The Great Grid Upgrade

Sea Link

Sea Link

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Document 7.6 Marine Archaeological Method Statements

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Contents

List of Tables

List of Figures

Sea Link Project

Marine Archaeological Method Statements

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeological has been commissioned by National Grid Electricity Transmission (the 'Client') to produce a Method Statement for Geoarchaeological Assessment of Geotechnical Site Investigations in advance of additional survey works associated with the Sea Link High Voltage Direct Current (HVDC) electricity transmission link (the 'Project'). The Sea Link HVDC Link stretches from its southern landfall in Pegwall Bay, east Kent, through the Outer Thames Estuary and into the east Suffolk coast landfall (the 'Site').

1.1.2 This document has been prepared in support of an Environmental Impact Assessment (EIA) Scoping Request and Written Scheme of Investigation (WSI) for additional survey works proposed for the Project, which are currently proposed for October 2024. The geoarchaeological assessment for the survey will comprise two separate elements, as follows:

- Targeting eight locations within the original Offshore Scheme Scoping to obtain duplicate vibrocores that were destroyed for engineering testing.

  Within the Offshore Scheme draft Order Limits, 65 vibrocores were collected by MMT in September 2021(from a total of 69 vibrocores, four of which were located beyond the Offshore Scheme draft Order Limits). The Stage 1 review recommended that a Stage 2 geoarchaeological recording be undertaken of a sample of cores to describe the sequences recovered and undertake a deposit modelling (if suitable) and interpret the depositional environment (if possible). Eight cores, including one high potential core and seven of medium potential, were identified and recommended for the Stage 2 review, however, these cores were not retained and used for engineering lab testing prior to their geoarchaeological analysis. In agreement with Historic England, the eight recommended for further assessment will be targeted and obtained in the next phase of marine surveys to recover and retain geoarchaeologically significant vibrocores for further Stage 2 geoarchaeological recording.

- It is proposed that nine vibrocores will also be obtained from five additional survey areas that were identified as optimal for hazard avoidance and were selected for targeted surveying. The locations of these vibrocores within these areas are currently unknown.

1.1.3 This section sets out a brief introduction to the geoarchaeological campaign for the Project and the scope of the document. **Section 2** describes the aims and objectives of the Project, with the geoarchaeological background to the Project outlined in **Section 3**. **Section 4** sets out the Geotechnical Site Investigation (GI) scope whilst **Section 5** describes the methods to be employed during the various stages of the geoarchaeological investigation (Stages 1 to 5).

1.2 Scope of document

1.2.1 This Method Statement sets out the strategy and methodology by which Wessex Archaeology will implement the geoarchaeological works in support of the marine GI.

1.2.1 In format and content this document conforms with current best practice and guidance for offshore developments. The current principal sources are:

- Management of Research Projects in the Historic Environment (MoRPHE; Historic England 2015a);
- Managing Significance in Decision-taking in the Historic Environment: Historic Environment Good Practice Advice in Planning: 2 (Historic England 2015b);
- Statements of Heritage Significance: Analysing Significance in Heritage Assets: Historic England Advice Note 12 (Historic England 2019);
- Preserving Archaeological Remains: Decision-taking for Sites under Development (Historic England 2016);
- Conservation Principles for the Sustainable Management of the Historic Environment. Consultation Draft 10 November 2017 (Historic England 2017);
- Joint Nautical Archaeology Policy Committee Code for Practice for Seabed Development (JNAPC 2006);
- Chartered Institute of Field Archaeologists (CIfA) Standard and guidance for archaeological field evaluation (CIfA 2020a); and
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England 2015c).

1.2.2 This Method Statement will be submitted to Historic England for approval prior to the intended commencement of the proposed GI.

2 AIMS AND OBJECTIVES

2.1 Specific aims and objectives

2.1.1 This Method Statement outlines the program of marine GI and reporting. The specific aims and objectives include:

- Targeted duplicate vibrocores from the original Offshore Scheme Scoping Boundary:
  - Eight undisturbed vibrocores will be delivered to Wessex Archaeology, Salisbury for an initial geoarchaeological assessment comprising vibrocore logs and photographs;
  - Deposits of potential geoarchaeological and archaeological interest will be identified, assigning a high, medium or low priority status (Stage 1);
  - Further geoarchaeological monitoring, recording and sub-sampling at Stage 2, where appropriate; and

- To define the possible scope of and methodological approaches to any of further palaeoenvironmental assessment (Stage 3) and palaeoenvironmental analysis (Stage 4) of the vibrocores.

- Vibrocores collected from the additional five survey areas across the Offshore Scheme draft Order Limits:

  - To review geotechnical vibrocore logs to identify deposits of potential geoarchaeological and archaeological interest, assigning a high, medium or low priority status (Stage 1);

  - To specify vibrocores to be retained for further geoarchaeological monitoring, recording and sub-sampling at Stage 2, where appropriate; and

  - To define the possible scope of and methodological approaches to any of further palaeoenvironmental assessment (Stage 3) and palaeoenvironmental analysis (Stage 4) of the vibrocores.

2.2 Research objectives

2.2.1 Selected research questions in the North Sea Prehistory Research and Management Framework (NSPRMF; 2023) are relevant to the Geoarchaeological Assessment. In particular, the work has the potential to contribute to those associated with:

- B. Where was there prehistoric human activity in the region;

- C. What are the chronologies for prehistoric human occupation; and

- E. What was the climatic, landscape and environmental context of prehistoric human activity.

2.2.2 In addition, the work has the potential to contribute to several of the Themes in the Maritime Archaeological Research Agenda for England (Ransley *et al.* 2013), particularly those associated with:

- Coastal change during the Palaeolithic and Mesolithic (Themes 1.1 and 2.1); and

- Maritime settlement and marine exploitation during the Palaeolithic and Mesolithic (Themes 1.2 and 2.2).

3 GEOARCHAEOLOGICAL BACKGROUND

3.1 Introduction

3.1.1 The following section provides a brief overview of the geoarchaeological and archaeological background for the Site, drawing on relevant information from the surrounding landscape.

3.1.2 Where age estimates are available for deposits these are expressed in millions of years (Ma), thousands of years (Ka) and within the Holocene epoch as either years Before Present (BP), Before Christ (BC) and Anno Domini (AD). Where radiocarbon dates are included, they are quoted as calibrated (cal.) BC or AD. These dates are supplemented where relevant with the comparable Marine Isotope Stage (MIS) where odd numbers indicate an interglacial period and even numbers a glacial period.

3.2 Geological baseline

3.2.1 The Site lies within the Cenozoic London Basin which, although traditionally regarded as a distinct sedimentary basin, is likely a southern extension of the North Sea Basin (Emu 2009). Stiff clay of the London Clay Formation (Eocene; *c.* 56-49 Ma) is present across much of the study area, with chalk bedrock mapped to the south and extending from the east Kent coastline.

3.2.2 The study area covers a significant expanse of the Outer Thames Estuary, an area associated with the Thames-Medway river system. Major drainage reorganisation during the Anglian glacial period (MIS 12) had a significant impact on the evolution of the Thames-Medway river systems and palaeogeography of the Outer Thames Estuary (Bridgland 2006). Prior to the Anglian period, the Thames Medway rivers occupied a more northerly course entering the southern North Sea via the present northern coast of Norfolk (Bridgland and Gibbard 1997) and the pre-Anglian stratigraphy of the Outer Thames Estuary is represented by Red Crag which are Plio-Pleistocene marine deposits (Stoker *et al*. 2011) that pre-date the earliest known occupation of Britain.

3.2.3 The Pleistocene geological history of the North Sea basin is dominated by repeated glacial/interglacial cycles, resulting in rising and falling sea levels and deposition of terrestrial, marine and glacially derived sediments. The only evidence of ice contact in the study area is associated with the Anglian glaciation (478–424 ka BP or MIS 12). The southern extent of the Anglian glaciation is highly debated, however based on bathymetric data Dix and Sturt (2011) argue for an Anglian glacial origin for over-steepened valleys (tunnel valleys) identified within the Outer Thames Estuary.

3.2.4 The Quaternary stratigraphy in the Outer Thames Estuary is recorded by the British Geological Survey as undifferentiated (Stoker *et al*. 2011). However, following the results of the Outer Thames Estuary Regional Environmental Characterisation report, it was suggested that fluvial deposits associated with the submerged Thames-Medway river system were likely to dominate the Pleistocene and early Holocene sequence (Emu *et al*. 2009). Marine and estuarine deposits dating to the Pleistocene have been recovered at Gunfleet Sands Offshore Wind Farm (Maritime Archaeology 2017), located west of the Project and approximately 6.8 km south of Clacton-on-Sea. However, no palaeoenvironmental assessments have been undertaken on such deposits.

3.2.5 Two distinct channel systems were identified from marine aggregate licence area 528: a northern and southern channel complex separated by high elevated bedrock (Wessex Archaeology 2021a). The channel complex is suggested to form part of the submerged Thames-Medway system postdating the Anglian (MIS 12). Given that the study area runs through Area 528, an equivalent complex stratigraphy is likely preserved across the Project.

3.2.6 In contrast, Holocene aged alluvium and peats recovered from the London Array and Nemo Link OWF areas, which cross the Project area, were assessed with the earliest sequence dating to 8240-7840 cal. BC (Wessex Archaeology 2016; Brown and Russell 2019). The pollen assemblage from this earliest sequence mainly comprised boreal woodland taxa and ostracods reflecting a freshwater environment. A rise in sea level was recorded in later sequences between 6600-5970 cal. BP and 5890-5390 cal. BP with the development of a saltmarsh environment. The peats are of high geoarchaeological potential, preserving a range of palaeoenvironmental remains and material suitable for radiocarbon dating.

3.2.7 Across the Outer Thames Estuary and wider southern North Sea, Pleistocene and early Holocene sediments are capped by post-transgression marine sands. The progressive inundation of the North Sea occurred over an extended time scale, with particularly rapid

sea-level rise during the early Holocene (11.5-7 ka), and with fully marine conditions occurring by around 6 ka (Sturt *et al*. 2013).

3.3 Archaeological record

3.3.1 The southern North Sea off the east coast of East Anglia is known to contain relatively well preserved palaeolandscape features such as fluvial channels that formed during periods of lower sea level when the southern North Sea was free of ice and sea levels were significantly lower. The remains of these terrestrial landscapes are frequently recovered by dredging and fishing activities in numerous areas around the southern North Sea generally in the form of the remains of extinct megafauna (e.g. woolly mammoths, woolly rhinoceros, bison, horse, lion and hyena).

3.3.2 The discovery of actual human artefacts, such as stone tools and worked bone, and even remains is a rarer occurrence, but artefacts have been recovered (e.g. Hublin *et al*. 2009). Reported finds from offshore activity has, to date, produced a range of early prehistoric lithic artefacts indicating early prehistoric activity in submerged palaeolandscapes from Lower, Middle, and Upper Palaeolithic periods (Tizzard *et al*. 2015) with notable collections of more recent Mesolithic artefacts from submerged palaeolandscape contexts (Momber *et al*. 2011; Wessex Archaeology 2013).

3.3.3 The earliest records of Lower Palaeolithic archaeology from northern Europe are associated with terrestrial deposits on margins of the North Sea basin in East Anglia, most notably from Pakefield (Parfitt *et al*. 2005) and Happisburgh Site 3 (Parfitt *et al*. 2010) . Whilst the archaeology at Pakefield was created during a fully interglacial, more Mediterranean climate, at around MIS 17, the remains at Happisburgh Site 3 are older (MIS 21 or MIS 25) and the environmental evidence is indicative of cool conditions at the edge the boreal zone (Candy *et al*. 2011) which implies that these early hominins were capable of surviving in northern Europe in periods not associated with fully interglacial environments (Parfitt *et al*. 2010). The importance of these sites is international, as they are currently unique at this latitude for this early date (Wessex Archaeology 2013).

3.3.4 Cohen *et al*. (2012) highlighted the North Sea basin as a key region for understanding Pleistocene hominins within a northerly, coastal environment. The east of England, particularly East Anglia, but also the southeast of England, are important regions for later Middle Pleistocene, Lower Palaeolithic archaeology (MIS 13-MIS 9). During this timeframe British archaeology reflects repeated episodes of hominin occupation during temperate interglacial and cool conditions, separated by phases of hominin absence during fully glacial periods.

3.3.5 Archaeological evidence is particularly abundant during MIS 13 and MIS 11 (Wymer 1999; Pettitt and White 2012) when warmer climate conditions meant Britain was again available to be recolonised by hominin communities, after a period of absence during the preceding Anglian glaciation (MIS 12). Lower Palaeolithic archaeological assemblages of this date tend to be characterised by handaxes, although during the earlier part of MIS 11, collections lacking handaxes (termed Clactonian) have been recognised. The foreshore, cliffs and hinterland at Clacton-on Sea (Essex) comprise an important Lower Palaeolithic site which is a designated geological Site of Special Scientific Interest (SSSI). Channel sediments from the area are also an important site for the Lower Palaeolithic Clactonian flint industry and have yielded a rare wooden spear alongside lithic artefacts. This archaeology dates from the Hoxnian interglacial period (MIS 11, c. 423–380 ka) (Sumbler 1996; Bridgland *et al*. 1999), and the type site for the Hoxnian (the Hoxne Brick Pit) is located a relatively short distance inland outside of Diss, Suffolk (Ashton *et al*. 2008).

3.3.6 During the MIS 10 glaciation there appears to have been a hiatus in hominin activity in Britain (Pettitt and White 2012). The post MIS 10 occupation Britain is associated with the emergence of the Neanderthals and their associated archaeology and patterns of behaviour. From the later part of MIS 9 the archaeological record attests to the development of Levallois core working strategies. This is also seen to mark the end of the Lower Palaeolithic and the beginning of the Middle Palaeolithic. The Levallois technique comes to dominate the British archaeological record during the early Middle Palaeolithic (late MIS 8 and MIS 7), with handaxe production occurring infrequently (Scott and Ashton 2011).

3.3.7 The international importance of early Middle Palaeolithic archaeology in the southern North Sea is highlighted by the numerous sites preserved within the Thames river terraces (White 2006; Scott *et al*. 2011) and, in particular, by the submerged prehistoric Levallois lithic assemblage from marine aggregates licence Area 240 in the palaeo-Yare catchment. Over 120 artefacts have now been recovered from this locale, some of which are identifiable as Levellois, with many recovered from in situ or minimally disturbed contexts (Tizzard *et al.* 2014; 2015).

3.3.8 The substantial, mixed assemblage of handaxes also recovered from Area 240 may be of older Lower Palaeolithic origin (e.g. >MIS 9), or may date to the Later Middle Palaeolithic when handaxes re-emerge as one of the key components of the archaeological record (late MIS 4-MIS 3) (Boismier *et al*. 2012). However, based on palaeoenvironmental and sedimentological evidence an early Middle Palaeolithic date is most likely (Tizzard *et al*. 2015).

3.3.9 Palaeogeographically, Area 240 is one of the most northerly Neanderthal sites in northwest Europe and of primary archaeological importance for defining Middle Palaeolithic potential and the contemporary palaeogeography across the southern North Sea basin (Tizzard *et al.* 2014). The site highlights the archaeological potential of preserved Pleistocene fluvial deposits within the southern North Sea.

3.3.10 Within the Outer Thames Estuary, a large Palaeolithic assemblage including over 200 Levallois flakes was recovered from aggregate deposits forming the Clacton to Holland-on-Sea beach replenishing scheme (Bynoe, 2018). These deposits were originally sourced from marine aggregate License Area 447, located in an area where the confluent post-Anglian (<MIS 12) confluent Rivers Thames, Medway and Blackwater would have been located (Bridgland and D'Olier 1995, Bridgland 2003, Sturt and Dix 2009, Dix and Sturt 2011). It is therefore likely that this Middle Palaeolithic assemblage originates from submerged Pleistocene deposits relating to this channel complex.

3.3.11 Currently there is no definitive evidence of a hominin presence in Britain during the Ipswichian (MIS 5e) or the early Devensian (MIS 5d-a; Lewis *et al*. 2011). Within the context of early prehistory and submerged palaeogeography, however, substantial areas of the southern North Sea basin would have been dry land during the warming and cooling limbs of the various sub-stages (MIS 5d to 5a) and archaeological sites of this age are relatively abundant in northern France (Lewis *et al*. 2011; Pettitt and White 2012). Therefore, the potential exists for human activity to have occurred sporadically both within Britain and in any sub-aerially exposed parts of the southern North Sea basin, during the early Devensian.

3.3.12 From late MIS 4 to MIS 3 there is evidence in Britain for Neanderthal recolonization. This late Middle Palaeolithic archaeological record is associated with morphologically and technologically distinctive handaxes (White and Jacobi 2002). A key site belonging to this period is Lynford Quarry, Norfolk where a palaeochannel containing mammoth remains and

associated late Middle Palaeolithic stone tools and debitage have been recovered (Boismier *et al*. 2012).

3.3.13 In the early Upper Palaeolithic, at the end of the Late Pleistocene, Neanderthals were replaced in northern Europe by modern humans who, occupying and moving through what is now the southern North Sea, were present in in Britain from around 34 ka (Jacobi and Higham 2011a; Bicket and Tizzard 2015). Archaeological evidence for this period consists of blade point/leaf point assemblages, thought to be associated with the final Neanderthal occupation of Britain, and small number of findspots associated with Evolved Aurignacian and Gravettian lithic artefacts which were produced by modern humans (Jacobi and Higham, 2011a).

3.3.14 During the last glacial period, the study area will have been beyond, yet close to the maximum Devensian ice margin. At the maximum of the last glacial period, the environment within the southern North Sea was relatively poor for human colonisation, with humans absent from Britain during these peak cold conditions. However, there was increasing human exploitation after ~15 ka. Humans at this time were hunting game, such as mammoth and deer, and evidence of these animals has been reported through marine aggregate dredging, and the associated reporting requirements (Bicket and Tizzard 2015).

3.3.15 The onshore archaeological record of later Upper Palaeolithic activity is marked by Creswellian/Final Magdalenian stone tool assemblages associated with the later Upper Palaeolithic recolonization of Britain (Jacobi and Higham 2011b), and offshore locations may provide unique and important context for coastal and lowland human activity during this period.

3.3.16 The Mesolithic period began in the early Holocene and at around 10 ka, sea levels were approximately 35 m below current levels (Shennan *et al*. 2018) sub-aerially exposing large parts of the southern North Sea and English Channel making them suitable for human occupation. Archaeological and palaeoenvironmental material from this period has been reported from North Sea contexts for over a century (Reid 1913; Godwin and Godwin 1933). For example, a Maglemosian harpoon artefact was trawled in the early 20th century and was later radiocarbon dated to around 12,000 years ago (Housely 1991).

3.3.17 Between 8 and 5 ka, much of the landscape was inundated by eustatically driven sea-level change, and by 6 ka sea level was only approximately 7 m below the present level (Shennan *et al*. 2018). Around this time, Britain became an island again (Coles 1998). Settlements at the time were often transitory and seasonal, and therefore leave little trace in the archaeological record. It is possible that the now submerged environment within the Norfolk Vanguard and Norfolk Boreas sites was occupied up until the final marine transgression thought to have occurred around 8,000 years ago.

3.3.18 It is clear from numerous research and development-led investigations that postglacial marine transgression has not destroyed Pleistocene and Holocene palaeogeography by default (Wessex Archaeology 2013). Areas of preserved palaeogeographic features do remain, and detailed reconstructions of palaeoenvironments and palaeogeography can be achieved for large parts of the North Sea basin (Tappin *et al*. 2011; Limpenny *et al*. 2011; Dix and Sturt, 2011).

3.3.19 Considerable attention has been paid to Mesolithic landscapes of the southern North Sea (Gaffney et al. 2007; Tappin *et al*. 2011) as the now-submerged palaeolandscapes provide key contextual evidence for recovered artefacts and a background landscape within which to place these human communities. Increasingly, a maritime perspective has developed for

understanding the early prehistoric archaeological record, where coasts, estuaries and wetlands are key landscape elements (Ransley *et al*. 2013).

4 SCOPE OF GEOTECHNICAL SITE INVESTIGATIONS

4.1 Previous Stage 1 Geotechnical Review

4.1.1 As part of the original marine survey, a combined marine geophysical and geotechnical archaeological assessment was undertaken to identify any anomalies (e.g. buried palaeolandscape features and associated deposits) of archaeological potential within the study area, in order to inform the planning process ahead of the proposed scheme (National Grid, forthcoming).

4.1.2 A total of 69 vibrocores were reviewed during the Stage 1 assessment, from which a sequence of Quaternary deposits was identified comprising fluvial gravel, non-marine sands, oxidised shallow marine sands, shallow marine to coastal sediments, fine-grained alluvium and peat, typically capped by seabed sediments. Both organic and minerogenic alluvium, and shallow marine to coastal deposits were considered to have moderate archaeological and geoarchaeological significance, given their potential to contain and preserve organic and inorganic microfossils suitable for palaeoenvironmental analysis. A representative selection of core samples was recommended for geoarchaeological recording in order to ground-truth interpretations.

4.1.3 A single peat deposit was recorded (VC-S6-005) and was assigned high priority status. Peat has a high potential to preserve waterlogged archaeology and material suitable for palaeoenvironmental analysis and radiocarbon dating. The entire peat deposit was recommended for further geoarchaeological recording to determine the suitability for further works (i.e. palaeoenvironmental assessment).

4.1.4 Following the Stage 1 review, a series of geoarchaeological deposit models were constructed to target medium to high priority deposits. A total of six two-dimensional stratigraphic profiles (‘transects’) were produced (National Grid forthcoming, Figures 4.7.A.8 – 4.7.A.13). The cross-sections provide vertical visualisations of the stratigraphic records, along lines drawn through selected vibrocores across the licence areas. These transects model the possible make-up of the deposits between these individual deposit records. The deposit modelling was undertaken following the guidelines produced by Historic England (2020).

4.1.5 Despite their perceived significance, the vibrocores were not retained for archaeological purposes. Additional geoarchaeological surveys planned for October 2024 will target the locations of the eight vibrocores assessed as medium and high archaeological potential areas and duplicate cores will be obtained to allow the Stage 2 assessment (following a Stage 1 assessment) to be undertaken.

4.2 Additional Geotechnical Assessment

4.2.1 A further programme of offshore GI is being undertaken in order to confirm the nature and extent of seabed conditions across five additional isolated survey areas located either beyond the extent of the Offshore Scoping Boundary used for the Scoping Report (Areas 2 - 5) or the extent of the marine geophysical survey (Area 1) and therefore beyond the original geoarchaeological assessment. The additional areas are summarised in **Table 1** and presented on **Figure 1**.

4.2.2 The addition of these five survey areas have meant that, where necessary, the Offshore Scheme draft Order Limits have been extended to include these areas (labelled on **Figure 1** as the 'Draft Marine Corridor').

Table 1 Summary of additional survey areas

Area name	Approximate area (km²)	Water depth (m)	Centre of area (WGS84 UTM31N)	
			Easting	Northing
Area 1 – Aldeburgh Nearshore	0.6	0 – 10	405607.66	5779964.20
Area 2 – East Shipwash	11.3	18 – 23	407018.81	5758097.31
Area 3 – North of the Sunk	5.68	20 – 32	409176.93	5748039.42
Area 4 – Grid Link Crossing	1.83	12 – 14	399778.34	5693503.22
Area 5 – Outer Pegwell Bay	9.1	5 – 11	395547.67	5686761.57

4.3 Scope of Investigation

4.3.1 The programme of intrusive marine GI works comprises:

- Eight vibrocores from within the original Offshore Scheme Scoping Boundary to replace previous high and medium priority vibrocores that were not retained (VC-S6-005, VC-005, VC-008A, VC-021, VC-022, VC-046A, VC-050, VC-055A, VC-061 and VC-062A); and
- Nine vibrocores from within four of the five additional survey areas, including:
  - four vibrocores from Survey Area 2;
  - one vibrocore from Survey Area 3;
  - one vibrocore from Survey Area 4; and
  - three vibrocores from Survey Area 5 to a maximum depth of 5 m below seabed.

4.3.2 All logs arising from the geotechnical investigation will be reviewed as part of the Stage 1 works (see **Section 5.2**), with a selection of the vibrocores previously identified as comprising deposits with high geoarchaeological potential (VC-S6-005, VC-005, VC-008A, VC-021, VC-022, VC-046A, VC-050, VC-055A, VC-061 and VC-062A), alongside other vibrocores from the five additional survey areas deemed to have medium or high geoarchaeological potential, made available for detailed geoarchaeological monitoring, recording and sub-sampling where appropriate at Stage 2.

4.3.3 No vibrocores are currently planned to be obtained from Survey Area 1 during the geotechnical survey campaign discussed within this Method Statement. The purpose of Area 1 is designed to expand the lateral extent of the corridor to offer additional installation flexibility. Given local environmental conditions and the water at the landfall being shallow, the access for geotechnical vessels is limited for the deployment of vibrocore and Cone Penetration Test (CPT) equipment.

5 METHODS

5.1 Vibrocore sample collection and storage

5.1.1 During the offshore site investigations, reference shall be made to ISO 19901-8:2014 section 5.4 Health, Safety and environmental (HSE) requirements for marine operations. The Archaeological Contractor will adhere to the Client's Health, Safety and Environment Requirements for Contractors and Suppliers.

5.1.2 In addition, the work will be carried out under the primary standard for offshore investigations (ISO 19901-8:2014(E), Petroleum and natural gas industries – specific requirements for offshore structures – Part 8: Marine Soil Investigations). In some instances, certain clauses of ISO 19901-8:2014(E) may be overridden by technical requirements.

5.1.3 The eight duplicate vibrocores are only for geoarchaeological purposes and will be delivered to Wessex Archaeology's Salisbury office whole and unsplit for geoarchaeological analysis.

5.1.4 Vibrocore samples recovered from the additional survey areas will be extruded offshore and samples will be labelled and preserved in opaque liners. Any samples of potential archaeological interest will not be analysed offshore, although basic soil descriptions will be taken offshore. All geotechnical logs will be provided to the Retained Archaeologist for geoarchaeological review at Stage 1 prior to any engineering testing. Upon request, sealed core samples will be provided to the Retained Archaeologist for onshore laboratory for testing and analysis at stage 2.

5.1.5 Temperature controlled storage for core samples will be provided by the GI Contractor in accordance with ISO19901-8 for a minimum period of 12 months. Disposal of samples shall be strictly on written instruction from the Client.

5.1.6 Samples sent to the Retained Archaeologists' laboratories will be stored and retained until the appropriate stage of investigation has been undertaken and reported on, as advised by the Retained Archaeologist.

5.1.7 All samples stored at the Retained Archaeologists' laboratory will be stored in a temperature monitored warehouse, placed in a horizontal position in dry conditions away from excessive moisture.

5.1.8 If samples containing deposits of high archaeological potential are recovered, they will be stored in a temperature-maintained chiller room to support further paleoenvironmental assessment and radiocarbon and luminescence dating if appropriate and required.

5.2 Marine geoarchaeological investigations review, interpretation, assessment, analysis and publication by the Retained Archaeologist

5.2.1 Once the samples have been collected (see **Section 5.1**), and to help frame geoarchaeological investigations of this nature, a staged approach to marine geoarchaeological investigations has been developed. This encompasses different levels of investigation appropriate to the results obtained, each accompanied by formal reporting of the results. These stages of investigation are set out in **Table 2**.

Table 2 Staged approach to marine geoarchaeological investigations

Stage	Description
Stage 1: Geoarchaeological review	Desk-based review of geotechnical and geological data. Establish likely presence/ absence/ distribution of archaeologically relevant deposits. Identify deposits or samples for Stage 2 works.
Stage 2: Geoarchaeological description and interpretation	Target deposits or samples identified in Stage 1. Describe the sequences recovered and undertake deposit modelling (if suitable). Interpret depositional environment (if possible). Identify if suitable deposits are present for Stage 3 works.
Stage 3: Palaeoenvironmental assessment	Sub-sample deposits of archaeological interest for paleoenvironmental assessment (e.g. pollen, plant macrofossils, foraminifera, ostracod and diatoms) and associated scientific dating. Provide an outline interpretation of the archaeological and palaeoenvironmental context. Any recommendations for Stage 4 works will depend on the potential for further analysis and the project research objectives.
Stage 4: Palaeoenvironmental analysis	Full analysis of samples and additional scientific dating as specified in Stage 3, together with a detailed synthesis of the results, in their local, regional or wider archaeological and palaeoenvironmental context. Publication would usually follow from a Stage 4 report.
Stage 5: Publication	Publication of the results of Stage 1-4 works for submission in a peer reviewed journal, book or monograph, depending on the archaeological significance of the work. The scope and location of the final publication will be agreed in consultation with the client and regulatory bodies where appropriate.

5.3 Stage 1: Review of geotechnical logs

5.3.1 All geotechnical vibrocore logs provided by the GI Contractor will be reviewed by a suitably trained geoarchaeologist (Wessex Archaeology) to identify the presence of deposits of geoarchaeological potential. This work will include an initial review of previous impacts and their implications for the geoarchaeological and archaeological potential of the deposits.

5.3.2 The logs will be assigned a high, medium or low priority status by Wessex Archaeology geoarchaeologists based on the geoarchaeological potential of the contained deposits. Of greatest geoarchaeological potential are sediments from former terrestrial and semi-terrestrial depositional environments, as well as certain features or inclusions of possible archaeological and palaeoenvironmental potential, specifically including the following criteria:

- Peat layers;
- Organic-rich deposits (e.g. highly organic clays and silts that may have formed in low energy back swamp environments);
- Deposits containing other organic material such as wood fragments, roots, dark organic staining etc;
- Clay or silt deposits, especially those containing laminated features such as lacustrine varves or tidal rhythmites;

- Inorganic fossils such as molluscs;
- Concentrations of charcoal;
- Individual artefacts such as lithics (although finding these items in cores is extremely rare); and
- Any other feature thought to indicate a terrestrial depositional environment.

5.3.3 Vibrocores with a medium or high geoarchaeological potential will be clearly highlighted by Wessex Archaeology to the GI Contractor and should be retained undisturbed and made available for geoarchaeological description, recording and palaeoenvironmental sampling.

5.3.4 Where vibrocores from the additional survey areas are identified as containing deposits of medium or high geoarchaeological potential, the entire vibrocore will be reviewed at Stage 2 (where necessary) in order to provide stratigraphic context for those deposits/contexts of high potential.

5.3.5 Any vibrocores assigned a low geoarchaeological potential during the log review stage, and that subsequently reveal deposits of a higher potential (e.g. during the course of subsequent geotechnical laboratory works), may be requested to be made available to the Retained Archaeologist for further geoarchaeological monitoring and recording.

5.4 Stage 2: Geoarchaeological description and interpretation

5.4.1 The geoarchaeologist (Wessex Archaeology) will attend the site compound or logging facility to describe, interpret, record and sub-sample retained vibrocores assigned a high or medium priority status. Alternatively, cores can be delivered to the laboratory of the Retained Archaeologist, if appropriate.

5.4.2 The eight duplicate vibrocores will be recorded at Wessex Archaeology's facilities, along with any additional vibrocores assigned a medium or high priority status during the Stage 1 log review. The cores will be opened under geoarchaeological supervision, taking care to identify any deposits of a high geoarchaeological priority not apparent at the preceding core logging stage.

5.4.3 Deposits of high geoarchaeological potential will be set aside for further geoarchaeological recording and palaeoenvironmental sub-sampling, either at the geotechnical laboratory or sent to Wessex Archaeology's laboratories, if appropriate.

5.4.4 Vibrocores described in the geotechnical laboratory, or retained for later description, will include information such as:

- Depth;
- Texture;
- Composition;
- Colour;
- Inclusions;
- Structure (bedding, ped characteristics etc); and

- Contacts between deposits.

Geoarchaeological deposit modelling

5.4.5 At Stage 2, depending on the nature of the results, data from the geoarchaeological logging and recording stages may be used to update the existing deposit model produced during the previous Stage 1 review (see **Section 4.1**). This model will outline the character, extent and depth of deposits across the site, and enables the subsurface topography to be mapped accurately, locating deposits of archaeological and geoarchaeological potential in three-dimensions.

5.4.6 All available data points will be entered into industry standard software (Rockworks 23). Each lithological description (e.g. peat, clay, silt, sand etc.) will be given a colour and pattern allowing cross correlating and grouping of the different sediment and soil types. The grouping of these deposits is based on these lithological descriptions, which define distinct depositional environments referred to as 'stratigraphical units' (e.g. alluvium, peat, buried soils etc.).

5.4.7 Where suitable contexts are present, stratigraphic units representing certain depositional environments and/or landforms, will be reconstructed both laterally and horizontally to create Digital Elevation Models (DEMs), thickness plots and/or linear transects.

Geoarchaeological sub-sampling

5.4.8 Where appropriate deposits for geoarchaeological assessment are identified, sub-samples will be taken for a range of specified analytical techniques, including where relevant; pollen, microscopic charcoal, plant macrofossils, diatoms, foraminifera and ostracods, in addition to samples for radiocarbon dating and Optically-Stimulated Luminescence (OSL) if appropriate at Stage 3 (see **Section 5.5**).

5.4.9 The location of all sub-samples taken from vibrocores will be recorded and the cores retained in the event further sub-sampling is required at the palaeoenvironmental analysis stage (Stage 4).

5.4.10 Where retained vibrocores will not be available at a later date, sub-sampling for analysis will be undertaken concurrent with the assessment sub-sampling.

5.5 Stage 3: Palaeoenvironmental assessment

5.5.1 Palaeoenvironmental assessment involves a suite of complementary techniques in accordance with Historic England guidelines on good practice in environmental archaeology (English Heritage 2011) and geoarchaeology (Historic England 2015c), providing a comprehensive understanding of the deposits and their environmental context.

5.5.2 The principal aim of assessment is to date key deposits, provide an outline of depositional and vegetational environments represented, and determine the preservation and concentration of the various remains outlined below. This provides a framework for establishing the potential of any given deposit to contribute towards themes and questions outlined in national and regional archaeological research agenda (see **Section 2.2**), including the North Sea Prehistory Research and Management Framework (NSPRMF 2023) and national maritime research framework (Ransley *et al.* 2013), and work towards the project Aims and Objectives as set out in **Section 2**.

5.5.3 The function of each of the palaeoenvironmental techniques within geoarchaeological investigations is provided in **Appendix A** and synthesized in **Table 3** below.

5.5.4 Scientific dating will be undertaken following the guidance in Bayliss & Marshall (2022) and Wessex Archaeology's in-house guidance on scientific dating (Wessex Archaeology 2021b). It is not anticipated that vibrocores will be collected in opaque liners; samples with potential for OSL dating will therefore be opened following appropriate methodology for sampling in a purpose-built red light facility in Amesbury. Sampling and dating will be undertaken in consultation with Professor Phillip Toms, University of Gloucestershire.

Table 3 Palaeoenvironmental analytical techniques

Technique	Deposit required	Sample Size/Vol	Purpose
Plant macrofossils	Peat and organic-rich sediment	2 cm slice 50% cross section, retaining sufficient material in core for other techniques if required	Local vegetation and environment. Derive suitable material for radiocarbon dating
Pollen	Peat and organic-rich sediment	1 cm^3	Vegetation and environmental change, human impact
Microscopic charcoal	Utilises pollen samples	-	Natural and anthropogenic fire incidence
Foraminifera	Freshwater and marine minerogenic deposits	~50 g	Past coastal and riverine environments
Ostracod			
Diatom			
Radiocarbon dating	Peat and organic-rich sediment	Short-lived terrestrial plant remains (seeds, twigs etc)	Establish chronological framework
OSL	Minerogenic deposits with sand content	Requires min 10 cm sections through entire core, contained in opaque core-liner	Establish chronological framework

5.5.5 Should sufficient potential be found to be present, then subsequent palaeoenvironmental analysis (Stage 4) will be implemented.

5.6 Stage 4: Analysis

5.6.1 Should the Stage 3 assessment demonstrate sufficient potential, then full analysis of selected micro- and macro-fossils will be undertaken. Stage 4 may be supported by additional scientific dating (e.g. radiocarbon or OSL) if required and 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.

5.6.2 The results of analysis work will lead to publication of the results in a suitable journal as appropriate.

5.7 Reporting, data management, post-fieldwork assessment and archiving

5.7.1 The approach for reporting, data management, post-fieldwork assessment and archiving will be undertaken as follows.

Reports

5.7.2 Following completion of each Stage of the work, a draft report will be submitted for approval to the client within two months of receiving all the required information including results from

analytical techniques. Once approved, a final version will be submitted within two weeks. It is anticipated that reports will follow each Stage of the assessment, although where appropriate Stages may be combined into a single report (e.g. Stages 1 and 2) where considered appropriate and in consultation with the client and Historic England (HE).

5.7.3 Each archaeological report will satisfy the Method Statement for the investigation and will present the project information in sufficient detail to allow interpretation without recourse to the project archive.

5.7.4 Archaeological reports will be prepared in accordance with the guidance given in the relevant CIfA Standards and Guidance documents (e.g. 2020a and 2020b). Reports will typically include:

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

5.7.5 Illustrations will include a plan of the area subject to investigation in relation to the development scheme.

5.7.6 Archaeological Reports for each relevant work package will be prepared by Wessex Archaeology and submitted to the Client. Following approval by the Client, each report is required to be submitted to Historic England for review within four weeks.

Publication

5.7.7 If no further mitigation works are undertaken, a short report on the results of the evaluation will be prepared for publication in a suitable journal, where the results are deemed appropriate/sufficient to do so.

OASIS

5.7.8 An OASIS online record (https://oasis.ac.uk/) will be created, with key fields completed, and a .pdf version of the final report submitted. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and national records and published through the Archaeology Data Service ArchSearch catalogue.

5.7.9 It is anticipated that the OASIS record will be updated at the completion of each Stage of the assessment, and that associated reports will be uploaded within two weeks of approval by the client and Historic England.

Post-fieldwork Assessment

5.7.10 Decisions regarding the scope of post-fieldwork assessment will be made by agreement between the nominated Client representatives and Archaeological Curators following submission of Archaeological Reports, based on the possible importance of the results in

terms of their contribution to archaeological knowledge, understanding or methodological development.

5.7.11 The assessment phase may include (but is not limited to) the following elements:

- the conservation of appropriate materials;
- the assessment and analysis of palaeoenvironmental remains (e.g. pollen, plant macrofossils, diatoms, foraminifera, ostracods) supported by scientific dating; 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.

5.7.12 On the basis of post-fieldwork assessment, and as agreed by the relevant local or national Archaeological Curators, mitigation requirements will be satisfied by carrying out analysis of the post-fieldwork assessment to include publication of important results in a recognised peer-reviewed journal or as a monograph.

Museum

5.7.13 Every effort will be made to identify a suitable repository for the archive resulting from the investigation. The Client will arrange for the archive to be stored by the Retained Archaeologist or by another appropriate party.

5.7.14 Deposition of any finds will only be carried out with the full agreement of the owner (as confirmed by the Receiver of Wreck, if appropriate).

Archiving

5.7.15 It is accepted practice to keep project archives, which may include paper records, graphics, artefacts, ecofacts and digital data (together with a summary of the contents of the archive) together wherever possible and to deposit them in appropriate receiving institutions once their contents are in the public domain.

5.7.16 The relevant Archaeological Curators and Wessex Archaeology will agree with the receiving institution a policy for the selection, retention and disposal of excavated material, and confirm requirements in respect of the format, presentation and packaging of archive records and materials, and will notify the receiving institution in advance of any fieldwork (SMA 1995; CIfA 2014b; Brown 2011; ADS 2013). It is important to note that selection, retention and disposal of recovered or excavated material should only occur if the legislative requirements of the *Merchant Shipping Act* 1995 and *Protection of Military Remains Act* 1986 are fully undertaken and the Receiver of Wreck and Ministry of Defence are involved in any such decisions, for instance ensuring all droits administered by the Receiver of Wreck are closed prior to discard or transfer to an accredited museum.

5.7.17 In England, the National Marine Heritage Record (NMHR) is the repository for marine fieldwork records. An OASIS (Online Access to the Index of archaeological investigation) record will be produced for any completed and agreed archaeological reports produced as a result of this Method Statement.

5.7.18 The complete project archive will be prepared following the standard conditions for the acceptance of excavated archaeological material by the receiving intuition, and in general following nationally recommended guidelines (SMA 1995; CIfA 2014b; Brown 2011; ADS 2013). The archive will usually be deposited within one year of the completion of the

construction of the project, with the agreement of the Client. Where artefacts have been recovered and reported to the Receiver of Wreck under the *Merchant Shipping Act* 1995, deposition may take longer than a year and only after any droit reports have been closed. Liaison with the Receiver of Wreck and the museum throughout the project will allow discussions to occur to arrange for any required accessioning prior to the droits being officially closed.

5.7.19 All digital data will be considered part of the primary archive and will accord with the procedures recommended by The Crown Estate, Marine Environment Data and Information Network (MEDIN), Archaeological Data Service (ADS) and the accepting institution. Data will be compiled in a format suitable for submission of Monument, Event and Source records for entry into the NMHR.

Security copy

5.7.20 In line with current best practice (e.g. Brown 2011), on completion of the project a security copy of the written records will be prepared in the form of a digital PDF/A file. PDF/A is an ISO-standardised version of the Portable Document Format (PDF) designed for the digital preservation of electronic documents through omission of features ill-suited to long-term archiving.

Archive and report copyright

5.7.21 The full copyright of the written/illustrative/digital archive relating to the project will be retained by the Client, the Retained Archaeologist or approved Archaeological Contractor under the *Copyright, Designs and Patents Act* 1988 with all rights reserved. The museum, however, will be granted an exclusive license for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations* 2003. In some instances, certain regional museums may require absolute transfer of copyright, rather than a licence; this should be dealt with on a case-by-case basis.

5.7.22 Information relating to the project will be deposited with the NMHR where it can be freely copied without reference to the Client, Wessex Archaeology or the approved Archaeological Contractor for the purposes of archaeological research, or development control within the planning process.

BIBLIOGRAPHY

ADS 2013. *Caring for Digital Data in Archaeology: a guide to good practice*. Archaeology Data Service & Digital Antiquity Guides to Good Practice.

Ashton, N., Lewis, S. G., Parfitt, S. A., Penkman, K. E. and Coope, G. R. 2008. New evidence for complex climate change in MIS 11 from Hoxne, Suffolk, UK. *Quaternary Science Reviews*, *27*(7-8), pp.652-668.

Bayliss, A., and Marshall, P., 2022. *Radiocarbon Dating and Chronological Modelling: Guidelines and Best Practice*. Historic England, London

Bicket, A. and Tizzard, L. 2015. A Review of the Submerged Prehistory and Palaeolandscapes of the British Isles, *Proceedings of the Geologist's Association* Volume 126, Issue 6, p.643-663

Brown, A. and Russell, J. 2019. *Mesolithic geoarchaeological investigations in the Outer Thames Estuary*. Wessex Archaeology.

Bridgland, D. R. 2006. The Middle and Upper Pleistocene sequence in the Lower Thames: a record of Milankovitch climatic fluctuation and early human occupation of southern Britain: Henry Stopes Memorial Lecture 2004. *Proceedings of the Geologists' Association*, *117*(3), pp.281-305.

Bridgland, D. and Gibbard, P. 1997. Quaternary river diversions in the London Basin and the eastern English Channel. *Géographie physique et Quaternaire*, *51*(3), pp.337-346.

Boismier, W., Gamble, C. and Coward, F. 2012. *Neanderthals among Mammoths: Excavations at Lynford Quarry, Norfolk, UK*. English Heritage

Brown, D. H. 2011. *Archaeological archives; a guide to best practice in creation, compilation, transfer and curation*, Archaeological Archives Forum (revised edition).

Candy, I., Silva, B. and Lee, J. 2011. Climates of the Early Middle Pleistocene in Britain: Environments of the Earliest Humans in Northern Europe. In Ashton N, Lewis, S G, and Stringer, C (eds.) *The Ancient Human Occupation of Britain*. Vol. 14, 11–22, Amsterdam, Netherlands, Elsevier B.V.

Chartered Institute for Archaeologists (CIfA) 2020a. *Standard and guidance for archaeological field evaluation*. Published 2014. Reading, CIfA.

CIfA 2020b. *Standard and guidance for the collection, documentation, conservation and research of archaeological materials*. Published 2014. Reading, CIfA.

Cohen, K. M., MacDonald, K., Joordens, J. C. A., Roebroeks, W. and Gibbard, P. L. 2012. The Earliest Occupation of North-West Europe: a Coastal Perspective. *Quaternary International* 271, 70-83

English Heritage 2011. *Environmental Archaeology. A Guide to the Theory, Practice of Methods, from Sampling and Recovery to Post-excavation* (2nd edition). Portsmouth: English Heritage.

EMU Limited 2009. *The Outer Thames Estuary Regional Environmental Characterisation*, London, GB ALSF/MEPF (DEFRA).

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

Heamagi, C. 2017. Gunfleet Sands 3 Demonstration Project Stage 4 Geoarchaeological Analysis Report. Maritime Archaeology Ltd. [online] Available at [redacted] [Accessed July 2023].

Historic England 2015a. *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide*. Available online at [redacted] [Accessed July 2023].

Historic England 2015b. *Managing Significance in Decision-Taking in the Historic Environment Historic Environment Good Practice Advice in Planning: 2*. Available online at [redacted] [Accessed July 2023].

Historic England 2015c. *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record*. Available online at [redacted] Accessed June 2023].

Historic England 2016. *Preserving Archaeological Remains: Decision-taking for Sites under Development*. Available online at [redacted] Accessed July 2023].

Historic England 2017. *Conservation Principles for the Sustainable Management of the Historic Environment*. Consultation Draft 10 November 2017.

Historic England 2019. *Statements of Heritage Significance: Analysing Significance in Heritage Assets Historic England Advice Note 12*. Available online at [redacted] [Accessed July 2023].

Historic England 2020. *Deposit Modelling and Archaeology Guidance for Mapping Buried Deposits*. Swindon, Historic England.

Housley, R. A. 1991. AMS Dates from the Late Glacial and Early Postglacial in North-West Europe: A Review. In Barton, N, Roberts, A J, and Roe, D A (eds.) *The Late Glacial in North-West Europe: Human Adaptation and Environmental Change at the End of the Pleistocene*. London, Council for British Archaeology, 25-36

Hublin, J-J., Weston, D. and Gunz, P. 2009. Out of the North Sea: the Zeeland Ridges Neandertal. *Journal of Human Evolution* 57: 777– 785.

Jacobi, R., and Higham, T. 2011. The Later Upper Palaeolithic Recolonisation of Britain: New Results from AMS Radiocarbon Dating. In Ashton N, Lewis, S G, and Stringer, C (eds.) The Ancient Human Occupation of Britain. Vol. 14, 223–247, Amsterdam, Netherlands, Elsevier B.V.

Joint Nautical Archaeology Policy Committee 2006. *Code of Practice for Seabed Development*, JNAPC.

National Grid (forthcoming). *PEIR, Part 4, Chapter 7, Appendix A, Marine Archaeological Technical Report*.

Parfitt, S. A., Ashton, N. M., Lewis, S. G., Abel, R. L., Coope, G. R., Field, M. H., Gale, R., Hoare, P. G., Larkin, N. R., Lewis, M. D., Karloukovski, V., Maher, B. A., Peglar, S. M., Preece, R. C., Whittaker, J. E., and Stringer, C. B. 2010. Early Pleistocene Human Occupation at the Edge of the Boreal Zone in Northwest Europe. *Nature* 466(7303), 229–33

Parfitt, S. A., Barendregt, R. W., Breda, M., Candy, I., Collins, M. J., Coope, G. R., Durbidge, P., Field, M. H., Lee, J. R., Lister, A. M., Mutch, R., Penkman, K. E. H., Preece, R. C., Rose, J., Stringer, C. B., Symmons, R., Whittaker, J. E., Wymer, J., and Stuart, A. J. 2005. The Earliest Record of Human Activity in Northern Europe. *Nature* 438(7070), 1008–12

Pettitt, P. and White, M. J. 2012. *The British Palaeolithic: Human Societies at the Edge of the Pleistocene World.* Abingdon, Routledge

Ransley, J., Sturt, F., Dix, J., Adams, J. and Blue, L. 2013. *People and the sea: a maritime archaeological research agenda for England*. York, Council for British Archaeology Research Report 171.

Scott, B. and Ashton, N. 2011. The Early Middle Palaeolithic: The European Context. In Ashton, N, Lewis, S G, and Stringer, C (eds.) *The Ancient Human Occupation of Britain*. Volume 14, 91–112, Amsterdam, Netherlands, Elsevier B.V

Society of Museum Archives (SMA) 1993. *Selection, Retention and Dispersal of Archaeological Collections.*

Stoker, M. S., Balson, P. S., Long, D. and Tappin, D. R. 2011. *An overview of the lithostratigraphic framework for the Quaternary deposits of the United Kingdom continental shelf*. British Geological Survey Research Report, 48

Sturt, F., Garrow, D. and Bradley, S. 2013. New models of North West European Holocene palaeogeography and inundation. *Journal of Archaeological Science*, 40 3963-3976

Sumbler, M. G. 1996. *British Regional Geology; London and the Thames Valley*. London: HMSO

Tizzard, L., Bicket, A. R., Benjamin, J. and De Loecker, D. 2015. *A Middle Palaeolithic Site in the Southern North Sea: Investigating the Archaeology and Palaeogeography of Area 240*. Salisbury, Wessex Archaeology Monograph no 35

Wessex Archaeology 2013. *Audit of Current State of Knowledge of Submerged Palaeolandscapes and Sites*. Salisbury, unpubl report, ref: 84570.01

Wessex Archaeology 2016. *Nemo Link Stage 4 Analysis*. Salisbury

Wessex Archaeology 2021a. *Aggregate Area 528: Palaeolandscape assessment of geophysical and geotechnical data*. Unpublished report, ref: 246490.01

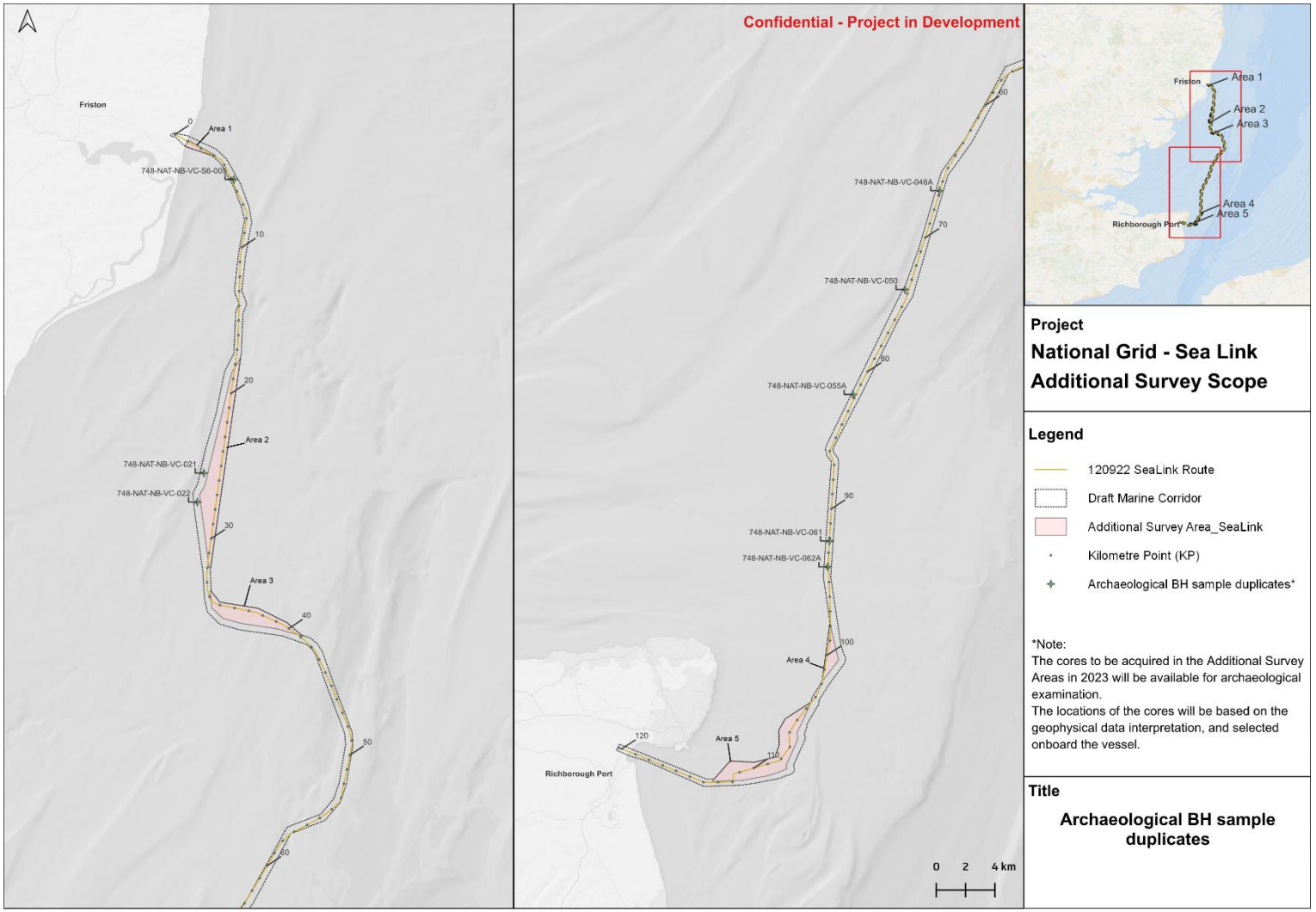
Wessex Archaeology 2021b. *Scientific Dating Sampling Guide*. Unpublished report, ref: WA_123.01, July 2021.

Wymer, J. J. 1999. *The Lower Palaeolithic Occupation of Britain*. Wessex Archaeology and English Heritage

Online sources

North Sea Prehistory Research and Management Framework 2023. 'Research Agenda', [redacted](accessed 24 July 2023)

Figure 1 Location of duplicate vibrocores and additional survey areas



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