# FIVE ESTUARIES OFFSHORE WIND FARM

## VOLUME 9, REPORT 19: OUTLINE MARINE WRITTEN SCHEMES OF INVESTIGATION (CLEAN)

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In preparation of this document Five Estuaries Wind Farm Ltd has made reasonable efforts to ensure that the content is accurate, up to date and complete for purpose.

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## DEFINITION OF ACRONYMS

| Term | Definition |
|---|---|
| AEZ | Archaeological Exclusion Zone |
| AoS | Area of Search |
| CITiZAN | The Coastal and Intertidal Zone Archaeological Network |
| DAC | Digital Archive Centre |
| ES | Environmental Statement |
| MA | Maritime Archaeology Ltd. |
| MAG | Magnetometer |
| MBES | Multi-beam Echosounder |
| MEDIN | Marine Environmental Data and Information Network |
| MHWS | Mean High Water Springs |
| MLW | Mean Low Water |
| MLWS | Mean Low Water Springs |
| MMO | Marine Management Organisation |
| MoD | Ministry of Defence |
| MS | Method Statement |
| NRHE | National Record of the Historic Environment |
| PAD | Protocol for Archaeological Discoveries |
| ROV | Remote Operated Vehicle |
| SBP | Sub-Bottom Profiler |
| SoS | Secretary of State |
| SSS | Side Scan Sonar |
| TEZ | Temporary Exclusion Zone |
| UKHO | United Kingdom Hydrographic Office |
| UHRS | Ultra-High Resolution Seismic |
| UXO | Unexploded Ordnance |
| VE | Five Estuaries Offshore Wind Farm |
| VE OWFL | Five Estuaries Offshore Wind Farm Ltd (the Applicant) |
| WSI | Written Schemes of Investigation |

| Term | Definition |
|---|---|
| WTG | Wind Turbine Generator |

## GLOSSARY OF TERMS

| Term | Definition |
|---|---|
| Archaeological Exclusion Zones | Buffers around known marine heritage receptors that should be avoided during construction works. The avoidance of AEZs must also consider that the use of anchors and lines, which could impact upstanding features, are adequately taken into account in the planning of operations. |
| Before Present | Time scale referring to the years before 1950. |
| Bronze Age | This period follows on from the Neolithic and is characterized by the increasing use of bronze work. It is subdivided in the Early, Middle and Late Bronze Age. Archaeological period lasting from 2,600-700 BC. |
| DEAD | Not detected over repeated surveys, therefore not considered to exist in that location. |
| Deemed Marine Licence | If a Development Consent Order (DCO) is granted, this may include provision deeming a marine licence to have been issued under Part 4 of the Marine and Coastal Access Act 2009. |
| Development Consent Order | An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP). |
| Decommissioning | The period during which a development and its associated processes are removed from active operation. |
| Drop Down Video | A survey method in which imagery of habitat is collected, used predominantly to survey marine environment. |
| Effect | Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. |
| Environmental Impact Assessment (EIA) | The process of evaluating the likely significant environmental effects of a proposed project or |

| Term | Definition |
|---|---|
| | development over and above the existing circumstances (or 'baseline'). |
| Environmental Statement | Presents the full findings of the Environmental Impact Assessment and the results of the potential impacts of VE on marine heritage receptors. |
| ES Assessment Boundary | The ES Assessment Boundary combines the search areas for the offshore and onshore infrastructure associated with the Proposed Development. It is defined as the area within which the Proposed Development and associated infrastructure will be located, including the temporary and permanent construction and operational work areas. |
| Geophysical | Relating to the physical properties of the Earth. |
| Heritage | The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions. |
| Heritage Asset | A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing) (NPPF 2023; Annex 2 Glossary) |
| Historic England | The public body that champions and protects England's historic places. |
| Historic Seascape Characterisation | Maps and describes historic cultural influences which shape seascape perceptions across marine areas and coastal land. |
| Impact | The changes resulting from an action. |
| Intertidal | The area of the shoreline which is covered at high tide and uncovered at low tide. |
| Last Glacial Maximum | Most recent time during the last glacial period that the ice sheets were at their greatest extents, approximately 26,500-19,000 years ago. |
| LIFT | Wreck that has been salvaged. |
| LIVE | Wreck considered to exist as a result of detection through survey. |
| Marine archaeology study area | Defined as the proposed Order Limits area up to MHWS and surrounded by a 1 km buffer. |

| Term | Definition |
|---|---|
| Marine Heritage Receptors | Physical resources such as shipwrecks, remains of aircraft, archaeological sites, archaeological finds and material including pre-historic deposits as well as archival documents and oral accounts recognised as of historical/archaeological or cultural significance. |
| Marine Management Organisation | MMO is an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs. MMO license, regulate and plan marine activities in the seas around England so that they're carried out in a sustainable way. |
| Marine Written Schemes of Investigation | Project specific document, created during the pre-consent process and applies through the subsequent lifecycle of the OWF project. Intended to ensure that everyone in the process, is aware of and understands archaeological mitigation measures, and how and when to apply them. The document will develop throughout the life of the project beginning with the Outline Marine WSI through to the Draft Marine WSI and final Agreed Marine WSI. |
| Mesolithic | The Middle Stone Age, falling between the Palaeolithic and the Neolithic; marks the beginning of a move from a hunter gatherer society towards food producing society. Archaeological period lasting from 10,000-4,000 BC. |
| Nanotesla | Measurement describing the magnetic field (flux) of ferrous materials as measures by a magnetometer. (One nanotesla equals 10−9 tesla). |
| Neolithic | This period follows on from the Palaeolithic and the Mesolithic and is itself succeeded by the Bronze Age. This period is characterized by the practice of a farming economy and extensive monumental constructions. Archaeological period lasting from 4,000-2,200 BC. |
| Offshore Wind Farm | An offshore wind farm is a group of wind turbines in the same location (offshore) in the sea which are used to produce electricity. |
| Order Limits | The extent of development including all works, access routes, cable corridors, visibility splays and discharge points. |
| Palaeolithic | The period is defined by the practice of hunting and gathering and the use of chipped flint tools. This period is usually divided up into the Lower, Middle and |

| Term | Definition |
|---|---|
| | Upper Palaeolithic. Archaeological period lasting from 50,000-10,000 BC. |
| Preliminary Environmental Information Report | Presents the results of the Environmental Impact Assessment to date and the results of the potential impacts of VE on marine heritage receptors. |
| Proposed Development | The development that is subject to the Application for development consent. |
| Protocol for Archaeological Discoveries | A document detailing how finds made during the lifetime of the Proposed Development should be reported. |
| Receiver of Wreck | Official of the British Government whose main task is to administer the law in relation to Wreck and Salvage. |
| Scour | A localised sediment erosion feature caused by local enhancement of flow speed and turbulence due to interaction with an obstacle. |
| Seascape | Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other. |
| Significance | A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect. |
| Study area | Area where potential impacts from the Proposed Development could occur, as defined for each aspect. |
| United Kingdom Hydrographic Office (UKHO) | Database of known wrecks and obstructions held and maintained by the UKHO. |
| UNKNOWN | The state of the wreck is unknown or unconfirmed. |
| Written Scheme of Investigation (WSI) | A document forming the agreement between the client, the appointed archaeologists, contractors and the relevant stakeholders. The document sets out methods to mitigate the effects on all the known and potential marine heritage receptors within the development area. |

# 1 OFFSHORE ARCHAEOLOGY AND CULTURAL HERITAGE

1.1.1 This Outline Marine Written Schemes of Investigation (WSI) sets out the basis for the archaeological mitigation strategies in relation to the Five Estuaries Wind Farm Ltd and accompanies Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage and Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

## 1.1 INTRODUCTION

1.1.0 Five Estuaries Wind Farm Ltd (hereafter referred to as The Applicant) is proposing to develop Five Estuaries Offshore Wind Farm (hereafter referred to as VE). At its closest point, VE is located 37 km off the Suffolk coast.

1.1.1 This Outline Marine WSI forms an umbrella document for all survey, investigation and assessment required for VE and will be supported by activity specific Method Statements (MS) as outlined in the Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects guidance (The Crown Estate, 2021). The framework for archaeological mitigation strategies for VE is outlined in Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage.

1.1.2 Set out within this Outline Marine WSI are:

- The roles and responsibilities of the Contractors, Retained Archaeologist and Archaeological Contractors involved in VE, and the formal lines of communication between the VE project team and the Archaeological Curators (Sections 2 and 7);
- The known and potential marine heritage receptors that could be impacted by VE, along with the importance of research frameworks in setting objectives to be delivered through work undertaken on behalf of VE (outlined in Section 5);
- The agreed mitigation and archaeological actions that are to take place in various circumstances (outlined in Section 6); and
- Summarised details on methodologies for archaeological actions throughout the lifetime of VE, which will be further clarified in an activity specific MS, is outlined in Section 8.

1.1.3 This document has been structured to consider required mitigation and offsetting works (further detailed in Section 6) within the marine archaeology study area (as defined in Section 1.2 and illustrated in Figure 11.1) through archaeological actions in relation to the following offshore phases.

1.1.4 The stages of development and their associated works are as follows:

- Pre-construction:
  - survey and site investigations; and
  - seabed preparation
- Construction:
  - Wind Turbine Generator (WTG) foundation installation;
  - installation of interconnector, array cables and export cables;
  - installation of offshore substations; and
  - associated vessel works – jack-up vessels, anchorage, etc.

- Operation and maintenance:
  - presence of interconnector, array, and export cables;
  - presence of offshore substations; and
  - associated vessel works – jack-up vessels, anchorage, etc.
- Decommissioning:
  - removal of foundations;
  - removal of cables; and
  - associated vessel works – jack-up vessels, anchorage, etc.

1.1.5 This document further presents recommended archaeological mitigation methodologies and actions for a range of work phases within the marine environment.

1.1.6 Each phase of work may require a more detailed MS which will be prepared by appropriately qualified professionals and submitted to Archaeological Curators.

1.1.7 This Outline Marine WSI will form the basis of the Draft Marine WSI and final Agreed Marine WSI. Final Agreed WSI will set out the overarching approach to survey and archaeological investigations agreed by the Regulators. The document will further outline when supporting archaeological methodologies will be required, and to who and how they are to be submitted for approval prior to work commencing.

1.1.8 This Outline Marine WSI has been compiled by Maritime Archaeology to accompany Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage of the Environmental Statement (ES) and should be read in conjunction with Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

## 1.2 MARINE ARCHAEOLOGY STUDY AREA

1.2.1 A marine archaeology study area has been established for the purposes of collating and characterising baseline data as part of this ES. The marine archaeology study area encompasses the ES proposed Order Limits plus a 1 km buffer up to MHWS (Figure 11.1). This study area has been updated since the Preliminary Environmental Information Report (PEIR).

1.2.2 The extended marine archaeology study area is industry standard and allows for the consideration of direct and indirect effects on marine archaeological and cultural heritage receptors and is designed to accommodate the potential imprecision of historic marine positioning. The marine archaeological study area is used for geophysical and baseline record assessment; however, the wider context of the region and its historical and archaeological uses are also included in the baseline.

1.2.3 There is an intertidal overlap between the onshore and offshore archaeology study areas up to MHWS to ensure that there is total coverage of the ES proposed Order Limits between the two chapters. Liaison between the two topics has been ongoing to avoid repetition of sites and marine heritage receptors. A detailed account of onshore archaeology can be found in Volume 6, Part 3, Chapter 7: Onshore Archaeology and Cultural Heritage.

1.2.4 Shipwrecks lying in the ES proposed Order Limits may have been recorded as lost outside the area or they may have been lost and drifted or dragged before settling on the seabed. While no impact of VE is expected outside the ES proposed Order Limits, Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes, outlines how tidal ranges and seabed movements can be affected by the development. This is further discussed in terms of impact on marine heritage receptors in Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage.

1.2.5 It is important to note, the study area assessed for impacts and extends beyond this 1 km buffer and is in keeping with the study area defined within the Physical Processes chapter.

# 2 IMPLEMENTATION OF THE OUTLINE MARINE WSI

## 2.1 INTRODUCTION

2.1.1 The primary responsibility for the delivery of the environmental measures presented in this Outline Marine WSI lies with The Applicant. Through project documentation and procedures, the implementation of this Outline Marine WSI will involve archaeological contractors and curators.

## 2.2 THE APPLICANT: IMPLEMENTATION

2.2.1 The Applicant will be responsible for implementing the Outline Marine WSI. The Applicant will ensure that all relevant project personnel understand the archaeological requirements, particularly those where reporting may be required by contractors through the Protocol for Archaeological Discoveries (PAD) (The Crown Estate, 2014) (Appendix A). Personnel responsible for communication of actions to The Applicant will be clearly appointed which may include specific representatives onboard work vessels.

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

2.2.3 This Outline Marine WSI provides a framework for archaeological investigations for VE. In support of this Outline Marine WSI, any future archaeological works undertaken will require a detailed MS outlining methods and future mitigation. These MSs will be produced prior to survey or construction work in order to provide a detailed methodology for each package of development or survey works and presented to the Archaeological Curators for agreement.

## 2.3 RETAINED ARCHAEOLOGIST: IMPLEMENTATION

2.3.1 Communication with the Archaeological Curators is the responsibility of The Applicant. The Applicant will engage a Retained Archaeologist to implement this Outline Marine WSI.

2.3.2 The Applicant will advise the Retained Archaeologist of all requirements or responsibilities related to communication with curators and contractors, and in relation to project timescales, plans and requirements, ensuring that the information is shared as soon as it becomes available.

2.3.3 The Retained Archaeologist will report to The Applicant and will provide advice to The Applicant to inform communication with curators and contractors in relation to the implementation of the Outline Marine WSI.

## 2.4 ARCHAEOLOGICAL CURATORS: IMPLEMENTATION

2.4.1 The main Archaeological Curators involved in the agreement of this Outline Marine WSI, and subsequent mitigation works are Historic England Coast and Marine Planning (seaward of MLWS), and Essex County Council (landward of Mean Low Water (MLW)).

2.4.2 Archaeological Curators will be provided with copies of all relevant project documentation and will be consulted in all aspects of the offshore historic environment. Historic England, Coastal and Marine Planning will provide guidance and advice for the offshore historic environment and the relevant Work Packages outlined within this Outline Marine WSI.

## 2.5 DEVELOPMENT CONTRACTORS: IMPLEMENTATION

2.5.1 Contractors working within the proposed Order Limits, where Archaeological Exclusion Zones (AEZs) are in place and where the PAD is being used, must ensure all relevant personnel are aware of the associated requirements. The avoidance of AEZs must consider that the use of anchors and lines, which could impact upstanding features, are adequately considered in the planning of operations. This will include understanding the Outline Marine WSI and all procedures and lines of communication for reporting unexpected archaeological discoveries.

# 3 PROPOSED DEVELOPMENT DETAILS

3.1.1 All offshore elements will be installed within the offshore ES proposed Order Limits (Figure 11.1). The key offshore elements of VE will be as follows:

- Up to 79 offshore wind turbine generators (WTGs), with associated foundations;
- Up to 200 km of Inter-array cables;
- Up to 2 offshore substation platforms (OSPs); and
- Up to 196 km offshore export cables, each in its own trench within the overall cable corridor.

3.1.2 At this stage in the VE development process, decisions on exact locations of infrastructure and the precise technologies and construction methods employed cannot be made. Therefore, the project description at this stage is indicative and the design envelope approach (often referred to as the 'Rochdale Envelope') has been used to provide certainty that the final project as built will not exceed these parameters, whilst providing the necessary flexibility to accommodate further project refinement during the detailed design phase post-consent.

3.1.3 This flexibility is required in terms of options for foundation types, WTG size, siting of infrastructure and construction methods etc. to ensure that anticipated changes in available technologies between now and the detailed design phase can be accommodated within the design, whilst retaining an EIA that considers all options, with conclusions that are robust regardless of the final design eventually built out.

3.1.4 The description of the Proposed Development will be refined as the design continues to evolve through the key subsequent stages of the design, consultation and EIA process culminating in the Environmental Statement (ES) that will accompany the Development Consent Order (DCO) Application.

3.1.5 The final project design will depend on factors including ground and environmental conditions that will be subject to detailed pre-construction surveys, project economics and the approach to procurement of resources.

# 4 SITE-SPECIFIC SURVEYS

4.1.1 Geophysical survey data was acquired in August and October 2021 by Fugro and consisted of shallow geophysical data including Multi-beam Echosounder (MBES), Side Scan Sonar (SSS), Magnetometer (MAG), Sub-Bottom Profiler (SBP) and Ultra-High Resolution Seismic (UHRS) data across the ES proposed Order Limits (Figure Figure 11.2).

4.1.2 The data quality was Good, meaning suitable, clear data in which anomalies can be clearly identified and interpreted and which provides the highest probability for marine heritage receptors to be identified. The definition of survey data quality for archaeological interpretation is further detailed in Section 2.4 of Volume 6, Part 4, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

4.1.3 Site-specific surveys undertaken to date are summarised in Table 4.1. Where there are survey data gaps within the VE proposed Order Limits the archaeological assessment of the geophysical data collected for the neighbouring development of North Falls Offshore Wind Farm has been used.

4.1.4 All the marine data collected was assessed for archaeological potential and all anomalies were recorded. The results are summarised in Section 5 and detailed in Section 4 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

**Table 4.1: Site-specific surveys undertaken**

| Survey type | Coverage of proposed Order Limits |
|---|---|
| MBES | The majority of the Offshore ECC (100% of the preferred cable route) and 100% of the Array areas. |
| SSS | The majority of the Offshore ECC (100% of the preferred cable route) and 100% of the Array areas. |
| MAG | The majority of the Offshore ECC (100% of the preferred cable route) and 100% of the Array areas. |
| SBP | The majority of the Offshore ECC (100% of the preferred cable route) and 100% of the Array areas. |
| UHRS | The majority of the Offshore ECC (100% of the preferred cable route) and 100% of the Array areas. |

4.1.5 Further site-specific surveys will occur should areas of potential impact require additional archaeological evaluation to determine archaeological significance and appropriate mitigation, this is detailed in Section 6.8

# 5 SUMMARY OF OFFSHORE ARCHAEOLOGY AND CULTURAL HERITAGE BASELINE

5.1.1 The date and for context the archaeological documents produced are summarised in Table 5.1.

**Table 5.1: Archaeological documents produced to date**

| Archaeological document | Summary | Submitted |
|---|---|---|
| Five Estuaries Offshore Wind Farm Environmental Impact Assessment: Scoping Report | Identified the marine heritage receptors of relevance to the VE array areas and offshore PEIR RLB. Described the likely potential effects from the construction, operation, and maintenance, and decommissioning of the offshore and intertidal components (up to MHWS) of VE on marine heritage receptors and set out the proposed scope and methods for the Environmental Impact Assessment (EIA). | 30 September 2021 |
| PEIR Volume 2, Chapter 11: Offshore Archaeology and Cultural Heritage | Identifies the marine heritage receptors of relevance to VE. Describes the potential effects from the construction, operation, and maintenance, and decommissioning of the offshore and intertidal components (up to MHWS) of VE on marine heritage receptors and sets out the scope and proposed methods for the EIA. | Updated for the ES phase and submitted alongside this document. |
| PEIR Volume 4, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report | A desk-based study of the environmental baseline for offshore archaeology and cultural heritage within the study area, which encompasses the proposed development footprint, as well as an archaeological | Updated for the ES phase and submitted alongside this document. |

| Archaeological document | Summary | Submitted |
|---|---|---|
| | assessment of geophysical data collected for VE. | |

5.1.2 A broad contextual overview of human activity in the region and of the archaeology site types that may be expected to occur within the marine archaeology study area is included in Section 3 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report. A summary of the known and potential archaeology within the marine archaeology study area is presented below, with a focus on marine heritage receptors which may be impacted by VE.

5.1.3 The offshore marine archaeological resource is presented by four main classes of material and features:

- Submerged prehistoric landscapes caused by changes to sea level and eventual stabilisation of sea level at or near to the present position of the coast. Such landscapes may contain highly significant evidence of prehistoric human occupation and/ or environmental change;
- Archaeological remains of watercraft deposited when vessels sank while at sea or became abandoned in an inter-tidal context which subsequently became inundated;
- Remains of aircraft crash sites, either coherent assemblages or scattered material, usually the result of Second World War military conflict, but also numerous passenger casualties, particularly during the peak of seaplane activity during the inter-war period. Also includes aircraft, airships and other dirigibles dating to the First World War, although these rarely survive in the archaeological record; and
- Structural remains other than watercraft, such as defensive structures, lighthouses or sites lost to the sea as a result of coastal erosion, may be found within the intertidal zone (between Mean Low Water Springs (MLWS) and MHWS);

5.1.4 Historic Seascape Character has also been assessed. The historic cultural influences which shape present perception of seascapes, its uses and its ability to accommodate change.

## 5.2 PALAEOLANDSCAPES

5.2.1 The marine archaeology study area covers a now submerged area that is dominated by the Thames-Medway rivers system which originally occupied a more northerly course than its current location but was pushed south by widespread glacial movements around 450,000 years ago.

5.2.2 Archaeological evidence from the pre-historic gravel terraces shows that the area was repeatedly utilised by people as shown by flakes and cores dated to the Middle Palaeolithic from the offshore area as well as several animal bones that have been recovered from the offshore zones indicating habitation both during cold and warm periods.

5.2.3 The southern extension of the ice sheets during the Anglian glacial period is currently debated. However, several enclosed deeps in the Outer Thames Estuary, interpreted as glacial meltwater channels, formed in close proximity to the Anglian ice margin during MIS 12 have been mapped by the Thames REC (Emu *et al*., 2009; Dix and Sturt, 2011) (Figure 11.3), suggesting ice extended further south than previously thought and it is likely that fluvial deposits associated with the submerged Thames-Medway River system dominate the Pleistocene and early Holocene sequence in this area (Emu *et al.,* 2009).

5.2.4 Peat deposits preserved within palaeochannels located between 6 km and 12 km offshore of the north Kent coast were investigated to support the development of the London Array OWF and Nemo Link projects (Wessex Archaeology, 2016; Brown and Russell, 2019) resulting in dates between 10,170-9,760 cal. BP and later sequences dated to between 8,550-8,390 cal. BP and 7,840-7,670 cal. BP. These deposits, influenced by the rising sea-level, indicate that the potential to locate and date organic material and peat in the marine archaeology study area is high.

5.2.5 It is also highly probably that Middle Palaeolithic assemblages located outside the intertidal zone within aggregate deposits, found by local collectors and assessed as part of archaeology specific projects, originates from now submerged Pleistocene deposits where the post-Anglian (<MIS 12) rivers Thames, Medway and Blackwater would have been located.

## 5.3 KNOWN WRECKS, AVIATION REMAINS AND OBSTRUCTIONS

5.3.1 The archaeological assessment of geophysical data to date combined with the baseline conditions has concluded that there are 34 LIVE wrecks, 20 DEAD wrecks, six UNKNOWN or unconfirmed, and one wreck listed as not fully surveyed within the study area (United Kingdom Hydrographic Organisation (UKHO) and National Record of the Historic Environment (NRHE) data). The location of 16 wrecks correlates with anomalies seen during the archaeological assessment of geophysical data (Section 5.4, Figure 11.4, Figure 11.6, Figure 11.7 and Figure 11.8) as detailed in Section 4 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

5.3.2 Further, there are two reported aircraft losses and find sites of aircraft components within the marine archaeology study area, with one site (for an unidentified Vickers Wellington) correlating with an anomaly seen in the geophysical datasets. Where *in situ* remains associated with any aviation losses are found, they will be archaeologically significant and automatically protected under the Protection of Military Remains Act 1986.

## 5.4 GEOPHYSICAL ASSESSMENTS

5.4.1 The assessment of geophysical data to date as detailed in Section 4 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report identified 4876 anomalies (Table 5.2) (low, medium, and high) of potential archaeological interest within the marine archaeology study area. During the assessment of geophysical data, the location of 16 known wrecks and one aircraft corresponded with anomalies of archaeological potential.

5.4.2 The 98 medium and 234 high potential anomalies have been assigned AEZs, the radius of the AEZs is 50 m for the medium potential anomalies and magnetic anomalies <100 nT not seen across other datasets, and 100 m for the high (Figure 11.5, Figure 11.6, Figure 11.7 and Figure 11.8).

5.4.3 The AEZs attributed by the North Falls archaeological assessment have been digitised using the publicly available PEIR document and have been included as indicative in Figure 11.6, Figure 11.7 and Figure 11.8. There are 56 AEZs recommended for North Falls, 35 of them are within the VE maritime archaeology study area, 26 of which are additional to those recommended for VE OWF.

**Table 5.2: Anomalies of archaeological potential within the marine archaeology study area**

| Number of anomalies | Archaeological potential |
|---|---|
| 58 | High |
| 172 | Magnetic anomalies of high potential (>100 nT not seen in SSS or MBES data) |
| 4 | Magnetic anomalies of high potential (>100 nT not seen in SSS or MBES data, but correlate with UKHO records) |
| 98 | Medium |
| 471 | Low (excluding magnetic anomalies) |
| 4,114 | Magnetic anomalies of low potential with no correlating data (<100nT) |
| 35 | Archaeological Exclusion Zones attributed by the North Falls archaeological assessment, digitised using the publicly available PEIR document. |

## 5.5 SEDIMENTARY HORIZONS

5.5.0 This section summarises the interpretation of the archaeological assessment of the SBP data and places the current understanding of the complex prehistoric landscapes and the correlation between marine and terrestrial sediment phases in context. For further detail refer to Section 4.3 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

5.5.1 As also seen in seismic data interpreted by Emu *et al*. (2009), the marine archaeology study area is characterised by complex cross-cutting channels that can exceed 40 m thickness in places and the presence of shallow gas suggesting fine-grained or organic deposits may be preserved. This interpretation is very similar to the assessment of sub-bottom data for VE (Figure 11.4) where several of the channels indicate crosscutting features and blanking is seen across large parts of the area, often in association with channel deposits, indicating that well preserved deposits with high geoarchaeological potential are extant within the marine archaeology study area.

5.5.2 While less evidence for both organic material and clear channel and valley features is seen within the two array areas of VE, the ECC does go through areas where geoarchaeological channels have previously been mapped and an increase of deposits of interest are noted (MA3000, to MA3003 and MA3010 to MA3017, Figure 11.4).

5.5.3 The channels and riverbeds identified by the Thames REC project (Emu *et al*., 2009) within the array area correlate with the VE SBP data analysis as illustrated on Figure 11.4 (see MA3004, MA3005, MA3006 and MA3009).

5.5.4 The channels along the ECC are also possibly associated or extensions of the features identified in the Thames REC project (Emu *et al*., 2009), see MA3000, MA3013 MA3016, Figure 11.4.

5.5.5 As noted, this is an area of complex cross-cutting channels which may not be easily distinguishable across surveys, or even survey directions, as seen at MA3006 (Figure 11.4), which is why the associations are not as clear as within the array areas.

5.5.6 The blanking which may be associated with possible organic material (MA3003, Figure 11.4) is frequently seen across the whole study area and is likely to be associated with deposits previously identified and analysed, (Wessex Archaeology, 2016; Brown and Russell, 2019). Therefore, any future geoarchaeological assessments should focus on sampling and assessing this deposit where it may be impacted, (see section 8.4 for further details on potential sampling on deposits of geoarchaeological potential).

**Table 5.3: Outline deposit model**

| Unit | Sediment | Description | Epoch | Geoarchaeological potential |
|---|---|---|---|---|
| 5 | Mobile seabed sediments | Sand and gravel. | Holocene | No |
| 4 | Channel/Valley infill | Soft possibly peaty silt, clay or sand. | Late Pleistocene to Early Holocene | Yes |
| 3 | London Clay | Firm to hard silty clay. | Tertiary | Low |
| 2 | Harwich Formation | Silty clays and sandy clayey silts. | Ypresian (MIS 3) | Low |
| 1 | Reading or Woolwich Formation | Dark grey shelly clay, laminated clay and silt or fine- to coarse-grained sand. | Thanetian to Ypresian (MIS 4-3) | Low |

## 5.6 RESEARCH FRAMEWORKS

5.6.1 All future survey campaigns will incorporate relevant location and national research frameworks to contribute to the knowledge and understanding of the historic environment. Specific research questions will be included in the MSs for each campaign.

5.6.2 Past and ongoing research projects and agendas in this area for which further research may be relevant include, but are not limited to:

- The Coastal and Intertidal Zone Archaeological Network (CITiZAN) project;
- North Sea Prehistory Research and Management Framework;
- The Greater Thames Estuary Research Framework; and
- A Maritime Archaeological Research Agenda for England (2022, online).

5.6.3 Contributions to our knowledge and understanding of the historic environment may also be in the form of project-led data gathering, assessment and publications made available to the public. Any works undertaken will tie in with current research frameworks relevant to the area, as well as specific research questions which will be further detailed in forthcoming relevant MSs.

5.6.4 Project-led research has the capacity to positively contribute to public knowledge and new understanding about palaeoenvironmental remains, buried sedimentary deposits and the evolution of past landscape in the coastal and marine area.

5.6.5 The above research, along with VE SBP data will be used to provide a wide palaeoenvironmental context in which to frame specific research questions set out in the MSs.

## 5.7 RELEVANT LEGAL PROTECTION

5.7.1 Legal obligations for heritage of relevance to all phases of VE are:

- Under the Protection of Wrecks Act 1973, if a wreck of historical, archaeological, or artistic importance were to be discovered then it would be possible for it to be designated at very short notice. This has the potential to disrupt construction activities and associated timetables;
- Under the Protection of Military Remains Act 1986, if a crashed military aircraft was discovered in the course of construction, then it is automatically protected. It is then an offence to undertake unauthorised disturbance of the site unless under licence; and
- Under the Ancient Monuments and Archaeological Areas Act 1979, sites that warrant protection due to them being of national importance as 'ancient monuments' must have a consent from the SoS before any works can be undertaken.

# 6 MITIGATION

6.1.1 The mitigation for VE has been formulated around the marine heritage receptors and anomalies identified in the desk-based assessment and geophysical data, as well as in anticipation of any previously unidentified or unexpected discoveries of sites or finds of archaeological interest.

6.1.2 The mitigation described below are mitigation measures or commitments that have been identified and adopted as part of the evolution of the project design of relevance to offshore archaeology and cultural heritage, these include project design measures, compliance with elements of good practice and use of standard protocols.

6.1.3 The mitigation is based on guidance set out in Historic Environment Guidance for Offshore Renewable Energy Sector (COWRIE, 2007) and Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021).

6.1.4 The below mitigation measures have been adopted from the pre-application phase to reduce the potential for impacts on marine heritage receptors. They will likely evolve over the phases of development phases, and in response to consultation and include further mitigation measures that have been identified as good or standard practice and incorporate actions that would be undertaken to meet existing legislation requirements.

6.1.5 This Outline Marine WSI is being developed in consultation with the Regulator and Archaeological Curators to form a framework that presents mitigation strategies aiming to avoid or minimise impact on marine heritage receptors. The Outline Marine WSI also summarises forthcoming surveys and associated archaeological investigations prior to pre-construction works commencing.

6.1.6 This Outline Marine WSI states when supporting archaeological methodologies will be required and to whom and how they are to be submitted for approval prior to work commencing, and follows the guidance detailed in Table 1 and Table 2 of the Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021).

6.1.7 Any intrusive activities associated with pre-construction and construction works will be planned to avoid any identified or recorded marine heritage receptors and AEZs detailed in this Outline Marine WSI unless other mitigation is agreed with Historic England.

6.1.8 A post-construction monitoring plan will be developed and submitted to the Archaeological Curators which will present the approach to monitoring required for established AEZs where there is a potential for further impact.

6.1.9 The post-construction monitoring plan will focus on monitoring sites of potential archaeological interest and revisiting areas that were identified as of archaeological significance during the construction phase, and to establish any impacts (positive, negative, or neutral).

6.1.10 The post-construction monitoring plan will further outline how geophysical survey data, drop-down video (DDV) and Remotely Operated Vehicle (ROV) imagery (if available) will be reviewed and compared with results from pre-construction data acquired for each of the features requiring monitoring.

6.1.11 A decommissioning plan will be prepared in line with any updated guidance and environmental assessments.

## 6.2 MARINE WRITTEN SCHEMES OF INVESTIGATION (WSI)

6.2.1 This Outline Marine WSI outlines the AEZs, the implementation for a PAD in accordance with the Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014) and future monitoring and assessment requirements.

6.2.2 This Outline Marine WSI also sets out the recommended AEZs for geophysical anomalies, provides information about areas of archaeological potential and where further geotechnical works may provide archaeological interest, and sets out procedures for further works to include archaeological input even when their main purpose is non-archaeological, so that the potential for information and efficiency is maximized.

6.2.3 Following the EIA application, during the pre-construction phase, a Draft Marine WSI (based on this Outline Marine WSI) will be produced which will detail all aspects of any further archaeological work and details the mitigation measures embedded into the project design. This will occur at the pre-commencement survey stage and will further outline when supporting archaeological methodologies will be required, and to whom and how they are to be submitted for approval prior to work commencing. The implementation of this Marine WSI (at every phase of the document) is the mitigation, rather than the document itself.

6.2.4 Throughout the lifetime of the project this Outline Marine WSI will evolve from the current Outline Marine WSI submitted with the EIA to the Draft Marine WSI submitted during the pre-construction phase and through to the final Agreed Marine WSI, which will be developed post-consent but ahead of construction activities. These documents will be produced in line with The Crown Estate guidance (2021).

6.2.5 The mitigation set out in the Marine WSI (at every phase of the document) will be discussed and agreed in consultation with the Archaeological Curators. It is anticipated that the agreement of a final Agreed WSI will be secured in the DCO.

## 6.3 ARCHAEOLOGICAL EXCLUSION ZONES (AEZ)

6.3.1 All intrusive activities undertaken during the life of the project will be routed and micro-sited to avoid any identified marine heritage receptors.

6.3.2 The implementation of AEZs around geophysical anomalies identified as having high and medium archaeological potential and recorded locations for wrecks, aircraft and obstructions will provide a buffer around these potential and known marine heritage receptors.

6.3.3 AEZs of 50 m are recommended around anomalies of medium archaeological potential (Table 12.2) and records for wrecks and obstructions which did not correlate with geophysical anomalies. For anomalies of high archaeological potential identified in the geophysical data AEZs of 100 m are recommended. The extent of the AEZs is based around the visible extent of the anomaly, where it can be identified. In the case of recorded anomalies not identified in the geophysical data as well as anomalies identified only in the magnetometer data the AEZs are based around the centre point of the recorded location.

6.3.4 The avoidance of marine heritage receptors remaining *in situ*, follows best archaeological practice, and impact by the proposed development will be avoided through the implementation of buffers (AEZs) around the known extents of sites. All development and related activities that could impact the seabed are prohibited within the boundaries of an AEZ.

6.3.5 AEZs have the potential to be amended (enlarged, reduced and re-shaped) or removed at a later date, subject to further data and review. Any changes to the AEZs which may occur will be agreed with the Archaeological Curators.

6.3.6 Temporary Exclusion Zones (TEZ) as a reactive measure may be applied in the case of unexpected discoveries of potential archaeology while further investigation and assessment is carried out.

6.3.7 The final development layout of VE will consider the locations of all AEZs. Where it is deemed that impacts cannot be avoided, measures to reduce, remedy or offset disturbances will be agreed.

## 6.4 PROTOCOL OF ARCHAEOLOGICAL DISCOVERIES (PAD)

6.4.1 There is potential for previously unknown sites or material of archaeological potential to be encountered during development works. As per the Outline Marine WSI, a project specific PAD (Appendix A) will be adopted to ensure impacts to these unexpected discoveries can be reduced.

6.4.2 The PAD document acts as a safety net alongside other mitigation measures to ensure reactive and effective reporting of any unexpected finds of archaeological potential can be investigated, assessed and potential impacts are avoided.

6.4.3 TEZ may be established around areas of possible archaeological potential until further investigation and assessment can be conducted.

## 6.5 ARCHAEOLOGICAL ASSESSMENT OF AVAILABLE DATA

6.5.1 Offshore geophysical surveys (including UXO surveys) undertaken during the life of the project will be subject to full archaeological review, where relevant, in consultation with Historic England.

6.5.2 Offshore geotechnical surveys are planned post-consent and prior to construction and will be undertaken following early discussions with Historic England. Areas with geoarchaeological potential will be targeted during geotechnical sampling campaigns and the results of the geoarchaeological assessment will be presented in phased geoarchaeological reports inclusive of publication. The published results will aim to enhance the palaeogeographic knowledge and understanding of the area.

6.5.3 Specialist archaeological input will be incorporated, as a proactive measure, into the survey methodologies and techniques through to the identification of anomalies and subsequent avoidance strategies and mitigation.

6.5.4 The proposed development area is of known importance for historic military and merchant activity, as well as of for geoarchaeology. Any features of potential archaeological interest or significance will be avoided where possible, or where impacts cannot be avoided will be further investigated and risk of impacts managed. Any locations of potential geoarchaeological interest or significance will be targeted, where possible, during geotechnical works to contribute to the characterisation of the palaeoenvironment and deposit model. Additional archaeologically specific cores will also be collected.

## 6.6 POST-CONSTRUCTION MONITORING PLAN

6.6.1 A post-construction monitoring plan will be produced within the Agreed Marine WSI (the iteration of this Outline Marine WSI which will be developed post-consent and pre-construction). The post-construction monitoring plan will recommend areas or sites of high archaeological interest and/ or significance and outline proposed measures to avoid or monitor such sites. It will also outline how any post-construction monitoring campaigns will collect, assess, and report on changes to marine heritage receptors that may have occurred during the construction phase.

6.6.2 This plan will include:

- Inclusion of archaeological objectives in any relevant surveys, such as geophysical, geotechnical, diver or ROV surveys, throughout this life of the project;
- Ground truthing campaigns of anomalies where the archaeological potential or significance is uncertain; and
- Monitoring of archaeological exclusion zones, areas of scour, areas of high archaeological potential, and other areas of potential interest.

## 6.7 THE IMPLEMENTATION OF MITIGATION MEASURES

### MITIGATION FOR KNOWN WRECKS AND OBSTRUCTIONS

6.7.1 Recorded in the UKHO and NRHE data there are 105 wrecks and obstructions within the marine archaeology study area. Within these records there are two live aircraft sites (one of which corresponds with geophysical anomaly MA0029) and 34 live wreck sites, with 16 recorded wreck losses corresponding with geophysical anomalies). The archaeological significance of these known wrecks is assessed based on the criteria set out in the Scheduled Monuments & Nationally Important but Non-Scheduled Monuments guidance (DCMS, 2013) and detailed in Section 3.3 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

6.7.2 Precautionary AEZs of a 50 m radius are recommended for all known marine heritage receptors, as illustrated in Figure 11.5, Figure 11.6, Figure 11.7 and Figure 11.8. Of the 105 wrecks and obstructions recorded in the UKHO and NRHE data 25 correspond with anomalies identified in the geophysical data and have been assigned specific AEZ based around their visible extent (Table 6.1) (these are detailed in Appendix A and B of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report). The records for wrecks, aircraft, fouls and obstructions not identified in the geophysical data are covered by a precautionary 50 m AEZ based around their recorded location (Table 6.1) (detailed in Appendix B of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report).

6.7.3 There are currently no designated marine heritage receptors such as Designated or Protected Wreck Sites or other sites subject to the provisions of the Protection of Military Remains Act 1986 within the proposed development area. However, the geophysical anomaly MA0029 corelates with the site of an unidentified Vickers Wellington aircraft. This site is assumed to become an automatically protected place under this Act even if the physical remains have not been confirmed as an aircraft.

6.7.4 The commitment to avoid all known marine heritage receptors and to further investigate the area of impacts ensuring that unknown receptors are located, and impact mitigated will ensure preservation *in situ*, which is in keeping with current best practice.

6.7.5 Where marine heritage receptors cannot be preserved *in situ*, justification for continued archaeological work including potential impacts will be clearly outlined in the relevant MSs produced ahead of any archaeological works and following agreement with Historic England.

**Table 6.1: AEZs for known wrecks and obstructions within the marine archaeology study area**

| Classification | Wreck ID | MA ID | Name | Status | Date sunk | AEZ (m) |
|---|---|---|---|---|---|---|
| Obstruction (seen in geophysical data) | 15865 | MA0001 | - | LIVE | - | 100 |
| Wreck (seen in geophysical data) | 15035 | MA0014 | - | DEAD | - | 100 |
| Wreck (seen in geophysical data) | 14553 | MA0012 | - | LIVE | - | 100 |
| Foul ground (seen in geophysical data) | 14859 | MA0013 | - | LIVE | - | 100 |
| Wreck (seen in geophysical data) | 14576 | MA0007 | - | LIVE | - | 100 |
| Wreck (seen in geophysical data) | 14581 | MA0008 | - | LIVE | - | 100 |
| Obstruction (seen in geophysical data) | 87002 | MA0754 | - | UNKNOWN | - | 100 |

| Classification | Wreck ID | MA ID | Name | Status | Date sunk | AEZ (m) |
|---|---|---|---|---|---|---|
| Wreck (seen in geophysical data) | 15074 | MA0034 | - | LIVE | - | 100 |
| Wreck (seen in geophysical data) | 87021 | MA0703 | - | UNKNOWN | - | 100 |
| Wreck (seen in geophysical data) | 87019 | MA0068 | - | UNKNOWN | - | 100 |
| Wreck (seen in geophysical data) | 87043 | MA0704 | - | UNKNOWN | - | 100 |
| Wreck (seen in geophysical data) | 14513 | MA0002 | SS *Nico* | LIVE | 19151218 | 100 |
| Wreck (seen in geophysical data) | 14535 | MA0020 | SS *Norhauk* | LIVE | 19431221 | 100 |
| Foul ground (seen in geophysical data) | 14803 | MA6677 | - | DEAD | - | 100 |
| Foul ground (seen in geophysical data) | 79309 | MA0021 | - | LIVE | - | 100 |
| Foul ground (seen in geophysical data) | 14532 | MA6377 | - | DEAD | - | 100 |
| Wreck (seen in geophysical data) | 70049 | MA0232 | HMS *Hastfen* | DEAD | 19170924 | 100 |
| Wreck (seen in geophysical data) | 14461 | MA0003 | MV *Janny* | LIVE | 19670126 | 100 |
| Wreck (seen in geophysical data) | 14555 | MA0578 | SS *Vancouver* | LIVE | 19410921 | 100 |

| Classification | Wreck ID | MA ID | Name | Status | Date sunk | AEZ (m) |
|---|---|---|---|---|---|---|
| Foul ground (seen in geophysical data) | 70092 | MA0033 | - | DEAD | - | 100 |
| Aircraft (seen in geophysical data) | 14995 | MA0029 | - | LIVE | - | 100 |
| Wreck (seen in geophysical data) | 14541 | MA6243 | - | DEAD | - | 100 |
| Wreck (seen in geophysical data) | 14996 | MA6650 | - | LIVE | - | 100 |
| Wreck (seen in geophysical data) | 14525 | MA0022 | SS *Morar* | LIVE | 19431127 | 100 |
| Unclassified (seen in geophysical data) | 102362 | MA0027 | - | UNKNOWN | - | 100 |
| Wreck | 10915 | - | FV *Marie Simone* | DEAD | 19681024 | 50 |
| Wreck | 15709 | - | - | DEAD | - | 50 |
| Aircraft | 15199 | - | - | LIVE | - | 50 |
| Wreck (covered by North Falls data) | 14540 | - | HMS *Lord St Vincent* (part of) | LIVE | 19410707 | 100 |
| Wreck | 14536 | - | - | LIVE | - | 50 |
| Wreck (covered by North Falls data) | 14534 | - | HMS *Lord St Vincent* (part of) | DEAD | 19410707 | 100 |
| Wreck | 14468 | - | - | DEAD | - | 50 |
| Foul ground | 79305 | - | - | LIVE | - | 50 |
| Obstruction | 15076 | - | - | DEAD | - | 50 |
| Foul ground | 59480 | - | - | DEAD | - | 50 |

| Classification | Wreck ID | MA ID | Name | Status | Date sunk | AEZ (m) |
|---|---|---|---|---|---|---|
| Wreck | 14588 | - | SS *Empire Bridge* | LIVE | 19460409 | 50 |
| Wreck | 14800 | - | - | LIVE | - | 50 |
| Wreck | 15819 | - | SS *Willy* | LIVE | - | 50 |
| Wreck | 98495 | - | - | NOT FULLY SURVEYED | - | 50 |
| Wreck | 14798 | - | FV *Protinus* (possibly) | LIVE | 19400318 | 50 |
| Wreck | 14802 | - | SS *Koningen Emma* (possibly) | LIVE | 19150922 | 50 |
| Foul ground | 14971 | - | - | DEAD | - | 50 |
| Wreck | 14518 | - | - | DEAD | - | 50 |
| Wreck | 14529 | - | SS *Palembang* (probably) | LIVE | 19160318 | 50 |
| Wreck | 14530 | - | - | LIVE | - | 50 |
| Wreck | 14589 | - | SS *Corcrest* | LIVE | 19490624 | 50 |
| Foul ground | 14478 | - | - | DEAD | - | 50 |
| Wreck | 14595 | - | SS *Koningen Emma* (part of) (probably) | LIVE | 19150922 | 50 |
| Foul ground | 14972 | - | - | LIVE | - | 50 |
| Foul ground | 15125 | - | - | LIVE | - | 50 |
| Foul ground | 15126 | - | - | LIVE | - | 50 |
| Foul ground | 79310 | - | - | LIVE | - | 50 |

| Classification | Wreck ID | MA ID | Name | Status | Date sunk | AEZ (m) |
|---|---|---|---|---|---|---|
| Wreck | 14523 | - | - | DEAD | - | 50 |
| Wreck | 14472 | - | SS *Haytor* | DEAD | 19400726 | 50 |
| Wreck | 14464 | - | HMS *Fleming* | DEAD | 19400724 | 50 |
| Wreck | 14458 | - | SS *Selma* | DEAD | 19151025 | 50 |
| Wreck (covered by North Falls data) | 87044 | - | - | UNKNOWN | - | 50 |
| Wreck | 14519 | - | - | DEAD | - | 50 |
| Wreck | 14492 | - | MV *Ingi* | LIVE | 19720914 | 50 |
| Wreck | 14475 | - | - | DEAD | - | 50 |
| Wreck | 14894 | - | MFV *Paullette* | DEAD | 19500519 | 50 |
| Wreck | 85403 | - | - | UNKNOWN | - | 50 |
| Wreck | 14528 | - | *Second Chance* (possibly) | LIVE | 19770930 | 50 |
| Wreck | 14527 | - | SS *Wearside* | LIVE | 19171025 | 50 |
| Foul ground | 79308 | - | - | LIVE | - | 50 |
| Wreck (covered by North Falls data) | 14548 | - | HMS *Resono* (possibly) | LIVE | 19151226 | 50 |
| Wreck | 14983 | - | - | DEAD | 19151226 | 50 |
| Wreck | 14462 | - | - | DEAD | - | 50 |
| Wreck (covered by North Falls data) | 14444 | - | - | LIVE | - | 50 |
| Wreck (covered by North Falls data) | 14522 | - | - | DEAD | - | 50 |

| Classification | Wreck ID | MA ID | Name | Status | Date sunk | AEZ (m) |
|---|---|---|---|---|---|---|
| Wreck | 14587 | - | SS *Fort Massac* | LIVE | 19460201 | 50 |
| Wreck | 14545 | - | MV *Bonnington Court* | LIVE | 19410119 | 50 |
| Wreck (covered by North Falls data) | 14544 | - | HMSM *E6* | LIVE | - | 50 |
| Foul ground (covered by North Falls data) | 77249 | - | - | DEAD | - | 100 |
| Wreck (covered by North Falls data) | 14546 | - | SS *Michail Ontchoukoff* | DEAD | 19161217 | 100 |
| Wreck (covered by North Falls data) | 14543 | - | SS *Marie Leonhardt* (probably) | LIVE | 19170214 | 50 |
| Wreck | 14537 | - | *Terukuni Maru* | LIVE | 19391121 | 50 |
| Wreck | 14520 | - | MV *Drofli* | LIVE | 19560802 | 50 |
| Wreck | 70010 | - | HMS *Scotch Thistle* | DEAD | 19401007 | 50 |
| Wreck | 15864 | - | - | LIVE | - | 50 |
| Wreck | 82140 | - | - | UNKNOWN | - | 50 |
| Wreck (covered by North Falls data) | 14970 | - | *Mac 5* (possibly) | LIVE | 19401226 | 50 |
| Wreck | 14514 | - | HMML 127 (possibly) | LIVE | 19401122 | 50 |
| Wreck | 14517 | - | - | LIVE | - | 50 |
| Obstruction | 14515 | - | - | DEAD | - | 50 |

| Classification | Wreck ID | MA ID | Name | Status | Date sunk | AEZ (m) |
|---|---|---|---|---|---|---|
| Wreck | 70300 | - | - | DEAD | - | 50 |
| Foul ground | 79307 | - | - | LIVE | - | 50 |
| Foul ground | 59485 | - | - | DEAD | - | 50 |
| Obstruction | 94626 | - | - | UNKNOWN | - | 50 |
| Obstruction | 94627 | - | - | UNKNOWN | - | 50 |
| Obstruction | 94628 | - | - | UNKNOWN | - | 50 |
| Obstruction | 94629 | - | - | UNKNOWN | - | 50 |
| Obstruction | 14533 | - | - | DEAD | - | 50 |
| Foul ground | 58541 | - | - | DEAD | - | 50 |
| Foul ground | 58542 | - | - | DEAD | - | 50 |
| Foul ground | 79311 | - | - | DEAD | - | 50 |
| Foul ground | 82869 | - | - | UNKNOWN | - | 50 |
| Unclassified | 100626 | - | - | UNKNOWN | - | 50 |
| Unclassified | 102229 | - | - | UNKNOWN | - | 50 |
| Unclassified | 102231 | - | - | UNKNOWN | - | 50 |
| Unclassified | 102232 | - | - | UNKNOWN | - | 50 |
| Unclassified | 102346 | - | - | UNKNOWN | - | 50 |
| Unclassified | 99186 | - | - | UNKNOWN | - | 50 |
| Unclassified | 99963 | - | - | UNKNOWN | - | 50 |
| Unclassified | 100626 | - | - | UNKNOWN | - | 50 |

6.7.6 Full description of locations and details are in Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

## MITIGATION FOR UNLOCATED MARINE HERITAGE RECEPTORS

6.7.7 There is always a possibility that yet unlocated marine heritage receptors will be located within the marine archaeology study area. Unlocated marine heritage receptors are of unknown archaeological potential and heritage significance but might still be impacted by indirect or direct impact caused by project activities. In recent years large offshore renewable developments have located several previously unknown and unlocated sites of high archaeological significance within site boundaries, even after construction.

6.7.8 Further investigations, including geophysical and geotechnical surveys, followed by archaeological campaigns are essential to developing effective mitigation within the ES proposed Order Limits. The combination of geophysical and geotechnical surveys completed to a standard where they can be archaeologically assessed and with archaeological objectives work effectively by increasing the likelihood of marine heritage receptors becoming identified and ultimately protected. Detailed archaeological assessments aim to ensure that to the extent possible, areas of impact are clear of marine heritage receptors ahead of any intrusive works or further mitigation and archaeological campaigns are taken.

6.7.9 Avoidance is considered the most effective form of protection, as per EN-3 (NPS, 2023). In the case of previously unlocated marine heritage receptors being identified during survey or construction works, TEZs will be established via the use of the PAD reporting until further investigation can be undertaken to determine the character of the discovery.

6.7.10 These TEZs may be lifted following further investigation and in consultation with the Archaeological Curators if the features are determined to be non-archaeological, or they may form the basis of an AEZ, to avoid further disturbance long-term.

6.7.11 The project specific PAD will be applied during any work where unknown archaeology may be encountered and is designed to operate when it is not practical or safe for an archaeologist to be present. The PAD does not replace the process of archaeological assessment and evaluation but rather acts as a safety net in the event of unexpected discoveries during the course of works.

6.7.12 Implementation of the PAD helps to ensure that any adverse effects of the development on sites, features or objects of potential archaeological significance encountered and/or recovered during project works are reduced by establishing rapid communication between key stakeholders, who are then able to implement appropriate mitigation. It should be noted that the implementation of the PAD protocol does not mitigate or avoid direct or indirect impacts on marine heritage receptors.

## MITIGATION FOR GEOPHYSICAL ANOMALIES OF ARCHAEOLOGICAL POTENTIAL

6.7.13 The combined geophysical data assessments undertaken to identify material of archaeological potential identified anomalies of low, medium, and high archaeological potential within the marine archaeology study area as detailed in Table 6.2.

6.7.14 While generally no active conservation strategy is proposed, AEZs have been applied to all known wrecks and contacts of high and medium potential. Exclusion zones will be revised in line with the most recent data and in agreement with Historic England.

6.7.15 Preservation *in situ* is ensured by the commitment to avoid all known marine heritage receptors and to further investigate areas of impacts ensuring the unknown receptors are located.

6.7.16 Where items are being removed and recovered from the seabed, conservation strategies will be clearly outlined in the relevant MSs produced and submitted to the Archaeological Curators ahead of any archaeological works.

6.7.17 Where items are being relocated from their original find spot to ensure that direct impact during construction activities can be avoided, strategies for relocation and methodologies for avoiding damage will be clearly outlined in the relevant MSs produced and submitted to the Archaeological Curators ahead of any archaeological works. Where any archaeological relocations are deemed necessary the Trinity and Sunk Deep Water Routes (DWR), utilised for shipping and navigation, will not be used for relocation sites to ensure the navigable depth is not reduced in these areas and also there will be no disruption to traffic movements.

6.7.18 Anomalies of low archaeological potential and magnetic anomalies >100 nanotesla (nT) without correlating seabed features have not been assigned AEZs due to the uncertainty of their archaeological potential. Further investigation of these sites will occur during future survey works, where possible (see Section 8.4 for further details) Avoidance of these features by micro-siting is recommended if there is potential for them to be impacted by the development.

6.7.19 It is possible these anomalies could represent material from wreck sites or other marine heritage receptors of significance but are not currently identifiable as such. If these anomalies are likely to be impacted, they should be assessed on a case-by-case basis, in agreement with the Archaeological Curators. Further assessment may be in the form of investigation undertaken in conjunction with ROV or UXO surveys.

**Table 6.2: Definition of archaeological potential**

| Archaeological potential | Archaeological definition |
|---|---|
| High | Anomalies considered to map material of archaeological interest such as wrecks or crash sites, buried, confirmed and potential palaeolandscapes, and their margins. |
| Medium | Anomalies that consist of defined structural outlines or coherent material distributions with strong backscatter, or clearly upstanding objects with shadow, or pronounced scour features; or a combination of these, interpreted as of possible archaeological interest but where further investigation would be required for more detailed interpretation. |
| Low | Anomalies considered to be of anthropogenic origin but likely related to modern activity with little or no archaeological significance such as modern debris, ropes, chains or fishing gear. |

6.7.20 Works during the construction, operation and decommissioning phases of the project should implement the project specific PAD (Appendix A) and any objects of archaeological potential should be reported, should an archaeologist not be present.

6.7.21 Anomalies assigned medium and high archaeological potential are probably of anthropogenic origin and of archaeological significance and have therefore been assigned AEZs based on their archaeological potential, their archaeological significance and their size as understood from the geophysical data assessment. For low potential and magnetic anomalies without correlating data the AEZs have been placed as a radius from the centre point. A gazetteer of the anomalies identified as high and medium potential and illustrations of high potential anomalies can be found in Appendix 1 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report.

6.7.22 Within the marine archaeology study area 235 high potential anomalies have been assigned 100 m AEZs (173 of these are magnetic anomalies which do not correspond with any records), and 98 medium potential anomalies have been assigned 50 m AEZs (15 of these fall entirely within the extent of a 100 m AEZ).

## MITIGATION FOR DEPOSITS OF GEOARCHAEOLOGICAL POTENTIAL

6.7.23 The baseline review, summarised in Section 5, supported by the geophysical survey data assessment, summarised in Section 5.4, and detailed in Sections 3 and 4 of Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report, has provided information on the location of palaeolandscapes and areas of geoarchaeological potential within the marine archaeology study area.

6.7.24 It is recognised that all phases of the development may cause direct impact to deposits which have the potential to be of geoarchaeological interest, however, the impact to the mentioned sediments will be restricted to the required burial and penetration depths, as outlined in Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage.

6.7.25 Geotechnical campaigns are currently planned post-consent and prior to construction and will be inclusive of the collection of archaeologically specific cores and archaeological objectives.

6.7.26 Any potential impact will be offset by the collection and analysis of geotechnical data, including dedicated cores for archaeological analysis. The geoarchaeological assessment will be undertaken using a phased approach to assessment and analysis of the collected geotechnical data resulting in project reports and a deposit model as prescribed in Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011) and further outlined in Section 8.4. This collection of geotechnical data and its subsequent geoarchaeological analysis will be used to contribute to seabed mapping and modelling of submerged prehistoric landscapes, resulting in a greater understanding of the prehistoric past and the use and habitation of submerged former terrestrial landscapes.

6.7.27 Specific archaeological sample locations will be recommended in addition to the geotechnical samples collected for the overarching geotechnical campaign. These will be outlined in specific method statements. Figure illustrates indicative potential locations where archaeological sampling may provide relevant information in building on the deposit model.

## MITIGATION FOR IMPACTS POST-CONSTRUCTION

6.7.28 To confirm the effectiveness of the established AEZs and other recommended mitigation, and the stability of marine heritage receptors, it is expected that some marine heritage receptors identified during the pre-construction surveys will require further monitoring.

6.7.29 Priority will be given to features and locations of high archaeological potential and significance located in proximity to installed infrastructure, particularly where archaeological potential and/or significance has been established through direct observation.

6.7.30 In addition to wrecks or wreck assemblages, attention will also be given to a range of feature types including discrete objects (historic anchors, aircraft components), magnetic anomalies with some degree of surface expression, possible debris, and areas of seabed disturbance.

6.7.31 The post-construction monitoring plan will be developed and submitted to the relevant Archaeological Curators and will outline the monitoring methodology and reporting structure.

## MITIGATION FOR UNEXPECTED ARCHAEOLOGICAL DISCOVERIES

6.7.32 Mitigation for unexpected archaeological discoveries is considered under the recommended archaeological objectives for geophysical and geotechnical surveys, and their subsequent archaeological review.

6.7.33 Additionally, any finds believed to be of archaeological potential that are identified and/or recovered by any operating vessels during construction, operation and maintenance or decommissioning phases and where an archaeologist is not present will be reported using the methodology outlined in the project specific PAD (Appendix A).

6.7.34 The VE PAD has been produced in reference to the Offshore Renewables Protocol for Archaeological Discoveries (The Crown Estate, 2014). The VE PAD aims to mitigate impact on the historic environment by enabling people working offshore to report their finds in an effective and convenient manner.

6.7.35 The PAD anticipates discoveries being made by project staff who report to a Site Champion (potentially the Client Representative on the vessel or another manager appointed by the contractor), who then reports to VE's nominated person to coordinate implementation of the PAD (the Nominated Contact) (see Section 6.4).

6.7.36 All discoveries of archaeological material must be reported by VE, in accordance with the communication plan, to the Nominated Contact, who will then inform the Retained Archaeologist. If the find constitutes 'wreck' within the terms of the Merchant Shipping Act 1995 then the Retained Archaeologist will produce a report to the Receiver of Wreck. Full contact details for all relevant parties are included in Appendix A of this document.

6.7.37 Any finds discovered will be safeguarded, for instance, kept in water in a clean, covered container. It is not recommended to remove concretion, clean the finds, or in any other way interfere with them.

6.7.38 Following the application of the measures outlined above, there may be other discoveries during offshore works or geophysical data assessments that have not been previously characterised through the archaeological assessments. Any discoveries that are of archaeological potential may require TEZs to be established.

6.7.39 TEZs must be respected during all activities associated with the wind farm construction, operation and maintenance, and decommissioning phases. Measures will be put in place to communicate the position of TEZs to all contractors and to monitor compliance with the TEZs during construction, operation and maintenance and decommissioning. As with AEZs, TEZs must also consider that the use of anchors and lines, which could impact upstanding features, are adequately considered in the planning of operations.

6.7.40 Following an assessment of the available data for the discovery, ground truthing or new information, the Retained Archaeologist will (in agreement with the curator, Historic England), provide advice on whether the TEZ may be lifted or will form the basis of a permanent AEZ and become applicable for all activities associated with VE across all phases of development.

6.7.41 Further archaeological works required as a result of the discovery will be undertaken subject to a MSs and followed by archaeological reporting.

## 6.8 FURTHER ARCHAEOLOGICAL WORKS

6.8.1 There are several recommended mitigation measures related to the various construction, operation and maintenance and decommissioning activities. The geophysical and geotechnical surveys can be undertaken prior to construction, other actions linked to future activities, such as AEZs and the post-construction monitoring plan, which will ensure that potential impacts during the decommissioning phase will be mitigated.

6.8.2 Future planned works, such as further high-resolution surveys, which may have an impact on potential marine heritage receptors and where archaeological assessment will be undertaken will require detailed MSs to be agreed by the relevant curator/s as per this Outline Marine WSI which will be used to form the Draft and final Agreed Marine WSIs.

6.8.3 Where relevant, future surveys will include archaeological objectives and be collected following parameters to ensure they are suitable for archaeological review.

6.8.4 Following The Crown Estate's 2021 guidance, this Outline Marine WSI forms the framework for the assumed mitigation that will be submitted with the DCO application. A pre-commencement survey Draft Marine WSI, based on this document, will follow, to be agreed with the Regulator prior to surveys taking place to ensure archaeological objectives continue to be considered.

6.8.5 Should consent be obtained, a final Agreed Marine WSI, based on the Draft Marine WSI, will be submitted. This final Agreed Marine WSI will set out the overarching approach to survey and archaeological investigation agreed by the Regulator prior to pre-construction works commencing; outline when supporting archaeological methodologies will be required and to who and how they are to be submitted for approval prior to work commencing; and outline a post-construction monitoring plan detailing monitoring of mitigation and requirements for further surveys. The datasets in the final Agreed Marine WSI will be updated during the construction phase with results from pre-construction surveys.

6.8.6 Archaeological works may be undertaken as separate investigations depending on the timing of work or as part of other project campaigns. Reports generated from each site investigation or survey will be made available between relevant contractors as soon as they become available.

6.8.7 Any future survey that generates relevant data (both geophysical and geotechnical) will be reviewed. Generally, each phase will provide incrementally greater resolution and more complete coverage as the final scheme footprint becomes more defined.

6.8.8 Further archaeological works, including documents and surveys are summarised in Table 6.3, as per The Crown Estate's 2021 guidance.

**Table 6.3: Further archaeological works**

| Archaeological assessment/document | Summary | Timescale |
|---|---|---|
| ES Offshore Archaeology and Cultural Heritage Chapter | Examines the likely significant effects (EIA term) that may be experienced as a result of VE on marine heritage receptors. | Q3/4 2023. |
| ES Offshore Archaeology Technical Report | Identifies known and potential marine archaeological resources within the offshore part of the Proposed Development of the ES proposed Order Limits and wider marine archaeology study area and provides an assessment of the potential effects on the marine heritage receptors likely to be impacted by the development of VE. | Q3/4 2023. |
| ES Outline Marine WSI | Based on this document. Considers required mitigation and offsetting works through archaeological actions in relation to the offshore phases, and further presents expected impacts, recommended archaeological mitigation (in form of the environmental measures) methodologies and actions for a | Q3/4 2023. |

| Archaeological assessment/document | Summary | Timescale |
|---|---|---|
| | range of work phases within the marine environment. | |
| Draft Marine WSI | Based on the ES stage Outline Marine WSI, to be agreed with the Regulator to ensure archaeological objectives are considered and impacts on marine heritage receptors are avoided and mitigated. | To be submitted post DCO application. |
| PAD training | Training for all relevant project staff and contractors for what to do and who to contact in the event of the discovery of unexpected or unidentified archaeology. | To occur post consent. |
| Geotechnical campaign | Archaeological core sample locations will be recommended based on desk-based and Sub-Bottom Profiler data to further assess the palaeoarchaeological potential of the development area. A phased approach to core sampling will be undertaken to further assess where sites of palaeoarchaeological importance are located and what can be determined from the sediments they contain. All survey works will be preceded by a specific MS and include specific research questions and specific details of methodologies. | To occur post consent, pre-construction |
| Archaeological watching briefs | If deemed necessary, a watching brief to monitor sites of potential archaeological interest and/or significance. This would be preceded by a specific MS. | To occur post consent. |
| Final Agreed Marine WSI | Based on the Draft Marine WSI, to set out the overarching approach to survey and archaeological investigations agreed by Regulator ahead of the commencement of any pre-construction works. This document outlines when supporting archaeological methodologies will be required, and to who and how they are to be submitted for approval prior | To be finalised following DCO application but before construction activities. |

| Archaeological assessment/document | Summary | Timescale |
|---|---|---|
| | to work commencing. The datasets within the Final Marine WSI will be updated through the pre-construction phase to include relevant results. | |
| Construction Method Statement | A MS to set out archaeological mitigation during the construction phase following any updates to the Final Marine WSI to include results from pre-construction surveys. | To occur post consent. |
| Archaeological post-construction monitoring plan document | An outline for the archaeological post-construction monitoring plan to understand the potential changes to known archaeological sites and ensure appropriate mitigation can be established. | To occur post consent. |
| Post-construction and operation and maintenance Method Statements | Specific MSs for post-construction monitoring and operation and maintenance activities. | To occur post consent. |
| Decommissioning Environmental Impact Assessment, final Agreed Marine WSI and Method Statements | Updates to the EIA, reflected in updates to the Draft or final Agreed WSI and further MSs. | To occur prior to decommissioning. |

# 7 RESPONSIBILITES AND COMMUNICATION

## 7.1 THE APPLICANT

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

7.1.2 Consultation with Historic England will be maintained throughout the mitigation works. Historic England act as a specialist advisor for the Marine Management Organisation (MMO) for the English area of the UK Territorial Sea to ensure the protection of the environment including sites of historic or archaeological interest during licensable activities. Historic England advise on licensable activities within the adjacent UK marine area (200 nautical miles offshore or the median line with an adjacent state) with the need to protect the environment, inclusive of any site that comprises of remains of any vessel, aircraft, or marine structure of historic or archaeological interest.

7.1.3 The owners' rights and responsibilities in relation to the seabed differ from the onshore and terrestrial historic environment in that within the marine zone an historic asset will either be reported to and reconciled by the Receiver or Wreck (in the case of a wreck or wreck material being discovered) if there is any attempt to recover it, or where the historic asset is not a wreck, it is considered as being owned by the landowner (in most cases The Crown Estate). In all cases, if the disturbance of historic assets is planned, their importance must be determined, and appropriate mitigation must be established.

7.1.4 Curatorial responsibility for the aspects of VE landward of MLWS resides with the terrestrial local authorities, Essex County Council.

7.1.5 Communication with the Archaeological Curators is the responsibility of The Applicant.

7.1.6 The Applicant:

- Will engage a Retained Archaeologist to implement the final Agreed WSI;
- May engage one or more archaeological contractors to deliver the mitigation measures set out within this Outline Marine WSI;
- Will advise the Retained Archaeological of all requirements or responsibilities related to communication with curators and contractors, or in in relation to scheme-wide documentation; and
- Is responsible for all communication with contractors engaged for construction activities.

## 7.2 RETAINED ARCHAEOLOGSIT/ ARCHAEOLOGICAL CONTRACTORS

7.2.1 The Retained Archaeologist will report to The Applicant and will provide advice to The Applicant to inform communication with the curators and contractors in relation to implementation of the final Agreed WSI.

7.2.2 The responsibilities of the Retained Archaeologist are as follows:

- Maintaining, reviewing, and updating the Marine WSIs (outline, draft final Agreed), as required;
- Advising The Applicant's contractor(s) as to which activities warrant archaeological involvement;

- Advising The Applicant's contractor(s) while evaluating scope of work specifications on their capacity to meet archaeological requirements;
- Advising The Applicant on the necessary interaction with third parties with archaeological interests, including the Archaeological Curators;
- Advising The Applicant on the implementation of generic archaeological requirements applicable to all construction activities;
- Advising The Applicant on MSs for archaeological investigations (which will be submitted to the curators);
- Advising The Applicant on survey specifications required for appropriate archaeological analysis to ensure that archaeological considerations are reflected in the survey design for both archaeological and non-archaeological surveys;
- Implementing and monitoring the PAD;
- Monitoring the work of and liaising with the archaeological contractor(s) where this is not the Retained Archaeologist;
- Reviewing available geophysical and geotechnical data and/ or reports that can inform the location of AEZs;
- Monitoring the preparation and submission of archaeological reports as appropriate and making them available to the Archaeological Curators;
- Ensuring provision for the management of The Applicant's material archive in consultation with an appropriate museum or suitable repository;
- Monitoring the preparation and submission of a post construction monitoring plan as appropriate and making it available to the Archaeological Curators; and
- Advising The Applicant on final arrangements for analysis, archive deposition, publication, and popular dissemination.

7.2.3 The archaeological documents submitted up to the current stage of development are described in Table 5.1.

## 7.3 ARCHAEOLOGICAL CURATORS

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

## 7.4 CONSTRUCTION CONTRACTORS

7.4.1 The construction contractors will report to The Applicant and will further:

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

- Implement the project-specific PAD and facilitate training for relevant staff.

# 8 SCHEMES OF INVESTIGATION

## 8.1 INTRODUCTION

8.1.1 These schemes of investigation represent a general foundation for all further archaeological works that may eventually be a condition of consent and will be updated, post-consent, to detail the specific packages of archaeological works that have been agreed. Individual MSs for each package of works will be produced to detail the nature of archaeological works to be carried out.

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

- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (COWRIE, 2008);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England, 2015);
- Deposit Modelling and Archaeology Guidance for Mapping Buried Deposits (Historic England, 2020);
- Commercial Renewable Energy Development and the Historic Environment Advice Note 15 (Historic England, 2021);
- Historic Environment Guidance for the Offshore Renewables Energy Sector (COWRIE, 2007);
- Joint Nautical Archaeology Policy Committee (JNAPC) Code for Practice for Seabed Development (JNAPC, 2006);
- Marine Geophysics Data Acquisition, Processing and Interpretation (English Heritage, 2013);
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021);
- Protocol for Archaeological Discoveries: Offshore Renewables Projects (ORPAD) (The Crown Estate, 2014);
- Universal guidance for Archaeological Field Evaluation (CIfA, 2023a);
- Universal guidance for archaeological monitoring and recording (CIfA, 2023b);
- Standard and guidance for the collection, documentation, conservation and research of archaeological materials (CIfA, 2014a, updated 2020);
- Standard and guidance for commissioning work on, or providing consultancy advice on, archaeology and the historic environment (CifA, 2014b, updated 2020);
- Standard and guidance for nautical archaeological recording and reconstruction (CifA, 2014c, updated 2020);
- Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (CIfA 2014d, updated 2020).

8.1.3 The schemes of investigation below include guidance outlining the requirements and expected standards in relation to:

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

- Marine geoarchaeological investigations;
- Investigations using divers and/ or ROVs; and
- Watching briefs.

## 8.2 ARCHAEOLOGICAL RECORDING, REPORTING, DATA MANAGEMENT AND ARCHIVING

8.2.1 Any future archaeological works will be accompanied by written reports pursuant to the requirements of those works and demonstrating appropriate planning, recording and data management and commitment to archiving and public dissemination of results according to the guidance summarised in the below sections and set out in Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021) and Historic Environment Guidance for the Offshore Renewables Energy Sector (COWRIE, 2007).

## 8.3 METHOD STATEMENTS

8.3.1 Any future archaeological works, including those required as a condition of consent, will be subject to a Method Statement (MS) being prepared in advance of works, with appropriate time for review and agreement.

8.3.2 Each MS will be submitted to the Archaeological Curators a minimum of 20 working days before the commencement of planned works and archaeological works will not commence unless the Archaeological Curators have confirmed their agreement.

8.3.3 The specifications for MSs are based on archaeological best practice and guidance for offshore development. The principal sources are:

- A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (Second Edition) (Historic England, 2011);
- Marine Geophysics Data Acquisition, Processing and Interpretation (English Heritage, 2013);
- Deposit Modelling and Archaeology Guidance for Mapping Buried Deposits (Historic England, 2020);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England, 2015);
- People and the sea: a maritime archaeological research agenda for England (Research Reports No 171) (Ransley et al., 2013);
- Universal guidance for Archaeological Field Evaluation (CIfA, 2023a);
- Universal guidance for archaeological monitoring and recording (CIfA, 2023b);
- Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials (CIfA, 2014a, updated 2020);
- Standard and Guidance for Commissioning Work on, or Providing Consultancy Advice on, Archaeology and the Historic Environment (CIfA, 2014b, updated 2020);
- Standard and Guidance for Nautical Archaeological Recording and Reconstruction (CIfA, 2014c, updated 2020); and
- Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (CIfA 2014d, updated 2020).

8.3.4 MSs will include provision for Archaeological Curators to monitor the conduct of the archaeological work as appropriate.

8.3.5 Unless otherwise agreed, the MS will address the following matters:

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

## 8.4 ARCHAEOLOGICAL CAMPAIGNS

8.4.1 For all aspects of marine geophysical investigations, The Applicant will adhere to standards and guidance as set out in the Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021). The archaeological assessment of new marine geophysical data will aim to avoid significant impacts through aiding further identification and clarification of known and potential marine heritage receptors as stated in Section 6.5. The acquisition and review of new data for archaeological purposes as required will contribute to effective planning of this project and to any requirements to offset unavoidable impacts to potential archaeology.

## GEOPHYSICAL SURVEYS

8.4.2 The specification of any proposed pre-works marine geophysical surveys, whether their primary aim is archaeological or non-archaeological, will be formed in keeping with the guidance in Marine Geophysical Data Acquisition, Processing and Interpretation (English Heritage, 2013). All surveys will be subject to advice from an archaeological contractor to ensure that archaeological input is provided at the planning stage and to enable archaeological considerations to be reflected without compromising the primary objective of the survey. This will ensure that survey objectives can be clearly set at the planning stage and maximum value from data recovered can be derived.

8.4.3 Surveys whose primary objectives are non-archaeological (e.g., engineering, or environmental) will include embedded archaeological objectives within the overall survey design. Where deemed necessary, an archaeologist or geophysicist with appropriate archaeological expertise will be onboard during the acquisition of data. If archaeologists are onboard, they will advise on the suitability for archaeological purposes of the data being acquired and be able to propose minor changes to the survey method, settings, etc. in order to optimise archaeological results, and thereby minimise the need for repeat surveys.

8.4.4 Where a survey is carried out primarily to meet archaeological objectives, the specification shall be prepared by the Retained Archaeologist or an archaeological contractor and carried out by a survey contractor.

8.4.5 New geophysical survey data will be interpreted by an archaeologist with an appropriate level of expertise. Raw survey data, together with factual reports and track plots, will be made available in digital formats to the Retained Archaeologist or an archaeological contractor. The results of further geophysical interpretation will be compiled as an archaeological report consistent with guidance within Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021).

## GEOTECHNICAL SURVEYS

8.4.6 As part of the DCO conditions geotechnical surveys will occur prior to construction and will incorporate archaeological objectives as per the mitigation detailed in Section 6.

8.4.7 Archaeological involvement in the planning, acquisition and review of any geotechnical surveys including pre-construction will be provided by the retained archaeologist or a suitable archaeological contractor following early discussions with Historic England.

8.4.8 All details on methodologies, strategies and research questions must be included in the agreed activity specific MS, see Section 8.3.

8.4.9 Sediment coring is usually the method used to obtain detailed information on seabed geology and stratigraphy used by offshore developers. A number of standard coring methodologies, techniques and types of equipment can be used to recover undisturbed, stratigraphic sediment samples.

8.4.10 Geotechnical coring can be used for providing detailed understanding of deeply buried stratigraphy in the investigation of submerged prehistory and palaeoenvironments. The assessed data can aid in the production of deposit models and contribute to models used to predict areas of high archaeological potential.

8.4.11 Commonly used techniques are vibrocore and boreholes where a sleeve is mechanically driven into the seabed from a vessel and a column of the sediment it passes through can be recovered.

8.4.12 Vibrocores can generally penetrate the seabed up to 8m and the sediments are collected in PVC sleeves that contain the stratigraphy of the deposits. Vibrocores can be opened and tested offshore or brought onshore, most commonly they are then cut into 1m sections, capped and further tested in geotechnical laboratories.

8.4.13 Boreholes can generally go deeper than vibrocores and can reach 50 to 60m Below Sea Bed (BSB), however the penetration depth depends on the sediments present as well as the constitution of the bedrock. When deploying boreholes, the sediment is commonly brought up in re-usable steel tubes up to 1m lengths, quickly recorded and deposited in bags noting the depth BSB while occasionally approximately 50cm samples in liners are taken at specific depths through the coring. The stratigraphy of the deposits is therefore not always contained when using boreholes.

8.4.14 Another method for data gathering is Cone Penetration Testing (CPT). CPT does not produce a sediment sample; it measures variations in sediment shear strength and is able to distinguish boundaries and changes in sediment units with limited benefits to geoarchaeological assessments.

8.4.15 Early discussions between geotechnical and archaeological contractors about their respective data and sampling needs must happen to ensure that beneficial working arrangements and timetables are agreed ahead of any geotechnical works as outlined in the mitigation detailed in Section 6. Details on agreements for example on where the archaeologist will have access to the cores before they are split and bagged must be included in the agreed activity specific MS.

8.4.16 As the VE OWF has overlapping boundaries with the North Falls Offshore Wind Farm Project discussions ahead of geotechnical works within both developments should outline clear objectives for determining geographical association of cross cutting palaeochannels between these proposed developments and ensure efficiently in utilising data from both developments while avoiding duplicate sampling locations. The proposed strategies and methods will be outlined in the activity specific MS.

8.4.17 When the geotechnical data has been gathered as per the agreed activity specific MS as detailed in Section 8.3. The aim of the archaeological assessment of geotechnical data is to:

- Investigate the environment within which the sediments samples were deposited;
- Evaluate the potential for past human exploration of past environments;
- Produce an overview of the geological stratigraphy; and
- Comment on the archaeological importance within the context of the palaeoenvironmental history and include current research frameworks such as North Sea Prehistory Research and Management Framework.

8.4.18 To meet the aims described above the archaeological assessments of geotechnical data will consist of a number of stages of work as outlined in Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011).

8.4.19 Stage 1 Desk Based Assessment, archaeological review of geotechnical logs and the initial formation of a deposit model;

8.4.20 Core logs derived from all collected vibrocores and boreholes will be reviewed by a qualified marine archaeologist. Cores that contain sediments or layers of potential archaeological interest will be identified and recorded using the agreed methodology. Such sediments or layers are likely to be composed of fine grained sediments that are indicative of estuarine, riverine, lacustrine or coastal environments and organic material including plant material and peat

8.4.21 Stage 2: Splitting and recording geotechnical cores;

8.4.22 Cores identified as possessing archaeological potential during Stage 1, will be subject to detailed recording to determine the presence or absence of archaeologically relevant material. Records will include notes on sediment colour, type, inclusions, material suitable for dating and palaeoenvironmental evidence. The cores will be split, cleaned, photographed and recorded. If cores are obtained for Optically Stimulated Luminescence (OSL) dating (as determined in the Final WSI) they will be appropriately collected, stored and only opened in a suitable OSL laboratory to ensure that samples will not be compromised.

8.4.23 Stage 3: Sub-sampling and assessment;

8.4.24 Where cores or contexts with the potential to yield archaeological information are identified during Stage 2, these would be subject to sub-sampling and assessment in laboratory conditions. The sub-sampling will generally collect between 50 - 500g and aim to gather information on insects, beetles, rodents, wood, pollen, diatoms and/or foraminifera. If appropriate, suitable samples will also be sent to specialist for further dating.

8.4.25 Stage 4: Analysis and dating;

8.4.26 This stage will subject samples extracted during Stage 3 to detailed laboratory analysis. This stage will result in an account of the successive environments within the coring area, a model of environmental change over time, and an outline of the archaeological implications of the analysis

8.4.27 Stage 5: Reporting and publication;

8.4.28 The format is designed to flow sequentially with each phase leading to the next and subsequent phase of work or representing the end of the assessment if the findings of any stage show that no further work is necessary. The results of all the phases of the archaeological assessment undertaken will be used in the project assessment report to:

- Describe the sedimentary sequence, relative chronology and character of the area;
- Describe the topography of the area and past changes in its environment;
- Describe the archaeological potential of the deposits within the area; and
- Inform the development of a deposit or landscape model of the area

8.4.29 Preliminary, archaeological core locations, recommended in addition to forthcoming geotechnical cores based on sub-bottom data and desk-based data are illustrated in Figure 11.9. It is likely that these will be refined in an activity specific MS ahead of any geoarchaeological works.

### DIVER AND ROV SURVEYS

8.4.30 It is possible that certainty of the nature and extent of individual marine heritage receptors or anomalies may only be achieved through the use of diver and/ or Remote Operated Vehicle (ROV) survey. For all aspects of archaeological investigations using divers or ROVs, The Applicant will adhere to standards and guidance as set out in the Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021) document.

8.4.31 To maximise the potential benefits of any proposed diver/ ROV surveys undertaken primarily for engineering, ecological or other non-archaeological purposes, The Applicant will seek archaeological input at the planning stage of any such works to ensure that archaeological objectives can be clearly set and maximum value from data recovered can be derived. Where the primary objectives of dive survey are non-archaeological, consideration will be given to having an archaeological contractor present during any diver or ROV surveys, either as observers or participating divers to optimise archaeological results and thereby reduce the need for repeat survey. Following the completion of a non-archaeological diver/ ROV survey, all data, including video footage, will be reviewed by an archaeological contractor with appropriate expertise. All surveys will be preceded by an activity-specific MS as detailed in Section 8.3.

8.4.32 Where the primary objectives of diver/ ROV surveys are archaeological, the diving will be led by archaeologists. An archaeological diver or ROV-based assessment may be required where additional information is required to discern the archaeological interest and/ or significance of a site to apply the most appropriate mitigation. The results of these surveys will be compiled as an archaeological report consistent with guidance within the Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021) and Standard and guidance for the creation, compilation, transfer, and deposition of archaeological archives (CifA, 2014b).

### WATCHING BRIEFS

8.4.33 Archaeological Watching Briefs (also referred to as Archaeological Monitoring and Recording (CIfA, 2023b) by a suitably qualified archaeologist will be applicable where material of possible or known archaeological interest will be moved or removed from the seabed and can be visibly assessed.

8.4.34 A Watching Brief is a formal programme of archaeological monitoring and will involve attendance by an archaeological contractor during offshore works as described below;

- Any finds will be collected and allocated a record number, and their position will be logged;
- Archaeological features or structures will be examined;

- Where possible, a sufficient sample of each layer/ feature type will be investigated in order to elucidate the date, character, relationships and function of the feature/ structure;
- Works may have to be halted for consultation with client and archaeological curators;
- Recording will include written, drawn, and photographic elements as conditions allow; and
- The archaeological results including further in depth assessments of significant remains will be compiled as an archaeological report consistent with the Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021) on reporting.

## 8.5 REPORTING AND PUBLICATION

8.5.1 Any reports will be prepared in accordance with the guidance provided in the relevant Chartered Institute for Archaeologists (CifA) Standard and Universal guidance and with reference to any other activity or analysis specific guidance.

8.5.2 Reports will detail the work undertaken and the archaeological evidence encountered. They will discuss the importance of the results including their potential contribution to archaeological knowledge and understanding.

8.5.3 Reports will 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;
- An explanation of how this work is relevant to the objectives and research agendas from applicable local and national archaeological research frameworks;
- Proposals for further analysis and publication; and
- Illustrations and appendices to support the report.

8.5.4 Where appropriate the report will provide recommendations for further assessment and/ or analysis requirements. Each report will be submitted by The Applicant to the curator, as well as to appropriate National and Regional repositories, including the Online Access to the Index of Archaeological Investigations (OASIS).

## 8.6 ARTEFACTS

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

8.6.2 In the event of discovery of unexpected archaeology, the Retained Archaeologist will be informed immediately in line with the current Marine WSI (described in Section 6.2) and as described in the PAD (Appendix A). The Retained Archaeologist will notify the relevant legal authority, The Applicant, and the Archaeological Curator as soon as possible, and the discovery will be referred to the Archaeological Curator or other relevant authority. All recovered finds will be held by the Retained Archaeologist or appointed Archaeological Contractor in appropriate conditions pending further recording, investigation, study, or conservation, and reported via the Retained Archaeologist to the Receiver of Wreck.

8.6.3 In the event of the discovery of items that may be eligible for legal protection, the Retained Archaeologist will notify the relevant legal authority, The Applicant, and the Archaeological Curator as soon as possible.

8.6.4 The Retained Archaeologist will prepare and implement a finds monitoring and maintenance programme, which will cross-refer to finds management/ monitoring systems maintained by The Applicant, and their Contractor (for example, UXO Survey IDs).

8.6.5 Recovered objects will be selected, retained, or disposed of in accordance with the policy agreed with the institution receiving the archive, in consultation with the Archaeological Curators and guided by advice within the selection strategy toolkit developed by CIfA) https://www.archaeologists.net/selection-toolkit)

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

## 8.7 POST-FIELDWORK ASSESSMENT

8.7.1 Following any archaeological evaluation, ground truthing or watching briefs investigation reports detailing the works, archaeological assessment and recommended further actions will be submitted to the Archaeological Curators.

8.7.2 Should the recovery of archaeological material be deemed necessary, then decisions regarding the scope of post-fieldwork assessment will be made by agreement between The Applicant and Archaeological Curators following submission of investigation reports. These decisions will be based on the possible importance of the results in terms of their contribution to archaeological knowledge, understanding or methodological development.

8.7.3 A single post-fieldwork assessment may be carried out in respect of the investigations associated with the scheme as a whole. Such an assessment may be carried out by expanding the overarching archaeological report to include proposals in respect of analysis, publication, and archiving.

8.7.4 This assessment will be carried out by the Retained Archaeologist or archaeological contractor, and will address where possible the character and extent, date, integrity, state of preservation and relative quality of the archaeological features or remains. A budget proposal for any further research, analysis, publication, and archiving must also be provided.

8.7.5 An assessment of the potential of the archive for further analysis may include (but is not limited to) consideration of the following elements:

- The dating and dendrochronological assessment of timbers;

- The conservation of appropriate materials, including the X-raying of metalwork;
- The spot-dating of all pottery from any investigation. This will be corroborated by scanning of other categories of material;
- The preparation of site matrices with supporting lists of contexts by type, by spot-dated phase and by structural grouping supported by appropriate scaled plans;
- An assessment statement will be prepared for each category of material, including reference to quantity, provenance, range and variety, condition, and existence of other primary sources; and
- A statement of potential for each material category and for the data set as a whole will be prepared, including specific questions that can be answered and the potential value of the data to local, regional and national investigation priorities.

8.7.6 Where specialists are required for further analysis advice will be sort from relevant Archaeological Curators and guidance. For example, for pottery or ceramic finds may refer to A Standard for Pottery Studies in Archaeology (Barkley *et al*., 2016).

8.7.7 Where warranted, a discrete post-fieldwork assessment may be undertaken of the specific sites or investigations in advance of assessment of the investigations associated with the scheme as a whole.

## 8.8 ORDNANCE

8.8.1 Should any item(s) of ordnance be discovered, they will be treated with extreme care as they may not be inert. Industry guidelines provided by The Applicant and those set out in The Crown Estate's 2021 guidance must be followed prior to any recording of items for archaeological purposes.

8.8.2 There is the potential for ordnance to be of archaeological interest, especially when discovered with other related material from a ship or aircraft wreck. Recording of these items will only be undertaken when it has been assessed as safe to do so. Any firearms and ammunition (e.g., from a crashed military aircraft) are likely to be subject to the Firearms Acts (various dates) and ammunition should be regarded as ordnance, irrespective of its size.

8.8.3 Where applicable, a relevant MS will set out how to deal with the discovery of ordnance. It will set out whether for this stage of works The Applicant has engaged a specialist UXO Contractor and will clearly explain the communication process between them and the Retained Archaeologist or the archaeological contractor and any potential licensing requirements.

8.8.4 Should ordnance be discovered on the seabed during an archaeological diver/ ROV survey, it will be reported to the dive supervisor, and the dive team will follow the procedures set out in the MS. If the diver/ ROV survey is for non-archaeological purposes any information about the ordnance, such as reports from the specialist UXO Contractor should be forwarded to the Retained Archaeologist undertaking the archaeological assessment of ROV survey data. This includes reports of when the ordnance has been disposed of.

8.8.5 Should ordnance be discovered on-board a vessel when there is no archaeologist on-board, the Contractor or specialist UXO Contractor will take the lead, and the item should be reported through the PAD, if safe to do so.

## 8.9 HUMAN REMAINS

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

- For human remains which are intentionally buried the process set out in the DCO article 18 'removal of human remains' will apply; and
- In all other cases, the Retained Archaeologist will immediately inform the Coroner and the Police.

8.9.2 Where practical, the human remains will be left *in situ*, covered, and protected. Where human remains have been found and development will unavoidably disturb them, the remains will be fully recorded, excavated, and removed from the site in accordance with the DCO and the advice of an appointed Project Osteologist as per guidance in The Role of the Human Osteologist in an Archaeological Fieldwork Project (Historic England, 2018).

## 8.10 AIRCRAFT

8.10.1 The majority of aircraft wrecks are military and so fall under the legal protection of the Protection of Military Remains Act 1986. Under this Act it is an offence to tamper with, damage, move or unearth any items at such sites unless the Ministry of Defence (MoD) has issued a licence authorising these activities. A licence is required regardless of whether the aircraft was in service of another nation's armed forces at the time of wrecking.

8.10.2 Application for a licence, and any subsequent work, will be undertaken in line with Crashed Military Aircraft of Historical Interest: Licensing of Excavations in the UK: Notes for Guidance of Recovery Groups (Ministry of Defence, 2011). Should human remains be discovered, they should not be touched, but must be reported immediately to the Ministry of Defence.

8.10.3 Any finds that are suspected of being military aircraft will be reported immediately to the Retained Archaeologist (where appointed), as well as The Applicant and the Joint Casualty and Compassionate Centre of the MoD. In the case of a military aircraft being investigated under license, any human remains will be reported immediately.

## 8.11 WRECK

8.11.1 There are currently no wrecks protected under the Protection of Wrecks Act 1973, the Protection of Military Remains Act 1986 or the Ancient Monuments and Archaeological Areas Act 1979 that have been recorded or identified within the marine archaeology study area. It is possible that significant discoveries will be made during survey work and subsequently protected under these Acts.

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

8.11.3 The Retained Archaeologist will prepare the reporting forms and submit them to The Applicant to be signed and submitted to the Receiver of Wreck. Due to the legal responsibilities under the Merchant of Shipping Act 1995; the responsibility for reporting ultimately rests with The Applicant.

8.11.4 Any artefacts reported to the Receiver of Wreck will be stored in a secure location until a closure letter has been received for the droit, offering title for the material, should no owner be found.

## 8.12 CONSERVATION AND STORAGE

8.12.1 All recovered materials, on land and underwater, will be subject to a Conservation Assessment to gauge whether special measures are required while the material is being held. This assessment will take place no more than four weeks after recovery.

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

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

8.12.4 Specialist conservation work, based on the recommendations prepared by the Retained Archaeologist will be applied following consultation with The Applicant and the Archaeological Curators. The Retained Archaeologist is responsible for all quality assurance and monitoring of works conducted.

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

8.12.6 Storage for geotechnical samples will be carried out in line with the English Heritage Environmental Archaeology guidance (Campbell and Moffett, 2011), including keeping samples in stable conditions, away from light, air and heat; keeping relevant records safe and accessible; and avoiding long term storage wherever possible. Good practice for core storage will be outlined in a specific MS and is essential to allow for geoarchaeological analysis and sampling to be carried out effectively.

## 8.13 ARCHIVING

8.13.1 Archiving will follow best practice as laid out within:

- Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation. Archaeological Archives Forum (Brown, 2011);
- Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (CIfA, 2014d, updated 2020);
- Dig Digital: A guide to managing digital data generated from archaeological investigations (DigVentures, 2019); and
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (Section 13.5: Archiving) (The Crown Estate, 2021).

8.13.2 Archive planning will be included within the relevant detailed MS. Agreement with the Archaeological Curators will be sought on the most appropriate archiving repository for either individual reports or the proposed development as a whole. For example, the online system for reporting archaeological investigations and linking research outputs and archives, OASIS.

8.13.3 The data management plan of the archaeological archive will:

- Ensure that records and materials are well-organised, and have the potential for re-use, further research and/ or other curatorial use that will further our archaeological understanding;
- Increase the opportunities for promotion of, and engagement with, the archaeological archive;
- Enable a better understanding of, and preparation for, the preservation requirements of the working project archive prior to the transfer of the archaeological archive into a repository;
- Help ensure all relevant procedures and guidance have been considered and followed at all stages of the project;
- Promote better collaboration between all stakeholders;
- Improve the active management if the working project archive, the adequate location of funds and staffing, and the efficient use of available storage space and resources; and
- Implement the FAIR principles of ensuring data is findable, accessible, interoperable, and reusable.

8.13.4 As a minimum, copies of all reports will be submitted to the NRHE (currently undergoing updates) of England. An OASIS form will be produced for the Proposed Development and copies of associated reports will be attached to this report. The NRHE of England will also be provided with notice of submission of the OASIS form.

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

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

# 9 ARRANGMENTS FOR REVIEW OF THE MARINE WSI

9.1.1 This Outline Marine WSI has presented mitigation measures based on the archaeological assessments undertaken in preparation of the VE ES. This document forms the framework for mitigation that will inform the Draft Marine WSI, following review and consultation with the relevant stakeholders.

9.1.2 It is expected to be a condition of the DCO that a Marine WSI is in place and that licensed activities, or any phase of those activities, must not commence unless a Marine WSI developed in consultation with the statutory historic body has been submitted to and approved by the MMO.

9.1.3 The methodological frameworks for the archaeological analysis and interpretation of survey data throughout the lifetime of the project are set out in this Outline Marine WSI but may be reviewed in consultation with the Archaeological Curators prior to the Draft Marine WSI to best ensure archaeological objectives are considered.

9.1.4 Following indicative timeline set out in The Crown Estate's 2021 guidance, the Marine WSI will undergo revisions throughout the different phases of development of VE:

- Pre-consent, the Outline Marine WSI then Draft Marine WSI will form the framework for mitigation based on archaeological objectives, and
- Post-consent the final Agreed Marine WSI will set out the details of the overarching approach to survey and archaeological investigations and when supporting archaeological methodologies will be required.

9.1.5 Prior to pre-commencement surveys, the Draft Marine WSI will need to be refined and updated, for approval by the MMO in consultation with Historic England, once the final distribution footprint of turbines (including quantity and spacing), offshore substation locations, and offshore export cable routes are determined, as well as the identification of new marine heritage receptors, or changed understanding of existing assets. The revision will constitute a final Agreed Marine WSI to be prepared prior to commencement of relevant licensed activities, to which detailed MSs will be appended.

9.1.6 MSs will be produced and submitted to the Archaeological Curators for all planned archaeological works and include provision for the monitoring of progress of the investigations.

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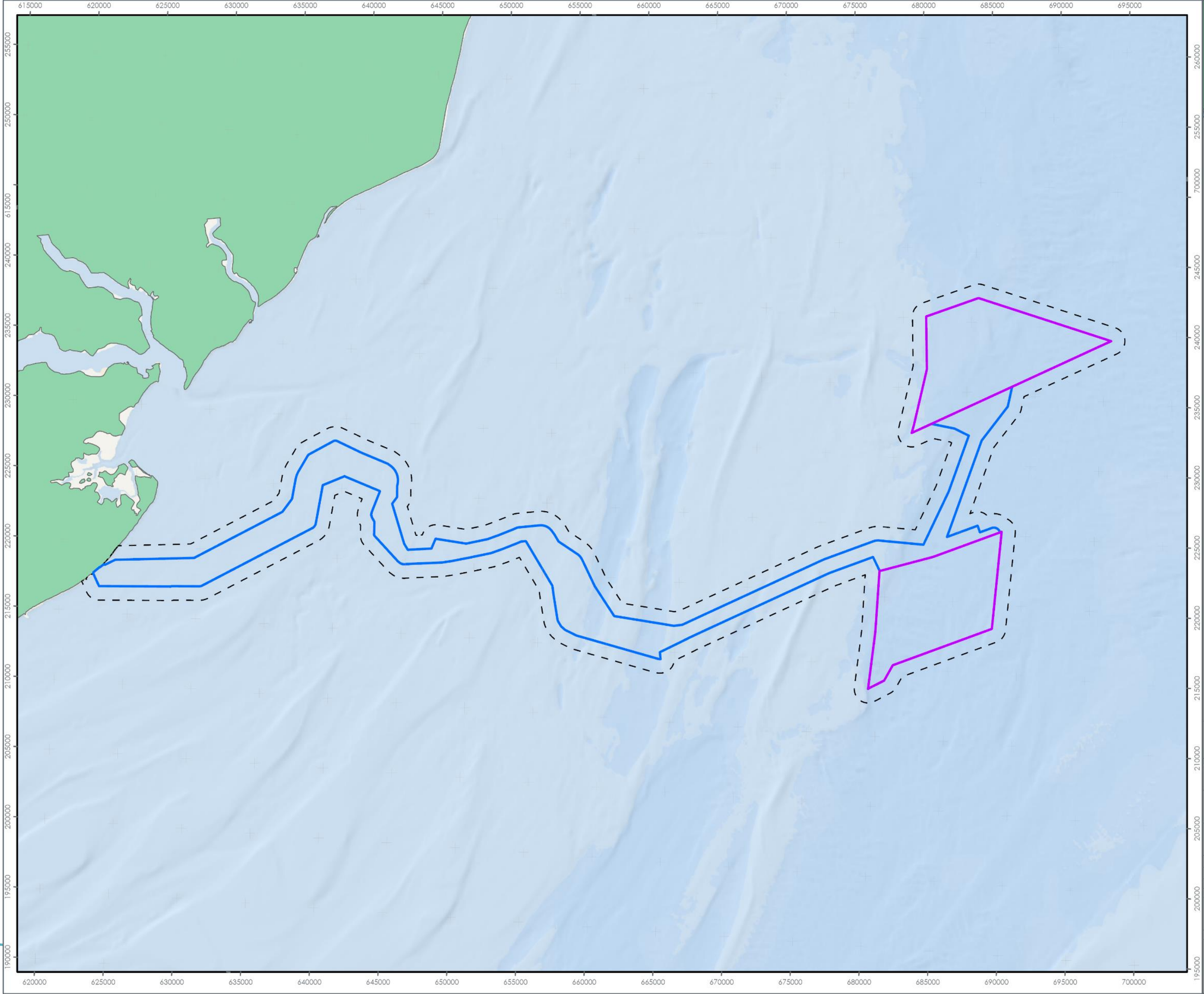


**LEGEND**

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area

0 2.5 5 10

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

**Marine Archaeology Study Area and ES proposed Order Limits**

| VER | DATE | REMARKS | Drawn | Checked |
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DRAWING NUMBER: 11.2.1

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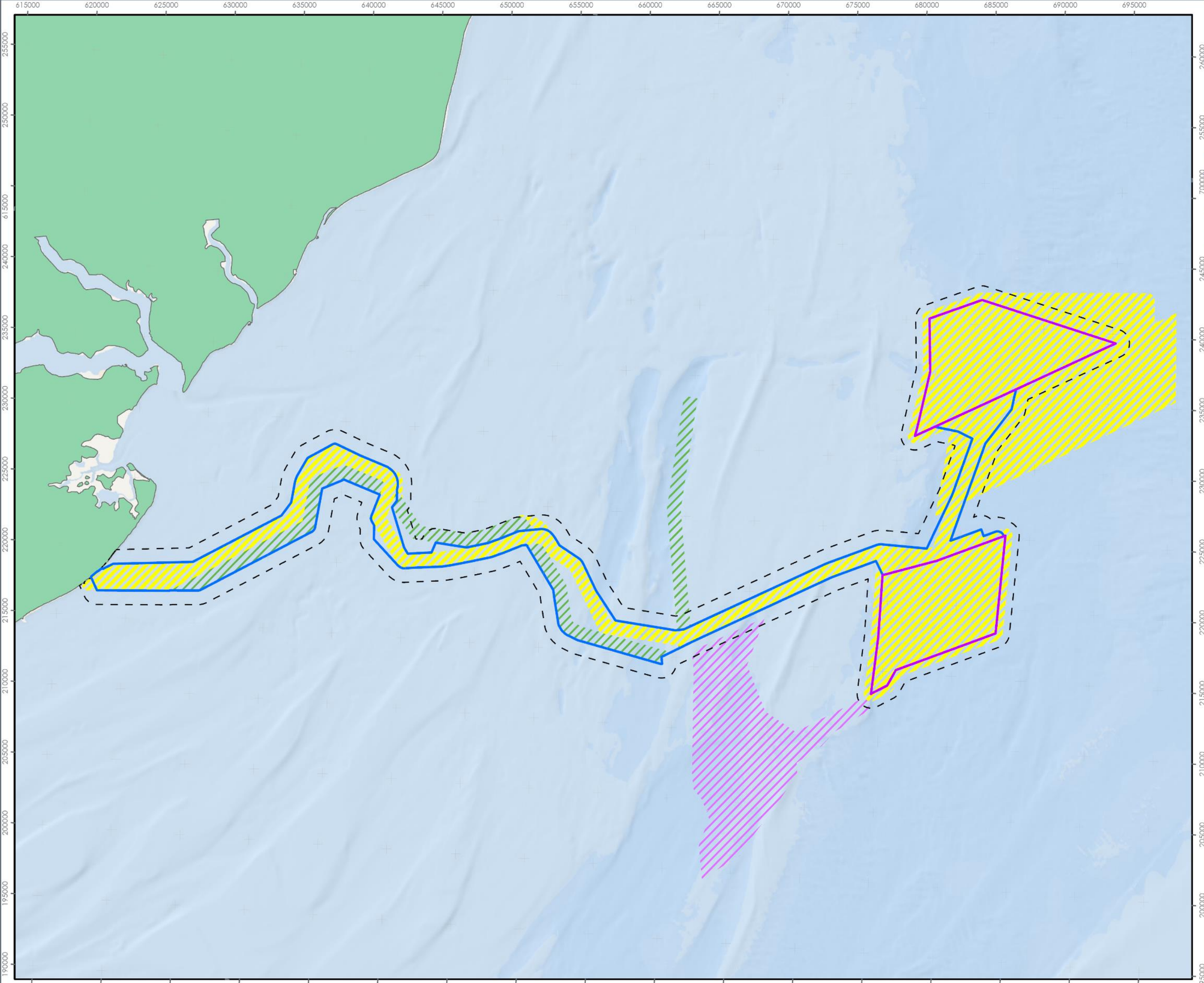
FIVE ESTUARIES
OFFSHORE WIND FARM




LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- VE Geophysical Survey Extent
- North Falls Offshore Array Boundary
- North Falls Export Cable Route Boundary

0 2.5 5 10

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

**Geophysical data coverage**

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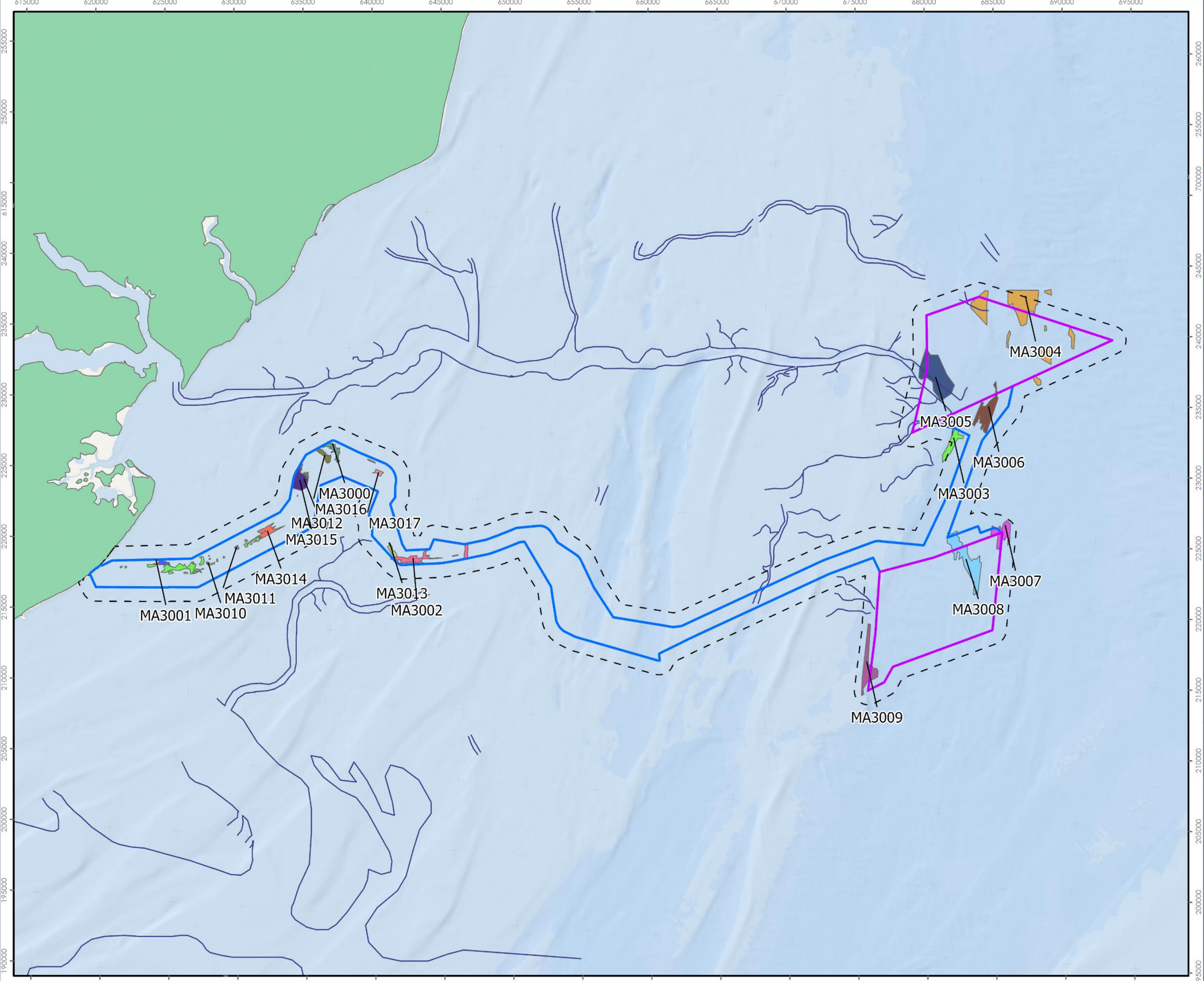


LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- Interpreted channel systems (EMU, 2009)

Channels with geoarchaeological potential

- MA3000
- MA3001
- MA3002
- MA3003
- MA3004
- MA3005
- MA3006
- MA3007
- MA3008
- MA3009
- MA3010
- MA3011
- MA3012
- MA3013
- MA3014
- MA3015
- MA3016
- MA3017

0 2.5 5 10

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

**Valleys and channels of geoarchaeological potential**

| VER | DATE | REMARKS | Drawn | Checked |
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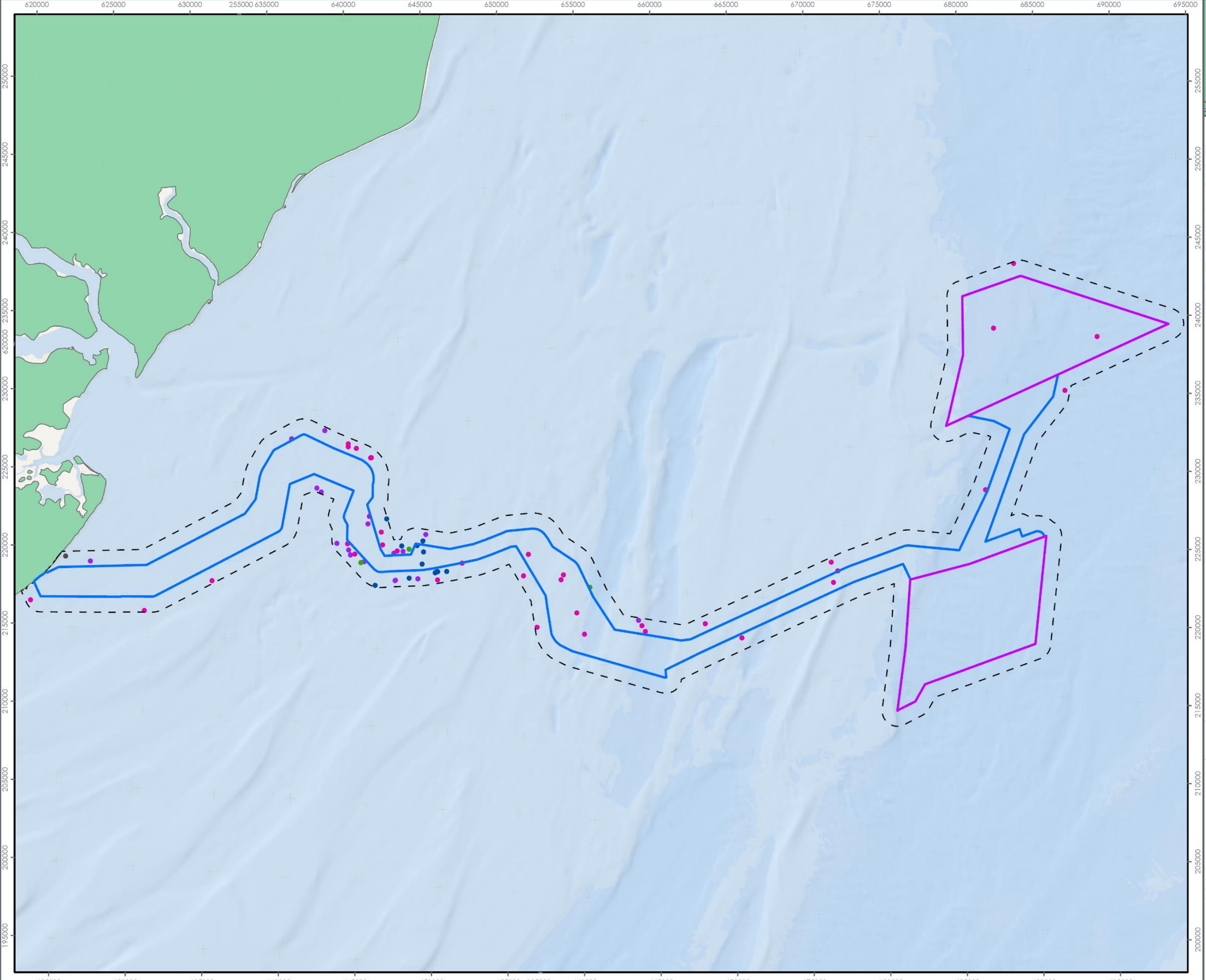
FIVE ESTUARIES OFFSHORE WIND FARM




**LEGEND**

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area

Recorded losses AEZ

- aircraft
- foul ground
- obstruction
- unknown
- wreck

0 2.25 4.5 9

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

**Archaeological Exclusion Zones recommended for recorded losses**

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1 | 30/01/2024 | DRAFT | HA | CH |
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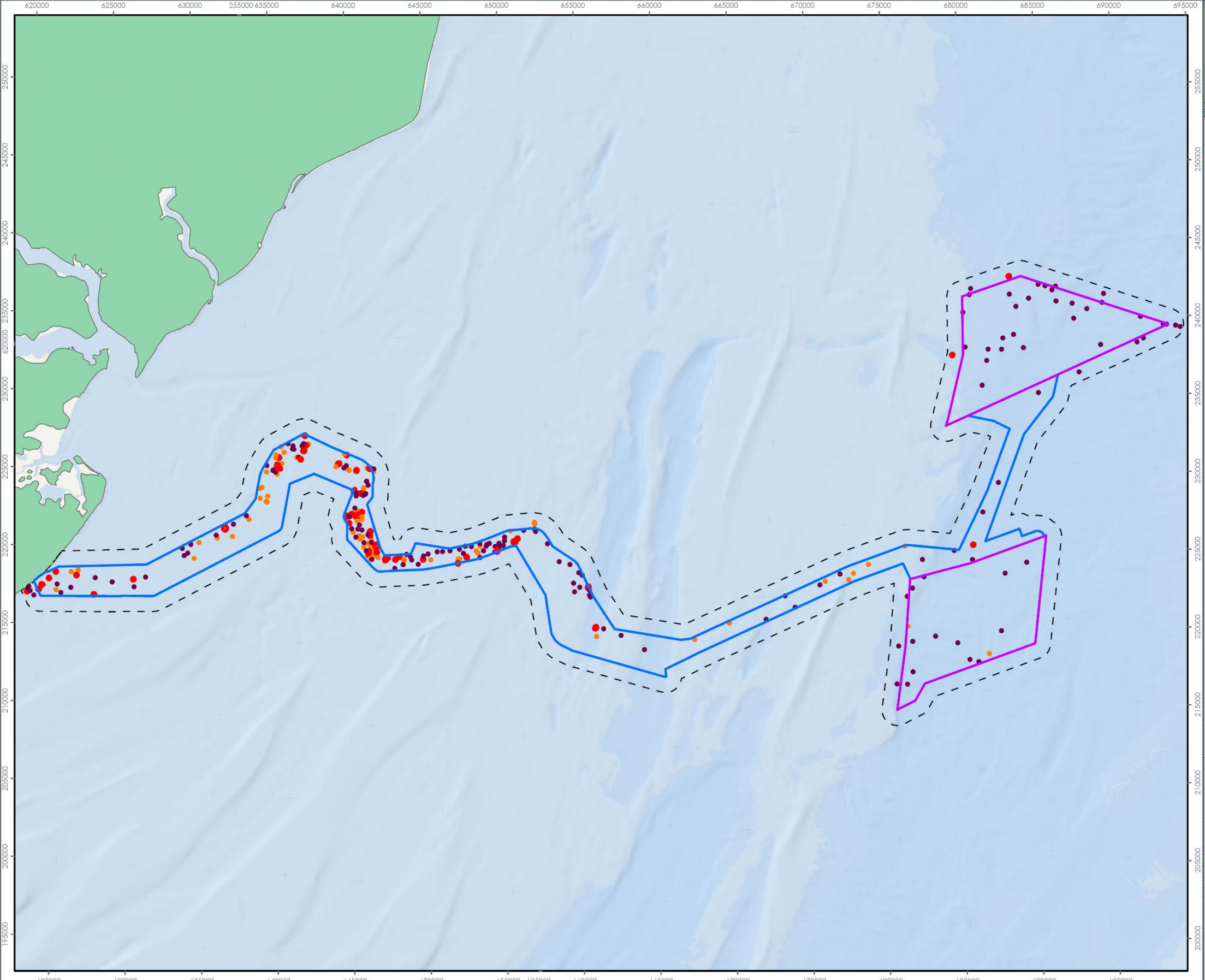
FIVE ESTUARIES
OFFSHORE WIND FARM




**LEGEND**

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area

Geophysical AEZ

- High
- High (mag only)
- Medium

0 2.25 4.5 9

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

**Archaeological Exclusion Zones recommended for geophysical anomalies**

| VER | DATE | REMARKS | Drawn | Checked |
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DRAWING NUMBER: 11.2.5

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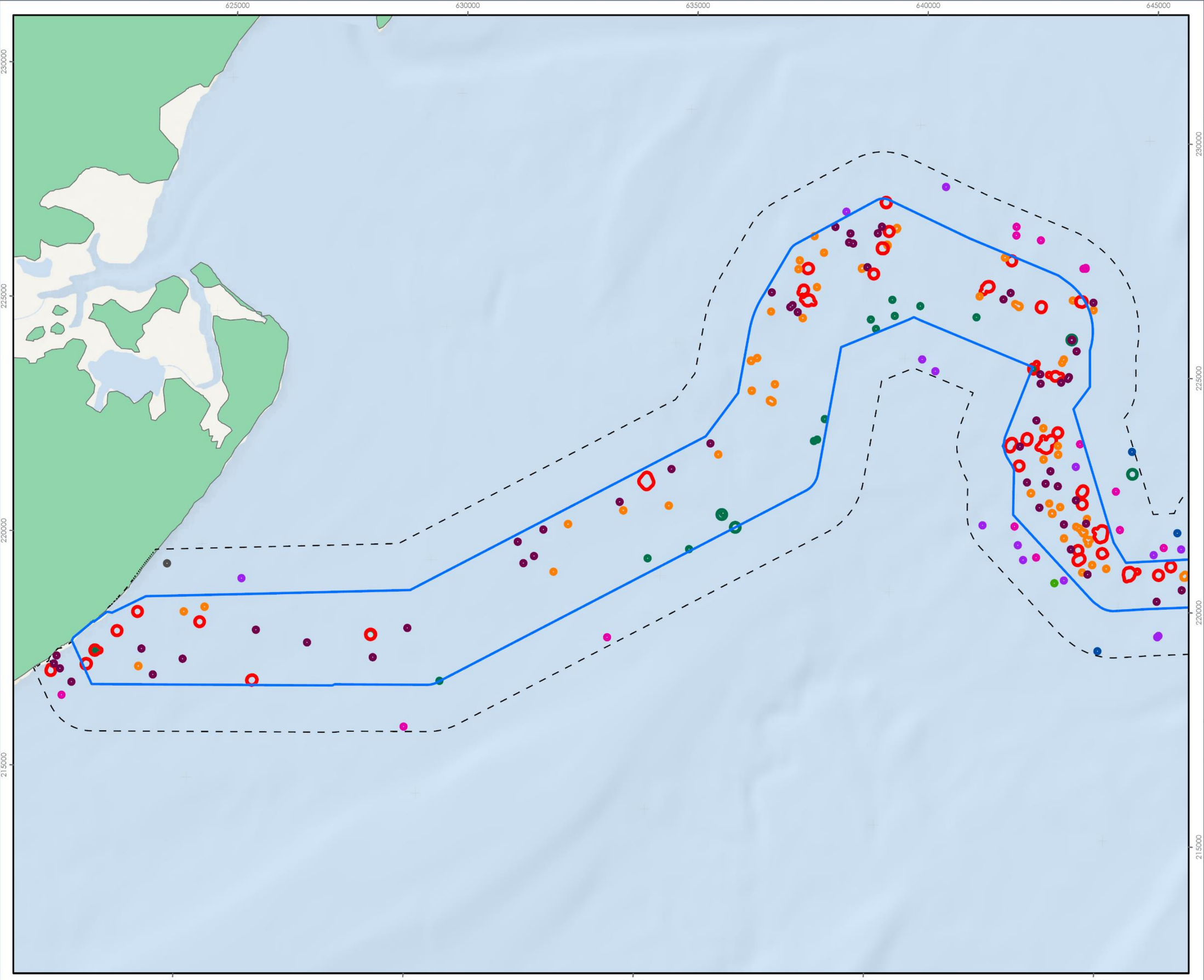
FIVE ESTUARIES
OFFSHORE WIND FARM




**LEGEND**

- Offshore Export Cable Corridor
- Marine Archaeology Study Area

Geophysical AEZ

- High
- High (mag only)
- Medium

Recorded losses AEZ

- aircraft
- foul ground
- obstruction
- unknown
- wreck
- North Falls AEZ

0 0.75 1.5 3

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

**Archaeological Exclusion Zones within the nearshore Offshore ECC**

| VER | DATE | REMARKS | Drawn | Checked |
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DRAWING NUMBER: 11.2.6

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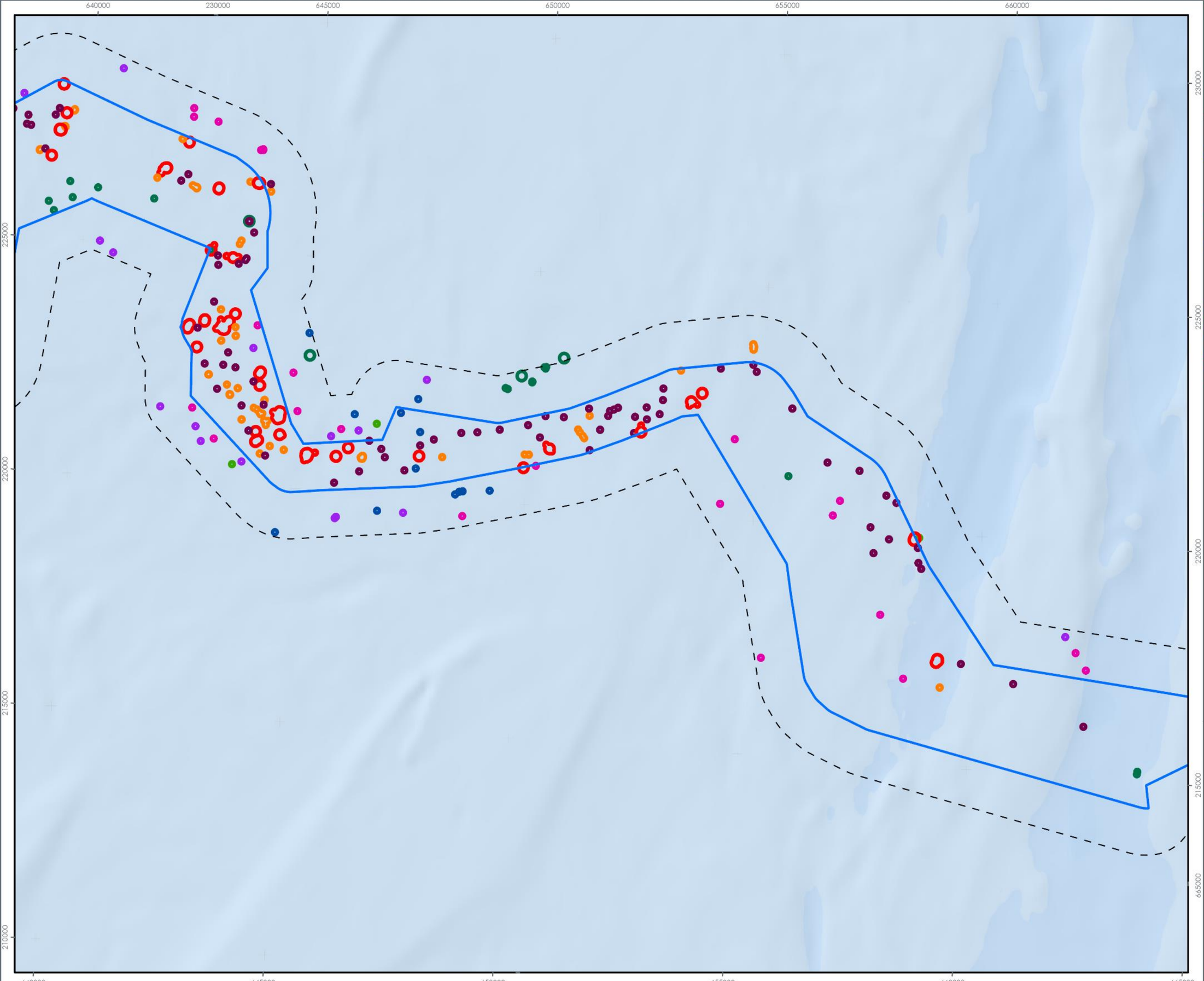
FIVE ESTUARIES
OFFSHORE WIND FARM




**LEGEND**

- Offshore Export Cable Corridor
- Marine Archaeology Study Area

Geophysical AEZ

- High
- High (mag only)
- Medium

Recorded losses AEZ

- aircraft
- foul ground
- obstruction
- unknown
- wreck

- North Falls AEZ

0 0.75 1.5 3

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

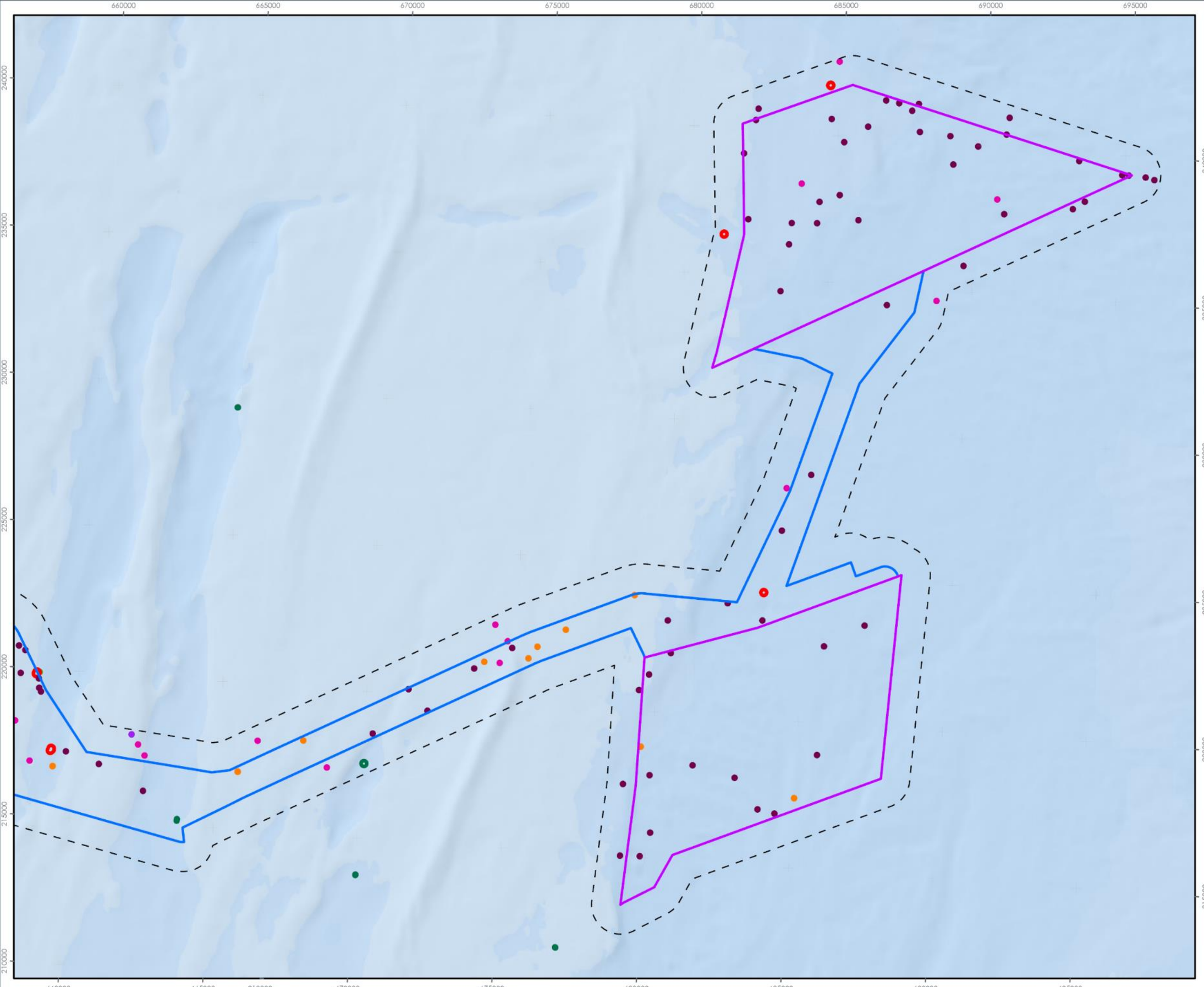
**Archaeological Exclusion Zones within the mid-section of the Offshore ECC**

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1 | 30/01/2024 | DRAFT | HA | CH |
| | | | | |
| | | | | |

DRAWING NUMBER: 11.2.7

| SCALE: | PLOT SIZE: | DATUM: | PROJECTION: |
|---|---|---|---|
| 1:75,000 | A3 | WGS84 | UTMN31 |

FIVE ESTUARIES
OFFSHORE WIND FARM




LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area

Geophysical AEZ

- High
- High (mag only)
- Medium

Recorded losses AEZ

- aircraft
- foul ground
- obstruction
- unknown
- wreck
- North Falls AEZ

0 1.25 2.5 5

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

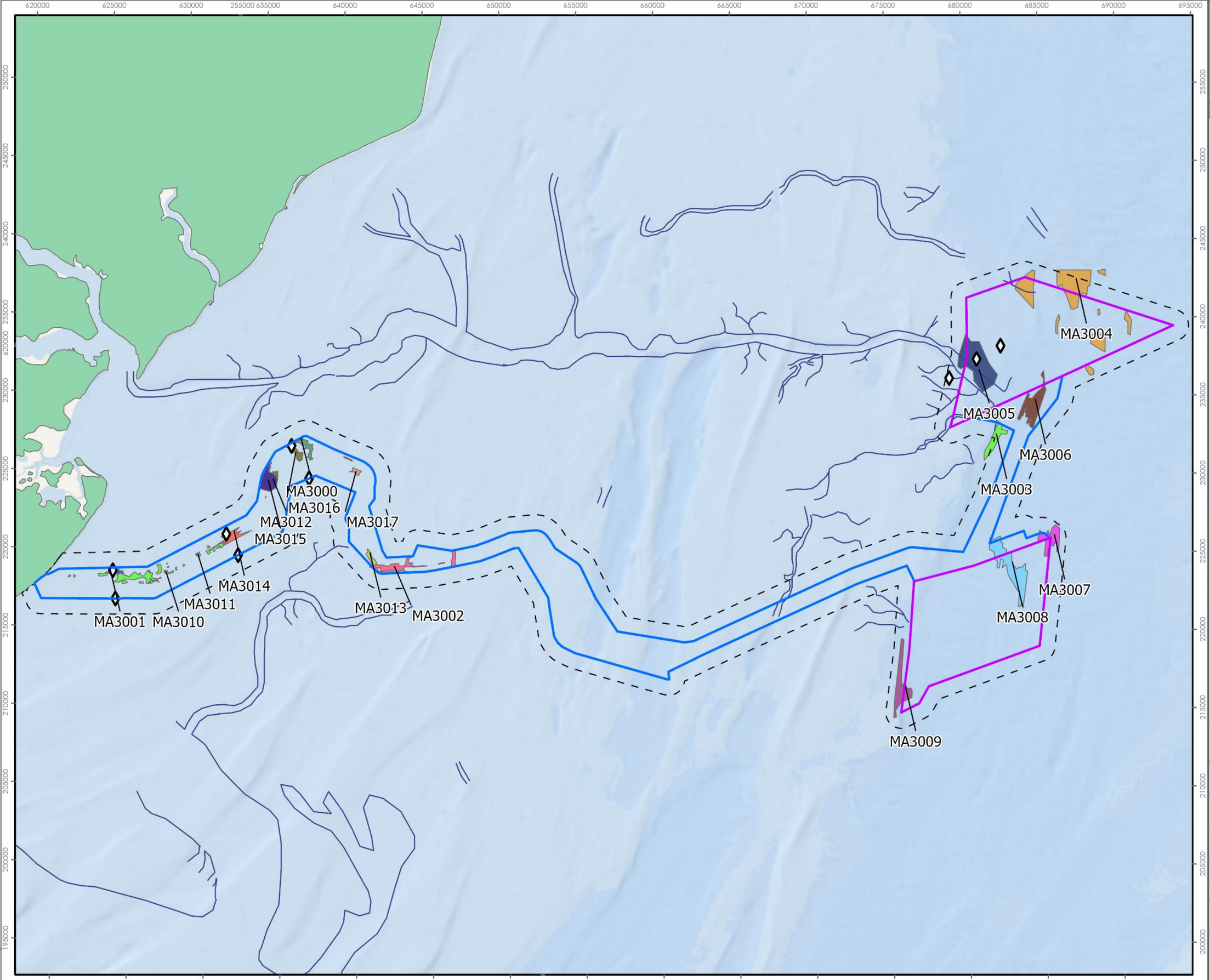
DRAWING TITLE: Archaeological Exclusion Zones within the Array Areas the offshore section of the Offshore ECC

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1 | 30/01/2024 | DRAFT | HA | CH |
| | | | | |
| | | | | |

DRAWING NUMBER: 11.2.8

| SCALE: 1:120,000 | PLOT SIZE: A3 | DATUM: WGS84 | PROJECTION: UTMN31 |
|---|---|---|---|

FIVE ESTUARIES OFFSHORE WINDFARM




LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- Potential geotechnical sample locations
- Interpreted channel systems (EMU, 2009)

Channels with geoarchaeological potential

- MA3000
- MA3001
- MA3002
- MA3003
- MA3004
- MA3005
- MA3006
- MA3007
- MA3008
- MA3009
- MA3010
- MA3011
- MA3012
- MA3013
- MA3014
- MA3015
- MA3016
- MA3017

0 2.25 4.5 9

Kilometers



PROJECT TITLE:

*FIVE ESTUARIES OFFSHORE WINDFARM*

DRAWING TITLE:

**Potential locations for geoarchaeological core collection**

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1 | 29/01/2024 | DRAFT | HA | CH |

DRAWING NUMBER: 11.2.9

| SCALE: | PLOT SIZE: | DATUM: | PROJECTION: |
|---|---|---|---|
| 1:225,000 | A3 | WGS84 | UTMN31 |

FIVE ESTUARIES OFFSHORE WINDFARM

# 12 APPENDIX A: OUTLINE PROJECT-SPECIFIC PROTOCOL FOR ARCHAEOLOGICAL DISCOVERIES (PAD)

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

12.1.2 This Outline PAD for VE summarises the protocol for archaeological discoveries, the roles and responsibilities of The Applicant and relevant contractors and contains contact details for The Applicant's reporting chain.

12.1.3 This Outline PAD has been developed in reference to the Protocol for Archaeological Discoveries: Offshore Renewables Project (The Crown Estate, 2014).

## 12.2 AIMS AND OBJECTIVES

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

12.2.2 The key objectives of this protocol are to:

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

## 12.3 ROLES

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

## 12.4 CURATORS

12.4.1 Historic England, Coastal and Marine Planning will be the Archaeological Curator responsible for heritage matters seaward of MLWS, and Essex County Council landward of MLWS. Historic England will be kept informed of any archaeological finds in relation to VE. For intertidal matters, the Historic England Science Advisor for the East of England and the relevant Local Authority Archaeologist for Essex County Council will be contacted.

## 12.5 RETAINED ARCHAEOLOGIST

12.5.1 The Retained Archaeologist, when appointed by The Applicant, will act on behalf of The Applicant and will act as liaison between the Nominated Contact and the Curators (see Figure 12.1). If a Retained Archaeologist is not appointed, advice can be sought from the PAD Implementation Service provided by Wessex Archaeology.

12.5.2 The Retained Archaeologist will:

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

## 12.6 NOMINATED CONTACT

12.6.1 The Nominated Contact will be the Environment Manager and/or Principal Contractor within VE's project team. The Nominated Contact will be responsible for all communications regarding archaeology recovered during the development of the project. The Nominated Contact will take part in the introductory training session and, if the role is passed on to another member of staff, then the new Nominated Contact will ensure that they receive suitable training to undertake the responsibilities in the protocol.

12.6.2 The Nominated Contact will:

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

## 12.7 SITE CHAMPION

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

- Take part in the PAD training;
- Act as the first point of contact for technical staff and crew working on the vessel;
- Liaise with the Nominated Contact;
- Ensure that no operations take place where a feature, anomaly or artefact has been located until the Nominated Contact and Retained Archaeologist have been informed and further advice has been received;

- Examine any deployed equipment to ensure that archaeological material has not been trapped, if relevant;
- Note the occurrence, time and exact position of any finds in the vessel's log;
- Fill in a Preliminary Records Form;
- Notify the Nominated Contact as soon as possible and pass on all logs, drawings and photos; and
- Ensure that all finds recovered are stored appropriately in accordance with the training provided.

## 12.8 ALL STAFF

12.8.1 Staff onboard vessels that have 'eyes on the seabed' or operate in a supervisory role, as well as staff from the onshore facilities at a management level with responsibilities regarding the offshore zone (particularly environmental planning) will be provided with training, where relevant, to ensure that they are aware of the reporting procedures and will report all finds, sites, objects and/or deposits to their Site Champion. The staff will follow the flowchart presented below in Figure 12.1 when reporting finds of archaeological potential.

## 12.9 FINDS IDENTIFICATION

12.9.1 Finds and sites can encompass one object or a collection of objects. Table 12.1 outlines a summary of materials that should be reported to the Retained Archaeologist.

**Table 12.1: Material of archaeological potential**

| Material | Report to the Retained Archaeologist | Archaeological potential |
|---|---|---|
| Rubber, plastic and modern objects found with aluminium objects | Yes | Potentially aircraft. Military aircraft are also subject to legal requirements under the Protection of Military Remains Act 1986 |
| Rubber, plastic, Bakelite and other modern materials | No | n/a |
| Iron and steel | Yes | Wreck/aircraft or associated debris |
| Concretions – iron/steel covered by a thick concrete-like coating | Yes | Wreck or associated debris |
| Aluminium, copper, copper alloy (bronze, brass) and precious metals | Yes | Archaeologically important objects |
| Ordnance (cannonballs, bullets, shells) | Yes | Unexploded Ordnance (UXO) guidance should always take precedence |

| Material | Report to the Retained Archaeologist | Archaeological potential |
|---|---|---|
| | | over archaeological requirements |
| Animal bones, teeth and tusks | Yes | Prehistoric animals, evidence of transport, butchering and consumption |
| Human bones | Yes | Human remains are also subject to legal requirements |
| Objects made out of bone (combs, harpoon points, decorative items) | Yes | Archaeologically important objects |
| Light coloured wood, or wood that floats easily | No | Unlikely to be of archaeological interest |
| Roundwood with bark – such as branches | No | Unlikely to be of archaeological interest |
| Roundwood that has clearly been shaped or made into a point | Yes | Part of a structure |
| Pieces of wood that have been shaped, jointed or fixed with wooden pegs, bolts or nails | Yes | Structure or wreck |
| Objects made out of dark, waterlogged wood (bowls, handles, shafts, etc.) | Yes | Archaeologically important objects |
| Small to medium size stones that are shaped, polished and/or pierced | Yes | Prehistoric objects (axe heads, knife blades) of archaeological importance |
| Large blocks of stone that have been pierced or shaped | Yes | Ballast mound or navigational cairn |
| Pottery | Yes | All fragments possess archaeological potential |
| Bricks with modern proportions and ‘v’-shaped hollows (‘frogs’) | No | n/a |
| Bricks that are unfrogged, small, thin, or otherwise unusual | Yes | Archaeologically important objects |

| Material | Report to the Retained Archaeologist | Archaeological potential |
|---|---|---|
| Peat (black or brown fibrous soil) | Yes | Likely or geoarchaeological interest |

## 12.10 FINDS HANDLING AND CONSERVATION PROCEDURES

12.10.1 Table 12.2 summarises how the finds or objects, if recovered to the surface, should be handled and stored until passed on to the Retained Archaeologist.

12.10.2 Here 'wet finds' refers to finds still wet when found, and 'dry finds' are finds that have dried out or were found dry.

**Table 12.2: Finds handling procedures**

| Wet finds | Dry finds |
|---|---|
| Photograph the find:<br>> Use a scale<br>> Focus on the object<br>> One item at a time<br>> Additional close-ups of important details | Photograph the find:<br>> Use a scale<br>> Focus on the object<br>> One item at a time<br>> Additional close-ups of important details |
| Fill in the Preliminary Record Form | Fill in the Preliminary Record Form |
| Place the finds in separate watertight plastic containers of appropriate size | Do not put in water |
| Check the container regularly and top up with water when needed | Label the container and ensure that associated finds are kept together |
| Label the container and ensure that associated finds are kept together | Do not clean or empty the find |
| Do not clean or empty the find | If the item breaks, do not glue it back together |
| If the item breaks, do not glue it back together | Place the container in a dark, cold, place |
| Place the container in a dark, cold, place | |

## 12.11 PRELIMINARY RECORD FORM

12.11.1 The reporting form as shown in Table 12.3 is to be used as guidance when reporting any find of archaeological potential. The information can be provided via email and presented in any format used by the contractors.

**Table 12.3: Preliminary Record Form**

| **Company name:** |
|---|
| Vessel/Team name: |
| Site name: |
| Date: |
| Time of compiling information: |
| Name of compiler (Site Champion): |
| Name of finder (if different to above): |
| Time at which discovery was encountered: |
| Vessel position at time when anomaly was encountered: |
| (If on land) Name of vessel from which find originated: |
| (If on land) Name of area from which find originated: |
| Original position of the anomaly on the seabed (if known): |
| Notes on likely accuracy of original position stated above (i.e., how accurate is the position and is the position the original position or has the material been moved by operations?) |
| Description of the find: |
| Apparent size of the find: |
| Details of any other finds recovered from the same area: |
| Details of photographs, drawings or other records made of the find: |
| Details of treatment or storage of find: |
| Date and time Nominated Contact informed: |
| General notes: |
| Signed: Date: |

## 12.12 PROJECT SPECIFIC ROLES

12.12.1 Appointed personnel as detailed in the final PAD will be responsible for the implementation of the PAD.

12.12.2 The PAD document will be circulated among relevant staff and if any changes to named personnel should occur, the document will be immediately updated and re-circulated.

## 12.13 RELEVANT LEGISLATION

- Burial Act 1857 – The Act requires a licence to be granted prior to the removal of human remains from deliberately deposited contexts. This is disapplied in some cases by the DCO which prescribes the process for permitting the removal and reinternment of such remains.
- Protection of Military Remains Act 1986 – The Act protects the resting places of military personnel from unauthorized disturbance. It allows the MoD to protect vessels and aircraft that were in military service at the time of their loss or wrecking.
- The Treasure Act 1995 – 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 Coroner's instructions.
- Protection of Wrecks Act 1973 – Under the 1973 Act shipwrecks and wreckages of historical, archaeological or artistic importance within UK territorial waters can be protected by way of designation. Once a wreck has been designated it is an offence to carry out certain activities on or around the site without a licence.
- Merchant Shipping Act 1995 – If any material is recovered which falls within the definition of 'wreck' the Receiver of Wreck must be notified and will seek to identify the original owner so that it can be claimed.
- Ancient Monuments and Archaeological Areas Act 1979 – Monuments that are of national importance within UK territorial waters can be protected by being added to the schedule of monuments protected under this Act. It is an offence to damage or carry out a range of specific activities on such a 'scheduled monument' unless authorised to do so.

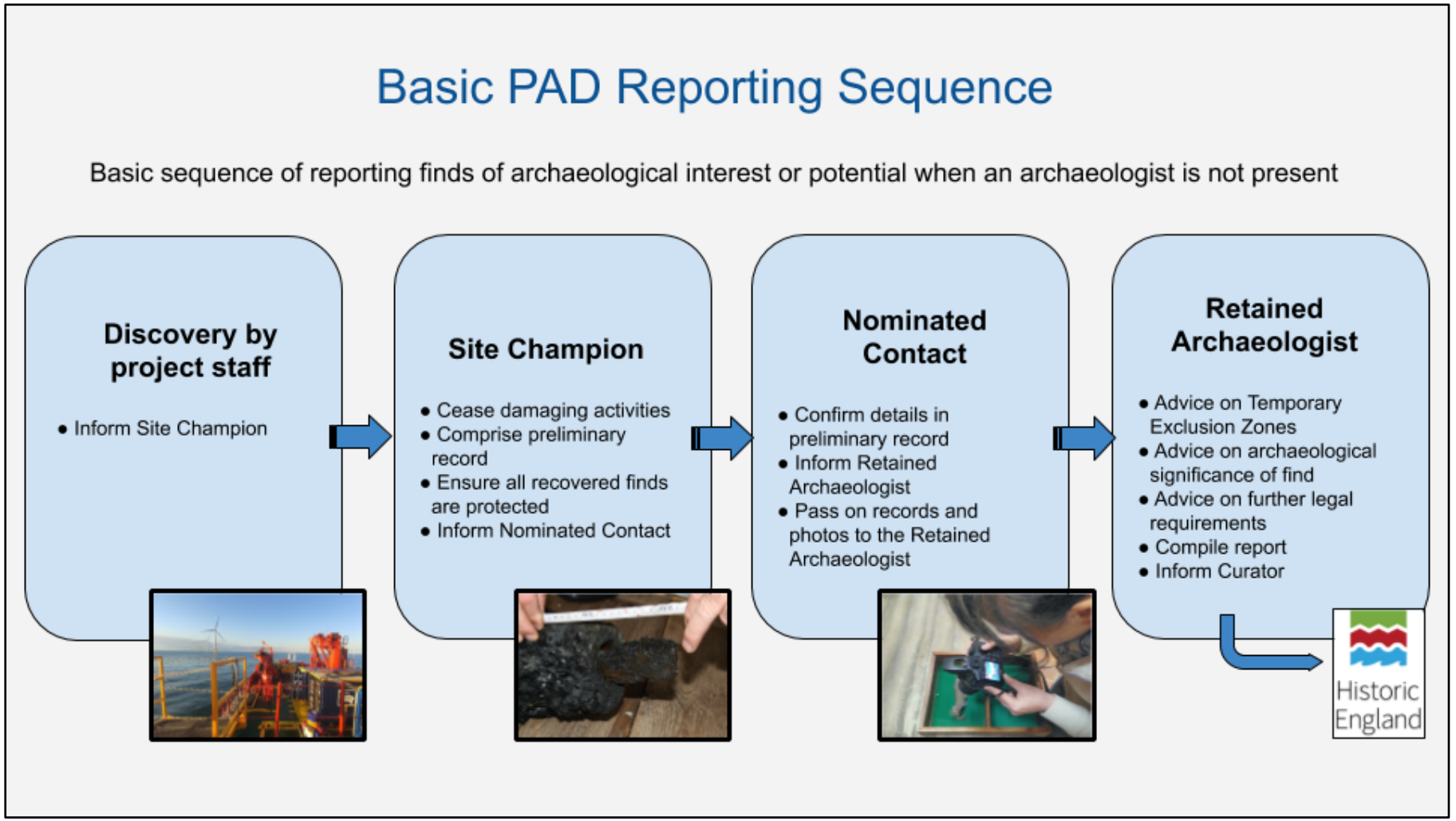



**Figure 12.1 Protocol for Archaeological Discoveries**

FIVE ESTUARIES
OFFSHORE WIND FARM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company number 12292474