Mona and Morgan OWF

WSI and PAD

Prepared for:

Morgan Offshore Wind Limited and Mona Offshore Wind Limited

Chertsey Road

Sunbury on Thames

Middlesex

TW16 7BP

By:

Coastal and Offshore Archaeological Research Services (COARS)

Ocean and Earth Science

National Oceanography Centre Southampton

University of Southampton

European Way

Southampton

SO14 3ZH

United Kingdom

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www.southampton.ac.uk/coars

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prepared by *date*	Michael Grant COARS, University of Southampton *May 2022*
approved by *signed* *date*	Miriam Parish BP Exploration Operating Company Limited *May 2022*
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Executive Summary

bp and Energie Baden-Württemberg AG (EnBW) ("Company" hereafter) have been awarded preferred bidder status for two offshore wind leases in the Irish Sea as part of The Crown Estate Offshore Wind Leasing Round 4, named Morgan and Mona. To inform the development of the projects, the Company intend to carry out a survey campaign commencing in Spring 2022. To support the survey planning, a Written Scheme of Investigation (WSI) has been developed and it outlined within this report. The WSI lays out the methodology that will be adopted during the 2022 campaign, consisting of the following components: 1) production of a desk based assessment of known archaeological assets within the area; 2) methodology for the assessment of the proposed coring locations using the aquired marine geophysical datasets; 3) development and implementation of Archaeological Exclusion Zones (AEZs); 4) Method Statement for the collection and retention of geoarchaeological material; and 5) a Protocol for Archaeological Discoveries (PAD).

Contents

GLOSSARY

AEZ – Archaeological Exclusion Zone imposed to protect known archaeological sites or geophysical anomalies of high, medium or low archaeological potential

ARCHAEOLOGICAL CONSULTANT – The nominated Archaeological Consultant is Dr Michael Grant, Lead Marine Consultant at COARS, who approved this document for the project

BATHYMETRIC SURVEY – A non-intrusive, remote-sensing investigative survey, using a multibeam echosounder, that measures the depth and topography of the seabed

COMPANY – Morgan Offshore Wind Limited and Mona Offshore Wind Limited

DBA – Desk-Based Assessment

GEOPHYSICAL SURVEY – A non-intrusive, remote-sensing investigative survey including side scan sonar, magnetometer and sub-bottom profiler, to detect or measure features on and below the seabed

GEOTECHNICAL INVESTIGATIONS – An intrusive survey method that penetrates the seabed recovering material samples for analysis

HISTORIC ASSETS – Elements of the historic environment that have local, regional or national significance, such as protected wrecks or submerged palaeo-landscapes

HISTORIC ENGLAND (HE) – the government's Statutory Heritage advisor and The Historic Buildings and Monuments commission for England or their successor function. HE's general powers under section 33 of the National Heritage Act 1983 were extended (via the National Heritage Act 2002) to modify their functions to include securing the preservation of monuments in, on, or under the seabed within the seaward limits of the UK Territorial Sea adjacent to England. They also provide advice in recognition of the English marine plan areas (inshore and offshore) as defined by the Marine and Coastal Access Act 2009 and the objectives and policies of published Marine Plans. HE is an executive non-departmental public body, sponsored by the Department for Digital, Culture, Media & Sport.

MMO – the Marine Management Organisation is responsible for licensing and regulating marine activities in the seas around England and Wales

MHWS – Mean High Water Springs, highest average tide

NOMINATED CONTACT – The shore-based representative from the developer who will be responsible for liaison between the Archaeological Consultant and the vessel-based Site Champion

PAD – The Protocol for Archaeological Discoveries sets out the procedures that must be followed in the event of unexpected archaeological discoveries either on the seabed or on the deck of working vessels and identifies the personnel with responsibility for ensuring that the PAD is followed

PROPOSED DEVELOPMENT – the two offshore wind leases in the Irish Sea awarded as part of The Crown Estate Offshore Wind Leasing Round 4, named Morgan and Mona, along with their proposed Export Cable Routes

ROYAL COMMISSION ON THE ANCIENT AND HISTORICAL MONUMENTS OF WALES (RCAHMW) - the statutory body for archaeology and cultural heritage within Welsh waters including marine archaeology in the Welsh area of the UK Territorial Sea and territorial waters adjacent to the Welsh coast up to the mean high-water mark with responsibility for marine planning, the application of policy and the identification of Welsh National Marine Planning Areas

RECEIVER OF WRECK – The Receiver of Wreck, the wreck administration within the MCA/UKHO, deals with all reports of wreckage from around the UK including Northern Ireland. It is based in the Maritime and Coastguard Agency headquarters in Southampton, with assistance from Coastguard personnel around the coast

RECEPTOR – Any environmental or other defined feature that is sensitive to, or has the potential to be affected by, an impact

RELEVANT NATIONAL AUTHORITIES – The Relevant National Authorities for this project are Historic England (HE) and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) respectively.

SITE CHAMPION – The Site Champion is usually the most senior representative on board the works vessel

STUDY AREA – an area used to gather data to provide sufficient contextual information about the proposed route and its environs from which to assess known and potential impacts on the heritage resource

TEZ – a Temporary Exclusion Zone imposed, under the terms of the PAD, in the event of an unexpected archaeological discovery until initial investigations have been completed. It may then either be removed or converted into an AEZ

THE CROWN ESTATE (TCE) – the body responsible for managing the seabed and foreshore in England, Wales and Northern Ireland, including offshore energy, aggregates, and cables and pipelines

UKHO – United Kingdom Hydrographic Office

WSI – The Written Scheme of Investigation forms an umbrella document for all survey, investigation and assessment required for a project and is supported by activity-specific Method Statements.

List of Acronyms used in the text

ADS	Archaeology Data Service
AEZ	Archaeological Exclusion Zone
BIIS	British–Irish Ice Sheet
BP	BP Alternative Energy Investments Limited
COARS	Coastal and Offshore Archaeological Services
CPT	Cone Penetration Tests
CIfA	Chartered Institute for Archaeologists
DBA	Desk based assessment
ECR	Export Cable Route
EEZ	Exclusive Economic Zone
EPSG	European Petroleum Survey Group
GIS	Geographic Information System
GPS	Global Positioning System
grt	Gross registered tonnage
HE	Historic England
HER	Historic Environment Record
ISB	Irish Sea Basin
ISIS	Irish Sea Ice Stream
LAT	Lowest Astronomical Tide
MIS	Marine isotope stage
MMO	Marine Management Organisation
MoD	Ministry of Defence
nm	Nautical miles
NMRW	National Monuments Record of Wales
NRHE	National Record of the Historic Environment
OSGB	Ordnance Survey Great Britain
OSL	Optically Stimulated Luminescence
OWF	Offshore Wind Farm
PAD	Protocol for Archaeological Discoveries
RCAHMW	Royal Commission on the Ancient and Historical Monuments of Wales
ROV	Remotely Operated Vehicle
RoW	Receiver of Wreck
SA	Study Area
SEA	Strategic Environmental Assessment
TEZ	Temporary Exclusion Zone
UKHO	United Kingdom Hydrographic Office
UTM	Universal Transverse Mercator
WGS	World Geodetic System
WSA	Wider Study Area
WSI	Written Scheme of Investigation

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WSI and PAD

1 Introduction

1.1 Outline

1.1.1.1 BP Alternative Energy Investments Limited (hereafter bp or BP) and Ebergie Baden-Württenberg (EnBW) ("Company" hereafter) have been awarded preferred bidder status for two offshore wind leases in the Irish Sea as part of The Crown Estate Offshore Wind Leasing Round 4, named Morgan and Mona (henceforth 'the Proposed Development'). To inform the development of the projects, the Company intend to carry out a survey campaign commencing in Spring 2022. The works proposed are a geophysical, geotechnical and environmental survey along the potential ECR corridors, within the Array Scoping Boundaries, and in the Marine Archaeology WSA (zone of influence) around each Array Scoping Boundary, along with a deep geotechnical survey within the Array Scoping Boundaries.

1.1.1.2 The location of Proposed Development is shown in Figure 1. The planned development is to install two fixed bottom 1.5 GW capacity offshore wind farms on the lease sites. The Project has applied for grid connection for both sites, with the base case assumption that the Mona Project will make landfall and connect to grid in north Wales, and Morgan will make landfall and connect to grid in north-west England.

1.1.1.3 In 2022, the Company will undertake a survey of the Proposed Development bidding areas, bidding area zone of influence and the potential ECR corridors, including geophysical, geotechnical and environmental survey data acquisition in the Irish Sea, in both English and Welsh waters. Geophysical survey data (non-marine licensable) acquisitions will occur alongside the environmental and geotechnical surveys and will comply with the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017).

1.1.1.4 The geotechnical survey element will include:

- Vibrocores, to an approximate depth of 6 m;

- Shallow cone penetration tests (CPTs), to an approximate depth of 6; and
- A deep geotechnical survey will be undertaken within the Array Scoping Boundaries only consisting of boreholes and deep CPTs.

1.1.1.5 The geotechnical surveys will cover both offshore Array Scoping Areas and along the potential ECR corridor options. Samples will be taken at approximately 1 to 2 km intervals along the full length of the potential export cable corridors. The specific vibrocore, CPT and borehole locations are not yet determined, but will be determined based upon the results of geophysical survey data acquired in 2021 and/ or 2022.

1.1.1.6 Coastal and Offshore Archaeological Research Services (COARS) were commissioned by the Company in March 2022 to provide archaeological consultant support for survey planning, including the preparation of a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) for the Proposed Development. The Proposed Development will include two offshore windfarms in the Irish Sea with a capacity expected to exceed 3GW.

1.1.1.7 The WSI and PAD are live documents that will be updated, for the benefit of works crews, as the project progresses and new evidence comes to light. In addition to this WSI, a separate desk-based assessment (DBA) of known archaeological assets within the Array Scoping Boundaries, Marine Archaeology WSA around each array, and along the ECR option corridors, which will inform the proposed survey and sampling strategy, has also been produced.

1.2 Location

1.2.1.1 The Proposed Development is located within the Irish Sea, covering license areas of approximately 320 km^2 for Morgan and 500km^2 for Mona. Morgan is situated to the north of Mona (**Figure 1**). A range of options for the Export Cable Routes (ECR) and landfalls are currently being explored for the Proposed Development. For Mona, a southernly ECR corridor towards the Bodelwyddan National Grid substation will be surveyed, while for Morgan a series of southeasterly ECR corridors towards the Penwortham National Grid Substation will be surveyed.

1.2.1.2 The 2022 site investigations will focus on the following areas:

- Mona and Morgan Bidding Areas (Array Scoping boundary in Figure 1);

- Within the zone of influence around each scoping area, referred to as the Marine Archaeology Wider Study Area (WSA) in Figure 1; and

- Along several Export Cable Route (ECR) corridor options, approximately 1.5km in width, within the Bodelwyddan and Penwortham Scoping Areas, extending from the bidding areas to 3m water depth at the coast.

1.3 Proposed 2022 Site Investigations

1.3.1.1 The proposed 2022 survey will occur within both English and Welsh waters. The following sample numbers are estimated.

1.3.1.2 Survey 1: shallow geotechnical and environmental survey of the bidding areas, the potential ECR corridor option areas and the zone of influence around the bidding areas consisting of a total of:

- 55 vibrocores in English waters and 45 vibrocores in Welsh waters along the ECR option corridor areas up to 6m deep, with a contingency of a further 55 vibrocores in English waters and 45 vibrocores in Welsh waters;

- 75 shallow PCPTs in English waters and 55 shallow PCPTs in Welsh waters along the ECR option corridor areas and 20 shallow PCPT in the Mona and Morgan Array Scoping areas, up to 6m deep, with a contingency of a further 75 shallow PCPTs in English waters and 55 shallow PCPTs in Welsh waters; and

- Approximately 215 benthic grabs across the bidding areas, zone of influences and along the ECR option corridor areas in both English and Welsh waters, with a contingency of a further 135 grabs across all areas.

1.3.1.3 Survey 2: deep geotechnical survey of the bidding areas consisting of a total of:

- 120 deep PCPT up to 60 m deep in the Array Scoping areas; and

- 35 deep boreholes up to 80 m deep in the Array Scoping areas.

1.4 Scope of the WSI and PAD

1.4.1.1 The Written Scheme of Investigation (WSI) outlines how potential impacts on known historic assets and their settings, and geophysical anomalies with archaeological potential, will be avoided, minimised or mitigated. To inform the WSI, a Desk Based Assessment (DBA) will be undertaken to identify any known historic assets within

area of impact from the proposed 2022 geotechnical site investigations. The methodology and data sources to be consulted during the DBA are laid out in this WSI.

1.4.1.2 The WSI also lays out a Method Statement concerning the handling and geoarchaeological assessment of material recovered from vibrocores and boreholes during the 2022 geotechnical investigations.

1.4.1.3 The Protocol for Archaeological Discoveries (PAD) clearly sets out the protocols and procedures that must be followed in the event of any unexpected archaeological discoveries whilst undertaking any activities that disturb the seabed. The WSI and PAD incorporate all current and relevant guidance (The Crown Estate 2010; 2014; 2021).

1.4.1.4 The Developer is responsible for the implementation of this WSI and PAD.

1.4.1.5 Any specific and targeted data acquisition commissioned for the proposed development will be archaeologically assessed by COARS and, if relevant, will be added to the WSI and PAD, including any revisions or additions, as deemed necessary, to the Archaeological Exclusion Zones (AEZs) outlined below.

2 Written Scheme of Investigation

2.1 Aims and Objectives

2.1.1.1 The primary aim of this WSI is to reduce the potential risks of impact (direct and indirect) by optimising survey programmes to best support archaeological analysis and interpretation in a timely way to inform project planning, design and delivery.

2.1.1.2 The aim of an AEZ is primarily to provide in-situ protection to sites (e.g. wreck of vessel or aircraft), and therefore exclude all activities within the exclusion zone thereby protecting archaeological and potential archaeological assets from accidental damage.

2.1.1.3 The potential risks to historic assets will be mitigated using site-specific AEZs which specify the extent of each exclusion zone to avoid all known and potential cultural heritage receptors.

2.1.1.4 With reference to the Model Clauses for Written Schemes of Investigation (The Crown Estate 2010; 2021) the objectives of this WSI are:

- to set out the scope of works of the Proposed Development;
- to propose measures for mitigating effects upon any archaeological material that may be encountered during seabed disturbing activities; and
- to identify and establish the position and extent of any AEZs.

2.2 Geoarchaeological Assessment Aims and Objectives

2.2.1.1 As part of the proposed measures for mitigating effects upon any archaeological material, the objective of the method statement for handling and geoarchaeological assessment of geotechnical samples is:

- To provide a methodology whereby the initial collection and retention of geotechnical cores is done so in a manner that will not compromise the archaeological assessment.; and
- To provide methods for undertaking Stage 1 and Stage 2 geoarchaeological assessments on the cores including assessment of Optically Stimulated Luminescence (OSL) dating potential.

2.2.1.2 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 2011) 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;
- To compliment, and enhance, other datasets being archaeologically assessed (e.g. marine geophysics) and advance the development of a site-wide deposit / ground model;

- 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.

2.2.1.3 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.

3 Desk Based Assessment Methodology

3.1.1.1 The Desk Based Assessment will be completed in accordance with professional standards and guidance. The objectives of this assessment will be:

- to set out the statutory, planning and policy contexts relating to the historic environment for UK territorial waters;

- to provide an overview of the historic environment within the Mona and morgan Array Scoping Boundary, a Marine Archaeology WSA around each Scoping Boundary, and ECR corridor options within the Penwortham and Bodelwyddan Scoping Areas, based on existing archaeological records and secondary sources; and

- to highlight known maritime sites that may be impacted by the proposed 2022 site investigations, with reference to:

    - shipwrecks, crashed aircraft and wreck material;
    - submerged prehistoric sites and artefacts, and
    - areas of archaeological potential.

3.2 Legislative Framework and Guidance

3.2.1.1 As the 2022 site investigations will be located in English and Welsh waters, the assessment will take account of the following national and international legislative procedures and guidelines. Specific legal requirements within certain acts, relating to historic assets, are explained in Appendix 1.

UK

- Protection of Wrecks Act 1973;
- Protection of Military Remains Act 1986;
- National Heritage Act (1983) amended 2002);
- Marine and Coastal Access Act 2009;
- Merchant Shipping Act 1995;
- Burial Act 1857;
- Ancient Monuments and Archaeological Areas Act 1979;
- UK Marine Policy Statement (HM Government 2011);
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017;
- Welsh National Marine Plan (2019);
- National Heritage Act 1983 (amended 2002);
- Historic Environment (Wales) Bill (2016);
- Planning Policy Wales (PPW) Chapter 6: The Historic Environment (2018);
- Planning Policy Wales Edition 7 (July 2014); and
- Technical Advice Note (TAN) 24: The Historic Environment.

International

- European Convention on the Protection of the Archaeological Heritage (Valetta) 1992;
- UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001);
- United Nations Convention on the Law of the Sea (UNCLOS) 1982;
- International Council of Monuments and Sites (ICOMOS) Charter on the Protection and Management of Underwater Cultural Heritage (1996) (the Sofia Charter);
- The European Convention of the Archaeological Heritage of Europe (Revised) 1992; and
- The World Heritage Convention.

3.2.1.2 This DBA will be compiled in line with industry best practice and the relevant offshore renewables and marine historic environment guidance. These include:

- Chartered Institute for Archaeologists (CIfA) guidelines: Standard & guidance for archaeological desk-based assessment (2014);
- Cadw guidance on Caring for Coastal Heritage (1999);
- Cadw Conservation Principles (2011);
- Joint Nautical Archaeology Policy Committee (JNAPC) code of practice for seabed development (1998);
- COWRIE Historic environment guidance for the offshore renewable energy sector (2007);
- COWRIE Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (2008);
- COWRIE Guidance for offshore geotechnical investigations and historic environment analysis: guidance for the renewable energy sector (2011);
- Historic Environment Advice Note: Commercial Renewable Energy Development and the Historic Environment (2021);

- The Crown Estate (2014). Offshore renewables protocol for archaeological discoveries; and
- The Crown Estate (2021). Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects.

3.3 Desk Based Assessment Sources

3.3.1.1 The DBA will incorporate documentary and cartographic searches utilising a variety of sources to locate all known cultural heritage assets, and to identify the archaeological potential of the area. These include:

UK-wide

- UK Hydrographic Office Data (UKHO);
- National Monuments Record of Wales (NMRW);
- National Record of the Historic Environment (NRHE);
- Records held by the Archaeology Data Service (ADS);
- Merseyside Historic Environment Record;
- Lancashire Historic Environment Record;
- Clwyd-Powys Historic Environment Record;
- National Trust HBSMR;
- Isle of Man Historic Environment Record;
- Marine Environment Data Information Network (MEDIN);
- British Geological Survey regional guide and previous work in the area;
- Readily accessible published sources and grey literature (e.g. results from previous studies);

International

- European Marine Observation and Data Network (EMODnet);
- OceanWise Wrecks and Obstructions database; and

- Wrecksite.eu website.

3.3.1.2 The DBA will include all known and potential maritime cultural heritage assets, identified during the assessment. Records located within the areas under consideration for the 2022 site investigations will be assigned a unique University of Southampton number using the abbreviation (**UoS**) for ease of identification.

4 Assessment of proposed geotechnical sampling locations

4.1.1.1 All benthic sampling will adhere to the proposed AEZs (see Section 5 , as supplied to the contractor and detailed within the DBA, but will not require an additional archaeological assessment of the proposed coring locations. Any archaeological discoveries made through the benthic sampling will adhere to the proposed Protocol for Archaeological Discoveries (PAD; see Section 7

4.1.1.2 Each of the proposed vibrocore and borehole locations for the 2022 geotechnical site investigations will be subject to an archaeological assessment of the seabed using available datasets.

4.1.1.3 A 50m buffer will be set around each proposed sampling location and compared with the existent archaeological record detailed within the DBA. This will include a consideration of any AEZs that have been created around known historic assets (see below).

4.1.1.4 An assessment of each proposed coring location will also be undertaken based upon the marine geophysical datasets collected in 2022, consisting of Multi-Beam Echo Sounder, Side Scan Sonar, Sub-bottom profilers and Magnetometer Surveys.

4.1.1.5 This dataset will also be supplemented by other available marine geophysical datasets including:

- Data collected during 2021 for the Proposed Development bidding areas;
- Celtic Array (Zone 9) 2010 MMT Survey[1] Bathymetry; and

[1] https://www.marinedataexchange.co.uk/details/2651/2010-mmt-zone-9-celtic-array-geophysical-bathymetry-and-environmental-surveys/packages

- UKHO Civil Hydrography Programme Bathymetry, including surveys HI1571 (2020), HI1376 (2013), HI1572 (2019) and HI1408 (2020).

4.1.1.6 Geophysical assessment will be undertaken utilising the programs Coda Octopus Survey Engine 4.3 and ArcGIS 10.8. Side Scan Sonar (SSS) and Sub-Bottom Profiler (SBP) data will be analysed within the former, with the positions of surface and sub-surface anomalies exported in shapefiles and uploaded into ArcGIS alongside processed magnetometer and bathymetry data, following the guidelines of Plets et al. (2013).

4.1.1.7 The geophysical data will be assessed for geophysical anomalies with archaeological potential, with selection based upon the presence of multiple lines of evidence (confirming datasets). Anomalies will be defined based upon their potential to be of archaeological interest classified using the following criteria:

- No potential: features such as boulders or known (and often mapped) anthropogenic features such as cables, anchorages, etc.;
- Low potential: usually identified by a single geophysical dataset (typically magnetics and/or SSS) that suggest an anthropogenic feature that may have archaeological significance and that differs in character from those designated as having no potential;
- Medium potential: typically identified by multiple geophysical datasets, and strongly suggestive of the presence of anthropogenic feature(s) which may be of archaeological interest, but cannot be visually identified or classified (e.g. cannot be positively identified as a wreck); and
- High potential: typically identified by multiple geophysical datasets and can be positively identified as being an archaeological site (e.g. wreck) or of archaeological interest.

4.1.1.8 Each anomaly will be cross-referenced between the different datasets, assigned a unique identification code, have its position recorded and a description of the anomaly made. of the proposed coring locations.

4.1.1.9 Any known and located historic assets, identified within the DBA, and geophysical anomalies identified as being of high, medium or low archaeological potential will

be protected through the imposition of an AEZ (see below) around each asset considered at risk.

4.1.1.10 The suggested extent of the AEZ is the radius of a circle centred on the given location and based upon the available geophysical data for each anomaly, including the lateral distribution of visible features, extent and direction of scour, and likelihood for debris spread away from the site.

4.1.1.11 A shapefile / CAD file will be provided to the Company containing the identified anomalies, along with any AEZs and recommendations. All intrusive works will then be moved outside of the AEZs to an alternative “clear” area.

5 Archaeological Exclusions Zones

5.1.1.1 The methodology for this WSI is to adopt the precautionary principle and impose AEZs around all known historic assets identified within the DBA.

5.1.1.2 Known historic assets which may be affected by the Proposed Development have been identified in the DBA. These will be protected by the imposition of an AEZ around each asset considered at risk.

5.1.1.3 AEZs will apply to any activities that may disturb the seabed, within which all development-related activities will be prohibited. Their locations and extent will be agreed in advance with curatorial authorities. The location and conditions of the AEZs will be conveyed to all teams involved in any such works.

5.1.1.4 The size of each AEZ has been designed to encompass all debris/ structure visible on the seabed, with an added dimension to adequately protect both potentially buried remains and the potential for mobile debris associated with the direction (and extent) of the scour (if known/ recorded).

5.1.1.5 The location, extent and number of AEZs will be monitored and may be revised throughout the project as new evidence comes to light, most notably through the acquisition of geophysical survey data.

5.2 Monitoring of AEZs

5.2.1.1 The effectiveness of any AEZ will be periodically monitored by the **Archaeological Consultant** in consultation with the **Site Champion** (see **Section 7.4** below). If deemed necessary by concerns raised by the **Site Champion**, such as one or more

incursions into an AEZ or repeated finds of archaeological material without the establishment of AEZs, this situation may be re-evaluated by periodic visits to the vessels by the **Archaeological Consultant**.

5.2.1.2 No operations that disturb the seabed will be undertaken within an AEZ. If it becomes apparent that intrusive activities have taken place within an AEZ, the party responsible will obtain advice from the **Archaeological Consultant** in accordance with their obligations with respect to the AEZ and the details of this WSI.

5.2.1.3 In the event that there is any incursion into an AEZ, the incursion will be fully investigated by the **Archaeological Consultant**, which may include further geophysical, ROV or diver survey, to determine if any identifiable heritage asset has been impacted, damaged or destroyed. The results of any investigation will be fully reported in a Technical Report, which will be submitted within two months of the investigations.

5.2.1.4 An archaeological report will be prepared to review whether there are still archaeological grounds for maintaining the AEZ. Any archaeological report on the AEZ will include recommendations regarding amendment of the extent, removal and/ or creation of new AEZs.

5.3 Establishing new AEZs

5.3.1.1 In the event that an unexpected archaeological discovery is made during the course of the works, either on the deck of a vessel or structure encountered on the seabed, all works will cease in the vicinity of the discovery and a temporary exclusion zone (TEZ) will be established. The TEZ will exclude all intrusive works in the vicinity of the find until further investigations have been concluded. Project-related work can, however, continue elsewhere.

5.3.1.2 At the earliest opportunity, any sub-sea gear should be lifted and examined for archaeological material. The occurrence will be recorded in the daily progress report or vessel log and a preliminary record should be completed, including the location of the vessel and the approximate location of the find (if different and known), together with photographs and/ or sketches of the find(s). Any finds should be stored in seawater in a suitable container without removal of any material or marine growths.

5.3.1.3 All related documentation should then be sent to the **Archaeological Consultant** who will provide advice on best practice. If deemed necessary, the archaeological consultant will notify, and will seek the advice of, the **Relevant Local and National Authorities**. If the finds are found to be of significant archaeological interest, prior to the recommencement of work in the area, further on-site investigations may be required, such as geophysical, ROV or diver surveys.

5.3.1.4 Following consultation, the **Archaeological Consultant** will advise on the status of the TEZ which will be either:

- converted into a permanent AEZ;
- revised or relocated; or
- removed.

5.3.1.5 The outcome will be conveyed to all works crews and navigational software will be updated accordingly.

5.4 Reporting and deliverables

5.4.1.1 On completion of any operations that disturb the seabed, if deemed necessary, a report may be compiled on the effectiveness of the AEZs, any alterations or additions to them, and the results of monitoring.

5.4.1.2 Reporting activities may include the results of archaeological assessment of serendipitous discoveries during works that impact the seabed, and the effectiveness, and implementation, of new exclusion zones. On completion of these works, an archaeological summary report may also be prepared to synthesise the results of any reports noted above that may arise throughout the course of the works. If a final archaeological report is deemed necessary, it will be submitted to the Relevant National Authorities within two months of the work and will address the following themes:

- Maritime sites and finds; and
- Palaeo-environmental and submerged prehistoric archaeology.

5.4.1.3 Reference to all archaeological assessment work will be made in any summary report which will consolidate the key results of the archaeological assessment undertaken upon completion of any works that disturb the seabed. Should a summary report be required, it will be delivered to the Relevant National Authorities,

and if relevant, to the Ministry of Defence (MoD) and the Receiver of Wreck (RoW), for consultation within two months of the completion of the works. This refers solely to summary reports; unexpected discoveries will be reported as appropriate at the time of discovery in accordance with the terms of the PAD (below).

5.4.1.4 Depending on outcomes, for example the discovery of unexpected archaeology, or possible incursions into AEZs, each element of work may give rise to one or more reports, the provision of which will be the responsibility of the **Developer** through their appointed **Archaeological Consultant**. Any reports will be delivered to the MMO and Natural Resources Wales, and circulated to the Relevant National Authorities, within two months.

6 Method Statement for collection and retention of geoarchaeological material

6.1.1.1 Following COWRIE guidance (COWRIE 2011), 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. These core logs will be compared against available sub-bottom seismic datasets to contextualise the records and establish which cores can best inform the evolving deposit / ground model. Recommendations are made to the Company 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 and their archaeological potential. . The results of the Stage 2 assessment will be used to enhance / refine the deposit / ground model, with recommendations for any Stage 3 assessment made, 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. The results of the Stage 3 assessment will be used to enhance / refine the deposit / ground model. 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. The results of the Stage 4 analysis will be used to enhance / refine the deposit / ground model. Stage 5 will proceed in the event that further publication of the findings is required.

- *Stage 5. Publication*.

6.1.1.2 The results of all the phases of the archaeological assessment undertaken will be used in to:

- Desccribe the sedimentary sequence and character of the deposits in the development area and create a relative chronology for them;

- Describe the palaeo-topography of the development area and past changes in its environment;

- Describe the archaeological potential of the deposits within the development area; and

- Inform the development of a deposit or landscape model of the development area.

6.1.1.3 For the purposes of this survey, a Stage 1 assessment will be undertaken to ensure that samples with archaeological potential are identified and can be safeguarded to permit future assessment and analysis. This involves the identification of suitable samples as well as their storage to ensure that future sampling, including OSL Dating, could be undertaken. This Method Statement relates to Stage 1 only, with additional method statements, relating to Stage 2 and subsequent stages, to be produced separately at a later date.

6.2 Guidance

6.2.1.1 This Method Statement has been drafted using archaeological and historic environment best practice guidance for offshore development, tailored to suit the specific circumstances of the Proposed Development, 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 (COWRIE 2011);
- COWRIE's Historic Environment Guidance for the Offshore Renewable Energy Sector (2007);
- The Crown Estate's Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects (2010a) 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; and
- Historic England's (2011) Environmental Archaeology.

6.3 Workflow

6.3.1.1 This section sets out two workflows for the geoarchaeological assessment of geotechnical samples. Multiple vessels will be in use for sample collection and the decision regarding workflows will be governed by operational constraints and vessel plans. The key difference between the workflows relates to whether cores will be split onshore or extruded offshore. It is anticipated that the vibrocores will be split onshore (see Option 1 Workflow) and borehole samples extruded offshore (see Option 2 Workflow). Sections of the vibrocores and boreholes with heightened geoarchaeological potential may be retained within their liners/Shelby tubes and split or extruded onshore (thereby following Workflow 1 from point 4 onward). Any such sections will be identified ahead of sample collection by the geoarchaeologist (Dr Michael Grant) following review of seismic profiles and other data, and agreements made with the Company and geotechnical contractors that these sections will be retained for onshore splitting or extrusion, and storage following Workflow 1.

6.3.1.2 This method statement allows for either situation, while ensuring that archaeological requirements are met. The Retained Archaeologist will provide advice to the Company and their geotechnical sub-contractors throughout the process to ensure that all archaeological requirements are met.

6.3.2 Option 1 Workflow:

1. A toolbox talk will be provided prior to vibrocore collection (ahead of mobilisation). This toolbox talk will include information on geoarchaeological requirements including those for OSL dating. This will include instruction on how to store cores/ samples.

2. Cores will be collected in plastic liners and stored according to this Method Statement (see Sections 6.4 and 6.5). Core collection will adhere to the Protocol for Archaeological Discoveries for Offshore Renewables Projects (ORPAD; The Crown Estate 2014) and Archaeological Exclusion Zones (AEZs).

3. Cores will be collected and stored onboard before being transported to the geotechnical laboratory onshore to permit splitting of cores and production of core logs.

4. Cores will be split and removed from linings and sub-samples taken for engineering purposes. The remaining core material will be kept intact in the plastic liners and will be wrapped in several layers of cling film and aluminium foil. Cores will be stored in a temperature-controlled environment.

5. Core logs will be provided to the Retained Archaeologist (COARS) for geoarchaeological review (Stage 1 geoarchaeological desk-based assessment). Any cores that could be suitable for OSL dating will be identified.

6. Samples identified as being of geoarchaeological interest on the basis of the geotechncial will be set stored under controlled conditions (see Section 6.4.7) to permit future geoarchaeological assessment (Stage 2 geoarchaeological recording)

7. Any Stage 2 and later Method Statements will be produced for agreement with the Company and the Relevant National Authority.

6.3.3 Option 2 Workflow:

1. A toolbox talk will be provided prior to sample collection. This toolbox talk will be conducted by a geoarchaeologist and 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.

2. Shelby tube samples will be collected and extruded on the vessel. Sample collection and extrusion will adhere to the Protocol for Archaeological Discoveries for Offshore Renewables Projects (ORPAD) (The Crown Estate 2014) and Archaeological Exclusion Zones (AEZs).

3. Sub-samples will be taken for engineering purposes.

4. 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 sample collection. Extruded sample sections will be sealed with wax where cohesive sections occur and bagged where extrusion results in cohesionless sediments.

5. Geotechnical logs will be provided to the Retained Archaeologist (COARS) for geoarchaeological review (Stage 1 geoarchaeological desk-based assessment). Any cores suitable OSL dating will be identified (note this will only be possible on cohesive material).

6. Samples identified as being of geoarchaeological interest on the basis of the geotechncial will be set stored under controlled conditions (see Section 6.4.7) to permit future geoarchaeological assessment (Stage 2 geoarchaeological recording)

7. Any Stage 2 and later Method Statements will be produced for agreement with the Company and the Relevant National Authority.

6.4 Methods for Core Collection, Splitting, Recording, Storage and Access

6.4.1.1 The extraction of boreholes and vibrocores will result in samples which may be of archaeological interest, while CPT logs can provide information regarding sediments in the area of interest which can feed into archaeological deposit models and palaeolandscape reconstructions.

6.4.2 Toolbox talks

6.4.2.1 A toolbox talk with the on-site Proposed Development geotechnical contractors will take place prior to the commencement of the geotechnical core splitting or extrusion. These toolbox talks would be provided alongside a briefing on the

ORPAD (The Crown Estate, 2014) which refers to locations of AEZs which vessel crews must adhere to. The toolbox talk will be delivered through a teleconference, in a similar manner to previous toolbox talks delivered by COARS for example as part of the 2021 Proposed Development survey. This 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. The toolbox talk will also contain information on the storage of samples to retain their OSL potential. The talk will be recorded, permitting repeat viewing by attendees as well as rapid dissemination to different teams working with the core material (such as vessel staff and laboratory teams) if they are unable to attend the initial Toolbox Talk. For any teams following the Option 2 workflow there will be additional focus on the identification of deposits of geoarchaeological interest such as those set out in Section 6.4.10 , in order that the geotechnical teams can identify such deposits as borehole samples are extruded and retain the samples for geoarchaeological assessment following storage procedures set out in Section 6.4.9 .

6.4.3 Core data and recovery

6.4.3.1 Contractors undertaking the vibrocore, borehole and CPT testing will be made aware of any AEZs and will follow the PAD.

6.4.4 Vibrocores

6.4.4.1 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 and Export Cable Route areas. 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.

6.4.4.2 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.

6.4.5 Boreholes

6.4.5.1 Borehole investigations will result in the recovery of physical samples. The primary purpose of these samples is to confirm ground conditions and geotechnical

properties within the Array Scoping Areas. Laboratory testing on the samples will include stiffness, shear strengths, swelling characteristics, thermal conductivity and electrical conductivity.

6.4.5.2 Borehole samples will be taken offshore extending to depths of up to a maximum of 80 m below seabed level in the array Scoping Areas. Samples will be recovered within Shelby tubes and extruded onboard the vessel. In the event that undisturbed samples are required for geoarchaeloligcal assessment, Shelby tubes shall be sealed with pucks and capped at the top and bottom and transferred to the laboratory for processing. Samples will primarily be extruded from the Shelby tubes in the offshore vessel laboratory following Workflow Option 2.

6.4.5.3 A small number of sections may be retained for geoarchaeological assessment. These sections will be retained in Shelby tubes in 1m long sections. The ends of the Shelby tube will be sealed with pucks and capped; the Shelby tubes comprise of metal cylinders and negate the requirement to be wrapped in opaque cling film to ensure light shielding. They will be stored on the vessel in a cool, dark temperature-controlled environment. This material will then be transported, intact, to onshore laboratory following workflow Option 1.

6.4.6 CPT logs

6.4.6.1 The CPT is an in-situ method of measuring the resistance of the soil. A metal cone will be pushed into the ground at a constant rate of speed and measurements of cone resistance and sleeve friction will be recorded electronically with load cells. No samples will be recovered by the CPT.

6.4.6.2 Although CPT testing does not result in a sediment sample, measured parameters from the CPT can indicate soil type and boundaries between sediment layers. Data from CPT tests can be used by archaeologists in the creation and validation of deposit models.

6.4.7 Core treatment, splitting and storage

6.4.7.1 Samples will either be extruded or split offshore and will therefore follow either Workflow Option 1 or Option 2.

6.4.7.2 All samples will be treated as per the guidance set out within Model Clauses for Archaeological Written Schemes of Investigation (The Crown Estate, 2010) 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 where light and air cannot reach them, as per guidance set out in Environmental Archaeology (Historic England 2011). While offshore, all cores will be kept at the vessel in a temperature-regulated isolated area kept away from frost and sunlight with consolidated material and cores in an upright position (equal to the way they were sampled). When disembarked from the vessel the cores will remain in a temperature regulated environment away from frost and sunlight in an upright position (equal to the way they were sampled), as on the vessel.

6.4.8 Core splitting following Workflow Option 1

6.4.8.1 Liners should 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. Alternatively, a router or fein saw can be used to cut through the plastic liner with minimal disturbance to the sample itself. The core would then be carefully opened longitudinally, with one half 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.

6.4.8.2 Conducting liner splitting and imaging in normal light conditions assists in the siting of sampling locations for the full range of laboratory analyses (including OSL dating), identifying areas of fracture to be avoided in OSL dating sampling, and is fundamentally safer.

6.4.8.3 Half cores will be retained and stored for geoarchaeological review and OSL dating sampling. Split cores 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. Cores should be kept in a cool, dark, temperature-controlled environment. These storage conditions will facilitate OSL analysis on any suitable core material.

6.4.9 Push sample extrusion onshore following Workflow Option 2

6.4.9.1 Borehole samples will be extruded offshore, with the exception of any sections identified as of geoarchaeological interest. In the latter case these sections will be sealed with pucks and capped at either end and stored on the vessel in a cool, dark temperature-controlled environment. These sections will then be transported back to onshore labs for splitting following the method set out in Section 6.5.4 For borehole samples extruded offshore deposits of potential geoarchaeological interest will be identified by the geotechnical contractor following the information set out in the toolbox talk conducted prior to core collection. Core samples will be bagged where the extruded sample is cohesionless. Samples will be transported onshore and geotechnical logs will undergo the Stage 1 geoarchaeological assessment, as set out in Section 6.5 .

6.4.10 Recording

6.4.10.1 Recording will be undertaken by the geotechnical contractor, using Eurocode 7, to describe sediments. Any additions to this will be to British Standard 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:

- 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.

6.4.10.2 The presence of any of the above features or inclusions should be noted within the core log, where observed.

6.4.10.3 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.

6.4.10.4 All samples 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.

6.4.10.5 Geotechnical logs and photographs will be provided to COARS for geoarchaeological assessment. As soon as the first sample core logs become available, these will be provided to COARS. 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.

6.4.10.6 The retained archaeologist will work with the geotechnical contractor to ensure core recording is carried out to an acceptable standard to facilitate geoarchaeological assessment. COARS have experience working with geotechnical contractors to ensure this, having overseen this methodological approach on a number of other OWF, providing additional training and close guidance (where required) to ensure these standards were met.

6.4.11 Core retention and access

6.4.11.1 Following their removal from the vessel all cores and core samples will be kept at the contractor's premises for the duration of the geoarchaeological assessment. All cores and samples will be retained for Stage 1 archaeological assessment and later stages of investigation if the Stage 1 assessment identifies a need for further work. Stage 1 will be completed within 9 months of the end of core collection if possible.

6.4.11.2 The core samples identified as having archaeological potential will be retained to permit future Stage 2 geoarchaeological recording, using the same storage recommendations stated in Section 6.4.7 . The timing and extent of any Stage 2 assessments will be agreed with the Relevant National Authority. Samples will not be discarded until the Relevant National Authority has approved the results of the assessment and/ or analysis. Following the production and acceptance of the Stage 1 report by the archaeological curator, any cores not recommended for further assessment and/ or analysis may be discarded.

6.5 Methods for Geoarchaeological Review of Geotechnical Data

6.5.1 Geotechnical Survey and Stage 1 Geoarchaeological Assessment

6.5.1.1 Following workflow Option 1 half cores will be retained for geoarchaeological assessment. Samples from the borehole campaign will either follow Option 1 (where restricted sections are identified as of geoarchaeological interest based on assessment of seismic data prior to core extrusion) or will follow Option 2 where extruded offshore.

6.5.1.2 Stage 1 review will be undertaken on the logs for these cores, and will seek to identify cores which can potentially provide information on the following areas:

- Cores containing sediments that can be related to a pre-marine transgression period at the end of the Pleistocene/ beginning of the Holocene;
- 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 Irish 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;
- Boreholes that sample Pleistocene deposits that are associated with terrestrial/ coastal sediment deposition;
- Cores likely to contain ecofacts that can be used to reconstruct the past environment; and
- Material suitable for dating (radiocarbon and OSL).

6.5.1.3 At the completion of the geotechnical survey, the geoarchaeologist will advise the Client which cores may have (geo-)archaeological potential and should be retained to permit Stage 2 geoarchaeological recording. This procedure is in accordance with the Guidance on Offshore Geotechnical Investigations and Historic Environment Analysis (COWRIE, 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).

6.5.2 Assessment of core material suitable for OSL Dating

6.5.2.1 Following the geoarchaeological review of the core logs, a separate consideration will be given to the sedimentary genus of each sample and suitability for OSL dating. Those samples of aeolian or waterlain origin will be prioritised, whilst those of sub-glacial origin will be avoided.

6.5.2.2 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.

6.5.2.3 It should be noted that it is unlikely that the restricted number of boreholes to be extruded offshore (following workflow Option 2) will retain their OSL potential due to the methods for extrusion. However, any sections of boreholes identified as being of geoarchaeological interest which will undergo splitting following workflow Option 1 would retain their OSL potential.

6.5.3 Reporting

6.5.3.1 A report will be produced summarising the results of the Stage 1 geoarchaeological desk based assessment, with recommendations for any Stage 2 geoarchaeological recording, including recommendations for samples that might be suitable for OSL dating. Following sign off by the Client, the recommendations and report will be finalised and submitted to the Relevant National Authorities for review within 3 months of the completion of the Stage 1 assessment. Following Stage 1 assessment, any samples that are assessed as being of no geoarchaeological interest can then be disposed of by the Client.

6.5.3.2 The extent of any Stage 2, 3 and 4 investigations would be based upon the Stage 1 recommendations and would be discussed in conjunction with COARS and the

Client. Method statements for Stage 2 and later works will be provided following the Stage 1 reporting.

6.5.4 Timeframes

6.5.4.1 The first core logs will be provided to COARS within 48 hours of production to ensure that any necessary amendments to the recording strategy can be incorporated into later logs.

6.5.4.2 All final core logs will be provided to COARS no later than one month after the end of the geotechnical campaign.

7 Protocol for Archaeological Discoveries

7.1 Scope

7.1.1.1 The protocol for archaeological discoveries (PAD) sets out best practice in the reporting of finds of archaeological interest discovered during the proposed works (**Appendix 2**). It is based on professional guidance for PADs (The Crown Estate 2014). The principles that are set out here are intended to address archaeological mitigation measures identified during the previous archaeological assessments of the development, and the approach to any further finds of archaeological interest.

7.1.1.2 The objectives of the PAD are:

- to set out the respective responsibilities of the **Company**, their **Contractors (Gardline** and **Fugro Ltd)**, and the **Archaeological Consultant** prior to and during any works that disturb the seabed;
- to include contact details and formal lines of communication between the parties and with archaeological curators;
- to clearly set out the protocols and procedures that must be followed in the event of any unexpected archaeological discoveries;
- to ensure that, in the event of unexpected archaeological discoveries being made, appropriate archaeological input, review and recording is undertaken.

7.1.1.3 The responsibility for implementing this PAD rests with the **Company**. This must include the engagement of the **Archaeological Consultant** to provide briefings to all relevant project contractors (and sub-contractors) in the use of the PAD and its implications.

7.2 Types of finds

7.2.1.1 'Finds' here are considered to mean all forms of artefact that can be found on the seabed. To be an artefact, the item must have been made, modified, used or transported by humans; i.e. their presence on the seabed is 'artificial' or 'cultural' rather than 'natural'.

7.2.1.2 For legal purposes, finds from the seabed fall into two categories. 'Wreck' has a specific legal definition broadly encompassing all sorts of materials that come to be on the seabed as a direct result of once being aboard or part of a vessel. Statutory law relating to 'wreck' is set out principally in the Merchant Shipping Act 1995, applicable to territorial waters out to twelve nautical miles. The common law relating to wreck is to be found in legal cases and commentaries.

7.2.1.3 All other finds are referred to as 'non-wreck'. 'Non-wreck' includes things such as prehistoric flint artefacts that were lost on land that has since been inundated by rising sea level, or artefacts that have been eroded from sites on the shore. The law applicable to 'non-wreck' is largely common law, to be found in legal cases and commentaries.

7.2.1.4 Any wreck recovered beyond UK territorial waters, but then brought into UK territorial waters, must be reported to the **RoW** under the terms of the Merchant Shipping Act 1995.

7.3 Circumstances of discovery

7.3.1.1 This PAD addresses finds of archaeological interest made in the following circumstances:

- Discoveries on the seabed during seabed inspections and investigations, seabed clearance or scheme installation;
- An anomaly that has been encountered on the seabed such as possible wreck or cultural heritage features identified during geophysical, geotechnical, Remotely Operated Vehicle (ROV) or diver surveys; or
- A find of archaeological interest made on a works vessel, for example wreck or objects recovered to the deck during geotechnical sampling or caught in equipment such as grapnels, anchors, or ploughs.

7.4 Terms of roles

7.4.1.1 This section defines the terms and roles with responsibility for ensuring compliance with the PAD (see below). The specific details of the individuals who will fill these roles will be confirmed and distributed in advance of the commencement of any project works that might disturb the seabed.

7.4.1.2 The **Company** will draw the attention of the **Contractor** to the potential for archaeological material to be found in the course of their works and will inform them of the possible importance of such finds. Key operational staff will be identified and must be briefed by the **Archaeological Consultant** on the operation of the PAD prior to the commencement of such works.

7.4.1.3 This PAD anticipates discoveries being made by the **Contractor**, who reports to the **Site Champion** (client representative on board works vessel), who then reports to the **Nominated Contact** (shore-based representative of the Developer). The **Nominated Contact** will then liaise with the appointed **Archaeological Consultant** to provide details of a reported discovery. The **Archaeological Consultant** will assess the nature of the appropriate action to be taken, and whether to contact the **Relevant National Authorities**, in this case Historic England (HE) and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW). The **Archaeological Consultant** will also brief the **Site Champion** on the types of archaeological finds and features that may be encountered. The responsibilities for each role are outlined below.

7.4.2 Nominated Contact

7.4.2.1 The **Nominated Contact** will be the contractor's shore-based point of contact for all communications regarding archaeological discoveries. The **Nominated Contact** will be issued with a copy of this document.

7.4.3 Site Champion

7.4.3.1 The **Nominated Contact** will identify a **Site Champion** (who will be the Client Representative of the **Company)** to act as a first point of contact for staff, and to liaise with the **Nominated Contact** in respect of the implementation of the PAD. The **Site Champion** will be issued with a series of preliminary record sheets and flow charts (see **Appendix 3**) setting out the actions to be taken in the event that an archaeological discovery is made either on the seabed or on the deck of the vessel. The **Site Champion** will report to the **Archaeological Consultant** via the

Nominated Contact; the **Archaeological Consultant** will check the necessary documentation before taking the appropriate action.

7.4.4 Archaeological Consultant

7.4.4.1 The **Archaeological Consultant** will be the initial point of contact for the **Nominated Contact**. They shall:

- Brief the **Site Champion** on the nature of archaeological finds and features and appropriate measures for interim conservation and safe storage;
- Advise on the identification of finds and features and, if possible, the character of their seabed locations;
- Advise on material conservation of any recovered finds;
- Agree appropriate actions to be taken; and
- Where appropriate, pass on all details and records associated with any discoveries to the **Relevant National Authorities**

7.4.5 Relevant National Authorities

7.4.5.1 Historic England (HE) and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) are the respective **Relevant National Authorities** for archaeology and heritage for territorial waters in this part of England and Wales respectively. In the event of an unexpected discovery of a find of archaeological significance, the **Archaeological Consultant** may consider it necessary to inform these authorities. Should this be necessary a representative from the **Relevant National Authorities** will be asked to:

- Liaise with other relevant archaeological authorities;
- Advise on proposals to further evaluate any finds; and
- Advise on proposals to mitigate the effects of work activities upon any finds.

7.5 Actions following discoveries on the seabed and on the deck of a works vessel

7.5.1.1 The following presents the actions to be taken in the event of an archaeological discovery during any project activities that disturb the seabed. The preliminary

record sheets and flow charts illustrating the actions to be followed are presented in **Appendix 3**.

7.5.2 Actions by the Contractor

7.5.2.1 If a find is discovered on the deck of a vessel or an anomaly or structure has been encountered on the seabed, the **Contractor** shall inform the **Site Champion**. The **Site Champion** will examine any archaeological material and will, as soon as possible after it has been discovered, arrange for sub-sea gear to be lifted and examined to see if any archaeological material is recovered with it. The reporting should be accompanied by a completed Preliminary Record Form (**Appendix 3**11

7.5.3 Actions by the Site Champion

7.5.3.1 Where it is possible to identify the position from which the find originated, the **Site Champion** will impose a temporary exclusion zone (TEZ) in the vicinity of the discovery within which intrusive works will cease until further investigations have been concluded. Works can, however, continue in an alternative location. The feedback and advice of the **Archaeological Consultant** will be sought through the **Nominated Contact** and will be available throughout ground-disturbance works in order to provide the necessary response required during any activity that disturbs the seabed.

7.5.3.2 The **Site Champion** shall record the occurrence as soon as possible in the Daily Progress Report or vessel log together with the time and exact vessel position. Where possible, the report entry should include a close approximation of the original position of the anomaly on the seabed. Additionally, the **Site Champion** shall ensure that the TEZ, is marked on navigational software, site drawings and survey charts. The **Site Champion** shall compile a preliminary record of the occurrence for discoveries both on the seabed and on the deck of the vessel.

7.5.3.3 The **Site Champion** shall inform the **Nominated Contact** of the occurrence as soon as possible and pass on all available information, including a copy of the preliminary record and copies of any photographs, drawings or other relevant records. If any finds have been recovered, the **Site** Champion shall arrange for them to be stored in seawater in a suitable clean container, which should be covered. Any rust, concretion or marine growth should not be removed. The flow charts in **Appendix 3** present the procedures to be followed in the event of a discovery.

7.5.4 Actions by the Nominated Contact and Site Champion

7.5.4.1 Once informed of a find by the **Site Champion**, the **Nominated Contact** will confirm with the **Site Champion** that all the details set out in the preliminary record are comprehensive and correct. The **Nominated Contact** shall ensure that any find is appropriately assessed and documented for the **Archaeological Consultant** who will, if deemed necessary, report the find to the **Relevant National Authorities.**

7.5.4.2 The Nominated Contacts will be:

- Simon Dykes: simon.dykes@se1.bp.com; +62 818 813 060
- Matthew Garratt: matthew.garratt@uk.bp.com; +44 7771 731402

7.6 Contact the Archaeological Consultant

7.6.1.1 The **Nominated Contact** will approach the **Archaeological Consultant** who will offer advice on the nature of any discoveries and appropriate action to be taken. The feedback and advice of the **Archaeological Consultant** will be sought through the **Nominated Contact** and will be available throughout ground-disturbance works in order to provide the necessary response required.

7.6.1.2 The Archaeological Consultant is:

- Dr Michael Grant, COARS
- +44 7584 610302
- M.J.Grant@soton.ac.uk

7.6.1.3 The **Archaeological Consultant** will discuss and agree the appropriate action to be taken, will process all records, and if deemed necessary, will provide a summary report for any discoveries.

7.7 Contact the Relevant Local and National Authorities

7.7.1.1 Should the **Archaeological Consultant** consider it necessary, the **Relevant National Authorities** will be consulted by the **Archaeological Consultant** for further advice. If necessary, all available information relating to the circumstances of the occurrence, including a copy of the preliminary record and copies of any photographs, drawings or other records that have been made will be passed on to the **Relevant National Authorities.**

7.7.1.2 The contact details for the Relevant National Authorities are:

Historic England	**RCAHMW**
Floor 4 The Atrium Cannon Bridge House 25 Dowgate Hill London EC4R 2YA	Ffordd Penglais Aberystwyth SY23 3BU

mpuconsultation@HistoricEngland.org.uk	Contact: Dr Julian Whitewright +44 (0) 1970 621200 julian.whitewright@rcahmw.gov.uk

7.8 Advise other teams/vessels working on the site

7.8.1.1 In the event that a find is considered to be of possible archaeological significance, a temporary exclusion zone (TEZ) may be established. This will protect the identified potential heritage asset while its significance is fully assessed.

7.8.1.2 Where a TEZ has been imposed, the **Site Champion** shall inform other vessels working in the area. Those vessels shall be advised by the **Nominated Contact** to stay alert for anomalies and finds.

7.9 Establishing new AEZs

7.9.1.1 Once a TEZ has been established and the significance of the historic asset it protects determined, it may be necessary to maintain this exclusion zone. If the historic asset is shown to be of archaeological significance the TEZ may be converted into a new AEZ. This decision will be taken by the **Archaeological Consultant** in consultation with the **Relevant National Authorities**, for any marine works seaward of MHWS.

7.10 Altering AEZs

7.10.1.1 If archaeological material is discovered during the works, then AEZs may be altered (enlarged, reduced, moved or removed) as a result. These discoveries might include material recovered on survey equipment or evidence from boreholes. Any alteration will be defined by the **Archaeological Consultant** in consultation with the **Relevant National Authorities** and will be issued to each works vessel by the **Nominated Contact** through the **Site Champion.**

7.11 Finds recovered within the UK 12nm limit

7.11.1.1 The **Nominated Contact** shall make any recovered finds available for inspection by the relevant authority. If the find is, or appears to be 'wreck', or associated material, the **Nominated Contact** shall give notice to the RoW as soon as possible that a find has been recovered in accordance with Section 236(1) of the Merchant Shipping Act 1995. **This is a legal requirement**. This clause also applies to finds

recovered outside territorial waters that are subsequently brought into territorial waters.

7.12 Reporting and archiving

7.12.1.1 Archaeological reports produced as a result of this WSI and PAD, will be sent for review to the **Relevant National Authorities** prior to finalisation, and deposition in identified local and/ or national archives. Similarly, any summary reports produced as a result of the agreed WSI, or through implementation of the PAD, will be sent as draft reports for agreement.

7.12.1.2 The **Archaeological Consultant** will be responsible for ensuring that copies of any archaeological assessment or summary reports are deposited with the National Record of the Historic Environment (NRHE) and/ or the National Monuments Record of Wales (NMRW).

7.12.1.3 An Historic England OASIS (Online Access to the Index of archaeological investigations) form with a digital copy of the report will be submitted within three months of completion of construction of the authorised scheme. The **Relevant National Authority** will be notified that the OASIS form has been submitted to the NRHE within 10 working days of the submission. Guidance for archiving digital outputs in Britain can be found on the Archaeological Data Service website:

https://archaeologydataservice.ac.uk/advice/DepositingData.xhtml

7.12.1.4 Any samples, finds or objects of cultural heritage interest that may be recovered during the project works will be handled and stored in the appropriate manner under the guidance of the **Archaeological Consultant**, in consultation with the curators and staff from the receiving institution. All subsequent decisions regarding the handling, transport and storage of retained finds will be agreed with the **Archaeological Consultant** in consultation with the **Relevant National Authorities** and the relevant staff from the allocated receiving institution. The relevant local and national curatorial bodies will receive the draft technical reports regarding discoveries to support determination of any subsequent action.

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9 Appendix 1: Legal Terms and Responsibilities

9.1 Legal Terms and Responsibilities

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

Merchant Shipping Act 1995. This Act is not a form of designation, but will affect offshore renewable energy schemes if, in the course of site investigations or construction, any material is recovered which falls within the definition of 'wreck'. All wrecks have an owner, and the Merchant Shipping Act sets out the procedure for returning recovered wreck to the owner or their successor. The Receiver of Wreck has to be notified of all recovered wreck landed in the UK and will seek to identify the original owner so that it can be claimed. Ownership of unclaimed wreck from within territorial waters vests in the Crown or in a person to whom rights of wreck have been granted. Unclaimed wreck from beyond territorial waters is returned to the finder. The Receiver of Wreck has a duty to ensure that finders who report wreck receive an appropriate salvage payment. In the case of material considered to be of historic or archaeological importance, a suitable museum will be asked to purchase the material at the current market valuation. The finder will receive the net proceeds of the sale as a salvage payment. If the right to, or the amount of, salvage cannot be agreed, either between the owner and finder or between competing salvors, the Receiver of Wreck will hold the wreck until the matter is settled, either through amicable agreement or by court judgement.

Protection of Military Remains Act 1986. The primary purpose of The Protection of Military Remains Act is to protect the resting places of military personnel from unauthorised disturbance. It allows the Ministry of Defence (MOD) to protect vessels and aircraft that were in military service when they were lost or wrecked. The MOD can designate any such named vessel lost after 4 August 1914 as a 'protected place' even if the position of the wreck is not known. In addition, the MOD can designate a 'controlled site' any such wreck whose position is known. Access is not prohibited at a 'protected place', but it is an offence to tamper with, damage, move or remove items from such a wreck without a licence. However, access, salvage and excavation are all prohibited on 'controlled sites', except where a licence for restricted activities has been obtained from the MOD. The remains of all aircraft that have been lost in military service are automatically classified as 'protected places' by the Act.

Human Remains. In 2008, the Ministry of Justice issued a statement on burial law and archaeology in relation to the Burial Act 1857. The main principle of the statement is:

Exhumation licence applications under the Burial Act 1857 will be considered wherever human remains are buried in sites to which the Disused Burial Grounds (Amendment) Act 1981 or other burial ground legislation does not apply. This is expected to apply to the majority of archaeological excavations. When licences are issued, a time limit, normally of up to two years, will be set for re-interment of human remains; it will be possible to apply for an extension when circumstances justify this. It will be rare for the Burial Act 1857, or other burial legislation, to apply to human remains found in the marine environment.

The Treasure Act 1996. The Act is supplemented by the Treasure (Designation) Order 2002. Finders of gold and silver objects (over 300 years old) and some base metal assemblages (prehistoric) as defined in the Act are required to report such finds by contacting the Coroner and delivering the items for hand over as per the coroners' instructions. The Act and the Order apply to objects found in or on land, in buildings (whether currently occupied or ruined), in rivers and lakes and on the foreshore (area between mean high water and mean low water on beaches and tidal river banks), provided that the object does not come from a wreck.

Ancient Monuments and Archaeological Areas Act 1979. Monuments that are of national importance within UK territorial waters can be protected by being added to the schedule of monuments protected under this Act. It is an offence to damage, or carry out a range of specified activities on such a 'scheduled monument', unless a licence for these activities has been obtained from the relevant authority, in the form of 'scheduled monument consent'. Monument can mean, among other things, the site of any vehicle, vessel, aircraft or other structure. It also refers many types of archaeological site in the traditional sense.

10 Appendix 2: Guidelines for identifying finds of Archaeological Interest and Handling Artefacts

10.1 Materials Guidelines

Rubber, Plastic etc. 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.

Iron and Steel. 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. 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. 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.

Bone. 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 the territorial waters, be subject to the provisions of the Burial Act 1857. Any suspected human bone should be reported and treated with discretion and respect. 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.

Wood. 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 palaeoenvironmental 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.

Stone. 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 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.

Pottery. 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.

Brick. 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.

Peat and Clay. Peat is black or brown fibrous organic material that was deposited when sea level was so low that the modern seabed formed marshy land, for example on the banks of a river or estuary. The 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. Prehistoric structures (such as wooden trackways) and artefacts are often associated with wetland areas where peat may have formed. In some rare instances archaeological material has been found within peat samples (moorlog) recovered from the North Sea seabed. Fine-grained sediments such as silts and clays are often found at the same places as peat. Any discoveries of such material could be of archaeological interest, and their occurrence should be reported.

10.2 Artefact Storage Advice

It should be noted that 'time is of the essence' in terms of the recovery of waterlogged archaeological material. If waterlogged organic items are allowed to dry out this can cause irreparable damage. Care in handling items is paramount.

In the event of artefact recovery, the finds should be stored in the following manner:

- If dry, finds should be placed in zip-lock bags and/or stored in a suitable protective container in a cool, dark area if possible.
- If waterlogged, any artefacts should be kept damp, or preferably totally submerged (in sea water), in zip-lock bags which are then stored in ridged plastic boxes to prevent damage. Items should be kept wet, covered, and stored in a cool, dark area if possible, and protected from any damage to potentially delicate waterlogged material.
- Any sediments of interest will be collected and double bagged into zip-lock bags.
- If particularly delicate or significant items are recovered the Retained Archaeologist should be contacted for further advice.

The Developer will supply suitable storage materials to its construction operations. The Retained Archaeologist can advise on suitable materials for this purpose.

11 Appendix 3: Protocol for Archaeological Preliminary Report Form

Mona and Morgan OWF: Protocol for Archaeological Discoveries

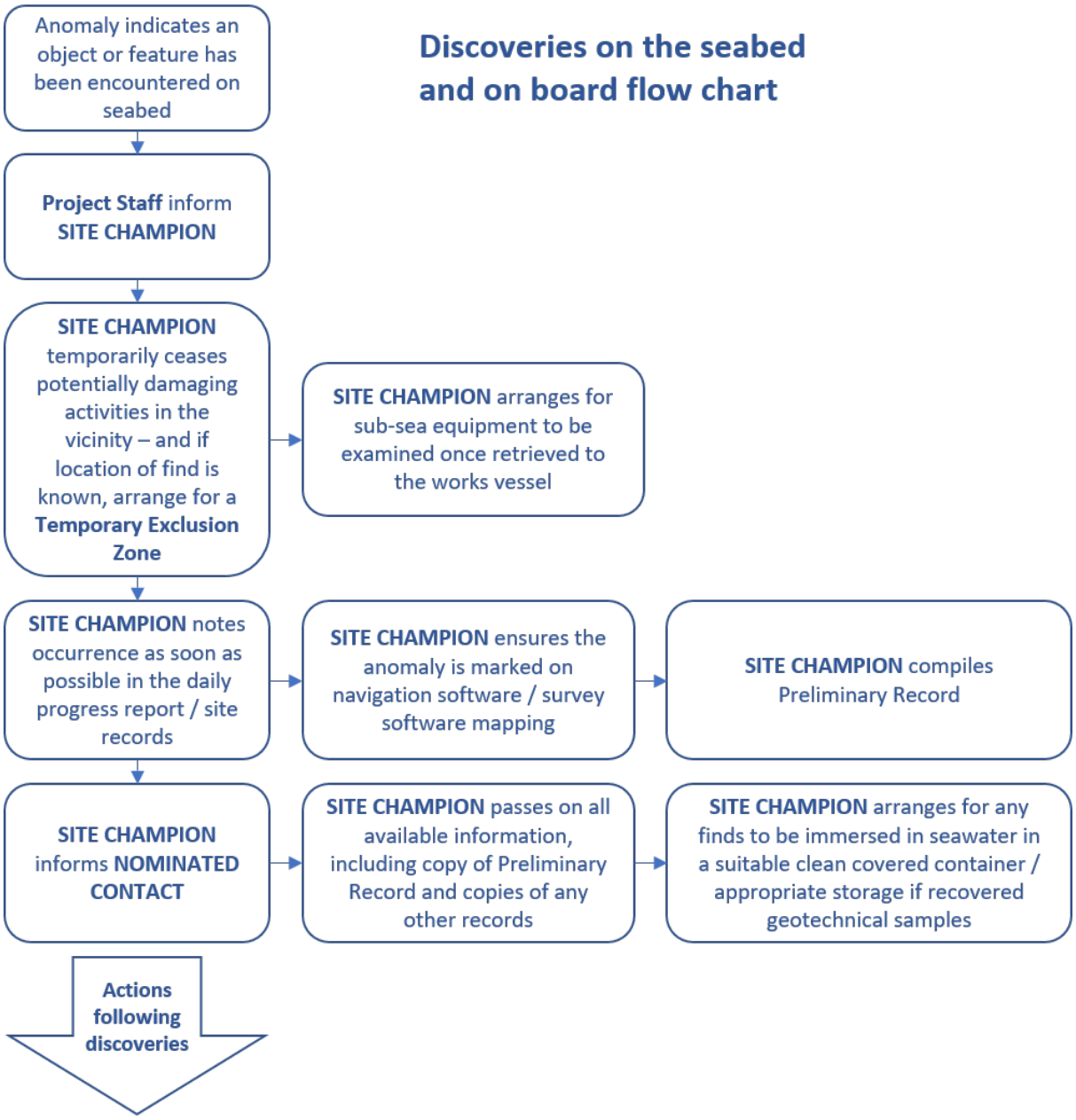
Preliminary Record Form: Discoveries on the Seabed / on board / inter-tidal zone / on land

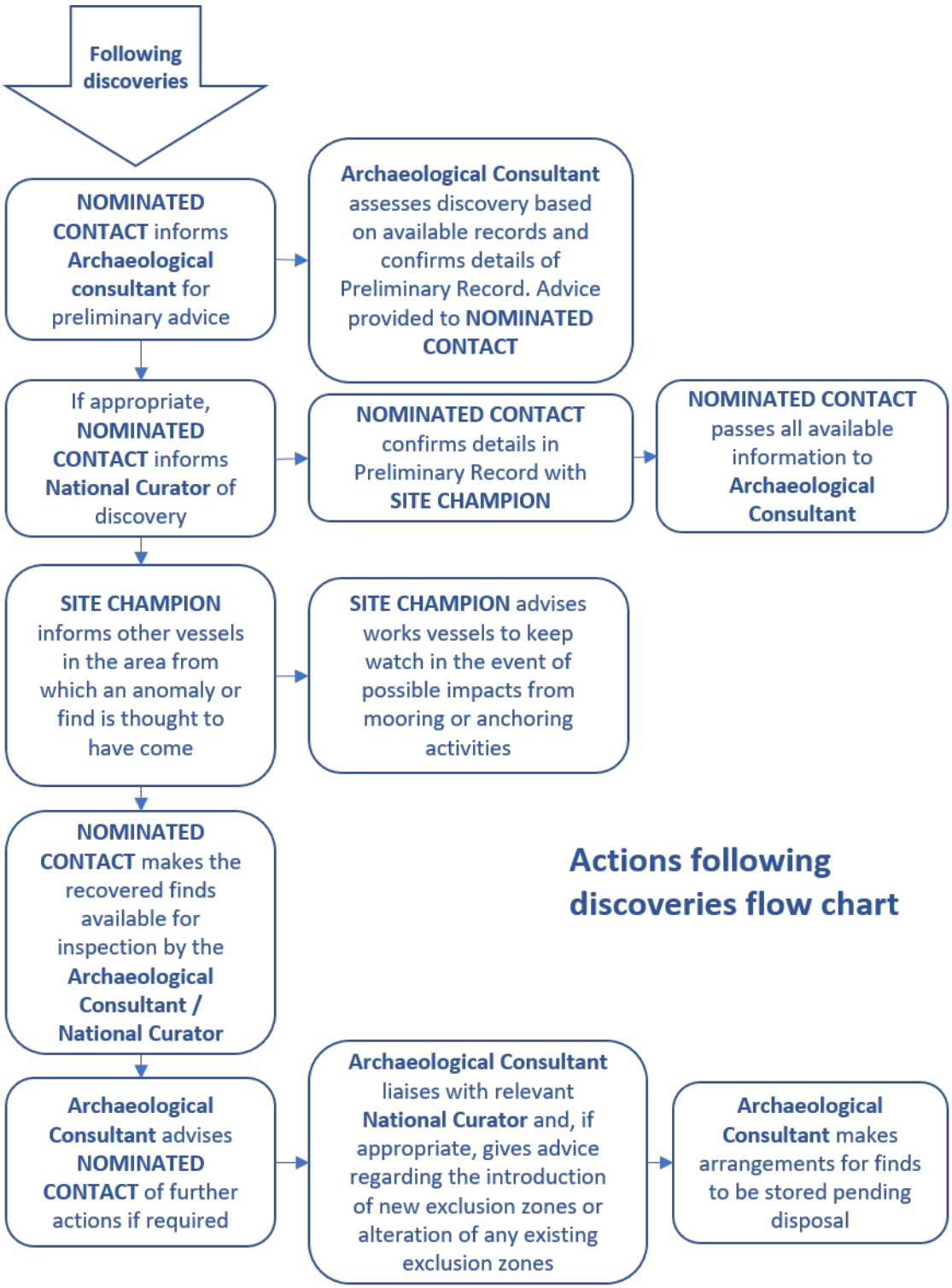
Vessel / Team Name:
Site / Sea Area Name
Date:
Time of compiling information:
Name of compiler (Site Champion):
Name of finder (if different to above):

Time at which discovery was encountered:
Vessel position at time when anomaly was encountered (e.g. recovery position)
Latitude
Longitude
Datum (if different to WGS84)
Original position of the anomaly on the seabed, if known:
Comment on accuracy of the original position state above:
How accurate is the position?
Is the position the original position or has the material been moved by operations (e.g trawling – if so provide start and end positions of trawl)
Details of circumstances and activity that lead to the discovery

Description of the find / anomaly:	
Apparent size / extent of the anomaly:	
Details of any find(s) recovered:	
Details of photographs, drawings or other records made of the finds(s):	
Details of treatment or storage of find(s):	
General notes:	
If discovered on the seabed:	
Method of identification (sonar, cable tensiometer, etc)	
Apparent size / extent of anomaly (length, width, height above seabed)	
Extent of deviation / route development	
Signed:	Date:

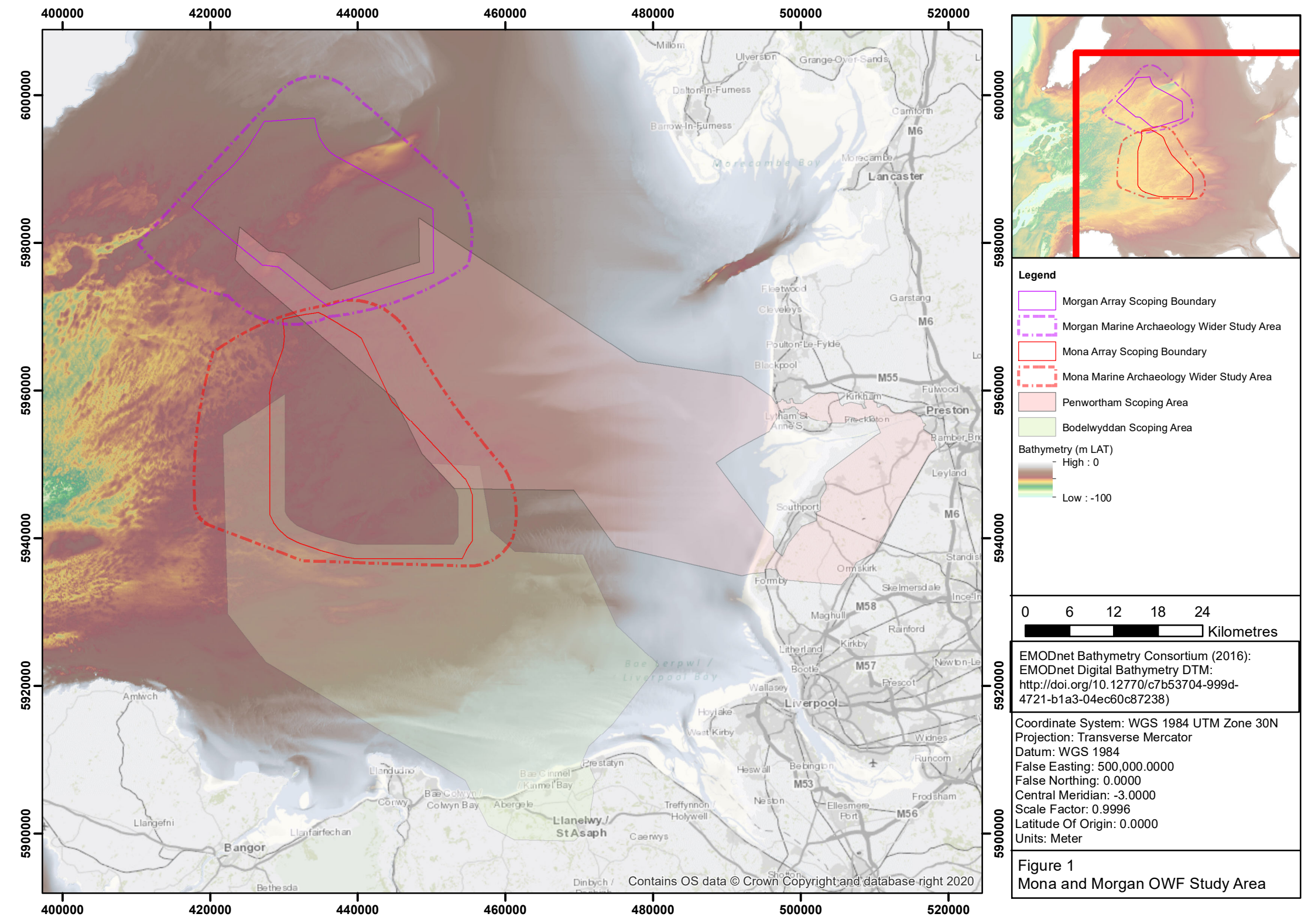
Discoveries on the seabed and on board flow chart





Actions following discoveries flow chart

12 Figures (overleaf)



Legend

- Morgan Array Scoping Boundary
- Morgan Marine Archaeology Wider Study Area
- Mona Array Scoping Boundary
- Mona Marine Archaeology Wider Study Area
- Penwortham Scoping Area
- Bodelwyddan Scoping Area

Bathymetry (m LAT)

High : 0

Low : -100

0 6 12 18 24 Kilometres

EMODnet Bathymetry Consortium (2016): EMODnet Digital Bathymetry DTM: http://doi.org/10.12770/c7b53704-999d-4721-b1a3-04ec60c87238)

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Figure 1
Mona and Morgan OWF Study Area