

REPORT



Hornsea Project One Offshore Wind Farm

Revised Archaeological Written Scheme of Investigation

Offshore Generation Assets

Submitted for approval pursuant to the discharge of Condition 13(2)(g) of deemed Marine Licences 1-3 (Schedules 8 - 10) of the Hornsea One Offshore Wind Farm Development Consent Order

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Accepted	Ditte Bilde (DITBI), 19 July 2016
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Doc. no.	2445887
Ver. no.	2445887A
Case no.	200-12-0458

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Acknowledgements

This document draws on a number of other studies which have been undertaken in relation to Hornsea Offshore Wind Project One, in particular:

- SMart Wind, 2013a. Draft Written Scheme of Investigation. PINS Document Reference: 7.5.10.2 July 2013.
- SMart Wind, 2013b. Marine Archaeology Technical Report. PINS Document Reference: 7.5.10.1 July 2013.
- SMart Wind, 2013c. Chapter 10 Marine Archaeology and Ordnance. PINS Document Reference: 7.2.10. July 2013.
- SMart Wind, 2013d. Quaternary Deposits PINS Document Reference: 7.5.1.4
- MA Ltd, 2015. Service 2 - Geophysical Data Assessment. February 2015.

1. Introduction

In February 2015, DONG Energy Wind Power A/S (“DONG Energy”) took full ownership of Hornsea Project One Offshore Wind Farm (“Hornsea Project One”). Hornsea Project One was awarded consent by the Secretary of State (SoS) on 10 December 2014. The Development Consent Order (DCO) was subsequently amended on 30 April 2015 by the Hornsea One Offshore Wind Farm (Correction) Order 2015 and on the 31 March 2016 by the Hornsea One Offshore Wind Farm (Amendment) Order 2016¹. The undertakers named in the DCO are Heron Wind Limited (“Heron”) Njord Limited (“Njord”) and Vi Aura Limited (“Vi Aura”) (the Project One companies²). The Hornsea Project One DCO grants development consent for, and authorises DONG Energy to construct, operate and maintain an offshore wind farm project with an installed capacity of 1,200 Megawatt (MW) that will consist of up to 174 (7MW) wind turbine generators (WTGs) and will be located 120km off the Yorkshire coast, covering an area of approximately 407 square kilometres. The Hornsea Project One DCO also grants four deemed Marine Licences (dMLs) for the marine licensable activities, these being the deposit of substances and articles and the carrying out of works involved in the construction of the generating station and associated development. Although some licence conditions are relevant only to one of the dMLs, a number are relevant to both.

DONG Energy is currently undertaking preparatory work on behalf of the Project One companies to progress with the discharge of the necessary pre-construction requirements and conditions as set out in the DCO and associated dMLs respectively.

The purpose of this Offshore Generation Assets Archaeological Written Scheme of Investigation (WSI) is to provide information to discharge and demonstrate compliance with Condition 13(2)(g) of DCO Schedules 8-10 (dMLs 1-3).

This Offshore Generation Assets Archaeological Written Scheme of Investigation (WSI) sets out the mitigation work required in relation to Hornsea Project One (the Project), located in the southern region of the North Sea. It is intended to form the basis of agreement between the developer (DONG Energy), its contractors and relevant regulators. The proposed programme contained in this document consists of archaeological mitigation for the offshore generation asset/wind turbine generator (WTG) area of the proposed development, which has been formulated in relation to scheme specific impacts and with reference to established standards and guidelines. Therefore, this document does not consider any area of the development beyond the offshore generation site boundary (i.e. the offshore transmission asset/export cable route to shore).

This document has been produced as an update to the previous WSI version; Draft Written Scheme of Investigation PINS Document Reference: 7.5.10.2, July 2013 (SMart Wind Ltd 2013a).

¹ A further non material amendment application and an application to vary the deemed marine licences numbered 1, 2 and 3 were submitted to the Secretary of State and the Marine Management Organisation respectively in July 2016. The applications are currently being determined and relates to two changes to the DCO and deemed Marine Licences 1, 2 and 3 (1) an increase to the name plate capacity of the wind farm to increase it from 1200MW to 1218MW and (2) changes to the coordinates of the internal boundaries between each wind farm area namely Work Number 1, Work Number 2 and Work Number 3. Details of this non material amendment application can be found on the Planning Inspectorate website <https://infrastructure.planninginspectorate.gov.uk/projects/yorkshire-and-the-humber/hornsea-offshore-wind-farm-zone-4-project-one>

² Heron and Njord are owned 100% by DONG Energy Wind Power A/S (“DONG Energy”). Vi Aura is owned 100% by Heron

1.1 Requirements under the Development Consents Order

Within the Hornsea Project One DCO, construction activities are split into 12 discrete work numbers, which are controlled by distinct sections of the DCO (including the dMLs). As stated above, four dMLs have been issued for Hornsea Project One, each applicable to discrete areas of the project. Each of the Hornsea Project One companies have responsibility for specific Marine Licences. The specific responsibilities for each of the work numbers and Hornsea Project One companies is provided in **Table 1**. The relevant components for this submission fall under Work Numbers 1-3 (Schedules 8-10, dMLs 1-3).

Work Number	Controlled by	Undertaker(s)	Specifics
1	Schedule 8 (dML 1)	Heron Wind Limited	An offshore wind generating station within Wind Farm Area 1.
2	Schedule 9 (dML 2)	Njord Limited	An offshore wind generating station within Wind Farm Area 2.
3	Schedule 10 (dML 3)	Vi Aura Limited	An offshore wind generating station within Wind Farm Area 3.
4	Schedule 11 (dML 4)	Heron Wind Limited	Up to five offshore High Voltage Alternating Current (HVAC) collector substations and, in the event that the mode of transmission is HVDC, up to 2 offshore High Voltage Direct Current (HVDC) converter stations together with a network of electrical circuits connecting the structures within Work No. 4.
5	Schedule 11 (dML 4)	Heron Wind Limited	An offshore RCS fixed to the seabed.
6	Schedule 11 (dML 4)	Heron Wind Limited	A marine connection to the shore, including cable and pipeline crossing works.
7	Schedule 11 (dML 4)	Heron Wind Limited	A foreshore connection consisting of an extension of the electrical circuits comprised in Work No. 6, including cable crossing works, crossing under the existing sea wall using the horizontal directional drilling method and terminating at the electrical circuit transition joint bays (Work No. 8).
8	DCO	Heron Wind Limited	Onshore works Up to four underground electrical circuit transition joint bays in the vicinity of Horseshoe Point in the parish of North Coates in the county of Lincolnshire, housing the connections between the offshore and the onshore electrical circuits.
9-12	DCO	Heron Wind Limited	All other onshore works

Table 1 Hornsea Project One work numbers that are controlled by the DCO

This Offshore Generation Assets WSI is submitted to discharge Condition 13(2)(g) of dMLs 1-3. The wording of the condition within dMLs 1-3 is detailed below in **Table 2**.

Condition	Detail
dMLs 1-3, Condition 13(2)(g)	A written scheme of archaeological investigation in relation to Wind Farm Area 1/2/3 in accordance with industry good practice to include— (i) details of responsibilities of the licence-holder, archaeological consultant and contractor; (ii) a methodology for any further site investigation including any specifications for geophysical, geotechnical and diver or remotely operated vehicle investigations; (iii) analysis and reporting of survey data to be submitted to the MMO within four months of survey completion; (iv) delivery of any mitigation including, where necessary, archaeological exclusion zones; (v) monitoring during and post construction, including a conservation programme for finds; (vi) archiving of archaeological material; and (vii) a reporting and recording protocol, including reporting of any wreck or wreck material during construction, operation and decommissioning of the authorised scheme

Table 2 dML condition of relevance to the Offshore Generation Assets WSI

This condition will be discharged on the basis of this, the finalised version of the WSI, through formal submission to the MMO and under advice from their statutory advisors, Historic England. Further works that may inform on the understanding of the historic environment, such as additional geophysical and geotechnical surveys or other forms of site investigation, will be addressed through thematic Method Statements produced in reference to the WSIs.

1.2 Project Background

DE took over full ownership of Hornsea Project One on 4th February 2015 following years of development alongside SMart Wind. Following the Final Investment Decision (FID) announced in February 2016, DE will now develop Hornsea Project One through into construction and operation. Onshore construction of the project started in Q1 2016 with onshore landfall works scheduled to commence in April 2017, with the offshore export cable installation works and all other offshore works (such as foundation installation and inter-array cabling installation) currently scheduled to commence in Q4 2017.

An offshore marine archaeological impact assessment report (SMart Wind, 2013a), a Technical Report (SMart Wind, 2013b) and a geophysical data assessment (MA Ltd, 2015), as well as a Draft Written Scheme of Investigation (SMart Wind, 2013c), have been produced that identify the known and potential archaeology within the development area, review potential impacts, and put forward mitigation proposals.

This document updates and supersedes the previous WSI. A separate WSI has been produced for the offshore transmission assets (DONG Energy, 2016a) and another WSI has been produced to cover the intertidal area i.e. between MLW and Mean High Water (MHW) (DONG Energy, 2016c). This document has been produced in response to the impact assessment, responses to the Technical Report, the Preliminary Environmental Information (PEI), the Environmental Statement and advice from curators/ regulators. Further updating may be required as the Project develops in order to fulfil deemed marine license conditions.

1.3 Development Scheme Details

The Generation Assets required for Project One includes the offshore array, comprising WTGs and foundations, and inter-array cabling. The Project will involve the placement of 174 turbines, and the current proposed layout has been agreed in principle with Trinity House (TH) and The Maritime and Coastguard Agency (MCA).

The project is considering the use of monopile or jacket foundations. A final decision on WTG foundation types has not yet been made and there is the potential for a proportion of WTGs to use jacket foundations using a suction caisson.

Whilst the final foundation option is still to be determined, it is likely that the majority of foundations will be monopiles (WTGs foundations not on monopiles will use suction cassions on jackets)

1.3.1 Monopile

Monopile foundations will be driven into the seabed from a jack-up barge. The pile foundations are up to 8.5 m in diameter and may penetrate up to 50 m into the seabed, depending on the exact nature of the subsurface geology in question. This has clear implications for even the deepest buried submerged prehistoric land surfaces which may be impacted by such activity.

Scour of the seabed sediments in the vicinity of the turbine foundation is reduced or prevented by the installation of a layer of anti-scour material around the foundation piles. This usually consists of varying grades of rock, or gravel, which is deposited around the base of the foundation. This material has the potential to impact upon any archaeology which is on the seabed, or buried a short distance into it.

1.3.2 Steel jacket foundations

A jacket foundation is a steel structure built in a lattice formation supporting the wind turbine that is mounted upon it.

There are several installation methods for the piles, including driving with a hydraulic hammer, the “drive, drill and drive” method, or drilling and grouting the pile.

The anticipated depth of penetration for driven piles will be up to 75 m. Direct impact is likely to be confined to penetration of the four piles at the corners of the jacket structure which will each be up to 3 m in diameter.

For the WTG jacket foundations there will be three piles using three suction cassions each up to 12 m in diameter penetrating down to a maximum of 10 meters.

These foundations are generally in the order of 800 to 1100 tonnes in weight. Direct impact is likely to be confined to penetration of the three piles at the corners of the jacket structure.

Archaeological impact is likely to occur on the seabed or buried a short distance into it in the close vicinity of the structures. Buried submerged prehistoric land surfaces may also be impacted by this activity.

1.3.3 Inter-Array Cables

A maximum of 450km of cables will be laid to connect the individual turbines. For their protection, those cables will be buried between 0.6m and 1.1m top of product from reference seabed level. Reference seabed level is defined as “level below which natural erosion and sediment migration is not expected (minimum elevation of seabed)”.

Installation of such cables has the potential to impact upon any archaeology that is located on the seafloor within a maximum 10 m wide corridor, and buried within 3m below reference seabed level.

This WSI for archaeological mitigation has been produced based on the results of assessment work, PEI and EIA recommendations, and discussion with relevant curators.

This 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 Generation Asset WSI has been structured to consider required mitigation and offsetting works through archaeological actions in relation to the following offshore phases:

- Geotechnical investigations;
- Construction;
 - Turbine foundation installation;
 - Inter-array;
 - Associated vessel works – jack-up vessels, anchorage, etc.;
- Operation, and;
- Decommissioning.

This WSI summarises the known and potential archaeology within the wind farm array (i.e. the Generation Assets), expected impacts, and recommended archaeological mitigation actions. It then presents mitigation methodologies for a range of work packages within the wind farm array. This document does not consider any area of the development beyond the limits of the wind farm array. Each package of work may require a more detailed Method Statement which will be prepared by appropriately qualified professionals.

The Project will submit each Method Statement to archaeological curators by recirculating a revised version of this WSI with the Method Statement included as an additional Appendix. It is anticipated that the archaeological curators will be able to respond to detailed Method Statements within fifteen working days, following agreement of the outline scope of each work package in this WSI.

2. Implementation of WSI

Primary responsibility for the delivery of this WSI lies with the Project. Through project documentation and procedures the implementation of this WSI will involve archaeological contractors and curators.

2.1 DONG Energy: Implementation

The Project is responsible for implementing the WSI. There are a number of archaeological mitigation actions requiring individual Work Packages which, if activated, will generate associated Method Statements. Ensuring the curators and all contractors are aware of the archaeological Work Packages will require effective communication.

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

The Project are 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 companies.

2.2 Archaeological Curators: Implementation

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

- Philippa Naylor (Marine Planning Archaeological Officer - Marine Planning Unit)
- Dr Helen Woodhouse (Inspector of Ancient Monuments - East Midlands)
- Jim Williams (Senior Science Advisor - East Midlands)

Archaeological curators will be provided with copies of all relevant project documentation. the Project should agree with HE regarding which curator will take the lead for the Work Packages outlined within this WSI.

2.3 Contractors: Implementation

Contractors companies working within the marine zone where Archaeological Exclusion Zones (AEZs) are in place and where the Protocol for Archaeological Discoveries 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 discoveries.

3. Summary of Known and Potential Archaeology

A detailed description of the archaeology and history of the development area is available within the Project offshore marine archaeological technical report (SMart Wind, 2013b). A summary of the known and potential archaeology within the generation asset site is presented here, with a focus on heritage assets which may be impacted by the development. Archaeological receptors within the offshore transmission asset area and beyond the limits of the WTG site are discussed in the archaeological WSI prepared for that area (DONG Energy, 2016a).

3.1 Palaeolandscapes

Previous analysis of geotechnical and geophysical survey data collected in the development area revealed the presence of Pleistocene fluvial and estuarine sediments with the potential to contain hominid remains beneath the Devensian glacial till (generally at depths of 15 m or more below the seafloor). Closer to the seabed surface this work identified that Early Holocene 'Upper Botney Cut' channels, generally up to 15 m deep and 80 m wide, are cut into larger late Glacial channels of considerably greater size containing reworked glacial till. The cable corridor crosses some Late Pleistocene and Early Holocene channels on its way to shore lying at variable depth below the surface. The most significant feature to the west of Inner Silver Pit is a large palaeofeature that extends 4 km from the landfall and appears to be a segment of the palaeo-Humber (SMart Wind, 2013d).

The likelihood of survival of the remains of Mesolithic activity and settlement in and particularly on the side of these later channels is high, although there are no known prehistoric terrestrial sites within the study area. Sampling undertaken during the Humber Regional Environmental Characterisation (REC) study (SMart Wind, 2013d) has shown that these deposits generally lie close to the surface of the seabed. It is therefore likely that the general area contains important prehistoric archaeological sites and finds and palaeoenvironmental evidence.

A further geotechnical campaign, completed in Q2 2015 collected geotechnical boreholes in combination with down-hole cone penetration tests (CPT's)/Wireline Push Samples (WPSs) to a maximum target depth of 50 m. Eight additional boreholes/WPSs were subjected to archaeological assessment and have confirmed the potential for archaeologically, or palaeoenvironmentally, significant material. Based on the results from all geoarchaeological reporting to date, it is recommended to proceed to the Stage 3 assessment of geoarchaeological samples recovered from the Project. This will enable a more comprehensive understanding of the palaeoenvironmental and geomorphological development of this area, resulting in a deposit model following completion of the staged assessment process.

The Stage 3 assessment is currently being considered and any further results will be integrated within this WSI once available. The archaeological method statement for the geoarchaeological assessment has been included in this document as **Appendix II**.

3.2 Offshore – Maritime

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.

The following baseline information on the potential of the maritime historic environment has been summarised from the Marine Archaeological Technical Report (SMart Wind, 2013b), Marine archaeology and Ordnance (SMart Wind, 2013c) and Service 2 - Geophysical Data Assessment (MA Ltd., 2015).

Data for known shipwrecks and recorded shipping losses within the marine archaeology study area were obtained from SeaZone and the National Record of the Historic Environment (NRHE). There are 40 charted wrecks and obstructions within the marine archaeology study area, nine of which lie within the wind farm array. The remaining 31 being located in the offshore export cable route corridor. The NRHE lists eight recorded positions in the offshore export cable route corridor, the bulk of which refer to named maritime casualties, mostly dating from the 20th Century. Many are also common to the SeaZone dataset. All but one is within 12 nautical miles of the coast, and no NRHE records are positioned within the WTG area (SMart Wind, 2013c).

3.2.1 Initial Geophysical Assessments

The assessment of geophysical data has been undertaken in several stages. The initial assessment of the WTG site geophysical dataset identified a total of 611 anomalies- a visible or digital signature indicating a possible find or site (The Crown Estate, 2014). The results are summarised in **Table 3** where the anomalies were classified as A1, A2 and A3 (**Table 4**).

Classification	Total number of anomalies	Number of A1	Number of A2	Number of A3
Wreck	10	10	n/a	n/a
Seafloor	40	n/a	40	n/a
Rope/chain	23	n/a	23	n/a
Recorded position	7	n/a	n/a	7
Debris	388	6	382	n/a
Mound	93	n/a	93	n/a
Magnetic	10	n/a	10	n/a
Dark reflector	40	n/a	40	n/a
Bright reflector	n/a	n/a	n/a	n/a
Total	611	16	588	7

Table 3 Initial geophysical data assessment result

Archaeological potential	Number of anomalies/A EZ's	Interpretation
A1	16	Anthropogenic origin of archaeological interest.
A2	588	Uncertain origin of possible archaeological interest.
A3	7	Historic record of possible archaeological interest with no corresponding geophysical anomaly.

Table 4 A1, A2, A3 specification

After the initial assessment the agreed mitigation for the archaeological sites consisted of a total of 18 AEZ's (A1 and A3), while the remaining A2 anomalies were referred to under the following clause:

“All anomalies of ‘unconfirmed’ A2 archaeological potential are to be taken into account during final design. Should this indicate possible impacts on such sites, in consultation with EH, further AEZ's may be implemented.”

(SMart Wind- Environmental Statement v2 - Chapter 10)

To ensure that mitigation is practicable and effective, given the significant number of anomalies identified and their wide distribution, further assessments of the geophysical data were undertaken with the aim of making a clear distinction between features of archaeological potential and other debris, natural features or seabed disturbance considered to be of low archaeological potential. The focus of the assessment was placed on the 588 anomalies classed as A2 and the historic records with no corresponding geophysical anomaly (A3). The A2 anomalies were located, described and characterised through an assessment of their archaeological potential. Potential was ascribed to anomalies within a scale of high, medium or low using the matrix provided (**Table 5**).

NOTE: For clarity, the WA classification system (Table 4), has been used throughout this WSI, with A2 anomalies with re-assigned AEZs included within the A1 specification.

Archaeological potential	Definition
High potential	Anomalies showing strong evidence of archaeological material such as wreck or crash sites, debris fields which correspond to historic anchorage sites and potential outcropping palaeolandscapes and their margins.
Medium potential	Anomalies suggestive of structural outlines or coherent material distributions with strong backscatter, or clearly upstanding objects with shadow, or pronounced scour features; or a combination of these, interpreted as possible archaeological features but which would require ground-truthing in order to verify.
Low potential	Sites considered to be modern mooring, debris, anchor or fisheries related activities that are in contrast to the general character of the area; of anthropogenic origin but likely related to modern activity with little or no archaeological potential; note: geological and sedimentary features are not routinely included.

Table 5 Definition of High, Medium and Low archaeological potential anomalies

An updated desk based assessment of the A3 records was undertaken where all National Record of the Historic Environment (NRHE) and United Kingdom Hydrographic Office (UKHO) records were compared against the A3 reported losses. Where the reported loss referred to a known shipwreck the wreck was assessed for archaeological significance according to the guidelines set out by Department

for Culture Media & Sport (DCMS, 2011). **Table 6** reflects the recommended changes to the AEZ's located within the WTG area.

A3 AEZ	UKHO ID	Recommendation	Comments (Information derives from the UKHO)
71025	9463	Remove AEZ	Foul, located by survey data in 1990: debris over 2 x 2 m. Not located in Project surveys and likely low archaeological potential.
71026	76770	Remove AEZ	10 m of Cone Penetration Tester rod left in seabed 2010 after shearing during testing operations, not protruding. No archaeological potential.
71027	9464	Remove AEZ	Foul, located by survey data in 1990: debris over 2 x 1 m. Not located in Project surveys and likely low archaeological potential.
71028	9599	Remove AEZ	Fisherman's fastener initially shown on Danish fishing chart (1972 ed) position disproved in 1988.
71029	9650	50 m AEZ	LIVE Foul found by acoustic sensor in 1990. Described as notable debris 4x4 m or possibly 15 m long. Previous data refers to two recorded obstructions, UKHO/NRHE dataset only includes one.
71030	n/a	Remove AEZ	No recorded loss/Foul found in the UKHO/NRHE records for this position, no other references.
71031	9630	Remove AEZ	Foul ground, registered as abandoned anchor cable identified on sonar 1987. Possibly associated with AEZ 70838 (A1), low archaeological potential.

Table 6 Re-assessment of A3 reported losses

A total of 19 Archaeological Exclusion Zones have been recommended as a result of the re-assessment of anomalies and reported losses (A3 and A2).

The position, extent and orientation of 10 A1 anomalies identified during the first archaeological assessment remain unaltered and the re-assessment provided no comment or further recommendation regarding their extent or suitability.

The updated archaeological assessment considered a total of 611 anomalies classified as A2. It also re-assessed the 7 records classified as A3. The final exclusion zones have been summarised below in **Table 7** and **Figures 2** as well as in detail in **Appendix I**.

Archaeological potential	Number of features	AEZ (m)	Mitigation
AEZ for A1 and upgraded A2 anomalies	18 (10 + 8)	Individually set, as detailed in Appendix I	No works within AEZ

Archaeological potential	Number of features	AEZ (m)	Mitigation
AEZ for A3 reported losses	1	50 m radius from centre point	No works within AEZ
Anomalies of Low archaeological potential	578	n/a	No AEZ but <i>Protocol for Archaeological Discoveries: Offshore Renewables Projects</i> (The Crown Estate, 2014) must be implemented and adhered to during further survey or construction.

Table 7 Final AEZ's

4. Impacts and Archaeological Mitigation

Based on the archaeological assessment work the potential impacts on historic environment features were assessed and appropriate mitigation actions put forward to minimise these impacts. This section reviews the potential impacts of construction, operation and decommissioning related activities within the offshore area and summarises mitigation actions to be taken.

Heritage considerations that should be borne in mind for all phases of the Project'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.
- 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.
- Under the Burial Act 1857, if human remains are discovered in the course of site 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).
- Under the Marine and Coastal Access Act 2009, operations that may have an effect on the marine environment within the UK Marine Area are likely to be defined as marine licensable activities and will be conducted under license from the Marine Management Organisation. Such operations will constitute deposition or removal of sediment from the seabed, any form of dredging (whether or not involving the removal of any material from the sea or sea bed), or alteration or removal of existing structures. The primary purpose of marine licensing is to protect the marine environment, public health and the need to prevent interference with the legitimate uses of the sea. The marine environment includes sites of historic or archaeological interest.

4.1 Construction

This phase of work has the potential to impact heritage features and deposits. This may include prehistoric deposits and land surfaces, wrecks, shipborne debris and crashed aircraft. Disturbance of marine archaeological sites includes the removal of artefacts or deposits surrounding them which can expose them to physical, biological and chemical decay. The preservative qualities of the water-logged sub-seabed environment means archaeological remains can be in excellent condition, making exposure or removal detrimental.

The greatest area of seabed disturbance has the largest potential to impact archaeological remains. The maximum number of turbines, maximum number of offshore platforms and maximum area for inter-array cables is used to inform the assessment.

4.2 Turbine and platform installation

The following foundations are being considered: monopile and steel jackets. The tendering process will establish which type(s) of foundation(s) are the most cost-effective for the Project site.

Direct impact of the monopile turbine foundation option causes the removal or disturbance of sediments resulting in a potential effect on prehistoric land surfaces. The maximum adverse

scenario is the construction of monopile foundations for up to 174 wind turbines, with a monopile foundation up to 8.5 m diameter penetrating the seabed by 50 m, and requiring scour protection of up to 42.5 m diameter. The maximum number of turbines using monopile foundations, is used to inform the assessment.

The depth and smaller seabed-take of the monopile foundations means that they are likely to have a limited impact on wrecks and shallowly buried Early Holocene remains but will affect deeper Holocene channels as well as deeper sediments that have potential to contain important early hominin remains.

A jacket foundation is a steel structure built in a lattice formation supporting the wind turbine, mounted upon it. The piles comprise a hollow steel pile driven up to 75 m into the seabed sub-strata. These foundations are generally in the order 800 tonnes in weight, excluding the piles. The anticipated depth of penetration for driven piles will be up to 75 m. Suction caissons may be used as an alternative to driven piles for the WTGs.

Direct impact is likely to be confined to penetration of the four piles at the corners of the jacket structure which will each be up to 3 m in diameter. For suction piles the worst case scenario is three piles each up to 12 m in diameter penetrating down to a maximum of 10 m. Archaeological impact is likely to occur on wreck material located on the seabed or buried a short distance into it in the close vicinity of the structures. Shallowly buried Early Holocene remains can be affected, and the deeper Holocene channels, as well as deeper sediments with potential to contain important early hominin remains, are also at risk.

Based on a maximum adverse scenario any archaeological deposits within the footprint of the foundations could be altered to the degree that all archaeological information and contextual evidence is likely to be entirely and permanently lost. More deeply buried deposits may be impacted through compression of lower stratigraphy from the combined weight of the hard core base, the plate and the turbine. This effect may reduce the ability to wholly or partially interpret such archaeological features.

4.2.1 Inter-array cables

Direct impact derives from construction actions of laying inter-array cables, and vessel anchoring/mooring causing the removal or disturbance of sediments resulting in a potential effect on prehistoric land surfaces.

Direct impact can also be a result of pre-lay grapnel runs and cable installation and the deployment of jack-up vessel spud feet and other vessel moorings which may affect shipwrecks and aircraft wrecks or prehistoric land surfaces through the removal or disturbance of sediments.

The maximum adverse scenarios include:

- Pre-lay grapnel runs for inter-array cables typically using Rennie, Flatfish or Gifford grapnels: impact width of < 1.5 m and depth of approximately 0.3 to 0.4 m.
- Cable installation will include inter-array cables buried up to 3 m and offshore export cables buried up to 5 m (most likely 3 m only).

- Deployment of jack-up vessel spud feet.
- Deployment of moorings will include nine anchors per barge, 12 tonne anchor dimensions = 16.38 m³ (width: 4.5 m, length: 3.64 m, penetration depth: 1 m).

There are 19 AEZ's located within the WTG site.

4.2.2 Mitigation

A range of mitigation and offsetting works are required in relation to the construction phase, these include:

I. Geotechnical Sampling

Previous geophysical survey data together with the assessment of geotechnical data has provided some information about potential Holocene sediments and palaeolandscapes. Although the impact to sediments will be restricted to the required burial and penetration depths, it is recognised that construction phase may cause disturbance to deposits which have the potential to be of geoarchaeological interest. To offset this potential disturbance further geotechnical sampling was undertaken in Q1 and Q2 2015 which has been assessed for archaeological potential. The information will allow refinement of the current understanding of the geomorphological development of the area and help to characterise and confirm the archaeological significance of deposits within the area. The archaeological assessment of the geotechnical cores has been undertaken by qualified professionals and subject to a full Method Statement (**Appendix II**) agreed with relevant curators.

II. Exclusion Zone Establishment and Monitoring

Archaeological Exclusion Zones (AEZs) agreed between the Project and archaeological curators will be the principal means used to preserve in situ any features or deposits of known or potential archaeological interest (The Crown Estate, 2010: 15).

Mitigation of impact on the 19 features of A1 and A3 archaeological significance or potential, identified in the assessment of the baseline and geophysical data, is recommended by the establishment of AEZs. AEZs are centred on each anomaly or, where the site is particularly extensive, based on a buffer drawn around the feature outline. All Archaeological Exclusion Zones are included in **Appendix I**.

The Offshore Renewables Protocol for Archaeological Discoveries (The Crown Estate 2014) provides for Temporary Exclusion Zones (TEZs) to be introduced when discoveries are made. Following the mitigation works outlined above there may be other discoveries that have not been characterised through geophysical assessment that will hence require 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.

The TEZ may be lifted following advice, or may form the basis of an AEZ in the event that further disturbance should be avoided (The Crown Estate, 2014).

III. Implementation of Protocol for Reporting Archaeological Discoveries

Where there is potential to encounter sites, objects or deposits of archaeological interest then a Protocol for Archaeological Discoveries will be followed (The Crown Estate, 2014). The Protocol Implementation Service that has been put in place by The Crown Estate makes provision for the reporting and assessment of discoveries. Additionally provision should be made for the reporting of discoveries between responsible parties, and procedures put in place to gain prompt archaeological advice and inspection (if required). See **Section 6.5** and **Appendix III**.

4.3 Operational phase

Activities: Maintenance operations may involve anchored or jack-up vessels being stationed at the required point of maintenance.

Impacts: The turbine structures themselves may affect sediment transport leading to the exposure of previously buried archaeological remains in the medium to long term. The anchoring activities associated with maintenance of turbine structure and inter-array cables will disturb the seabed. These will impact upon any archaeology or wreck, as already discussed during construction (**Section 4.2.1**).

Mitigation: Avoidance of established AEZs, as detailed in this WSI and supplementary Method Statements; Protocol for Reporting Archaeological Discoveries (The Crown Estate, 2014).

4.4 Decommissioning

Activities Turbines are likely to be decommissioned by cutting the pile off below the seabed (partial removal). Cables are typically capped and ballasted to the seabed. Vessels or barges will be used during these activities. They will require anchoring or jack-up legs on and in the seabed.

It is important to clarify that the level of decommissioning is not yet confirmed. This will be discussed nearer the time with the regulatory bodies and a decommissioning plan will be produced.

Impacts: The additional disturbance to the seabed from the cutting off the piles and capping the cables is expected to be minor or negligible. The anchors and jack-up legs of the vessels used could impact sites or features.

Mitigation: Prior to commencing decommissioning geophysical survey data will be reviewed to ensure anchors and jack-up legs are not impacting any features or anomalies. This will include monitoring of existing AEZs. Furthermore DONG Energy will circulate the position of AEZs to all offshore contractors involved in the decommissioning process to ensure that all AEZs are avoided as primary form of mitigation. The Protocol for Archaeological Discoveries (The Crown Estate, 2014) will be put in place for decommissioning work.

4.5 Packages of Work

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

The mitigation works have been formulated into 'Work Packages'. The Work Packages may require a more detailed Method Statement to be agreed by the relevant curator/s. (See Section 6 for Work Package methodologies). Work Packages may be undertaken as separate investigations depending

on the timing of work and required specialist capacity of contractors. Reports generated from each Work Package should be made available between relevant contractors as soon as they become available.

Main Work Packages are expected to be:

- Work Package 1 - Geotechnical assessment of offshore boreholes and vibrocores;
- Work Package 2 - Anomaly Investigation;
- Work Package 3 - Watching briefs;
- Work Package 4 - AEZ establishment and monitoring; and
- Work Package 5 - Implementation of protocol for reporting finds of archaeological interest.

5. Responsibilities and Communication

5.1 DONG Energy (The Project)

The implementation of the WSI is the responsibility of the Project.

Consultation with Historic England will be maintained throughout the mitigation works. Curatorial responsibility for the sub-tidal aspects of the Project resides with Historic England.

Communication with the archaeological curators is the responsibility of the Project.

the Project may engage a retained archaeologist to implement the WSI.

the Project may engage one or more archaeological contractors to deliver the mitigation measures outlined within this WSI.

the Project 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.

the Project is responsible for all communication with contractors engaged for construction activities.

5.2 Retained Archaeologist/ Archaeological Contractors

The retained archaeologist will report to the Project.

The retained archaeologist will provide advice to the Project to inform communication with the curators and contractors in relation to implementation of the WSI. The responsibilities of the retained archaeologist are as follows:

- Preparation of thematic Method Statements to meet the requirements set out in the WSI;
- Advising the Project's Contractor(s) as to which activities warrant archaeological involvement;
- Advising the Project's Contractor(s) in the course of evaluating scope of work specifications on their capacity to meet archaeological requirements;
- Advising the Project on the necessary interaction with third parties with archaeological interests, including the archaeological curators;
- Advising the Project on the implementation of generic archaeological requirements applicable to all construction activities;
- Advising the Project on Method Statements for archaeological investigations (which should be submitted to the curators);
- Implementing and monitoring the Protocol for Archaeological Discoveries;
- 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 Project material archive in consultation with an appropriate Museum or suitable repository; and
- Advising the Project on final arrangements for analysis, archive deposition, publication and popular dissemination.

Archaeological contractors will report to the Project, who will copy correspondence to the retained archaeologist.

5.3 Archaeological Curators

As required, Method Statements, reports and deliverables will be submitted to the archaeological curators by the Project. Method Statements or other documents related to scheme-specific time tabling 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 then agreement with the proposals/ documentation will be assumed.

5.4 Contractors

Contractors shall:

- Familiarise themselves with the applicable requirements of this WSI and make them 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 Archaeological Exclusion Zones;
- Assist and afford access to archaeologists employed by the Project;
- 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 Protocol for Archaeological Discoveries.

6. Methodology for Mitigation Actions

The following methodology section has been written with reference to the *Model clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects* (The Crown Estate 2010). This document was produced to “apply, as relevant, to archaeological investigations on land, intertidal areas and at sea, due to the breadth of impacts from offshore developments” (The Crown Estate 2010). Mitigation for archaeological investigations on land and in the intertidal areas will be covered in the onshore (DONG Energy, 2016b) and intertidal (DONG Energy, 2016c) WSIs. The mitigation actions stated in Section 6 do not consider any area of the development above the Mean Low Water Springs.

6.1 Archaeological Assessment of Boreholes/ Vibrocores (Work Package 1)

Work has been undertaken to characterise the nature and extent of the potential channel features and sub-surface deposits likely to occur across the Study Area, in order to offset against the potential impacts the scheme may have upon them. This includes a programme of sampling and archaeological analysis of geotechnical cores. The results are being used to understand the geomorphological development of the area being impacted by the development.

The archaeological assessment and analysis of the results is based on a staged approach as detailed in **Appendix II**. Borehole/vibrocore results are being integrated with geophysical survey results to develop a deposit model, also known as a sedimentary sequence model, for the development area.

All work on the geoarchaeological samples conforms to the following guidelines:

- COWRIE, 2011, *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (commissioned for COWRIE Ltd) (this guidance applies up the Mean High Water Mark, but has been used to guide the Method Statement)
- English Heritage, 2011, *Environmental Archaeology: a guide to the theory and practice of methods, from sampling to post excavation*.

Geoarchaeological assessment of samples that were acquired during geotechnical surveys that took place in 2011, 2012 and 2015 has been undertaken. For the 2015 geotechnical campaign, the Retained Archaeologist (MA Ltd) was notified of the planned drilling positions noting that no AEZ's would be affected.

If the Project requires additional geotechnical surveys to be undertaken at some point in the future, advice from the Retained Archaeologist may be sought in order to ensure that archaeological input is provided at the survey planning stage, and to enable archaeological considerations to be taken into account. However, given that the previous, and potentially ongoing, geoarchaeological assessment of the large number of geotechnical cores that have been acquired to date is considered to have adequately offset the overall impact of the Project on potential deposits of archaeological interest across the Project area, further archaeological assessment of the comparatively minor amount of geotechnical material, that may potentially be acquired in the future, is therefore not proposed.

6.2 Anomaly Investigation (Work Package 2)

As described in Section 3.2, an extensive assessment of geophysical data has been undertaken. This has led to the establishment of 19 AEZ's.

At the time of writing, it is expected that the Project can, and will, be constructed, operated, and decommissioned without disturbing the seabed within any of the identified AEZ's. However, if it becomes necessary to consider options whereby works related to the Project might be permitted to disturb the seabed within established AEZ's, further anomaly investigation will be necessary.

This may include:

- Geophysical survey; and
- Diver, Camera or ROV surveys.

Where previous geophysical survey has been of a high specification and coverage and has insonified anomalies from a range of directions (side scan) then further geophysical survey may not be appropriate. Instead diver or ROV surveys may be undertaken.

The aim of acquiring enhanced information derived from such further investigation is to enable alteration of AEZs and may result in their being enlarged, reduced, moved or removed. Any such changes must be made through consultation with, and with the agreement of, Historic England and will be communicated to all relevant parties (The Crown Estate, 2010:15).

Work should follow guidance as laid out within Section 5 Marine Geophysical Investigations of Model Clauses for Archaeological WSIs and Section 7 Archaeological Investigations Using Divers and/ or ROVs of Model Clauses for Archaeological WSIs (The Crown Estate, 2010).

In the event that additional geophysical survey data is acquired within the established AEZ's, the work should be subject to advice from the Retained Archaeologist to ensure that archaeological input is provided at the survey planning stage and to enable archaeological considerations to be taken into account.

6.3 Watching Brief on Seabed Preparations and Marine Cable Operations (Work Package 3)

The aim of a watching brief is to monitor construction activities that may involve the bringing of objects or deposits onto the deck of a construction vessel. A watching brief may be appropriate for any pre-lay grapnel runs that are undertaken, or any other construction phase work that is likely to make seabed material visible at surface. At this stage, such works are planned for the inter-array cables only. Any pre-lay grapnel runs that are required should be designed to ensure they avoid all established AEZs.

If a watching brief is required, work should follow guidance as laid out within Section 8 *Archaeological Watching Briefs of Model Clauses for Archaeological WSIs* (The Crown Estate 2010).

Should archaeologically significant material be recovered during the watching brief, then the archaeologist must have the authority to prevent further work in that area until further mitigation can be undertaken.

Assuming that none of the seabed preparation, cable survey, or installation methods are planned to bring objects or deposits on board the vessel and/or that conditions in which the material would be brought up or handled would not be suitable for archaeological observations, it would not be productive to undertake a watching brief. In which case, construction contractors should follow the Protocol for Archaeological Discoveries (**Section 6.5**). This would be particularly important for any pre-lay grapnel runs.

If required, a detailed Method Statement for the watching brief should include provision for the storage of archaeological finds. This should follow recommendations within:

- Robinson, W. 1998 'First Aid for Underwater Finds'.

Following recovery of any finds of archaeological interest, an assessment should be undertaken which identifies required specialist analysis and conservation. The Project will be responsible for meeting the costs of appropriate analysis and conservation.

6.4 AEZ Establishment and Monitoring (Work Package 4)

In order to mitigate the potential impacts of the Project on features identified in the assessment of the baseline and geophysical data, 19 AEZ's have been established.

The aim of AEZs is to preserve any sites, features or deposits of archaeological interest located therein. These are likely to include known wreck sites as well anomalies that have not been characterised by any of the assessments.

Work should follow guidance as laid out within Section 4 *Archaeological Exclusion Zones of Model Clauses for Archaeological WSIs* (The Crown Estate, 2010).

AEZs must be respected during all site activities including construction work and vessel mooring. Any activity which may disrupt the seabed within the AEZ's has the potential to impact material of archaeological interests.

All AEZ positions must be clearly established. The extent of each AEZ should be determined by the known nature of the site from available geophysical, video or diver survey data. The shape of the AEZ should be appropriate for the site or anomaly it is designed to protect.

The position of all AEZs must be clearly communicated to all contractors, who must be aware of the importance of the AEZs and that activities will be monitored to ensure compliance (see below).

Establishing and Altering AEZs During Construction

There is the potential for sites or finds of archaeological interest to be discovered during construction works. In the event of such discoveries, site work may need to stop in that area and archaeological curators will be consulted on the need for, and potential size of, an AEZ.

During construction, new data or information may become available that requires changes to established AEZs. AEZs could be enlarged, reduced, moved or removed based on new evidence. Archaeological curators will be consulted on changes to AEZs. Any changes must be communicated by the Project to all contractors.

Monitoring AEZs

No intrusive activities (any actions which disturb the seabed) must be undertaken within an AEZ.

All contractors must be aware of the position of the AEZ and that activities are monitored.

Vessels involved in construction should be recording data on their position and activities at all times on Electronic Monitoring Systems (EMS). This information must be of sufficient detail and quality to know whether the works being undertaken are intrusive (e.g. anchoring) or non-intrusive (e.g. travelling to the work site).

Should a breach of an AEZ take place then the construction contractor should inform the Project as soon as the event has taken place. The Project must then inform the consenting authority of the incident and seek archaeological advice from the archaeological curator.

The Project will review construction activity data available from vessel tracking and/ or any other appropriate sources against the location of established AEZ's, and report any identified breaches to HE.

6.5 Implementation of Protocol for Archaeological Discoveries (Work package 5)

A Protocol for Archaeological Discoveries (the Protocol) is required to be in place for a number of marine activities. The Protocol is required when there is a potential to encounter sites, objects or deposits of archaeological interest. Project specific details associated with the Protocol for the Project are presented in **Appendix III**.

For the Project, the activities requiring the Protocol are likely to be:

- Diver, drop-down camera, and ROV surveys;
- Infrastructure installation activities, including anchoring and mooring of vessels;
- Activities occurring during the operational phase of the Project, such as major maintenance campaigns; and

- Activities occurring during decommissioning.

7. Reporting and Publication

If activated, each of the Work Packages outlined within this WSI will generate reports. Reports should be prepared in accordance with the guidance provided in the relevant CIfA Standard and Guidance (see <http://www.archaeologists.net/codes/ifa>) and with reference to any other activity or analysis specific guidance.

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.

Following Section 2.5 Reporting of The Crown Estate (2010) *Model Clauses for Archaeological WS/s*, 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.

Where appropriate the report should provide recommendations for further assessment and/ or analysis requirements.

Each report will be submitted by the Project to the curator, and they will also submit copies to appropriate National and Regional repositories.

8. Archiving

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.
- ClfA, Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives.
- [The Crown Estate, 2010](#), *Model Clauses for Archaeological WSIs* (Section 2.8: Archiving).

Archive planning should be included within detailed Method Statements for the relevant Work Packages.

Agreement with the curators should be sought on the most appropriate archiving repository for either individual Work Package reports or the scheme as a whole.

As a minimum, copies of all Work Package reports will be submitted to the National Record of the Historic Environment (NRHE) of England.

An OASIS form will be produced for the whole project and copies of associated reports will be attached to this report. The National Record of the Historic Environment (NRHE) of England will also be provided with notice of submission of the OASIS form.

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 Digital Archive Centre (DAC).

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

9. Arrangements for Review of WSI

The WSI for the Generation Assets has put forward mitigation measures based on the archaeological assessments undertaken in preparation of the Environmental Statement.

As any future stages of archaeological mitigation are implemented that may inform on the understanding of the historic environment as the Project is developed, such as additional geophysical and geotechnical surveys or other forms of site investigation, these will be addressed through thematic Method Statements produced in reference to the WSIs.

This WSI has sought to anticipate different possible outcomes to outline appropriate courses of mitigation action. The WSI, including the Method Statements are produced under and in reference to the Work Packages, will be submitted to Historic England for approval.

Method Statements should include provision for Historic England to monitor progress of the investigations, including site visits or meetings where appropriate.

Based on the outcome of various Method Statements and in response to discoveries or monitoring reviews, a series of archaeological reports will be generated. Archaeological reports will be prepared by the Retained Archaeologist or relevant contractor and submitted to the Project who will then submit them to Historic England.

10. References

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- DONG Energy, 2016a. *Hornsea Project One Revised Archaeological Written Scheme of Investigation – Offshore Transmission Asset*. June 2016.
- DONG Energy, 2016b. *Hornsea Project One Written Scheme of Investigation (WSI) for Archaeological Strip, Map and Record & Watching Brief at/during Construction along the Onshore Electrical Cable Route*. June 2016.
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- MA Ltd, 2015. *Service 2 - Geophysical Data Assessment*. February 2015.
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- SMart Wind, 2013a. Draft Written Scheme of Investigation. PINS Document Reference: 7.5.10.2 July 2013.
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- SMart Wind, 2013c. Chapter 10 Marine Archaeology and Ordnance. PINS Document Reference: 7.2.10. July 2013.
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- The Crown Estate, 2014. Protocol for Archaeological Discoveries. Offshore Renewables Projects. London: Online, <http://www.thecrownestate.co.uk/media/148964/ei-protocol-for-archaeological-discoveries-offshore-renewables-projects.pdf> [Accessed on June 11th, 2015].

Wessex Archaeology, 2013. Round 3 Hornsea Offshore Windfarm, Subzone 1 and Export Cable Route, Stage 1 and 2 Geoarchaeological Assessment.

11. Figures

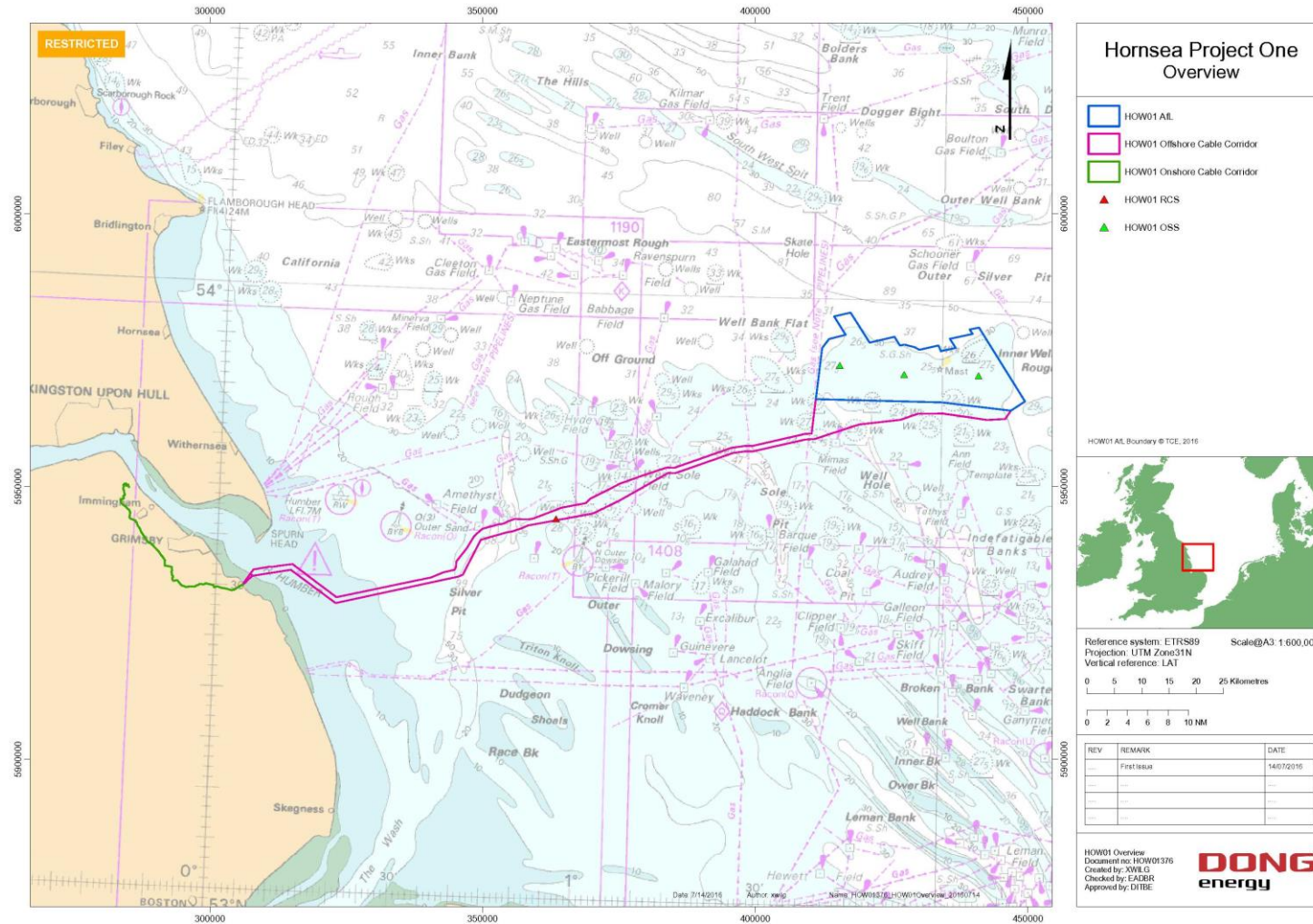


Figure 1 Location of Hornsea Project One Offshore Wind Farm

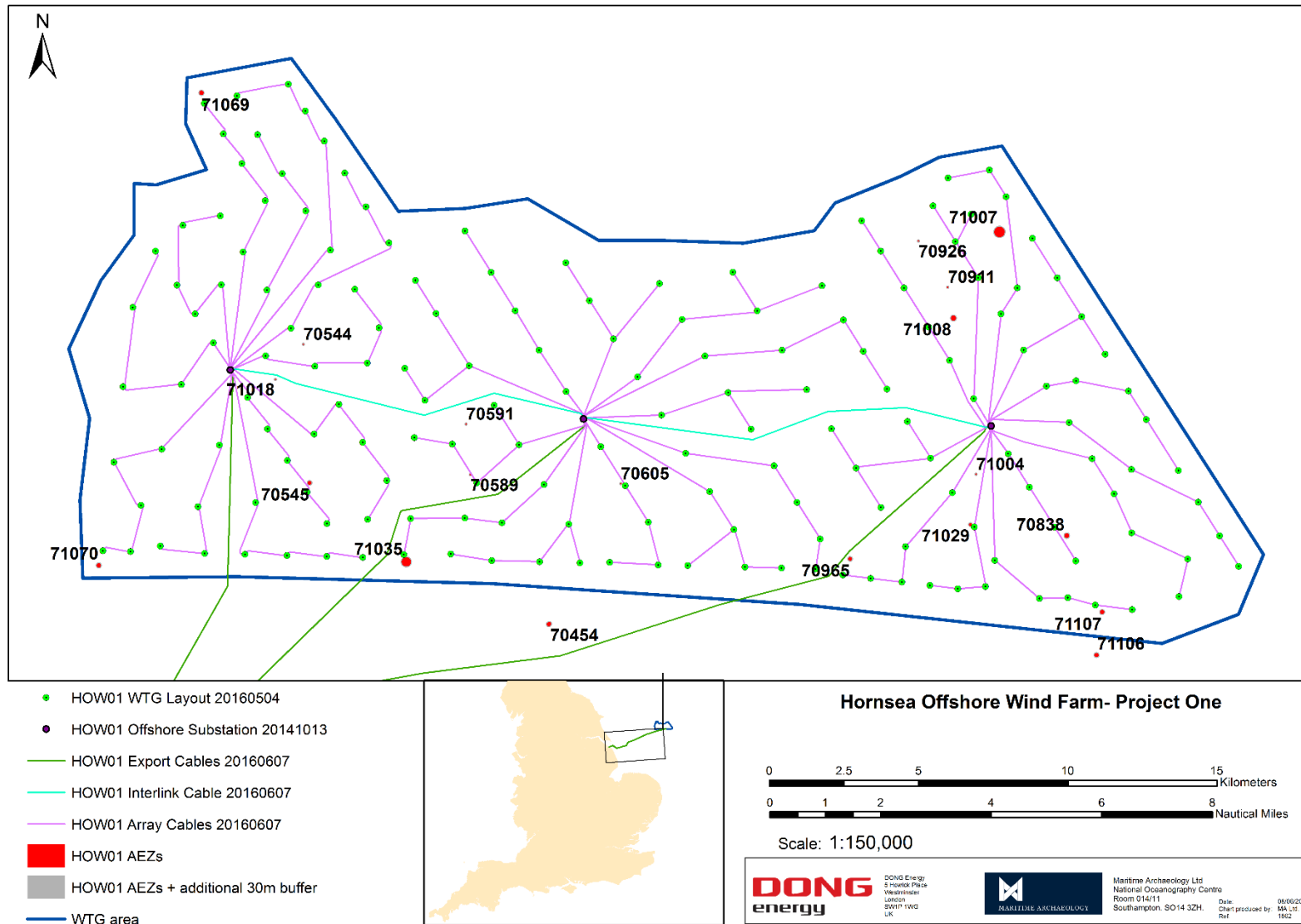


Figure 2 AEZ's in Wind Turbine Generator Area

12. Appendix I: Archaeological Exclusion Zones (AEZs)

Ano m a	Classification	Easting	Northing	Arch. potential	Length (m)	Width (m)	Height (m)	Magnetic (nT)	Description	AEZ	Area
70545	Wreck	418166	5968355	A1	16.4	10.7	0.4	0	Group of reflectors with height and parallel structure on the edge of a sediment wave. Possible wreck site	50	Wind Farm Site
70838	Wreck	443544	5966583	A1	29.5	8.7	0.9	0	Two elongated reflectors with a group of right-angular reflectors at one end suggest this may be a wreck structure, broken up and partially buried. Some localised scour. Likely to be a wreck site, though no wreck is previously recorded in this area.	50	Wind Farm Site
70965	Wreck	436282	5965805	A1	14.2	4.8	0.8	42	Two steep sided, proximal mounds likely to represent a metal wreck structure. Sidescan sonar imagery shows a structured, angular, anthropogenic object partially buried. Possible two ends of a shipwreck with centre buried and associated debris. Corresponds with known live wreck location. Magnetic anomaly suggests at least partial ferrous construction.	50	Wind Farm Site

71007	Wreck	441288	5976774	A1	36.7	124.8	2.5	0	Possible metal wreck, two points of height, steep sided protrusions above the seabed suggesting a broken up/partially buried wreck. Wreck appears broken into separate sections, minimal debris field. Corresponds with unknown recorded wreck location (UKHO 6928).	50	Wind Farm Site
71008	Wreck	439746	5973882	A1	35.0	15.0	1.2	96	A broken up wreck. Sidescan sonar indicates one end is significantly more intact and proud of the seabed. Strong angular reflectors amidships and curved stem visible. Magnetic anomaly suggests significant ferrous content of structure. Associated with previously recorded wreck location.	50	Wind Farm Site
71035	Wreck	421407	5965706	A1	105.7	18.6	4.0	2483	Distinct wreck site. Acoustic and magnetic signatures suggest this is a metal wreck with several large flat sections, some of which appear to be the result of outwards collapse. Associated with a recorded wreck site.	50	Wind Farm Site

71069	Wreck	414540	5981438	A1	23.5	12.9	0.4	308	Large structure identified in the sidescan sonar data. Strongly angular with flat, square sections. It has a corresponding magnetometer signature and bathymetric scouring suggesting this is a likely wreck site that is only partially exposed. No associated Seazone record, located approx. 260 m outside of the Subzone 1 boundary.	50	Wind Farm Site
71070	Wreck	411107	5965586	A1	22.9	6.5	2.5	2	Shipwreck, metal hulled, structure amidships, defined hull shape. Collapsed and broken at one end. Upright. Some debris field. Identified in sidescan sonar and multibeam bathymetry data sets. Coincides with a known wreck location believed to be the wreck of the Perseus, a trawler lost in 1915. Located approx. 390 m outside of the Subzone 1 boundary.	50	Wind Farm Site
71106	Wreck	444541	5962579	A1	19.2	8.3	0.4	0	Group of elongated and angular reflectors suggest this may be a structure. Unusual arrangement between sections, constant apparent heights and angles suggest possible wreck structure.	50	Wind Farm Site

71107	Wreck	444729	5964023	A1	20.2	11.8	0.5	0	Potential anthropogenic debris, hard irregular reflector with shadow, possible wreck. Two adjacent anomalies recorded by EMU with same description, approx. 13m apart. Grouped by WA. Recorded as debris by EMU, but described as possible wreck.	50	Wind Farm Site
71029	Recorded Obstruction	440317	5966956	A3	-	-	-	0	LIVE Foul found by acoustic sensor in 1990. Described as notable debris 4x4m or possibly 15m long. Previous data refers to two recorded obstruction UKHO/NRHE dataset only includes one.	50	Wind Farm Site
70926	Anthropogenic material	438570	5976469	A1 (from A2)	25.24	10.25	1.65	0	Linear reflector with associated shadow. Probable anthropogenic material.	25	Wind Farm Site
70911	Anthropogenic material	439556	5974909	A1 (from A2)	14.15	1.51	0.55	0	High magnetic return indicating ferrous material.	25	Wind Farm Site
71004	Anthropogenic material	440503	5968653	A1 (from A2)				0	Irregular reflectors and shadows. Probable anthropogenic debris.	25	Wind Farm Site
70605	Anthropogenic material	428600	5968331	A1 (from A2)	19.46			0	Linear reflector with associated shadow. Probable anthropogenic material.	25	Wind Farm Site
70591	Anthropogenic material	423415	5970338	A1 (from A2)	17.15	0.39	1.55	0	Irregular reflector with associated shadow. Probable anthropogenic object.	25	Wind Farm Site
70589	Anthropogenic material	423551	5968626	A1 (from A2)	25.65	1.95	0.66	0	Large irregular reflector. Probable anthropogenic material.	25	Wind Farm Site
70544	Anthropogenic material	417958	5972999	A1 (from A2)	14.12	3.81		0	Area of irregular reflectors. Probable anthropogenic material.	25	Wind Farm Site
71018	Anthropogenic material	417035	5971830	A1 (from A2)				0	Substantial reflector with associated shadow. Probable anthropogenic material.	25	Wind Farm Site

13. Appendix II: Method Statement for Archaeological Assessment of boreholes/vibrocores (Work Package 1)

13.1 Introduction

Maritime Archaeology Ltd (MA Ltd) has been contracted by DONG Energy ('the Client') to provide archaeological advice and assessment services in relation to the geoarchaeological assessment of the proposed Hornsea Offshore Wind Farm Project 1 (the 'Project').

An archaeological impact assessment has been conducted using baseline, geophysical, and geotechnical data (SMart Wind, 2013 a, b, c and d). Further work is planned to characterise the nature and extent of the potential channels across the Study Area, in order to offset the potential impact of the scheme upon them.

13.1.1 Project Background

The geoarchaeological assessments that have been, and are being, undertaken are summarised in **Table 8**.

Year	Samples acquired	Archaeological assessment
2011	28 VC's 24 CPT's	6 VC's and a number of bagged samples analysed Birmingham Archaeo-Environmental (Krawiec, et al);
2012	129 VC 12 BH's 162 CPT's	Wessex Archaeology Stage 1-2 Assessment of 27 VC and 12 BH's (Wessex Archaeology, 2013)
2014-2015	3 BH's CPT's	MA Ltd forthcoming, as outlined within this WSI.

Table 8 Hornsea Project 1 geoarchaeological assessments

The geoarchaeological assessments have revealed the presence of Pleistocene fluvial and estuarine sediments with the potential to contain hominid remains beneath the Devensian glacial till as well as Early Holocene channels that are probably cut into larger late Glacial channels containing reworked glacial till. The cable corridor crosses some Late Pleistocene and Early Holocene channels on its way to the shore (SMart Wind 2013d).

13.1.2 Method for 2015 Geoarchaeological Assessment

As further archaeological work has been deemed necessary on the cores collected in 2014/2015. The following sections detail the proposed methodology for Work Package 1, as previously defined within this WSI. The assessment will take into account all the previous geoarchaeological assessments and produce a report that summaries all the geo archaeological results.

- Task 1 - Provide training session for geotechnical contractor (complete 2015);
- Task 2 - Archaeological analysis of geotechnical samples (complete March 2016);
- Task 3 - Archaeological Assessment Report (to be finalised and submitted to archaeological curators in 2016).

This methodology will be used as the basis for a brief, or briefs, to engage archaeological contractors to undertake Work Package 1 – Archaeological Assessment of Boreholes/Vibrocores.

The geoarchaeological assessment is undertaken to understand the sub-surface deposits and palaeochannel features within the development area. The results will be used to understand the geomorphological evolution of the area being impacted by the development.

The assessment of potential archaeological deposits follows a staged approach as described in Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects (The Crown Estate, 2010), COWRIE's Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011), and English Heritage (2011) Environmental Archaeology: a guide to the theory and practice of methods, from sampling to post excavation. The proposed staged approach comprises of the following elements:

- Stage 1 – Desk-Based Assessment: Archaeological review of geotechnical logs;
- Stage 2 – Splitting and recording geotechnical cores;
- Stage 3 – Sub-sampling & assessment;
- Stage 4 – Analysis and dating.

The staged approach is designed to flow sequentially with each stage leading to the subsequent stage of work, or representing the end of the assessment if the findings of any stage show that no further work is appropriate.

Close liaison between archaeological and geotechnical staff will be required. This will be facilitated by the Project. It is expected that the borehole/ vibrocore contracting team/s will recover the samples and store them. Agreements will need to be in place for archaeological contractors to visit the storage location for the extraction, assessment and sub-sampling of the boreholes/ vibrocores.

A number of geotechnical boreholes and CPT's were collected from the Project area in 2014/2015. Three 60 m geotechnical boreholes were drilled at OSS locations and one push – CPT was undertaken at each WTG location these will be subjected to a geoarchaeological assessment as outlined within this WSI.

The CPT's collected are likely to be of limited archaeological value, but results of the CPT testing should still be made available for archaeological review.

Contractors acquiring the marine boreholes were made aware of any AEZ's close to the proposed sample location, and the Protocol for Archaeological Discoveries was followed.

13.2 Task 1- Archaeological Training for Geotechnical Staff (Completed 2015)

In accordance with this WSI, the retained archaeologist provided borehole/vibrocore contractors with an archaeological training day. This approach has been successfully employed by MA Ltd on several DONG Energy projects.

A qualified archaeologist delivered the training which aimed to ensure that data captured during borehole/vibrocore survey for the purpose of archaeological assessment and analysis was fully documented. In total, MA Ltd provided two sessions for project staff.

The overarching purpose of the training provided was to enable geotechnical staff working offshore to operate without the presence of an archaeologist on-board the vessel, while obtaining basic records to appropriate archaeological standards.

The training of the geotechnical contractor(s) was provided in three parts:

- Background and Archaeological Theory;
- Protocol for Archaeological Discoveries;
- Practical session featuring recording of example core material (to archaeological standards) and find identification.

The training session was developed in a power point format suitable for delivery to survey and technical staff involved in the geotechnical survey of the Project. The information was targeted at those who are responsible for the lab analysis and recording of recovered cores. The presentation covered the following key issues and elements:

- Introduction
- How geotechnical survey is relevant to archaeological investigation;
- Broad background to prehistoric archaeology in offshore contexts, including areas and sites as well as find spots from submerged contexts;
- Sediment types: which are typically of interest archaeologically;
- Overview of the archaeological assessment sequence;
 - Core logging
 - Sampling
 - Analysis & assessment
 - Modelling
 - Reporting
- Key issues: storing of samples; access to samples; co-operation with other users of samples; collection of archaeology-only sample(s);
- Recording and documentation procedures, including: logging, coding and storage of samples in accordance with the documents and guidelines.
- Information on the procedure to be followed in the event of unexpected archaeological discoveries using the Protocol for Archaeological Discoveries.
- Marine archaeological finds identification session
- Summary & Conclusion
- Question & Answer Session

The presentation drew on information contained in Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE 2011). In addition, a range of training material was developed, including hand-outs, and sample forms.

The training session provided to the geotechnical contractor has enabled the recording of core logs by laboratory staff on and offshore. All cores should be recorded in their entirety, including photographic records to appropriate standards. These will then be provided to MA Ltd for assessment.

13.3 Task 2- Archaeological analysis of geotechnical samples

Geotechnical data contributes towards the understanding of the geomorphological evolution of a landscape prior to and during inundation. This in turn can help focus attention on areas with the highest archaeological potential.

13.3.1 Stage 1 – Desk Based Assessment: Archaeological Review of Geotechnical Logs

Due to the palaeoenvironmental potential of the development area, where possible, core material should be retained for archaeological review and assessment.

As described in **Section 13.2** logs produced by the borehole/vibrocore contractor will be reviewed by a qualified archaeologist with marine and geotechnical experience.

Stage 2 will be undertaken based on the information contained in the logs provided by borehole/vibrocore technicians who have received the archaeological training.

- Sediments or layers of interest are likely to be composed of: Fine grained sediments that are indicative of estuarine, riverine, lacustrine or coastal environments potentially supportive of human populations.
- Organic material including plant material and peat.

The Retained Archaeologist will have the necessary experience to analyse and interpret vibrocore and borehole cores, and any resulting records and samples, for archaeological purposes.

The results of the review and any associated recommendations will be presented in the Stage 1-2 geoarchaeological report.

13.3.2 Stage 2 - Recording Geotechnical Cores

Vibrocores, or borehole cores identified as possessing archaeological potential during Stage 1, will be subject to detailed recording to determine the presence or absence of archaeologically relevant material. If no Stage 1 assessment has been possible, all cores may be recorded during Stage 2. These records will include notes on:

- Sediment colour;
- Sediment type;
- Sedimentary architecture;
- Inclusions, including organics, macro-fossils and archaeological artefacts;
- The presence of polymorphs, and;
- Other datable material.

Cores will be recorded using Rockworks software, and sediments or layers of potential archaeological interest will be highlighted. Written and photographic records will be completed by a qualified archaeologist, or will be produced by geotechnical staff who have undertaken training to familiarise themselves with the vital aspects of these records. In the latter instance, all such records will be made available to the archaeological contractor at the earliest opportunity. Cores must be retained until the requirement for further archaeological sampling, if any, has been determined.

The results and conclusions have been delivered as a stand-alone assessment report detailing recommendations for conducting a Stage 3 assessment.

13.3.3 Stage 3: Methodology for Sub-sampling of Cores and Assessment

Where cores or contexts with the potential to yield archaeological information are identified during Stage 2, the archaeological contractor will make an informed judgement and recommend whether a Stage 3 assessment of the deposits is justified. The judgement will be based on a consideration of

whether the commitment of additional resource to sub-sampling and assessment in laboratory conditions is justified when considered against the Project's overall commitment to offset any potential impacts of the Project through the further development of a deposit model.

This stage will be broken down into the following elements:

- Sub-sampling of selected contexts with potential for yielding palaeoenvironmental material/information for example:
 - Pollen;
 - Diatoms;
 - Ostracods and/or foraminifera;
 - Waterlogged plants;
 - Insects and molluscs;
 - Charcoal.
- Samples of generally between 250 - 500g (or more if it can feasibly be stored) will be taken;
- One core half to be sub-sampled; remaining half retained;
- Basic lab analysis to determine potential of samples to yield results through detailed specialist analysis during Stage 4;
- If appropriate, suitable samples will be sent for radiocarbon dating.

From contexts where archaeological indicators are clearly identified, larger bulk samples may be required in order to facilitate detailed analysis. Any such larger samples will be agreed with other core users prior to being taken. Sub-samples will also be taken and retained at this stage.

Results and conclusions from this stage will be delivered as a stand-alone assessment report detailing recommendations for conducting, or not conducting, a Stage 4 assessment.

13.3.4 Stage 4: Analysis and Dating

As for Stage 3, the archaeological contractor will make an informed judgement and recommend whether the commitment of additional resource to Stage 4 analysis and dating is justified when considered against the Project's overall commitment to offset potential impacts of the Project through the continued development of a deposit model. If undertaken, this stage will subject samples extracted during Stage 3 to detailed laboratory analysis. Specialist analysis for a range of palaeoenvironmental and archaeological indicators will include:

- Microfossils such as pollen (used as a regional proxy indicator).
- Macrofossils such as insect and molluscs remains as well as waterlogged plant remains including seeds, wood and charcoal (all site specific indicators which provide comment on vegetation type, rates of change etc.).
- Foraminifera, molluscs and diatoms provide data on coastal sites, sea-level rise as well as global climate change. Foraminifera and diatoms should ideally be analysed in conjunction with each other.

This stage will result in an account of the successive environments within the coring area, a model of environmental change over time, and an outline of the archaeological implications of the analysis.

13.4 Task 3 - Archaeological Assessment Report

Each stage of work will generate a report; these are likely to be of increasing complexity as recording and analysis progresses. The initial Stage 1 report is expected to follow the following outline, with additional sections as required:

- Non-technical summary
- Introduction
 - Project Background
 - Area of Study
 - Brief Review of Previous Work
- Methodology
- Results: Geotechnical Assessment
 - Borehole Analysis
 - Vibrocore Analysis
- Discussion
- Conclusion and Recommendations for Further Work
- References
- Appendix of core logs

13.4.1 Subsequent Geotechnical Reports

Subsequent geotechnical reports will be produced as stand-alone assessments of any further stages that are undertaken.

If progressed beyond Stage 1/2, a final assessment report and deposit model will be produced to a level of detail that will reflect the stage reached during the project. This report will describe the nature of the deposits and the sedimentary sequence, including a relative chronology, an assessment of palaeoenvironmental change within the development area, and assessment of the archaeological potential of the deposits studied.

13.4.2 Project Deliverables

The Retained Archaeologist will submit the following key deliverables as a result of the project as a whole:

- Training sessions for the geotechnical contractor (completed)
- Archaeological assessment of geotechnical data (boreholes/vibrocores – Stage 1-2) (completed)
- Hard copies of the report and CDs containing: digital report, background data; GIS; and lab results.

13.4.3 Storage, Retention and Disposal of Samples

Storage: All geoarchaeological samples should be treated in accordance with Environmental Samples of The Crown Estate, 2010. This will include all samples being stored in appropriate conditions by the geotechnical contractor/s and archaeological contractor/s pending assessment and analysis work. In line with recommendations in *Environmental Archaeology* (English Heritage, 2011:14), samples should be kept cool with light and air excluded.

Retention: Geoarchaeological samples should be retained by the geotechnical contractor/s and/or archaeological contractor during the geotechnical project. Following completion of analysis and reporting the long-term archiving of relevant samples should be considered. Archiving of relevant sample material should be undertaken along with the other elements of the project.

It should be recognised that approaches to geoarchaeological data archiving are currently being developed through the network of MEDIN DACs (Data Archive Centre) (COWRIE 2011: 46). Options for long term curation of cores and samples in a DAC should be explored, including donation to a suitable repository (e.g. the National Geological Repository, part of the British Geological Society).

Disposal: A timetable should be agreed with both the borehole/vibrocore contractor/s and the archaeological contractor/s on the length of storage of samples. This should be sufficient to allow all appropriate analysis work to be undertaken. The results of the various stages of archaeological assessment will determine the archaeological significance of each of the samples. Only after the results of the assessment and in agreement with the curators will sample material taken for archaeological assessment or analysis be disposed of (if appropriate).

13.4.4 Archiving

On completion of the project, a final copy of the report and any other deliverables, such as a deposit model, will be submitted to the curator, Historic England, and to the National Record of the Historic Environment (NRHE).

In addition, an OASIS form will be completed and submitted online.

13.5 Sedimentary Sequence Deposit Model

As outlined by COWRIE (2011:38), an archaeological deposit model should illuminate the character and nature of buried sediments and deposits, their vertical extents, their relationship across the area being studied, and their individual levels of archaeological interest.

The questions relevant to offshore renewable energy developments that can be addressed by archaeological deposit modelling include:

- What sediments are within the development area?
- What is their archaeological interest?
- What sedimentary deposits of archaeological interest will be directly impacted by the development?
- What is the significance of the impact?

Depending on the results of the geoarchaeological assessment a graphic representation of the sedimentary sequence of the development area will be produced. The complexity of this model will reflect the stage of work achieved during this project. The model will illustrate the vertical and horizontal relationship of sedimentary extents across the development area and will describe their archaeological interest.

The model will, in its simplest form, be a two-dimensional plot of boreholes/ vibrocores describing their vertical relationship with links between contexts interpreted as contiguous. With information derived from later stages it may be possible to produce a three dimensional graphic describing the vertical and horizontal relationships.

14. Appendix III –Protocol for Archaeological Discoveries - Project specific roles, responsibilities, and contact details

14.1 Introduction

This Appendix is a project specific accompaniment to the Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014), which is included as **Annex I**. It summarises the Protocol for Archaeological Discoveries, the roles and responsibilities of the developer and relevant contractors and contains contact details for the developer's reporting chain.

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 progress and should be considered as a safety net and not as a replacement for other archaeological impact assessments.

“The aim of protocols for unexpected discoveries is to reduce any adverse effects of the development upon the marine historic environment by enabling people working on the project to report their discoveries or recovered material rapidly in a manner that is convenient and effective. The protocol will set out the respective responsibilities of the developer, main contractors, and archaeological contractors/consultants. The protocol therefore provides a mechanism to aid compliance with the Merchant Shipping Act 1995 in respect to recovery of ‘wreck’, as defined by the Act and reporting of military vessel and aircraft wrecks to the Ministry of Defence.”

COWRIE's Historic Environment Guidance for the Offshore Renewable Energy Sector (2007).

ORPAD applies to finds or features that are or may have been made, used or affected by people. This includes fossilised remains from periods of human habitation. It does not include geological, ecological or pre-human fossils unless a link to human activity can be established.

The response to a reported find is assessed on a case-by-case basis. It could comprise further survey, a Temporary Exclusion Zone (TEZ) or an Archaeological Exclusion Zone (AEZ).

In order for the Protocol for Archaeological Discoveries to be effective, three elements need to be fully resourced and functioning. These are:

1. The Implementation Service (IS);
2. The Developer's internal reporting chain, and;
3. Awareness training to the right personnel.

(The Crown Estate, 2014)

Element 1 has been established and funded by The Crown Estate. Contact details and requirements have been summarised in this document.

To fulfil the requirements the developer, the Project, has agreed to provide details of the internal reporting chain (Element 2) which have been included in this document **Section 15.3**.

Element 3 has been undertaken by MA Ltd and provided to relevant geotechnical personnel. The Project also provides offshore personnel with an introduction as a part of the initial offshore induction process, which encourages relevant offshore personnel to familiarise themselves with the Project WSI and the Protocol for Archaeological Discoveries.

14.2 Roles and Responsibilities

The Protocol for Archaeological Discoveries contains a flow chart that should be followed in order to make the reporting of finds of archaeological potential efficient and effective.

The ORPAD assumes that a discovery is made by Project Staff who will report it to a Site Champion on their vessel or site, who then reports to the Nominated Contact (nominated by the developer to co-ordinate implementation of the ORPAD). The Nominated Contact will in turn inform the retained archaeologist, Implementation Service (IS), and the Developer's Project Manager(s). The IS will in turn liaise with the Nominated Contact, Archaeological Curators, and the Developer's Project Manager(s) as necessary (See **Figure 1**).

Developer - DONG Energy.

Retained Archaeologist - Appointed by the developer to provide archaeological advice or services.

Implementation Service (IS) - the IS is provided through The Crown Estate and is responsible for responding to reports made through the ORPAD. The IS will liaise with all parties and should not take precedence over the developers retained archaeologist.

Nominated Contact - Nominated by the developer to act as a formal point of contact between the developer, the subcontractors, the site champions, the IS and the retained archaeologist in matters related to the ORPAD. An Environmental manager, Project Manager or any other co-ordinator might be suitable. All parties should have the nominated contact's full contact details and any change in personnel should be circulated.

Site Champion - Formally appointed by the developer (vessel master, construction foreman or other person in position to control the immediate works).

Project Staff - Personnel working on the project in any role or capacity.

Figure 4 outlines the basic sequence of reporting, this applies when an archaeologist is not present. For detailed responsibilities of the various roles, refer to the Protocol for Archaeological Discoveries, included as **Annex I**.

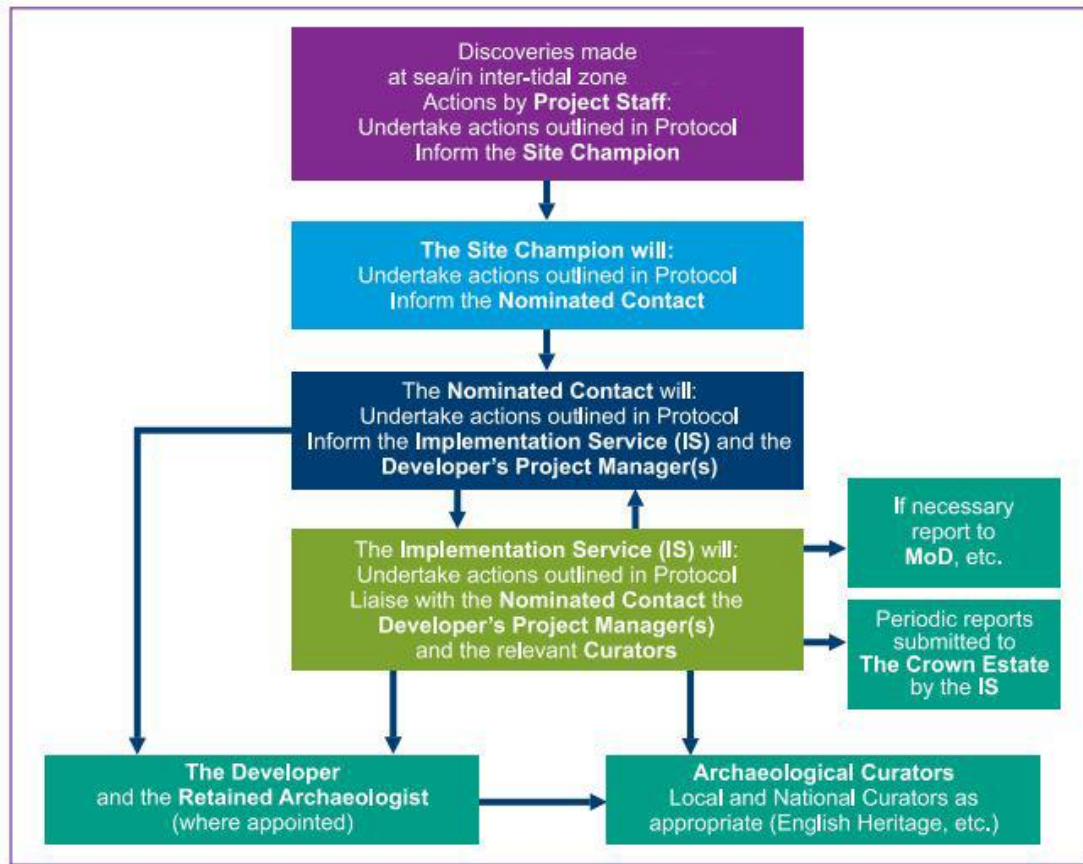


Figure 3 ORPAD basic sequence for reporting (The Crown Estate 2014).

14.3 Project specific roles

For DONG Energy’s Hornsea Project One development, the personnel detailed in **Table 9** (below) will be responsible for the implementation of the ORPAD. The appointments have been made by the developer on agreement with the Retained Archaeologist.

Site Champions will be identified during the induction process and details will be circulated amongst the contractor, the Project, and the Retained Archaeologist via email. This WSI will be referenced as part of the induction, and copies will be circulated among relevant staff. If any changes to named personnel should occur, the WSI will be updated and re-circulated.

14.4 Nominated PAD Personnel

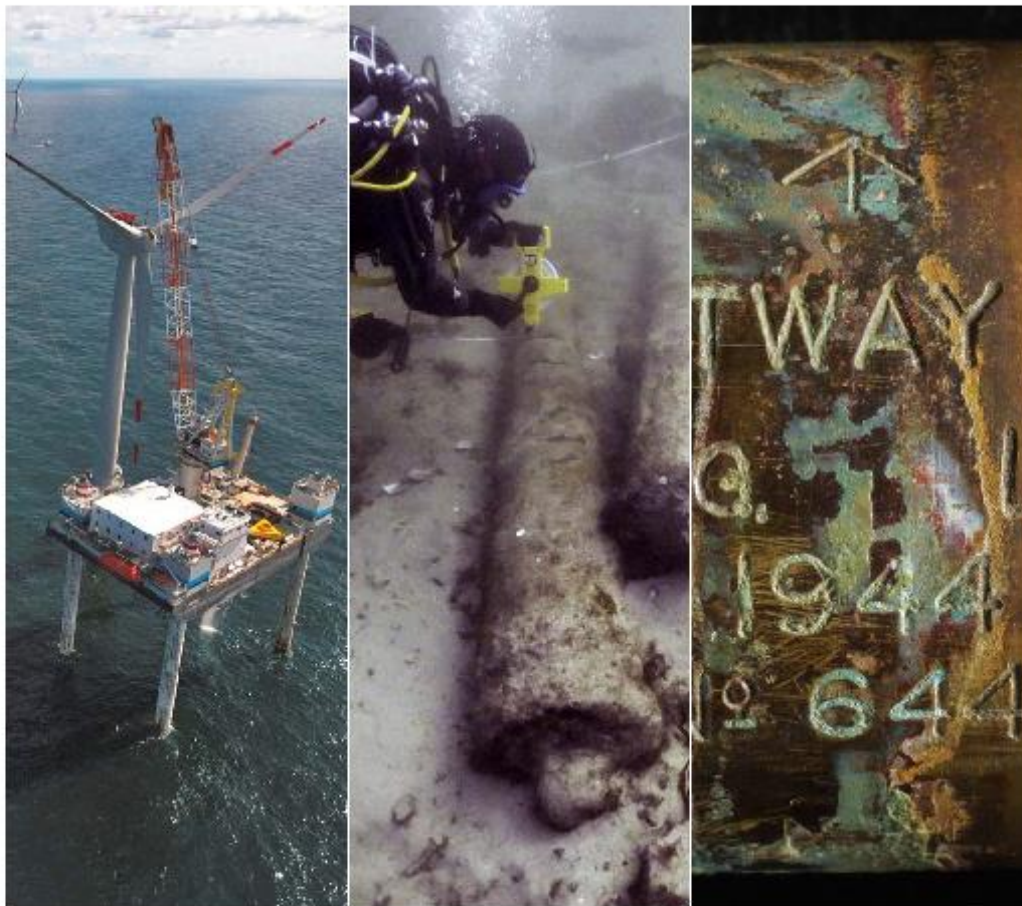
HORNSEA OFFSHORE WIND FARM, PROJECT ONE: ORPAD PERSONNEL				
Role	Name	Email	Phone	Vessel
Developer (DONG Energy)	Bronagh Byrne	BRYBR@DONGenergy.co.uk	+44(0)20 7811 5470	n/a
Retained Archaeologist	Maritime Archaeology Ltd.	christin.heamagi@maritimearchaeology.co.uk	+44 (0)2380 237300	n/a
Implementation Service	Wessex Archaeology	protocol@wessexarch.co.uk	+44 (0)1722326867	n/a
Nominated contact	Ditte Bilde	DITBI@DONGenergy.co.uk	+44 20 7 8115437	n/a

Table 9 Project specific roles in relation to the PAD

Annex I Protocol for Archaeological Discoveries: Offshore Renewables Project.



Protocol for Archaeological Discoveries: Offshore Renewables Projects



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