mitigation and Management Plans

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:

1.22 Compulsory Acquisition

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
22.41	Applicant	Additional information has been received from Happisburgh REACT regarding holiday lets [REP3-060]. Which of the owners referred to has the Applicant engaged with personally (or their representative) and how has it been explained to each owner the basis, including relevant timescales, on which compensation may be payable to them under the DCO or other relevant legislation including under Land Compensation Act 1973 Part 1?	The Applicant has not personally engaged with the parties mentioned with regards the Land Compensation Act 1973. This is because they are not directly affected by the Order limits, as noted in b). below. Those properties (and businesses) that lie within the Primary Consultation Zone (as described in the Consultation Report (document reference 5.01) have been kept informed about the project development and consultation opportunities through regular Newsletters delivered directly via Royal Mail, and one of the parties making the submission has been a frequent participant at consultation events, with whom the Applicant has engaged in personal (face to face) conversations and there have been e-mail correspondence exchanges with both individuals and with Happisburgh Respect our Environment and Coastal Tourism (REACT) during the development and consultation process. Many of the issues previously cited by Happisburgh REACT have been addressed by the Applicant in previous submissions, e.g. adoption of HVDC transmission technology eliminating a requirement for a Cable Relay Station and no works affecting the beach at Happisburgh. As the Parties mentioned do not own land within the Order limits they will not be eligible to claim compensation under the compensation code as a result of the exercise of compulsory acquisition powers under the DCO. No land is being acquired from the Parties nor is it the Applicant's understanding that any rights are being interfered with which could provide an injurious affection claim. In relation to Part 1 of the Land Compensation Act 1973, claims can only be made in respect of certain physical factors (noise, light, smell, fumes, smoke, dust, fluids discharge) arising from the operation of the project, with the date of claim being 1 year after the project becomes operational. The effects of noise, lighting and dust were assessed in full as part of the EIA (ES Chapters 25 Noise and Vibration, 26 Air Quality, and 29 Landscape and Visual Impact Assessment). No operational impacts were identified as part of those assessments. As it is the Applicant's position that there will be no operational impact arising from the physical factors listed on any properties in Happisburgh, it will not be possible to make a claim under Part 1 of the Land Compensation Act 1973.

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22.42	Applicant	The NFU/LIG continue to await a draft Option and Easement to progress voluntary negotiations. Please confirm that this documentation can now be issued to the NFU/LIG.	The draft Option and Easement document has now been issued to the principal firm of Solicitors representing a significant number of landowners to review the format and wording of the documents on behalf of all the solicitors acting for the landowners. Once this wording has been agreed it can be signed for all landowners who have signed Heads of Terms (HoTs).
22.43	Applicant	The ExA is concerned that all persons affected by the use of CA powers in the DCO should receive a detailed timeline and timings of the different parts of construction for both the Vanguard project and the Boreas project. Please explain how and when this detail will be provided.	The Applicant has provided an updated version of Table 5.36 from Chapter 5 within Appendix 22.1 (ExA; FurtherWQApp22.1; 10.D4) which includes Norfolk Boreas works. This provides an outline onshore construction programme for both projects. It should be noted that actual years of construction are subject to consent award, CfD award and a FID for the Project. The Applicant refers to the response to Q18.27 which provides further details on the works to be conducted within each period illustrated within Appendix 22.1 (ExA; FurtherWQApp22.1; 10.D4). As noted in 18.27, works and associated impacts will be limited to shortened timescales in any one location during each construction period as a result of the Applicant's onshore construction methodology. With respect to the detailed timeline and timings of the different parts of construction, this will be produced through detailed design once the project has received consent and the contractor is appointed and will be provided directly to those whose land interests are affected.
22.44	Applicant	How would a landowner contact the Applicant once the development is constructed and in operation to seek permission, where there is a restrictive covenant in place, to carry out agricultural related activities?	The Applicant will not be the owner and operator of the transmission elements of the Project post construction, but details of the new operator will be issued to landowners at that time of transfer to the Offshore Transmission Owner (OFTO). It is expected that the OFTO would have a plant protection enquiry team which the landowner could contact in the circumstances described.
22.45	Applicant	Please comment on the request from the NFU/LIG set out in [REP3-049] to see specific details recorded in the DCO as to what each compound site/mobilisation unit will be used for.	The definition of mobilisation area is included in the dDCO as follows: "*mobilisation area" means an area associated with the onshore transmission works including hard standings, lay down and storage areas for construction materials and equipment, areas for spoil, areas for vehicular parking, bunded storage areas, areas for welfare facilities including offices and canteen and washroom facilities, workshop facilities and temporary fencing or other means of enclosure and areas for other facilities required for construction purposes*'.

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			Any differences between the specific uses of each mobilisation area will be confirmed at the detailed design stage once a contractor has been appointed. At this stage, the Agricultural Liaison Officer (ALO) will be able to supply these details to the relevant affected landowners should they require specific detail as to the proposed use of the mobilisation area on their land. The above details however are not available at this stage (over and above what is already included in the definition of mobilisation area) and therefore cannot be included at this stage in the dDCO.
22.46	Applicant	Would the running track remain in place after the 150m sections of ducting have been reinstated or will the running track be removed at the same time? If it was to remain in place, how long would this be for? Please clarify what appears to be conflicting statements in Chapter 5: Project Description and the OCoCP, paragraph 2.5.5.	The running track requirements for duct installation are detailed in Chapter 5 paragraphs 320 and 321 which states that "During the duct installation process, each work team would use the running track to travel from the mobilisation area to the work front. The running track would also be used for transport of plant and materials between the mobilisation area and the work front. The running track would be extended piece-wise as the work front moves outward from the mobilisation area. When duct installation is completed, the running track would be taken up and the topsoil replaced. All recovered stone and other materials would be removed from site via the mobilisation area." To clarify, the above reference to 'when duct installation is completed' refers to the completion of the entire duct installation section (notional duct installation sections are illustrated in Figure 24.07a of Chapter 24 of the ES), not just the individual 150m workfront section. As such, in terms of timescales, the running track closest to the mobilisation area could be in place for 12-18 months within the two year duct installation period with the running track at the end of the duct installation section (furthest from the mobilisation area) being in place for one week (associated with the last 150m workfront section) This approach is secured in the OCoCP under Section 3.8 "Once all the trenching for the onshore cable route is completed and back-filled, the stored topsoil will be re-distributed over the area of the relevant work section, with the exception of the running track and any associated drainage. Long-term

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			storage of topsoil in bunds or heaps will be avoided where possible. However, some topsoil will have to be reserved for re-covering the final area when the running track is removed at the end of the duct installation phase." To clarify, the OCoCP will be updated to correct the term 'onshore cable route' above to 'approximate 150m workfront section.' OCoCP section 2.5.5 refers to running track requirements during cable pulling, which are not applicable to the 150m ducting sections and reference should be made to Section 3.8 as outlined above which is relevant to this phase of the works.
22.47	NFU/LIG Applicant NCC NNDC	Are you satisfied that it has been shown how exactly construction of the different cables will take place at the crossing point, with the Orsted development in two phases and the Vanguard and Boreas proposed developments? Please provide reference to submitted documents as appropriate.	The Applicant refers to the SoCG with Orsted Hornsea Project Three (UK) Ltd (Rep1 – SOCG – 18.1). The document notes, in response to Q1.13.3 of the ExA's first written questions to the Hornsea Project Three examination, that as part of the co-operation agreement, the parties will agree a mechanism to determine the method and design at the point of crossing incorporating the principle that one project would install using open cut, and one through HDD. The SoCG also notes that with respect to the co-operation agreement "both parties will design the cable installation works so as to ensure that the other parties can still install their cables – for example, if the first project installs the cables by way of open cut trench, that section of trenching will include enhanced thermal conductivity backfill to reduce any potential future thermal interactions with the second project." Furthermore, "parties will share design specifications when known to help facilitate the design of the other party's cables at the point of crossing".
22.48	NFU, LIG		
22.49	Applicant	Given that the National Trust maintains its objection to the proposed acquisition of its interests in its inalienable land, would the Applicant please clarify its position regarding the use of CA powers in relation to such land.	The Applicant removed the exclusion for National Trust's interests in the version of the Book of Reference submitted at Deadline 2 (document reference 4.3). Whilst the Applicant is confident that agreement can be reached with the National Trust it is considered appropriate to do so given that agreement has not yet been reached.

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			Discussions and negotiations are still ongoing with the National Trust and the Applicant remains confident that HoTs can be reached by the close of the examination.
22.50	National Trust Applicant	Please list the outstanding topics that are currently under discussion between the parties. Please provide a brief summary of the parties' position on each topic, or otherwise indicate where the only outstanding issue on a particular topic pertains to commercially confidential matters.	Discussions are currently ongoing between the Applicant and National Trust on the HoTs. The only outstanding point to be resolved is in relation to Archaeology. The Applicant has amended the HoTs so that the Applicant is under an obligation: • To provide a copy to National Trust of any recorded information required under the final WSI in relation to archaeological remains within the Option Land or any other areas on the Blickling Estate affected by the Project; • To agree to consult with National Trust on necessary next steps in the event of discovery of archaeological remains and on any proposed mitigation (in so far as it is relevant to the Option Land or any other area on the Blickling Estate affected by the Project); and • To use reasonable endeavours to ensure that objects of historic value found within the Option Land or any other area on the Blickling Estate affected by the Project are properly excavated and understood prior to their destruction and that information is made available (as well as producing standard technical reports which accompany archaeological works) all as per and in accordance with the requirements of the final WSI. The Applicant remains confident that the parties will reach agreement on the terms surrounding Archaeology and, accordingly, HoTs will be agreed with National Trust shortly.
22.51	Applicant	Please provide an update of the schedule of Compulsory Acquisition.	The Applicant has provided this for Deadline 4, please see Version 2 of document reference ExA_CA_10.D1.6.

1.23 Habitats Regulation Assessment

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
23.64	Applicant	Please comment on the views expressed by the RSPB in its Comments on Applicant's Response to Written Questions [REP2-034] in which concerns are maintained over elements of the collision risk modelling and consequently they consider that adverse effects on integrity (AEOI) cannot be ruled out for the following: The kittiwake population of Flamborough and Filey Coast SPA (FFC SPA) alone and in-combination; The gannet population of FFC SPA alone and in-combination; The lesser black-backed gull population of the Alde-Ore Estuary SPA alone and in-combination.	Following requests from NE and the RSPB, an updated collision assessment was submitted by the Applicant at Deadline 1 (Appendix 3.2, document reference ExA; WQApp3.2; 10.D1.3). This provided clarification and responses to points raised regarding appropriate seabird density input values and a comparison of the results obtained using the Applicant's implementation of the Band model with the Band (2012) Excel version and the Marine Scotland Science (MSS) stochastic Collision Risk Modelling (CRM), which demonstrated the equivalence of each version of the model. In addition, the note presented the collision results obtained for specified upper and lower parameter values (for seabird density, avoidance rates, flight heights and nocturnal activity rates). This note concluded there would be no significant effects from the project alone or cumulatively with other projects. Therefore, this demonstrated that the collision modelling methods and results presented in the original application were robust. As these results were also used in the HRA there is no requirement to reassess impacts in relation to the Flamborough and Filey Coast (FFC) Special Protection Area (SPA) and Alde-Ore Estuary SPA, and the original conclusions of the HRA, that there would be no Adverse Effects on Integrity for any feature, remain valid. Nonetheless the Applicant will continue to seek to address any outstanding concerns raised with respect to the assessment. NE and the RSPB have requested that the MSS model be used in preference to the Applicant's. The Applicant has made several attempts to undertake this, but on each occasion to date has encountered errors in the MSS model which have prevented its use. On each occasion the Applicant has communicated these issues to the developer of the MSS model and a revision has been made available. This has prevented the Applicant from presenting full stochastic results for the MSS model to date. Due to these delays, the Applicant does not consider that the MSS model will be appropriate for use within the time frame of the project examination. It should also be noted that, as a result of further refinement to the Project Design Envelope, the option to use a 9MW turbine (the smallest and most

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			numerous turbine option) has been removed. Relevant parameters have been updated by the Applicant in the revised dDCO submitted at Deadline 4 accordingly. Revised collision risks for the project, using parameters for the 10MW turbine (which will now be the worst case for collision risk), estimated using the Band (2012) model and using NE's preferred input parameter values will be provided at Deadline 6. The revision will also include collisions estimated using evidence based input parameter values. Updated cumulative and in-combination collisions will also be presented. This aspect was discussed and agreed with NE during a call on the 8th March.
23.65	Applicant	In regard to the collision risk Band model, can you revise the input and output spreadsheets using mean densities? Also please run the option 2 as advised by NE.	The Applicant considers that it is important to note that the parameters requested by NE have all been supplied by the Applicant at various stages of the application and this is evidenced in the outputs presented by NE in their response at Deadline 3 (Natural England's comments on Appendix 3.2: Collision Risk modelling update and clarification). In their response, NE presented collision estimates using the Band model (option 2) with their preferred input parameter values and reached a conclusion that for the Norfolk Vanguard project alone impacts are not significant (for all but one highly precautionary case: great black-backed gull upper 95% density estimate assessed against the smaller reference population). On this basis NE stated: '*we conclude that collision risk from Vanguard alone would have no significant impact at the EIA scale for all species, although this conclusion can only be made with low confidence regarding impacts on great black-backed gull at Vanguard East*.' Therefore, the Applicant does not consider that any further CRM is required for the 9MW turbine. This was agreed with NE during a call on the 8th March. However, as stated in response to WQ 23.64, as a result of further refinement to the Project Design Envelope the option to use a 9MW turbine (the smallest and most numerous turbine option) has been removed for the Project. Relevant parameters have been updated in the revised dDCO submitted at Deadline 4 accordingly. Revised collision risks for the project, using parameters for the 10MW turbine (which will now be the worst case for collision risk), estimated using the Band (2012) model and using NE's preferred input parameter values

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			will be provided at Deadline 6 (see also the response to Q 23.64). The revision will also include collisions estimated using evidence based input parameter values. Updated cumulative and in-combination collisions will also be presented.
23.66	NE, RSPB		
23.67	NE, RSPB		
23.68	NE		
23.69	NE		
23.70	Applicant	Having regard to [REP3-038] and impacts to non-seabird migrants of the Breydon Water SPA, Broadland SPA, and North Norfolk Coast SPA it is not clear whether you have: i. concluded no likely significant effects (LSE); or ii. identified a LSE but concluded no AEOI. Please can you confirm which is the case. If you consider there to be a LSE, please can you provide the integrity matrices for these sites.	The conclusions of the non-seabird migrant collision assessment (Norfolk Vanguard Offshore Wind Farm Migrant non-seabird Collision Risk Modelling, ExA; AS; 10.D3.6) are that there would be no likely significant effects on the features of these SPAs due to collision mortality either from the project alone or cumulatively with the East Anglia THREE wind farm (paragraphs 16 and 18 of Norfolk Vanguard Offshore Wind Farm Migrant non-seabird Collision Risk Modelling, ExA; AS; 10.D3.6).
23.71	Applicant	Please comment on NE's ongoing concerns regarding the apportionment figure used for the breeding season for lesser black-backed gull at the Alde-Ore Estuary SPA. In [REP2-034] the RSPB considers that it is not entirely clear how an apportioning figure for the Alde-Ore Estuary SPA of 3.5% for lesser black-backed gulls during the chick-rearing season has been derived from the data, and that the figure of 2,000 pairs quoted for the years in question is inaccurate. Please justify how you have arrived at these figures and explain the extent to which you have had regard to the theoretical approach proposed in SNH 2018 Guidance which takes into	Further assessment of the potential impacts on the lesser black-backed gull population of the Alde-Ore Estuary SPA will be submitted by the Applicant at Deadline 6. This will provide further consideration of apportioning of lesser black-backed gull impacts among candidate populations. With respect to the estimates presented previously, the HRA used a figure of 25% to apportion impacts to the Alde-Ore Estuary SPA population, which was calculated using relative population sizes (as detailed in the HRA), although noting that the tracking studies conducted on this population indicated much lower connectivity and on which the value of 3.5% was derived. This was calculated as follows: The average number of breeding pairs since 2007 has been just over 2,000 (2,016, rounded down). This represents 4,000 breeding adults, however it was assumed that only one bird from each pair is foraging at any given time, thus

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		account foraging range and colony factors.	2,000 birds. The tracking data reported that less than 0.5% of adult foraging time was spent in the Norfolk Vanguard site, which indicates a maximum of 10 individuals (2000 x 0.005 =10) would be present at any given time. The average total number of birds was estimated at around 300 individuals in the wind farm and 2km buffer, however this value was originally presented in the PEIR using survey data from 2016 only and was not updated in the final application to include the 2017 survey data. Review of the survey results indicates that inclusion of both 2016 and 2017 data reduces this estimate to around 230 (mean estimates for June: 86, July: 398, August: 212). To estimate the percentage of Alde-Ore SPA birds present on Norfolk Vanguard, the estimates number from this SPA (10) was divided by the average total present (previously given as 300, here updated to 230) to give 10/230 = 4.3%. This is slightly higher than the 3.5% reported in the original application but is still clearly considerably lower than the 25% used for assessment in the submitted HRA. If the population within the wind farm (without buffer) is used, the onsite average is 90, which gives an Alde-Ore SPA proportion of 11% (10/90), which although higher still remains much lower than the 25% used for assessment in the submitted HRA. Thus, while there is evidence that connectivity is indeed very low, a more precautionary estimate was used for assessment. Further consideration of the different data sources will be provided in an updated assessment which will be submitted by the Applicant at Deadline 6. This will include application of the method detailed in the SNH 2018 guidance.
23.72	Applicant	Please clarify how the seasonal apportionment figures for gannet at FFC SPA that you have cited in response to ExQ1 23.44 have been calculated, as these are slightly lower than the figures calculated by NE [REP3-038].	The seasonal apportionment used for Norfolk Vanguard followed the same approach originally developed by MacArthur Green for the Dogger Bank Creyke Beck projects (which was discussed in detail with NE during that project's examination and agreed to be an appropriate method), subsequently updated for the Dogger Bank Teesside projects (used with NE's agreement) and used most recently for the East Anglia THREE project (used with NE's agreement). The method principally differs from that used by NE in that it incorporates evidence on the migration routes taken by birds from different colonies. The most recent report presenting these methods (MacArthur Green 2015a) is

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			submitted as Appendix 23.1 (ExA; FurtherWQApp23.1; 10.D4.6). Following discussion of this topic with NE during a call on the 8th March the Applicant agreed to also present seasonally apportioned figures using NE's preferred values.
23.73	NE		
23.74	Applicant	Please comment on NE's ongoing concerns regarding the breeding season apportionment figure of 16.8% used for kittiwake at FFC SPA.	The seasonal apportionment used for Norfolk Vanguard followed the same approach originally developed by MacArthur Green for the Dogger Bank Creyke Beck projects (which was discussed in detail with NE during that project's examination and agreed to be an appropriate method), subsequently updated for the Dogger Bank Teesside projects (used with NE's agreement) and used most recently for the East Anglia THREE project (used with NE's agreement). The most recent report presenting these methods (MacArthur Green 2015b) is submitted as Appendix 23.2 to this response (ExA; FurtherWQApp23.2; 10.D4.6). In addition, analysis of kittiwake tracking data supplied by the RSPB will be used to inform this assessment, as requested by NE.
23.75	Applicant	In your response to ExQ1 23.32, you stated that you would provide a screening response for Bancs des Flandres SPA and Cap Gris-Nez SPA. Please can you provide the screening exercise that you proposed at D1.	This screening response will be provided for Deadline 6.
23.76	Applicant	Please respond to NE's comments regarding LSE screening for auks at FFC SPA. In particular, do you agree with NE that a LSE should be screened in for guillemot, razorbill and seabird assemblages, including puffin, at the FFC SPA as a result of operational displacement. If so, then please provide an updated integrity matrix for this site.	The Applicant does not agree that a likely significant effect (LSE) cannot be ruled out for these species from the FFC SPA and has presented justification for this in the HRA. This conclusion is further supported by the results of the review of evidence of auk displacement submitted at Deadline 1 (Norfolk Vanguard Offshore Wind Farm Offshore Ornithology: Operational Auk Displacement: update and clarification (Appendix 3.3, document reference ExA; WQApp3.3; 10.D1.3). This review concluded that a maximum of 50% displacement was appropriate for these species combined with a maximum consequent mortality of 1%. When these precautionary rates are combined with the percentage of the Biologically Defined Minimum Population Scales (BDMPS) populations which originate from FFC SPA (guillemot 5%, razorbill 3.3% and puffin 0.9%), the proportion of the

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			total impacts for each species will be 50% x 1% x 5% = 0.025% (guillemot), 50% x 1% x 3.3% = 0.016% (razorbill) and 50% x 1% x 0.9% = 0.0045% (puffin). To place these figures in context, for the most abundant of these species (guillemot) for every 4000 individuals present in the nonbreeding season and considered to be at risk of displacement, 2000 would be displaced, of which 20 would die as a result, with one of these predicted to be from FFC SPA. On this basis the risk of an LSE is ruled out for the Project alone.
23.77	NE		
23.78	Applicant	Please respond to NE's concerns regarding impact to the gannet feature of FFC SPA during the non-breeding season as a result of operational displacement from the project alone. Do you agree with NE that there could be a LSE and if not, then please justify your position. If so, please provide an updated integrity matrix for this site.	The Applicant does not consider that this species is at risk of operational displacement effects during the nonbreeding season, and reasons for this have been presented throughout the assessment. The total predicted displacement mortality for gannet presented in the ES, using NE's recommended rates, reported that there would be up to 20 and 3 individuals at risk across both Norfolk Vanguard East and West during the autumn migration and spring migration seasons respectively. Apportioning of impacts to the FFC SPA uses percentage values of 4.2% (autumn) and 5.6% (spring) (see response to 2nd WQ 23.72 above for reference documents). At these rates less than 1 individual from the FFC SPA (adult population 16,938 between 2008 and 2012, although in 2017 the RSPB reported this to be 26,782: A summary of the FFC SPA 2017 whole colony count and population trends, unpublished RSPB report) would be at risk of displacement mortality across the entire nonbreeding period (i.e. summed across autumn and spring) and this result would only be very slightly altered if NE's estimated apportioning rates were used instead. It is clear from this extremely low level of potential effect that an LSE can be ruled out due to gannet displacement from Norfolk Vanguard alone.
23.79	NE		
23.80	Applicant	Please can you confirm whether the conclusions of the HRA Report with regard to displacement of gannet from the FFC SPA would alter should adult mortality rates be applied to the assessment, and	The Applicant does not consider that gannet is a species of concern with regard to displacement impacts due to its wide ranging habits, varied prey and the fact that very few gannets were recorded at Norfolk Vanguard during the breeding season. The latter aspect means that:

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		justify this.	a) any effects would be distributed amongst a large population of which only a small percentage would be apportioned to FFC; b) effects will be even further reduced during the nonbreeding season as most individuals will be passing through the southern North Sea (i.e. not resident in the region) and thus opportunities for displacement effects are minimal; c) birds are much less constrained outside the breeding season, further reducing the risk that displacement would have any effect on survival. Taken together, the above aspects indicate that displacement will be low and consequences lower still, hence the Applicant does not consider it appropriate to take the highly precautionary approach of assigning mortality to this effect.
23.81	Applicant	Please can you provide the clarification note regarding in-combination operational displacement of gannet at the FFC SPA?	As stated in response to question 3.30, the Applicant notes that, to the best of its knowledge, gannet in-combination displacement is not an impact which has been required for previous OWF applications, and as a consequence there are no previous assessments on which this can build. Instead it is necessary to review the original applications for each project to be included. This work to collate abundance estimates for North Sea OWFs is underway, however it will not be completed for submission at Deadline 4. The Applicant will endeavour to provide this by Deadline 5.
23.82	Applicant	Please respond to the concerns that have been raised regarding the assessment of nocturnal activity rates for gannet and kittiwake at FFC SPA.	Natural England and the RSPB were invited to review and provide comments on the draft manuscript for gannet nocturnal flight activity and this analysis was subsequently published as a peer-reviewed study (Furness et al. 2018), taking into account comments from these organisations and also the anonymous reviewers appointed by the journal. The final version of this work, reflected in the published paper, recommended rates of 8% in the breeding season and 3% in the nonbreeding season, which were judged to be an appropriate balance of evidence and precaution. However, because the Norfolk Vanguard assessment was conducted prior to the final publication, while the datasets used were identical, a slightly less precautionary calculation was used (4.3% in the breeding season and 2.3% in the nonbreeding season). In the CRM update submitted at Deadline 1 (Norfolk Vanguard Offshore Wind Farm Offshore Ornithology: Collision Risk Modelling: update and clarification (Appendix 3.2, document reference ExA; WQApp3.2;

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			10.D1.3)) the slightly higher published rates were used for the gannet collision estimates. The previously recommended nocturnal rates were derived from a 1 to 5 scale of seabird nocturnal activity presented in Garthe and Hüppop (2004), which was converted to a 0-100% value for use in the Band model. However, Garthe and Hüppop (2004) state that their scale indicates relative activity across species and is not intended as a measure of absolute activity, as applied by Band (2012). It is also important to note that these scores were based on existing limited evidence and expert judgement. Consequently, the Applicant considers the rates in Furness et al. (2018), calculated from analysis of gannet tracking data, to provide robust, evidence based alternatives which are therefore more appropriate for use in the collision modelling for this species. The RSPB has noted that, since the nocturnal activity rates reflect the relative rates of activity between daytime (when surveys are conducted) and nighttime, it is important that the daytime estimates of activity are representative. In other words, if the daytime seabird density estimates are derived from surveys conducted during periods of the day when birds are relatively in-active then the nighttime adjustment will underestimate activity. The RSPB cite Figure 3 in Furness et al. (2018) as indicative of an early morning peak in activity which may not be captured by aerial surveys conducted later in the day (and suggest that the surveys were likely to have been conducted at midday). However, what is actually required of the daytime surveys is that they are undertaken during representative periods of the day, covering neither peaks nor troughs. The diurnal activity presented in Figure 3 of Furness et al. (2018) indicates this mid-point of activity is likely to occur between mid-morning and mid-afternoon. The timings of the aerial surveys have been provided in an appendix to these question responses (ExA; FurtherWQApp3.1; 10.D4.6) and provide a clear indication that the surveys covered a wide range of times between 8am and 6pm throughout the year, and thereby these data were collected through the middle of the range of activity levels. There have also been questions raised about the consistency of definitions of sunrise and sunset and twilight across the nocturnal activity analyses and that

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			used in the Band (2012) collision model. This aspect was critical to the study and the same definitions were used in Furness et al. (2019) as by Band (2012) to ensure that the results were compatible. Preliminary outputs from the analysis of kittiwake data were used in the original Norfolk Vanguard application and it was considered at that time that this work was close to completion and would soon be published. However, following submission of the Norfolk Vanguard application, additional data were offered for inclusion in this analysis. This has delayed publication of this work (while the additional data have been collated, and agreement is reached between the data owners about the most appropriate analytical methods to be used). Thus, while it is anticipated that the final results will be similar to those used in the ES, in acknowledgement that this work has been delayed, the CRM update submitted at Deadline 1 (Norfolk Vanguard Offshore Wind Farm Offshore Ornithology: Collision Risk Modelling: update and clarification (Appendix 3.2, document reference ExA; WQApp3.2; 10.D1.3)) provided calculations using NE's recommended rates of 25% and 50%.
23.83	NE, RSPB		
23.84	Applicant	Please provide an update regarding the kittiwake tracking data and revisiting the breeding season apportionment at FFC SPA.	The agreement between the Applicant and the RSPB with respect to access to these data specifies that named RSPB staff should be given an opportunity to comment on the proposed analysis of these data. An email was sent in this regard to the RSPB on the 31st January 2019 and a reply was received on the 26th February 2019. Consequently, this is an area of analysis which has not been finalised and further consideration will be given to the appropriate analysis and interpretation of these data. The intention is that this will be completed in time to inform an update of the assessment of effects on the FFC SPA population of kittiwake which will be provided at a future deadline (expected to be Deadline 6).
23.85	Applicant	What is your response to NE's comments regarding common scoter at Greater Wash SPA? Do you agree or disagree with NE's view that a LSE should be identified, and please justify your conclusion? If you agree then please provide an updated integrity	Natural England requested provision of a figure over-laying the Offshore Export Cable Corridor with the common scoter distribution used to designate the SPA. This was submitted at Deadline 2 (Norfolk Vanguard Limited Deadline 2 Submission - Appendix 23.1 to the comments on responses to Written Questions - Greater Wash SPA common scoter distribution and Norfolk

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		matrix for this site.	Vanguard Offshore Windfarm) and this note clearly indicates that based on the best available knowledge, the Offshore Export Cable Corridor does not pass through areas identified as important for this species (Natural England and JNCC 2016: Departmental Brief: Greater Wash potential SPA). The Applicant acknowledges that NEs position is that because the Offshore Export Cable Corridor crosses the SPA there is potential for an effect on this species and hence an LSE cannot be ruled out. However, in this instance the Applicant considers that this approach is unnecessarily precautionary. This is based on the very low likelihood of spatial overlap (even when considering the entire offshore cable route as in the submitted figure, rather than just the zone around a very slow-moving installation vessel), combined with the additional low likelihood of a temporal overlap, with a realistic period of installation through the SPA measured in weeks. It is on this basis, the Applicant considers that the risk of an LSE can be excluded.
23.86	Applicant	Please provide an update on the collision risk modelling for little gull at Greater Wash SPA.	The Norfolk Vanguard Information to Support HRA (Norfolk Vanguard Offshore Wind Farm, Information for the Habitats Regulations Assessment, Ref 5.3) assessed the worst case collision mortality for little gull as 2 individuals, and on this basis concluded there would be no risk of an Adverse Effect on Integrity (AEoI). The CRM update submitted at Deadline 1 (Norfolk Vanguard Offshore Wind Farm Offshore Ornithology: Collision Risk Modelling: update and clarification (Appendix 3.2, document reference ExA; WQApp3.2; 10.D1.3)) provided additional estimates, calculated using NE's preferred input rates. This indicated a maximum mortality of 16.7 individuals. As described in section 6.1.3.2 of the Norfolk Vanguard Information to Support HRA, a precautionary estimate of the population size of little gulls visiting the Greater Wash Area of Search is around 10,000 individuals per year, while a more realistic (but still precautionary) estimate is likely to be around 20,000 individuals per year. The only published estimate of little gull survival suggests a survival rate of adults of 0.8 (Horswill and Robinson 2015). At this survival rate, natural annual mortality for little gull will be between 2,000 and 4,000 birds. The estimated maximum Norfolk Vanguard collision mortality of 16.7

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			birds represents an increase in mortality of 0.42% to 0.85%. Following SNCB recommendations, an increase in mortality of less than 1% is considered to be undetectable against the range of background variation. Therefore, this increase, which is below the threshold at which increases in mortality are detectable, means that no significant impact can be attributed to this level of impact arising from the proposed Norfolk Vanguard project alone. Thus, the conclusions of the original assessment remain unchanged. The Greater Wash SPA designated population of little gull is 1,255, which is 13% of a population of 10,000 or 6.5% of a population of 20,000. On this basis, and assuming collisions would be distributed uniformly throughout the population, this would imply that a maximum of 2 individuals from the Greater Wash SPA population of little gull could be killed by collisions (13% of 16.7), which would be even reduced further on the basis of the more realistic wider population (of 20,000). The natural mortality of the SPA population (at a mortality rate of 0.2) is 251 individuals. The addition of 2 to this would increase mortality by 0.8%, which would be undetectable. Thus, it can be concluded that the maximum additional mortality of 2 individuals from the SPA population will be undetectable and there will be no adverse effect on the integrity of the Greater Wash SPA as a result of collisions at the Norfolk Vanguard project alone. At this level of predicted mortality for Norfolk Vanguard alone the project's potential to contribute to an in-combination effect is considered to be sufficiently small as to be ruled out.
23.87	Applicant	Please respond to NE's comments regarding the construction phase displacement of red-throated diver for the Greater Wash SPA from the construction of the offshore export cable (either from the project alone or in-combination), and from the potential displacement as a result of vessel movements during the operational stage. Please explain what implications for construction operations NE's request for seasonal restrictions on cable laying would have?	This question combines two separate potential sources of disturbance impacts for red-throated diver (offshore export cable installation and operational vessel movements) therefore for clarity, separate responses are provided. Offshore export cable installation Updated assessment of Greater Wash SPA red-throated diver displacement due to cable installation from the project alone and in-combination will be provided at Deadline 6. Following completion of this assessment the Applicant

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			will review the requirements for seasonal restrictions, with consideration given to the proportionate nature of such measures in relation to the potential impact magnitude. However, it should be noted that seasonal restrictions can have significant implications for delivery of construction and maintenance programmes, especially offshore where operations can only be undertaken in safe and optimal weather conditions. Operational vessel movements The Applicant discussed this topic with NE during a call on the 8th March. Following this NE agreed to provide further details of its standard mitigation comprising vessel operation procedures for vessel transit corridors to mitigate impacts to re-throated diver. Once these have been received the Applicant will review them and provide an update at the next opportunity.
23.88	Applicant	As recommended by NE, please present an in-combination operational displacement assessment for red-throated diver at Greater Wash SPA.	The Applicant has reviewed the cumulative red-throated diver assessment submitted for the Thanet Extension project. This assessment has demonstrated that when a like-for-like approach is applied for wind farm projects in the southern North Sea those currently in Examination (Norfolk Vanguard, Hornsea Project THREE and Thanet Extension) contribute a very small amount to the predicted cumulative effect, with over 95% of the total effect attributed to existing, operational wind farms. The Applicant does not consider there to be any requirement to repeat the analysis and reporting undertaken for Thanet Extension as this would simply present the same information and reach the same conclusions. The Applicant discussed this with NE during a call on the 8th March and it was agreed that it was appropriate for the Applicant to refer to the Thanet Extension work in relation to the cumulative assessment.
23.89	Applicant	In relation to red-throated diver from the Outer Thames Estuary SPA and Greater Wash SPA, NE has commented that it cannot rule out AEOI and has referred to mitigation measures that were secured for East Anglia THREE. Please provide an update on	The Applicant discussed this topic with NE during a call on the 8th March. Following this NE agreed to provide further details of the proposed vessel operation measures. Once these have been received the Applicant will review them and provide an update at the next opportunity.

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		this matter, including what these measures are and whether you would be willing/able to employ them?	
23.90	Applicant	In response to the concerns raised by NE [REP3-051] please provide an update on progress made regarding the assessment of in-combination collision risk at Greater Wash SPA.	The only species from the Greater Wash SPA considered to be at risk of collisions is little gull. An update on the assessment for this species has been provided in response to Q23.86 above.
23.91	NE		
23.92	NE		
23.93	NE		
23.94	Applicant	Do you have any further comments to make regarding the issue of micrositing within the HHW SAC?	The Applicant acknowledges that as a European site, the HHW SAC has a special environmental status. For this reason, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include proposed mitigation measures and agreement processes associated with the micro-siting of cables within the HHW SAC.
23.95	The Applicant	Please explain whether there is a specific reason why a sandwave levelling, seabed preparation and disposal plan cannot be secured as a separate Condition in the Deemed Marine Licences (DMLs)?	The Applicant acknowledges that as a European site, the HHW SAC has a special environmental status. For this reason, the Applicant agrees that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transition asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan.
23.96	NE		
23.97	Applicant	What is your response to the mitigation measures suggested by NE at D1 [REP1-088] to decrease impact on the HHW SAC? Are you willing to commit to any of these measures (such as the reduction of footprint associated with vessel stabilisation, through the use of alternative work vessels, the provision of evidence to quantify footprint of rock	The Applicant has noted the suggestions made by NE in REP1-088. The Applicant agrees that there may be scope to further mitigate the impacts of the proposed cable installation operations on habitats in the HHW SAC through appropriate consultation, detailed design and vessel procurement. The Applicant acknowledges that as a European site, the HHW SAC has a special environmental status. For this reason, the Applicant proposes that there is

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		armouring potentially required and the reuse of existing stabilisation material footprints)?	benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include proposed mitigation measures and agreement processes associated with the micro-siting of cables within the HHW SAC.
23.98	NE		
23.99	Applicant	Please respond to NE's comments raised in D2 [REP2-036] regarding the impacts from the disposal of dredged sediment on the HHW SAC?	**NE's comments on the Applicant's response to Q5.2 [REP2-036]** As discussed above, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include the location and methodology for sediment disposal within the HHW SAC. The best method would be determined at that time, taking into account the pre-construction survey data and any evidence from other relevant projects. **NE's comments on the Applicant's response to Q5.10 [REP2-036]** With regards to the following comments by NE: *"Natural England does not agree there will be negligible impact. The Applicant has provided information with regard to volume, extent, morphology, however in its Relevant Representation, Natural England suggested the Applicant used all relevant information in the supplementary advice on conservation objectives, which does not appear to have been done.* • The Applicant reviewed the supplementary advice and has referred to it throughout the response to the First Written Questions (Q5.10) (document reference ExA; WQ; 10.D1.3). *"Also we note that there appears to be no assessment here of the impact of the dredging itself on the attributes."*

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			• Given the Applicant's commitment to dispose of sediment arising from sandwave levelling (dredging) in the SAC back into the SAC, the two activities of levelling and disposal are considered together as there would not be one without the other. With regards to the volume of the sandbank features, the Applicant's response to the First Written Questions (Q5.10) explains that this will not change as a result of sandwave levelling (dredging) due to the commitment to dispose of sediment back into the SAC. With regards to the extent of the sandbank feature, the Applicant's response explains that the seabed composition and spatial distribution of the feature would also not change for the same reason. With regards to morphology, the Applicant's response refers to the ABPmer Sandwave Study, provided in Appendix 7.1 of the Information to Support HRA report which considered the effects of sandwave levelling (dredging) and disposal on seabed morphology, sandwave morphology and form and function of the HHW SAC. *"Natural England believes that there are two aspects to this a) the combined repetitive impact to the same footprint area over different installation phases/stages and b) the combined repetitive impact to a feature over different stages a) The combined repetitive impact to the same area over different installation phases/projects"* *<u>a) The combined repetitive impact to the same area over different installation phases/projects</u>* *"Often impacts from one phase of installation i.e. preparation, installation and operation continue into the next phase especially where recoverability is hindered by the different activities. For example: if mobile sediments are reworked between seabed preparation works such as sandwave levelling undertaken c1 year prior to construction and the cable installation activities,*

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			will further sandwave levelling be required throughout the construction phase?" • Cables would not be installed at the same location, the worst case width of disturbance from cable installation is 37m (Section 7.3.2.2.1 of the Information to Support HRA report) and the minimum separation is 75m (Figure 11 of the Export Cable Installation Study, ES Appendix 5.1), therefore there would be no repeated disturbance of the same footprint during construction. • Sandwave levelling would be undertaken at an appropriate period before the installation of each cable pair, likely to be in the order of weeks prior to installation, to ensure that recovery of sandwaves does not occur prior to the installation of cables. *"There is also no guarantee that that the sandwave levelling will be sufficiently successful to negate the need for the placement of cable protection immediately after construction which is considered in a different phase. Therefore the same area may be impacted twice by activities in different phases/stages of the project."* • The impact assessment includes a worst case scenario footprint for cable installation and for cable protection. Should there be an overlap between these areas, this would reduce the overall spatial footprint of the project. However, it should be noted that if sandwave levelling is achieved during construction but cables become unburied during O&M, it is likely that cable burial would be possible again, avoiding the need for cable protection. *"Similarly if the sandbank restores within the timeframes suggested by the applicant and Operation and Maintenance activities are required will sandwave levelling be required again on those sandbanks to reach the cables?"*

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			• Sandwave levelling is not expected to be required for cable maintenance. *"This is also true where several different tools are used to achieve cable burial which intensifies the impact to the mixed sediment and/or coarse sediment feature with no guarantee of success, meaning there may still be a requirement for cable protection."* • As discussed above, the impact assessment includes a worst case scenario footprint for cable installation and for cable protection. Should there be an overlap between these areas, this would reduce the overall spatial footprint of the project compared with that assessed in the ES. *"In addition the cumulative impact to features from all of the proposed site preparation, construction and operational phase my further hinder the recoverability of Sabellaria spinulosa reef."* • As discussed above there would be no repeated disturbance to the same footprint and therefore the same area of reef during construction. The period between preparation and cable installation is likely to be in the order of weeks and therefore new reef is not expected to have developed in this period. • It is acknowledged that reef can be expected to recover following cable installation and therefore has potential to be affected during maintenance if a repair is required at the location of a reef. In this event, the maintenance works would be localised and less than that of construction which the reef would have already been shown to recover from. As discussed above, maintenance works would be discussed with the MMO and NE

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			<u>*b) the combined repetitive impact to a feature over different phases/projects*</u> *"While it is unlikely that sister projects will directly have the same physical disturbance to an area; the impacts are still to the same feature of the site. Therefore this could extend the timeframe of impacts on the feature and overall recoverability of said feature. This should be fully assessed including the implications for the site potentially being in unfavourable condition for 10+ years when considering impacts to sandbanks."* • In-combination impacts on sandbanks have been assessed in the Information to Support HRA report. The worst case disturbance width from cable installation is 30m per cable pair (with two 30m swathes for Norfolk Vanguard and a further two for Norfolk Boreas). A 30m disturbance width represents 0.08% of the total SAC area per cable pair (based on 40km length and 30m width in the 1,467.59 km² SAC area). • Cable installation would take approximately 3 months for each cable pair and recovery is expected within approximately 1 year as discussed in Appendix 7.1 of the Information to Support HRA report. • While construction for Norfolk Vanguard and Norfolk Boreas could extend over 10 years in total, each cable installation activity would be spatially and temporally isolated within this period and therefore the Applicant maintains that this would not result in the sandbank feature being in unfavourable condition. *"Conclusion: As we have limited survey data from within the MPAs and 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 and the likely level of success is unknown. Therefore the timeframes for any recovery are also uncertain."*

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			• The Applicant has commissioned studies to support the Application with the aim of addressing uncertainty regarding cable installation as far as practicable at this stage, including the Export Cable Installation Study (ES Appendix 5.1) and ABPmer Sandwave Study (Appendix 7.1 of the Information to Support HRA report). In addition, In response to requests from NE, the Applicant is progressing an interim cable burial study in the HHW SAC with a view to justifying and potentially refining the cable protection requirements. • The worst case scenario included in the assessment is conservative and takes account of the maximum footprint for cable installation (including preparation), as well as the maximum cable protection and frequency of maintenance works, providing a highly conservative assessment. • As discussed above, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include proposed mitigation measures and agreement processes associated with dredging and sediment disposal within the HHW SAC. **NE's comments on the Applicant's response to Q9.3 [REP2-036]** With regards to NE's comments regarding exploring how the parameters (i.e. location of sediment disposal in the SAC) could be best assessed to ensure they are habitat regulations compliant, the Applicant maintains that the assessment of a worst case scenario is compliant with the Habitats Regulations. In addition, and as discussed above, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include proposed mitigation measures and agreement processes associated with sediment disposal within the HHW SAC.

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			NE's comments on the Applicant's response to Q23.17 [REP2-036] The Applicant does not understand the request to justify a buffer that was advised by NE, however as stated above, the Applicant proposes that there is benefit in securing the mitigation associated with the HHW SAC in a single plan and through a separate condition in the transmission asset DMLs. The Applicant is engaging with NE as to the precise wording of the condition and content for the plan. This would include the location and methodology for sediment disposal and the best method would be determined at that time, taking into account the pre-construction survey data and any evidence from other relevant projects.
23.100	NE		
23.101	MMO		
23.102	Applicant, NE, MMO, TWT and WDC	A conclusion of no AEOI on the SNS cSAC relies on appropriate mitigation measures being secured in the final Site Integrity Plan and Marine Mammal Mitigation Protocol. However, these mitigation measures are not yet specified and there remains some doubt over how effective certain measures, such as soft start piling, actually are. Please comment further on this matter.	In response to the offshore Issue Specific Hearing (ISH2) Action Point 2, the Applicant has provided a note outlining how the SIP may be delivered (Consideration of Cumulative Impacts on Marine Mammals, Delivery of the SIP, document reference ExA;ISH2;10.D4.4). This demonstrates that there are a range of options to manage in-combination effects and mitigation for harbour porpoise in the Southern North Sea SCI, highlighting the importance of the SIP framework which allows the flexibility to adopt the most appropriate method prior to construction in order to achieve no adverse effect on the integrity of the SCI. In addition, the wording of the DCO (Schedules 9 and 10 Condition 14(1)(m) and Schedules 11 and 12 Condition 9(1)(l)) ensures that construction cannot commence until the MMO is satisfied that there would be no AEOI.
23.103	Applicant	Please comment on the view that consultation with TWT and WDC would best be undertaken before the SIP is submitted to the MMO.	Table 2.1 of the In Principle (document 8.17) includes early consultation with The Wildlife Trusts (TWT) and Whale and Dolphin Conservation (WDC) in the initial review of the In Principle SIP post consent. In addition, TWT and WDC will be kept informed of developments throughout the SIP process. At the latter stages of finalising the SIP, prior to submission to the MMO, consultation is likely to be with the MMO and NE. The Applicant notes there are

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			fundamental disagreements between TWT/WDC and NE and as the Applicant will be required to follow the advice of NE and the MMO, the Applicant cannot commit to further consultation with TWT and WDC during this stage. TWT and WDC will have further opportunity to be consulted by the MMO prior to the condition being discharged.
23.104	The Applicant	Please comment on the view that piling operations should cease if monitoring demonstrates that the mitigation measures being employed are not proving to be effective.	As the Applicant outlines in response to Question 20.140 above, the Applicant has now agreed with the MMO to include an amendment to Condition 19(3) of the Generation DMLs (Schedule 9-10) to address this concern. Condition 14 of the Transmission DMLs has also been updated accordingly. This wording is included in the dDCO submitted at Deadline 4.
23.105	NE, Applicant	The conclusions of no AEOI for all onshore sites presented in the Information to Support HRA report (document 5.3) are not agreed by NE. NE's position is summarised in the SoCG with NE [REP1-049]. Please provide an update as to the position on this matter.	The Applicant and Natural England have continued to engage on the issues raised by NE in their Relevant Representation and summarised in the SoCG submitted at Deadline 1 (Rep1 - SOCG - 13.1), with a view to progressing matters and reaching common ground on these issues. The Applicant initially submitted two clarification notes to NE (Appendix 2 and 3 of the SoCG submitted at Deadline 1) on 3rd December 2018 in relation to NE's concerns regarding: • Paston Great Barn SAC on issues relating to hedgerow loss; and • Norfolk Valley Fens / The Broads SAC on issues relating to water supply to designated sites. Following feedback from Natural England on these two notes and a conference call held on 22nd January 2019, the Applicant has subsequently submitted further updates to these two clarification notes to NE on 27th February 2019. Clarification has also been provided to NE regarding sediment management at the River Wensum SAC and on a number of other outstanding issues raised by NE. These further clarifications were also provided to NE on 27th February. NE and the Applicant discussed the content of these additional clarifications in a call held on 27th February and NE are considering the information with a view to providing comments in due course.

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			These items remain not agreed in the current SoCG submitted at Deadline 4, however a joint statement has been submitted to the examination to set out where progress has been made (document reference: ExA; AS; 10.D4.8). NE has indicated that a response to the majority of these clarification notes should be provided by Deadline 5 of the examination.
24.106	NE, Applicant	The conclusions of no adverse effect on site integrity for all onshore sites presented in the Information to Support HRA report (document 5.3) are not agreed by NE. NE's position is summarised in the SoCG with NE [REP1-049]. Please provide an update as to the position. In particular: • Can the Applicant provide a comparison of the impact of trenched and trenchless crossing techniques on the flow of water to Botton (*sic*) Common SSSI and Norfolk Valley Fens SAC, as requested by NE? • What is the Applicant's response to NE's comments regarding the need for sensitive restoration within the River Wensum floodplain north of Penny Spot Beck? Can the Applicant provide an update on the assessment of impacts to River Wensum SAC, Norfolk Valley Fens SAC and The Broads SAC when considered in-combination with the Hornsea 3 cable route?	As noted in response to Q23.105, ongoing dialogue is currently taking place between the Applicant and NE on these issues. In relation to the specific points raised, the Applicant has issued further information to NE in updated clarification notes provided on 27th February 2019. The notes provided to NE provide further clarification to the points raised in this question. In summary: **Norfolk Valley Fens SAC (Booton Common SSSI)** • A conceptual model of local hydrogeological conditions for Booton Common SSSI (Norfolk Valley Fens SAC) has been provided to NE which describes the water supply mechanism to the site (based on the site's WetMecs account). The conceptual model indicates that there is no groundwater pathway of effect between trenched / and trenchless construction activities associated with the project and Booton Common SSSI (Norfolk Valley Fens SAC). **Sensitive restoration within River Wensum floodplain** Updated mitigation measures have been presented within a clarification note provided to NE on 27th February. These measures specifically relate to construction activities within the functional floodplain adjacent to the River Wensum and include: • The preferred way of accessing works within the functional floodplain will be to use geotextile and not to topsoil strip, to improve grassland recovery time; • Where a topsoil strip is required, this will be undertaken as a turf cut with turf rolls stored outside the functional floodplain; • Surface Water Drainage will be installed in advance of construction; • A bentonite breakout contingency plan will be implemented.

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			These measures are considered appropriate to minimise the risk of sediment release during construction and to improve the success of post-construction reinstatement/restoration. Once these measures have been agreed with NE the outline CoCP will be updated (as secured through Requirement 20 of the dDCO). **In-combination effects** Natural England raised concerns of potential in-combination effects at Norfolk Valley Fens SAC (Booton Common SSSI) due to the proximity of both Norfolk Vanguard and Hornsea Project 3 buried cables. NE also raised concerns about the Norfolk Vanguard alone effects associated with the River Wensum SAC and The Broads SAC. NE has not requested further information regarding in-combination effects for the River Wensum SAC or The Broads SAC. The following information has been submitted to NE to address their concerns: • The Applicant has provided a conceptual model of local hydrogeological conditions and the interaction of Norfolk Vanguard with groundwater dependent sites (Norfolk Valley Fens SAC and The Broad SAC). The conceptual model demonstrates that there is no pathway for an effect. On this basis, no impacts are predicted to these water dependent sites associated with the construction, operation or decommissioning of Norfolk Vanguard alone or in-combination with Hornsea Project 3. • The updated commitments related to sediment management and reinstatement associated with the trenchless crossing of the River Wensum SAC outlined above, provide further assurance that the risk of sediment release will be reduced to as low as reasonably practicable and that there will be no adverse effect upon site integrity associated with Norfolk Vanguard alone. As detailed within the Information to Support Habitat Regulations Assessment (ref: 5.3) if no adverse effect upon site integrity has been determined with respect to the River Wensum SAC for Norfolk Vanguard alone then no in-combination effect occurring with another plan or project, including Hornsea Project Three, would occur.

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			Natural England is currently reviewing the information provided in the clarification notes referred to in response to Q23.105 and are aiming to provide a response by Deadline 5.
24.107	NE		
24.108	Applicant	NE remain concerned as set out in [REP2-037] that there is likely to be an impact on the Paston Great Barn SAC due to loss and severance of foraging and commuting habitat over at least 7 years but is unable to assess the significance of the impact without further information on habitat to be lost and fragmented as a result of the proposed development. Please provide an update as to any further information provided to NE and of discussions relating to the matter.	As noted in the Applicant's response to Q23.105, ongoing dialogue is currently taking place between the Applicant and NE on this issue. In relation to the specific point raised, the Applicant has provided an updated clarification note to NE on 27th February 2019 which provides further information in relation to the potential habitat lost or fragmented, specifically: • Details of habitat value of the hedgerows located within the onshore project area which are to be temporarily lost during construction (and up to 7 years during the aftercare period), including height, gaps/solid hedge ratio, aspect, species composition of hedgerow shrubs and non-woody plants, width of hedge; • A plan indicating the location of the hedgerows located within the onshore project area which are to be temporarily lost during construction (and up to 7 years during the aftercare period); • Details of the habitat value of the 11ha of habitat potentially fragmented during construction; • A plan showing the location of the suitable alternative foraging habitat within the study area which is available to the Paston Great Barn bat colony and the location of the 11ha of habitat potentially fragmented during construction; • Confirmation that the hedgerow planting (but not standard trees) will take place over the cable easement; and • Commitment to a Mitigation Plan to be included within the ecological management plan (EMP) to be consulted on with NE post-consent.

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			Natural England is currently reviewing this further information and is aiming to provide a response prior to the environmental matters issue specific hearing (27th March).
24.109	NE		

1.24 Onshore Ecology

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
24.20	NE, Applicant	NPS EN-1 Sections 5.3.16 – 5.3.17 requires the ExA to have regard to the protection of legally protected species and habitats and species of principal importance for nature conservation and to refuse consent where harm to the habitats or species and their habitats would result, unless the benefits (including need) of the development outweigh that harm, and to give substantial weight to any such harm to the detriment of biodiversity features of national or regional importance which it considers may result from a proposed development. Please provide an update as to the final position set out in Table 12, Statement of Common Ground - Onshore ecology and ornithology [REP1-049], specifically commenting on legally protected species and habitats and species of principal importance for nature conservation.	As noted in the Applicant's response to Q23.105, ongoing dialogue is currently taking place between the Applicant and NE on these issues. Natural England are currently reviewing further information provided by the Applicant in the form of updated clarification notes circulated on 27th February 2019 and is aiming to provide a response by Deadline 5.
24.21	NE		
24.22	NE		
24.23	Applicant	NE in its Response to WRs and Other Supporting Documents submitted by other parties, 30 January	As noted in the Applicant's response to Q23.105, ongoing dialogue is currently taking place between the Applicant and NE on these issues.

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		2019 [REP2-037] considers there is insufficient detail in the CoCP for measures to safeguard the designated site in relation to sediment control and reinstatement of all work areas. In addition, detailed management and monitoring procedures should be provided in the CoCP in case of 'breakout' (where the drilling fluid leaves the bore and escapes into the surrounding substrate). Please comment with reference to any further changes proposed to the content of the CoCP to meet these concerns.	Updated sediment management measures which will be implemented within the functional floodplain adjacent to the River Wensum have been set out in a clarification note provided to NE. These measures set out in the clarification note include: • The preferred way of accessing works within the functional floodplain will be to use geotextile and not to topsoil strip, to improve grassland recovery time; • Where a topsoil strip is required, this will be undertaken as a turf cut with turf rolls stored outside the functional floodplain; • Surface Water Drainage will be installed in advance of construction; • Details of the content of a bentonite breakout contingency plan, including management and monitoring procedures. These measures are considered appropriate to minimise the risk of sediment release during construction and to improve the success of post-construction reinstatement/restoration. Natural England is currently reviewing the information provided in the clarification notes referred to in response to Q23.105 and is aiming to provide a response by Deadline 5. Once these approaches have been agreed with NE the outline CoCP will be updated and the measures will be secured through Requirement 20 of the dDCO.
24.24	Applicant	NE identifies in its SoCG [REP1-049] what it considers to be significant limitations to the onshore ecological surveys identified in Paragraphs 82-83 of Chapter 22 ES [APP-347]. Do you agree that access for field surveys was only gained for 50% of the onshore project area and was conducted outside the optimal survey period? Do you agree that the procedure outlined in OLEMS [APP-031] for badger main setts within the project area which require to be closed and destroyed	The Applicant agrees that access for field surveys was only granted by landowners for approximately 50% of the survey area, which is clearly stated in the assumptions and limitations section (section 22.5.3) of ES Chapter 22 Onshore Ecology. The data coverage on which the EIA is based was discussed with the ETG (which included Natural England) during July 2017 and January 2018 meetings as part of the Evidence Plan Process. In light of the survey coverage achievable, the EIA has adopted a precautionary approach (as set out in section 22.5.3 of Chapter 22 Onshore Ecology) and where access was not available, aerial imagery from 2017 and the Norfolk Living Map remote sensing dataset have been used to identify broad habitat types. Where suitable habitat was identified via this remote sensing dataset, ecological receptors have been

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		should include other types of setts which may be found within (previously un-surveyed) areas of the project area and if not why not? Do you agree that nesting and ground nesting birds should be included with OLEMS measures to safeguard protected species if they are unexpectedly found, i.e. work to cease immediately, and if not why not?	assumed to be present. A commitment to survey these areas post-consent has been included in the OLEMS (doc ref: 8.7), once access is available. This approach was presented to and agreed with stakeholders during the July 2017 and January 2018 ETG meetings. The Applicant acknowledges that the optimum period for Phase 1 Habitat Survey for identifying plant species is between March and September. This is of particular importance where identification of plant species is required to identify habitats to as high a degree of accuracy as possible. The purpose for the Extended Phase 1 Habitat Survey for Norfolk Vanguard was to identify broad habitat types for either their own value or as UK Habitats of Principal Importance, and for their suitability to support legally protected and notable species. This information can be gathered during any time of year and is not constrained by seasonal restrictions. Therefore, the Applicant agrees that the survey, which was undertaken in February, was undertaken marginally outside of the optimal survey period, but does not agree that this in any way undermines the value of the results obtained. The Applicant agrees that the procedure outlined in OLEMS for badger main setts within the onshore project area which require to be closed and destroyed should include other types of setts which may be found within (previously un-surveyed) areas of the onshore project area. The OLEMS will be updated to reflect this. This was agreed within the SoCG between the Applicant and NE submitted at Deadline 1 (Rep1 - SOCG - 13.1). The OLEMS states that works will cease immediately if any protected species are unexpectedly found (section 12.1 – actions to be undertaken by the Environmental Clerk of Works (ECoW)). All ground nesting birds are protected and so are captured by the commitment stated above. The Applicant has not sought to include an exhaustive list of every protected species where the ECoW would request works to cease if they were unexpectedly found. The

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
			commitment is simply that works will cease if any protected species is unexpectedly found.
24.25	N/A		
24.26	NE		
24.27	NE		
24.28	Applicant	In light of NE's comments as to the residual impact for birds including impacts to wintering / on passage bird species, to breeding bird species and bird species during operational lighting and noise, do you intend to conduct a noise survey?	The Applicant does not intend to conduct further noise surveys or noise assessment work and considers its approach to identifying residual impacts for birds to be appropriate. As noted in the Applicant's response to Q23.105, ongoing dialogue is currently taking place between the Applicant and NE on these issues. In relation to the specific point raised, the Applicant has provided an updated clarification note on 27th February 2019 which provides further information in relation to the potential noise impacts upon birds, specifically: • The 300m buffer used for screening potential disturbance effects arising from noise and lighting disturbance was used within the assessment following agreement on the methodology with NE in January 2017. One designated site is located within this 300m buffer, the River Wensum SSSI, and was subject to breeding bird surveys to establish the baseline. No bird species (for which the site is designated) were recorded breeding within the site within 300m of the onshore project area, and as such the site was not considered further. As no other designated sites with ornithological interest features were identified within this 300m buffer, no further assessment was undertaken. Natural England is currently reviewing this further information and is aiming to provide a response by Deadline 5.
24.29	Applicant/NE	Please provide an update on the position regarding mitigation of impacts outlined in WQ24.28 above including what further changes if any are proposed to the CoCP or OLEMS to deal with the risk of damaging or destroying ground nesting birds (i.e.	The OLEMS submitted with the application included measures for managing the risk of damaging or destroying ground nesting birds during construction. Paragraph 230 of the OLEMS states:

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		skylarks) during construction.	"*If protected species are unexpectedly found, or trees and hedges specified to be retained are damaged during construction, the following action would take place: works would cease immediately… works would restart once the ECoW, Natural England, Norfolk County Council and or North Norfolk, Broadland or Breckland Council (as appropriate) are satisfied with the works proposed*." This commitment within the OLEMS covers all protected species, including ground nesting birds. Additional mitigation measures for skylarks are included in section 10.3.1 of the OLEMS, which include: • Keeping winter crop stubble low during the nesting season; • Where possible and subject to separate landowner agreements, set aside ground nesting bird areas outwith the onshore cable route prior to construction – note that the findings of the assessment are not reliant on the delivery of this measure; and • Vegetation removal will take place outside of the nesting bird season. The Applicant acknowledges that pre-construction nesting bird checks are not specified within the OLEMS. This is standard practice and will be included in an update to the OLEMS. With this additional inclusion, the Ecological Management Plan produced in accordance with the OLEMS, on which NE would be consulted, will include details of a pre-construction check of all arable habitats for ground nesting birds prior to construction.
24.30	Applicant	FWQ 24.16 and 24.17 related to the Applicant's approach to assessment of impacts to sand martins. NE highlighted at DL2 in its comments on the Applicant's FWQ responses that mitigation within the OLEMS should include method statements on reducing light, vibration and noise impacts on sand martins nesting in the cliff face. If HDD works are undertaken during breeding season it recommends that an Ecology Clerk of Works monitor for vibration	As noted in the Applicant's response to Q23.105, ongoing dialogue is currently taking place between the Applicant and NE on this issue. In relation to the specific point raised, the Applicant has provided an updated clarification note on 27th February 2019 which provides further information in relation to the potential impacts upon sand martins at Happisburgh, specifically: • Chapter 25 Noise and Vibration considered the potential construction activities that may give rise to significant vibration

PINS Question Number	Question is addressed to:	Question:	Applicant's Response:
		effects to ensure works do not damage or destroy the nest of any wild bird while it is in use or being built, with a remit to stopping the works if necessary. Please comment.	effects (typically percussive activities – piling, compacting etc). HDD was not identified as a significant source of vibration. As such no pathway of effect has been identified. In addition, as set out in the Applicant's response to Q10.3 an Artificial Light Emissions Management Plan will be submitted to the relevant authority for approval prior to construction commencing, which is captured in the outline CoCP and secured through Requirement 20. The plan will detail the location, height, design and luminance of all lighting to be used during the construction of the project, together with measures to limit lighting disturbance. Site lighting will be directional and positioned so that it is directed at the work areas to minimise light spillage and skyglow. All construction lighting will be designed in line with the Bat Conservation Trust (BCT)'s guidance on lighting. On this basis, the Applicant does not consider that further mitigation is necessary in relation to the sand martins potentially nesting in the cliffs at Happisburgh. Natural England is currently reviewing this further information and is aiming to provide a response by Deadline 5.