

# Erebus Floating Offshore Wind Farm

## Marine Archaeological Written Scheme of Investigation

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## 1.0 Introduction

- 1.1.1 MSDS Marine Ltd were contracted by MarineSpace Ltd to produce a Marine Archaeological Written Scheme of Investigation (WSI) covering the area within the Offshore Consent Boundary of the Erebus Floating Offshore Wind Farm (FLOW). This WSI supports the application for development consent and outlines mitigation strategies and methods by which this mitigation can be achieved, following on from those recommended within the Environmental Statement (ES) and anticipated potential marine licence conditions.
- 1.1.2 An archaeological condition was included within the consent given for geotechnical coring for which a method statement for geoarchaeological involvement in the campaign was produced in May 2021 (Appendix A, MSDS Marine report number: 2021/MSDS20149/6) and a protocol for reporting finds of archaeological interest was implemented (Appendix B, MSDS Marine report number: 2021/MSDS20149/3). These documents are appended to this WSI.
- 1.1.3 It is recognised that this document may require amendment following receipt of the marine licence and associated conditions, to ensure it allows each archaeological condition to be met.

## 1.2 Project Description

- 1.2.1 Erebus is a proposed Floating Offshore Wind Farm development in the Celtic Sea. The project is located approximately 44 km southwest of the Pembrokeshire coastline, in an outline area of interest of approximately 43.5 km<sup>2</sup>. The key project components are:
- Between 7 and 10 floating wind turbine generators (WTGs), of total capacity up to 96MW, as well as the associated semi-submersible platforms and mooring infrastructure.
  - Inter-array cables and a single offshore export cable route to landfall.
  - Onshore cabling between landfall and the grid connection.
  - Onshore substation at the grid connection point.

## 1.3 Aims and Objectives

- 1.3.1 The objectives of the WSI are in line with best practice guidance set out within The Crown Estate (2021) document, *Archaeological Written Schemes of Investigation for Offshore Renewables Projects*. The objectives are also in line with the mitigation proposed by the ES. The objectives are as follows:
- To provide details of the responsibilities of the developer, archaeological consultant, and contractor and to provide details of lines of communication;
  - To ensure consultation with archaeologists on the elements of scheme design that have the potential to impact archaeological sites and materials;
  - To ensure delivery of archaeological mitigation including to establish the exact position and extent of any Archaeological Exclusion Zones (AEZs) and to set out methods for their modification and/or removal;
  - To establish a reporting and recording protocol, including reporting of any wreck or wreck material during construction, operation and decommissioning of the Proposed Development;
  - To set out methods for an intertidal archaeological watching brief;

- To ensure that any further geophysical and geotechnical investigations undertaken within the Offshore Consent Boundary in association with the project are subject to archaeological input, review, recording and sampling where required;
  - To ensure archaeological involvement in any diver and/or remotely operated vessel (ROV) obstruction surveys conducted within the Offshore Consent Boundary;
  - To propose measures for the mitigation of archaeological remains encountered during further geotechnical sampling or investigations, or during the construction work associated with the project;
  - To establish the analysis, reporting and archiving requirements for the archaeological works undertaken in association with the development.
- 1.3.2 A brief summary of the archaeological background and impacts is also included within this WSI (Sections 3 and 4), and further details can be found within the ES and Technical Report.

## 2.0 Implementation of the WSI

2.1.1 This section sets out the responsibilities of the Developer and lines of communication during the pre-construction, construction, and post-construction process for the Project with the aim of ensuring that the archaeological mitigation measures described are fully implemented in a timely manner that does not interfere with the smooth running of the project programme.

### 2.2 Responsibilities and Communications

2.2.1 Primary responsibility for the delivery of this WSI lies with the Developer. Through project documentation and procedures, the implementation of this WSI will involve a range of archaeological contractors and curators.

2.2.2 The Developer shall employ the services of a suitably qualified and experienced Archaeological Consultant (henceforth referred to as the 'Retained Archaeologist') to ensure the effective implementation of the WSI and other relevant commitments in relation to archaeology. In the pre-application period MSDS Marine were contracted by MarineSpace on behalf of the Developer to provide archaeological advice and products.

2.2.3 Additional Archaeological Contractors may be employed, on an ad hoc basis, by either the Developer, or the Retained Archaeologist if this task is delegated to them by the Developer. Suitably qualified Archaeological Contractors may be called to provide a range of services relating to specialist archaeological provision (e.g., fieldwork, geotechnical, analysis etc.). The term 'Archaeological Contractor' is used in this WSI where activities may be conducted either by an additional contractor or by the Retained Archaeologist. Where work is to be conducted by an Archaeological Contractor who is not the Retained Archaeologist, the Archaeological Contractor will report to the Retained Archaeologist who will advise the Developer.

2.2.4 Cadw, the Royal Commission on Ancient and Historic Monuments of Wales (RCAHMW) and Dyfed Archaeological Trust (DAT) are the Archaeological Curators. Cadw principally deal with designated heritage assets (both onshore and offshore), while the RCAHMW's remit also includes marine archaeology. DAT's remit covers onshore archaeology and remains within the intertidal zone. The Archaeological Curators will be consulted regarding activities undertaken as part of this WSI.

- 2.2.5 The regional archaeological curator for heritage matters above Mean Low Water (MLW) is Dyfed Archaeological Trust. Contact with Dyfed Archaeological Trust should be made for all matters relating to the intertidal zone, along with the RCAHMW and Cadw as necessary.
- 2.2.6 Contact with the Archaeological Curator will be administered by the Developer under advice from the Retained Archaeologist. In relation to the implementation of the WSI, the Retained Archaeologist will report to the Developer's appointed project contact (e.g., Project Manager). Interaction with the development construction team will be administered by the project contact, advised by the Retained Archaeologist.
- 2.2.7 The responsibilities of the Retained Archaeologist will include:
- Maintaining, reviewing, and updating the WSI, as required;
  - Advising the Developer on the necessary archaeological works and input required;
  - Advising the Developer which elements warrant archaeological involvement;
  - Advising the Developer in the course of evaluating scope of work specifications on their capacity to meet archaeological requirements;
  - Advising the Developer on the necessary interaction with third parties with archaeological interests, including the Archaeological Curator(s);
  - Advising the Developer on the implementation of generic archaeological requirements applicable to all construction activities;
  - Advising the Developer on the micro-siting of cable routes and WTG locations and other elements of the development covered by this WSI, based upon archaeological results from Environmental Impact Assessment (EIA) and pre-construction surveys;
  - Advising the Developer on Method Statements for archaeological investigations;
  - Preparing Method Statements for all archaeological activities;
  - Ensuring that Method Statements are developed in consultation with the Archaeological Curator with the aim of securing agreement on the methods to be used, and providing final versions of Method Statements to the Archaeological Curator;
  - Implementing and monitoring the protocol for reporting of archaeological remains;
  - 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 Curator;
  - Preparing provisions for the management of the project archives in consultation with an appropriate Museum; and
  - Advising the Developer on final arrangements for analysis, archive deposition, publication and popular dissemination and the necessary schedule for these deliverables.
- 2.2.8 Where Method Statements, reports or other deliverables are submitted by the Developer to the Archaeological Curator, their agreement/acceptance will be assumed if no contrary response is received within 30 working days of submission.
- 2.2.9 All Construction Contractors engaged in the construction of the project shall:

- Familiarise themselves with the generic requirements of the WSI and make them available to their staff;
- Obey legal obligations in respect of 'wrecks' and 'treasure' under the Merchant Shipping Act 1995 and the Treasure Act 1996 respectively;
- Respect constraint maps and AEZs;
- Assist and afford access to archaeologists employed by the Developer;
- 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 reporting finds of archaeological interest.

### 2.3 Arrangements for reviewing the WSI

- 2.3.1 Provision will be made for the WSI to be revised as appropriate should elements of the project change or particular archaeological issues come to light. Any revisions will be prepared by the Retained Archaeologist and submitted to the Developer.

### 2.4 Monitoring Compliance with the WSI

- 2.4.1 Compliance with this WSI will be ensured by regular meetings between the Retained Archaeologist and the Developer. The regularity of meetings may alter at different points within the project depending on the need, for example, pre-construction surveys and activities are likely to require closer contact than post-construction. However, regular contact will be maintained to ensure compliance with the WSI. These meetings will ensure compliance through agendas which include discussions of the construction programme and any upcoming work which may require archaeological input, as per the stipulations of this WSI. The Retained Archaeologist also advises the Developer of the required scope of any necessary works and plans these works at the regular meetings and other meetings as required.
- 2.4.2 Following this advice, appropriate method statements will be prepared as required for each element of the project which requires archaeological involvement, in line with the requirements of the WSI. These will be produced in consultation with the Archaeological Curator, with the aim of securing agreement on the method. Agreement by the Curator will be assumed if no response is received within 30 working days of submission. The Retained Archaeologist will ensure compliance with these method statements during the subsequent works, thereby also ensuring compliance with the WSI.
- 2.4.3 The performance of the WSI will also be monitored through the provision of archaeological reports, prepared to inform on the results of various activities undertaken under its auspices. These include a review of new geophysical, geotechnical and ROV/diver data, and the results of the implementation of the protocol for reporting finds of archaeological interest. These reports will be submitted to the Developer who will submit them to Natural Resources Wales (NRW) marine licensing team (MLT) as required under potential licence conditions. The advice of Archaeological Curators may be sought in the review of these reports, as to the satisfactory completion of such work to enable addition to a public archive. The reports will be submitted within the timeframes stipulated by the conditions of the marine licence.

- 2.4.4 The responsibility for ensuring the implementation of the protocol for reporting finds of archaeological interest (Appendix B – Offshore Protocol for Archaeological Discoveries) rests with the Developer, who will ensure that its agents and contractors are contractually bound to implement the protocol.
- 2.4.5 Based on Appendix B below, the Developer and the Retained Archaeologist will agree the system for archaeological reporting of the Protocol.
- 2.4.6 During any site evaluation/investigation or construction work that has the potential to affect archaeological remains, the Retained Archaeologist will advise the Developer who will liaise directly with the Archaeological Curator with regard to site monitoring and reporting. The Developer will be kept informed of any contact between the Retained Archaeologist and the Archaeological Curator. A programme of monitoring visits (if deemed appropriate) by the Archaeological Curator and the Developer will be agreed in advance of the commencement of work on site.

## 2.5 Health and Safety

- 2.5.1 The Retained Archaeologist will ensure that any method statements prepared to meet the requirements of the WSI are compliant with the requirements of the Developer's Health and Safety Plans for the project.
- 2.5.2 Health and Safety considerations will be of paramount importance in conducting all fieldwork. Safe working practices will override archaeological considerations at all times.
- 2.5.3 All work will be carried out in accordance with the Health and Safety at Work etc. Act 1974, the Management of Health and Safety at Work Regulations 1999 the SCAUM (Standing Conference of Archaeological Unit Managers) health and safety manual Health and Safety in Field Archaeology (SCAUM, 2007) and all other relevant Health and Safety legislation, regulations, and codes of practice in force at the time.

## 3.0 Summary of Known and Potential Archaeology

- 3.1.1 The ES and Technical Report identified a series of known and potential remains within the Offshore Consent Boundary, relating to:
- Submerged prehistory and palaeolandscapes;
  - Maritime archaeology;
  - Aviation archaeology;
  - Maritime infrastructure, intertidal and coastal sites; and
  - Milford Haven Waterway: Registered Landscape of Outstanding Historic Interest
- 3.1.2 These remains are briefly summarised below. Further details can be found within Chapter 14: Marine Archaeology and Cultural Heritage and Volume 3, Technical Appendix 14.1 Marine Archaeology Combined Desk Based Assessment & Technical Report.
- 3.1.3 Assessment of geophysical survey data and the project ground model demonstrated that a series of sedimentary units are present within the Study Area, including potential channel features and fills, and likely glacial deposits. These deposits are undated but may relate to a



series of different Pleistocene and Holocene formations. There is potential for palaeoenvironmental remains particularly within channel deposits, and other sediments may hold datable material. Mesolithic archaeological sites in the vicinity demonstrate the potential for in situ remains from this period, particularly associated with landscape features such as channels and there is also potential for in situ material from other prehistoric periods, including Late Upper Palaeolithic. Earlier remains are more likely to have been reworked and there is potential for redeposited remains of all periods.

- 3.1.4 Maritime archaeological sites and geophysical anomalies are present within the Offshore Consent Boundary. Desk based sources indicate the presence of the remains of one wreck (*HMS Leda*) on the rocks at West Angle Bay, of which remains may survive in gullies (though none were observed during the walkover survey), while 114 potential maritime sites were identified within the geophysical survey data within the Offshore Consents Boundaries, including 3 high potential and 11 medium potential anomalies, three identified as wreck sites and others which may represent material associated with wrecks. Other wrecks were also identified within the Study Area. There are also large numbers of buried magnetic anomalies of uncertain origin, which may represent archaeological remains. Additionally, there is further potential for wreck remains from all periods, though particularly from the post-medieval and modern periods to be present within the Study Area.
- 3.1.5 Two aircraft losses are also reported within the Study Area, and aircraft material has been found within the Study Area. Due to the high number of aircraft passing over the area during wartime in particular there is a relatively high potential for remains of wrecked aircraft to be present within the Offshore Consent Boundaries.
- 3.1.6 Features relating to maritime infrastructure were also reported in the intertidal zone on the northern side of West Angle Bay including a rock cut channel leading to an embayment used for mooring vessels, and other associated features such as a jetty, possible crane base, pathway and mooring points. Other mooring points were also found on the south side of the bay, and most maritime infrastructure features were associated with the outcropping bedrock on the bay's margins. However, aerial photos from the 1940s demonstrated the presence of a sub-linear feature crossing the sandy part of the bay, interpreted as a military or maritime feature (possibly a blockade or jetty) of which below ground remains could exist. There are also numerous coastal archaeological sites in the area including prehistoric remains, early medieval scheduled remains and later remains which are actively eroding from the coastline or have been subject to erosion in the past. There is therefore potential for eroded remains to be present within the site, including potential for human remains from a scheduled early medieval cemetery (discussed in detail in Chapter 24: Onshore Archaeology and Cultural Heritage).
- 3.1.7 The Offshore Consent Boundary also intersects the western edge of the Milford Haven Waterway, a Registered Landscape of Outstanding Historic Interest. The waterway is characterised as a ria, with evidence of activity on its margins from the prehistoric period onwards. Characterisation within the Offshore Consent Boundary demonstrates that this area forms the West Angle to Freshwater Coastal Strip, characterised by the narrow coastal strip, with evidence of variety of archaeological sites, including military sites representing the historic defensive role of the area, in addition to other sites including Iron Age promontory forts, early medieval remains and evidence of flintworking.

3.1.8 Potential impacts to these archaeological remains and recommended mitigation are discussed below.

## 4.0 Impacts and Archaeological Mitigation

### 4.1 Overview of Impacts and Mitigation

4.1.1 A range of scenarios are included within the Project Design Envelope, and potential impacts to archaeological sites and palaeolandscape remains could be posed by a number of different project components. These include:

- Anchoring of the floating wind turbines (through drag embedment anchors or piling);
- Mooring weights, chains and lines associated with the floating wind turbines;
- The area of swept by the lines;
- Cable installation (inter-array and export cable);
- Sand wave levelling;
- Potential offshore disposal sites for dredged material;
- HDD or open cut trenching within the intertidal zone and potential associated features such as the excavation of nearshore floatation pits and HDD exit pits;
- the mooring of vessels and ancillary equipment across the scheme;
- Scour associated with the installations; and
- Operation, maintenance, and decommissioning activities.

4.1.2 Details of the worst-case scenario for each impact are set out within Chapter 14: Marine Archaeology and Cultural Heritage. The ES recommended that standard and additional mitigation be employed, including implementation of:

- AEZs, Temporary Archaeological Exclusion Zones (TAEZs) and Areas of Archaeological Potential (AAPs) (see Sections 4.2 – 4.8);
- A watching brief within the intertidal zone if open cut trenching is undertaken (see Section 4.9);
- A protocol for reporting finds of archaeological interest (see Section 4.10 and Appendix B);
- Geoarchaeological work associated with geotechnical cores (see Appendix A for methods associated with 2021 campaign and Section 5.6 for methods for future work).

4.1.3 The following sections set out methods and details relating to each aspect of the mitigation strategy outlined above.

### 4.2 Archaeological Exclusion Zones (AEZs)

4.2.1 AEZs are recommended for potentially archaeologically significant contacts that are clearly identifiable in the survey data and where the extents are largely known. AEZs will remain for the life of the project or until ground truthing or higher resolution data determines a reduction in potential, significance, or extents.

- 4.2.2 Medium and high potential contacts have been identified as likely to be of anthropogenic origin and potentially of archaeological significance. These contacts have been recommended AEZs based on the size of the contact, the extents of any debris, the potential significance of the contact, the potential impact of the development and the seabed dynamics within the area.
- 4.2.3 Dependant of the form of the contact, AEZs have either been recommended as a radius from the centre point of the contact or as a distance from the extents. Particularly in the case of shipwrecks, which tend to be longer in length than width, the use of a circle provides unequal protection around the extents. This not only impacts the protection afforded but does not present proportional mitigation.
- 4.2.4 Contacts and their recommended exclusion zones are detailed in **Error! Reference source not found.** (the distribution of the AEZs is set out within Figures 14.1 to 14.4: Chapter 14: Marine Archaeology and Cultural Heritage). Note, where discrepancies exist between the position within different datasets, the position deemed to be most accurate has been used, typical that derived from MBES data.
- 4.2.5 In total three AEZs relating to high potential contacts and eleven AEZs relating to medium potential contacts have been recommended. Additionally, an AEZ has been recommended around the location of a wreck reported within the intertidal zone, beyond the data coverage for the geophysical survey data. Two high potential and eleven medium potential contacts have not been recommended AEZs, for completeness these have been included within the table below with explanations as to why no AEZ has been recommended.

**Table 1 Archaeological Exclusion Zones (AEZs), positions relative to WGS84 UTM Zone 30N**

MSDS ID	Potential	Description	X	Y	AEZ (m)
ERS21_0032	High	Wreck	322809.0	5702192.5	Outside area
ERS21_0099	High	Wreck	346455.1	5718238.0	50 m extents
ERS21_0123	High	Wreck	352719.9	5727917.7	25 m extents
ERS21_0137	High	Wreck	351655.3	5726857.8	25 m extents
ERS21_0222	High	Wreck	352897.7	5729037.3	Outside area
ERS21_0013	Medium	Unidentified debris	320329.2	5701692.1	15 m radius
ERS21_0017	Medium	Potential debris	320758.2	5704324.4	15 m radius
ERS21_0019	Medium	Unidentified debris	321145.8	5704254.3	15 m radius
ERS21_0024	Medium	Unidentified debris	315665.6	5706366.1	Outside area
ERS21_0035	Medium	Unidentified debris	322268.1	5701978.8	15 m radius
ERS21_0051	Medium	Unidentified debris	316469.5	5702932.7	15 m radius
ERS21_0063	Medium	Unidentified debris	321332.0	5708034.0	Outside area
ERS21_0071	Medium	Wreck debris	322862.8	5702130.9	Outside area
ERS21_0083	Medium	Potential debris	332862.6	5705175.1	Outside area
ERS21_0091	Medium	Likely geological	346006.2	5717330.6	Outside area
ERS21_0093	Medium	Potential debris	348602.8	5719723.0	Outside area
ERS21_0094	Medium	Potential debris	348571.0	5719691.5	Outside area
ERS21_0096	Medium	Potential debris	343315.5	5715644.0	15 m extents

MSDS ID	Potential	Description	X	Y	AEZ (m)
ERS21_0097	Medium	Likely geological	348579.7	5719905.3	Outside area
ERS21_0103	Medium	Mound	341392.0	5713917.5	25 m extents
ERS21_0106	Medium	Potential debris	337286.5	5710386.1	25 m extents
ERS21_0114	Medium	Unidentified debris	350635.9	5725211.2	25 m extents
ERS21_0125	Medium	Anchor	353252.1	5729471.9	Outside area
ERS21_0132	Medium	Anchor	353305.3	5728706.1	15 m radius
ERS21_0205	Medium	Mound	354603.3	5729274.8	Outside area
ERS21_0265	Medium	Unidentified debris	350231.3	5725047.9	15 m radius
ERS21_0273	Medium	Wreck debris	352938.6	5729049.6	Outside area
MSDS_Erebus_245	Medium	Potential Wreck Debris	353960.5	5728442.9	50 m radius

- 4.2.6 Three high potential contacts lie within the Offshore Consent Boundary (ERS21\_0099, ERS21\_0123 and ERS21\_0137). Of these, two (ERS21\_0123 and ERS21\_0137) were ground truthed by Remotely Operated Vehicle (ROV) and identified as wrecked vessels, the other contact (ERS21\_0099) has been assessed as likely anthropogenic debris, potentially representing the remains of a wrecked vessel. The two contacts identified as wrecked vessels (ERS21\_0123 and ERS21\_0137) have been assigned 25 m AEZs based on the visible extents of the wreckage. Due to not having been ground truthed, and uncertainty regarding the identification and extents, the potential wrecked vessel (ERS21\_0099) has been assigned a 50 m AEZ based on the extents visible in the geophysical data. An AEZ with a 50 m radius has also been recommended to protect the area in which the probable remains of HMS *Leda* were reported (MSDS\_Erebus\_245). It is considered these AEZs are appropriate to ensure robust, but proportional, mitigation from the impacts of development.
- 4.2.7 Consent Boundary Mitigation recommendations are made using all available evidence, should further data be collected, for example through the ground truthing of the contacts, further assessment of the potential and/or significance will be made, and mitigation recommendations adjusted accordingly.

### 4.3 Temporary Archaeological Exclusion Zones (TAEZs)

- 4.3.1 TAEZs have also been recommended, primarily to afford protection to buried magnetic anomalies of an uncertain level of significance. Temporary AEZs have been put in place as Standard Mitigation, to allow for investigation and potentially alterations of AEZs where features are identified as not of archaeological significance. One hundred and thirty TAEZs are recommended for magnetic anomalies with no corresponding seabed feature, or corresponding seabed features that are likely to be geological in origin such as boulders. TAEZs have been recommended as a radius' from the centre point of the anomaly.
- 4.3.2 One hundred and eight anomalies have been recommended a 15 m TAEZ and 77 anomalies a 25 m TAEZ. TAEZs are detailed in Table 2 and their distribution is shown on Figures 14.5 to 14.10: Chapter 6: Marine Archaeology and Cultural Heritage.

*Table 2 Temporary Archaeological Exclusion Zones, positions relative to WGS84 UTM Zone 30N*

<b>MSDS ID</b>	<b>Amplitude (nT)</b>	<b>X</b>	<b>Y</b>	<b>TAEZ (m)</b>
ERS21_MAG_0044	161.4	321592.0	5703418.3	15
ERS21_MAG_0047	67.0	321203.3	5703778.3	15
ERS21_MAG_0052	90.6	319962.0	5704398.3	15
ERS21_MAG_0053	77.1	319684.0	5704705.3	15
ERS21_MAG_0070	739.4	320378.8	5707460.0	25
ERS21_MAG_0152	56.5	316343.8	5706563.2	15
ERS21_MAG_0154	121.7	319009.8	5701128.2	15
ERS21_MAG_0182	55.6	316534.8	5705262.5	15
ERS21_MAG_0183	138.2	316539.0	5705798.3	15
ERS21_MAG_0201	69.0	316670.3	5704194.5	15
ERS21_MAG_0213	60.7	316912.5	5702287.3	15
ERS21_MAG_0214	63.6	316913.0	5700802.5	15
ERS21_MAG_0216	54.7	316915.3	5702755.5	15
ERS21_MAG_0244	52.1	317284.5	5700533.8	15
ERS21_MAG_0248	75.0	317383.3	5705142.8	15
ERS21_MAG_0250	111.3	317384.0	5705711.0	15
ERS21_MAG_0267	57.8	317610.0	5705078.3	15
ERS21_MAG_0282	159.0	317885.0	5706878.8	15
ERS21_MAG_0286	147.5	317934.5	5702995.0	15
ERS21_MAG_0297	74.3	318217.0	5703703.8	15
ERS21_MAG_0299	86.6	318281.5	5701348.0	15
ERS21_MAG_0338	102.2	319208.0	5704062.3	15
ERS21_MAG_0339	115.2	319209.8	5704137.3	15
ERS21_MAG_0342	84.2	318553.0	5704279.0	15
ERS21_MAG_0350	95.0	319174.8	5705316.0	15
ERS21_MAG_0354	59.4	318472.8	5705917.3	15
ERS21_MAG_0368	67.6	319945.8	5707801.8	15
ERS21_MAG_0402	86.3	320287.5	5701437.3	15
ERS21_MAG_0411	66.5	317526.3	5702035.3	15
ERS21_MAG_0418	62.0	320824.0	5702581.3	15
ERS21_MAG_0420	69.6	320700.3	5702809.3	15
ERS21_MAG_0422	55.6	321071.3	5702861.8	15
ERS21_MAG_0431	150.0	320318.8	5703293.0	15
ERS21_MAG_0434	50.5	320221.3	5703419.5	15
ERS21_MAG_0445	127.6	318764.5	5703778.0	15
ERS21_MAG_0463	82.2	319261.0	5704597.5	15
ERS21_MAG_0503	68.4	320006.3	5707575.5	15
ERS21_MAG_0505	50.4	320419.8	5707798.5	15
ERS21_MAG_0571	64.5	322438.6	5700681.6	15
ERS21_MAG_0587	282.7	321953.2	5700978.2	25
ERS21_MAG_0615	66.0	322498.4	5702331.8	15
ERS21_MAG_0616	182.6	322424.6	5702246.5	15
ERS21_MAG_0617	80.5	322032.3	5702362.1	15
ERS21_MAG_0621	164.1	321616.0	5702398.3	15
ERS21_MAG_0624	60.4	321494.5	5702816.0	15
ERS21_MAG_0625	239.3	321954.7	5702905.0	25
ERS21_MAG_0639	78.8	322505.7	5703737.3	15
ERS21_MAG_0653	125.3	321953.2	5704437.5	15

MSDS ID	Amplitude (nT)	X	Y	TAEZ (m)
ERS21_MAG_0662	71.7	321920.4	5704783.8	15
ERS21_MAG_0731	185.7	319636.0	5701496.1	15
ERS21_MAG_0742	195.5	318958.7	5706316.9	15
ERS21_MAG_0934	119.1	353318.2	5729050.5	15
ERS21_MAG_0955	138.2	353154.3	5728788.0	15
ERS21_MAG_0970	57.3	353236.1	5728445.5	15
ERS21_MAG_0991	51.9	352690.1	5727951.2	15
ERS21_MAG_0999	104.3	352578.3	5727821.1	15
ERS21_MAG_1000	68.7	352570.7	5727811.8	15
ERS21_MAG_1001	212.4	352559.1	5727798.0	25
ERS21_MAG_1004	54.5	352520.2	5727753.4	15
ERS21_MAG_1008	86.3	352316.8	5727588.5	15
ERS21_MAG_1014	88.3	352266.7	5727458.1	15
ERS21_MAG_1021	67.2	351976.0	5727106.6	15
ERS21_MAG_1022	339.8	351934.1	5727049.9	25
ERS21_MAG_1025	259.8	351692.2	5726781.0	25
ERS21_MAG_1026	51.8	351730.6	5726781.0	15
ERS21_MAG_1058	100.5	350974.0	5725485.0	15
ERS21_MAG_1059	1022.8	350397.4	5725432.4	25
ERS21_MAG_1060	1022.8	350421.9	5725425.2	25
ERS21_MAG_1061	755.7	350429.3	5725422.5	25
ERS21_MAG_1062	181.5	350372.8	5725400.9	15
ERS21_MAG_1063	106.5	350558.0	5725356.0	15
ERS21_MAG_1064	213.8	350595.6	5725347.1	25
ERS21_MAG_1065	1471.5	350524.8	5725343.0	25
ERS21_MAG_1066	106.1	350461.0	5725330.0	15
ERS21_MAG_1067	139.3	350584.5	5725328.0	15
ERS21_MAG_1068	218.8	350280.6	5725286.2	25
ERS21_MAG_1069	138.4	350557.5	5725281.5	15
ERS21_MAG_1070	210.7	350237.8	5725232.8	25
ERS21_MAG_1071	153.1	350248.3	5725203.2	15
ERS21_MAG_1072	761.0	350249.3	5725189.6	25
ERS21_MAG_1073	116.9	350403.6	5725175.8	15
ERS21_MAG_1074	166.4	350205.0	5725149.3	15
ERS21_MAG_1075	116.6	350427.5	5725119.0	15
ERS21_MAG_1076	159.8	350375.1	5725104.6	15
ERS21_MAG_1077	107.6	350624.0	5725023.0	15
ERS21_MAG_1078	153.3	350304.7	5724959.0	15
ERS21_MAG_1079	149.9	350225.9	5724854.6	15
ERS21_MAG_1080	131.2	350234.5	5724849.5	15
ERS21_MAG_1081	163.7	350446.9	5724792.6	15
ERS21_MAG_1082	121.5	350417.4	5724753.6	15
ERS21_MAG_1083	251.8	349879.3	5724722.5	25
ERS21_MAG_1084	208.6	349956.5	5724553.5	25
ERS21_MAG_1085	102.5	349955.3	5724481.9	15
ERS21_MAG_1086	158.6	349910.9	5724418.4	15
ERS21_MAG_1087	271.2	349821.9	5724379.2	25
ERS21_MAG_1088	143.8	349840.5	5724321.5	15
ERS21_MAG_1089	132.5	349800.0	5724268.5	15

MSDS ID	Amplitude (nT)	X	Y	TAEZ (m)
ERS21_MAG_1097	58.0	349510.9	5724090.8	15
ERS21_MAG_1098	182.6	349662.3	5724087.0	15
ERS21_MAG_1107	66.2	349354.5	5723892.1	15
ERS21_MAG_1108	83.2	349371.2	5723868.2	15
ERS21_MAG_1113	77.6	349145.8	5723621.3	15
ERS21_MAG_1115	54.4	349287.0	5723593.0	15
ERS21_MAG_1117	84.2	349533.0	5723588.0	15
ERS21_MAG_1152	150.0	348404.0	5722156.5	15
ERS21_MAG_1165	93.0	348332.5	5721205.0	15
ERS21_MAG_1167	75.7	348384.5	5721201.5	15
ERS21_MAG_1181	62.0	348399.3	5720751.0	15
ERS21_MAG_1189	89.7	348138.5	5720187.0	15
ERS21_MAG_1204	77.7	347990.7	5719398.0	15
ERS21_MAG_1208	59.5	347902.7	5719281.7	15
ERS21_MAG_1209	56.8	347807.5	5719275.5	15
ERS21_MAG_1213	315.7	347785.0	5719144.0	25
ERS21_MAG_1229	54.1	346974.6	5718457.2	15
ERS21_MAG_1234	272.4	346939.5	5718406.5	25
ERS21_MAG_1237	99.0	346561.5	5718257.0	15
ERS21_MAG_1238	54.2	346897.0	5718246.0	15
ERS21_MAG_1241	357.4	346641.0	5718032.5	25
ERS21_MAG_1249	80.8	345595.5	5717469.0	15
ERS21_MAG_1258	50.8	343127.7	5715485.1	15
ERS21_MAG_1280	138.2	339478.5	5712590.0	15
ERS21_MAG_1287	180.6	338432.1	5711131.9	15
ERS21_MAG_1296	156.4	336576.0	5709107.5	15
ERS21_MAG_1298	125.4	336492.5	5708563.1	15
ERS21_MAG_1312	78.3	335568.0	5705872.0	15
ERS21_MAG_1314	374.3	334903.0	5705575.0	25
ERS21_MAG_1316	112.5	334567.5	5705448.5	15
ERS21_MAG_1324	395.6	322096.0	5704160.9	25
ERS21_MAG_1347	165.1	330297.0	5703880.4	15

#### 4.4 Establishing New Archaeological Exclusion Zones

- 4.4.1 If new finds of archaeological importance are made during the course of construction (or any subsequent stage of the Project) they may be subject to the implementation of additional AEZs.
- 4.4.2 All finds of archaeological material will be reported to the Retained Archaeologist by the Construction Contractor(s), in accordance with the PAD (see Appendix B). The Retained Archaeologist will inform the Archaeological Curator and the Developer of all reports.
- 4.4.3 All activities that may affect the seabed in the vicinity of any find will cease until archaeological advice has been sought and received and, if necessary, an archaeological inspection of the material and site has taken place.
- 4.4.4 The Archaeological Curator will be consulted by the Retained Archaeologist on the need for, and the design (position, extent) and implementation of any new AEZs.



## 4.5 Altering Archaeological Exclusion Zones

- 4.5.1 AEZs and TAEZs may be altered (enlarged, reduced, moved, or removed) as a result of the results of future geophysical or ROV surveys and/or archaeological field evaluation. Archaeological field evaluation may include suitable high-resolution marine geophysical survey, and/or survey by diver or ROV.
- 4.5.2 The alteration of AEZs will only be undertaken following consultation with the Archaeological Curator. Following alteration, a new plan giving details of the revised AEZs will be drawn up for the Developer by the Retained Archaeologist and issued by the Developer to its Construction Contractor(s) and onboard vessel representatives.

## 4.6 Monitoring Archaeological Exclusion Zones

- 4.6.1 The effectiveness of the AEZs will be monitored by regular review by the Retained Archaeologist of vessel track plots and anchor spots supplied by the Developer. This data will be reviewed monthly by the retained archaeologist, at a minimum.
- 4.6.2 Should a breach of an AEZ be suspected this will be resolved by further investigation, which may include carrying out a geophysical or diver/ROV survey of the area thought to be affected.
- 4.6.3 On completion of the construction phase, the Retained Archaeologist will compile a report on the effectiveness of the AEZs, any alterations to them, and the results of monitoring.

## 4.7 Relocation of Archaeological Material

- 4.7.1 During the course of the construction works it is anticipated that a small amount of material of anthropogenic origin, and of medium archaeological significance, will require removal outside of the construction impact area, typically this relates to isolated material, or material out of context such as anchors.
- 4.7.2 Whilst old anchors may be of archaeological interest, as isolated finds they are of limited archaeological significance and are usually subject to a program of recording. Known and unknown material of this type should be removed, sympathetically, to wet storage outside the impact area. Archaeological material should not be recovered to surface unless procedures and facilities are in place for on-going long-term storage, retention, and conservation.
- 4.7.3 Where a contact is isolated, it will be recorded as found through the Target Investigation Report (TIR) process prior to removal. The contact will then be removed to wet storage outside of the impact area and an as left survey undertaken, to include at a minimum, the position and a photographic or video record across the whole contact. Where multiple contacts are to be relocated to the same position every effort will be made to ensure that they are not placed on top of each other.
- 4.7.4 The photographic or video record will allow any additional archaeological assessment that may be required to be undertaken and the position allows for relocation should further investigation or recording be required

## 4.8 Areas of Archaeological Potential (AAPs)



- 4.8.1 AAPs are primarily reserved for magnetic anomalies where, due to line spacing or data coverage, positions are not accurately known or there is potential for the presence of additional material not covered by the survey extents. Any additional material is likely to be identified following higher resolution or full coverage data assessment but as the nature and position is not precisely known, no formal exclusion zone is recommended but instead an awareness of the potential within an area, and an expectation of further investigation, is considered appropriate at this phase.
- 4.8.2 An AAP has been defined around a complex area of magnetic anomalies identified along the Export Cable Corridor (ECC) (see Figures 14.5 and 14.7: Chapter 14: Marine Archaeology and Cultural Heritage). While this cluster may relate to a disused spoil ground, without further investigation this is not certain. Following further investigation such as through geophysical, ROV or diver survey, mitigation will be revised in line with the anticipated effects.

## 4.9 Archaeological Watching Brief and Recording

### Watching Brief Methods

- 4.9.1 This section sets out an overview of methods for archaeological watching briefs.
- 4.9.2 The ES recommended that a watching brief be undertaken within the intertidal zone should open cut trenching occur. A detailed method statement for the proposed works will be produced and agreed with the Archaeological Curators prior to any watching brief activities taking place. All watching briefs will be conducted in line *Chartered Institute for Archaeologists Standards and Guidance for Archaeological Watching Briefs* (CIfA 2014a).
- 4.9.3 Excavated surfaces and up-cast material will be inspected by the Archaeological Contractor. Any standing section of trench edge will be inspected by the Archaeological Contractor, where safe to do so.
- 4.9.4 Archaeological features or structures will be examined and/or excavated. A sufficient sample of each layer/feature type will be investigated in order to elucidate the date, character, relationships, and function of the feature/structure. Development activities will include provision for sampling of features and deposits in order to recover artefacts, ecofacts and dating evidence, and in order to determine stratigraphic relationships. Recording will include written, drawn, and photographic elements as conditions allow.
- 4.9.5 Where appropriate, sieving of bulk environmental samples will be undertaken to enhance levels of artefact recovery. Bulk soil samples may be taken specifically for artefact recovery. Any finds will be collected and allocated a record number and their position will be logged.
- 4.9.6 Suitable time will be allowed, and resources made available within the construction programme for each such intervention.
- 4.9.7 If significant archaeological or palaeoenvironmental deposits are encountered then the Developer, in consultation with the relevant Curator, will make provision for the Archaeological Contractor to undertake a programme of investigation commensurate with the evidence discovered.

### Recording and Reporting

- 4.9.8 A site plan at an appropriate scale will be annotated with the position of areas observed in relation to the construction footprint and provided to the relevant Contractors. The plan will

show the location of features observed and recorded in the course of the investigations. The site plan should include a note of the position-fixing method and the accuracy achieved.

- 4.9.9 The basic record of each feature/structure identified during the watching brief should include:
- A full photographic record;
  - Drawn record (plans and sections);
  - Position in three dimensions; and
  - A written description including initial interpretation and contextual relationships.
- 4.9.10 Positions will be related to National Grid and Ordnance Datum (above the Mean Low Water Mark (MLWM)) or ETRS89 UTM (zone 30N) LAT for the offshore elements of the scheme.
- 4.9.11 The archaeological results will be compiled in a report by the Archaeological Contractor, in accordance with the requirements outlined in *Standard and Guidance for archaeological watching briefs* (ClfA, 2014a), and in accordance with reporting procedures set out in Section 6.1.

### General Archaeological Practices

- 4.9.12 During the course of seabed preparation, construction and future activities associated with the Project, archaeological finds and deposits may be encountered, and records may need to be produced. This situation may arise under a number of different circumstances, for example during watching brief activities. However, where it does arise the following general methods will be employed.

### Survey and Recording

- 4.9.13 All finds and seabed archaeological deposits will be recorded using a pro forma recording system, and a running matrix of assigned contexts will be maintained for each site.
- 4.9.14 A full photographic record will be maintained using video and digital stills photography. The photographic record will illustrate both the detail and the general context of the principal features, finds excavated, and the site as a whole.

### Positioning

- 4.9.15 Surveys should be carried out to a single datum and coordinate system, preferably WGS84 UTM Zone 30N for the offshore elements of the scheme.

### Finds and Conservation

- 4.9.16 Objects relating to human exploitation of the area that may be identified in the course of the Project will be recovered by the Archaeological Contractor or, where recovery is impracticable, recorded. All finds will be recorded by context and significant objects ('special finds') in three dimensions using a sequence of unique numbers. Finds encountered by other contractors working on the Proposed Development will be reported under the protocol for reporting finds of archaeological interest (Appendix B).
- 4.9.17 Finds and other items of archaeological interest recovered offshore in the course of investigation are the property of the Crown Estate as the landowner, with the exception of all human remains, items that are 'treasure' for the purposes of the Treasure Act 1996 and 'wreck' for the purposes of the Merchant Shipping Act 1995. The Developer will seek permission from

the landowner to donate finds to an appropriate Museums Service prior to depositing the archive.

- 4.9.18 In the event of the discovery of items that fall under the Treasure Act 1996 (as amended), the Contractor will immediately notify the Retained Archaeologist, who will notify the District Coroner within 14 days. The Developer and the Archaeological Curator will be notified as soon as possible. Items falling under the Treasure Act (as amended) will be removed from the site by the Archaeological Contractor and stored in a secure location, pending a decision by the Coroner.
- 4.9.19 Subject to these legal requirements and to the agreement reached with the Museum regarding selection, retention and disposal of material, the Archaeological Contractor will retain all recovered objects unless they are undoubtedly of modern or recent origin. The presence of modern objects will, however, be noted on context records. In these circumstances, sufficient material will be retained to elucidate the date and function of the deposit from which it was recovered.
- 4.9.20 Any finds and environmental samples will be processed according to professional standards for finds analysis, environmental sampling, and archive preparation, and in accordance with the Chartered Institute of Archaeologists' *Standard and Guidance for the collection, documentation, conservation and research of archaeological materials* (ClfA, 2014c).
- 4.9.21 Finds will be primarily conserved, bagged, and boxed in accordance with guidelines set out in the United Kingdom's Institute for Conservation's Conservation Guidelines No 2 (ICON, 1984). In consultation with the Developer and the Archaeological Curator, the Retained Archaeologist will advise on the implementation of passive conservation for smaller objects pending more detailed conservation strategies. The Developer will also make provision for a professional conservator to undertake a conservation assessment of assemblages, including recommendations and timescales for the conservation of the object.
- 4.9.22 Specialist work approved by the Developer and the Archaeological Curator on metalwork, bone (including worked bone, human remains and other organic remains), industrial waste, ceramic material, glass, and lithic material will be carried out by suitable Archaeological Contractors, monitored by the Retained Archaeologist.
- 4.9.23 In the event of the discovery of unexpected, unusual, or extremely fragile and delicate objects and deposits, such as waterlogged wood, the Retained Archaeologist, the Developer, and the Archaeological Curator will be notified immediately. Additional work required to recover, record, analyse, conserve, and archive such objects and deposits will be agreed with the Archaeological Curator.

### Human Remains

- 4.9.24 The ES and Technical Report identified potential for human remains, particularly within the intertidal and nearshore area, due to the proximity of these areas to an eroding Scheduled early medieval cemetery site.
- 4.9.25 In the event of the discovery of any confirmed human remains, the Construction Contractor or Archaeological Contractor will immediately inform the Retained Archaeologist. The Retained Archaeologist will inform the Developer, the Archaeological Curator, and where appropriate the Coroner, and the Police.

- 4.9.26 It is proposed that any such remains will be left in situ until the Developer, the Coroner and the Archaeological Curator have been informed. Where development will unavoidably disturb them they will be fully recorded, excavated and removed from the site subject to compliance with the relevant Ministry of Justice Licence for such activities which will be obtained by the Retained Archaeologist.
- 4.9.27 The final placing of human remains following analysis will be subject to the requirements of the Ministry of Justice Licence.

#### **4.10 Protocol for Archaeological Discoveries (PAD)**

- 4.10.1 A PAD will be implemented during all marine pre-construction and construction works. It will address the reporting of unexpected finds of archaeological material, recovered from the sea during pre-construction and construction activities.
- 4.10.2 The PAD will largely follow the format laid down in the document Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014). The Retained Archaeologist will operate to administer the PAD and provide initial advice to the Developer and will liaise with the Archaeological Curators as necessary. The details of the PAD, including key roles and communication steps are set out in Appendix B.
- 4.10.3 Once agreed by the Developer and the Archaeological Curator, the PAD will be distributed in a form suitable for use on board construction vessels. The Developer will ensure that the relevant staff on all construction vessels are informed of and have access to the PAD, including supporting material detailing the find types that may be of archaeological interest, and the potential importance of any archaeological material encountered.
- 4.10.4 All finds of archaeological material will be reported by the Construction Contractor(s), to the Nominated Contact (an archaeological contractor, in the case of pre-application activities MSDS Marine have performed this role) who will inform the Developer and then the Archaeological Curator. If the find is 'wreck' within the meaning of the Merchant Shipping Act 1995 then the Nominated Contact will also make a report to the Receiver of Wreck. Full contact details for all relevant parties will be included in the PAD.
- 4.10.5 The response to reported finds will be implemented through the measures set out in the PAD, including further surveys or establishment of new AEZs if appropriate.
- 4.10.6 The PAD will be implemented by means of toolbox talks presented to the relevant vessel crews to ensure that all staff are made aware of what constitutes an appropriate find, and through periodic reports by the Nominated Contact. The frequency and timing of these toolbox talks is determined in relation to ongoing activities.
- 4.10.7 The PAD will be supported by a package of awareness training for the Developer and its contractors' and sub-contractors' staff.
- 4.10.8 At the end of the construction phase, the Nominated Contact will prepare a report on the results of the PAD. The results will be included in the final archaeological report in the section covering maritime sites and finds within the area affected by the wind farm and cables.

#### **4.11 Crashed Aircraft Procedures**

- 4.11.1 The ES and Technical Report identified potential for remains of crashed aircraft to occur within the Offshore Consents Boundaries. This section sets out the specific procedures to be followed in the event that remains of an aircraft are identified.
- 4.11.2 The majority of aircraft wrecks are military and so fall under the legal protection of the Protection of Military Remains Act 1986. Archaeological Contractors should refer to guidance outlined in Collaborative Offshore Wind Research into the Environment (COWRIE) Historic Environment Guidance (Wessex Archaeology, 2007), Draft Interim Guidance on the use of the Protocol for Reporting Finds of Archaeological Interest in relation to Aircraft Crash Sites at Sea (Wessex Archaeology, 2008) and Military Aircraft Crash Sites: Archaeological guidance on their significance and future management (English Heritage, 2002).
- 4.11.3 Any finds that are suspected of being military aircraft will be reported immediately to the Retained Archaeologist. The Developer will be informed as well as the Service Personnel and Veterans Agency (SPVA: Joint Casualty and Compassionate Centre [JCCC] – SO3 Historic Casualty Casework). The Retained Archaeologist should seek specialist advice for the identification of aircraft remains where necessary.
- 4.11.4 Any subsequent actions will be guided by Crashed Military Aircraft of Historical Interest: Licensing of Excavations in the UK – Guidance Notes for Recovery Groups (MOD and SPVA, 2007) and by advice received from SPVA. In the case of a military aircraft being investigated under licence, any human remains will be reported immediately in accordance with paragraph 14 of Guidance Notes for Recovery Groups.

## 5.0 Methods for Archaeological Involvement in Further work

### 5.1 Introduction

- 5.1.1 Archaeological involvement in further work is a key component in the ongoing process of assessing known and potential archaeological remains within the development area, to ensure robust and proportionate mitigation for heritage assets which may be impacted by the development.
- 5.1.2 A detailed Method Statement will be produced by the Retained Archaeologist in advance of each archaeological element discussed below. These will be produced in consultation with the Archaeological Curator, with the aim of securing agreement on the method. Agreement by the Curator will be assumed if no response is received within 30 working days of submission of individual method statements. Overviews of methods are given below.

#### Further surveys requiring archaeological involvement

- 5.1.3 Archaeological involvement will be necessary in future and potential surveys:
- Geophysical survey will require an archaeological assessment of the survey dataset;
  - Diver/ROV obstruction surveys will require an archaeological assessment of the survey dataset (video and positional data);
  - Geotechnical investigations will require geoarchaeological assessment and, where necessary, analysis following the staged approach set out below;
- 5.1.4 Should archaeological material be encountered by these works, sufficient time and resources will be made available to ensure the archaeological assessment of such material. In areas where

there are to be further impacts no impacts will take place until the assessment has been conducted and mitigation actions agreed and implemented. The scope of any further assessment will be agreed with the Archaeological Curator and, where necessary, further suitable mitigation measures will be instigated in agreement with the Archaeological Curator.

- 5.1.5 The results of these ongoing assessments would be subject to further mitigation measures, as necessary.
- 5.1.6 The geoarchaeological assessment and analysis of cores represents the primary way in which impacts to the palaeolandscape are mitigated. Note that at the time of writing, geoarchaeological work associated with the 2021 cores is ongoing.

## 5.2 Planning Surveys

- 5.2.1 When planning geophysical and geotechnical surveys, the Developer will advise the Retained Archaeologist well in advance that further surveys are being planned and seek their input into the scope of work.
- 5.2.2 Archaeological input will take the form of advice from the Retained Archaeologist on measures to optimise archaeological results from the planned geotechnical, geophysical, and other surveys or work (such as benthic grabbing, for example). Areas to be considered will include:
- The available details on previously identified sites and/or anomalies and areas of heightened archaeological potential;
  - The archaeological potential of areas where no existing sites and/or anomalies are yet known;
  - The equipment, equipment settings, survey methodology(s) and data collection points that will optimise the recovery of archaeological information; and
  - The requirements for data analysis, interpretation, and archiving.
- 5.2.3 The required response to elements of archaeological input may include:
- Altering vibrocore/borehole positions in order to maximise the potential for the collection of archaeological data (already undertaken for the 2021 geotechnical campaign);
  - ‘Boxing’ wreck sites in order to provide the best possible images and positional data; and/or
  - Investigating anomalies which are of potential anthropogenic origin during geophysical or ROV campaigns in order to better understand those anomalies and hone mitigation.

## 5.3 Fieldwork

- 5.3.1 Where further survey work has, as one of its objectives, the ensonification of previously identified sites and/or anomalies in order to alter or remove an AEZ, the Developer will make provision for a suitably qualified Archaeological Geophysical Contractor to be available to provide advice and input into the survey and as the survey is ongoing. In some cases, this may include presence of the Archaeological Contractor on the vessel alongside the vessel crew, or, in most cases, this advice may be given remotely. In all cases the archaeologist will ensure that the best possible data is collected for those anomalies subject to review.

## 5.4 Archaeological Assessment of Marine Geophysical Survey data

- 5.4.1 An archaeological assessment of marine geophysical survey data was undertaken by MSDS Marine during the production of Chapter 14: Marine Archaeology and Cultural Heritage the ES chapter and Volume 3, Technical Appendix 14.1 Marine Archaeology Combined Desk Based Assessment & Technical Report to which this WSI is appended. All data were collected to a specification that fulfils the requirements of Section 5 of *Archaeological Written Schemes of Investigation for Offshore Renewables Projects* (The Crown Estate 2021).
- 5.4.2 The data assessed by MSDS Marine provided full coverage of the nearshore area, ECC and array area with sidescan sonar (SSS) and multibeam echo-sounder (MBES) and limited coverage of magnetometer (MAG).
- 5.4.3 New marine geophysical data that extends beyond the coverage of existing data or is of a higher specification will be subject to assessment by a suitably qualified Archaeological Geophysical Contractor. Following the collection of data MSDS Marine undertake an assessment of data coverage to establish coverage and the specification of deliverables. Where further archaeological investigation is required of an anomaly due to route planning constraints full use will be made of all geophysical datasets.
- 5.4.4 Any such assessment will be preceded by a method statement which will set out in detail the methods to be used, along with the aims and objectives of the work. The method statement will be produced in consultation with the Archaeological Curator, with the aim of securing agreement on the method. Agreement by the Curator will be assumed if no response is received within 30 working days of submission. In order to maximise the potential benefits of any geophysical survey, the Developer will seek archaeological input at the planning stage of any such works.
- 5.4.5 Surveys will be carried out to a single datum and co-ordinate system, preferably WGS84 UTM Zone 30N. All survey data, including navigation (position, heading and velocity) will be acquired digitally in industry-standard formats. Care will be taken to maintain the orientation and attitude of sensors on line. Trackplots will be corrected for layback (including catenary effects) and made available in digital (geographical information system (GIS)) form.
- 5.4.6 Once the surveys have been processed to meet their primary objectives, the survey data, together with factual reports, will be made available in digital formats to the Developer's Retained Archaeologist, or a suitably qualified Archaeological Contractor for archaeological analysis and interpretation.
- 5.4.7 Archaeological interpretation will include:
- Assessment of SSS, magnetometer, MBES and seismic data for areas within the vicinity of known wreck sites and previously identified geophysical anomalies;
  - Assessment of SSS, magnetometer, MBES and seismic data within areas that will be subject to scheme impacts in order to identify any as yet unknown geophysical anomalies that may represent anthropogenic material; and
  - The assessment of seismic data in order to plot the general trend of the subsurface sediments with archaeological potential.
- 5.4.8 The criteria for assessing the archaeological potential of contacts is set out in **Error! Reference source not found.**



*Table 3 MSDS Marine Criteria for the Assessment of Potential*

Potential	Interpretation
Low	A contact potentially of anthropogenic origin but that is unlikely to be of archaeological significance – Examples may include; discarded modern debris such as rope, cable, chain, or fishing gear, small, isolated contacts with no wider context or small boulder like features with associated magnetometer readings.
Medium	A contact believed to be of anthropogenic origin but that would require further investigation to establish its archaeological significance – Examples may include; larger unidentifiable debris or clusters of debris, unidentifiable structures, or significant magnetic anomalies.
High	A contact almost certainly of anthropogenic origin and with a high potential of being of archaeological significance – high potential contacts tend to be the remains of wrecks, the suspected remains of wrecks or known structures of archaeological significance.

5.4.9 The archaeological results of any further geophysical survey will be compiled as a report by the Archaeological Contractor and will include likely requirements (if any) for further archaeological work or any required changes to mitigation including the addition or removal of AEZs. The report will be submitted to the Developer by the Retained Archaeologist and thence to the Archaeological Curator. The scope of any further work will be agreed by the Developer and the Archaeological Curator.

## 5.5 Archaeological Assessment of Diver/ ROV Survey Data

5.5.1 An ROV inspection of two high potential anomalies was undertaken by MSDS Marine during the production of Chapter 14: Marine Archaeology and Cultural Heritage the ES chapter and Volume 3, Technical Appendix 14.1 Marine Archaeology Combined Desk Based Assessment & Technical Report to which this WSI is appended. The inspection was undertaken to better understand the character of the anomalies, and to establish with greater certainty whether the anomalies represented the remains of wrecked vessels.

5.5.2 Where additional ROV surveys are undertaken seabed photography and video footage will be subject to archaeological assessment and analysis by a suitably qualified Archaeological Contractor. Any such assessment will be preceded by a method statement which will set out in detail the methods to be used, along with the aims and objectives of the work. The method statement will be produced in consultation with the Archaeological Curator, with the aim of securing agreement on the method. Agreement by the Curator will be assumed if no response is received within 30 working days of submission.

5.5.3 In order to maximise the potential benefits of any proposed diver/ROV surveys, the Developer will seek archaeological input at the planning stage of any such works.

5.5.4 Archaeological input will take the form of advice from the Retained Archaeologist on measures to optimise archaeological results from the planned survey. Advice will include:



- The available details of sites and/or anomalies identified in the desk-based assessment;
  - The archaeological potential of areas where no existing sites and/or anomalies are yet known;
  - The type and level of diver/ROV positioning, voice recording and video/still recording to be utilised;
  - The provision of clear guidance on the types of sites and finds that are to be reported and recorded;
  - Wherever possible input into the scope of works to include potential archaeological sites/AEZs where more detailed mitigation planning is required; and
  - Other specific advice will be given depending on the nature and purpose of the investigations. All such areas would be outlined within the method statement for the work.
- 5.5.5 Consideration will be given to having an Archaeological Contractor (or archaeological team) present during any diver or ROV surveys, either as an observer(s) or participating diver(s) to optimise archaeological results and thereby reduce the need for repeat survey. However, operational constraints will have to be considered when trying to accommodate archaeologists aboard.
- 5.5.6 ROV surveys take place during pUXO inspection campaigns. The investigation of pUXO is a highly specialist task, with significant safety implications, thus the addition of an archaeologist(s) to the crew is not generally considered practical and indeed is not common practise. However, there remains a requirement to monitor outputs, and procedures will be put in place and maintained during the works. The procedures will include contractor briefings on the Protocol for Archaeological Discoveries and the archaeological review of daily logs and Target Investigation Reports. Licensed activities associated with pUXO campaigns are not typically subject to archaeological conditions, however, this mitigation has been put in place as an additional commitment by the Developer to ensure the protection of the marine historic environment.
- 5.5.7 Following the completion of the diver/ROV pUXO inspection works all data, including video footage, still images and geophysical data, where available, will be reviewed by the Archaeological Contractor to assess the archaeological potential of the identified contacts. The Archaeological Contractor will also review daily Target Investigation Reports and Progress Reports to ensure that all opportunity to assess investigated contacts are taken.
- 5.5.8 The results of the archaeological assessment will be presented in a report identifying contacts and/or geophysical anomalies that are of sufficient archaeological interest to warrant further investigation and/or mitigation. The report will identify contacts that are no longer considered to be of archaeological interest where AEZs, TAEZs or the AAP can be revised or removed. Where a contact not previously identified as of archaeological interest is identified during the pUXO inspection works, the potential will be assessed, and appropriate mitigation implemented.
- 5.5.9 The report will include a statement of the likely requirements (if any) for further archaeological work and mitigation.
- 5.5.10 The report will be forwarded to the Retained Archaeologist, who will submit it to the Developer and the Archaeological Curator for a decision on the scope of any further work where required.

## 5.6 Geoarchaeological Assessment of Geotechnical Data

- 5.0.2 A Method Statement was produced for geoarchaeological involvement in the 2021 geotechnical campaign was produced, this is detailed in Appendix A – Method Statement for Archaeological Involvement in Geotechnical Campaign. This details methods for core collection, transport, storage, and retention, in addition to methods for geoarchaeological assessment and analysis, as per the staged process set out below.
- 5.6.1 New geotechnical data (i.e., vibrocores and boreholes) will be subject to a staged programme of assessment and analysis by a suitably qualified Geoarchaeological Contractor detailed in the Method Statement and undertaken in line with key guidance including COWRIE's *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (Gribble and Leather 2010). Early planning and liaison with the Developer's Geotechnical Contractor to enable the archaeological recording of intact cores will be a key requirement for this data set. Method statements will be produced should any further geotechnical work take place.
- 5.6.2 Method statements will be produced prior to the collection of geotechnical cores, in order that the cores can be collected, transported, stored, and retained in a way which will not preclude any of the potential later detailed geoarchaeological assessment and analysis, to follow the staged process set out below. The method statements will be produced in consultation with the Archaeological Curator, with the aim of securing agreement on the method. Agreement by the Curator will be assumed if no response is received within 30 working days of submission.
- 5.6.3 Each stage of this phased assessment of the cores is dependent on the results of the preceding stage. A recommendation as to the need for further archaeological work will be made at the end of each stage. A report will be produced at whatever stage in the process further archaeological assessment or analysis is not required.
- 5.6.4 Following COWRIE guidance (Gribble and Leather 2010), the aims of archaeological assessment of geotechnical data are achieved through a programme of staged recording, assessment, and analysis:
- Stage 1. Geoarchaeological review of core logs: consists of a desk-based assessment of geotechnical core logs by a trained geoarchaeologist to determine which cores contain sediments of archaeological interest. Recommendations are made to the client as to which cores the geoarchaeologist would like to look at in Stage 2. For Stage 1 to be undertaken the core logs must be recorded in a manner which will allow identification of sediments of archaeological interest. The OSL potential of the sediments is also assessed.
  - Stage 2. Geoarchaeological recording: a detailed inspection and recording of the cores identified in Stage 1 to further assess archaeological potential. This requires physical access by the geoarchaeologist, who will make a record of the sediments encountered, their archaeological potential, and recommendations for any Stage 3 assessment, if required.
  - Stage 3. Geoarchaeological assessment: samples are taken from the cores recommended (and recorded) in Stage 2 for specialist assessment to determine the age and palaeoenvironmental potential of the sediments. This stage comprises the sampling and laboratory analysis of a selected core, or cores, to a level sufficient to enable an assessment of the value of the palaeoenvironmental material (pollen, diatoms, ostracods, and foraminifera) surviving within the core(s). The assessment seeks to establish the

preservation, diversity, and quantity of palaeoenvironmental material, in order to further refine the interpretation of the sedimentary environment, and past human activity, identified in the Stage 2 recording. Recommendations are made as to whether a Stage 4 analysis programme, including dating, should take place on any of the core material.

- Stage 4. Geoarchaeological analysis: consists of more detailed investigation of the core material typically using the same techniques as Stage 3, but with extended counting and / or higher sampling intervals within key stratigraphic units. The work will be undertaken to a high standard which should permit the publication / dissemination of the results.
- Stage 5. Publication

## 6.0 Activities subsequent to investigations

### 6.1 Reports

- 6.1.1 Reports should be prepared in accordance with the guidance provided in the relevant ClfA Standard and Guidance (see <http://www.archaeologists.net/codes/ifa>) and with reference to any other activity or analysis specific guidance. Reports will also satisfy all requirements set out within the relevant method statement covering the work package.
- 6.1.2 The timetable for depositing archives with the receiving institution after completion of the post-fieldwork programme will be set out in the relevant Method Statement and will adhere to the appropriate marine licence conditions.
- 6.1.3 In the event that little of significance is found during the course of the scheme construction, a final report on the investigative work will be prepared by the Archaeological Contractor within six weeks of completion of all scheme works.
- 6.1.4 If significant archaeological sites and finds are recorded then this final report will be preceded by the submission to the Retained Archaeologist by the Archaeological Contractor(s) of investigation reports following the completion of fieldwork.
- 6.1.5 The Archaeological Contractor will also be required to produce an assessment report which will establish the value of the recorded archaeology and provide a costing for the post-excavation analysis, publication, and archiving (including deposition of archive).
- 6.1.6 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.
- 6.1.7 Following *The Crown Estate (2021) Archaeological Written Schemes of Investigation for Offshore Renewables Projects*, 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.

- 6.1.8 Where appropriate the report should provide recommendations for further assessment and/or analysis requirements.
- 6.1.9 On behalf of the Developer the Retained Archaeologist will submit a copy of each report to the Archaeological Curator and the NRW within the timescales of marine licence conditions, and leaving sufficient time for the report to be commented on and re-submitted as an agreed report within 6 months of the completion of construction of the authorised scheme, as per the licence conditions. Reports on the archaeological analysis of survey data will be submitted to the Archaeological Curator and NRW within 4 months of the survey completion.
- 6.1.10 Decisions regarding the level of post-excavation work required will be taken following submission of investigation reports and consultation by the Developer and the Retained Archaeologist with the Archaeological Curator.
- 6.1.11 Following the production and acceptance of archaeological reports they will be deposited with the relevant repositories by submitting an Online Access to the Index of archaeological investigations (OASIS) (Wales) form with a digital copy of the report. This will take place within 6 months of completion of construction of the authorised scheme, as per the anticipated marine licence conditions.

## 6.2 Publication

- 6.2.1 In consultation with the Developer and the Archaeological Curator, the Retained Archaeologist will ensure that the results of important archaeological investigations undertaken in connection with the project will be published in an integrated manner.
- 6.2.2 Publication media and all publication matters will be discussed and agreed in advance with the Developer and Archaeological Curator.

## 6.3 Archives

- 6.3.1 Archive planning will be included within detailed Method Statements for each activity undertaken. Archiving will 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, 2014d, *Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives*.
  - The Crown Estate, 2021, *Archaeological Written Schemes of Investigation for Offshore Renewables Projects* (Section 2.8: Archiving).
- 6.3.2 The Archaeological Curator will be notified of any archaeological investigation in advance of fieldwork and any specific requirements relating to the preparation and deposition of project archives will be accommodated as appropriate.
- 6.3.3 Where there is the likelihood of any archaeological fieldwork (e.g., the potential watching brief associated with open cut trenching), the Retained Archaeologist will contact an appropriate receiving institution to discuss the intended fieldwork and seek its agreement to accept the site archive for long-term storage and curation. The Retained Archaeologist will consult the receiving institution with regard to its policy on the selection, retention, and disposal of excavated material, and to confirm the requirements in respect of the format, presentation

and packaging of archive records and materials. A museum Accession Number will also be sought on each occasion. For offshore digital data, it may be appropriate to archive this with a MEDIN Digital Archive Centre (DAC).

- 6.3.4 Project archives, including written, drawn, photographic and material elements (together with a summary of the contents of the archive) will be prepared and deposited by the Retained Archaeologist in accordance with the requirements of the receiving Museum.
- 6.3.5 Written, drawn and photographic archives will be compiled to a standard that allows for the publication of a summary report. Written archives will be on clean, stable materials, and will be suitable for photocopying. The materials used will be of the standard recommended in Guidelines for the Preparation of Excavation Archives for Long-term Storage (Walker, 1990).
- 6.3.6 The timetable for depositing archives with the receiving institution after completion of the post-fieldwork programme will be set out in the relevant Method Statement.
- 6.3.7 On completion of scheme construction, an OASIS form will be produced and copies of all archaeological reports will be attached as data files. Notification of the completion of the OASIS form will be sent to NRW, the Dyfed Archaeological Trust HER, the RCAHMW and Cadw as appropriate, to notify the curators of compliance with this WSI and potential marine licence conditions. Submission of the OASIS forms will take place within 6 months of completion of construction of the authorized scheme, as per the marine licence stipulations, and notifications NRW and curators will be sent within 10 days of the submission of the OASIS forms.
- 6.3.8 The costs of archiving (whether digital, paper or object) will be met by the Developer. Tenders or costings by contractors for work packages should include provision for the preparation and deposition of the expected archive.

## 7.0 References

- Brown, D. (2011) Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation. Archaeological Archives Forum.
- Chartered Institute for Archaeologists (CIfA) (2014a), Standard and Guidance for Archaeological Watching Briefs, Reading.
- Chartered Institute for Archaeologists (CIfA) (2014b), Standard and Guidance for Archaeological Field Evaluations, Reading.
- Chartered Institute for Archaeologists (CIfA) (2014c), Standard and Guidance for the collection, documentation, conservation and research of archaeological materials.
- Chartered Institute for Archaeologists (CIfA) (2014d) Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives.
- Institute of Conservation (ICON), (1984), Environmental Guidelines for the Permanent Storage of Excavated Material from Archaeological Sites, Conservation Guidelines No. 3, ICON.
- MSDS Marine (2021) Erebus Floating Offshore Windfarm: Marine Archaeology Technical Report.
- Standing Conference of Archaeological Unit Managers (SCAUM) (2007), Health and Safety in Field Archaeology: Manual, SCAUM/FAME.
- The Crown Estate (2021), Archaeological Written Schemes of Investigation for Offshore Renewables Projects. The Crown Estate.
- The Crown Estate (2014), Protocol for Archaeological Discoveries: Offshore Renewables Projects, Guidance Document ref: 73830.04
- Walker, K., (1990), Guidelines for the preparation of excavation archives for long-term storage, ICON.

## 8.0 Appendix A – Method Statement for Archaeological Involvement in Geotechnical Campaign

### 8.1 Introduction

- 8.1.1 MSDS Marine have produced this method statement with input from COARS (their geoarchaeological contractor) on behalf of MarineSpace, to ensure geoarchaeological input into the 2021 geotechnical campaign being undertaken in support of Erebus Floating Offshore Wind Farm. This method statement sets out workflows and methods to ensure geoarchaeological requirements can be met alongside other geotechnical and engineering priorities. The details set out within this document have been produced following discussions with MarineSpace and the geotechnical contractors (GEOxyz).
- 8.1.2 The geoarchaeological involvement is necessary to characterise the prehistoric archaeological and palaeoenvironmental potential of the area and to mitigate impacts to these historic assets.
- 8.1.3 Additionally, a marine licence has been obtained for the geotechnical works. Conditions associated with the marine licence included Condition 3.22 Archaeology: The Licence Holder must ensure that if any archaeological features or finds are disturbed during the course of the Licenced Activities, all Licensed Activities must cease until advice on any necessary mitigation measures from the Licensing Authority has been given in writing. All mitigation measures must then be implemented prior to Licensed Activities recommencing.
- 8.1.4 This condition will be met by following the protocol for archaeological discoveries (PAD) (The Crown Estate 2014). A project-specific PAD has been issued to MarineSpace and is currently in use (Technical Appendix 15.2; ERE-CON-ITP-CON-ENV-0037-Appendix I) (MSDS Marine report no: 2021/MSDS20149/3). The current document is therefore focused on the geoarchaeological work.

### 8.2 Aims and Objectives

- 8.2.1 The purpose of this method statement is:
- To provide guidance on the collection and retention of geotechnical cores in order that they can be used for archaeological as well as engineering purposes. It is important that initial collection, storage, and retention of cores is undertaken in a way which will facilitate archaeological assessment; and
  - To provide methods for undertaking Stage 1 and Stage 2 geoarchaeological assessments on the cores.
- 8.2.2 Broadly, the aim of the archaeological assessment of geotechnical data as set out within COWRIE's Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather 2010) is to:
- 'Investigate the deposition sequence of sediments within the area represented by the cores to identify, as far as possible, the environments within which this deposition took place; • Evaluate the potential for past human exploitation and occupation of these past environments;

- Produce an overview of the geological stratigraphy to provide an indication of the prehistoric archaeological potential for the area; and
  - Comment on the archaeological importance of the identified deposits, within the context of the wider palaeoenvironmental history of the region and the UK’.
- 8.2.3 Collection and retention methods should not preclude and, where possible, should facilitate these aims, as should the subsequent geoarchaeological assessment and analysis of the cores. It should be noted that some of the methods of analysis require special consideration and have requirements in terms of core processing and storage. In particular, OSL dating, which determines the age elapsed since sedimentary minerals were last exposed to sunlight. The time-dependent signal is extremely sensitive to light. Treatment of cores should follow the method set out below to ensure that they retain their potential for OSL dating.
- 8.2.4 Following COWRIE guidance (Gribble and Leather 2010), the aims of archaeological assessment of geotechnical data are achieved through a programme of staged recording, assessment, and analysis:
- Stage 1. Geoarchaeological review of core logs: consists of a desk-based assessment of geotechnical core logs by a trained geoarchaeologist to determine which cores contain sediments of archaeological interest. Recommendations are made to the client as to which cores the geoarchaeologist would like to look at in Stage 2. For Stage 1 to be undertaken the core logs must be recorded in a manner which will allow identification of sediments of archaeological interest. The OSL potential of the sediments is also assessed.
  - Stage 2. Geoarchaeological recording: a detailed inspection and recording of the cores identified in Stage 1 to further assess archaeological potential. This requires physical access by the geoarchaeologist, who will make a record of the sediments encountered, their archaeological potential, and recommendations for any Stage 3 assessment, if required.
  - Stage 3. Geoarchaeological assessment: samples are taken from the cores recommended (and recorded) in Stage 2 for specialist assessment to determine the age and palaeoenvironmental potential of the sediments. This stage comprises the sampling and laboratory analysis of a selected core, or cores, to a level sufficient to enable an assessment of the value of the palaeoenvironmental material (pollen, diatoms, ostracods and foraminifera) surviving within the core(s). The assessment seeks to establish the preservation, diversity, and quantity of palaeoenvironmental material, in order to further refine the interpretation of the sedimentary environment, and past human activity, identified in the Stage 2 recording. Recommendations are made as to whether a Stage 4 analysis programme, including dating, should take place on any of the core material.
  - Stage 4. Geoarchaeological analysis: consists of more detailed investigation of the core material typically using the same techniques as Stage 3, but with extended counting and / or higher sampling intervals within key stratigraphic units. The work will be undertaken to a high standard which should permit the publication / dissemination of the results.
  - Stage 5. Publication
- 8.2.5 It is the experience of MSDS Marine and COARS that Stages 1 and 2 can be combined into a single stage. This would allow a streamlining of the archaeological process, with only four rather than five reporting stages, and also allow more rapid progression from Stage 1 to 2 without delays to the geotechnical teams.



## 8.3 Guidance

8.3.1 This Method Statement has been drafted using archaeological and historic environment best practice guidance for offshore development, tailored to suit the specific circumstances of Project Erebus, with a view to establishing a clear and workable process that will accommodate archaeological needs in respect of geotechnical works. Relevant guidance includes:

- COWRIE's Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather 2010);
- COWRIE's Historic Environment Guidance for the Offshore Renewable Energy Sector (2007);
- The Crown Estate's Archaeological Written Schemes of Investigation for Offshore Renewables Projects (2021) and Protocol for Archaeological Discoveries (2014); and
- The Joint Nautical Archaeology Policy Committee's Code for Practice for Seabed Development (2008);
- Historic England's (2015) Geoarchaeology;
- Historic England's (2011) Environmental Archaeology.

## 8.4 Workflow

8.4.1 This section sets out a workflow for the geoarchaeological assessment of the cores that has been discussed with the geotechnical contractor to ensure that guidelines are followed as per best practice.

1. Core collection and processing will adhere to the Protocol for Archaeological Discoveries for this project (Technical Appendix 15.2; ERE-CON-ITP-CON-ENV-0037-Appendix I) following licence conditions received for the coring.
2. Cores will be collected in liners and stored according to this Method Statement (see Section 5) and existing agreements with the geotechnical contractor.
3. Locations of potential geoarchaeological interest will be identified on seismic profiles by a geoarchaeologist, ahead of core splitting. These sections of interest will be provided to the client and any conflicts with other requirements discussed. The discussions will result in a list of sections which could be retained for geoarchaeological assessment.
4. A geoarchaeological toolbox talk will be provided prior to core splitting. This toolbox talk will include information on geoarchaeological requirements and identification of deposits of geoarchaeological interest. This will also include instruction on how to store cores/samples of interest (including those sections identified in step 3).
5. Cores will be processed and core logs produced. Cores will be removed from liners and subsamples taken for engineering purposes. Deposits of potential geoarchaeological interest will be identified and stored for geoarchaeological assessment following the information set out in the toolbox talk conducted prior to core splitting and with reference to the sections of interest identified within the seismic profiles. Samples stored for geoarchaeological purposes will be retained intact and will be wrapped in several layers of cling film and aluminium foil (see Section 5). Cores will be stored in a temperature-controlled environment.
6. Core logs and photographs will be provided to the Retained Archaeologist (MSDS Marine) for geoarchaeological review by COARS (Stage 1 geoarchaeological desk-based assessment).

7. Additionally, following geotechnical lab testing photographs of tested samples will also be provided to MSDS Marine for geoarchaeological review, in order to establish whether any samples retain geoarchaeological potential. This will potentially allow geoarchaeological and engineering priorities to be met when there are conflicting interests in the same core section.
8. Cores identified as being of geoarchaeological interest on the basis of the core logs will undergo a visual inspection by a geoarchaeologist, followed by recording of sediments in cores deemed as having good geoarchaeological potential (Stage 2 geoarchaeological recording).
9. Reporting and recommendations for further work will be made.

8.4.2 Any Stage 3 and later Method Statements will be produced for agreement with MarineSpace.

## 8.5 Methods for Core Collection, Splitting, Recording, Storage and Access

8.5.1 The extraction of vibrocores will result in samples which may be of archaeological interest.

### Toolbox talks

8.5.2 A briefing should be provided to laboratory teams on the Protocol for Archaeological Discoveries following the licence condition received for the coring (The Crown Estate, 2014).

8.5.3 The toolbox talk with the geotechnical laboratory contractors should take place prior to core splitting. The toolbox talk would explain to contractors why geotechnical material is of archaeological importance, how best to handle and report it, and priority sediment types for geoarchaeological assessment. There will be particular focus on the identification of deposits of geoarchaeological interest (see 'Recording' below) in order that the geotechnical teams can identify such deposits as vibrocores are processed and retain the samples for geoarchaeological assessment following storage procedures set out in below. The toolbox talk will also contain information on the storage of samples to retain their OSL potential.

8.5.4 Toolbox talks would be delivered through a teleconference.

### Core data and recovery: vibrocores

8.5.5 The vibrocore is a geotechnical tool used to recover soil samples from the ground. The primary purpose of these samples is to confirm ground conditions and geotechnical properties within the array area and ECR corridor. To recover the samples, the vibrocorer is first lowered to the seabed via a crane and is also controlled via an umbilical. A narrow barrel is then vibrated so that it can penetrate the ground under the force of gravity to a maximum depth of 6 m.

8.5.6 Vibrocore samples will be retained within the sleeves in which they are recovered. These will be clear plastic, allowing for approximate recording on recovery. The samples will be cut into 1 m lengths within the sleeves, split and assessed. Recording, retention, and storage will include the methods set out below.

8.5.7 Contractors undertaking the vibrocore testing will follow the PAD (Appendix B).

### Core opening, treatment, and storage

8.5.8 Cores will be processed in an onshore laboratory.

8.5.9 All cores will be treated as per the guidance set out within Archaeological Written Schemes of Investigation (The Crown Estate 2021) and Historic England's (2011) guidance, Environmental Archaeology. Cores will be adequately and clearly labelled and recorded. All cores will be stored

in an appropriate manner while awaiting assessment and analysis. They will be kept cool in an environment away from direct sunlight and frost as per guidance set out in Environmental Archaeology (English Heritage, 2011).

- 8.5.10 Cores can be opened lengthways in normal lighting conditions. This is typically achieved using a circular saw to cut the core liner, with care being taken not to penetrate the sediment. The core would then be photographed alongside a scale. It is important to minimise moisture loss to ensure samples retain any OSL potential, so reviewing and sampling intervals should be limited in so far as possible, and cores wrapped afterwards to reduce moisture loss.
- 8.5.11 Conducting core opening and imaging in normal light conditions assists in the siting of sampling locations for the full range of laboratory analyses (including OSL), identifying areas of fracture to be avoided in OSL sampling, and is fundamentally safer.
- 8.5.12 Sub samples will be taken for testing and for geoarchaeological purposes, following the workflow set out above. Samples of geoarchaeological interest should be retained intact and should be wrapped in several layers of clingfilm to maintain sample integrity and preserve moisture content; the sample number should be marked on the clingfilm. Core orientation should also be clearly indicated, with top and bottom shown using coloured end caps or labelled accordingly. Three layers of aluminium foil should then be applied and secured with tape; again, the sample number should be added to this. Samples should be kept in a cool, dark, temperature-controlled environment. These storage conditions will facilitate OSL analysis on any suitable core material.

### Recording

- 8.5.13 Recording will be undertaken by the geotechnical contractor, using Eurocode 7, to describe sediments. Any additions to this will be to British Standards and will be specified where used. Characteristics which are of archaeological interest will be logged. In particular, any evidence of the following will be recorded:
- Shell or sand horizons immediately adjacent to the tills or within the tills (see paragraph 8.5.14);
  - Laminated sands with dark horizons;
  - Fine-grained sediments indicative of fluvial/estuarine conditions;
  - Organic materials such as peat, wood or charcoal which can be used to date sediment layers and provide information on past environments;
  - Visible palaeoenvironmental and paleoclimatic indicators such as mollusc shells and plant remains;
  - Mammal macrofaunal remains which can be used to reconstruct landscape and habitat; and
  - Archaeological artefacts which provide direct evidence of a prehistoric human presence in the palaeolandscapes
- 8.5.14 Optimal OSL samples within marine cores will have significant portions of fine silt and/or fine sand and be contained within well-sorted units that are at least 100 mm thick. If the unit is greater than 100 mm thick, then the OSL sample is best sited in the lower 100 mm of the unit. Units with visible cracks and/or comprising material that lacks cohesion to survive sampling and/or transport in normal lighting conditions should be avoided. In so far as possible, the aim

should be to take a sequence of samples from a core, rather than a single sample. This enables the opportunity to evaluate the stratigraphic consistency of dates. The presence of any of the above features or inclusions should be noted within the core log, where observed and intact samples of these sections should be retained for geoarchaeological assessment, following the storage methods set out in 'Contractors undertaking the vibrocore testing will follow the PAD (Appendix B).

- 8.5.15 Core opening, treatment, and storage'.
- 8.5.16 Any voids within the cores should also be noted, along with the depths of the voids. Likewise, areas of loose sediment should be noted, again, along with depths.
- 8.5.17 All cores should be photographed in good light. Photographs should cover the entirety of the core (although this can be done in separate sections), including any areas of loose material or voids.
- 8.5.18 Core logs and photographs will be provided to MSDS Marine who will pass them on to the geoarchaeological specialist for assessment. As soon as the first sample core logs become available, these will be provided to MSDS Marine. This is to provide an opportunity to assess whether the cores are being recorded to an appropriate standard which would allow archaeological assessment, and to suggest changes to recording if required.
- 8.5.19 The retained archaeologist and geoarchaeologist will work with the geotechnical contractor to ensure core recording is carried out to an acceptable standard to facilitate geoarchaeological assessment.

#### **Core retention and access**

- 8.5.20 Following their removal from the vessel all cores and core samples will be transported to the contractor's premises. All samples of geoarchaeological interest will be retained for Stage 1 geoarchaeological assessment and later stages of investigation if the Stage 1 assessment identifies a need for further work.
- 8.5.21 The core samples will be made available for archaeological inspection when required. These samples will be made available within a period of one month following a request to the contractor and/or the storage facility. Samples will not be discarded before full archaeological assessment and (where required) analysis has taken place. Note that following the stage 1 assessment any core samples of geoarchaeological interest can be sent to the geoarchaeological contractor and there will be no need for further storage by the geotechnical contractor.

## **8.6 Review of Geotechnical Data**

### **Geotechnical Survey and Stage 1 Desk Based Assessment**

- 8.6.1 The Stage 1 review will be undertaken on the logs for the vibrocores, and will seek to identify cores which can potentially provide information on the following areas:
  - Cores containing any material which may be used to constrain dates of glacial advances/retreats, which have implications for periods of potential human habitation;
  - Cores containing sediments that can be related to a pre-marine inundation period at the end of the Pleistocene / beginning of the Holocene period;

- Cores that show evidence of a transition from organic-rich clays / peats, associated with dryland edge marsh / fen environments, towards saltmarsh and subsequent full marine inundation;
- Cores that have the potential to provide information about past sea level that can be used to enhance our understanding of when this part of the North Sea was flooded and therefore no longer inhabitable to people;
- Cores containing organic material that can be readily dated to establish the age of the deposits;
- Cores that sample Pleistocene deposits that are associated with terrestrial / coastal sediment deposition (e.g. Yarmouth Roads, Brown Bank and Botney Cut formations);
- Cores likely to contain ecofacts that can be used to reconstruct the past environment; and
- Material suitable for dating (C14 and OSL).

8.6.2 At the completion of the geotechnical survey, the geoarchaeologist will advise MSDS Marine and the Developer which cores may have (geo-)archaeological potential and should be subject to Stage 2 visual inspection and any subsequent geoarchaeological recording. This procedure is in accordance with the Guidance on Offshore Geotechnical Investigations and Historic Environment Analysis (Gribble and Leather, 2011). Stage 2 geoarchaeological recording will require a geoarchaeological description of the core material to be undertaken, following Historic England's Geoarchaeology guidance (Historic England 2015) and the marine geoarchaeology techniques as taught by COARS on the Historic England-funded Marine Geoarchaeology CPD Training Course (Grant et al. 2015).

8.6.3 The cores will also be reviewed for their OSL potential. In addition to an assessment of the geometry and texture of potential samples, consideration will be given to the sedimentary genus of each sample. Those samples of aeolian or waterlain origin will be prioritised, whilst those of sub-glacial origin will be avoided.

### Stage 2 Geoarchaeological Recording and OSL Sampling

8.6.4 The geoarchaeologist would arrange physical access to the cores, in accordance with Stage 2 geoarchaeological assessment, and a report with recommendations, including storage requirements (i.e. duration or disposal) for any samples will be produced. Not all cores would be recorded if, after visual inspection, they are deemed to not have any geoarchaeological potential (e.g. glacially derived). The reasons for excluding any cores from recording after visual inspection will be included within the subsequent report, for clarity.

8.6.5 Geoarchaeological recording can take place at the geotechnical contractor's facilities or alternatively be transported back to the laboratories at the National Oceanography Centre Southampton (NOCS). The latter has the advantage that it will allow the geoarchaeologist easy access to the cores should sampling be required for Stage 3 assessment or any subsequent Stage 4 analysis. It also means that the cores can be placed within refrigerated storage at NOCS to reduce any deterioration of the core material from processes such as fungal growth or drying out which could ultimately lead to contamination of the samples for techniques such as radiocarbon dating or the loss of biological remains (such as pollen).

8.6.6 Geoarchaeological recording will include, but not limited to:

- Depth range (e.g. 0-25cm)

- Main colour (using a Munsell chart)
- Mottles colour/Size abundance
- Texture by feel
- Structure
- Stones – content/type/shape
- Roots/size/shape/abundance/
- Boundary sharpness
- Notes/Horizon name

- 8.6.7 Any suitable OSL samples will be taken. Having identified suitable units, the core should be sectioned to create a 300 mm long semi-cylinder that is centred on an OSL sample and maintains the original core diameter in so far as possible. The cylinder should then be wrapped in several layers of clingfilm to maintain sample integrity and preserve moisture content; the sample number should be marked on the clingfilm. Three layers of aluminium foil should then be applied and secured with tape; again, the sample number should be added to this. Prior to transport, samples should be stored in a dark location, and not in direct sunlight.
- 8.6.8 This technique of obtaining OSL samples from cores split under normal lighting conditions has been applied successfully at a number of sites by the specialists working on this project (Dr Philip Toms), such as on the Humber Regional Environmental Characterisation (REC) project. This project involved OSL analysis of a number of samples from a vibrocore. The results were consistent with a radiocarbon date taken from the same vibrocore, and OSL dates were also found to be consistent with their relative stratigraphic order (Tappin et al. 2011: 203). Thus, while the methods set out here differ from those set out in Luminescence Dating: Guidelines on using luminescence dating in archaeology (English Heritage 2008), they have been tested and proven to be an effective, practical and reliable means by which OSL dates can be obtained.
- 8.6.9 A report will be produced summarising the results of the Stage 2 geoarchaeological assessment and sub sampling, and detailing the scope of any Stage 3 assessment if required, including any recommendations for radiocarbon dating or other suitable dating techniques. Following sign off by the Developer recommendations and a report will be finalised and submitted to the Archaeological Curators for review within 3 months of the completion of the Stage 2 analysis. Following Stage 2 assessment, any samples that are assessed as being of no geoarchaeological interest can then be disposed of by the client.
- 8.6.10 The extent of any Stage 3 and 4 investigations would be based upon the Stage 1 and 2 results and would be discussed in conjunction with MSDS Marine and the Developer. Method statements for Stage 3 and later works will be provided following the Stage 2 reporting.

## 9.0 Appendix B – Offshore Protocol for Archaeological Discoveries

### 9.1 Purpose of the document

- 9.1.1 This document sets out the procedure for reporting discoveries of potential archaeological interest made offshore of the Mean High Water Springs (MHWS) level during the course of pre-construction surveys, construction and installation work on the Erebus project, hereafter referred to as the ‘Project’.
- 9.1.2 Any archaeological finds made by project staff are important because they may shed light on past human use of the landscape, sea and seabed. The information that such discoveries bring to light can help archaeologists to better understand what happened in the past, and therefore to better protect those aspects of our history and prehistory that should be conserved on behalf of future generations.
- 9.1.3 The aim of the Offshore Protocol for Archaeological Discoveries (PAD) is to reduce any adverse effects of the development upon the historic environment by enabling people working on the project to report their finds in a manner that is both convenient to their every-day work and effective with regard to curatorial requirements.
- 9.1.4 The document has been prepared at the pre-application stage for the main project. The PAD has been produced at this stage due to a condition on the marine licence for geotechnical works, which included a condition specific to Archaeology:
- Condition 3.22 Archaeology: The Licence Holder must ensure that if any archaeological features or finds are disturbed during the course of the Licenced Activities, all Licensed Activities must cease until advice on any necessary mitigation measures from the Licensing Authority has been given in writing. All mitigation measures must then be implemented prior to Licensed Activities recommencing.
- 9.1.5 The client will ensure their obligations under this condition are met by using the protocol set out within this document which ensures for reporting of potential of archaeological finds, cessation of activities while the find is reviewed, and curatorial advice sought on mitigation where necessary (where confirmed archaeological features or finds are identified). The geotechnical campaign took place in May 2021, ahead of the application for the main project. However, the PAD will also form part of the documentation submitted in support of the application for the construction of the wind farm and is therefore appended to the current WSI.

### 9.2 Protocol Details and Version

- 9.2.1 The Protocol that will be used is based on the Protocol for Archaeological Discoveries for Offshore Renewables Projects introduced by The Crown Estate (The Crown Estate 2014).

### 9.3 Circumstances of Discovery

- 9.3.1 This PAD addresses finds of archaeological interest made on the seabed, based on an assessment of the working practices involved in pre-construction survey work and construction activities. For example, during a geotechnical campaign finds may be encountered within cores when core splitting or extrusion occurs.

## 9.4 Operations of the Protocol

### Overview of the PAD

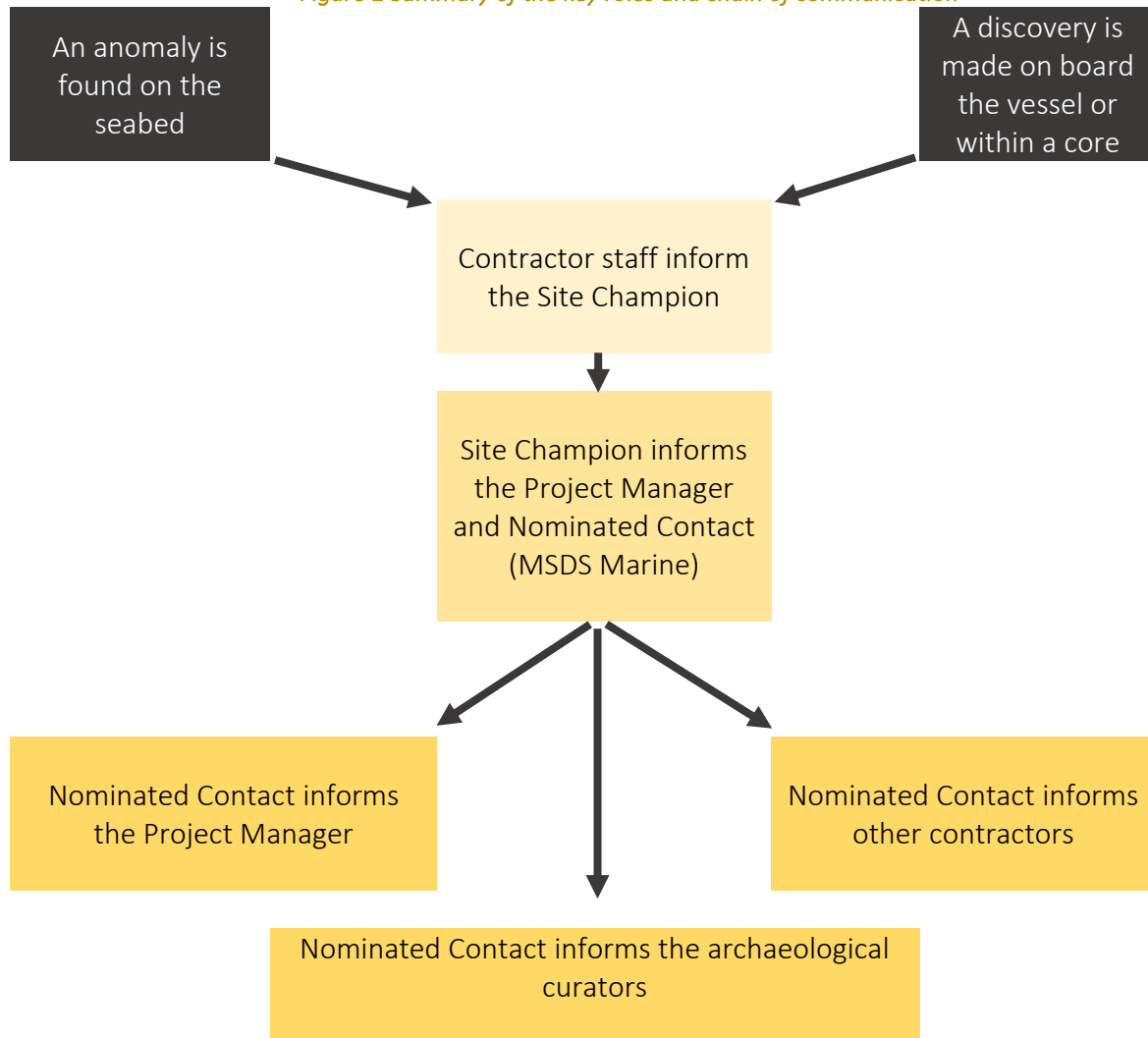
- 9.4.1 The PAD has been designed to allow Developers to report unexpected finds of archaeological interest made on the seabed or in the intertidal zone during the course of offshore construction works. A series of actions is defined for such cases, summarised below and in Figure 1.
- 9.4.2 The PAD anticipates discoveries being made by **Project Staff** who report to the **Site Champion** (for example the Vessel Master, Site Foreman or Laboratory Manager in the case of geotechnical core splitting) on their vessel, site or laboratory; who then completes a series of steps including stopping work and reporting the find to the **Nominated Contact** (for pre-application activities this has been MSDS Marine). The Nominated Contact will provide specialist advice and technical support services relating to the identification of the find<sup>1</sup>.
- 9.4.3 The Nominated Contact will liaise with the Developer and the Archaeological Curator, along with any additional relevant stakeholders depending on the nature of the find, and planned activities within the area. If the find or feature is determined to be of archaeological interest then suitable mitigation measures will be devised in consultation with the Archaeological Curator. Additionally, following the licence condition for geotechnical works *'all Licensed Activities must cease until advice on any necessary mitigation measures from the Licensing Authority has been given in writing. All mitigation measures must then be implemented prior to Licensed Activities recommencing.'*
- 9.4.4 The Nominated Contact, along with the Developer and their contractors shall draw to the attention of all relevant staff the potential for archaeological material to be found in the course of survey, construction and installation work and inform them of the possible importance of such finds.
- 9.4.5 Personnel working on the project will be briefed on the Protocol for Archaeological Discoveries and copies of this Protocol will be available onboard the installation vessels and on all sites.

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<sup>1</sup> Note, the Crown Estate (2014) Protocol for Archaeological Discoveries includes an additional step whereby the report is passed to the Implementation Service who provide additional support on identification and input into mitigation. This Service is run by an archaeological contractor. MSDS Marine, who has access to all project datasets and has a strong understanding of the archaeological potential of the area, along with specialists in maritime archaeology, is best placed to give this advice. As such there is no need for the inclusion of the additional step of corresponding with the Implementation Service, who do not have access to the up to date project data. They will therefore not be included within the Protocol for Archaeological Discoveries implemented by the Project.



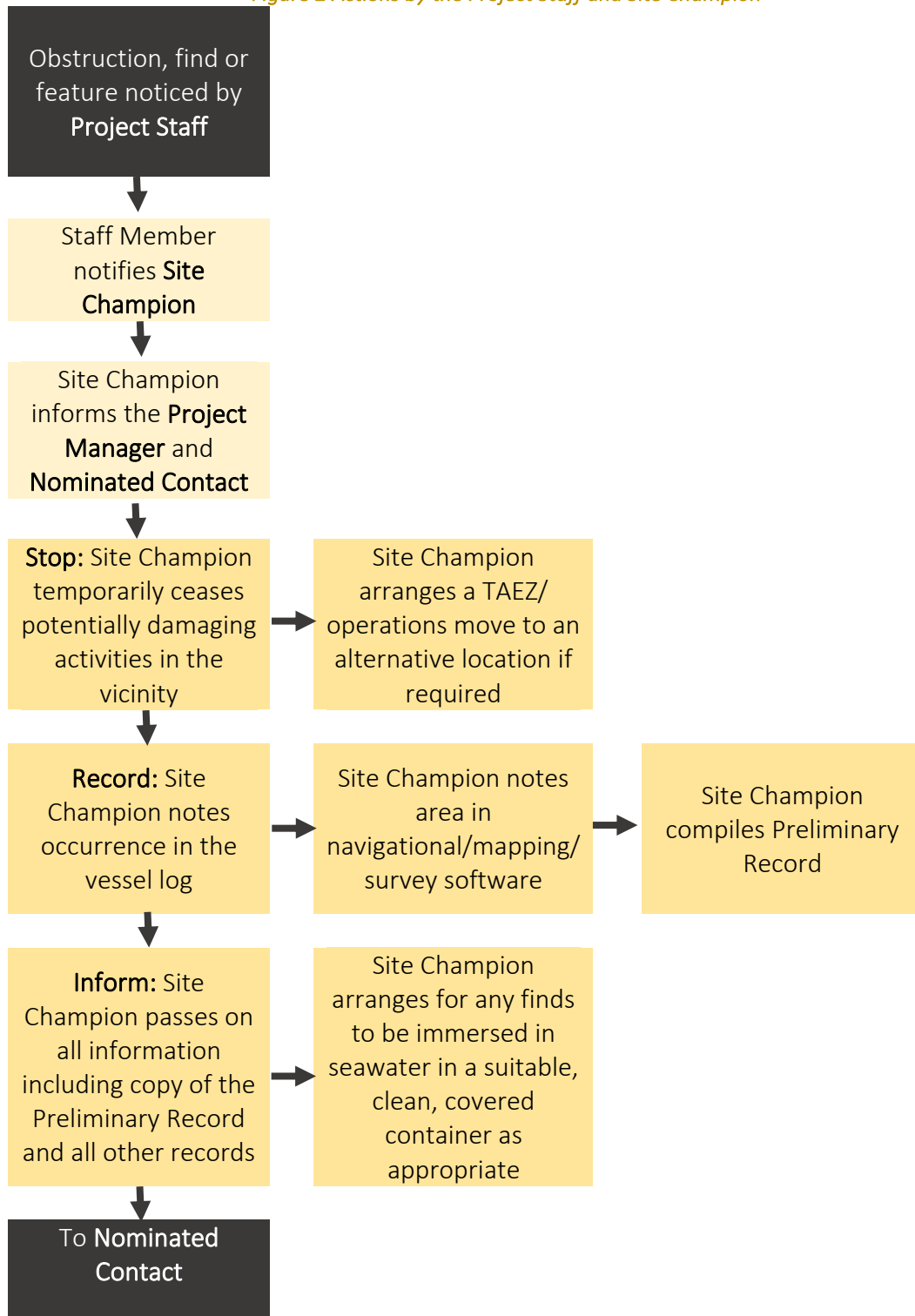
*Figure 1 Summary of the key roles and chain of communication*



## 9.5 Actions by the Project Staff and Site Champion

- 9.5.1 Actions required by the Project Staff and Site Champion are set out in Figure 2 and are discussed here.
- 9.5.2 The first step is the identification of a find of potential archaeological interest. If finds or features are identified by the Project Staff they should then be reported to the Site Champion. The Site Champion will then undertake a series of actions: Stop; Record and Inform, as set out within Figure 2. They should ensure works in the vicinity are stopped and a TAEZ is put in place. They should ensure that the find is recorded in the vessel log, navigational software and within the Preliminary Record Form (Section 11). The Site Champion should inform the Nominated Contact and pass over any records. They should also ensure that if any finds have been recovered from the seabed, that they are stored appropriately. Advice on storage is set out within this document and can be sought from the Nominated Contact.

Figure 2 Actions by the Project Staff and Site Champion



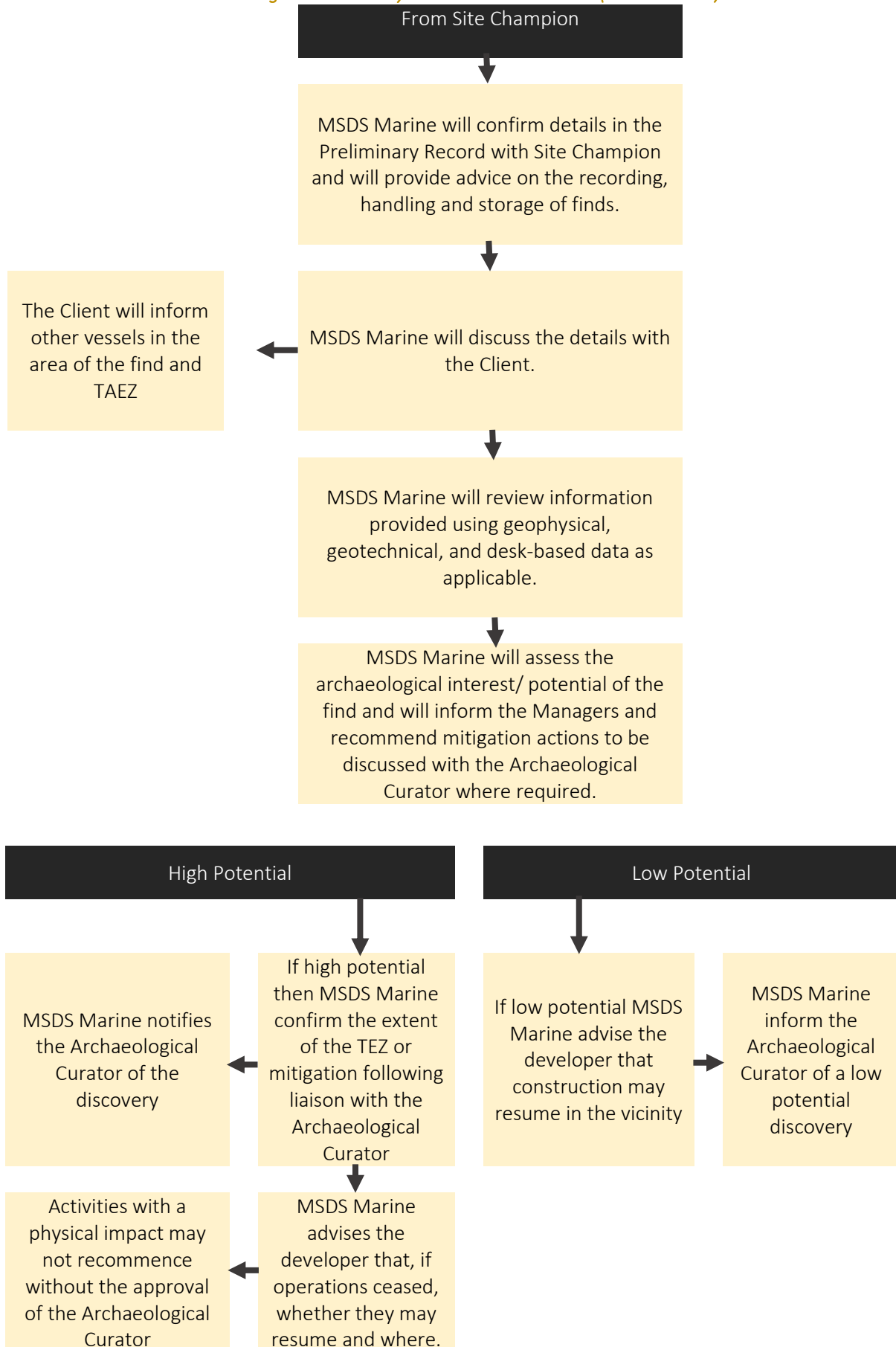
## 9.6 Actions by the Nominated Contact

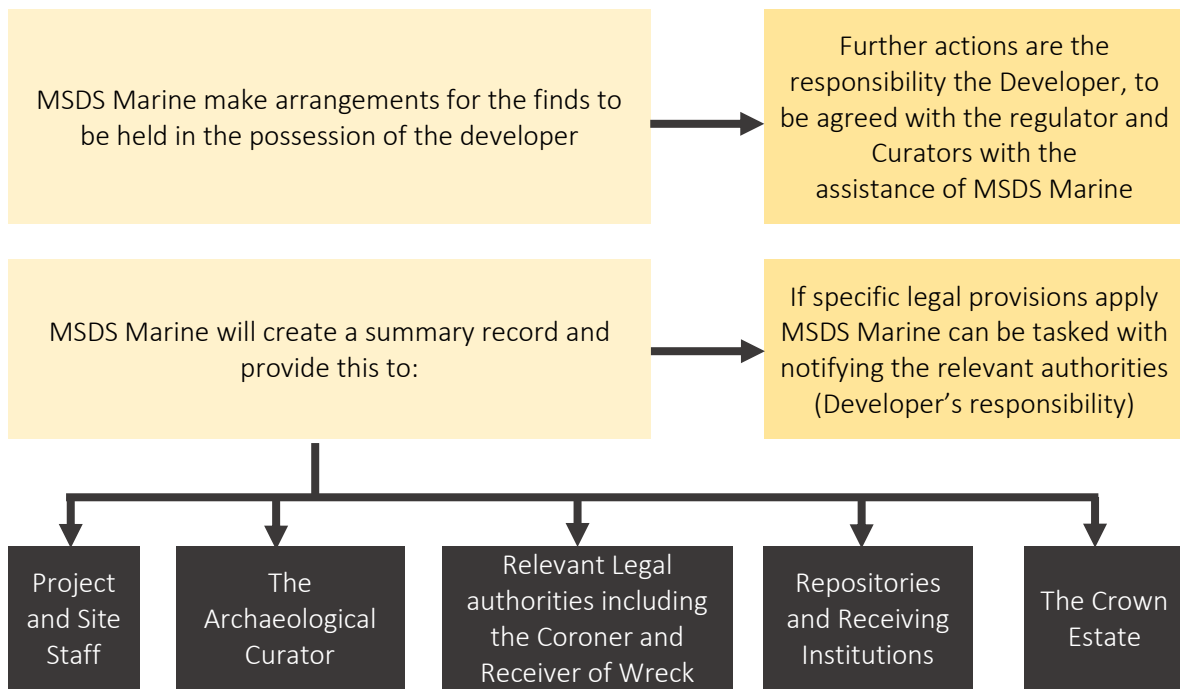
- 9.6.1 The Nominated Contact for this project is MSDS Marine. Actions required by the MSDS Marine are set out in Figure 3. MSDS Marine will confirm the details laid out in the Preliminary Record with the Site Champion and then inform the Project Manager and pass on the details of the

discovery. The Project Manager will inform any other vessels working in the area of the exclusion zone.

- 9.6.2 The Nominated contact will then review the discovery in order to determine whether it is of low or high archaeological potential. Low potential finds may be isolated finds (including anchors) or peat deposits that do not contain prehistoric archaeological remains. **High potential finds include finds that predate 1800 AD, finds that relate to an aircraft, multiple finds from the same area, reports indicating the presence of a wreck or other structural remains, or peat or other fine-grained sediments that contain worked flint, charcoal, or bone.**
- 9.6.3 Once the potential has been established, MSDS Marine will inform the Project Manager of this.
- 9.6.4 For reports that are deemed low potential, MSDS Marine will generally advise that isolated finds be moved to wet storage and request an 'as found' record and an 'as left' record with photos and positions. MSDS Marine should be contacted prior to moving any find using the PAD process.
- 9.6.5 For reports that are deemed high potential, MSDS Marine will conduct a review of geophysical data and recommend the extent of the exclusion zone. They may also recommend other mitigation such as further archaeological investigation. Mitigation strategies will be devised in liaison with the Archaeological Curator, following the licence condition. MSDS Marine will also advise when and where operations can continue. Physical impacts may not occur within exclusion zones without the approval of the Archaeological Curator.
- 9.6.6 MSDS Marine will then make arrangements for any finds which have been recovered to be held in the possession of the developer. They will also produce a summary record and provide this to relevant stakeholders. A summary record will include advice on the identification of finds and the character of their seabed locations, an assessment of the archaeological potential of the report which will include the rationale for the conclusion reached, and advice on actions to be taken in respect of the discovery, including any recovered finds.
- 9.6.7 Any further actions taken are the responsibility of the developer, and are to be agreed with the Regulator and Archaeological Curator with the assistance of MSDS Marine.

Figure 3 Actions by the Nominated Contact (MSDS Marine)





### Legal Implications

- 9.6.8 It should be noted that if the wreck of an aircraft is encountered it is automatically protected as a protected place under the terms of the Protection of Military Remains Act 1986 and it is an offence to tamper with, damage, or move the wreck or to remove items.
- 9.6.9 Furthermore, all items of ‘wreck’ are reportable to the Receiver of Wreck under the terms of the Merchant Shipping Act 1995. Reporting discoveries, anomalies and finds via the PAD will be sufficient to meet the requirements of the Act.
- 9.6.10 Other acts may apply in certain situations, depending on the nature of the find. Reporting under the PAD will result in advice from the Nominated Contacts in regard to specific legal requirements for different types of find. Specific Acts of relevance to different finds are detailed in Section 10 of this document.

## 10.0 Guidelines for Identifying and Handling Finds

- 10.1.1 The following guideline can be used to identify any discovered material and must be referred to when planning appropriate handling and storage. Advice on the identification of finds has been provided following the accepted advice provided by The Crown Estate in their Protocol for Archaeological Discoveries (2014).
- 10.1.2 Archaeological material can come in a variety of sizes, shapes, and materials. Materials can degrade in different ways so it is important that they are handled with care and that the appropriate handling and storage techniques are applied.
- 10.1.3 Finds are vulnerable to deterioration at all times, whether they are recovered or not. Fragile material, such as wood, can be damaged by the force of passing machinery. It is crucial that all finds be treated carefully, and interfered with as little as possible.
- 10.1.4 Leaving finds in situ is the best way to manage them. Once a find is recovered to the surface, it requires conservation which can be difficult and expensive to administer.

### 10.2 General advice for finds handling and storage:

- ⊕ Handle all finds carefully
- ⊕ Photograph all sides of a find with a scale
- ⊕ Take close up photographs of any markings, glazing, or imagery
- ⊕ Keep finds wet and ensure the water is changed regularly if biological growth is detected
- ⊕ Keep finds cool and ideally in the dark
- ⊕ Keep finds in protective containers where possible
- ⊕ Label any finds
- ⊕ Contact MSDS for advice on finds storage
- ⊗ Do not attempt to clean the find by removing any sediment build up, concretion, or marine life
- ⊗ Do not allow finds to dry out
- ⊗ Do not handle finds more than necessary

### 10.3 Metal

- 10.3.1 Metal is likely to survive in marine environment, though it may corrode when in water or form concretions of material (a hard mass of material which typically has a mineral matrix, commonly formed around ferrous objects in particular). Typical metal finds might include ingots, ballast, coins, ornaments, tools, weapons, aircraft or ship parts, and personal items. If potential unexploded ordnance (UXO) is encountered this should be dealt with under the UXO protocol.
- 10.3.2 The Crown Estate (2014) Guidance for the identification of metals is as follows:

#### Iron and Steel

- 10.3.3 The potential range and date of iron and steel objects is so wide that it is difficult to provide general guidance. In broad terms, iron and steel objects which are covered by a thick amorphous concrete-like coating ('concretion') are likely to be of archaeological interest and

should be reported. Pieces of metal sheet and structure may indicate a wreck and should be reported. Specific operational measures are likely to apply in respect of ordnance (cannonballs, bullets, shells) which should take precedence over archaeological requirements. However, discoveries of ordnance may be of archaeological interest, and they should be reported.

### Other Metals

10.3.4 Items made of thin, tinned or painted metal sheet are unlikely to be of archaeological interest. Aluminium objects may indicate aircraft wreckage from World War Two, especially if two or more pieces of aluminium are fixed together by rivets. All occurrences should be reported' and remains of this nature may be subject to the Protection of Military Remains Act 1986. 'Copper and copper alloy (bronze, brass) objects might indicate a wreck, or they may be very old. All occurrences should be reported. Precious metal objects and coins are definitely of archaeological interest because they are relatively easy to date. All occurrences should be reported (The Crown Estate 2014: 19)

### Actions to take:

10.3.5 If possible, do not recover metal. It can be difficult and expensive to conserve and some types of site, such as aircraft, are covered by specific legislation which prohibits recovery without appropriate licences.

10.3.6 For metals which are lifted, lifting should be carried out carefully and the find should be photographed. All metals should be stored in cool seawater. Different metals should not be stored together. The shape of the concretion can be used to identify the item and as such concretions should not be removed. If the find is too large to cover in seawater, wrap it in soaked material and keep wet. Some metal products e.g. lead, pewter and copper salts can be toxic, so handle with gloves or wash hands thoroughly after contact.

10.3.7 Metals can sometimes be identified the colour of their corrosion. Table 4 below aims to help identify the type of metal used;

Metal	Corrosion
Gold	No corrosion
Silver	White, waxy layers that turn lilac in the light
Copper/Copper Alloy e.g. Bronze	Dark red/purple/green/blue
Iron/Steel	Black or rusty with a crust of concretion.
Lead	Grey or white crystals
Pewter/Tin/Lead Alloy	Grey surface, possibly crystalline, soft or friable
Aluminium	Little corrosion

*Table 4 Guidance on the identification of metals*

## 10.4 Ceramics

10.4.1 Pottery can be made from china, porcelain, terracotta, earthenware and other clay-based materials. Typical finds might include crockery, ornaments, clay pipes, lamps, containers and tableware.

10.4.2 Any fragment of pottery is potentially of interest, especially if it is a large fragment. Items which look like modern crockery can be discarded, but if the item has an unusual shape, glaze or fabric it should be reported (The Crown Estate 2014: 19). Additionally, clay pipes should be reported.

### **Actions to take:**

10.4.3 Photograph finds with a scale, especially if they have any glazing or markings. Store in saltwater.

## **10.5 Ceramic Building Material**

10.5.1 Ceramic building material can be in the form of bricks, building blocks, mudbricks, and tile. Bricks and tile can appear unusually shaped. Ceramic building material can be evidence of a ship, or submerged settlement.

10.5.2 Bricks with modern proportions and v-shaped hollows ('frogs') are of no archaeological interest. Unfrogged, 'small', 'thin' or otherwise unusual bricks may date back to Medieval or even Roman times and should be reported (The Crown Estate 2014: 19). Occurrences of tile should also be reported.

### **Actions to take:**

10.5.3 Photograph finds with a scale, especially if they have any glazing or markings on them. Store in saltwater.

## **10.6 Stone**

10.6.1 Stone has been used by humans for thousands of years and it very durable underwater, making it a common find. There are different types of stone: quartz, limestone, marble, granite, obsidian, slate, sandstone, and flint. Typical finds might include ballast, anchors, millstones building material, shot, carvings, tools, sculptures, whetstones, flint or stone tools and other personal items.

10.6.2 Small to medium size stones that are shaped, polished and/or pierced may be prehistoric axes. All occurrences should be reported. Objects such as axe heads or knife blades made from flint are likely to be of prehistoric date and should be reported. Large blocks of stone that have been pierced or shaped may have been used as anchors or weights for fishing nets. All occurrences should be reported. The recovery of numerous stones may indicate the ballast mound of a wreck, or a navigational cairn. All occurrences should be reported (The Crown Estate 2014: 19).

### **Actions to take:**

10.6.3 Photograph with a scale and then store in water or wrap in soaked towelling.

## **10.7 Skeletal Material and Faunal Remains**

10.7.1 Skeletal finds and faunal remains can come in the form of bone, ivory, tooth, antler, baleen, tortoiseshell, tusk, or shell. Typical finds might include human, or animal remains, personal items such as combs or jewellery, carvings, and tool handles.

10.7.2 Discoveries of animal bone, teeth and tusks are of archaeological interest because they may date to periods when the seabed formed dry land and should be reported. Such bones, teeth, tusks etc. may have signs of damage, breaking or cutting that can be directly attributed to human activity. Large quantities of animal bone may indicate a wreck (the remains of cargo or provisions) and should be reported. Human bone is definitely of archaeological interest, and may, if buried and found within territorial waters, be subject to the provisions of the Burial Act 1857. Alternatively, it may be subject to the Protection of Military Remains Act 1986. Any suspected human bone should be reported and treated with discretion and respect.



10.7.3 Objects made out of bone – such as combs, harpoon points or decorative items – can be very old and are definitely of archaeological interest. All occurrences should be reported (The Crown Estate 2014: 19).

#### **Actions to take:**

10.7.4 Skeletal finds are vulnerable to environment change, so if any are recovered, ensure they are photographed with a scale and then immediately submerged in seawater and sealed in a suitable container. Change the water if biological growth occurs e.g. algae mould.

### **10.8 Wood**

10.8.1 Wooden finds could be evidence of a wrecked vessel. Typical wooden finds might include small personal items e.g. tools and bottle corks, or larger finds e.g. ships timbers, furniture, chests, barrels, dwelling posts, and wattle panels.

10.8.2 Light coloured wood, or wood that floats easily, is probably modern and is unlikely to be of archaeological interest. ‘Roundwood’ with bark – such as branches – is unlikely to be of archaeological interest, although it may provide paleo-environmental evidence. However, roundwood that has clearly been shaped or made into a point should be reported. Pieces of wood that have been shaped or jointed may be of archaeological interest, especially if fixed with wooden pegs, bolts, or nails – all occurrences should be reported. Objects made out of dark, waterlogged wood – such as bowls, handles, shafts and so on – can be very old and are definitely of archaeological interest. All occurrences should be reported (The Crown Estate 2014: 19).

#### **Actions to take:**

10.8.3 Timber finds are often very fragile and so must be lifted with care. Photograph with a scale. Do not allow the wood to dry out and ensure that it has sufficient support to stop it falling apart and submerge it in seawater. Keep the find in a cool and dark area. Change the water if biological growth is detected e.g. algae or mould. If the find is too large to store in water, try to keep it damp and cool in a darkened area.

### **10.9 Peat and Clay**

10.9.1 Peat is black or brown fibrous soil that formed when sea level was so low that the seabed formed marshy land, for example on the banks of a river or estuary. Peat is made up of plant remains, and also contains microscopic remains that can provide information about the environment at the time it was formed. This information helps us to understand the kind of landscape that our predecessors inhabited, and about how their landscape changed. It can also provide information about rising sea-level and coastline change, which are important to understanding processes that are affecting us today. Prehistoric structures (such as wooden trackways) and artefacts are often found within or near peat, because our predecessors used the many resources that these marshy areas contained. As these areas were waterlogged and have continued to be waterlogged because the sea has risen, ‘organic’ artefacts made of wood, leather, textile and so on often survive together with the stone and pottery which are found on ‘dry’ sites.

10.9.2 Fine-grained sediments such as silts and clays are often found at the same places as peat. These fine-grained sediments also contain the microscopic remains that can provide information

about past environments and sea level change. Any discoveries of such material would be of archaeological interest, and their occurrence should be reported (The Crown Estate 2014: 20).

**Actions to take:**

10.9.3 Any sediments collected should be stored in a sealed container with seawater and keep cool. Do not try to break apart the deposits.

## 10.10 Fibre and Textiles

10.10.1 Fibrous finds are unlikely to survive in marine conditions, but occasionally they do. Typical fibrous finds might include ropes and rigging, weaving, sailcloth, sacks, clothing, basketry, fishing nets etc.

**Actions to take:**

10.10.2 Due to the incredibly fragile nature, once any fibrous or textile find has been recovered it must be dealt with quickly. Take photographs with a scale, but do not use flash. Carefully place it in a sealed container. Try to keep it out of the light. If possible, keep the find in its original burial deposit i.e. the sediment it was found in, and seawater. This will help to protect the material.

## 10.11 Plastic, Rubber etc.

10.11.1 In most cases, rubber, plastic, Bakelite and similar modern materials are not of archaeological interest and can be disregarded. One exception is where such materials are found in the same area as aluminium objects and structures, which may indicate aircraft wreckage from World War Two. Such material should be reported (The Crown Estate 2014: 14) and should not be removed from the site.

**Actions to take:**

10.11.2 Do not bend or clean any plastic or rubber finds. Photograph the find with a scale and then store in seawater in a cool and dark area.

## 10.12 Resinous or Mineral Substance

10.12.1 These materials include amber, jet, coal, or bitumen. Typical finds might include ornaments, jewellery, beads, sealants, or caulking materials, all of which would be of archaeological interest and should be reported.

**Actions to take:**

10.12.2 These finds might appear stable, but if they are not stored properly, they may begin to deteriorate. Photograph a find with a scale, and then keep stored in seawater.

## 10.13 Glass

10.13.1 Glass artefacts are found on the seabed. Finds may include bottles, beads, panes of glass from ship's windows. Unless obviously modern (beer bottles etc) glass finds should be reported, particularly where it occurs alongside other finds as this may represent a wreck site.

10.13.2 Glass is likely to survive in marine conditions, but it does degrade; glass deterioration is usually categorised by leaching, which causes an iridescent pattern to form on the glass, it looks somewhat like an oil slick. It can also begin to flake away.

**Actions to take:**

10.13.3 Photograph with a scale before packing carefully to avoid breakage. Ensure it is covered in cool seawater in the dark.

## 11.0 Preliminary Record Form

### 11.0.1 Preliminary Record Form: Discoveries on the seabed/ on board a vessel/ within a core

Protocol for Archaeological Discoveries			
Preliminary Record Form: Discoveries on the seabed/ on board/ in the intertidal zone / on land			
Company Name			
Vessel/ Team Name			
Site / Sea Area Name			
Date			
Time of compiling information			
Name of compiler (Site Champion)			
Name of finder (if different from above)			
Time at which discovery was encountered			
Vessel position at time when anomaly was encountered			
Latitude		Longitude	
Datum (if different from WGS84)			
Original position of the anomaly on the seabed, if known			
Notes on likely accuracy on position stated above:			
How accurate is the position?			
Is the position the original position or has the material been moved by operations?			
Details of circumstances that led to the discovery			
Description of the find / anomaly			
Apparent size /extent of the anomaly			
Details of any find(s) recovered			
Details of any photographs, drawings of other records made of the find(s) e.g. location figure			
Details of treatment or storage of find(s)			
Date and time Nominated Contact informed			
General notes			
If discovered on the seabed:			

Derived from e.g. Obstacle Avoidance Sonar, Cable Tensiometer?			
Apparent size/ extent of anomaly (length, width, height above seabed)			
Extent of deviation/ route development			
Signed		Date	