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| **From:** | Pater, Chris |
| **To:** | Norfolk Vanguard |
| **Cc:** | Fletcher, Will |
| **Subject:** | Norfolk Vanguard Offshore Wind Farm Project (EN010079) - Submission of Written Representation |
| **Date:** | 16 January 2019 18:33:03 |
| **Attachments:** | 2019-01-16_EN010079_NORFOLK VANGUARD_Written Representation_Historic England.pdf |

Dear Sir/Madam

PINS Registration ID: 20012795

Please find attached our Written Representation for this proposed project

Yours faithfully,

Christopher Pater (MSc, PhD)
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**PLANNING ACT 2008 (AS AMENDED) – SECTION 88 AND THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010 (AS AMENDED) - RULE 6**

**APPLICATION BY NORFOLK VANGAURD LIMITED FOR AN ORDER GRANTING DEVELOPMENT CONSENT FOR THE PROPOSED NORFOLK VANGUARD OFFSHORE WIND FARM**

**APPLICATION REF: EN010079**

**SUBMISSION DATE: 16th JANUARY 2019**

**REPRESENTATIONS OF THE HISTORIC BUILDINGS AND MONUMENTS COMMISSION FOR ENGLAND (HISTORIC ENGLAND)**

## Contents

## Summary

## Summary

I The application is clear that the proposed project will use High Voltage Direct Current (HVDC) rather than HV Alternating Current (HVAC) although decisions have yet to be made regarding installation design, such as the foundation options with different designs requiring seabed preparation. It is therefore a relevant matter to consider how the characterisation of the existing environment generated by this Environmental Statement will require specified mitigation measures to ensure that any subsequent survey programmes required to deliver this proposed project (should consent be obtained) are adequately informed by archaeological objectives.

II Regarding the coastal location identified for the cable landfall location (Happisburgh South) we are aware from the information provided to us in this application that Horizontal Directional Drilling (HDD) has been selected to occur at depth. We also note the position of the onshore transition pit and associated onshore landfall works are positioned back from the eroding cliffs such that intrusion onto the foreshore area and the risk of encountering archaeological materials is correspondingly reduced.

III These comments are in part to ensure that Written Schemes of Investigation (onshore and offshore) are fit-for-purpose to enable the implementation of appropriate mitigation measures to avoid and reduce the impact from the proposed development on the historic environment. A crucial matter is that measures within the draft Development Consent Order provide for appropriate methodologies to be employed so that further investigations within the proposed project area, prior to the commencement of construction activities, deliver effective mitigation.

IV We have provided recommendations for changes to the draft Development Consent Order (Deemed Marine Licences) and associated project application documentation inclusive of the In Principle Monitoring Plan.

## 1. Introduction

1.1. The Historic Buildings and Monuments Commission for England (HBMCE), known as Historic England, is the Government's adviser on all aspects of the historic environment in England - including historic buildings and areas, archaeology and historic landscape – and have a duty to promote public understanding and enjoyment. HBMCE are an executive Non-Departmental Public body sponsored by the Department for Digital Culture, Media and Sport (DCMS) and we answer to Parliament through the Secretary of State for Digital Culture, Media and Sport. Our

remit in conservation matters intersects with the policy responsibilities of a number of other government departments – particularly the Ministry of Housing, Communities and Local Government, with their responsibilities for land use planning matters. The National Heritage Act (2002) gave HBMCE responsibility for maritime archaeology in the English area of the UK Territorial Sea.

1.2. In our Section 56 Relevant Representation (dated 14th September 2018) we noted that the applicants had provided an Environmental Statement, however we identified that this development had the potential to impact upon the historic environment, and that this impact would be significant in relation to a number of heritage receptors and in relation to EIA policy. We also stated that a number of specific points would be addressed in our full Written Representation in relation to the onshore and offshore sections of the Environmental Statement.

1.3 This statement also aims to address the issue raised in the 'Examining Authority's Written Questions and Requests for Information' as issued by the Planning Inspectorate on 19th December 2018.

## 2 Comments on the draft Development Consent Order. PINS Document reference 3.1

2.1 Schedules 9, 10, 11 and 12; Deemed Licences under the 2009 Act – Generation Assets and Transmission Assets. Part 1 (Interpretation) – amend as follows:
Article 4 – the address for returns and correspondence for HBMCE is:

Historic England
Cannon Bridge House
25 Dowgate Hill
London
EC4R 2YA
Tel: 020 7973 3700

2.2 Schedules 9, 10, 11 and 12, Deemed Marine Licences under the 2009 Act – Generation Assets and Transmission Assets. Part 4 (Conditions) – amend as follows:
Schedule 9 & 10; Article 14(1)(h) and Schedule 11 & 12; Article 9(1)(h)
*"An archaeological written scheme of investigation in relation to the offshore Order limits seaward of mean low water, which must be submitted at least six months prior to commencement of the licensed activities and must accord with the outline written scheme of investigation (offshore) and industry good practice, in consultation with the statutory historic body (and, if relevant, North Norfolk District Council) to include—"*

2.3 We have requested this amendment so that the timeframe for submission prior to commencement of licensable activities subject to these draft Deemed Marine Licences are consistent with the articles within the draft Deemed Marine Licences which provide for an archaeological written scheme of investigation within the proposed Development Consent Order for Hornsea Project Three Offshore Wind Farm, presently subject to Nationally Significant Infrastructure Project (NSIP) examination procedures (Planning Inspectorate Application reference: EN010080).

2.3 Schedules 9, 10, 11 and 12, Deemed Marine Licences under the 2009 Act – Generation Assets and Transmission Assets. Part 4 (Conditions) – Schedules 9 and 10, Article 15(1) and Schedule 11 and 12; Article 10(1) and all other occurrences when the term "statutory historic body" is used to be changed to "Historic Buildings and Monuments Commission for England (Historic England)"

## 3. Comments in relation to the Environmental Statement: Outline Written Scheme of Investigation (Onshore). PINS Document reference 8.05

3.1 In general, the outline Written Scheme of Investigation (WSI) provides an overview of the strategy that will be used to assess the onshore archaeological remains with a more detailed WSI being produced at a later stage, should consent be obtained.

3.2 Section 5.1, paragraphs 42 and 45 summarises the geophysical survey work that has been carried out to date, and will be carried out in the future to support the proposed development. It would be useful if these sections named the techniques that were utilised. It is stated in Appendix 6 of this document that magnetometry will be used, but it would be useful to include this information in the main text of this outline WSI for clarity.

3.3 Section 5.4, paragraph 52 – we agree with the strategy used to position trial trenches, focusing on the anomalies identified through the geophysical survey as well as blank areas.

3.4 Section 5.4, paragraph 54 – provision should be made for the watching briefs to be extended into an excavation if significant remains are discovered. The time permitted between stripping an area and the excavation taking place should also be stated clearly to ensure that sites are not left open to the elements, as this can result in damage to vulnerable archaeological remains. This point is raised again in Appendix 2 of this document, in Section 1.3, paragraph 17, such that any areas in which sub-surface archaeological remains are identified as being present are not subject to prolonged periods of exposure. We welcome this statement, but a specific time limit will need to be decided upon, building in flexibility to take into any account issues that may increase the rate of damage to a site, such as from

poor weather conditions discussed in Appendix 2 of this document (Appendix 2, Section 1.17, paragraph 116).

3.5 Section 6.1, paragraph 66 – it is stated that following the completion of fieldwork, a post-excavation assessment would be carried out in accordance with Historic England guidance. We would ask that timings for the work are included in subsequent WSIs in terms of when artefacts will be cleaned and stabilised, and when bulk environmental samples will be processed. A clear timetable is needed to ensure that remains are not left in sample bags/buckets for long periods of time as this can lead to the degradation and loss of materials/information that could be obtained from the archaeological remains. For example, it is stated in Appendix 2 of the Outline WSI (Onshore) that the environmental samples will be processed '*as appropriate*' (Section 1.7, paragraph 58), but a timescale should be defined as to how long samples are permitted to be stored in the sample bags/buckets as well as how they will be stored (inside vs. outside). We note that there is a commitment to ensure that finds are appropriately conserved and stored in Appendix 2 of this document (paragraph 80), but request that this is extended to environmental remains as well so that the assemblage is stable until it is assessed by the different specialists.

3.6 The guiding principle for archaeological recovery set out in the CIfA document *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials* (2014) is that the "…research of archaeological materials will result in an ordered, stable, accessible archive" and that appropriate provisions should be made for the "physical/chemical stability and security of finds and the finds archive, both on and off site" (CiFA 2014, Section 3.3.7). Ideally, processing bulk environmental samples should not be seen strictly as a 'post-excavation' task, being processed as the excavations are continuing on site. This allows information to be fed back to the site, guiding the excavations to target key features/deposits so that opportunities are not missed.

3.7 Section 6.4 discussed the strategy to preserve archaeological remains when key remains are identified. We agree with this approach but recommend that the principles and stages presented in the Historic Environment document *Preserving Archaeological Remains* (2016) are taken into account[1]

3.8 Outline WSI (Onshore), Appendix 2, Section 1.4 discusses the strategy for Hand Excavation of Archaeological Features, including the percentage of different features types that will be excavated. This section discusses how structures will be dealt with (paragraph 25), but does not specify how floor surfaces will be dealt with if found. Floor surfaces need to be approached in a specific way to ensure that

[1] https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/.

remains and features are recorded and sampled in an appropriate manner. This may include the use of micromorphology or chemical techniques. Paragraph 26 discusses the excavation of human remains. We would stress that the advice given in the APABE/Historic England document '*Guidance for the Best Practice for the Treatment of Human Remains*' (2017) should be followed where possible to ensure that spatially distinct samples are collected from the floor of a grave once the human remains have been removed, from the head, torso and leg/foot area of the grave (APABE/HE 2017 Annex S3, paragraph 225).

3.9 Section 1.6, paragraph 50 states that all finds and environmental samples will be processed as appropriate, but it should be noted that not all remains should be cleaned. For example, organic residues adhering to a pottery shard would be damaged if the pottery was washed. If residues are identified then a specialist should be contacted and the procedures outlined in the Historic England document *Organic Residue Analysis and Archaeology* (2017) should be followed[2]. We do welcome the commitment in paragraph 50 to process the assemblage following its removal from the ground but repeat the need to specify a timetable for when this will happen and at what stage of the project.

3.10 Section 1.7 discusses the Environmental sampling strategy in terms of the contexts that will be sampled and the involvement of specialists on site where necessary. However, the range of environmental samples that may be taken are not discussed in detail and we would need to see this in subsequent WSIs. For example, only bulk samples are mentioned (paragraph 53), but other sample types may be required such as monoliths, micromorphology samples, small samples for geoarchaeological assessment (magnetic susceptibility, pH, soil phosphates) or for the recovery of insect remains etc. The full range of samples expected to be taken and what remains/deposits/features they will target needs to discussed so that the strategy is clear. Some data has been omitted from Section 1.11 in terms of the timetable for the submission of reports (paragraphs 70 and 71) and the deposition of the archive (paragraph 78).

3.11 Outline WSI (onshore), Appendix 6 (Priority Archaeological Geophysical Survey) – It is stated in Section 5.1 (page 13) that magnetometry will be carried out across the footprint of the onshore project area, but will provisions be made for the use of additional techniques where necessary? It is also stated on page 14 that surface conditions will be recorded, but we would recommend that weather conditions for each day of survey should also be recorded, as noted in the EAC document *Guidance for the use of Geophysics in Archaeology* (Schmidt et al. 2016, Section 3.2, page 30). Details of the weather should also be included in the list of information required in the final report that is cited in Section 5.4.

[2] https://historicengland.org.uk/images-books/publications/organic-residue-analysis-and-archaeology/

## 4. Comments in relation to the Environmental Statement: Outline Written Scheme of Investigation (Offshore). PINS Document Reference: 8.06

4.1 In general, the outline offshore WSI provides an overview of the strategy that will be used to assess the offshore archaeological remains, but additional information is required in the subsequent detailed WSIs in terms of what work will specifically be carried out and how, the types of samples that will be collected and the remains/properties that will be assessed. For example, the strategy outlined in Section 1.7.1 (paragraph 26) is sensible, but much more detail will be required in any WSI produced post-consent such as:

- What geophysical techniques will be used?
- What palaeoenvironmental remains will be assessed from the cores?
- How will the cores be assessed, taking into account the needs of the different assessments that will be carried out and the remains that will be targeted?

4.2 The Marine Geophysical Investigations are summarised in Section 1.9.4, but there is no mention of the resolution of information obtained from the existing surveys, and if it is suitable to identify features of archaeological interest. We welcome the statement that archaeological contractors will be involved in planning future geophysical survey work to address gaps in the current understanding (paragraph 70). We are also pleased to see the Historic England document *Marine Geophysical Data Acquisition, Processing and Interpretation* (2013) cited (paragraph 72) and suggest that the recommended line spacings presented in this document are utilised in the future geophysical survey work.

4.3 The Marine Geoarchaeological Investigations are presented in Section 1.9.5. We are pleased that an archaeological contractor will be involved in future data review (paragraph 78) and that second archaeology cores are being considered (paragraph 81). Additional detail is required specifically about the proposed palaeoenvironmental and dating work in terms of what will be assessed and how this work will be carried out.

4.4 Section 1.9.6 discusses the use of Divers and/or ROVs to investigate “A2” anomalies in more detail, but it is not clear how the features will be selected for study. We welcome the inclusion of archaeological contractors into this work (paragraph 90) and look forward to receiving the detailed method statement to support this work.

## 5. Comments on the In Principle Monitoring Plan (offshore). PINS Document reference: 8.12

5.1 We note that the In Principle Monitoring Plan (IPMP) was prepared following consultation with the Marine Management Organisation (MMO) and relevant Statutory Nature Conservation Bodies (SNCBs). We also understand that the IPMP is designed to assist delivery of identified monitoring measures, as required by the conditions contained within the draft Deemed Marine Licences (DMLs). Therefore, as it is the intention that the IPMP should provide a key mechanism for regulatory authorities to be assured that offshore monitoring activities (especially during construction and operation) will be delivered; we hereby offer the following comments.

5.2 Table 4.1 (In principle monitoring proposed – Marine Geological and Physical Processes) mentions that the:

> *"Scope for surveys and programmes and methodologies for the purposes of monitoring shall be submitted to the MMO for written approval at least 4 months prior to the commencement of any survey works"*

5.3 It is therefore important to consider this commitment with the statement made in Table 4.6 (In principle monitoring proposed – Offshore Archaeology and Cultural Heritage) that:

> *"Norfolk Vanguard Limited has submitted an outline WSI with the DCO application. This will be updated at least four months prior to the intended start of construction"*

5.4 In consideration of the above details and the other statements made about pre-construction geophysical surveys within the proposed Order limits it is essential that the WSI is agreed and operation i.e. at least 4 months prior to the commencement of any survey programmes, as mentioned above (paragraph 3.2). It is only through such effective coordination will it be possible to investigate and identify seabed features of known and potential archaeological interest. Furthermore, such collaborative data gathering and coordinated data processing should enable in-situ protection through use of Archaeological Exclusion Zones (AEZ) to be in place before construction starts and thereby inform engineering micro-siting requirements.

5.5 In reference to the draft Deemed Marine Licences, Schedules 9, 10, 11 and 12, Deemed Marine Licences under the 2009 Act – Generation Assets and Transmission Assets. Part 4 (Conditions) –
Schedules 9 and 10, Article 18(1); and Schedule 11 and 12; Article 13(1) – it is apparent that any offshore IPMP submitted for approval by the MMO should conduct consultation with "relevant statutory bodies" includes Historic England so

that confirmation can be provided that "…proposed pre-construction surveys, including methodologies and timings, and a proposed format and content for a pre-construction baseline report;" are in accordance with an archaeological WSI simultaneously prepared in consultation with Historic England and agreed (formally) with the MMO.

5.6 We also offer the observation that the following statement made in sub-section 4.10.1 (Conclusions of the Environmental Statement): "For the project alone the effects that have been assessed are anticipated to be minor adverse or negligible on the basis of embedded mitigation" is based only on those elements of the historic environment found or anticipated at the time of preparing the ES and the assumption that proposed embedded mitigation strategies can be delivered in the absence of final design at the time of application submission.

## 6. Comments in relation to Environmental Statement: Volume 1, Chapter 5 – Project Description (Document Ref: 6.1.05)

6.1 We understand that the proposed development comprises two distinct offshore turbine areas:

- Norfolk Vanguard East (NV East); and
- Norfolk Vanguard West (NV West).

6.2 The electricity export cables from both turbine area areas, known as "the OWF sites" (approximately, 70km and 47km from the coast of Norfolk respectively at nearest points) are to be installed within a cable corridor to a landfall point at Happisburgh South (Norfolk). Onshore cables will transport electricity approximately 60km to a National Grid substation at Necton (Norfolk). Furthermore, we understand that Vattenfall Wind Power Ltd (parent company of Norfolk Vanguard Limited), through one of its subsidiaries, is also developing Norfolk Boreas, a 'sister project' to Norfolk Vanguard. We therefore appreciate that Norfolk Boreas could share a grid connection location and also much of the offshore and onshore cable corridors with Norfolk Vanguard. Therefore, in order to minimise impacts, Norfolk Vanguard Limited will include within its Development Consent Order (DCO) application some enabling works for the Norfolk Boreas project.

6.3 We acknowledge the detail provided about the "project design envelope" adopted for this proposed project regarding reasoned minimum and maximum extent for a number of key parameters and that the final design will lie between the minimum and the maximum extent of the consent sought. In summary, we understand that the proposed project could consist of between 90 and 200 wind turbines, each having a capacity of between 9MW and 20MW, to give an export capacity of up to 1,800MW at the point of connection to the offshore electrical platform(s). Of particular note, Norfolk Vanguard Limited has made the decision to deploy HVDC technology for the offshore and onshore export infrastructure for the project.

6.4 At the proposed landfall location two cable ducts will be installed under the cliff by Horizontal Directional Drilling (HDD). An additional drill is included in the impact assessment worst case scenarios where applicable. We understand from section 5.4.3 (foundations) that the following are being considered through the ES:

- Quadropod and tripod;
- jacket foundations with either three or four feet attached to the seabed with either 3 or 4 suction caissons or piles;
- Suction caissons;
- Monopiles;
- Gravity base structures; and
- Tension leg floating foundations

6.5 Section 5.4.13 (Cable installation methods) describes how pre-construction UXO surveys will be conducted to facilitate the safe micro-sitting of infrastructure, also boulder clearance and pre-lay grapnel run (estimated 20 to 30 m width of disturbance) and pre-sweeping through sand waves where necessary. Furthermore in reference to cable burial methods (section 5.4.13.2) it is estimated that seabed depth of 3m will be required. However, it was noted that there was no specific attention (or any other documentation cross-referencing) to demonstrate how these programmes will be fully informed by archaeological assessment practices or other mechanisms to be employed should any consented project encounter previously unknown archaeological materials. However, it was noted that section 5.5.8 (indicative onshore construction programme) did allude to "archaeological preparations" in conjunction with Historic England and the relevant local authorities. This would seem to address matters such as identified within section 5.5.5 (onshore project substation), sub-section 5.5.5.4 (pre-construction works) such that a Geoarchaeological Watching Brief report (see Appendix 28.06) that archaeological input will be included in the geotechnical survey programme. We welcome this approach as it ensures that opportunities are not missed and that there is not duplication of effort.

6.6 It is a particularly relevant matter that pre-construction surveys are designed in conjunction with any Retained Archaeologist and Archaeological Curator so that survey specifications and plans can be designed in accordance with an agreed archaeological Written Scheme of Investigation (to be produced from the outline WSI, PINS document reference: 8.06). This is to ensure the collection of sufficient quantity and adequate quality data for archaeological analysis and thereby inform delivery of mitigation measures for archaeological receptors. However, the IPMP will require revision to facilitate such efficient and coordinated action.

## 7. Comments in relation to the Environmental Statement: Volume 1, Chapter 6 – EIA Methodology (PINS Document Reference 6.1.6)

7.1 We are aware of the requirements for an Environmental Impact Assessment (EIA) exercise to be completed for this proposed development, in particular that it is the purpose of an Environmental Statement (of the EIA) "…to inform the decision-maker, stakeholders and all interested parties of any significant environmental issues that may result from the project during its construction, operation and (where relevant) decommissioning."

7.2 We acknowledge the detail provided regarding action to characterise the proposed development areas (onshore and offshore) and that the Applicant has adopted a design envelop approach (as set out in section 6.4) and that the use of such an envelope allows the Applicant to consider the possible maximum extent of the consent sought and likely environmental impacts that could occur as the proposed project is finalised prior to construction.

7.3 Section 6.5.2 (Determining Receptor Value and Sensitivity) contains matters of particular relevance to the historic environment and how heritage assets (as defined within National Planning Policy Framework and UK Marine Policy Statement) should be included as part of the overall receptor sensitivity assessment. It is important to add that such consideration is applicable to both known and identifiable heritage assets and risk associated with encountering presently unknown heritage assets as might exist within the proposed development areas (onshore and offshore). We add that Table 6.3 within section 6.6 (Information for inclusion in Environmental Statements) is helpful regarding factors specified in EIA regulation (2017) 5(2) as likely to be significantly affected by the development and therefore inclusive of cultural heritage, architectural, archaeology and landscape.

## 8. Comments in relation to the Environmental Statement: Volume 1, Chapter 8 – Marine Geology, Oceanography and Physical Processes – PINS Document Reference: 6.1.8

8.1 We note from Table 8.8 (data sources) the attention given to data generated from surveys conducted to date, although we note that the use of terms such as "High" associated with (data) "confidence" is undefined given the disparate nature of the data sources described.

8.2 The description provided of the existing environment (section 8.6) is helpful such that the development area can be characterised as a bathymetry of within NV West vary as between 25m and 50m below LAT and containing sandbank features

(typically 5m high) which trend north-south through NV West as the south-east limit of the Norfolk Bank System. The bathymetry of NV East varies from a maximum depth of 42m below LAT across the north-east part of the site to a minimum depth of 22m below LAT in the north-east part of the area. Seabed features comprise a series of north-south oriented sandbanks with widths of 2 to 3km and heights up to 17m above the surrounding seabed. Other identified bedforms include sand waves (greater than 2m high), megaripples (less than 2m high) and sand ridges.

8.3 Within the proposed electricity export cable corridor we understand that bathymetry close to NV West and NV East is between 40 to 50m below LAT with depths decrease to 10m below LAT between 500-1000m from the coast. The 2m below LAT isobath is typically 200m to 30m from the coast. Seabed feature are generally sandbanks orientated north-south with shoals that cross or extend into the offshore cable corridor along with sand waves, megaripples and sand ridges, that latter can be up to 9m high with crests typically oriented west-east to south-west to north-east.

8.4 Section 8.6.2 (geology) provides a summary of geological conditions which includes formations which might have potential for geoarchaeological analysis, especially as and when organic material (such as peat deposits) were identified (for example, see Table 8.9 and sub-section 8.6.7.1, paragraph 95). We will expand on these matters in the comments we offer in reference to the offshore archaeology (Chapter 17). However, we did note that the description provided of a “geological sinkhole” (Chapter 17, paragraph 158) does not appear to be included within this chapter.

8.5 Section 8.6.10 (Morphological Change of the Haisborough Sandbank System) contains relevant analysis in terms of risk of encountering previously unknown historic sites or archaeological material. In particular, paragraphs 111 and 112 which describe “…historic large-scale natural changes having occurred over decadal periods.” It is therefore a matter of risk assessment, derived from desk-based sources of information, that must be completed by the Applicant to determine what high-resolution and seabed penetrating survey techniques should be employed to determine whether or not presently unknown (i.e. partially buried or buried) archaeological materials might be present within either NV East, NV West or within the proposed electricity export cable corridor. It is therefore a relevant matter that section 8.7.2 (Effects) identified other receptor groups inclusive of offshore and intertidal archaeology and cultural heritage. A revised IPMP would therefore facilitate a survey data acquisition programme through a linked timetable for delivery.

## 9. Comments in relation to the Environmental Statement: Volume 1, Chapter 17 – Offshore and Intertidal Archaeology and Cultural Heritage – PINS Document Reference: 6.1.17

9.1 In general, we are content with the information as presented regarding this proposed development such that the Environmental Statement (ES) establishes baseline conditions for the historic environment as might be encountered within the intertidal zone at the electricity export cable landfall location, within the offshore cable corridor and within either NV East or West sites. This chapter also assesses the potential impacts to offshore and intertidal archaeological receptors from the proposed project and explains the options for embedded mitigation.

9.2 The information presented in this chapter is based on desk-based sources of information and corroboration with geophysical and geotechnical survey data acquired for this project. We are aware that this chapter is supported by technical reports contained within Appendices 17.1 to 17.4 for which we have prepared comments separately within this Written Representation. We also note that this chapter has elaborated on the outcomes of the conventional EIA matrix-based approach when attempting to analysis impacts to include qualified expert judgement and additional descriptive comment.

9.3 We noticed in Table 17.3 (Consultation Responses) that regarding the Evidence Plan Process (EPP) that Historic England will continue to participate in the EPP and we must ask what are the Terms of Reference for the EPP at this stage of the NSIP cycle? The attention given in this table to comments previously returned e.g. during the Preliminary Environmental Information Report (PEIR) consultation was noted and how matters had been addressed through the submitted ES.

9.4 Sub-section 17.4.1.2 (Sensitivity) should have given particular attention to Historic England's *Conservation Principles* (published 2008) as the present explanation about assessment of importance of a heritage asset focusses on the criteria used for determining whether a heritage asset should be subject to statutory protection; whereas Table 17.4 identifies high heritage significance inclusive of sites that are already subject to statutory protection. As intimated by paragraph 25, the determination of "heritage significance" should focus on the measures and methodologies to be utilised by the Developer to determine such significance as necessary to inform the design of the proposed project.

9.5 The detail in Table 17.8 (summary of acquired geophysical data) provides a useful breakdown of survey activity completed to date with particular reference to the rating of data quality. It is therefore an essential matter that any archaeological Written Scheme of Investigation (WSI) as might be produced for this proposed project provides sufficient instruction for completion of data acquisition programmes to highest data quality standards possible (e.g. magnetometer and sub-bottom profiler i.e. shallow seismic which we consistently identified as data standard "variable" or "poor or very poor").

9.6 Section 17.6 (Existing Environment) also highlights that sand waves identified across the development area may contain shipwreck and how post-transgression marine sediments might also cover (and protect) earlier land surfaces. We therefore note (paragraph 61) the following regarding palaeoenvironmental features:

- NV East – 18 features;
- NV West – 110 features; and
- Cable corridor – 43 features

9.7 We therefore note the summary provided in paragraph 67 regarding the archaeological potential of the identified sedimentary sequences, particularly those identified within NV West and the electricity export cable corridor. Therefore the archaeological WSI will need to set out a methodological approach that will utilise most effectively data generation programmes as should be commissioned if this application is successful.

9.8 Anomalies which might be archaeological interest have been identified as:

- NV East – 318 features
- NV West – 184 features; and
- Cable corridor – 732 features

9.9 Paragraph 72 details that within NV East there are four "A1" anomalies plus the wreck of a submarine "…lying just outside the study area." However, we must request that all necessary action is taken by any project contractor or sub-contractor (should consent be obtained) that activities that might impact the seabed are sufficiently informed through all formal project documentation to avoid this wreck (Ref: 71480; UKHO ID 79542) discovered in 2014 during survey for the proposed offshore array area. Paragraph 78 explains how 1,190 anomalies have been interpreted as "A2" (uncertain origin of possible archaeological interest). We must draw particular attention to anomalies identified as A2 as being relevant to how the project is planned and delivered. Furthermore, conditions within any Development Consent Order (including deemed Marine Licences) that provide for the preparation of an archaeological Written Scheme of Investigation, should enable detailed analysis to be completed. This analysis should ascertain whether any A2 anomalies can be removed (non-anthropogenic) or more added as might be at risk. Importantly, such assessment is inclusive of geo-archaeological evidences as captured by paragraph 80.

9.10 Section 17.6.3 (intertidal archaeology) mentions that "long HDD" will pass beneath the beach, but we must be certain that depth of clearance will be sufficient not to jeopardis any in-situ archaeological materials. In particular, in the Happisburgh area, archaeological sites (as described in paragraph 93) have been found which are of considerable importance.

9.11 Section 17.6.4 (Historic Seascape Character and Setting) tended to focus on identified features (e.g. wartime losses), known heritage assets or the risk of encountering previously unknown archaeological or historic sites which should be considered as heritage assets. Although, Table 17.15 did include other characterisation factors including fishing and industry, we noticed that is was within Table 17.19 (and Table 17.20) where more narrative was provided about the capacity of present perceptions of historic seascape character to accommodate change as proposed by this and other offshore renewable energy projects. We do not concur with the assessment regarding the assessment of character to accommodate change in reference to: "aquaculture"; inshore fisheries"; and "offshore fishing grounds" as the capacity to accommodate identified spatial historic character is considered to be dependent on agreeing access (during construction) in reference to "rolling, temporary safety zones". It would seem to us that a change in seascape will have occurred due to construction of an offshore wind farm which will, by definition, result in modification of behaviour among marine stakeholders and the activities (e.g. default exclusion of fishing techniques employing certain gear types) that they can legally, practically and economically practice; their perception of historic seascape character may therefore change. Elsewhere, the perceptions of change for "energy industry" and "extractive industry" are debatable depending on respective positions as acknowledged.

9.12 We hereby confirm that embedded mitigation that delivers avoidance of anomalies of possible or known archaeological/historic interest is a key mechanism to be delivered through conditions of any consent as might be obtained for this proposed development (paragraph 121), if avoidance is not possible then the measures outline in paragraph 122 are to be enacted accordingly. Furthermore, if as an unintended consequence of delivering this project previously unknown features of the historic environment are discovered that a system of notification to relevant authorities and curators is enacted (paragraph 123). Section 17.7.3 (monitoring) makes important reference to the "In Principle Monitoring Plan" (Application document Ref: 8.12) which we have commented on separately as necessary within this Written Representation.

9.13 Table 17.17 (assessment of importance) in Section 17.7.4 (worst case) provides a useful summary. However, we do not agree with the interpretation of "negligible" and "medium" in the importance column for "intertidal assets"/"Findspots" and "potential derived intertidal finds"/"Isolated artefacts and findspots…" It is our position that while such heritage assets might be rare and unlikely to be encountered given the use of HDD, should such discoveries occur they are more likely to be of "high" importance as per the explanation provided elsewhere in this chapter of the ES.

9.14 Section 17.7.6 (potential impacts during construction) identifies the key matters that require attention to realise the plan that embedded mitigation measures will avoid impacts to those seabed features identified at this stage of known or possible archaeological interest (e.g. as included within Table 17.18). Paragraph 143 makes an important point about that those anomalies classified as "A2" and "A3" will not be afforded AEZs, at this stage, but that "…the positions of these features would be avoided through the scheme design (micrositing) where possible." The following matters therefore require clarification:

- What is the margin of error with "micrositing" that might inadvertently compromise these anomalies?
- When avoidance is not possible, commitment that investigation as per the methodological approaches set out in any post-consent WSI will be enacted.

9.15 Paragraph 145 provides a partial interpretation of how any Protocol for Archaeological Discoveries should be employed. It is a relevant matter the use of such a protocol is equally applicable to situations in which "chance finds" might be indicative of a wider debris field representing previously unknown in-situ archaeological material.

9.16 Section 17.7.7.4 (Impacts to the setting of heritage assets), it is an important matter to highlight (vis. paragraph 178) that we do not specifically identify the setting of a heritage asset as being impacted (i.e. "negligible"), but rather how the setting contributes to the significance of a heritage asset; therefore the matter in question is whether or not harm to the significance of the heritage asset has occurred given the design and position of the proposed development in what is considered to be its setting, see Appendix 17.01 (section 3.5 – Assessment of Setting) which explains this point.

9.17 Section 17.8 (Cumulative impacts), in response to the approach adopted we must comment on the statement made in paragraph 192 which appears to identify matters that might "…affect not only the heritage assets themselves but also their settings and the perceptual values associated with the historic seascape character." In reference to the advice we have provided to you here (see above), it is important to appreciate that the relative significance of a heritage asset may be due to its setting and that we do not differentiate between "impacts" (these comments are also applicable to the text used in Table 17.21). Furthermore, it is not a matter of "perceptual values" associated with Historic Seascape Character, but a perception of historic character as might be associated with a spatially identifiable location drawn from disparate interests and therefore different and real "values".

9.18 Table 17.22 should also include East Anglia One North and Two (pre-application) and Hornsea Project Two (post-consent).

9.19 Section 17.8.1 (Cumulative direct impact to potential heritage assets) includes a statement that require close attention: "cumulative direct impacts to known heritage assets are not anticipated to occur due to the avoidance of known archaeological sites and features identified through EIA for each of the constructed and planned projects as part of the consenting process." It is apparent to us that the EIA exercises conducted for seabed infrastructure projects, typically sets out to characterise the development area in reference to "Rochdale Envelope" principles; and it is apparent that substantial assessment work is necessary post-consent to finalise the intended construction design. We therefore acknowledge that direct impacts to presently unknown heritage assets may occur and thereby cause cumulative impacts. In particular the comment made in paragraph 203 that the southern North Sea becomes "…associated primarily with offshore renewables".

9.20 Section 17.9 (Transboundary impacts) sets out a how the southern North Sea and the considerable number of seabed developments competed, under construction or planned could greatly benefit from geo-archaeological/palaeoenvironmental alaysis to reveal evidences of submerged prehistoric landscapes. In particular, that such effort could be in accordance with co-ordinated strategies across national boundaries. We appreciate the collective knowledge benefits that are possible and that it is possible to identify "a significant beneficial transboundary impact", subject to application of professional archaeological standards. It is therefore apparent that the inclusion within any Development Consent Order of agreed mitigation strategies are essential.

9.21 Table 17.24 (Potential Impacts Identified for Offshore and Intertidal Archaeology) – the comments provided in this representation above (our paragraph 9.13) are applicable here regarding "in situ intertidal sites" during construction.

## 10. Comments in relation to the Environmental Statement, Volume 1, Chapter 28 – Onshore Archaeology and Cultural Heritage – PINs Document Reference: 6.1.28)

10.1 In general the mitigation strategy that has been proposed appears sensible, but we note that the majority of the work will be carried out post-consent. This may result in some issues that need to be taken into account. For example, previously unknown archaeological remains can be discovered even after an area has been evaluated as the evaluation process only focuses on a small percentage of the overall area. Carrying out investigative works post-consent, but pre-construction

will require flexibility to be built into the proposed timetables of work to allow the time needed for previously unknown remains to be properly assessed. It is noted that avoidance, micrositing and route refinement will form the backbone of the mitigation strategy, which is good to see, but in some cases avoidance may not be possible. We therefore recommend that the potential of identifying previously unknown archaeological remains of significance are discussed with the Local Authority in terms of the risks that this may pose to the timely completion of the proposed project.

10.2 In section 28.7.6.4 we note that the impact of the development on geoarchaeology/palaeoenvironmental remains and the hydrology of and area are discussed as well as how identified impacts may be mitigated. We were also pleased to see a discussion regarding the potential impact of HDD bentonite slurry outbreak (Section 28.7.6.5) and the impact of heat loss from the installed cables (Section 28.7.7.2). In general the strategies and approaches that will be utilised appear sensible; our detailed comments for the method statements are associated with the relevant appendices and will not be duplicated here.

## 11. Comments in relation to the Environmental Statement: Volume 3, Appendix 17.02: Stage 1 Geoarchaeological Review (offshore)

11.1 References have been made to the 'English Heritage' guidance documents, which should be amended to Historic England.

11.2 It is stated in Table 1 that radiocarbon dating will be considered to place the remains into context, but it should be noted that the limit to detection is approximately 50,000yrs BP; deposits expected to be older than this would need to be dated using alternatively scientific techniques, such as OSL or amino acid racemisation dating. These techniques have not been discussed in Table 1, but OSL has been mentioned in the subsequent stages of the geoarchaeological work published in the ES (Appendices 17.03 and 17.04).

## 12. Comments in relation to the Environmental Statement: Volume 3, Appendix 17.03: Stage 2 Geoarchaeological Review (offshore)

12.1 The stages of the geoarchaeological assessment and recording presented in Table 1 have been updated following the completion of Stage 1, discussing the use of OSL dating as part of the dating strategy. We are pleased that OSL is being considered, but note that samples will be collected at Stage 3. We are concerned about this approach as the cores will have previously been split and exposed to light during Stage 2. This approach deviates from that presented in the Historic

England document *Luminescence Dating* (2008), which recommends that core samples are collected using opaque sample tubes and then stored and processed under controlled light conditions (HE 2008, Section 7.3). Even in the best of circumstances, this adds multiple layers of additional uncertainty to what is already a complicated scientific process. The approach presented here may result in questions being asked about whether the exposure of the split cores to light resulted in the luminescence signal being partially reset (bleached). If this was the case, the dated event may not relate to the archaeological event of interest. The approach presented here is potentially hazardous, but not impossible; where it is employed it necessitates much more detailed reporting and possibly additional laboratory work (such as undertaking duplicate measurements on both quartz and feldspar minerals from the same sample, as these minerals reset at different rates; consistent ages would give confidence that a sediment has not been re-bleached during sampling).

12.2 If additional cores are collected in the future that require dating using techniques such as OSL, we would recommend that cores are collected using light-proof/opaque liners that are then stored and split under safe-light conditions in the laboratory. Half of the core could then be stored appropriately for OSL dating while it is decided if dating is required on a given core/deposit. If OSL dating is required, samples can then be collected, with any remaining material being utilised for other forms of analyses (palaeoenvironmental analysis, geoarchaeology etc.). By making minor changes to the order in which the different phases of analyses are currently being carried out, it will limit the addition of layers of uncertainty to the luminescence chronology and increase the confidence in the resulting dates.

12.3 It is stated in Section 4.2.2 that large distances exist between vibrocores. A comment should be included about the reliability of the resulting deposit model and if there are recommendations for additional boreholes to be collected to resolve some of the gaps in our understanding.

12.4 Recommendations made in Section 7 are clearly set out with a good explanation of why certain work is needed. We feel that the work that has been proposed for Stage 3 is sensible and appropriate, but refer to our concerns raised above about the use of OSL dating on cores that have been split and exposed to light.

## 13. Comments in relation to the Environmental Statement: Volume 3, Appendix 17.04: Stage 3 Geoarchaeological Review (offshore)

13.1 The results of the dating programme carried out to date are summarised and in general we are pleased to see the results of this work as well as a discussion of the limitations in some cases of the resulting scientific dates. It would be useful to

include an additional figure to highlight the position of the OSL and radiocarbon samples selected for dating on the deposit models as this would allow us to see how the dated deposits relate to each other across the sampled boreholes.

13.2 Section 4.2 summarises the radiocarbon dating programme, with the results presented in Table 3. We note that the radiocarbon dating certificates have not been included in an appendix, and that the delta-$^{13}C$ ($\delta^{13}C$) values have not been included in Table 3. This information should be included as standard when citing radiocarbon dates as it provides valuable information about whether fractionation or marine reservoir corrections should be taken into account, depending on the material that has been sampled. Table 3 therefore needs to be updated to include information regarding the $\delta^{13}C$ values. We would also caution the use of *Potamogeton sp*. seeds for radiocarbon dating, as the resulting dates may suffer from a hardwater effect that could affect the accuracy of the dates produced. Sample UB-36847 incorporated one *Potamogeton sp*. seed into the material selected for dating, and so the effects are probably only minimal in this case, but sample UB-36849 exclusively sampled *Potamogeton sp*. seeds. This should be discussed more in the report in terms of the effect that this may have on the resulting dates, and therefore the interpretations made regarding the chronology.

13.3 It is stated in Section 4.3.1 that the cores sampled for OSL dating were previously exposed to light. We refer to our previous comments above on this issue. The full OSL results report (Appendix 2, this document) does not elaborate on this issue, or mention that the sampled cores had been split and exposed to light prior to being sampled for OSL dating. As this approach differs from that presented in the Historic England *Luminescence Dating* (ibid.) guidance document, it would be useful to understand if this has impacted on the resulting chronology. It would also be useful to include a non-technical summary of the results presented in the figures/graphs (either in the full OSL report (Appendix 2) or in the main text of the Stage 3 Geoarchaeological report) as there is a question about how accessible the results presented in the figures are to a non-specialist, which may affect how the dates are incorporated into the site chronology at a later stage.

13.4 We broadly agree with the recommendations made for further work presented in Table 15 but additional detail is required in terms of what samples will be specifically looked at. For example, it is stated that “additional dating is required” but it would be useful to state which deposits in each of the targeted boreholes will be sampled and by what techniques. We appreciate that a summary has been provided in Table 16 in terms of the number of dates proposed for the Stage 4 palaeoenvironmental analysis, but further details are needed. It would also be good to justify the number of dates recommended at the next phase and whether two OSL dates, for example, is enough considering the issues identified following the initial phase of work.