



Historic England

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

**APPLICATION BY EQUINOR LIMITED FOR AN ORDER GRANTING
DEVELOPMENT CONSENT FOR THE PROPOSED SHERINGHAM AND DUDGEON
OFFSHORE WIND FARM EXTENSION PROJECTS**

APPLICATION REF: EN010109

SUBMISSION DEADLINE: 20/02/2023

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

REGISTRATION ID No: 20033332

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Summary

- i. We broadly accept the assessment of the known historic environment as might be encountered by the proposed project, in consideration of how it is presently described and the identification of a “worst-case” construction scenario for the historic environment.
- ii. We note the assessment of geophysical data acquisition completed to inform production of the Environmental Statement and where further survey data will be necessary should consent be obtained.
- iii. The ES includes an assessment of the impacts of the proposal upon the historic environment both offshore and on shore. We have provided comments on the main heritage chapters below (see Chapters 5 and 6)
- iv. The application includes both an Outline Written Scheme of Investigation (WSI) for the on and offshore areas. These are designed as a mitigation action to inform further archaeological assessment. Should consent be obtained this will need to include geophysical data, further assessment and intrusive archaeological excavation. We concur that such mitigation would need to be inclusive of geoarchaeological assessment of geotechnical data; refinement of the design of both off and onshore infrastructure post-consent to avoid known archaeological sites or anomalies of possible archaeological interest.
- v. The draft Development Consent Order includes four (draft) Deemed Marine Licences which include conditions for WSIs and acknowledges that implantation of the WSI is crucial in any post-consent and pre-construction phase to adequately inform the planning and engineering design and delivery of the proposed project(s).

1. Introduction

- 1.1 This Written Representation reviews the Development Consent Order (DCO) application made by Equinor New Energy for the proposed Sheringham Shoal and Dudgeon Offshore Wind Farms Extension. We understand from the application documents that the array area for Sheringham Extension Project (SEP) and Dudgeon Extension Project (DEP) will be for each project to have a maximum electricity export capacity greater than 100MW, respectively, from SEP which will be 15.8km and DEP which will be 26.5km from northern East Anglian coastline. The electricity export cables from both projects are to reach landfall at Weybourne (north Norfolk). The onshore transmission cables are to run 60km to a new high voltage alternating current (HVAC) substation near to the existing Norwich Main substation.
- 1.2 The submitted application includes an Environmental Statement (ES), dated August 2022, produced to satisfy the requirements of Environmental Impact Assessment (EIA) requirements, under the terms of European Union 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.
- 1.3 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 by the SEP and DEP project. We are also aware that although SEP and DEP have different commercial ownerships, they are each NSIPs and that in this instance one application is being made for development consent together with associated transmission infrastructure.
- 1.4 We understand that the operational Sheringham Shoal and Dudgeon Offshore Wind Farms are owned by different partners and that Equinor New Energy (ENE) Ltd is the only partner with ownership in both developments. Furthermore, that ENE Ltd is the Applicant here on behalf of partners in Sheringham Shoal and Dudgeon for the extension of these two wind farms. The explanation is noted that while the preferred development scenario option is for SEP and DEP to have an integrated transmission system, which serves both project that are also constructed concurrently. However, given that each has different commercial ownership, we acknowledge that alternative development scenarios are possible. Furthermore, that the DCO application will seek consent for a range of scenarios, but in the same overall corridors to allow for separate development programmes.
- 1.5 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. We have a duty to promote public understanding and enjoyment.

- 1.6 HBMCE are an executive Non-Departmental Public body sponsored by the Department for Culture, Media and Sport (DCMS) and we answer to Parliament through the Secretary of State. Our remit in conservation matters intersects with the policy responsibilities of a number of other government departments particularly those with responsibilities for land use planning matters.
- 1.7 The National Heritage Act (2002) also gave HBMCE responsibility for maritime archaeology in the English area of the UK Territorial Sea (i.e. English Inshore Marine Planning Area).
- 1.8 In our Section 56 Relevant Representation (dated 14th November 2022) we noted that this development has the potential to impact upon the historic environment (onshore and offshore), and that this impact could be significant in relation to a number of heritage receptors and in relation to EIA policy.
- 1.9 The Examining Authority's First Written Questions as issued by the Planning Inspectorate on 27th February 2023 will be addressed separately.

2. **Environmental Statement: Volume 1, Chapter 4 – Project Description (Document Reference: 6.1.4) PINs Reference: APP-090**
- 2.1 We are aware that there are several development options under consideration (Table 4.2), we also note the intention to apply a design envelope (i.e. “Rochdale Envelope” approach), so that the Applicant maintains flexibility to accommodate project adjustment post consent, should permission be obtained. For example, to develop all of the proposed DEP North and DEP South array areas, or only to use the DEP North array area. The offshore Order Limits also includes the offshore cable corridors that either connect the wind farm sites together (interlink cable corridors) or connect the wind farm sites to the landfall (export cable corridors).
- 2.2 We note that the proposed order limit includes the existing Dudgeon Offshore Wind Farm and that an amendment is being sort of the Electricity Act 1989 Section 36 Consent in consideration that it was not constructed to its full consented capacity. Seabed depths vary from around from 14m below Lowest Astronomical Tide (LAT) in the northwest of the SEP wind farm site to 36m in the northwest of the DEP North array area. Sand waves are present particularly in the northwest of the DEP North and DEP South array areas and within the interlink cable corridors.
- 2.3 In summary, SEP will consist of between 13 and 23 Wind Turbine Generators (WTGs), each having a rated electrical capacity of between 15MW and 26MW. DEP will consist of between 17 and 30 wind turbines, each having a rated electrical capacity of between 15MW and 26MW. Therefore together, there could be between 30 and 53 WTGs with a blade tip height above HAT of between 265 and 330m. Regarding transmission assets, we are aware that this project could be:
- connected to one another via interlink cables, with either a single Offshore Substation Platform (OSP) in the SEP serving both SEP and DEP; or
 - one OSP in the SEP wind farm site and a second in the DEP North array area with an offshore export cable corridor for both SEP and DEP to the landfall at Weybourne with two cable ducts (one per Project) installed under the cliff by Horizontal Directional Drilling (HDD).
- 2.4 The chapter does not provide specific details about the number of cables (other than it will be HVAC) which could be buried, or the number of trenches required, or estimate of the actual distance to a new Onshore Substation (OnSS) which will be required adjacent to the extant Norwich Main substation.
- 2.5 The detail in sub-section 4.4.1.1 is helpful in the description provided of a “worst-case basis” vis. maximum spatial footprint which would be deployment of Gravity Base Structure (GBS) foundations, for example up to 19 x 18MW wind turbines at SEP and 24 x 18MW wind turbines at DEP (plus maximum scour protection). However, Table 4.6 (Maximum temporary construction footprints in the Wind Farm Sites and Offshore Cable Corridors) only provided for “Sea bed preparation – wind turbines” an overall spatial footprint. In sub-section 4.4.3.3 we noted that GBS

seabed penetration could be 0.1m to 5m which presents significant risk of encountering presently unknown and buried archaeological materials.

- 2.6 Section 4.4.3 sets out the proposed foundations designs that could be deployed although no information appears to be included about how selection of foundation will be informed by ground models using data produced by a geotechnical survey. In summary we understand the designs include:
- Gravity Base Structure foundations;
 - Jacket with piles;
 - Suction bucket; and
 - Monopile

In consideration that elements of the scheme will include piled foundations. We recommend that the Historic England document *Piling and Archaeology* (2019) is referred to: [REDACTED]. It should be noted that the use of scour protection can actually lead to the erosion (secondary scour) in adjacent areas. This could inadvertently reveal buried archaeological remains or deposits (Sub section 4.4.3.2.4).

- 2.7 In Table 4.13 (GBS Foundation Parameters) it states that “Maximum penetration below mud line” could be 6m. In consideration of the explanation provided in sub-section 4.4.3.3.2 (Sea Bed Preparation), and the description provided of dredging to a depth of 5m over a “Maximum sea bed diameter (base plate)” of 60m, it will be essential for the Applicant to demonstrate viable mitigation strategies which facilitate prior seabed investigation (shallow seismic) to allow for avoidance of identified archaeological sites or full programmes of archaeological excavation for any such sites that cannot be avoided.
- 2.8 We must therefore highlight the importance of adaptive mitigation strategies that can be implemented if necessary and explained fully in an archaeological Written Scheme of Investigation. It would also be appreciated if the Applicant could explain if a mix of foundation types might be utilised and what maximum number of GBSs might be required for SEP and DEP.
- 2.9 For each foundation design, scour protection is estimated 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 changes in seabed sedimentary dynamics scour and therefore whether placement of scour protection materials also represent an impact requiring mitigation.
- 2.10 Section 4.4.7.1 (Offshore Export Cables) states that there will be “...up to two HVAC offshore export cables...” with descriptions provided of the different development scenarios and number of OSPs. The Applicant will also need to provide figures for the anticipated “Export cable installation” required depth of burial. Although, we did note that HDD will be used to install the cables under the intertidal zone, although depth of HDD was not specified. In paragraph 145, an important statement is made about providing “...greater flexibility in the detailed

routeing/micro-siting of the export cable/s at the pre-construction stage”. Such an approach must be conducted in consideration of both the known historic environment and presently unknown historic environment, as might be discovered through the SEP and DEP projects.

- 2.11 For Sub section 4.4.7.4 (Cable Installation Method), we understand that attention given to boulder clearance, but we are aware that further clearance will be required to bury cables in the seabed inclusive of jetting, vertical injection, cutting and ploughing. In particular, we noted the use of Pre-Lay Grapnel Run (sub-section 4.4.7.4.2) to remove “sea bed debris” such as anchors (as illustrated in Plate 4-9).
- 2.12 We must draw the attention of the Applicant to professional archaeological examination of any and all survey data (e.g. visual and geophysical) to determine if items, such as an anchor, can be identified as contemporary or historic. On this matter we draw the attention of the Applicant to the historic anchor discovery made by the East Anglia ONE Offshore Wind Farm development¹.
- 2.13 Section 4.4.8 (Offshore Temporary Works Area) states the provision to be made for micro-siting around sensitive features which must be considered as inclusive of cultural heritage. Furthermore, that in paragraph 205, any post consent survey coverage of the offshore temporary works area should be designed to demonstrate no construction impact within any agreed Archaeological Exclusion Zones (AEZs). We have previously provided comment on required approach to archaeological mitigation through the SEP and DEP Offshore Temporary Works Order Limits Environmental Report consultation (as dated April 2022).

¹ [REDACTED]

**3. Environmental Statement: Volume 1, Chapter 5 – EIA Methodology
(Document Reference: 6.1.5) PINs Reference: APP-091**

- 3.1 We appreciate that SEP and DEP are the subject of a single DCO application with a combined EIA process and associated submissions, and that each project is assessed individually, so that mitigation is project specific. It is also acknowledged that the assessments cover scenarios whereby SEP or DEP are developed in isolation, as well as both SEP and DEP being developed, either concurrently or sequentially.
- 3.2 Section 5.5 (Project Design Envelop) while we appreciate the intended output is an EIA based on clearly defined environmental parameters and the likely environmental impacts that could result, it is important that any such approach takes account of both the known heritage assets and risk of encountering presently unknown heritage assets.
- 3.3 Section 5.6 (Characterisation of the Existing Environment) includes an important statement about the work necessary to characterise the existing environment to produce a “robust baseline to inform understanding of the existing environmental conditions...” It is also relevant to note acknowledgment, by the Applicant, about:
- further data requirements;
 - to ensure data gathered are targeted and directed at answering the key question; and
 - filling key data gaps.
- 3.4 We appreciate that information gathered should ensure that the development location can be characterised sufficiently to make appropriate EIA judgements, as described in Section 5.7. We also appreciate that a central focus of an ES is the identification of likely significant effects (in EIA terms) of the proposed project and that this approach considers the project in three phases: construction, operation and decommissioning and that Section 5.7.8 (Mitigation) defines two types of mitigation: embedded and additional.

- 4. Environmental Statement: Volume 1, Chapter 6 - Marine Geology, Oceanography and Physical Processes (Document Reference: 6.1.6) PINs Reference: APP-092**
- 4.1 We appreciate that the detail of this chapter should be read in conjunction with other relevant chapters, inclusive of Chapter 14 (Offshore Archaeology). We understand that survey data acquired by this project comprises geophysical surveys (multibeam echosounder, side-scan sonar and shallow seismic) conducted across the proposed wind farm extension areas and associated export cable corridors (excluding offshore temporary works areas) between September 2019 and August 2020. From these data a baseline environment characterisation was produced.
- 4.2 Table 6-2 (Summary of Realistic Worst-case Scenarios) does highlight in 'construction' phase impacts attributable to seabed preparation for up to 24 conical GBS foundations for 18MW WTGs e.g. "Impact 2a". It is therefore relevant that impact to sedimentary sequences of possible palaeo-environmental interest require assessment through geo-archaeological interpretation of those survey data acquired and described within Sub section 6.4.2.1 and Table 6-5.
- 4.3 We are aware from the detail provided in Chapter 14, that geotechnical survey was conducted in 2021 within the electricity export cable corridor and we will offer further comment in Section 5 of this Written Representation regarding any corroboration offered with the geophysical data (i.e. shallow seismic) already obtained. We consider this to be a relevant matter, previously something we raised at raised at the PEIR consultation, in consideration of the potential to encounter prehistoric sedimentary sequences and landscape elements of archaeological interest. We therefore offer an additional reference to be included ins the assessment because it demonstrates the palaeo-envionmental importance of the Greater Wash area:

Brown A., Russel J., Scaife R., Tizzard L., Whittaker J. and Wyles S. (2018) Lateglacial/early Holocene palaeoenvironments in the southern NorthSea Basin: new data from the Dudgeon offshore wind farm. *Journal of Quaternary Science* **33**(6); pp.597–610

5. Environmental Statement: Volume 1, Chapter 14 – Offshore Archaeology and Cultural Heritage (Document Reference: 6.1.14), PINs Reference: APP-100

- 5.1 In the consultation summary presented in Table 14-2, we note the acknowledgement by the Applicant that "...there are gaps in the most recent survey coverage...", but through using other historic datasets the Applicant has determined that an "...accurate characterisation of the archaeological potential of the study area..." is possible for the purposes of EIA.
- 5.2 We acknowledge that the study area for Offshore Archaeology and Cultural Heritage is defined for SEP and DEP and the offshore cable corridors (interlink and export cables), including the intertidal zone at the landfall up to MHWS. We also note that the study area has been expanded to incorporate assessment of the Offshore Temporary Works Area as part of the ES.
- 5.3 The detail provided in Table 14-2 (Realistic Worst Case Scenarios) provides an important point of consideration in terms of both a maximum area of disturbed sea bed sediments and associated risk for archaeological material to be present either on the seafloor or buried, but in addition to area it is relevant to consider impact in reference to spatial distribution of "worst case" design options i.e. GBSs and where placement and depth of placement might cause greatest impact to archaeological materials and palaeo-environmental sedimentary sequences.
- 5.4 The detail in Table 14-2 about "Sea bed preparation" i.e. sand wave clearance also requires attention from an archaeological perspective as we are aware from Chapter 6 (6.5.1 Bathymetry and Bedforms) that sand waves are prevalent across SEP and DEP, particularly in the northwest of DEP North array area and northwest of DEP South array area; including sand waves, with crests reaching heights of approximately 2-4m.
- 5.5 Sand waves are also identified in the interlink cable corridors, and at the north western end of the DEP South array area to DEP North array area interlink cable corridor reaching heights of up to 3m. An assessment of risk is therefore required to determine the likelihood of encountering presently unknown archaeological sites as may occur in sand waves as may require clearance.
- 5.6 Section 14.3.3 (Summary of Mitigation Embedded in the Design and Additional Mitigation), in general we concur with the "additional mitigation" measures that are proposed. However, mention of "Geoarchaeological assessment" requires clarification to understand whether this is completion of an agreed programme of analysis (utilising geotechnical material obtained in 2021) or if it will utilise geotechnical material obtained post-consent, should permission be obtained. It is not entirely clear if any more geotechnical survey (i.e. bore holes or vibro-cores) will be conducted.
- 5.7 The requirement for such data would seem essential given the design envelope approach adopted for this EIA exercise (as explained in Chapter 5) and

identification of worst-case impact scenarios for each way SEP and/or DEP could be delivered (Chapter 4).

- 5.8 Section 14.4.2 (Data and Information Sources) includes important information about the assessment of geophysical data for quality, as summarised in Table 14-6 (Summary of Acquired Geophysical Data) in that these data were considered suitable for archaeological purposes although it is acknowledged that some parts of the study areas were not covered by the surveys conducted in 2019 and 2020. Regarding data quality, it is noted that the majority of data are classed as “good”, but that the Side Scan Sonar (SSS) data was classed as being of “variable” quality, which may impact the ability to identify smaller objects and therefore there is the potential for remains to be present that have not been identified or resolved through the geophysical survey campaign (as highlighted in paragraph 49).
- 5.9 Regarding the Offshore Temporary Works Area, we note the statement that an additional archaeological assessment has not been carried out by any specialist sub-contractor. All information presented for the updated order limits are desk-based only. Paragraph 55 requires close attention regarding the combination of some specifically acquired geophysical data and access to historic data sets generated to inform the Sheringham Shoal and Dudgeon Offshore Wind Farm projects (reports dated between 2009 and 2014).
- 5.10 We note the conclusion that sufficient characterisation was thought possible for EIA purposes and acknowledgement of the greater risk of encountering presently unknown archaeological sites where there is no existing survey coverage. However, we must add that in areas where historic survey data sets have been used there is also the risk that previously unknown sites are now exposed due to dynamic seabed conditions. We must also draw your attention to the “...commitment to ensuring full coverage of construction areas post-consent is set out in the Outline WSI Offshore”.
- 5.11 It is important that any Outline WSI Offshore represents an agreed methodological approach to utilise survey data to maximise archaeological interpretation. A separate Condition in the draft DCO (and Deemed Marine Licences) would therefore be necessary to ensure surveys are conducted to produce full coverage (i.e. spatial extent as relevant to the order limits); this would provide the commitment to ensure full coverage of construction areas using high-resolution marine geophysical approaches post-consent, as set out in the Outline WSI (Section 14.4.2, paragraph 55; Sub-section 14.4.3.1, paragraph 65).
- 5.12 Table 14-8 (Criteria for Determining Heritage Importance) includes under “Medium” “Assets that contribute to regional research objectives” and it is therefore relevant to highlight the applicability of the North Sea Prehistory Research and Management Framework as soon to be republished online and which will join other maritime related research frameworks².

- 5.13 The identification of outcome objectives to be delivered in line with an Outline WSI in the crucial post-consent and pre-construction period is therefore essential. The consent obligation placed on the Applicant to deliver accordingly are key to enable the positive aspects and societal benefits identified in paragraphs 84 and 85 to be delivered. It is also appreciated how sub-section 14.4.3.4 (Significance of Effect) highlights an important difference in Chapter 14, such that the significance of effect is a function of the sensitivity of the receptor.
- 5.14 Sections 14.4.4 and 14.5.4 (Historic Seascape Characterisation) summarises how the proposed development may alter perceptions of historic seascape character. We also respond to the statement made in paragraph 92 that HSC is not a means of assigning "...a level of importance..." nor a "...measure of magnitude..." which accords with how HSC does not attempt to attribute sensitivity to perceptions of historic character. We therefore note the approach taken, as summarised in Table 14-26 (Capacity of Perceptions of Character to Accommodate Change During Construction).
- 5.15 We appreciate the attention in Section 14.5.1 (Seabed Prehistory), paragraph 106 and the identification of palaeo-geographic features from geophysical data (see also Table 14-14) as described in paragraphs 116 to 128 with locations identified as being of high archaeological potential. This therefore reinforces the importance of archaeological advice to inform the spatial distribution of infrastructure associated with SEP and DEP.
- 5.16 Regarding the geo-archaeological analysis of geotechnical logs, we note that the initial assessment is presented in Appendix 14.3. Furthermore, that core sections and further samples will be subject to further geoarchaeological assessment, as set out in the Outline WSI. Previous geophysical surveys and geotechnical investigations have identified several channel features thought to have formed during periods of low sea level when the area would have been exposed. We are pleased to see that the associated sediments, such as peat have been deemed to be of high archaeological significance (Sub section 14.5.1.1).
- 5.17 Previous palaeoenvironmental assessment of boreholes recovered from Botney Cut feature channel ID 7026 identified remains dating to a period of significant climate change immediately prior to the onset of the Holocene and it is thought that similar age channels may be present across the Study Areas. We agree that if present, the sediments associated with these features would be of high archaeological potential (Sub-section 14.5.1.1, paragraphs 117-118; 14.5.1.3, paragraph 133). Table 14-15 summarises the importance of different asset types. We agree that the majority of the asset types are of high importance.
- 5.18 Section 14.5.2 (Maritime and Aviation Archaeology) includes the identification of anomalies of potential archaeological interest, as summarised in Tables 14-16 and 14-17. We are also aware of the explanation provided that the baseline presented provides 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 other anomalies presently identified could be revealed as being of considerable archaeological interest.

- 5.19 Paragraphs 151 and 152 make an important point about the 512 anomalies classified as “A2” (“uncertain origin of possible archaeological interest”). The involvement of professional, accredited and experienced maritime archaeological advice in the post-consent/pre-construction phases is therefore essential to adequately inform any subsequent analysis (should consent be obtained). We are aware that archaeological analysis of geophysical survey data has not been undertaken within the spatially defined possible offshore temporary works. We appreciate the desk-based review presented in Table 14-20 and the identification of 21 additional wrecks (“A1”) and obstructions and 221 “A2” anomalies (where survey data is available).
- 5.20 It is therefore essential that archaeological interpretation of new survey data to be commissioned is bound into any consent as might be forthcoming for this proposed development. The Outline WSI would provide the methodological approach to subsequent archaeological analysis, as mentioned in paragraph 156. Paragraphs 157-161 highlight the potential of encountering previously unidentified wrecks (vessel or aircraft).
- 5.21 The Applicant must also be aware of the automatic application of the Protection of Military Remains Act 1986 for all military aircraft crash sites (see paragraphs 165-166). We are pleased to see that the potential for previously unknown remains and unidentified wrecks to be present dating from the Mesolithic period onwards is acknowledged, as well as the issues affecting visibility and therefore identification (Sub-section 14.5.2.1, paragraph 157).
- 5.22 Sub-section 14.5.2.2 (Cultural Significance of Identified Assets) we concur that the archaeological interest (or otherwise) of “A1” and “A2” sites and anomalies will be further examined post-consent (should permission be obtained). We also note the acknowledgment of how wrecks may occur within a ‘setting’ of relevance to their historical and archaeological interest (paragraph 174).
- 5.23 We are minded to concur with the potential impacts as set out in Section 14.6 and Table 14-27 as relevant to construction and avoidance measures (Recommended AEZs Within the Study Area). We are pleased to see that the archaeological potential of the intertidal zone was classed as being high, and that the significance of the sequence of organic sands, peats and muds that outcrop on the Weybourne foreshore is highlighted (Sub section 14.5.3.1, paragraph 182, Table 14-24).
- 5.24 We appreciate that the potential for encountering such remains is low, but if found they could be highly significant, as stated in Sub-section 14.5.3.3. We appreciate that the final design and location of elements of the scheme have not yet been finalised and that micro-siting elements will take the findings of the archaeological

assessment into account. This will include the information obtained from surveys carried out post-consent (Section 14.5.4, paragraph 202).

- 5.25 It is therefore important to see that a precautionary approach is being used, and that the worst-case scenario is being considered (Sub section 14.6.1.1.1, para 224). We also agree that without mitigation, there would be the potential for major adverse impacts (Sub section 14.6.1.1.3 and 14.6.1.1.4).
- 5.26 It is also stated that the use of HDD to install the cable ducts in the intertidal area will allow the cables to pass below the beach deposits and therefore result in no direct impact to assets (Sub section 14.6.1.1, paragraph 218). However, it is acknowledged that the depth of sedimentary sequences of archaeological interest at landfall are not yet known, and so it is not correct to say that there will be no direct impacts. This needs to be amended by the applicant.
- 5.27 Further investigations will be carried out e.g. geoarchaeological assessments of the geotechnical post-consent to inform the design of the HDD and nearshore cable installation, but this will also provide an opportunity to investigate the archaeological potential of the areas in more detail and to mitigate any impacts. The Norfolk coast has the potential for deposits of archaeological importance to be present, such as the Cromer Forest-bed Formation (CF-bF). If present, archaeological and palaeoenvironmental remains of international importance may be preserved, and so an appropriate sampling and mitigation strategy is required.
- 5.28 The proposed mitigation has been set out in the Outline WSI (Offshore); it is stated that the direct impacts to known heritage assets will be avoided following the application of the proposed mitigation strategy. This includes the implementation of AEZs around all "A1" anomalies (Sub section 14.6.1.1.5, paragraph 229). It is noted that the size of the AEZ can be reduced, enlarged or removed in agreement with Historic England when additional survey data information becomes available (Sub section 14.6.1.1.5, paragraph 239). We are therefore prepared to accept, at this stage, the recommended AEZs to be used within the Study Area, as set out in Table 14-27.
- 5.29 It is however important to ensure that Historic England are a named party in the DCO to ensure this post consent consultation is underpinned by the terms of the order once granted.
- 5.30 It is stated that AEZs are not recommended for "A2" anomalies, but that the position of these features will be avoided by micro-siting elements of the scheme during detailed project design (Sub section 14.6.1.1.5, paragraph 240). Further high-resolution geophysical surveys are planned pre-construction which will help clarify the nature and extent of these anomalies (Sub section 14.6.1.1.5, paragraph 240).
- 5.31 It is however acknowledged that if features cannot be avoided then additional work may be required to establish the archaeological interest of the feature (e.g. an

- ROV and/or diver survey). A mitigation strategy will be developed for these features on a case-by-case basis (Sub section 14.6.1.1.5, paragraph 241) to offset or reduce the impacts. It is acknowledged that it will be impossible to avoid heritage assets that have not yet been discovered (potential heritage assets), which may be impacted during activities such as the preparation of the seabed, installation of wind turbines or the associated infrastructure (Sub section 14.6.1.2, paragraph 246). However, the precise nature and extent of any direct impacts will not be known until the final design and layouts of the proposed scheme have been confirmed (Sub section 14.6.1.2.1).
- 5.32 We agree with the conclusion that any direct impacts that result in damage to, or disturbance of in situ prehistoric maritime and aviation sites and potential submerged landscape features and palaeoenvironmental evidence will be adverse, permanent and irreversible. Therefore, without mitigation there is the potential for major adverse effects (Sub section 14.6.1.2.4, paragraph 255).
- 5.33 Mitigation has been proposed to reduce the impacts of the development, which includes further archaeological assessment of high-resolution geophysical data and geoarchaeological assessment of geotechnical data, which will be undertaken post-consent (Sub section 14.6.1.2.5).
- 5.34 We are pleased to see that archaeologists will be included in the planning and design of the survey and sampling campaigns, and that further mitigation measures will be agreed with Historic England where necessary (Sub section 14.6.1.2.5, paragraph 257). Paragraphs 257-262 also clearly demonstrate the importance of the archaeological conditions to be included within the Deemed Marine Licences which accompany this application.
- 5.35 We are pleased to see that the potential impacts of changes in coastal processes on the historic environment has been considered with reference to the Marine Geology, Oceanography and Physical Processes chapter. It is stated that the changes in coastal processes will generally result in an increased bed-level, which in turn would increase the potential for protection of heritage assets. This would result in a negligible effect and no impact upon buried heritage assets.
- 5.36 We agree that without mitigation, there is the potential for “major adverse” impact upon potential in situ heritage assets during the operation and maintenance of the proposed windfarms through the action of things such as jack-ups or vessel anchors (Sub section 14.6.2.2.1). The archaeological assessment of post-construction monitoring data will reduce, as far as possible the potential for unintended impacts during operation. We are pleased to see that the primary mitigation approach will be an avoidance strategy, but that a reporting protocol will also be implemented alongside the mitigation measures set out in the Outline WSI (Offshore) (Sub section 14.6.2.2.5).
- 5.37 It is acknowledged that changes to coastal processes that will occur during the operation of the proposed windfarm may result in the redistribution of erosion and

accretion patterns or affect the stability of nearby morphological and archaeological features. If features are exposed this can increase the rate of deterioration (Sub section 14.6.2.3). However, the impacts will be within the immediate vicinity of the cables (the areas of direct physical impacts), so indirect impacts can be managed using the same mitigation strategies.

- 5.38 It is noted that a decommissioning policy for SEP and DEP have not yet been prepared, but that there is the potential for impacts to *in situ* heritage assets within the footprint of jack-ups or vessel anchors deployed during decommissioning (Sub section 14.6.3.2, paragraph 308). We concur that a protocol for archaeological discoveries should be prepared that will be agreed in consultation with Historic England to mitigate impacts to any unexpected discoveries made during the decommissioning works (Sub section 14.6.3.2, paragraph 314).
- 5.39 Section 14.7 (Cumulative Impacts) – we acknowledge that the electricity export cables for Dowsing Offshore Wind and Hornsea Project Three OWF could overlap with the export and interlink cables for SEP and DEP and associated Offshore Temporary Works Area. We are aware that these projects should all be subject to the same primary mitigation for known heritage assets through avoidance and that when considering spatial distribution of these infrastructure that there should be no pathway for cumulative direct (physical) impacts.
- 5.40 We also agree with the statement in paragraph 323 that for presently unknown heritage assets that “...significant cumulative (unavoidable) direct (physical) impacts may occur if archaeology is present across multiple plans, projects and activities.” We therefore consider it important to question Table 14-29 “Construction Impact 4” and “Operational Impact 4” (Impacts to the setting of heritage assets) that “setting of marine heritage assets is not considered to form a key part of their significance, which lies primarily in their historical and research value.” In particular, the attempt to differentiate between different “significance” such that some may be considered more “key” than others. The essential matter is whether or not significance can be identified and described which must be considered equally for setting, historical and research value etc.
- 5.41 We concur with the statements made in Sub-section 14.7.3 (Assessment of cumulative impacts). In particular, the remark made in paragraph 330 that demonstrates the importance of Deemed Marine Licence conditions that will deliver cultural heritage mitigation and realise the ambition of “industry wide build-up of data”. The DCO provisions therefore provide the only means of ensuring that SEP and DEP have the potential to contribute to a measurable “...overall cumulative beneficial impact” as alluded to in paragraph 334.
- 5.42 Section 14.8 (Transboundary impacts) – we appreciate the argument made for “significant beneficial impact” (paragraph 339) with the focus on the potential for integrated research and management to be a positive cumulative and transboundary impact for both the UK and adjacent North Sea states. The reality of delivering any such positive outcome will be directly related to enactment of

mitigation measures within the DCO. We also concur with the screening exercise presented in Table 14-32 (Interaction Between Impacts).

- 5.43 It would be important to note however, that within the English Inshore Marine Planning Area if an unknown heritage asset is encountered that on further investigation merits statutory protection this will have a direct bearing on what mitigation measures should be prioritised.
- 5.44 In terms of Potential Monitoring Requirements (Section 14.11), as directed at Archaeological Exclusion Zones (AEZs), it is important to focus on how the eventual design of SEP and DEP will follow consent (if permission obtained) and therefore which AEZs may require monitoring, as described in paragraph 346. For example, from the 30 “A1” anomalies, 7 are identified as debris fields which will require detailed assessment in reference to an agreed archaeological WSI to determine the spatial extent of any AEZ i.e. if a wider buffer is required than presently recommended in Table 14-27 (see our comments above in paragraph 5.15).
- 5.45 Furthermore, paragraph 352 also mentions the reliance on geotechnical data acquired post-consent, which following geo-archaeological assessment, will inform the design of HDD and nearshore cable installation to pass beneath deposits of potential or known archaeological interest. The approaches summarised in this section seem sensible and appropriate, but we refer you to our comments on the Outline WSI for more detailed discussion.
- 5.46 In general, we concur with the statement made in paragraph 354 regarding avoidance of more obvious anomalies which are readily identifiable as wreck. However, for “A2” anomalies we note that AEZs are not recommended at this time which does place considerable attention on post-consent high resolution survey work to determine if AEZs are required. We appreciate that a situation may occur where an anomaly or cluster of anomalies might not be avoidable. The methodology for qualifying the existence of heritage assets and taking account of identifiable significance must be led through an agreed WSI used post-consent and pre-construction.
- 5.47 Paragraph 355 describes the application of a formal protocol for archaeological discoveries, but it is important to be clear that post consent (should permission be forthcoming) and pre-construction is the crucial period for optimising the use of a WSI; through its application the project is designed and delivered in consideration of archaeological and historic sites encountered. The application of a Reporting Protocol really becomes applicable from construction onwards if sites are discovered when an effective system of decision-making between key stakeholders becomes essential, as demonstrated by the identification of a residual impact of “minor adverse” in Table 14-34 (Summary of Potential Impacts on Offshore Archaeology and Cultural Heritage). Depending on the site encountered and its significance as a heritage asset, the extent of residual impact may be “moderate” or even “major”.

6. Environmental Statement: Volume 1, Chapter 21 – Onshore Archaeology and Cultural Heritage (Document Ref: 6.1.21)

- 6.1 Chapter 21 sets out the baseline data, potential impacts and mitigation requirements for onshore archaeology and cultural heritage.
- 6.2 A total of 546ha of the proposed scheme area was identified for priority geophysical surveys, targeting areas of known archaeology as shown on the NHER and from aerial mapping (Section 21.4.2.1, para 45).
- 6.3 This was complemented by a programme of archaeological and geoarchaeological monitoring of ground investigation works (Section 21.4.2.1, para 47). This work identified areas of high to moderate palaeoenvironmental and geoarchaeological interest, particularly in the areas of the River Bure, Swannington Beck and the River Wensum that could be impacted by the proposed development (Section 21.5.3.5, para 123-127).
- 6.4 It is stated that further investigation and data gathering would be progressed post-consent, including further geophysical surveys and trial trenching, alongside the mitigation requirements set out in the Outline WSI (Onshore) (Section 21.4.3.1, para 57).
- 6.5 It is also noted that heritage assets located within or partly within the DCO application boundary have not yet been fully evaluated through intrusive evaluation (e.g. trial trenching) approaches (Section 21.5.3.2, para 112), and that a series of surveys and investigations will be carried out post-consent (Section 21.6.1.2.3, para 188).
- 6.6 Where positive results are available, non-intrusive studies (LiDAR, aerial photography, historic mapping and geophysics) have clearly demonstrated the potential presence of buried archaeological remains, some of which are perceived to be of high importance (Section 21.5.3.2, paras 114-115, Table 21-10). It is acknowledged that these remains could be at risk of direct physical impacts (Section 21.5.3.2, para 117).
- 6.7 We have concerns that the gaps in the current survey data, and some of the post-consent survey strategy presents a risk for previously unknown archaeological remains being discovered during the construction phase of the project. These concerns are set out below.
- 6.8 We are pleased to see that the previously unknown non-designated heritage assets that may be present within the scheme area have been classed as being of high importance as a precautionary approach (Section 21.5.3.4, para 120; Section 21.6.1.2, para 158).
- 6.9 It is not clear why deposits of high geoarchaeological and palaeoenvironmental potential have been assigned a precautionary heritage importance of medium

importance for the same reason: being uncertain in terms of the precise nature, extent and date (Section 21.5.3.6). Our view is that the uncertain nature of the remains should be assigned a high importance until further information is available to allow this to be reassessed. We recommend this is amended by the applicant before the end of the examination.

- 6.10 We are pleased to see that direct and indirect impacts on the historic environment have been considered (Section 21.6). This includes the potential impacts on both designated and non-designated heritage assets at the construction, operational and decommissioning phases of the scheme.
- 6.11 The discussion includes the potential for the proposed development to interact with local hydrological processes that can in turn impact buried archaeological remains through either desiccation or waterlogging (Section 21.6, para 138).
- 6.12 We have also noted that no designated assets will be impacted by the proposed scheme as the route has been designed to avoid them, except for the Mannington and Wolterton Conservation Area (Section 21.6.1.1, para 146-147).
- 6.13 The potential impacts of the development at the landfall location have been discussed in Section 21.6.1.2, but this has not included an impact of how the scheme may impact deposits of palaeoenvironmental or geoarchaeological potential in this area. It has been stated that the direct physical impacts in this location could represent up to a medium magnitude of impact (Section 21.6.1.2, para 173).
- 6.14 We recommend that the potential magnitude of impact and heritage importance be increased as a precautionary measure until additional information is available to allow the potential for deposits of palaeoenvironmental and geoarchaeological value to be present have been considered, and for the magnitude of impact to be reassessed (Section 21.6.1.2.2, para 178). This will need to be amended by the applicant before the end of the examination.
- 6.15 It is stated that avoidance, micro-siting and refinement of the route has formed the basis of the embedded mitigation strategy, which is good to see (Section 21.3.3, para 23 & Table 21-3). We are pleased to see that the priority geophysical survey works were used to help inform the design of the proposed scheme (Section 21.6.1.2.3, para 187).
- 6.16 It is stated (Section 21.6.1.2.3, para 188) that post-consent survey and evaluation work will be carried out as described in the Outline WSI (Onshore) (Document Reference 9.21). The additional mitigation will potentially include preserving archaeological remains where possible, set-piece excavations, strip, map and record excavation, watching briefs, earthwork surveys and geoarchaeological/palaeoenvironmental surveys (Section 21.6.1.2.3, para 189).

- 6.17 It has been argued that following the implementation of the proposed mitigation that any impacts would be of minor adverse significance. However, we have concerns over some of the approaches set out in the Outline WSI (Onshore) (see Chapter 15 below).
- 6.18 The impacts of the proposed scheme on the localised groundwater levels has been discussed in Section 21.6.1.3.1. It has been concluded that the impacts are expected within the direct location of the cable trenches, with any potentially deeper geoarchaeological deposits not being affected by the hydrological changes (para 202-203).
- 6.19 It is further argued that the geoarchaeological deposits are of medium heritage importance, which we question. It has been concluded that following mitigation any residual impacts will be classed as being of minor adverse significance (Section 21.6.1.3, para 206).
- 6.20 We are pleased to see that the potential impacts from bentonite slurry outbreak on deposits of geoarchaeological and palaeoenvironmental interest have been considered (Section 21.6.1.3, para 210). It is stated that the impacts of HDD drilling and bentonite slurry outbreak will be managed through the approaches detailed in the Outline WSI (Onshore) (Document Reference 9.21), which would reduce the impacts to being of minor adverse significance (Section 21.6.1.3, para 214).
- 6.21 The impact of the proposed onshore substation on the setting of designated heritage assets is considered in Section 21.6.2.1. We are satisfied with the conclusion presented in Table 21-12 (para 229) that there would be no impact on the designated heritage assets and scoped into the assessment (see Onshore Infrastructure Setting Assessment. Volume 3, Appendix 21.4)
- 6.22 We are pleased to see that the potential impacts from the heat emission of cables is considered, particularly as the cable route crosses through river valleys where there is the potential for waterlogged archaeological / palaeoenvironmental remains to be preserved (Section 21.6.2.2, para 239). It is argued that the proposed mitigation detailed in the Outline WSI(Onshore) (Document Reference 9.21) will result in no impact to the archaeological remains (Section 21.6.2.2, para 243).

7. Environmental Statement Volume 3, Appendix 14.1: Archaeological Assessment of Geophysical Data (Document Reference: 6.3.14.1). PINs Reference: APP-199

- 7.1 We note the data sources used by the Applicant to inform this assessment consists of geophysical survey datasets acquired in 2019 and 2020; comprising Sub-bottom Profiler (SbP), Side Scan Sonar (SSS), Magnetometer and Multibeam Echo Sounder (MBES) data, provided to a specialist archaeology sub-contractor. Given that these datasets are between 2-3 years old, Historic England confirms that new post-consent survey datasets will be required to steer the design of these projects.
- 7.2 It should be noted that the line spacings used for the offshore geophysical surveys were larger than recommended for archaeological assessments in the Historic England document *Marine Geophysics: Data Acquisition, Processing and Interpretation* (2013). In addition, it is stated that initially, only 25% of the SbP survey lines were assessed; additional lines were interpreted in order to more accurately map the extents of these features (Section 2.3.6). It is therefore possible that smaller features may not have been identified following this work if they fell between the survey lines. We would therefore recommend that this document is referred to when planning future geophysical campaigns:
- [REDACTED]
- [REDACTED].
- 7.3 An assessment of the quality of the information obtained from the geophysical survey work generally classed the data as being “good” (criteria defined in Table 6). However, SSS nearshore data was classed as being of “variable” quality, as it was affected by weather (Sections 2.4.6 & 2.4.7). It was concluded that the SSS data could be used to identify larger objects, such as wrecks, but that it was more difficult to identify smaller objects. It was also noted that the Magnetometry data obtained from the DEP and SEP areas was of “average” quality due to the background noise in the data (Section 2.4.10). This coupled with the large line spacings of 75m meant that it was felt that smaller objects may not have been picked up in the data. This suggests that there is the potential for previously unknown features and remains to have been missed.
- 7.4 A summary of the palaeogeographic and archaeological features and remains presented in Section 3 suggest that terrestrial features dating to the late Glacial and Early Holocene are present within the area of the proposed development (e.g. Sections 3.1.27; 3.1.28; 3.1.35; 3.2.13; 3.2.16; 3.2.24; 3.2.26; 3.2.33; and 3.2.52). Evidence suggests that features of geoarchaeological, palaeoenvironmental and archaeological interest are present, including organic material such as peat. For example, the assessment of borehole BH06 recorded highly laminated sequences, including peat that was thought to represent the gradual infilling of a freshwater lake between c.12,700 and 9260 cal BP (Section 3.2.42). These deposits are important as this period is associated with significant changes in the climate and environment.

- 7.5 It is noted that due to the penetration of the Parametric Sonar data, the shallow nature of some of the features and the acoustic similarities between Unit 6b and the underlying Units 6a and 5, that it was not possible to accurately map the full extent of the features, particularly the Botney Cut features (Section 3.2.4). It is therefore important that the Outline WSI is clear about areas to be targeted using additional techniques, such as boreholes to help characterise and understand the features and their associated features.
- 7.6 It was stated that there was the possibility that the units associated with the Botney Cut had a more complex depositional history, which will need to be considered when applying research questions and the strategies used to investigate them (Section 3.2.12).
- 7.7 Several channel features were identified within the area of the proposed development; the age of the channels is not yet clear, but it was acknowledged that the development runs to the north of one of the most important stretches of coastline for Palaeolithic archaeology in the British Isles, and so there is the potential for significant features, deposits and remains to be present. We are therefore pleased to see that the area has been assigned a high level of archaeological potential (Section 3.2.10 and 3.2.23). We also agree with the recommendations made in Sections 5.1.3 and 5.1.4 that the archaeological contractor should be consulted on potential samples that will be acquired for archaeological purposes.
- 7.8 The geophysical survey work has also allowed features of archaeological potential to be identified. The results of this work have been summarised in Tables 9 to 18: most of the anomalies have been classified as “A2” (428 out of 470 anomalies in total), being of uncertain origin of possible archaeological interest. It was noted in Chapter 14 that AEZs will not be recommended for “A2” anomalies, with a strategy developed to characterise and understand the nature of these anomalies if they cannot be avoided (Section 5.1.14). If they are of archaeological interest, a mitigation strategy will also need to be developed, as set out in an agreed WSI.

- 8. Environmental Statement Volume 3, Appendix 14.2 Addendum: Archaeological Geophysics (Document Reference 6.3.14.2), PINs Reference: APP-200**
- 8.1 We are aware that this addendum presents the result of surveys carried out within four additional offshore export cable corridor options. No new data was processed to investigate these areas, and so existing information was utilised (Section 2.3.1). The report did not include information about the line spacings used when the data was originally collected, and it was noted that not all the additional areas have full geophysics coverage. In addition, the full suite of geophysics techniques was not used for some of the additional cable corridors (Section 2.4.3). It is therefore possible that presently unknown features of archaeological interest may exist in these areas (Section 2.4.5).
- 8.2 The same stratigraphic sequence of prehistoric terrestrial and channel features was discussed in Appendix 14.2, such that they may be associated with *in situ* or derived remains, or organic deposits/peat accumulations (e.g. Sections 3.2.7, 3.2.9). We agree that these features/deposits should be classified as being of high archaeological importance.
- 8.3 Similar issues were noted in Appendix 14.2 regarding the penetration of the Parametric Sonar data, the shallow nature of some of the features and the acoustic similarities between Unit 6b and the underlying Units 6a and 5. It was stated that it was not possible to accurately map the full extent of the features, particularly the Botney Cut features (Section 3.2.15). Additional work will therefore be needed to clarify and characterise the nature of the events/features recorded in these areas.
- 8.4 The geophysical survey work has also allowed features of archaeological potential to be identified. The results of this work have been summarised in Tables 6 and 7: most of the anomalies have been classified as “A2” (87 out of 89 anomalies in total), being of uncertain origin of possible archaeological interest. It was noted in Chapter 14 that AEZs will not be recommended for A2 anomalies, and so a strategy will need to be developed to characterise and understand the nature of these anomalies if they cannot be avoided (Section 5.1.7) and whether they are of archaeological interest. If they are, a mitigation strategy will be required.

- 9. Environmental Statement Volume 3, Appendix 14.3: Stage 1 Geoarchaeological Assessment (Document Reference: 6.3.14.3) PINs Reference: APP-201**
- 9.1 From the archaeological review of 51 geotechnical vibrocores, five cores of high priority sampled organic clay and peat (Section 7.2.1) were identified. In addition, alluvial deposits of medium priority were recorded in a total of 17 cores that are located within the previously mapped palaeochannels.
- 9.2 It is recommended that all of these cores are progressed to “Stage 2”, being recorded by a geoarchaeologist and assessed for their potential for further paleoenvironmental assessment (Sections 7.2.1 and 7.3.1). We agree with these recommendations, but feel it would have been useful if the cores had been investigated in terms of the presence and, or absence of different macro- and micro-remains, so that the significance and potential of the sampled deposits could be determined, which would help understand the impact of the proposed scheme.

- 10. Environmental Statement Environmental Statement: Onshore Archaeological Desk-Based (Baseline) Assessment. Volume 3, Appendix 21.1 (Document Ref: 6.3.21.1)**
- 10.1 We are broadly satisfied with the scope and methodology of the Archaeological Desk-Based Assessment.
- 10.2 large number of non-designated heritage assets were identified within the 500m Study Area (1370), demonstrating the rich and diverse archaeological landscape that may be impacted by the proposed development that spans the Palaeolithic to the modern day. Some of the known sites are complex and extensive (Sections 21.1.4.1.6 and 21.1.5.2).
- 10.3 There is high potential for the further discovery of buried archaeological sites features (Section 21.1.5.2). The archaeological remains also have the potential to address several of the research questions posed in the Regional Research Framework [REDACTED], in particular questions about the use of space, the transition between different periods, chronologies, trade and contact.
- 10.4 It is stated in Section 23.1.5.4.9 (para 210) that the scheme could potentially affect below ground deposits over a wider area than the footprint of the scheme through changes to the hydrology, which may result in the desiccation and drying out of wetland deposits and preserved organic archaeological remains. A strategy has been presented in the Outline WSI (Onshore) (Document Reference 9.21) to mitigate any impacts.

- 11. Environmental Statement: Aerial Photographic, LiDAR and Map Regression Analysis. Volume 3, Appendix 21.2 (Document Ref: 6.3.21.2) & Aerial Photographic and Map Regression Addendum. Volume 3, Appendix 21.3 (Document Ref: 6.3.21.3)**
- 11.1 We are broadly satisfied with the scope, methodology and conclusions of the Aerial Photographic, LiDAR and Map Regression Analysis and Addendum.
- 11.2 The Aerial Photographic, LiDAR and Map Regression Analysis document (6.3.21.2) contains an assessment of the available data prior to the submission of the Section 42 PEIR in 2021.
- 11.3 We had raised concerns in our Section 42 response that the assessment of historic map sources was too limited but acknowledged that this was due to relevant archives being closed during Coronavirus lockdowns. The Addendum (6.3.21.3) has addressed these concerns and includes additional map and aerial photographic sources and assessment.

**12. Environmental Statement: Onshore Infrastructure Setting Assessment.
Volume 3, Appendix 21.4 (Document Ref: 6.3.21.4)**

12.1 We consider the methodology and list of designated heritage assets presented in Appendix 21.4 to be adequate for the purpose of this assessment and welcome the integration of the assessment with the Landscape and Visual Impact Assessment (Chapter 26).

12.2 A total of 21 designated heritage assets whose settings could potentially be affected by the onshore substation at the PEIR stage. We acknowledge all but 3 heritage assets were subsequently screened out through revision of the substation location and initial assessment.

**13. Environmental Statement: Priority Archaeological Geophysics Survey.
Volume 3, Appendix 21.6 (Document Ref: 6.3.21.6)**

- 13.1 The results of the priority archaeological geophysics survey works have been presented in Appendix 21.6. Magnetometry was used to investigate the priority areas. It was concluded that the anomalies were well defined (Section 4).
- 13.2 We recommended in our Section 42 response in 2021 that the use of other geophysical survey techniques should be considered in wetland sections of the cable corridor. We note this is now covered in Table 21-1 of the Onshore Archaeology and Cultural Heritage of the Environmental Statement (Document Ref: 6.1.21), which states the use of additional techniques where relevant and necessary for post-consent surveys is included within the Outline WSI (Onshore) (Document Reference 9.21).

- 14. Environmental Statement: Archaeological and Geoarchaeological Monitoring Assessment Volume 3, Appendix 21.7 (Document Ref: 6.3.21.7)**
- 14.1 Appendix 21.7 presents the findings of the archaeological and geoarchaeological monitoring ground investigation work. This work identified areas of moderate to high palaeoenvironmental potential (organic alluvium and peat) that could preserve plant macro- and microfossils such as pollen and diatoms (e.g. Section 5.3.6).
- 14.2 The cores were visually assessed in terms of their potential, but the samples do not appear to have been evaluated to characterise the deposits and to understand their significance and potential to address archaeological questions. We therefore recommend that samples are investigated further, determining the presence/absence of palaeoenvironmental remains and establishing the date of the deposits to place the findings into context.
- 14.3 This information is needed because many of the remains mentioned in the report are not visible to the naked eye and so can only be determined through further laboratory work. This work would also guide the development of an appropriate mitigation strategy.
- 14.4 We consider that this is particularly important for the material investigated by BH9-25, where a peat accumulation was recorded c.9.20m below ground level. It was stated that this material had the potential to date to the Pleistocene period, but that unfortunately no samples were recovered (Section 5.3.31).
- 14.5 If this material is Pleistocene in age then the material is of high palaeoenvironmental and geoarchaeological significance; the potential impacts of the proposed scheme need to be considered for this area, and whether additional samples need to be recovered to investigate the deposits in more detail.
- 14.6 We therefore recommend a methodology and timetable for addressing this matter and undertaking this work is provided by the applicant before the end of the examination.

15. Environmental Statement Outline Written Scheme of Investigation (WSI) (Onshore) (Document reference 9.21)

- 15.1 It is noted that each phase of mitigation work would be subject to a survey specific WSIs/Method Statements that would be approved by NCC and Historic England where appropriate (Section 1.1, para 50). The additional mitigation will include (para 51):
- Project-wide onshore archaeological geophysics
 - Targeted metal detecting survey
 - Targeted archaeological trial trenching
 - Targeted earthwork condition survey
 - Targeted geoarchaeological & palaeoenvironmental surveys
- 15.2 Section 1.2 details the additional project-wide archaeological geophysical survey that would be carried out post-consent. In addition to the remaining 7 of the 37 Priority Geophysical Survey Areas, the Outline Schedule of Archaeological Requirements (Document reference 9.21 Appendix 2) lists known archaeological sites and features which would be subject to post-consent geophysical survey.
- 15.3 We have concerns that targeting the post-consent geophysical survey on known archaeological sites and features and omitting areas where no existing data exists risks overlooking significant previously unidentified archaeological remains. Chapter 6, Section 1.2, para 65 suggests that the post-consent geophysical survey will cover the remainder of the onshore cable corridor. We strongly advise that geophysical survey should be completed across the whole of the onshore cable corridor to maximise the potential for previously unknown archaeological sites and features to be identified.
- 15.4 The detailed geophysical survey that will be carried out post-consent will predominately utilise magnetometry, but we are pleased to see that additional and alternative geophysical survey techniques will be applied where relevant and where necessary (Chapter 6, Section 1.2, para 68).
- 15.5 Targeted metal detecting surveys are proposed as part of the post-consent works (Chapter 6, Section 1.3, para 72). We welcome that these will include the locations of previous finds that could indicate the presence of Anglo-Saxon cemeteries. However, potential exists for previously unidentified archaeological sites of this type to be present along other sections of the cable corridor and we recommend a metal detecting survey is programmed into the mitigation.
- 15.6 Chapter 6, Section 1.4 outlines the trial trench evaluation work that will be carried out post-consent. It is disappointing that this work was not carried out to inform the application. We advised this should be undertaken in our advice at and before the Section 42 stage.
- 15.7 As magnetometry was only carried out in priority areas and not over the full area of the scheme and aerial photographic data is restricted by the suitability

of soils for cropmark production and the availability of suitable imagery, there is the potential for previously unknown remains to be present in unsurveyed areas that would need to be dealt with as part of the post-consent/pre-construction work.

- 15.8 There is also the potential for previously unknown remains to be present in the Priority Geophysics areas, as magnetometry is not suited to identifying organic features or remains such as wood.
- 15.9 It is proposed that the trial trenching will be 'focussed primarily on potential archaeological anomalies identified from the analysis of the geophysical survey data, Aerial Photographic and Lidar Assessment and Geoarchaeological Assessment work' (Chapter 6, Section 1.4, para 74).
- 15.10 Whilst this is a good starting point, its effectiveness is reliant on the completion of geophysical survey along the whole of the cable corridor. As previously noted, not all archaeological site types are conducive to detection through geophysical survey or aerial photography.
- 15.11 The suggestion that 'several trenches may also be needed to sample and investigate apparent blank areas' implies that the majority of areas without positive geophysical survey or aerial photographic results would not be trenched (Chapter 6, Section 1.4, para 74).
- 15.12 As previously noted, not all archaeological site types are conducive to detection through geophysical survey or aerial photography. Not carrying out trial trenches in areas of unknown potential would increase the risk of significant archaeological remains being encountered during the construction phases of the project with adverse impacts on timetabling and the historic environment.
- 15.13 It is noted that the trial trench evaluation work will inform the additional mitigation work that may be required, which could include set piece excavations, strip, map and sample excavations or archaeological monitoring (Chapter 6, Section 1.4, para 76). These types of investigations seem appropriate, but again, time will need to be factored into any work programmes to allow for the proper investigation of any unexpected discoveries.
- 15.14 There are therefore a number of unanswered questions about the potential impact to the historic environment and we have some concerns that heritage assets could be compromised as a result. Unexpected discoveries can seriously impact programmes of work and so it is essential that time is built into the pre-construction programme to allow for any discoveries to be dealt with in an appropriate manner.

- 15.15 Further consideration to this approach needs to be given by the applicant and the ExA need to be assured that adequate time and resources will be set aside to allow the appropriate level of archaeological work to be undertaken.
- 15.16 Chapter 6, Section 1.7 outlines the geoarchaeological and palaeoenvironmental investigations that will be carried out post-consent. It is stated that areas of potential were identified (see Appendix 21.7) and that a post-consent approach to geoarchaeology and the palaeoenvironment would be formulated and agreed (Chapter 6, Section 1.7, para 86).
- 15.17 Additional detail is required in this section of the Outline WSI about the areas that will be targeted and the remains and approaches that will be investigated through this work (e.g. pollen, plant remains, insects, scientific dating techniques etc.). We recommend the applicant is asked to provide this information as part of the examination submission.
- 15.18 Chapter 7, Section 1.2 outlines the excavation methodology. It should include a reference or link to Appendix 1 in this document (Example (model) Clauses) as this provides the information needed to clarify what is expected of this work. For example, the percentage of features that will be investigated (e.g. ditches, pits or post-holes, occupation surfaces etc.), or how specific feature types (e.g. hearths or ovens) or assemblages (e.g. human remains or animal bone groups) will be investigated.
- 15.19 We are pleased to see that a mechanism will be established to allow archaeological investigation during watching brief where appropriate (Chapter 7, Section 1.3, para 98).
- 15.20 Chapter 7, Section 1.4 summarises the preservation option for sites where this is warranted. It is important to note that not all sites can and should be preserved. It needs to be appropriate for the archaeology and for the site in question. We would recommend that the principles outlined in the Historic England document 'Preserving Archaeological Remains' (2016) are referred to when discussing the suitability of each case for preservation:

[REDACTED]

Appendix 1: Example (model) clauses – mitigation specification works.

- 15.21 Section 1.2 (para 6) references the research frameworks that will be referred to, but it omits the most recent version: [REDACTED]. This needs to be amended.
- 15.22 The approach to investigating certain types of features and remains has been summarised in Section 1.5 (para 20). The majority of this seems sensible and appropriate, but we would question the 100% excavation of industrial

features, such as kilns or ovens. These features have the potential to preserve fired clay in situ, which can be dated using archeomagnetism. For this technique to work, samples of in situ fired clay need to be recovered by a specialist, and so we would recommend that features are not fully excavated until the use of archaeomagnetic dating has been considered and discussed with a specialist.

- 15.23 Section 1.7 (para 45) states that all finds will be washed, but we would recommend that artefacts are not cleaned if organic residues are preserved on the surface, as outlined in the Historic England document 'Organic Residue Analysis and Archaeology' (2017):

[REDACTED]

- 15.24 It is stated in Section 1.7 (para 47) that all environmental samples will be processed, which is good to see. We would recommend that this work is carried out at the same time as the excavations to allow information to be fed back into the excavation strategy. This also ensures that the samples are processed as part of the excavation phase, resulting in an ordered, stable and accessible archive of material.

- 15.25 A number of dating techniques are mentioned in Section 1.8, which is good to see, but we would recommend that a chronological modeller is included in the project, to help guide the dating strategy for the project.

- 15.26 It is stated in Section 1.9 (para 59) that samples would be taken from each human burial where appropriate to retrieve small bones and other biological remains. We would recommend that samples are recovered as standard, in line with the recommendations made within the Historic England document 'The Role of the Human Osteologist in Archaeological Fieldwork Projects' (2018): this document recommends that samples from the head, torso and leg/foot area are recovered.

[REDACTED]

- 15.27 The title of Appendix 5 (WSI for Priority Archaeological Geophysical Survey) appears to be wrong, as the appendix actually presents the WSI of Investigation for Archaeological and Geoarchaeological Monitoring.

- 15.28 Section 3.1.2 presents the aims of the geoarchaeological work, but this section does not include a requirement to recommend further stages of work following the initial investigation of the cores. The requirement for additional work is stated in Section 4.8.2, which is needed to quantify and qualify the nature of the deposits and remains that are preserved through further analysis and dating.

**16. Environmental Statement: Outline Written Scheme of Investigation (Marine)
(Document Reference: 9.11)**

- 16.1 It is stated that HDD will be used to install the export cable at the landfall, and that this approach will largely avoid interaction with the intertidal zone (Section 1.1.1). The Applicant has identified 45 local Historic Environment Records (HER) (Section 1.2.4) records for the intertidal zone and that the existence of currently unknown remains within the intertidal zone should be considered high. We appreciate the objective that HDD should go under the intertidal zone, with the greatest risk of encountering sites limited to entry on the landward side of the cliffs and submarine exit point approximately 1km from shore.
- 16.2 There is no mention of the potential for deposits of archaeological, geoarchaeological or palaeoenvironmental value in these areas and this needs to be considered so any potential impacts can be mitigated (see the comments we make above in paragraph 5.15). We welcome the Applicants assertion at this stage that a finalised version of the document will be submitted to the Marine Management Organisation (MMO), in line with the presupposed Deemed Marine Licence conditions for this DCO (paragraph 8). Historic England welcomes this, however, we remind the Applicant that the draft document would need to go through consultation with Historic England prior to any MMO discharge.
- 16.3 Historic England welcomes the Applicants commitment that, prior to further surveys taking place for these extension projects, a pre-commencement survey Draft WSI (in accordance with this Outline WSI) will be developed in consultation with archaeological curators (Section 1.1.3, paragraph 13). Historic England looks forward to further engagement with the Applicants on this document. In addition to this, the Chartered Institute of Archaeologists (CIFA) standards and guidance references that have been used need to be checked (see paragraph 16), as some of these references were updated as recently as 2021. This should be completed prior to the submission of the formal WSI.
- 16.4 A total of 550 features of archaeological interest or potential have been identified, as listed in Table's 6 and 7. Regarding embedded mitigation, we note that there is no embedded mitigation relevant to the Offshore Archaeology and Cultural Heritage assessment to date, this is due to no designated heritage assets presently within the Order Limits, We accept that the parameters of the proposed project is sufficiently wide to accommodate micro-siting, as part of the cable route refinement and wind farm design to be progressed post consent. Additional mitigation has been detailed in the Outline WSI (Offshore) (Section 1.3.2, paragraph 80). It is understood that the mitigation will comprise:
- Archaeological assessment of further geophysical data to be acquired post-consent;
 - Geoarchaeological assessment of geotechnical data;
 - Refinement of the design of offshore infrastructure post-consent to avoid AEZs where possible; and

- Further investigation where avoidance is not possible, and additional mitigation to reduce or offset any impacts.
- 16.5 It is stated that any marine geophysical surveys whose primary aim is non-archaeological will be subject to advice from a retained archaeologist. Such action will ensure that archaeological specialists can input into the planning stage of any survey campaigns and that the data is suitable to address archaeological questions. The specific work that will be carried out will be detailed in a subsequent WSI, which will be agreed with Historic England (Section 1.5.1, paragraph 95-97). We are pleased to see that limitations of the geophysical survey have been noted, particularly with the difficulties in identifying non-ferrous buried remains such as wooden vessels (Section 1.5.1, paragraph 98).
- 16.6 We are pleased to see that archaeological specialists will also input into the geoarchaeological/geotechnical campaigns, and that archaeology-specific cores will be collected at targeted locations (Section 1.5.2, paragraph 102 and 111). It is noted that a second geotechnical campaign carried out in 2022 will be progressed so that both sets of cores can be taken forward as a combined work package (Section 1.5.2, paragraph 108). A method statement for this work will be prepared in conjunction with Historic England, which should summarise the sort of the approaches and techniques that will potentially be utilised (e.g. plant remains, pollen, diatoms, ostracods, scientific dating techniques etc.).
- 16.7 It is stated that geotechnical cores will be retained undisturbed until a selection of cores for archaeological recording has been made (Section 1.5.2, para 114). This is essential for the archaeology work as some of the sediments of interest are complex in nature and must have the appropriate sampling strategy applied. We accept that avoidance will provide the primary mitigation of the scheme. However, where anomalies cannot be avoided, further investigation will be needed. ROVs or divers will be used to gather more information about the anomalies and to establish its interest (Section 1.5.3). The surveys will include the input of an archaeological specialist to ensure that the surveys also address any archaeological questions (Section 1.5.3, paragraphs 121 and 125); we agree with this approach.
- 16.8 AEZs will be established for all “A1” anomalies, all “live” wrecks and one “A3” anomaly (Section 1.6.1, paras 136 & 143; Table 12). The size and extent of the AEZs will be defined following additional survey work, which seems sensible and appropriate.
- 16.9 Watching briefs will be implemented for all works that may disturb archaeological material, which will include archaeological supervision on board the vessels to allow the consideration of potential archaeological material (Section 1.6.2, paragraph 148). We are pleased to see that the results of high-resolution geophysical surveys will be used to identify the areas of greatest risk that would benefit from further monitoring (Section 1.6.2, paragraph 149).

16.10 Sections 1.6.3 and 1.9 outlines the protocol for archaeological discoveries that will be implemented, with a provision for conservation where appropriate. The work that will be carried out post-fieldwork is summarised in Section 1.8.4 to address the character, extent, date, integrity, state of preservation and relative quality of any archaeological remains. The list of further work presented in paragraph 194 seems to focus on assessment and dating of artefacts but does not appear to include the processing of deposits of palaeoenvironmental value which must be addressed through any Marine WSI subsequently produced (should consent be obtained).

**17 draft Development Consent Order (Document Reference 3.1)
PINs Reference: APP-024**

17.1 the document contains the following schedules in the draft Deemed Marine Licence:

- Schedule 10 Marine Licence 1: Sheringham Shoal Extension Project Offshore Generation – Work Nos. 1A, 2A and 6A or 6C
- Schedule 11 Marine Licence 2: Dudgeon Extension Project Offshore Generation – Work No. 1B, 2B and Work No. 6B or 6C
- Schedule 12 Marine Licence 3: Sheringham Shoal Extension Project Offshore Transmission – Work Nos. 3A to 7A or 3C to 7C
- Schedule 13 Marine Licence 4: Dudgeon Extension Project Offshore Transmission – Work Nos. 3B to 7B or 3C to 7C

17.2 In schedules 10 and 11 (Part 2 – Pre-construction plans and documentation) Condition 13(1)(c) we recommend the 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 through delivery of Conditions 13(2) and 13(2).

17.3 Condition 13(1)(e)(vi) stipulates that the Applicants must submit an Online Access to the Index of archaeological investigations (OASIS) form within six months of completion of construction of the authorised scheme. Historic England welcomes this inclusion. However, we would offer a revision of this condition (see below) to adequately reflect the requirements of the condition:

“a requirement for the undertaker to ensure that a copy of any agreed archaeological report is deposited with the Archaeological Data Service, by submitting an OASIS (Online Access to the Index of archaeological investigationS’) form with a digital copy of the report within six months of completion of construction of the authorised scheme, and to notify the MMO and Historic England that the OASIS form has been submitted to the Archaeological Data Service within two weeks of submission”

17.4 Schedules 10 and 11, Conditions 13(2) and 13(2) – we support the measures set out here 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. We recommend Schedule 10 and 11 (Part 2) Condition 13(2) should include reference to any UXO Clearance activities that could occur as a result of these extension works. In addition to this, reference to consultation with the relevant historic body should also be included in

this condition. Historic England provides the following example for the Applicant to consider:

“Pre-construction archaeological investigations, UXO clearance and pre-commencement material operations which involve intrusive seabed works must only take place in accordance with a specific written scheme of archaeological investigation which is itself in accordance with the details set out in the outline written scheme of investigation (offshore), and which has been submitted to and approved by the MMO in consultation with the statutory historic body.”

17.5 In schedules 12 and 13 (Part 2 – Pre-construction plans and documentation), we recommend Condition 12(1)(c) Construction Method Statement should include 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 through delivery of Conditions 12(2) and 12(2).

17.6 Condition 12(1)(f)(vi) stipulates that the Applicants must submit an Online Access to the Index of archaeological investigations (OASIS) form within six months of completion of construction of the authorised scheme. Historic England welcomes this inclusion. However, we would offer a revision of this condition to adequately reflect the requirements of the condition:

“a requirement for the undertaker to ensure that a copy of any agreed archaeological report is deposited with the Archaeological Data Service, by submitting an OASIS (Online Access to the Index of archaeological investigationS’) form with a digital copy of the report within six months of completion of construction of the authorised scheme, and to notify the MMO and Historic England that the OASIS form has been submitted to the Archaeological Data Service within two weeks of submission’

17.7 Schedules 12 and 13, Conditions 12(1)(f) and 12(1)(f) – 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.

17.8 Schedule 12 and 13 (Part 2) Condition 12(2) should contain reference to any UXO Clearance activities that could occur as a result of these extension works. In addition to this, reference to consultation with the relevant historic body should also be included in this condition. Historic England provides the following example for the Applicant to consider:

“Pre-construction archaeological investigations, UXO clearance and pre-commencement material operations which involve intrusive seabed works must only take place in accordance with a specific written scheme of archaeological investigation which is itself in accordance with the details set

out in the outline written scheme of investigation (offshore), and which has been submitted to and approved by the MMO in consultation with the statutory historic body.”

17.9 Historic England agrees with the wording of Schedule 2 Part 1, Requirement 18 in relation to post-consent archaeological works.

17.10 18 (1) states that the statutory historic body should be consulted by the relevant planning authority prior to the approval of the written schemes of archaeological evaluation for each phase of works. We welcome this and concur that Historic England should be consulted as the relevant statutory historic body along with Norfolk County Council.

18. Historic England Written Representation: Conclusions

- 18.1 Historic England are broadly content with the layout and design of the proposed scheme, the information provided in the environmental statement and the proposed mitigation measures. We have provided further information above with regards to the ES with regards to onshore and offshore heritage.
- 18.2 In relation to the Historic Environment matters, and in coming to a decision, the ExA would therefore need to weigh the harm against the benefits of the proposals, as set out in policy.
- 18.3 We have flagged some concerns with regards to the onshore and offshore archaeological assessment that we recommend the applicant address these matters during the examination and prior to the consent being granted.
- 18.4 We have also flagged some concerns with regards to the onshore and offshore outline WSIs which we recommend the applicant address prior to the consent being granted.
- 18.5 We have flagged some concerns regarding the wording of the draft DCO and the role of Historic England set out therein, particularly in relation to offshore archaeology. We consider these are matters that would need to be addressed prior to the consent being issued.