Hornsea 4

Ørsted

Hornsea Project Four: Preliminary Environmental Information Report (PEIR)

PEIR Annex F2.4: Outline Marine Written Scheme of Investigation

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Glossary

Term	Definition
Archaeological Exclusion Zone	Areas where archaeological receptors are present and should be avoided during project works.
Area of Archaeological Potential	A high amplitude magnetic anomaly identified during geophysical data review without sufficient data for precise positioning; areas to subject to further review during the site investigation programme in order to develop appropriate mitigation.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
Export cable corridor (ECC)	The specific corridor of seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) from the Hornsea Four array area to the Creyke Beck National Grid substation, within which the export cables will be located.
Hornsea Four	The proposed Hornsea Project Four offshore wind farm project; the term covers all elements within the Development Consent Order (i.e. both the offshore and onshore components).
Marine Environmental Data and Information Network (MEDIN)	The Marine Environmental Data and Information Network promotes sharing of, and improved access to, data collected and analysed by government departments, research institutions and private companies.
Model Clauses	Guidance issued by The Crown Estate; Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate, 2010)
Orsted Hornsea Project Four Ltd	The Applicant for the Hornsea Four project
Written Scheme of Investigation (WSI)	Project specific document forming the agreement between the client, the appointed archaeologists, contractors and the relevant stakeholders. The document sets out methods to mitigate the effects on all the known and potential archaeological receptors within the development area.

Acronyms

Acronym	Definition
AEZ	Archaeological Exclusion Zone
AAP	Area of Archaeological Potential
CIfA	Charted Institute for Archaeologists
DCO	Development Consent Order
dML	deemed Marine Licence
EIA	Environmental Impact Assessment
EIA Report	Environmental Impact Assessment Report (note that the new EIA Directive refers to an EIA Report and not an Environmental Statement)
GBS	Gravity Base Structure
HE	Historic England
MMO	Marine Management Organisation

Acronym	Definition
NSIP	Nationally Significant Infrastructure Project
OASIS	Online AccesS to the Index of archaeological investigationS
OSS	Offshore Substation
PEIR	Preliminary Environmental Information Report
PAD	Protocol for Archaeological Discoveries
RCS	Reactive Compensation Station
ROV	Remotely Operated Vehicle
TEZ	Temporary Exclusion Zone
WSI	Written Scheme of Investigation
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
WTG	Wind Turbine Generator

Units

Unit	Definition
GW	Gigawatt (power)
kV	Kilovolt (electrical potential)
kW	Kilowatt (power)
nT	Nanotesla (magnetic induction)

1. Introduction

1.1 Introduction

1.1.1.1 This outline Archaeological Written Scheme of Investigation (WSI) summarises the proposed mitigation approach in relation to the Hornsea Project Four Offshore Wind Farm (hereafter Hornsea Four) that will be located approximately 65 km offshore from the East Riding of Yorkshire in the Southern North Sea.

1.1.1.2 It is intended to set out the basis for the archaeological mitigation for Hornsea Four which will ultimately be confirmed through the development of the final WSI that will form the basis of agreement between the Applicant (Ørsted Hornsea Project Four Ltd), its contractors and relevant regulators.

1.1.1.3 The requirement for a WSI, to be approved by the Marine Management Organisation (MMO) in consultation with Historic England (HE), is included as Condition 12(2) of the Generation Assets deemed marine licence and Condition 14(2) of the Transmission Assets deemed marine licence in Schedule 11, Part 2 and Schedule 12 Part 2 respectively of the draft Development Consent Order (DCO) (**C1.1: Draft DCO including Draft DML**).

1.1.1.4 This outline WSI summarises the known and potential archaeology within the marine archaeological study area (**Figure 1**), expected impacts, and recommended archaeological mitigation methodologies and actions for a range of work phases within the marine environment. Each phase of work may require a more detailed Method Statement which will be prepared by appropriately qualified professionals and submitted to archaeological curators.

1.1.1.5 This outline WSI is primarily concerned with works required prior to and during construction as these activities have the greatest potential to impact historic environment assets. There is also consideration of potential mitigation during the operational phase of the wind farm and during future decommissioning works. This document does not consider any area of the development landward of Mean High Water Springs (MHWS).

1.1.1.6 The document been structured to consider required mitigation and offsetting works through archaeological actions in relation to the following offshore phases:

- Preconstruction
    - Survey and site investigations;
    - Seabed preparation;
- Construction:
    - Turbine foundation installation;
    - Inter-array and export cables;
    - Offshore substation, reactive compensation station (RCS);
    - Associated vessel works – jack-up vessels, anchorage, etc;
- Operation (including maintenance); and
    - Presence of foundations;

- Exposure of inter-array and export cables
- Use of cable protection measures,
- Associated vessel works – jack-up vessels, anchorage, etc;

- Decommissioning.
  - Removal of foundations
  - Removal of cables
  - Associated vessel works – jack-up vessels, anchorage, etc;

1.1.1.7 This outline WSI document has been compiled by Maritime Archaeology to accompany the Hornsea Four Preliminary Environmental Information Report (PEIR), and with due regard to advice from curators and regulators.

1.1.1.8 **Volume 5, Annex 10.1: Marine Archaeology Technical Report** incorporates a geophysical data review (**Appendix C** of **Volume 5, Annex 10.1**) and a paleogeographic review of geophysical survey data (**Appendix D** of **Volume 5, Annex 10.1**), together with a corresponding PEIR chapter (**Volume 2, Chapter 10: Marine Archaeology**), have been produced to identify the known and potential archaeology within the development area, review potential impacts, and present mitigation proposals; this outline WSI should be read in conjunction with these PEIR documents which provide detail on the archaeological baseline and the Hornsea Four scheme details.

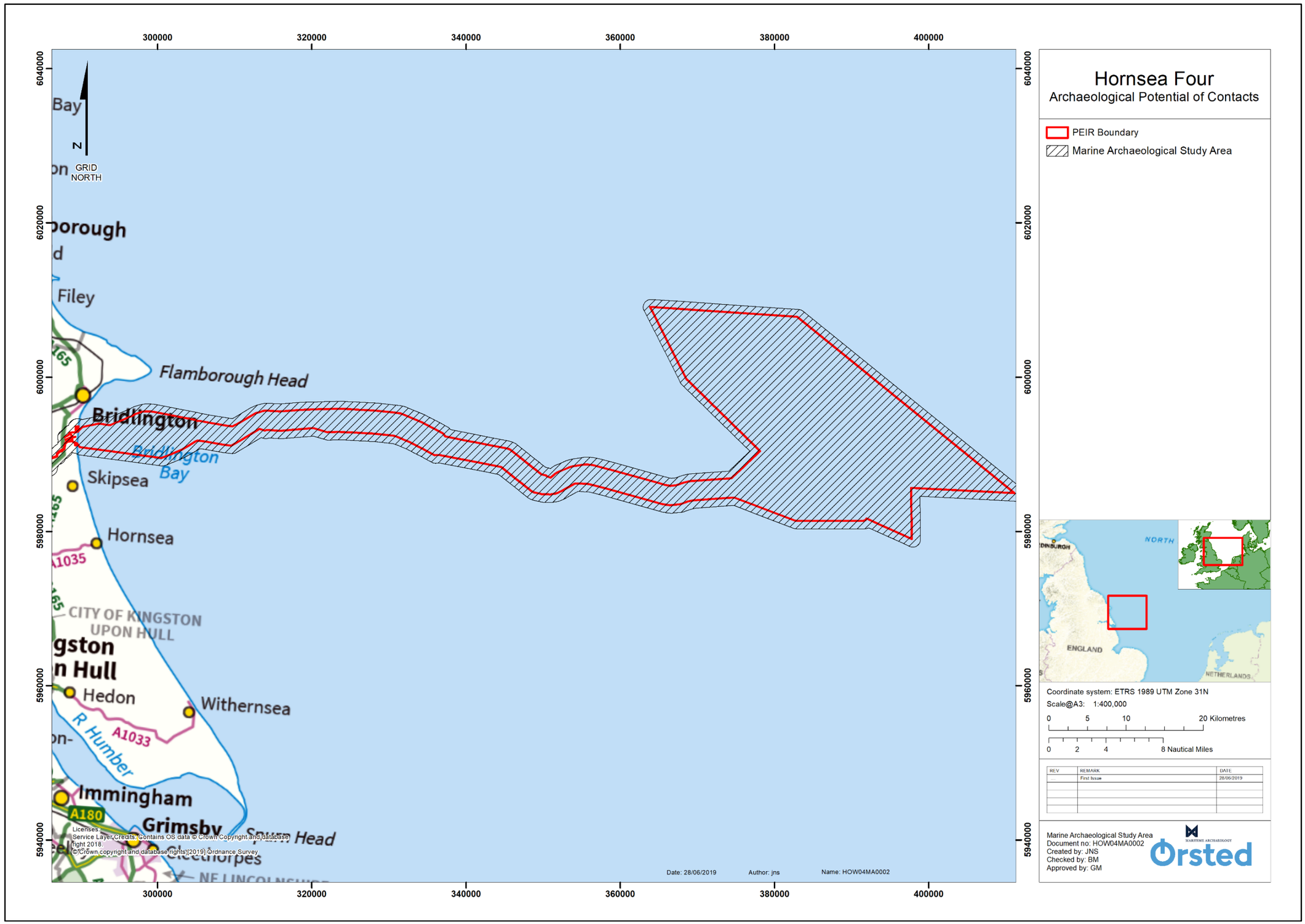


Figure 1: Marine archaeological study area (not to scale).

2. Implementation of the Outline WSI

2.1 Introduction

2.1.1.1 Primary responsibility for the delivery of the measures in this outline WSI lies with the Applicant. Through project documentation and procedures, the implementation of this outline WSI will involve archaeological contractors and curators.

2.2 Hornsea Four: Implementation

2.2.1.1 The Applicant will be responsible for implementing the outline WSI. The Applicant will ensure that all project personnel understand relevant archaeological requirements, particularly those where reporting may be required by contractors through the Protocol for Archaeological Discoveries (PAD) (The Crown Estate, 2014). Personnel responsible for communication of actions to the Applicant should be clearly appointed. This may include specific representatives on-board work vessels.

2.2.1.2 The Applicant will be responsible for maintaining a record of contacts related to the delivery of mitigation. This will include archaeological consultants, contractors and curators, in addition to Nominated Contacts within survey, sampling and construction contractors.

2.2.1.3 Any future archaeological works undertaken will require detailed Method Statements outlining methods and mitigation as outlined in Section 7.3.

2.3 Archaeological Curators: Implementation

2.3.1.1 The main archaeological curators involved in the agreement of this outline WSI and subsequent mitigation works are:

- Philippa Naylor, HE Marine Planning Team; and
- Keith Emerick, HE Yorkshire.

2.3.1.2 Archaeological curators will be provided with copies of all relevant project documentation. HE will take the lead for the offshore historic environment and the Work Packages outlined within this outline WSI.

2.4 Construction Contractors: Implementation

2.4.1.1 Construction contractors working within the marine zone, where Archaeological Exclusion Zones (AEZs) are in place and where the PAD is being used, must ensure all relevant personnel are aware of the associated requirements. This should include understanding the WSI and all procedures and lines of communication for reporting unexpected archaeological discoveries.

3. Development Scheme Details

3.1.1.1 Hornsea Four will involve the placement of up to 180 turbines and up to ten offshore for electrical infrastructure (nine offshore substations and one accommodation platform)

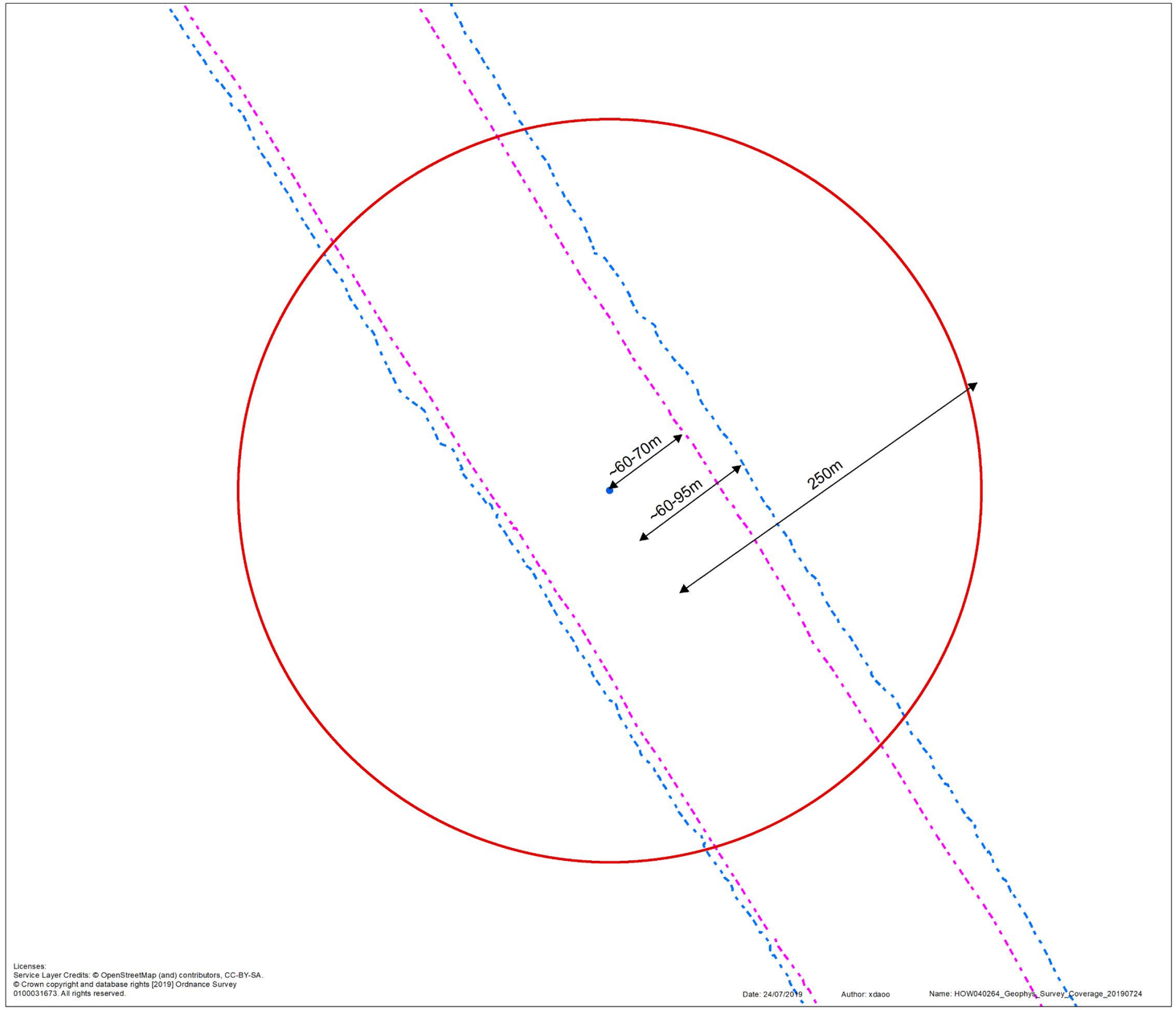
within the array area and 3 substations along the ECC, with the final layout to be defined at a later stage.

3.1.1.2 The following foundation types for turbines, offshore substations and accommodation platforms are being considered:

- Monopile (all);
- Monopod Suction Bucket (all)
- Piled Jacket (Wind Turbine Generator (WTG), Medium and Large Offshore Sub-station (OSS);
- Suction Bucket Jacket (WTG, Medium and Large OSS);
- Box type Gravity Base (Large OSS); and
- Pontoon Gravity Base Structure (GBS type 1 and 2)

3.1.1.3 Some form of seabed preparation may be required for each foundation type. Seabed preparations may include seabed levelling, ground reinforcement and removing surface and subsurface debris within the areas as illustrated on **Figure 2**, which shows the extent of initial side scan sonar (blue) and multibeam echo-sounder (pink) survey coverage within the 250 m buffer around each indicative turbine location (red). If debris are present below the seabed surface then excavation may be required for access and removal. The survey coverage, illustrated in **Figure 2**, is therefore crucial to identify potential debris and other features around the turbines to understand the requirements seabed preparation work. Further surveys will be undertaken ahead of construction, as detailed in **Table 6.**

3.1.1.4 Full details are provided in **Volume 1, Chapter 4: Project Description**.



Hornsea Four
Geophysical Survey
Coverage Diagram

- Indicative Turbine
- 250m Turbine Buffer (500m diamater)

Equipment

- Multi Beam Echosounder
- Side Scan Sonar

Coordinate system: ETRS 1989 UTM Zone 31N
Scale@A3: 1:2,500

0 25 50 100 Meters

0 0.0125 0.025 0.05 Nautical Miles

REV	REMARK	DATE
	First Issue	24/07/2019

Geophysical Survey Coverage Diagram
Document no: HOW040264
Created by: XDAOO
Checked by: KIEBE
Approved by: ELEAN

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Figure 2: Turbine works buffer (not to scale).

4. Summary of Archaeology and Cultural Heritage Baseline

4.1 Introduction

4.1.1.1 A detailed description of the archaeology and cultural heritage of the development area is available within **Volume 5, Annex 10.1: Marine Archaeology Technical Report**. A summary of the known and potential archaeology within the development area is presented here, with a focus on heritage assets which may be impacted by the development.

4.2 Palaeolandscapes

4.2.1.1 The presence of Holocene landscape features and deposits within the marine archaeological study area and its immediate vicinity has been demonstrated by the North Sea Palaeolandscapes Project (NSPP) (Gaffney *et al.* 2007: 43ff) **Figure 3** and the Humber Regional Environmental Characterisation (REC) (Tappin *et al.* 2011).

4.2.1.2 The NSPP data reveals a Mesolithic shoreline associated with the Outer Silver Pit, a vast sea inlet which existed to the south of Dogger Bank from 8,000-7,500 years ago, which extends into the north-eastern array area, along with fluvial systems with associated deposits across the rest of the ECC (**Volume 5, Annex 10.1: Marine Archaeology Technical Report**).

4.2.1.3 The likelihood of survival of the remains of Mesolithic activity and settlement on the Mesolithic shoreline, or within fluvial deposits is high. Sampling undertaken during the Humber Regional Environmental Characterisation (REC) study has shown that these deposits generally lie close to the surface of the seabed (**Volume 5, Annex 10.1: Marine Archaeology Technical Report**). It is therefore likely that the general area contains important prehistoric archaeological deposits and palaeoenvironmental evidence.

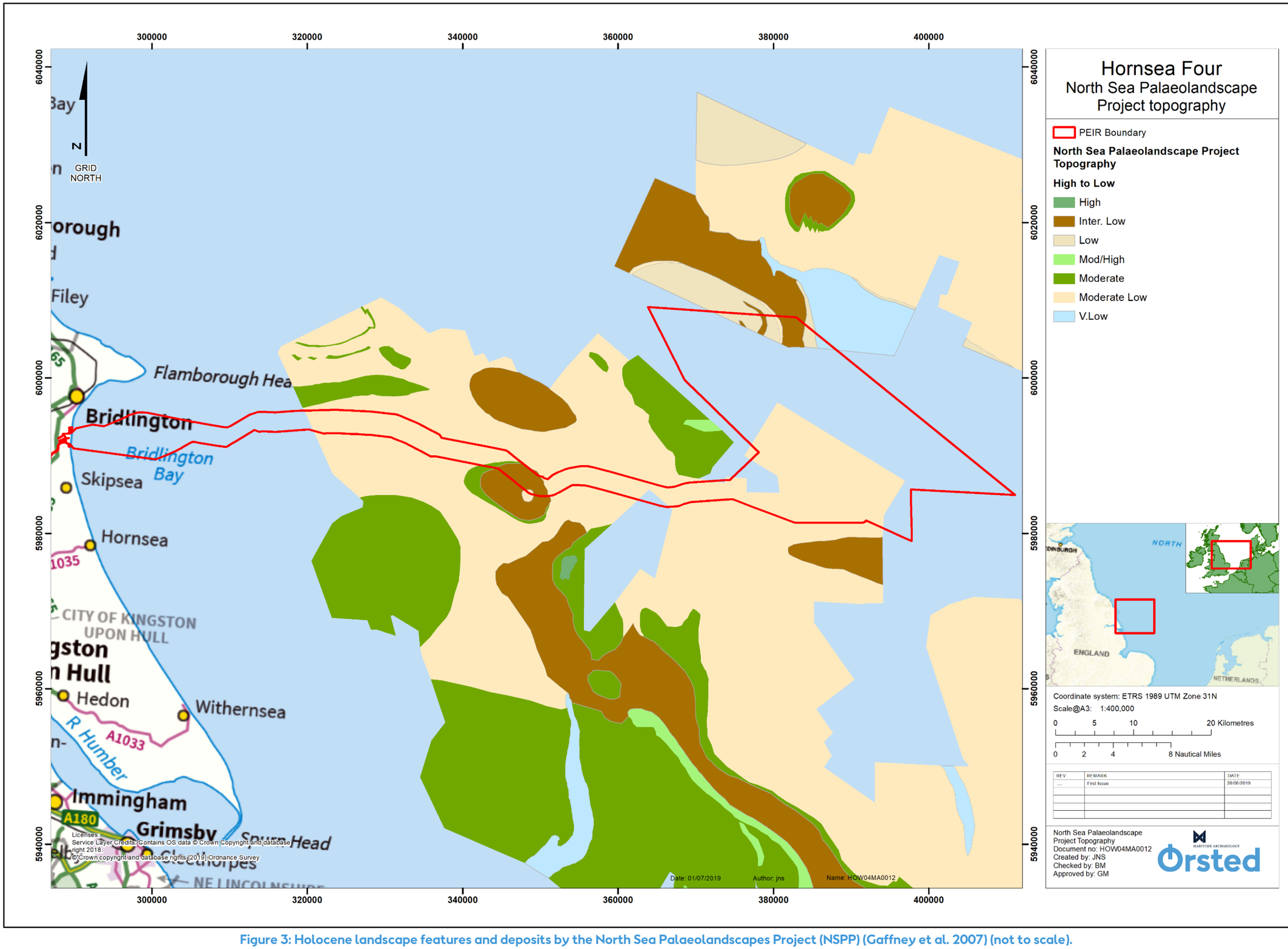

Figure 3: Holocene landscape features and deposits by the North Sea Palaeolandscapes Project (NSPP) (Gaffney et al. 2007) (not to scale).

4.3 Sedimentary horizons

4.3.1.1 Further a workshop followed by a Palaeogeographic Review of Geophysical Survey Data (**Appendix C** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report**) was undertaken which identified a sedimentary sequence and deposits of archaeological interest (in bold) as summarised in **Table 1**.

Table 1: Deposits of archaeological potential (Appendix C of Volume 5, Annex 10.1: Marine Archaeology Technical Report).

Deposit	Description
Holocene	During the Holocene period the site was characterised by terrestrial, intertidal and then fully marine conditions. A Holocene shoreline is likely to have run along the north-eastern edge of the array area and studies show palaeochannels dating to this period may be present within the array area. Marine sands are underlain by early Holocene channels cut into the earlier glacial channels (Botney Cut). Depressions in possible morraines and other glacial features along the export cable route may hold organic deposits of Holocene date.
HTG20	Glaciotectonite
Botney Cut	Related to the Late Devensian and Early Holocene period. Predominantly glacio-fluvial features and till. Some of the botney cut features may be re-interpreted as Bolders bank
Boulders Bank	Related to the Devensian period. Diamicton probably formed by an ice lobe, with probable internal sub-glacial channels. Different phases of Bolders Bank glacial activity within the area. Present as a blanket deposit in the southern part of the array area, with more erosive properties to the north.
HGT30	Glaciotectonite
Eem Formation	Related to the Ipswichian interglacial. Fine to medium grained shelly marine sands, or intertidal/sub-tidal deposits.
HTG40	Glaciotectonite
Egmond Ground	Fine grained marine sands interbedded with clays
HTG52	Glaciotectonite
Swarte Bank	Related to the Anglian glaciation. Primarily characterised by sub glacial valleys incised into the Yarmouth Roads formation and underlying deposits (where present)
Yarmouth Roads	Related to the Cromerian Period. Fluvial or deltaic deposits with sands, silts, clays and reworked peat. Partially equated with the onshore Cromer Forest Beds which are associated with in situ archaeological material at Happisburgh and Pakefield. Multiple phases of Yarmouth Roads Formation have been identified within the site. Internal Yarmouth Road reflectors are clearly visible within seismic data.
Chalk	Bedrock
Pre Chalk	Bedrock

4.4 Offshore – Maritime

4.4.1.1 Following Holocene sea level rise which caused the severing of (modern) Britain from the European landmass, the nature of the potential marine heritage encountered in the offshore zone becomes dominated by 'maritime' – ships, boats and shipborne debris.

4.4.1.2 Baseline information on the potential of the maritime historic environment has been summarised from **Volume 5, Annex 10.1: Marine Archaeology Technical Report**.

4.4.1.3 Data for known shipwrecks and recorded shipping losses within the marine archaeology study area were obtained from the United Kingdom Hydrographic Office (UKHO) and the National Record of the Historic Environment (NRHE).

4.4.1.4 There are 18 known wrecks within the PEIR boundary with 13 classed as LIVE. Further there are also seven foul and seabed obstructions within the PEIR boundary (**Figure 4**). The majority of the known wrecks are dated to the 20th century.

4.5 Geophysical assessments

4.5.1.1 The assessment of geophysical data as detailed in **Appendix C** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report** identified 129 contacts of potential anthropogenic origin within the PEIR boundary. One hundred and twenty-five of these are of low archaeological potential. The low potential contacts have been characterized as a mixture of small features or seabed contacts with associated magnetic anomalies. A further 24 magnetic anomalies over 100 nT but with no corresponding seabed contacts have been identified within the PEIR boundary. Further, three medium and two high potential anomalies were identified as described in detail in **Appendix C** and **Section 5.3** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report**.

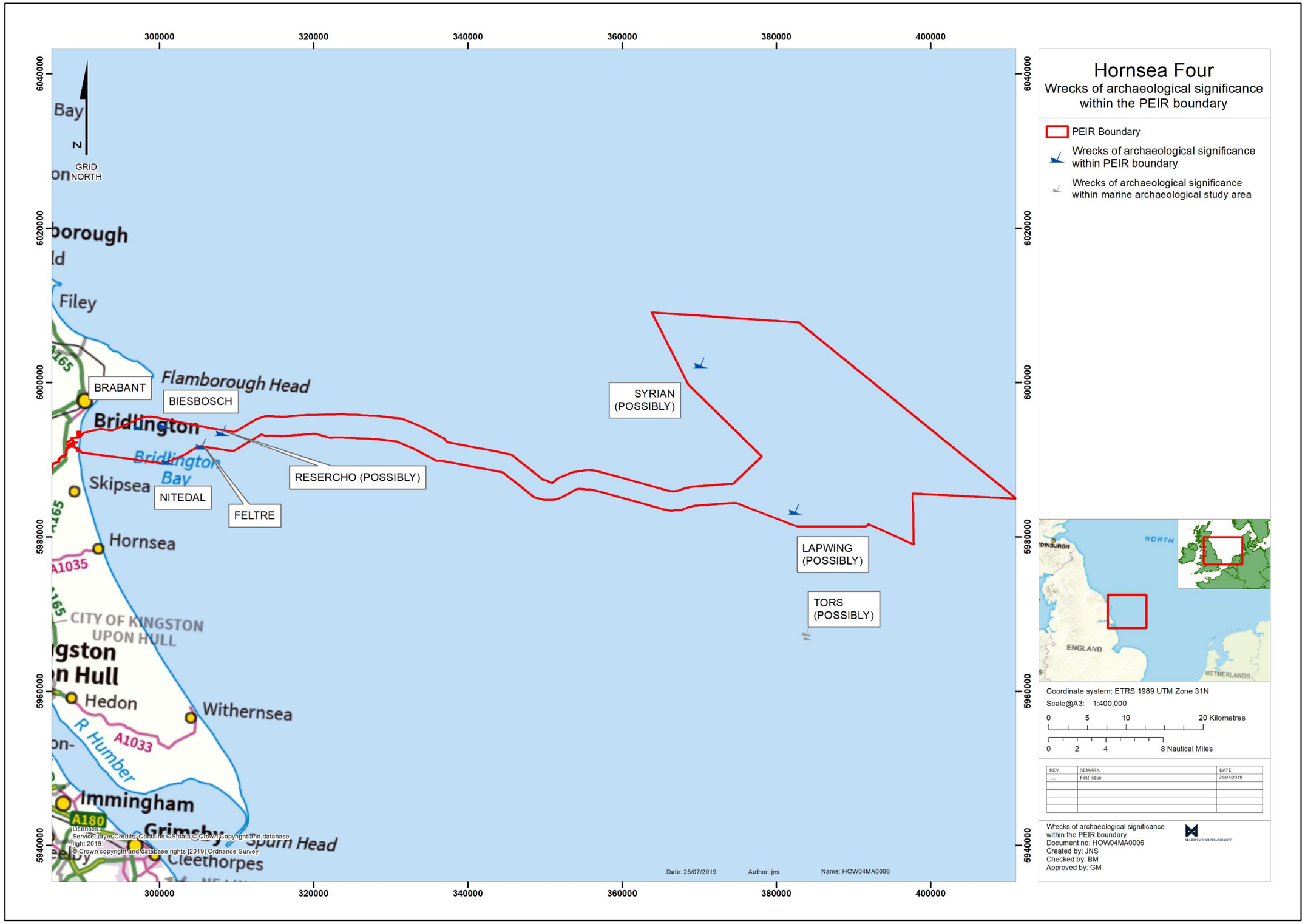

Figure 4: Known wrecks and obstructions (not to scale).

4.6 Potential Impacts

4.6.1.1 The impact assessment was carried out in accordance with the methodology set out in **Volume 1, Chapter 5: Environmental Impact Assessment Methodology**; this includes a summary of the Maximum design Scenario (MDS).

4.6.1.2 Heritage considerations of relevance to all phases of Hornsea Four's lifecycle are:

- Under the Protection of Wrecks Act 1973, if a wreck of historical, archaeological or artistic importance were to be discovered then it would be possible for it to be designated at very short notice. This has the potential to disrupt construction activities and associated timetables; and
- Under the Protection of Military Remains Act 1986, if a crashed military aircraft was discovered in the course of construction then it is automatically protected. It is then an offence to undertake unauthorised disturbance of the site unless under licence; and
- Under the Burial Act 1857, if human remains are discovered in the course of site; and investigations or construction it is unlawful to remove or disturb human remains without authority. The Department of Constitutional Affairs is responsible for burials in England. These authorities should be contacted respectively if human remains are encountered (also see COWRIE 2008).

4.6.1.3 The potential impacts of Hornsea Four upon archaeology and cultural heritage are summarised in **Table 2**.

Table 2: Potential impacts on heritage receptors.

Phase	Potential impact
Construction	**Direct** or **indirect** impacts to potential archaeological receptors and / or their physical setting from: Site and seabed preparation (seabed levelling; removing surface and subsurface debris, excavation and dredging) Vessels movements (anchoring/ mooring and the deployment of jack-up vessels) Installation of infrastructure (vessel movement, foundations construction) Offshore cable installation (vessel movements, array, export and interconnector cables and landfall works)
Operation	**Direct** impacts to potential archaeological receptors and / or their physical setting from: Anchors of vessels deployed during periodic overhauls and scheduled and unscheduled maintenance; and use of jack-up vessels. **Indirect** impacts comprising either increased protection to, or deterioration of, known and potential archaeological receptors caused by: changes to the tidal regime due to the presence of the windfarm foundations; changes to the wave regime due to the presence of the windfarm foundations; changes to the sediment transport regime due to the presence of the windfarm foundations; introduction of scour effects due to the presence of the windfarm foundations; and introduction of scour effects due to exposure of inter-array, interconnector and export cables.
Decommissioning	**Direct** impacts to potential archaeological receptors and / or their physical setting from: Vessels movements (anchoring/ mooring and the deployment of jack-up vessels) The removal of infrastructure (vessel movement, foundation removal) If relevant, offshore array, and export cable removal (Vessel movements, array cable, export cable and interconector removal.

5. Embedded Mitigation

5.1 Introduction

5.1.1.1 Embedded mitigation measures are referred to as Commitments by the Applicant, and the terms are used interchangeably. Embedded mitigation measures (Commitments) are embedded within the assessment at the relevant point in the EIA (e.g. at Scoping or PEIR).

5.1.1.2 At Scoping, embedded mitigation measures (Commitments) are either primary (design) and/or tertiary (guidance). At PEIR the embedded mitigation measures (Commitments) may also include secondary commitments (i.e. proposed mitigation measures to reduce significant impacts/effects to environmentally acceptable levels).

5.1.1.3 Impact on the archaeological resource is mitigated by the precautionary principle, based on the prevention of damage to receptors by proactively putting in place protective measures rather than attempting to repair damage after it has occurred.

5.1.1.4 The Applicant has made several commitments as a part of the preapplication process to ensure that significant impact on archaeological receptors will not occur during the construction, operation or decommissioning of the wind farm and associated infrastructure as detailed in **Table 3** . All commitments and their method of security in documented in **Volume 4, Annex 5.2: Commitments Registe**r.

Table 3: Marine archaeology commitments.

ID	Measure Proposed
Co46	Primary: The offshore export cable corridor and the array will be routed to avoid any identified archaeological receptors pre-construction, with buffers as detailed in the Marine Written Scheme of Investigation WSI.
Co140	Primary: Archaeological exclusion zones (AEZs) will be established in the Marine WSI in accordance with the outline Marine WSI (document reference **F2.4**), to protect any known / identified marine archaeological receptors.
Co141	Tertiary: A Marine Written Scheme of Archaeological Investigation (WSI) will be developed in accordance with the Outline Marine WSI. The Marine WSI will include the implementation of a protocol for Archaeological Discoveries in accordance with 'Protocol for Archaeological Discoveries: Offshore Renewables Projects' (The Crown Estate, 2014).
Co166	Secondary: A geophysical survey (including a UXO survey) will be undertaken prior to construction and will be subject to a full archaeological review in consultation with Historic England.
Co167	Secondary: A geotechnical survey will be undertaken prior to construction, including a staged geoarchaeological assessment and analysis of geotechnical data inclusive of publication, in consultation with Historic England.

5.2 Mitigation: known wrecks and obstructions

5.2.1.1 Eighteen known wrecks identified in the data provided by UKHO are located within the PEIR boundary. Of the 18 wrecks, 13 are classed as LIVE. Further there are seven foul and seabed obstructions within the PEIR boundary. Of the 25 known heritage receptors two wrecks correlate with the geophysical data assessed for archaeological potential as detailed below.

5.2.1.2 Wrecks and obstructions are further classified in a number of ways by the UKHO:

- LIVE: Wreck considered to exist as a result of detection through survey;
- DEAD: Not detected over repeated surveys, therefore not considered to exist in that location;
- LIFT: Wreck has been salvaged; and
- ABEY: Existence of wreck in doubt and therefore not shown on charts.

5.2.1.3 As per commitment Co140 in **Table 3,** precautionary Archaeological Exclusion Zones (AEZ's) of 50 m are recommended for all 25 known heritage receptors outlined in **Section 3.3** and **Appendix A** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report**.

5.3 Mitigation: geophysical anomalies

5.3.1.1 The combined geophysical archaeological data assessment undertaken by MSDS Marine (**Appendix C** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report**) identified 153 contacts of archaeological potential within the PEIR boundary as outlined in **Table 4**.

Table 4: Contacts of archeologically potential.

Archaeological potential	Contacts	AEZs
Low	124	n/a
Medium	3	3
High	2	2
Isolated magnetic anomalies >100 nT	24	n/a
Total	**153**	**6**

5.3.1.2 Contacts of low archaeological potential and isolated magnetic anomalies are deemed unlikely to be of archaeological significance have not been assigned AEZs. All contacts have been further detailed in **Appendix C** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report.**

5.3.1.3 As per commitment Co141 in **Table 3,** if any works during the construction, operational and decommissioning phases of the project is taking place on any of the locations the project specific protocol for archaeological discoveries (**Appendix A** of this document) should be utilised and any objects of archaeological potential should be reported.

5.3.1.4 The AEZ radius has been given on a case-by case basis and determined from the centre point of the contact or associated group of contacts.

5.3.1.5 As per commitment Co46, and Co140 in **Table 3**, mitigation of impact on five features of medium and high archaeological significance or potential, identified in the assessment of the baseline and geophysical data, is recommended by the establishment of AEZs as summarised in **Table 5**, **Figure 2** and detailed in **Appendix C** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report**.

Table 5: Proposed AEZs.

Contact ID	Potential	Basic Description	Easting	Northing	AEZ Radius (m)
MSDS_HOW04_2019_ARCH_0086	High	Potential wreck	379559.3	5994689.6	75
MSDS_HOW04_2019_ARCH_0224	High	Wreck	382353.2	5983573.2	100
MSDS_HOW04_2019_ARCH_0079	Medium	Potential anthropogenic debris	374099.1	6002824.4	15
MSDS_HOW04_2019_ARCH_0088	Medium	Potential ballast mound	387801.1	5984995.7	30
MSDS_HOW04_2019_ARCH_0234	Medium	Potential anthropogenic debris with large magnetic anomaly	385666.0	5993861.0	25

5.3.1.6 Discrete magnetic anomalies >100 nT have been identified as likely to be anthropogenic and have archaeological potential. However, due to the uncertainty of the exact position of features identified in only a single magnetometer survey line, suitable AEZs cannot be confidently or accurately assigned. Therefore, such features are designated as Areas of Archaeological Potential (AAPs) for which an elevated level of awareness is required during the development programme. Full details of AAPs are provided in **Appendix A** of **Volume 5, Annex 10.1: Marine Archaeology Technical Report**.

5.3.1.7 As per commitment Co141 in **Table 3**, if any works during the construction, operational and decommissioning phases of the project is undertaken within any of the Areas of Archaeological Potential (AAPs), the project-specific protocol for archaeological discoveries (**Appendix A** of this document) should be utilised and any objects of archaeological potential should be reported.

5.4 Mitigation for unexpected archaeological discoveries

5.4.1.1 As per commitment Co141 in **Table 3,** where there is potential to encounter unexpected sites, objects or deposits of archaeological interest not located during previous archaeological assessments, a project specific PAD will be implemented. The Hornsea Four PAD is presented in **Appendix A** of this document.

5.4.1.2 The Hornsea Four PAD has been produced based on the Offshore Renewables Protocol for Archaeological Discoveries (The Crown Estate 2014).

5.4.1.3 The Hornsea Four PAD aims to mitigate impact on the historic environment by enabling people working offshore to report their finds in an effective and convenient manner.

5.4.1.4 The protocol anticipates discoveries being made by project staff who report to a Site Champion (potentially the Client representative of the vessel or other manager appointed by the contractor), who then reports to the Applicant's nominated person to co-ordinate implementation of the protocol (the Nominated Contact) (see **Appendix A** of this document, **Figure A1**).

5.4.1.5 All discoveries of archaeological material must be reported by the Applicant, in accordance with the communication plan, to the Nominated Contact, who will inform the Retained Archaeologist. If the find constitutes 'wreck' within the terms of the Merchant Shipping Act

1995 then the Retained Archaeologist will produce a report to the Receiver of Wreck. Full contact details for all relevant parties are included in the project-specific PAD (Appendix A of this document).

5.4.1.6 Any finds discovered should be safeguarded i.e. kept in water in a clean, covered container. It is not recommended to remove concretions, clean the finds, or in any other way interfere with them.

5.4.1.7 Following the mitigation works outlined above, there may be other discoveries that have not been previously characterised through geophysical assessment that may require Temporary Exclusion Zones (TEZs) to be established. TEZs must be respected during all activities associated with the wind farm construction. Measures must be put in place to communicate the position of TEZs to all contractors and to monitor compliance with the TEZs during construction.

5.4.1.8 The TEZ may be lifted following advice or may form the basis of an AEZ in the event that further disturbance must be avoided.

5.5 Further archaeological works

5.5.1.1 There are a range of mitigation requirements related to the various construction, operation and decommissioning activities. A number of the required mitigation measures, as detailed in Co166 and Co167 in Table 3, can be undertaken prior to construction, some of which may be on-going concurrently. Other actions are linked to particular construction activities.

5.5.1.2 Future planned works potentially impacting on potential archaeological receptors will require detailed Method Statements to be agreed by the relevant curator/s. Archaeological works may be undertaken as separate investigations depending on the timing of work or as part of other project campaigns. Reports generated from each archaeological commitment should be made available between relevant contractors as soon as they become available.

5.5.1.3 Table 6 outlines the completed and planned site specific surveys and data. Each phase will generate data (both geophysical and geotechnical) that will be reviewed, as per commitment Co166 and Co167 (Table 3). Generally, each phase will provide incrementally greater resolution and more complete coverage as the final scheme footprint becomes ever more defined.

Table 6: Summary of site-specific survey data.

Title, year and reference	Summary	Coverage of Hornsea Four
Geophysics 1A Pre-application survey Data acquired during summer 2018 and 2019	Survey works to inform the application process and characterize the PEIR area. Line spacing is generally wide and the survey is not full coverage. Sensors: Multibeam Echosounder (MBES), Side Scan Sonar (SSS), Magnetometer (MAG), Sub-bottom Profiler (SBP), in the array area also Ultra-high Resolution Seismic (UHRS).	Limited coverage of the Hornsea Four array area and export cable route (ECR)
Geophysics MBES Pre-development survey Planned for summer 2020	Full coverage MBES survey (low resolution, i.e. not for target picking)	Array and export cable areas

Title, year and reference	Summary	Coverage of Hornsea Four
Geophysics 1B Pre-development survey Planned for summer 2021	Survey works to inform design and development. (Insonifies seabed contacts >0.5m.) Sensors: MBES, SSS, MAG, SBP, (UHRS).	Targeted areas in array and export cable areas
Geophysics 1C Pre-Geotech surveys Takes place prior to each of the geotechnical campaigns. So far pre-GT1A-ECR area completed in 2018, pre-GT1A-Array area planned for spring 2020	Survey works to mitigate risk of UXO at geotechnical locations. (Insonifies seabed contacts > 0.3m.) Sensors: MBES, SSS, MAG, SBP.	Each position where geotechnical samples will be obtained.
Geophysics 2A Pre-construction survey Timing depends on construction date	High-resolution survey suitable for the detection of UXO. (Insonifies seabed contacts > 0.3 m.) The survey will inform the final route planning, UXO clearance works and final archaeological mitigation. Sensors: MBES, SSS, MAG, SBP.	Full coverage within installation corridors/areas
Geophysics 2B UXO campaign Timing depends on construction date	Inspection of potential UXO targets and demolition of confirmed UXO. ROV works.	Inspection on positions flagged for potential UXO within all installation corridors/areas
Geotechnical 1A Pre-development planning Planned for spring 2020	On and offshore, deep and shallow sampling and testing (boreholes/Vibrocores and CPTs) collected to support consenting and engineering requirements and the potential for deposits of geoarchaeological interest for	Array site and export cable route (Coverage and location awaiting confirmation.
Geotechnical 1B Pre-development planning Planned for spring 2021	On and offshore, deep and shallow sampling and testing collected to derive design values for soil properties on specific designated areas and /or locations (including OSS and RCS)	Array and export cable (Coverage and location awaiting confirmation)
Geotechnical 2 Post FID Timing depends on construction date	On and offshore deep and shallow sampling and testing collected to confirm ground conditions on selected locations to enable and complete most economic detailed design, mitigate installation risks and fill data gaps in the previously obtained information	Array and export cable (Coverage and location awaiting confirmation)

6. Responsibilities and Communication

6.1 Hornsea Four

6.1.1.1 The implementation of the final WSI document will be the responsibility of the Applicant.

6.1.1.2 Consultation with HE will be maintained throughout the mitigation works. Curatorial responsibility for the aspects of Hornsea Four seaward of MHWS resides with HE.

6.1.1.3 Communication with the archaeological curators is the responsibility of the Applicant. The Applicant may engage a Retained Archaeologist to implement the final WSI. The Applicant

may engage one or more archaeological contractors to deliver the mitigation measures set out within this outline WSI.

6.1.1.4 The Applicant will advise the Retained Archaeologist of all requirements or responsibilities related to communication with curators and contractors, or in relation to scheme-wide documentation such as Environmental Management Plans.

6.1.1.5 The Applicant is responsible for all communication with contractors engaged for construction activities.

6.2 Retained archaeologist / archaeological contractors

6.2.1.1 The Retained Archaeologist will report to the Applicant.

6.2.1.2 The Retained Archaeologist will provide advice to the Applicant to inform communication with the curators and contractors in relation to implementation of the final WSI. The responsibilities of the Retained Archaeologist are as follows:

- Maintaining, reviewing and updating the WSI, as required;
- Advising the Applicant's Contractor(s) as to which activities warrant archaeological involvement;
- Advising the Applicant's Contractor(s) in the course of evaluating scope of work specifications on their capacity to meet archaeological requirements;
- Advising the Applicant on the necessary interaction with third parties with archaeological interests, including the archaeological curators;
- Advising the Applicant on the implementation of generic archaeological requirements applicable to all construction activities;
- Advising the Applicant on Method Statements for archaeological investigations (which should be submitted to the curators);
- Implementing and monitoring the PAD;
- Monitoring the work of and liaising with the archaeological contractor(s) where this is not the Retained Archaeologist;
- Monitoring the preparation and submission of archaeological reports as appropriate and making them available to the archaeological curators;
- Ensuring provision for the management of the Applicant's material archive in consultation with an appropriate museum or suitable repository; and
- Advising the Applicant on final arrangements for analysis, archive deposition, publication and popular dissemination.

6.3 Archaeological Curators

6.3.1.1 As required, Method Statements, reports and deliverables will be submitted to the archaeological curators by the Applicant. Method Statements or other documents related to scheme-specific programming will be highlighted to the curators as requiring their agreement/ acceptance within a particular timescale. If no response is received from the curator within a reasonable period to be agreed with the curator(s), then it will be assumed that the curator(s) agree with the proposals/ documentation.

6.4 Construction contractors

6.4.1.1 The construction contractors will report to the Applicant and should further;

- Familiarise themselves with the applicable requirements of the final WSI and make it available to their staff;
- Obey legal obligations in respect of 'wreck' and 'treasure' under the Merchant Shipping Act 1995 and the Treasure Act 1996 respectively;
- Respect constraint maps and AEZs;
- Assist and afford access to archaeologists employed by the Applicant;
- Inform the Retained Archaeologist of any environmental constraint or matter relating to health, safety and welfare of which they are aware that is relevant to the archaeologists' activities; and
- Implement the project-specific PAD.

7. Scheme of Investigations

7.1 Introduction

7.1.1.1 This scheme of investigation represents a general foundation for all further archaeological works that may eventually be a condition of consent and will be updated, post-consent, to detail the specific packages of archaeological works that have been agreed. Individual Method Statements for each package of works will be produced to detail the nature of archaeological works to be carried out.

7.1.1.2 The Method Statements and specifications in this document are based on archaeological best practice and guidance for offshore development. The principal sources are:

- Standard and guidance for the collection, documentation, conservation and research of archaeological materials (CIfA 2014a);
- Standard and guidance for commissioning work on, or providing consultancy advice on, archaeology and the historic environment (CIfA 2014b);
- Standard and guidance for archaeological field evaluation (CIfA 2014c);
- Standard and guidance for nautical archaeological recording and reconstruction (CIfA 2014d);
- Standard and guidance for an archaeological watching brief (CIfA 2014e);
- Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects. Guidance issued by The Crown Estate;
- Joint Nautical Archaeology Policy Committee (JNAPC) Code for Practice for Seabed Development 2006;
- Collaborative Offshore Wind Research into the Environment (COWRIE) Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy, 2008;
- Collaborative Offshore Wind Research into the Environment (COWRIE) Historic Environment Guidance for the Offshore Renewables Energy Sector (2007); and
- The Protocol for Archaeological Discoveries: Offshore Renewables Projects (ORPAD) (The Crown Estate 2014).

7.1.1.3 The scheme of investigation outlined below includes guidance outlining the requirements and expected standards in relation to:

- Recording, reporting, data management and archiving;
- Samples and artefacts;
- AEZs;
- Marine geophysical investigations;
- Marine geoarchaeological investigations;

- Investigations using divers and/or Remotely Operated Vehicles (ROVs); and,
- Watching briefs.

7.2 Archaeological Recording, Reporting, Data Management and Archiving

7.2.1.1 Any future archaeological works will be accompanied by written reports pursuant to the requirements of those works and demonstrating appropriate planning, recording and data management and commitment to archiving and public dissemination of results according to the guidance set out in Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate 2010) and Historic Environment Guidance for the Offshore Renewables Energy Sector (COWRIE 2007).

7.3 Method Statements

7.3.1.1 Any future archaeological works, including those required as a condition of consent, will be subject to a Method Statement being prepared.

7.3.1.2 Each Method Statement will be submitted to the Archaeological Curators and archaeological works will not commence unless the Archaeological Curators have confirmed their agreement.

7.3.1.3 Method Statements will include provision for Archaeological Curators to monitor the conduct of the archaeological work as appropriate.

7.3.1.4 Unless otherwise agreed, the Method Statements will address the following matters:

- Form of commission and contractual relationship with the Applicant;
- Relations between licence condition(s), WSI and the Method Statement;
- Context in terms of relevant construction works;
- Summary results of previous archaeological investigations in the vicinity;
- Archaeological potential;
- Specific objectives of archaeological works;
- Extent of investigation;
- Investigation methodology, to cover:
    - intrusive methods;
    - recording system;
    - finds, including the policy for selection, retention and disposal and provision for immediate conservation and storage;
    - environmental sampling strategy; and
    - anticipated post-investigation actions, including processing, assessment and analysis of finds and samples;
- Reporting, including Intellectual Property Rights in the report and associated data, confidentiality and timescale for deposition of the report in a publicly accessible archive;
- Timetable, to include investigation and post investigation actions;
- Monitoring arrangements, including monitoring by Archaeological Curators; and,
- Health, safety and welfare.

7.3.1.5 Examples of campaigns where archaeological input is recommended are included in **Section 7.3**. A Method Statement should be produced and approved before any works can commence.

7.4 Archaeological campaigns

7.4.1.1 For all aspects of marine geophysical investigations, the Applicant will adhere to standards and guidance as set out in the Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate, 2010) document. The archaeological assessment of new marine geophysical data will aim to avoid significant impacts through aiding further identification and clarification of known and potential receptors as stated in Co166 (**Table 3**). The acquisition and review of new data for archaeological purposes will also contribute to any requirements to offset unavoidable impacts to potential archaeology.

7.4.1.2 The specification of any proposed marine geophysical surveys whose primary aim is non-archaeological will be subject to advice from an archaeological contractor to ensure that archaeological input is provided at the planning stage and to enable archaeological considerations to be considered without compromising the primary objective of the survey. Where a survey is carried out primarily to meet archaeological objectives, the specification shall be prepared by the Retained Archaeologist and carried out by a survey contractor.

7.4.1.3 Where archaeological objectives have been added to a survey whose primary objectives are non-archaeological (e.g. engineering or environmental), consideration will be given to the option of having an archaeologist or geophysicist with appropriate archaeological expertise onboard during the acquisition of data. If archaeologists are onboard, they will advise on the suitability for archaeological purposes of the data being acquired and be able to propose minor changes to the survey method, settings, etc. in order to optimise archaeological results, and thereby minimise the need for repeat surveys.

7.4.1.4 New geophysical survey data will be interpreted by an archaeologist with an appropriate level of expertise. Raw survey data, together with factual reports and trackplots, will be made available in digital formats to an archaeological contractor. The results of further geophysical interpretation will be compiled as an archaeological report consistent with Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate, 2010) on reporting.

7.4.1.5 Archaeological involvement in the planning, acquisition and review of any geotechnical surveys including pre-construction and future monitoring surveys should be provided. Any necessary archaeological analysis, of any material obtained, will follow a staged approach as outlined in *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (COWRIE, 2011), to satisfy the requirements of the Archaeological Curators and ensure that the required mitigation measures are delivered as outlined in Co167 (**Table 3**).

7.4.1.6 It is possible that certainty of the nature and extent of individual receptors or anomalies may only be achieved through the use of diver and/or ROV survey. For all aspects of archaeological investigations using divers or ROVs, the Applicant will adhere to standards and guidance as set out in the Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate, 2010) document. In order to maximise the potential benefits of any proposed diver/ ROV surveys undertaken primarily for engineering, ecological or other non-archaeological purposes, the Applicant will seek archaeological input at the planning stage of any such works. Where the primary objectives of dive survey are non-archaeological, consideration will be given to having an archaeological contractor present during any diver or ROV surveys, either as observer(s) or

participating diver(s) to optimise archaeological results and thereby reduce the need for repeat survey. Following the completion of a non-archaeological diver/ROV survey, all data, including video footage, will be reviewed by an archaeological contractor with appropriate expertise.

7.4.1.7 Archaeological diver or ROV-based investigations will take place where the primary objectives are archaeological, and the diving is led by archaeologists. An archaeological diver or ROV-based assessment may be required where it is not possible to protect an archaeological site through avoidance. The results of which will be compiled as an archaeological report consistent with the Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate, 2010) on reporting.

7.4.1.8 Archaeological Watching Briefs by a suitably qualified archaeologist may be applicable where material will be moved or removed from the seabed and can be visibly assessed. Further, a Watching Brief is a formal programme of archaeological monitoring and will involve attendance by an archaeological contractor during offshore works as described below;

- Excavated surfaces and material will be, where possible, inspected by the archaeological contractor;
- Any finds will be collected and allocated a record number and their position will be logged;
- Archaeological features or structures will be examined;
- Where possible, a sufficient sample of each layer/feature type will be investigated in order to elucidate the date, character, relationships and function of the feature/structure;
- Recording will include written, drawn, and photographic elements as conditions allow; and
- The results of will be compiled as an archaeological report consistent with the Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate, 2010) on reporting.

7.5 Reporting and publication

7.5.1.1 Any reports should be prepared in accordance with the guidance provided in the relevant CIfA Standard and Guidance and with reference to any other activity or analysis specific guidance.

7.5.1.2 Reports are expected to detail the work undertaken and the archaeological evidence encountered. They should discuss the importance of the results including their potential contribution to archaeological knowledge and understanding.

7.5.1.3 The reports will typically include:

- A non-technical summary;
- The aims and methods of the work;
- The results of the work including finds and environmental remains;
- A statement of the potential of the results;
- Proposals for further analysis and publication; and
- Illustrations and appendices to support the report.

7.5.1.4 Where appropriate, the report should provide recommendations for further assessment and/ or analysis requirements. Each report will be submitted by the Applicant to the curator, as well as to appropriate National and Regional repositories.

7.6 Artefacts

7.6.1.1 Artefacts that are exposed in the course of scheme works will be recovered by the archaeological contractor or, where recovery is impracticable, recorded. From the point of discovery, all finds will be held by the archaeological contractor in appropriate conditions pending further recording, investigation, study or conservation.

7.6.1.2 Recovered objects will be selected, retained or disposed of in accordance with the policy agreed with the institution receiving the archive, and in consultation with the Archaeological Curators.

7.6.1.3 Contingency will be made for specialist advice and conservation needs on-site should unexpected, unusual or extremely fragile and delicate objects be recovered.

7.7 Post-fieldwork Assessment

7.7.1.1 Post-fieldwork assessment of archaeological materials is currently not expected or required. Should the recovery of archaeological material be deemed necessary then decisions regarding the scope of post-fieldwork assessment will be made by agreement between the Applicant and Archaeological Curators following submission of investigation reports. These decisions will be based on the possible importance of the results in terms of their contribution to archaeological knowledge, understanding or methodological development.

7.8 Ordnance

7.8.1.1 In the event that any item(s) of ordnance is discovered it should be treated with extreme care as it may not be inert. Industry guidelines provided by the Applicant must be followed prior to any recording of items for archaeological purposes.

7.9 Human Remains

7.9.1.1 In the case of the discovery of human remains, at all times they should be treated with due decency and respect. For each situation, the following actions are to be undertaken, and in any event, the Retained Archaeologist will inform the Applicant and Archaeological Curators:

- For human remains on land and in intertidal areas, application should be made to the Ministry of Justice for an exhumation licence under the Burial Act 1857;
- For human remains within territorial waters where the remains have been intentionally buried, application should be made to the Ministry of Justice for an exhumation licence; and
- In all other cases, the Retained Archaeologist will immediately inform the Coroner and the Police.

7.9.1.2 Where practical, the human remains will be left in situ, covered and protected. Where human remains have been found and development will unavoidably disturb them, the remains will be fully recorded, excavated and removed from the site.

7.10 Aircraft

7.10.1.1 The majority of aircraft wrecks are military and so fall under the legal protection of the Protection of Military Remains Act 1986.

7.10.1.2 Any finds that are suspected of being military aircraft will be reported immediately to the Retained Archaeologist (where appointed). In the case of a military aircraft being investigated under license, any human remains will be reported immediately.

7.11 Wreck

7.11.1.1 Archaeological artefacts that have come from a ship are 'wreck' for the purposes of the Merchant Shipping Act 1995. The Applicant, via their archaeological contractors, should ensure that the Receiver of Wreck is notified within 28 days, either on behalf of or directly by the Applicant for all items of wreck that have been recovered.

7.12 Conservation and Storage

7.12.1.1 All recovered materials, on land and underwater, will be subject to a Conservation Assessment to gauge whether special measures are required while the material is being held.

7.12.1.2 This Conservation Assessment will be carried out by the Retained Archaeologist or an archaeological contractor with an appropriate level of expertise, with advice from appropriate specialists.

7.12.1.3 The Retained Archaeologist (where appointed) or an archaeological contractor with appropriate expertise will implement recommendations arising from the Conservation Assessment.

7.12.1.4 Where no special measures are recommended, finds will be conserved, bagged, boxed and stored in accordance with industry guidelines. The cost of long-term care and conservation of recovered artefacts will be the responsibility of the Applicant.

7.13 Archiving

7.13.1.1 Archiving should follow best practice as laid out within:

- Brown, D. (2011) Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation. Archaeological Archives Forum;
- IfA, Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives; and
- The Crown Estate (2010) Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (Section 2.8: Archiving).

7.13.1.2 Archive planning should be included within the relevant detailed Method Statement. Agreement with the Archaeological Curators should be sought on the most appropriate archiving repository for either individual reports or the scheme as a whole.

7.13.1.3 As a minimum, copies of all reports will be submitted to the NRHE of England. An Online AccesS to the Index of archaeological investigationS (OASIS) form will be produced for the whole project and copies of associated reports will be attached to this report. The NRHE of England will also be provided with notice of submission of the OASIS form.

7.13.1.4 An accession number will be obtained from the receiving repository and the Project archive should then be deposited with any potential finds. The receiving repository should be notified of archaeological investigations in advance of fieldwork. For offshore digital data, it may be appropriate to archive this with a MEDIN Marine Environmental Data and Information Network (MEDIN) Digital Archive Centre (DAC).

7.13.1.5 All costs of archiving (whether digital, paper or object) will be met by the Applicant. Tenders for such works should include provision for the preparation and deposition of expected archive.

8. Arrangements for Review of the WSI

8.1.1.1 This outline WSI has presented mitigation measures based on the archaeological assessments undertaken in preparation of the Hornsea Four PEIR.

8.1.1.2 The requirement for a WSI to be in place and approved is set out in Condition 12(2), Schedule 11, Part 2 and Condition 14(2), Schedule 12, Part 2 to the deemed Marine Licences (dMLs) which form the draft Development Consent Order (DCO) (**C1.1: Draft DCO including Draft DML**).

8.1.1.3 The outline WSI will need to be refined and updated, for approval by the MMO in consultation with HE, once the final distribution footprint of turbines (including quantity and spacing), offshore substation location, and offshore export cable route are determined, if they are likely to impact the AEZs or other archaeological material, as well as the identification of new receptors, or changed understanding of existing receptors.

8.1.1.4 The revision will constitute a final project specific WSI to be prepared following the award of the DCO, to which detailed Method Statements should be appended.

8.1.1.5 Method Statements should be produced and submitted to the Archaeological Curators for all planned archaeological works and include provision for the monitoring of progress of the investigations.

9. References

Brown, D. (2011) Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation. Archaeological Archives Forum.

CIfA (2014) Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives. Reading, Charted Institute for Archaeologists.

CIfA (2014a) Standard and guidance for the collection, documentation, conservation and research of archaeological materials. Reading, Charted Institute for Archaeologists.

CIfA (2014b) Standard and guidance for commissioning work on, or providing consultancy advice on, archaeology and the historic environment. Reading, Charted Institute for Archaeologists.

CIfA. (2014c) Standard and guidance for archaeological field evaluation. Reading, Charted Institute for Archaeologists.

CIfA (2014d) Standard and guidance for nautical archaeological recording and reconstruction. Reading, Charted Institute for Archaeologists.

CIfA (2014e) Standard and guidance for an archaeological watching brief. Reading, Charted Institute for Archaeologists.

COWRIE (2007) Historic Environment Guidance for Offshore Renewable Energy Sector Salisbury, Wessex Archaeology.

COWRIE (2008) Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy. Oxford, Oxford Archaeology.

COWRIE (2011) Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector. Commissioned by COWRIE Ltd (project reference GEOARCH-09).

Gaffney, V. and Fitch, S. (2009) Europe's Lost World: the Rediscovery of Doggerland. Report vol. 160, Council for British Archaeology Research.

Gaffney, V., Thomson, K. and Fitch, S. (2007) Mapping Doggerland: the Mesolithic Landscapes of the Southern North Sea. Oxford, Archaeopress.

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Tappin, D R, Pearce, B., Fitch, S., Dove, D., Gearey, B., Hill, J.M., Chambers, C., Bates, R., Pinnion, J. Diaz Doce, D., Green, M., Gallyot, J., Georgiou, L., Brutto, D., Marzialetti, S., Hopla, E., Ramsay, E. and Fielding, H. (2011) The Humber Regional Environmental Characterisation. Open Report OR/10/54. British Geological Survey.

The Crown Estate (2010) Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects. Salisbury, Wessex Archaeology.

The Crown Estate (2014) Protocol for Archaeological Discoveries: Offshore Renewables Projects. Salisbury, Wessex Archaeology.

Appendix A: Outline Project-Specific Protocol for Archaeological Discoveries (PAD)

1 Introduction

The Protocol for Archaeological Discoveries: Offshore Renewables projects (ORPAD) is a system developed for monitoring and reporting unexpected and incidental archaeological and historical finds where an archaeologist is not present on site or immediately available. The ORPAD document should be used at all stages of the development process and should be considered as a safety net and not as a replacement for other archaeological mitigation strategies.

This outline PAD for Hornsea Four summarises the Protocol for Archaeological Discoveries, the roles and responsibilities of the Applicant and relevant contractors and contains contact details for the Applicant's reporting chain.

The requirement for a final PAD, for approval by the Marine Management Organisation in consultation with HE, is provided for by a condition attached to the deemed Marine Licences included as a schedule to the draft DCO (**C1.1: Draft DCO including Draft DML**)

This outline PAD has been developed based the Protocol for Archaeological Discoveries: Offshore Renewables Project (The Crown Estate, 2014).

2 Aims and objectives

The aim of this outline protocol is to set out the proposed approach to mitigating the impact of Hornsea Four on the historic environment by implementing a project specific protocol for unexpected archaeological discoveries encountered during the course of site investigation or construction activities.

The key objectives for this protocol are to:

- Set out the proposed procedures to be followed in order to avoid impacts on unexpected archaeology encountered during the course of the development programme; and
- Ensure that all contractors are familiar with the requirements of the protocol through the provision of awareness training and guidance on how to implement the protocol for on-site and office-based staff. Such training will focus on identifying, recording and reporting archaeologically significant features and material that may be encountered during development, operation and decommissioning of the wind farm.

3 Roles

To ensure that the Protocol is being implemented, personnel assigned a role will be required to confirm that they are willing and competent to undertake the tasks requested. All relevant personnel will be provided with an introductory presentation outlining the tasks and procedures involved for successful implementation.

4 Curators

The HE Marine Planning Team will be the Archaeological Curator responsible for heritage matters offshore. HE will be kept informed of any archaeological finds in relation to Hornsea Four.

5 Retained Archaeologist

The Retained Archaeologist, when appointed by the developer, will act on behalf of the Applicant and will act as liaison between the Nominated Contact and the Curators. If a Retained archaeologist is not appointed, the Implementation Service can provide advice. See **Figure A.1**.

The Retained Archaeologist will:

- Advise on temporary exclusion zones (TEZs) and mitigation strategies;
- Advise on the need for a Watching Brief;
- Advise on material conservation, identification and character of finds;
- Advice on immediate actions to be taken in respect of the find;
- Advise on resolving ownership issues; and
- Liaise with the relevant local authorities, museums and curators with regard to reported finds.

6 Nominated Contact

The Applicant will nominate a key member of the Environment and Consents team to act as the Nominated Contact. The Nominated Contact will be responsible for all communications regarding archaeology recovered during the development of the project. The Nominated Contact will take part in the introductory training session and, if the role is passed on to another member of staff, then the new Nominated Contact will ensure that they receive suitable training to undertake the responsibilities in the Protocol.

The Nominated Contact will:

- Take part in Protocol training;
- Keep updated records of the Retained Archaeologist and Curator contact details;
- Designate Site Champion(s) and liaise with the Site Champion(s);
- Notify the Retained Archaeologist of any finds as soon as possible;
- Ensure that the records produced by the Site Champion are correct and pass all information on to the Retained Archaeologist;
- If necessary, ensure that a Temporary Exclusion Zone is established and maintained until further advice is received from the Retained Archaeologist and / or the Curator; and
- Make finds available for inspection by the Retained Archaeologist and /or the Curator.

7 Site Champion

One Site Champion on each vessel will be appointed by the Nominated Contact.

The Site Champion will:

- Take part in Protocol training;
- Act as the first point of contact for technical staff and crew working on the vessel;
- Liaise with the Nominated Contact;
- Ensure that no operations take place where the feature, anomaly or artefact was located until the Nominated Contact and Retained Archaeologist have been informed and further advise has been received;
- Examine any deployed equipment to ensure that archaeological material has not been trapped, if relevant;
- Note the occurrence, time and exact position of any finds in the vessel's log;
- Fill in a Preliminary Record Form;
- Notify the Nominated Contact as soon as possible and pass on all logs, drawings and photos; and.
- Ensure that all finds recovered are stored appropriately in accordance with the training provided.

8 All staff

Staff on-board vessels and on land facilities will be made aware of the reporting procedures and report all finds to their Site Champion. The staff will follow the flowchart presented below when reporting finds of archaeological potential.

9 Finds Identification

Finds and sites can encompass one object or a collection of objects. Table A.1 outlines a summary of materials that should be reported to the Retained Archaeologist.

Table A.1 Material of archaeological potential to be reported.

Material	Report to the Retained Archaeologist	Archaeological potential
Rubber plastic and modern materials found with aluminium objects	Yes	Potential aircraft. Military aircraft are also subject to legal requirements under the **Protection of Military Remains Act 1986**
Rubber, plastic, Bakelite and other modern materials	No	n/a
Iron and steel	Yes	Wreck/ aircraft
Concretions – iron/steel covered by a thick concrete like coating	Yes	Wreck
Aluminium, copper, copper alloy (bronze, brass) and precious metals	Yes	Archaeologically important objects

Material	Report to the Retained Archaeologist	Archaeological potential
Ordnance (cannonballs, bullets, shells)	Yes	**Unexploded Ordnance (UXO) guidance** should always take precedence over archaeological requirements
Animal bone, teeth and tusks	Yes	Prehistoric animals, evidence of transport, butchering and consumption
Human bones	Yes	Human bones are also subject to legal requirements under the **Burial Act 1857**
Objects made out of bone (combs, harpoon points, decorative items)	Yes	Archaeologically important objects
Light coloured wood, or wood that floats easily	No	Unlikely to be of archaeological interest
Roundwood with bark – such as branches	No	Unlikely to be of archaeological interest
Roundwood that has clearly been shaped or made into a point	Yes	Part of a structure
Pieces of wood that have been shaped, jointed or fixed with wooden pegs, bolts or nails	Yes	Structure or wreck
Objects made out of dark, waterlogged wood (bowls, handles, shafts etc.)	Yes	Archaeologically important objects
Small to medium size stones that are shaped, polished and/or pierced	Yes	Prehistoric objects (axe heads, knife blades) of archaeological importance
Large blocks of stone that have been pierced or shaped	Yes	Anchors or weights of archaeological importance
Large collection of stones in the same area	Yes	Ballast mound or navigational cairn
Pottery	Yes	All fragments possess archaeological potential
Bricks with modern proportions and v-shaped hollows ('frogs')	No	n/a
Bricks that are unfrogged, 'small', 'thin' or otherwise unusual	Yes	Archaeologically important objects
Peat (black or brown fibrous soil)	Yes	Likely of geoarchaeological interest

10 Finds handling and conservation procedures

Table A.2 summarises how the finds should be handled and stored until passed on to the Retained Archaeologist ('wet finds' refers to finds still wet when found; 'dry finds' are finds that have dried out or found dry).

Table A.2 Summary of handing recommendations.

Wet finds	Dry finds
Photograph the find • Use a scale • Focus on the object • One item at a time Additional close-ups of important details	Photograph the find • Use a scale • Focus on the object • One item at a time Additional close-ups of important details
Fill in the Preliminary Record Form.	Fill in the Preliminary Record Form.
Place the finds in separate water tight plastic containers of appropriate size.	Do **not** put in water.
Check the container regularly and top up with water when needed.	Label the container.
Label the container.	Place the container in a dark, cold place.
Place the container in a dark, cold place.	If the item breaks, do not glue it back together.
If the item breaks, do not glue it back together.	

11 Preliminary Record Form

The reporting form as shown in Table A.3 is to be used as guidance when reporting a find of archaeological potential. The information can be provided via email and presented in any format used by the contractors.

Table A.3 Reporting form.

Company Name:
Vessel/Team Name:
Site Name:
Date:
Time of compiling information:
Name of compiler (Site Champion):
Name of finder (if different to above):
Time at which discovery was encountered:
Vessel position at time when anomaly was encountered:

a) Latitude
b) Longitude
c) Datum (if different from WGS84)
(If on land) Name of vessel from which find originated:
(If on land) Name of area from which find originated:
(If on land) Date on which find was located:
Original position of the anomaly on the seabed, if known:
Notes on likely accuracy of original position stated above (how accurate is the position and is the position the original position or has the material been moved by operations?)
Description of the find:
Apparent size of the find:
Details of any other finds recovered from the same area:
Details of photographs, drawings or other records made of the find.
Details of treatment or storage of find.
Date and time Nominated Contact informed:
General notes:
Signed: Date:

12 Project specific roles

For Hornsea Four, appointed personnel as detailed in the final PAD will be responsible for the implementation of the Protocol.

The appointments will be made by the developer in agreement with the Retained Archaeologist. The PAD document will be circulated among relevant staff and if any changes to named personnel should occur, the document will be immediately updated and re-circulated.

13 Relevant Legislation

Burial Act 1857 The Act requires a licence to be granted prior to the removal of human remains from deliberately deposited contexts.

Protection of Military Remains Act 1986. The Act protects the resting places of military personnel from unauthorised disturbance. It allows the Ministry of Defence (MoD) to protect vessels and aircraft that were in military service when they were lost or wrecked.

The Treasure Act 1996. The Act is supplemented by the Treasure (Designation) Order 2002. Finders of gold and silver objects (over 300 years old) and some base metal assemblages (prehistoric) as defined in the Act are required to report such finds by contacting the Coroner and delivering the items for hand over as per the Coroners' instructions.

Protection of Wrecks Act 1973. Under the 1973 Act, shipwrecks and wreckage of historical, archaeological or artistic importance within UK territorial waters can be protected by way of designation. Once a wreck has been designated it is an offence to carry out certain activities on or around the site without a licence.

Merchant Shipping Act 1995. If any material is recovered which falls within the definition of 'wreck' the Receiver of Wreck has to be notified and will seek to identify the original owner so that it can be claimed.

Ancient Monuments and Archaeological Areas Act 1979. Monuments that are of national importance within UK territorial waters can be protected by being added to the schedule of monuments protected under this act. It is an offence to damage or carry out a range of specified activities on such a 'scheduled monument'.

Basic Reporting Sequence

Basic sequence of Reporting finds of Archaeological Interest or potential when an archaeologist is not present.

Discovery by project staff

- Inform Site Champion

Site Champion

- Cease damaging activities
- Comprise preliminary record
- Ensure all recovred finds are protected
- Inform Nominated Contact

Nominated Contact

- Confirm details in preliminary record
- Inform Retained Archaeologist
- Pass on records and photos to the Retained Archaeologist

Retained Archaeologist

- Advice on temporary excusion zones
- Advice on archaeological significane of find
- Advice on fruther leagal requirements
- Compile Report
- Inform the Curator

Curator

Historic England

Historic England

Figure A.1: Basic reporting sequence for unexpected archaeological discoveries.

14 References

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