Historic England

PLANNING ACT 2008 (AS AMENDED) – SECTION 88 AND THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010 (AS AMENDED) - RULE 6

APPLICATION BY ØRSTED LIMITED FOR AN ORDER GRANTING DEVELOPMENT CONSENT FOR THE PROPOSED HORNSEA FOUR OFFSHORE WIND FARM

APPLICATION REF: EN010098

SUBMISSION DATE: 29/03/2022

WRITTEN REPRESENTATION OF THE HISTORIC BUILDINGS AND MONUMENTS COMMISSION FOR ENGLAND (HISTORIC ENGLAND)

Cannon Bridge House, 25 Dowgate Hill London, EC4R 2YA
Telephone: 0370 333 0607
www.HistoricEngland.org.uk

Contents

Summary

i This Written Representation reviews the Development Consent Order application made by Ørsted for the proposed Hornsea Four Offshore Wind Farm. We understand from the application documents that the array area for Hornsea Four is to be located approximately 69km from the coastline of the East Riding of Yorkshire in the Southern North Sea. The submitted application includes the offshore wind turbine generators, electricity export cables to landfall and onshore cabling to an onshore substation for connection with the UK electricity transmission network.

ii The submitted Development Consent Order (DCO) application includes an Environmental Statement produced to satisfy the requirements of Environmental Impact Assessment (EIA) requirements, under the terms of European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU)) on the assessment of the effects of certain public and private projects on the environment (EIA Directive). The EIA Directive is transposed into English law for Nationally Significant Infrastructure Projects (NSIPs) by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

iii We are aware that the Planning Act 2008 requires an EIA to be undertaken and provided in support of a DCO for certain types of projects, such as the proposed Hornsea Four project. However, we are also aware that the Applicant has designed the EIA such that is adopts "a proportionate approach" in reference to PINS Advice Note Six (Preparation and Submission of Application Documents) and the Institute of Environmental Management and Assessment (IEMA) publication *Delivering Proportionate EIA - A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice* (IEMA, 2017). We note how the Applicant has conducted the EIA exercise to address concerns about the UK planning regime and the production of "…overly long and complex documentation and unfocussed assessments." (Volume A1, Chapter 2, paragraph 2.1.2.7).

iv. Furthermore, the Applicant to deliver a "proportional EIA approach" has produced accompanying documentation such as an "Impacts Register" (Volume A4, Annex 5.1) and a "Commitments Register" (Volume A4, Annex 5.2). We are aware that National Policy Statement for Renewable Energy Infrastructure (EN-3), paragraph 2.6.44, explains the consideration of flexibility by the Examination Authority with regards to necessary micro-siting of elements of a proposed wind farm during construction where requested at the application stage. We understand that the intension is that if previously unknown marine archaeology is discovered that wind farm infrastructure can be micro-sited and thereby enable such material(s) to be left undisturbed and in-situ. We are aware from the submitted documentation that there is an absence of complete geophysical survey data coverage and that geoarchaeological assessment was not completed at the time of application.

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 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 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 15/12/2021) we noted that the applicants had provided an Environmental Statement (ES), however we identified that this development has the potential to impact upon the historic environment, and that this impact could 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 submitted DCO.

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 28/02/2022.

2. Comments on Environmental Statement: Volume A1, Chapter 4 – Project Description (PINS Document Ref: A1.4)

2.1 We are aware of the requirements for an EIA exercise to be completed for this proposed development and the attention given to using a 'design envelope', so that the Applicant maintains flexibility to accommodate project adjustment post consent, should permission be obtained. For example, in their choice of foundation designs, transmission system (i.e. High Voltage Alternating Current (HVAC) or High Voltage Direct Current (HVDC)), the positioning of infrastructure and construction methodologies. The Applicant explains that such matters are needed to ensure they can benefit from anticipated changes in available technology and project economics to optimise delivery of Hornsea Four, should their application be successful.

2.4 We also note that development of a Commitments Register (A4.5.2) and that "mitigation by design" is considered a crucial component in the adoption of a Design Envelope approach.

2.5 It is proposed that Hornsea Four array area will be constructed approximately 69 km east of Flamborough Head (at its closest point) and adjacent to Hornsea Two on its eastern boundary. Seabed depths vary from around 30m below Chart Datum (CD) in the south of the Hornsea Four array area to more than 60m below CD in the north, with greatest depths encountered on the north-eastern flank close to the Outer Silver Pit. Sand-waves are present within the Hornsea Four array area, particularly across the north western corner and along the southern margin.

2.6 We are also aware, as explained in Section 4.5.6, that this proposed development could incorporate Energy Balancing Infrastructure (EBI) as a means to support "…the whole energy system…" for importing, storing and exporting energy or converting to other energy sources etc. We note the explanation provided that EBI is required in recognition of rapid changes that are occurring in how the UK produces and uses electricity and that such infrastructure could be located adjacent to either the onshore or offshore substations. However, the text states that final design of the EBI will be agreed in writing with East Riding of Yorkshire Council, which presumably only relates to EBI as might be constructed onshore.

2.7 The proposed array area for Hornsea Four could comprise 180 Wind Turbine Generators (WTGs) connected to an offshore substation(s) via inter-array cables, and then up to six electricity export cables will transfer power from the Hornsea Four offshore substation to a location on the coastline east of Fraisthorpe (East Riding of Yorkshire). We understand that 18 cables could be buried in up to 6 trenches over a distance of 39km to a new Onshore Substation (OnSS), as illustrated in Figure 4.23, adjacent to the Creyke Beck National Grid Energy Transmission 400 kV Substation, located near Cottingham (Humberside).

2.8 In summary, it is understood that the maximum number of offshore structures within the Hornsea Four array area could be 190; comprising 180 WTGs (maximum blade tip height 370m), an Accommodation Platform, 6 Offshore Transformer Substations and 3 offshore HVDC Converter Substations (only required if AC/DC power transformation required for export to shore) or 3 offshore HVAC booster stations to house reactive compensation equipment along the export cable corridor. We are aware that the locations for these facilities will be determined during any detailed design stage as could follow consent.

2.9 Table 4.7 summarises the foundations designs that could be used and that the selection of design(s) and locations will be informed by a ground model using data produced by a geotechnical survey conducted in Q2 2020 and Q1 2021. In summary we understand the designs include:

- Monopile (maximum diameter 15m, embedded to 40m);
- Gravity base structure foundations (maximum diameter 53m, requiring seabed preparation area of 69m and scour protection on 93m);
- Piled jacket (maximum 3 legs of 4.6m diameter, embedded between 70 and 100m);
- Mono suction bucket (maximum diameter 20m, embedded 20m); and
- Suction bucket jacket (maximum number of legs not given, embedded between 20 and 30m).

2.10 Paragraph 4.8.4.10 explains that if Gravity Base Structures (GBSs) are used for WTG that a maximum of 110 structures will be used. However, no detail is provided about the depth of seabed excavation required to install gravity base foundations. Paragraphs 4.8.4.16 – 18 provide summary details about seabed preparation as is likely to be required for GBSs, for example, seabed levelling to remove surface and subsurface debris. However, it is possible that presently buried and unknown archaeological materials could be encountered and therefore approved and supervised (archaeological) excavation may be required to enable access and recovery. We must therefore highlight the importance of adaptive mitigation strategies that can be implemented if necessary, which should be explained fully in an archaeological Written Scheme of Investigation.

2.11 Paragraphs 4.8.4.19 – 22 mention scour protection measures and it is important that the determination of impact and consideration of risk needs to assess how presently unknown archaeological materials might be exposed through scour and therefore whether placement of scour protection materials also represent an impact requiring mitigation.

2.12 It is apparent from the information presented, that no one foundation type can be deployed across the entire Hornsea Four development area and that at least two different foundation types could be used. It also apparent that to install the required cable circuit network, including that within the proposed export cable corridor, will require techniques to bury cables in the seabed inclusive of jetting, vertical injection, cutting and ploughing with an anticipated burial depth of 3m (vis. Table 4.25).

2.13 However, to inform the EIA, Hornsea Four has created an indicative layout containing 180 potential WTG positions and the 10 potential platform positions

(offshore substations and accommodation platform as illustrated in Figure 4.13). Although it is noticed that no indication is given as to how different foundation designs might be deployed across the array area.

3. Comments on Environmental Statement: Volume A1, Chapter 5 – EIA Methodology (PINS Document Ref A1.5)

3.1 We note the statement made by the Applicant that they have "…taken an early and positive step in embracing the concept of proportionality in EIA…" (paragraph 5.2.1.6) with the attention of avoiding or reducing impacts "…by committing to avoid the most sensitive, important or valuable features early in project design and in so doing reducing the scope of the Hornsea Four EIA and the amount of assessment required." (paragraph 5.2.1.7).

3.2 We appreciate that a central focus of an ES is the identification of likely significant effects (in EIA terms, as illustrated in Figure 5.3) of the proposed project and that this approach considers the project in three phases: construction, operation and decommissioning. In consideration of the Applicant's approach to "proportionate EIA" the adoption of mitigation and providing an upfront Commitment Register are crucial components.

3.3 Section 5.3.3 explains the use of an Impact Register and addresses each technical topic under consideration in the EIA process and that it is a "live document" to be updated throughout the EIA exercise. Paragraph 5.3.4.1 is clear that any effects judged to be not significant are excluded from further assessment in the EIA, as set out in the published Scoping Opinion, or otherwise agreed during the pre-application Evidence Plan process. However, it is confirmed that all impacts and effects (including those scoped out) are included in the accompanying Impacts Register.

3.4 The detail provided about "commit, consult, design" (Section 5.4) is helpful including the definitions provided of "primary (inherent) mitigation" and "secondary (foreseeable) mitigation" and that pre-mitigation effects and residual effects are set out for secondary mitigation; with all mitigation commitments recorded in the Commitments Register. We are aware that the Commitments Register details how each commitment will be legally secured i.e. through the DCO, deemed Marine Licence or other documents such as management plans.

3.3 Section 5.10 (Competent Experts) we appreciate that the Infrastructure Planning (EIA) Regulations 2017 requires this information to be provided and we therefore hope that given the stated experience of the parties involved in the production of the ES that all necessary action can be taken to address the criticism of ES's as described in Chapter 2.

4. Comments in relation to Environmental Statement: Volume A2, Chapter 9 – Marine Archaeology (PINS Document Reference: A2.9)

4.1 In general, we are content with the information as presented regarding the proposed development such that the ES establishes baseline conditions for the historic environment, as might be encountered within the intertidal zone at the electricity export cable landfall location and within the offshore cable corridor (e.g. as summarised in paragraph 9.7.1.6).

4.2 Paragraph 9.7.1.12 includes important information about the assessment of geophysical data and the identification of anomalies of potential archaeological interest as summarised in Tables 9.6 and 9.7. We are also aware of the explanation provided in paragraph 9.7.1.1.6 and the determination that the baseline presented gives an accurate estimation based on the survey data and review of desk-based sources of information. However, we anticipate that this baseline will require revision, should consent be obtained, and action is taken to finalise the engineering design of the development. It is therefore possible that anomalies presently identified could be revealed as being of considerable archaeological interest.

4.3 It is also important to differentiate between what might be identifiable "wreck" and whether it should be considered a heritage asset. It is therefore of limited use in an ES to identify five anomalies of "medium potential" and two anomalies of "high potential" if this is primarily based on how much they resemble a wreck site as indicated by available survey imagery. It is therefore inevitable that such readily identifiable sites will be contemporary (i.e. losses of vessels in the 20th century), for example as described in paragraph 9.7.1.13. However, it is possible that multiple sites presently identified as "low potential" which could represent archaeological sites of considerable antiquity that require attention and an appropriate assessment strategy, should consent be obtained.

4.4 Section 9.7.2 (Historic Seascape Characterisation) summarises how the proposed development may alter perceptions of historic seascape character. However, it is not immediately apparent that use has been made of the national database for HSC as was produced from England's Historic Seascapes: Demonstrating the Method. SeaZone Solutions Limited, 2011 [redacted].

4.5 Paragraphs 9.7.2.12 and 9.7.2.13 include statements that Hornsea Four will further alter the perception of the Historic Seascape (Character). Therefore, in reference to the statement made in paragraph 9.7.2.15, it is not immediately apparent how alteration of perception (in the context of guidance that developments should "…respect and retain cultural distinctiveness and legibility wherever possible") can be reconciled with a determination of "no significant change" in paragraph 9.7.2.16. It is our advice that "methodological development" should not be necessary given the existence of the national database for HSC (as referenced above), which we would have expected the Applicant to use in this ES.

4.6 Section 9.7.4 (Data limitations) – Mentions that there could be "…a perceived increased risk to potential maritime archaeological receptors as parts of the seabed within the Order Limits have not been assessed for archaeological potential at the

time of DCO application." We concur that there is potential for presently unknown marine archaeological receptors to be encountered during phases inclusive of pre-construction, construction, operation and maintenance and/or decommissioning, should consent be obtained. We note the statement that these data limitation will be minimised by future and ongoing seabed surveys, as well as by the marine archaeology "commitments". It is therefore important that we clarify the function of an archaeological Written Scheme of Investigation to specify how any post-consent and pre-construction survey work should be conducted to determine if any presently unknown and thus unexpected marine archaeological receptors are located in the proposed development areas. We therefore do not directly concur with the position advocated by the Applicant that there is "no increased risk from Hornsea Four…" we add that the approach adopted by the Applicant in the preparation of this ES is different to other offshore wind farm projects and therefore cannot be easily compared with other offshore wind farm projects.

4.7 Paragraph 9.8.1.2 describes that by adopting a "Proportionate Approach to EIA" the Applicant has "scoped out" particular impacts on the historic environment which is an approach that PINS was prepared to accept on the basis that Historic England will be consulted on the delivery of proposed mitigations strategies as set out within a Commitments Register. It is therefore an important matter for us to understand how these commitments will be formally secured as a component of any consent secured.

4.8 Paragraph 9.8.1.3 claims justification for "scoping out" some potential impacts (as listed in Table 9.8) based on other "…similar projects within the former Hornsea Zone, as well as other offshore wind farms located further afield, where location-specific impacts on marine archaeology have been successfully mitigated through the application of best-practice mitigation…" We must refer this matter to the Examination Authority to determine whether such an approach is justifiable in consideration of the risk that this project could encounter elements of the historic environment of importance which are presently unknown. On this matter we note the statement in paragraph 9.8.1.4 that the Commitments Register is included within the draft DCO as a document to be certified.

4.9 It continues to be our advice that there could be significant impact to presently unknown archaeological materials during the following defined phases:

- Construction (array area and export cable construction activities);
- Construction (Intrusion of piling foundations disturbing or destroying archaeological receptors);
- Construction (Compression of stratigraphic contexts containing archaeological material); and
- Construction (cable laying operations).

We acknowledge how the Applicant has referred to the use of Commitments (as set out in Table 9.9), should result in "negligible impact" on marine archaeology receptors. However, using previous (archaeological) assessments for other wind farms in the Hornsea Zone demonstrates the relevance of setting conditions for detailed post-consent and pre-construction assessment activities given the identification of possible impact and therefore the relevance of adaptive mitigation

to avoid "likely significant effect". We therefore suggest that best practice could be demonstrated by combining:

- embedded mitigation (i.e. avoiding presently known sites); and
- adaptive mitigation (i.e. adjustment to implement an avoidance strategy where possible when sites are discovered).

4.10 We draw your attention to the statement made in paragraph 9.8.1.6 that the use of "…the term "scoped out" relates to the Likely Significant Effect (LSE) in EIA terms and not "scoped out" of the EIA process per se. All impacts "scoped out" of LSE are assessed for magnitude, sensitivity of the receiving receptor and conclude an EIA significance in the Impacts Register" in accordance with how the Applicant has adopted a proportionate approach to this EIA exercise.

4.11 We understand from the documentation submitted by the Applicant that they are seeking to apply commitments which are described as:

- Primary (i.e. inherent design principles to inform installation techniques and engineering designs/modifications);
- Secondary (i.e. to reduce LSE to environmentally acceptable levels following initial assessment); and
- Tertiary (i.e. imposed due to legislative requirements and/or standard industry practices).

4.12 It is appreciated that the overall aim of this approach to mitigation is to eliminate and/or reduce any LSE arising from of different anticipated impacts and that the Maximum Design Scenario (MDS) sets out how the greatest possible impacts associated with different parameters. We note that the detail presented in Table 9.10 as directed at the deployment of 110 Gravity Base Structures (GBS) (WTG-type) foundations, 70 suction caisson jacket (WTG type) foundations plus scour protection and:

- six small Offshore Substations on GBS (Box-type) foundations with scour protection;
- three large OSS on GBS foundations with scour protection;
- One offshore accommodation platform on a GBS;
- three HVAC booster stations on GBS (Box-type) foundations with scour protection in the ECC;
- Remedial burial of intra-array cables;
- Remedial burial of interconnector cables; and
- Remedial burial of electricity export cables.

4.13 Table 9.10 presents the MDS impact on archaeological receptors as related to factors inclusive of:

- Scour, penetration, draw down and compression effects caused by (a) the presence of WTGs, substation foundations and the exposure and replacement of cables or the use of cable protection measures; and
- Penetration and compression effects on seabed caused by corrective and preventative operation and maintenance activities (via jack-up vessels or divers); and

- At decommissioning through the draw-down of sediment into voids left by removed foundations or cables.

It is important to highlight that the this does not include impacts to archaeological receptors as could be attributable to the construction of the proposed development, including clearance and dredging of the seabed as will be required for the deployment of GBSs.

4.14 Section 9.10 (Assessment methodology) we offer a correction that the date of the Evidence Plan Technical Panel meeting was 6th November 2019, Minutes were issued on 13th November. We acknowledge the explanations provided to us about the approach to conducting this EIA exercise and that a Commitments Register is used to set out a schedule of archaeological works within any geophysical and geotechnical survey campaign as could be conducted, if consent is obtained (vis. Commitments No 140, 166 and 167).

4.15 Section 9.11 (Impact Assessment), we are aware that impacts associated with the proposed offshore construction of Hornsea Four have been considered on marine archaeology receptors and that all environmental impacts arising from the construction of this proposed development have been scoped out from further assessment. We are also aware that impacts associated with any offshore operation and maintenance works have been assessed on marine archaeology receptors and that the possible environmental impacts are listed in Table 9.10 reflecting the suggested MDS.

4.16 Paragraph 9.11.2.3 explains that "Impacts on archaeological receptors during the operation and maintenance phase can occur if deposits of archaeological potential are buried close to the seafloor and are directly, or by sedimentary changes, affected by the works." However, we maintain that the crucial matter is determine whether any archaeological receptors exist ahead of construction to inform the design of WTG foundation placement, as could best facilitate avoidance. We acknowledge that paragraph 9.11.2.4 states that archaeological receptors should be avoided through commitments for embedded mitigation. Furthermore, if avoidance is not possible, mitigation will be delivered through application of the methodologies within an agreed Outline Marine WSI. Therefore, the magnitude of impact is assessed as "negligible" and "not significant" and is not considered further.

4.17 Paragraph 9.11.2.9 focusses attention on MDS for impacts on marine archaeology during the operational and maintenance phase and that impacts "…are assumed to be limited". We note that the spatial focus for attention is the immediate area around the foundations or cable repair and reburial areas where contact with the seabed occurs as a result of the usage of Jack Up Vessels (JUVs). We note further that embedded commitments should allow for any archaeological receptors to be avoided. The Applicant concludes that the magnitude of impact is "negligible" and "not significant" and is not considered further.

4.18 Section 9.11.3 (Decommissioning) we are aware that for anticipated impacts on marine archaeology during any decommissioning phase it is assumed such impacts will be (spatially) limited to the immediate area of any foundations and cables to be

removed. Impact is considered inclusive of anchoring and JUVs. We note further that embedded commitments should allow for any archaeological receptors to be avoided. The Applicant concludes that the magnitude of impact is "negligible" and "not significant" and is not considered further.

4.19 Section 9.12 (Cumulative Effect Assessment) in paragraph 9.12.1.5 sets out that for the majority of potential effects for marine archaeology, planned projects were screened into the assessment case-by-case to represent the marine archaeology resources as might be encountered within the southern North Sea. However, we noted in Table 9.15 that the reason for inclusion was "cumulative effects on sediment movement and disturbance" for all the projects identified (mostly related to cables). It is our advice that this this assessment could also have considered offshore wind farm array areas constructed or otherwise planned for the southern North Sea and that consideration of marine archaeology resources could have given attention to how such development might compromise scientific activities to explore and map the complexity of prehistoric landscapes as known to exist within and under the contemporary seabed. We note that paragraph 9.12.1.8 does mention "palaeoenvironmental information" as could be affected by changes in sedimentary conditions attributable to seabed development.

4.20 Table 9.16 focusses on cumulative impact associated with sediment changes which could cause erosion or deposition and thereby destabilising archaeological sites and contexts, as relevant to defined phases of construction and operation of this proposed development. We noted the reference made to the Viking Link interconnector project (paragraph 9.12.1.12) and we add that a statutory EIA was not required to support a Marine Licence application for the installation of this submarine electricity cable within the UK EEZ. However, an informal EIA exercise was completed, which concluded that the significance of residual effect on currently unknown archaeological sites and artefacts was moderate and that best practice/project specific mitigation was applicable.

4.21 In paragraph 9.12.1.20 we note the determination that any impact during both construction and operations could be on the receptor directly, but that based on a "…commitment to avoid archaeological receptors, the magnitude of impact is considered to be indistinguishable to natural variation meaning negligible." Furthermore, the statement made in paragraph 9.12.1.25 requires further attention in reference to "…the low number of additional structures planned and the substantial commitments (Table 9.9) in place to mitigate effect on marine archaeological receptors…" For example, if the number of structures considered should also include WTG array areas in the southern North Sea.

4.22 Section 9.14 (Inter-Related Effects), Table 9.17 does not consider impacts associated with construction when the majority of seabed disturbance including scour, penetration, draw down and compression will occur.

4.23 Section 9.15 (Conclusion and summary), the statement made in paragraph 9.15.1.6 regarding the anticipated magnitude of impacts on marine archaeology as negligible and therefore that the impacts are not significant is not applicable to the construction

phase given that this phase was not assessed due to it being scoped out, as demonstrated by the detail included in Table 9.18.

4.24 Although no crashed aircraft sites have been identified at this stage there was no acknowledgment that should the remains of military aircraft be found that all such sites are automatically afforded designated status as 'protected places' under the Protection of Military Remains Act 1986.

4.25 No detail appears to be provided about how cable laying operations will be conducted at any coastal landfall location. No strategic approach was presented to assess the heritage interest of any heritage assets that this project might encounter prior to or during construction. We consider this a relevant matter given the attention in Table 9.12 to how major, moderate or low beneficial "impacts" could be identified. For example, information as could be derived from archaeological technical reports produced out of the assessment exercises conducted for this proposed project, as necessary to inform any construction programme, should consent be obtained.

5. Comments on Environmental Statement: Volume A4, Annex 5.1: Impacts Register

5.1 For MA-C-1, MA-C-2, MA-C-3, MA-C-6 (All Offshore) Project Phase: Construction The text statement that "The implementation of Commitments will result in a negligible impact on marine archaeology receptors. Previous assessments for Hornsea Project One, Hornsea Project Two and Hornsea Three have shown that this will have no likely significant effect with application of best-practice mitigation." It is therefore our advice that for this statement to be realised the means of best-practice mitigation should be included as conditions within any Development Consent Order as might be awarded for this proposed development.

6. Environmental Statement: Volume A4, Annex 5.2: Commitments Register

6.1 We understand the following from the information presented and that this Annex sets out the following:

- Primary – Commitment 46 "All intrusive construction activities will be routed and microsited to avoid any identified archaeological receptors pre-construction." Commitment Stage: Route Planning and Site Selection (RPSS). Secured through DCO Schedule 11, Part 2 - Condition 13(2) & 13(3) and DCO Schedule 12, Part 2 - Condition 13(2) & 13(3)(Marine Written Scheme of Archaeological) and is applicable "Pre-commencement of the relevant stage of licensed activities".

- Primary – Commitment 201 "Gravity Base Structure (GBS) foundations will be utilised at a maximum of 110 foundation locations. The location of GBS foundations will be confirmed through a construction method statement which will include details of foundation installation methodology." Secured through DCO Schedule 11, Part 2 - Condition 13(1(c) (Construction Method Statement)"

Commitment Stage: DCO. Secured through DCO Schedule 11, Part 2 - Condition 13(1)(c) (Construction Method Statement) and is applicable "Pre-commencement of the relevant stage of the licensed activities".

- Secondary – Commitment 166 "An offshore geophysical survey (including an Unexploded Ordnance (UXO) survey) will be undertaken prior to construction" Commitment Stage: Preliminary Environmental Information Report (PEIR). Secured through DCO Schedule 11, Part 2 - Condition 13(2) & 13(3) and; DCO Schedule 12, Part 2 - Condition 13(2) & 13(3)(Marine Written Scheme of Archaeological Investigation) and is applicable "Pre-commencement of the relevant stage of licensed activities".

- Secondary – Commitment 167 "An offshore geotechnical survey will be undertaken prior to construction" Commitment Stage, how secured and when applicable as for Commitment 166.

- Tertiary – Commitment 140 "Marine Written Scheme of Archaeological Investigation (WSI) will be developed in accordance with the Outline Marine WSI".

- Tertiary – Commitment 181 "An Offshore Decommissioning Plan will be developed"
  Commitment Stage: RPSS. Secured through DCO Schedule 11, Part 2 - Condition 13(2) & 13(3) and DCO Schedule 12, Part 2 - Condition 13(2) & 13(3)(Marine Written Scheme of Archaeological and is applicable "Pre-commencement of the relevant stage of licensed activities".

7. Environmental Statement: Volume A5, Annex 9.1: Marine Archaeology Technical Report

7.1 Section 2.4 (Geotechnical Data Assessment Methodology) explains that archaeological assessment of geotechnical data was not complete at the time of application and that method statements will be supplied to Historic England as per Commitments 140 and 167.

7.2 Paragraph 2.5.1.2 confirms that commitments are offered as part of any pre-application phase to avoid and reduce the potential for impacts to marine archaeological receptors (also set out in Table 2) although this does not include Primary Commitment No 201 (vis. GBSs).

7.3 Section 3.1 (Environmental context) provides a useful description of the proposed development area including desk-based sources of information that mention known and possibly identified remains of ships or boats with the potential acknowledged for more to be discovered. For example, 15 records are mentioned which are classed fishermen's fasteners which could be indicative of wreckage or other submerged feature which could be of possible archaeological interest.

7.4 Paragraph 3.4.1.5 mentions the *Adventure* which the text indicates was lost in 1882 but was not considered of archaeological significance due to it being modern or due to the absence of other information. We do not agree with this conclusion.

7.5 We note the detail provided about known wreck sites (i.e. "live" or "dead" UKHO records), such as *Brabant* (sunk by enemy mine November 1917) considered to be of "medium archaeological significance"; and *Nitedal* (Sunk by German U-boat in October 1917) which could "hold good potential for adding to the archaeological record".

7.6 Section 4 (Geophysical assessments) we note the statement that there are limitations with the baseline data and their ability to inform the EIA exercise due to the lack of "…full coverage geophysical survey data and the ongoing geoarchaeological programme prior to DCO Application". However, we note that due to the "proportional approach to impact assessment" conducted that the Applicant will ensure "…future commitments to mitigate the impact of the development on known and unknown archaeological receptors" as set out within the Commitments Register (Annex 5.2) and enacted through conditions contained within the DCO and associated deemed Marine Licences (dMLs). We therefore understand that possible impacts to known and identified archaeological receptors could be mitigated by utilising embedded mitigation methodology.

7.7 Section 4.1.4 (Medium Potential Anomalies within the Order Limits) and section 4.1.6 (High Potential Anomalies within the Order Limits) are of interest as are anomalies of potential interest outwith the proposed Order Limits. We also note the detail of section 4.2 (Archaeological Assessment of Magnetometer Data). All these anomalies, as they may spatially relate to the proposed development and MDS, require attention as part of any post consent assessment to reduce risk of impact to features which could be revealed to be of archaeological interest.

7.8 Section 4.3 (Palaeogeographic Assessment of Geophysical Data) we are aware that the information presented here is a summary based on a ground model and geotechnical investigations conducted todate together with other Hornsea project areas and previous geotechnical work. We therefore appreciate the statement (paragraph 4.3.1.4) that "Ongoing and geotechnical and future survey campaigns will target all formations identified within the Order Limits and geoarchaeological assessment which will follow will provide further insights into the palaeoenvironmental and archaeological potential of Hornsea Four."

7.9 Section 5.2 (Mitigation for Known Wrecks and Obstructions) we concur that "precautionary" Archaeological Exclusion Zones (AEZs) of 50m should be applied to the 23 known "heritage" receptors (comprising 18 wrecks, 5 foul and identified seabed obstructions).

7.10 Section 5.4 (Mitigation for Geophysical Anomalies of Archaeological Potential) we concur that any works prior to construction, during operation and at decommissioning that take place at any of the locations identified in Table 19 should be follow investigation methodologies as informed by an Outline Marine Written Scheme of Investigation. Furthermore, anomalies assigned high (2) and medium (5)

archaeological potential, which could be of archaeological interest, are assigned AEZs. We also concur with the mitigation measures summarised in Sections 5.4 (Mitigation for Deposits of Palaeographic Potential) and 5.5 (Mitigation for Unexpected Archaeological Discoveries).

8. Additional Application Information: F2.4 Outline Marine Written Scheme of Investigation (PINS Document Reference: F2.4)

8.1 In paragraph 7.1.1.2 we recommend that the following Historic England guidance is referenced: 'Deposit Modelling' (https://historicengland.org.uk/images-books/publications/deposit-modelling-and-archaeology/), 'Environmental Archaeology' ([redacted] and 'Waterlogged Organic Artefacts' ([redacted]

8.2 In paragraph 7.4.1.4 it is our advice that scientific dating should also be added to the list of considerations to be addressed by individual Method Statements.

8.3 In section 7.10 (Human Remains) should reference all the relevant guidance, including the Historic England 'The Role of the Human Osteologist in an Archaeological Fieldwork Project' guidance ([redacted]

9. Additional Application Information F2.10 Outline Written Scheme of Investigation for Onshore Archaeology. PINS Document reference: F2.10

9.1 Paragraph 7.2.1.5 infers that scientific dating will only form part of the post-excavation analysis stage. However, scientific dating must form an integral part of the post-excavation assessment stage to determine evidential and interpretative value, design a fit-for-purpose scientific dating programme, refine research questions, etc., for the post-excavation analysis stage of the project.

9.2 Paragraph 7.7.1.5: Regarding the reporting of archaeological discoveries, in addition to the ORPAD Implementation Service, etc., provision should be made to notify the Humber Archaeological Partnership (archaeological advisors to the local authority) of any significant discoveries as a matter of course.

9.3 Paragraph 7.7.1.9: As above with regard to reporting archaeological discoveries.

9.4 Paragraph 10.7.1.9 should state that samples will be processed and sorted for the post-excavation assessment (as per the Historic England 'Environmental Archaeology' guidance).

9.5 Paragraph 10.8.1.2 states "The soil sampling strategy for each SPE and SMS area will be informed by the results of the evaluation works…" However, how will the sampling strategy for any outstanding evaluation works be designed?

9.6 Paragraph 10.8.1.3 states that flotation samples "…will typically be up to 40 litres in size." Forty litres is actually the minimum; the Historic England 'Environmental Archaeology' guidance stipulates that flotation samples should be between 40 and 60 litres in volume.

9.7 Paragraph 10.8.1.5 should also mention coarse-sieved samples in addition to the other sample-types listed.

9.8 Section 10.9 should reference all the relevant guidance, including the Historic England 'The Role of the Human Osteologist in an Archaeological Fieldwork Project' guidance ([redacted]

10. draft Development Consent Order

10.1 Schedules 11 (Generation Assets) and 12 (Transmission Assets), Part 2 - "Pre-construction plans and documentation" Condition 13(1)(c) Construction Method Statement should also encompass referral to information derived from post-consent and pre-construction archaeological evaluation to inform delivery plans to avoid in-situ archaeological sites as could be revealed through assessments conducted and completed post-consent and pre-construction.

10.2 Schedule 11 and 12, Part 2; Deemed Licences under the 2009 Act – Generation Assets and Transmission Assets. Part 1 (Interpretation): Conditions 13(2) & 13(3) we concur with the measures set out that condition the delivery of archaeological mitigation measures, inclusive of a Marine Written Scheme of Archaeological, to address matters for project delivery post-consent and pre-construction.

10.3 Schedule 15 (Documents to be certified) includes the Commitments Register, which is defined in the DCO Part 1 (Preliminary). However, we cannot identify any other provisions within the draft DCO (and draft Deemed Marine Licences) which condition delivery of the Commitments Register.