

Outer Dowsing Offshore Wind

Environmental Statement

Appendix 13.3 Marine and Intertidal Archaeology Geoarchaeological assessment Phase One (Array)

Volume 3 Appendices

Date: March 2024

Document Reference: 6.3.13.3

Pursuant to APFP Regulation: 5(2)(a)

Rev: 1.0

Company:	Outer Dowsing Offshore Wind	Asset:	Whole Asset			
Project:	Whole Wind Farm	Sub Project/Package:	Whole Asset			
Document Title or Description:	Appendix 13.3: Marine and Intertidal Archaeology Geoarchaeological Assessment Phase One (Array)					
Internal Document Number:	PP1-ODOW-DEV-CS-REP-0176	3 rd Party Doc No (if applicable):	N/A			
Outer Dowsing Offshore Wind accepts no liability for the accuracy or completeness of the information in this document nor for any loss or damage arising from the use of such information.						
Rev No.	Date	Status / Reason for Issue	Author	Checked by	Reviewed by	Approved by
1.0	March 2024	DCO Application	Maritime Archaeology	GoBe	Shepherd & Wedderburn	Outer Dowsing

Table of Contents

Abbreviations / Acronyms.....	4
Terminology	4
Reference Documentation	5
1 Introduction.....	6
1.1 Geoarchaeological Background	6
1.2 Aims and Objectives.....	7
2 Geotechnical Site Investigations	8
3 Methodology	10
3.1 Geoarchaeology briefing session	10
3.2 Geoarchaeological methodology	11
3.3 Phase One – Desk-Based Assessment: Archaeological Review of Geotechnical logs	12
4 Results.....	13
4.1 Archaeological Assessment of Sub-Bottom Data	13
4.2 Deposit model.....	17
4.3 Geoarchaeological Assessment of Vibrocore Logs	20
5 Discussion	34
6 Recommendations for Phase Two assessments.....	36
7 References	40

Table of Tables

Table 1.1: Outline Deposit Model table.....	18
Table 1.2: Vibrocores assessed during Phase One	21

Table of Figures

Figure 1 Locations of the 50 Vibrocores assessed within the Array Area in this Phase One Report	9
Figure 2 Palaeochannels and Vibrocore Locations in the Array Area.....	16
Figure 3: Locations of the Assessed Vibrocores Displayed by Geoarchaeological Priority	35

Table of Plates

Plate 1 Illustrated outline deposit model (adapted from Outer Dowsing Offshore Wind Farm Geophysical UHRS And Light Geotechnical Survey East Anglia, Offshore UK, ENVIROS Survey & Consultancy Limited, 2022). 19

Abbreviations / Acronyms

Acronym	Expanded name
AfL	Agreement for Lease
BH	Borehole
CPT	Cone Penetration Tests
ECC	Export Cable Corridor
GC	Gravity Cores
GT R4 Limited	The Applicant. The special project vehicle created in partnership between Corio Generation (a wholly owned Green Investment Group portfolio company), Gulf Energy Development and TotalEnergies
MA	Maritime Archaeology Ltd
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
NSPRMF	North Sea Prehistory Research and Management Framework
ODOW	
PAD	Protocol for Archaeological Discoveries
PEIR	Preliminary Environmental Information Report
SBP	Sub-Bottom Profiler
VC	Vibrocore
WSI	Written Scheme of Investigation

Terminology

Term	Definition
Agreement for Lease (AfL)	The area of the seabed awarded to GT R4 Ltd. through an Agreement for Lease (AfL) for the development of an offshore wind farm, as part of The Crown Estate's Offshore Wind Leasing Round 4.
Array Area	The area offshore within which the generating station (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling will be positioned.
Cores	Refers to the soil samples collected by the Vibrocorer
Document	A document can be anything that is written, drawn, depicted, photographed or recorded on a material such as paper or in a digital program / media
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, Tota Energies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore

Term	Definition
	Wind. The Project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Shall	Indicates that a provision is mandatory
Should	Indicates that a provision is not mandatory but is recommended as good practice
Enviros	Enviros Survey & Consultancy Ltd

Reference Documentation

Document Number	Title
6.1.3	Chapter 3: Project Description

1 Introduction

1. GTR4 Ltd (trading as Outer Dowsing Offshore Wind) hereafter referred to as the ‘Applicant’, is proposing to develop Outer Dowsing Offshore Wind (ODOW) (‘the Project’). The Project Array area will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, and connection to the electricity transmission network, ancillary and associated development and areas for the delivery of up to two Artificial Nesting Structures (ANS) and the creation of a biogenic reef (if these compensation measures are deemed to be required by the Secretary of State) (see Volume 1, Chapter 3 Project Description (document reference 6.1.3) for full details).
2. This report presents a Phase One geoarchaeological assessment of Vibrocores (VCs) collected in 2022 as part of the pre-construction engineering campaign at the proposed Project area.
3. This Phase One geoarchaeological report summarises the current understanding and geoarchaeological potential of the material collected to date and presents Phase Two recommendations for cores and samples collected in the windfarm area.
4. This geoarchaeological report has been produced by Maritime Archaeology (MA) on behalf of the Applicant.

1.1 Geoarchaeological Background

5. The marine archaeological resource can be characterised into the following five main categories of sites and features:
 - Submerged prehistoric landscapes related to fluctuations in past sea-level. Such landscapes may contain significant evidence of prehistoric human occupation and/or environmental change.
 - Archaeological remains of vessels deposited after a wrecking event at sea or abandoned in an intertidal context.
 - Remains of aircraft crash sites, either coherent assemblages or scattered material, typically the result of Second World War (WWII) military conflict, but also numerous passenger casualties. This category includes aircraft, airships and other dirigibles dating to the First World War (WWI); however, these rarely survive within the archaeological record.
 - 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 MLWS and MHWS).
 - Historic Seascape Character: the historic cultural influences which shape present perception of seascape, its use and its ability to accommodate change.
6. A comprehensive archaeological desk-based assessment has been produced to support the application (Volume 1, Chapter 13 Marine and Intertidal Archaeology), prior to the writing of this geoarchaeology Phase One report. The previously submitted Technical Report (Volume 5, Annex 7.1) included a preliminary deposit model, based on Sub-Bottom Profiler (SBP) data.

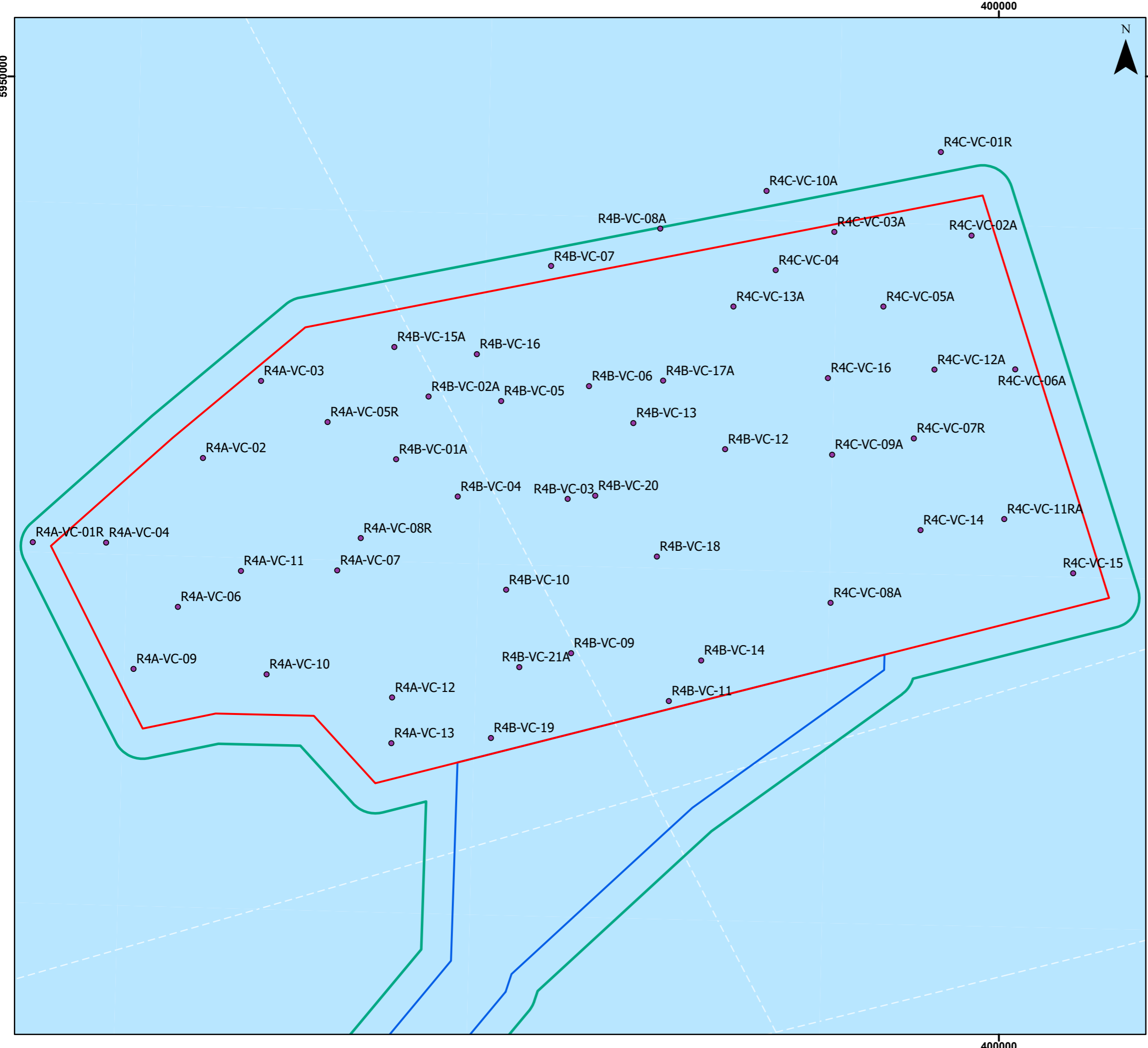
7. No geoarchaeological investigations or assessments have been conducted in the AfL Array Area in association with the Project, prior to the writing of this report. However, previous geoarchaeological assessments have been undertaken in this area of the North Sea. These previous studies, such as the North Sea Palaeolandscapes Project (NSPP) have been used to assess the geoarchaeology of the Project area.
8. This report is Phase One of five Phases (see section 3.2). The geoarchaeological assessment in this report focuses on submerged prehistoric landscapes and will assess the geoarchaeological potential of core logs produced during the geotechnical campaigns undertaken between 26th February and 6th March 2022.

1.2 Aims and Objectives

9. The main aim of the Phase One geoarchaeological report is to understand the geoarchaeological potential of the sub-seafloor deposits within the Project.
10. The objectives of this Phase One report are as follows;
 - Assess the available core logs for geoarchaeological potential to improve our understanding of the archaeological and palaeoenvironmental capacity within the Project;
 - Provide a preliminary understanding of the palaeoenvironmental context, using the outline deposit model and core logs;
 - Cross reference all collected cores against the sub-bottom data collected for the Project as well as palaeolandscape features identified in the North Sea Palaeolandscape project (University of Birmingham, 2011);
 - Present recommendations for Phase Two assessment as per the outlined methodology, Section 3.2.

2 Geotechnical Site Investigations

11. Enviro Survey and Consultancy Ltd (Enviros) were appointed to conduct geotechnical investigations of the Array Area for the Project. Investigations took place from 26th February to 6th March 2022.
12. During this survey period 50 VCs were successfully collected, using the survey vessel MV Glomar Vantage. While a 6m Vibrocorer was used, a maximum penetration range of up to 5.5m and a maximum soil recovery of 5.5m were achieved for the VCs. Additionally, 73 BHs were collected in the offshore ECC. A separate report discusses their geoarchaeological potential.



Legend

- Array Area
- Offshore Export Cable Corridor
- 1km Buffer
- Array Vibrocores



Coordinate System: WGS 1984 UTM Zone 31N
 0 3 6 km
 Scale: 1:120,000 A3 Page Size

Environmental Statement

Locations of the 50 Vibrocores assessed within the Array Area in this Phase One Report

Figure 13.1



Document Path: O:\Active_Tenders\1900 - Goble GIG-Total Outer Dowsing OWP\GIS\ODOW_ESR1900_ODOW_ESR1900_ODOW_ESR1900_ODOW_ESR1900

3 Methodology

13. The geoarchaeological assessment methodology is based around two main articles of guidance; *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (COWRIE, 2011). As well as *Environmental Archaeology: a guide to the theory and practice of methods, from sampling to post excavation and Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits*, Historic England (2020).
14. The Phased approach utilised, as set out in Section 22 will allow a directed development of our collective understanding of the historic environment of the offshore zone and thereby offsetting potential impacts through public benefit in line with the previously submitted Outline Marine WSI (Volume 5, Annex 7.2) document and guidance in *Offshore Geotechnical Investigation and Historic Environment Analysis: Guidance for the Offshore Renewable Energy Sector*, COWRIE (2011).
15. This Phase One geoarchaeological assessment will take the North Sea Prehistory Research and Management Framework (NSPRMF) into account when making recommendations for further Phase Two works. The programme of geotechnical works will allow for a maximisation of this opportunity to align with the goals of the NSPRMF. In addition to the ability to fully utilise the results from the currently completed and further planned site investigation works.
16. All core locations have also been compared to The North Sea Palaeolandscapes Project (NSPP), (University of Birmingham, 2011) data and the results are presented below.

3.1 Geoarchaeology briefing session

17. While the VC locations were not selected by an archaeologist, MA provided the geotechnical contractors with an archaeological briefing session, drawing on information contained in *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (COWRIE, 2011). The presentation aimed at increasing awareness of archaeological needs throughout the geotechnical campaign. The session was provided in person at the laboratories in Bristol, UK and to client representatives onboard coring vessels.
18. The overarching purpose of the briefing provided was to enable geotechnical staff working offshore to operate without the presence of an archaeologist on-board the vessel, or the onshore lab while obtaining basic records to appropriate archaeological standards.
19. The presentation covered the following key issues and elements:
 - Introduction;
 - How geotechnical survey is relevant to archaeological investigations;
 - Broad background to prehistoric archaeology in offshore contexts, including areas and sites as well as find spots from submerged contexts;
 - Sediment types: which are typically of geoarchaeological potential;
 -

- Overview of the archaeological assessment sequence;
- Core logging;
- Sampling;
- Analysis and assessment;
- Modelling;
- Reporting;
- Key issues: storing of samples; access to samples; co-operation with other users of samples; collection of archaeology-only sample(s);
- Recording and documentation procedures, including logging, coding and storage of samples in accordance with the documents and guidelines;
- Information on the procedure to be followed in the event of unexpected archaeological discoveries using a project specific Protocol for Archaeological Discoveries (PAD);
- Summary & Conclusion; and
- Question & Answer Session.

20. In addition, a range of briefing material was incorporated, including hand-outs and guidance sheets which were distributed over email and made available to all attendees.

3.2 Geoarchaeological methodology

21. This geoarchaeological campaign was one part of the mitigation strategies in place to offset the impacts to archaeological resources from the ground investigations as well as generate geoarchaeological data in support of future geotechnical campaigns.

22. The assessment of geotechnical cores for deposits of archaeological potential is following a phased approach as described in The Crown Estate, 2010, COWRIE, 2011, and English Heritage, 2011. The proposed phased approach is composed of the following elements:

- **Phase One – Desk based assessment: archaeological review of geotechnical logs** (this and the corresponding ECC report);
- Phase Two - Splitting and recording geotechnical cores;
- Phase Three – Sub-sampling and assessment;
- Phase Four – Analysis and dating; and
- Phase Five – Reporting (including publication).

23. This project format is designed to flow sequentially with each phase leading to the subsequent phase of work or representing the end of the assessment if the findings of any stage show that no further work is necessary. Each phase will build on the outline deposit model (Table 1.1), adding more detail and context until the final report is written.

3.3 Phase One – Desk-Based Assessment: Archaeological Review of Geotechnical logs

24. Initial core recording conducted either onboard the offshore site investigation vessels or in the onshore lab was undertaken by staff who had undertaken the briefing session as described in Section 3.1. All core logs derived from the collection of geotechnical vibrocores and produced by the geotechnicians were reviewed by a qualified marine archaeologist for the purpose of this Phase One report. Logs that had the potential to contain sediments or layers of possible geoarchaeological potential were identified and the results are presented in Section 4.
25. The VCs collected in the Array were assessed individually for geoarchaeological potential by referencing the core logs against palaeoenvironmental features, such as palaeolakes and palaeochannels previously identified by the NSPP (University of Birmingham, 2011) and analysis of the sub-bottom profiler data detailed in Volume 5, Annex 7.1 and summarised in section 4.1. All core locations were given an assessment grade as outlined below, indicating their geoarchaeological potential.
- **None;** geoarchaeological potential cannot be determined, for example the core does not reach any Units of geoarchaeological potential.
 - **Low;** the geoarchaeological potential is assessed as low, for example it reaches either a Unit that has geoarchaeological potential or is located within or close to a palaeo-feature.
 - **High;** The geoarchaeological potential is assessed as high, for example the core reaches both a Unit that has geoarchaeological potential and is located in a palaeo-feature.
26. Only the cores defined as having **high** geoarchaeological potential have been recommended for Phase Two assessment.
27. The results of the Phase One assessment are presented in Section 4 below and subsequent recommendations for the Phase Two assessment are included in Section 6.

4 Results

28. This Phase One geoarchaeological assessment has established that the AfL Array area is primarily composed of mobile sandy and gravelly surface deposits, formed into sandwaves and ripples, overlying dense gravels and stiff clay. The stiff clays and other fine grain sediments interpreted as Bolders Bank Formation has been identified across many of the VCs, underlying the mobile Holocene sand formations and primarily compose of firm to stiff clays which are of particular geoarchaeological interest as they represent prehistoric estuarine and lacustrine formations. Within the ECC VCs soft clay representing the Botney Cut Formation was noted, this has not been seen in the Array Area.
29. The Egmond Ground Formations have also been observed in the UHRS data collected along the ECC (GEOxyz, 2023) and is believed to be represented by sand and gravels. The Egmond Ground Formation is underlain by the Swarte Bank Formation in localised cannels along the ECC and is seen as sand and clay in the UHRS data.
30. Bedrock in the form of Cretaceous Chalk is seen along the offshore ECC and AfL Array area and is in places seen just below the Holocene sands.
31. The deposit model and results outlined here cover both AfL Array area and offshore ECC. The two reports should therefore be read with each other.

4.1 Archaeological Assessment of Sub-Bottom Data

32. The Technical Report provided an initial assessment of the Sub-Bottom data (Volume 5, Annex 7.1: Marine and Intertidal Archaeology Technical Report). The initial deposit model from the core logs will be further refined following further assessments of geotechnical data, as laid out in section 22. A deposit model is vital to provide context for the VCs, allowing the geotechnical core data to be cross referenced with the potential nature, extent and distribution of palaeolandscapes.
33. The sub-bottom data assessment identified seven palaeochannel features present in the Array Area, which have been used to provide context for the deposits recovered with the VCs. These palaeochannels as identified, are listed below and illustrated on Figure 2.

MA3000

34. MA3000 is a channel, 15km long and 4.5km at the widest point with possible narrower tributaries running in a north north-west to south south-east direction. While not overlapping previous data, it is located perpendicular to a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011) and parallel to wetlands identified by NSPP (University of Birmingham, 2011) as well as a tunnel valley, a sub-glacial incision formed by pressurised glacial meltwater. The channel has mostly sloping sides that in places are straight and a flat uneven base, the channel depth varies from 2m to 12m. One VC was collected within the channel feature (R4C-VC-07R) The core penetrated down to 3.3m and recovered 0.20m of gravels and 3.1m of dark CLAY interpreted as Unit C (Table 1.2). Further two cores, R4C-VC-16 and R4C-VC-11A are located on the edges of MA3000, both recovered Unit A and C and have been recommended for further recording.

MA3001

35. MA3001 is an area of 1.5km by 0.5km stretching in a north north-west to south south-east direction, west of MA3000. This could be an extension of a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011) which comes in from the east and thus connecting MA3000 and MA3001 to the wider channel systems previously identified in the area. The feature is up to eight meters deep with shallow sloping sides and uneven slightly rounded base. No VCs were collected within this feature, however R4C-VC-11A is located on the edge of MA3001 where Units A and C were recovered, this VC has been recommended for further recording (Table 1.3).

MA3002

36. MA3002 covers an area of 3.6km by 2.8km in an area of sandbanks and does not overlap with the data from NSPP (University of Birmingham, 2011) but shows similar character to a wetland or lake environment as seen both north and south of MA3002. The feature shows gently sloping sides and a slight rounded base. The feature is generally two to eight meters deep but has a dip in the middle which stretches down 16m. One VC was collected within the feature (R4C-VC-15) which penetrated down to 4.7m but only recovered Unit A and has therefore not been recommended for the Phase Two assessment.

MA3003

37. MA3003 is 4km by 4.2km, west of the southernmost part of MA3000 in an area of sand waves. The feature does not overlap with the data from NSPP (University of Birmingham, 2011) but shows similar character to a wetland or lake environment as seen both north and south of MA3003. The feature is up to 20m deep but has mostly sloping banks and is only between 2m and 8m deep around the perimeter. The eastern side of the feature is shallower than the western. No VCs have been collected within the extent of the feature or within 1km of its edges.

MA3004

38. MA3004 is a channel 9km long and 0.6km wide. The channel is located north north-west to south south-east to the west of MA3005 and a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011). The channel is approximately 6m deep with relatively steep banks. No cores were collected within the channel; however, one VC (R4B-VC-18) located between MA3004 and MA3005 has been recommended for the Phase Two assessment (Table 1.3).

MA3005 and MA3006

39. MA3006 stretches over 12km by 1.3km NNW to SSE and overlays perfectly with a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011). However, the project data extends this channel feature another 5.6km south (MA3005). The channel system has relatively steep banks but is in places very shallow and seen close to the seafloor. The channel base is mostly rounded but in deeper sections uneven reflectors are noted indicating a change in sediments. The channel system can be up to 20m deep but is in the majority approximately 4m deep. The feature is also located within a tunnel valley filled with reworked Holocene deposits.

40. One VC (R4B-VC-20) was collected in the northern part of MA3005. The core penetrated down to a depth of 5.5m and only contained Unit A, why it has not been recommended for Phase Two assessment. No VCs were collected within the extent of MA3006.

41. Around the edges of MA3005 and MA3006 six VCs have been recommended for Phase Two assessment (Table 1.3) R4B-VC-03, R4B-VC-05, R4B-VC-14, R4B-VC-16, R4B-VC-18 all contain Unit A and C while the log for R4B-VC-11 indicates that Unit C has been reached at 3.5m BSB.

MA3007

42. MA3007, while not overlying geographically with previously identified channels, this feature seems to be a northern extension of a shallow lake or wide river. It also partly overlies one of the tunnel valleys within the marine archaeology area and is therefore likely to contain material of geoarchaeological interest, however the SBP data does not penetrate the infill sediment within the tunnel valley. It is likely that the southern extension of this feature is present deeper within the sediments. One VC was collected within the tunnel valley and within the extent of previously identified wetland deposits, but outside the extent of the palaeofeature noted within the SBP data. R4A-VC-07 recovered Unit A, SAND with bands of clay overlaying brown gravelly SAND, reaching Unit C at 2m BSB which stretches until the end of the Vibrocore at 3.35 BSB. R4A-VC-07 has been recommended for the Phase Two assessment (Table 1.3).

4.2 Deposit model

43. The use of a deposit model is crucial for the understanding of the local and regional context of the offshore ECC and AfL Array Area, supporting the archaeological interpretation. As outlined by COWRIE (2011:39) *“An archaeological deposit model can illuminate the character and nature of buried sediments and deposits, their vertical extents, their relationship across the area being studied, and their individual levels of archaeological interest”*. Therefore, the deposit model has been a key part of the assessment. Guidance on Deposit Modelling and Archaeology (Historic England, 2020) has also been considered although the guidance does not cover the marine zone.
44. The outline deposit model, Table 1.1 and Plate , presented below has been developed based on the results from the sub bottom data assessment and the results of the Phase One assessment of the VCs both in the AfL Array Area and the offshore ECC.

Table 1.1: Outline Deposit Model table

Unit	Stratigraphy	Description	Epoch	Geoarchaeological potential
Unit A	Holocene mobile sands	Mobile loose to medium gravelly or silty SAND, in places GRAVEL or CLAY.	Holocene	Sedimentary low geoarchaeological potential, however archaeological artefacts may be located within these sediments
Unit B	Botney Cut Formation	Laminated fine SAND with very soft to soft CLAY	Quaternary, Marine Isotope Stage 2	Potential to contain material of geoarchaeological interest
Unit C	Bolders Bank Formation	Fine to medium SAND and soft to stiff CLAY with sand, gravel chalk and pebbles. At base GRAVEL	Quaternary, Marine Isotope Stage 3-2	Potential to contain material of geoarchaeological interest
Unit D	Egmond Ground Formation	Medium to fine SAND and gravels	Quaternary, Marine Isotope Stage 11	Limited potential to contain material of geoarchaeological interest
Unit E	Swarte Bank Formation	Stiff to very stiff CLAY	Quaternary Marine Isotope Stage 12	Potential to contain material of geoarchaeological interest
Unit F	Bedrock Formation	Cretaceous CHALK	Cretaceous	No geoarchaeological interest

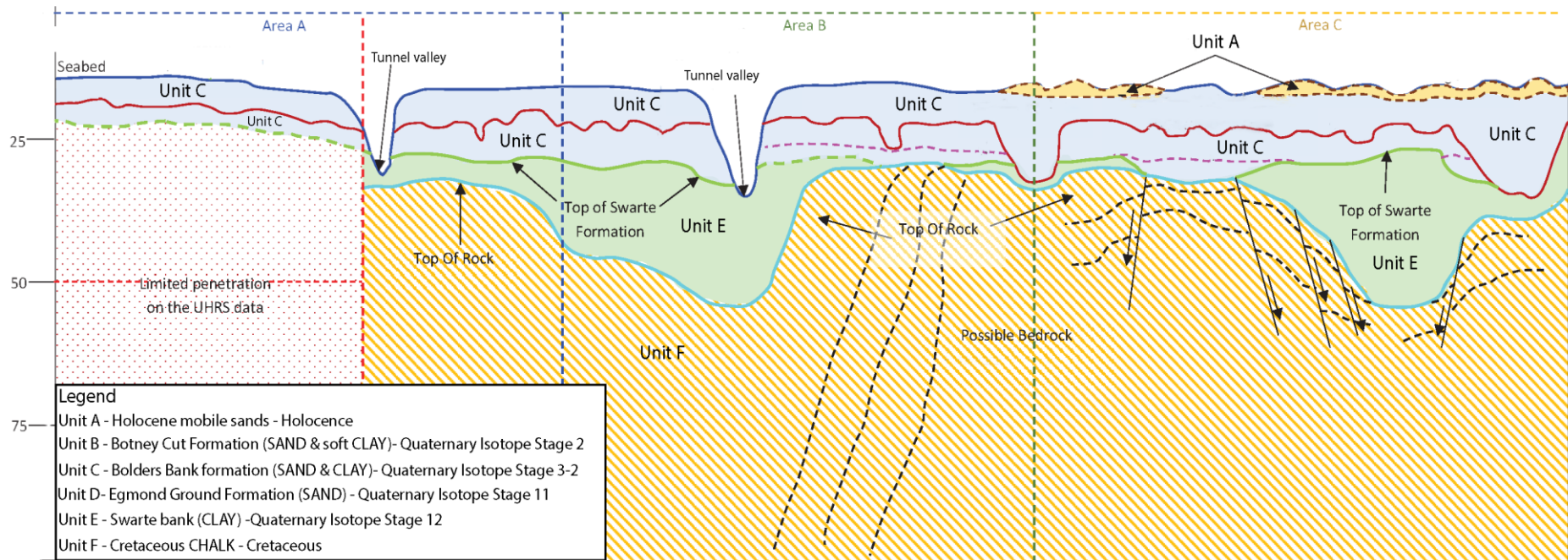


Plate 1 Illustrated outline deposit model (adapted from Outer Dowsing Offshore WindFarm Geophysical UHRS And Light Geotechnical Survey East Anglia, Offshore UK, ENVIROS Survey & Consultancy Limited, 2022).

4.3 Geoarchaeological Assessment of Vibrocore Logs

45. The results from the Phase One assessment of the 50 VCs in the AfL Array Area are outlined below in Table 1.2 which shows a summary of the stratigraphy as understood from the core logs and a priority grading based on each core's geoarchaeological potential and viability for geoarchaeological analysis at Phase Two.

Table 1.2: Vibrocores assessed during Phase One

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
R4A-VC-01R	0.0 - 2.7 m: Very Dense grey SAND with traces of shell fragments, penetrates Unit A	3.00	2.70	367960.32	5934553.41	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None
R4A-VC-02	0.0 – 0.2 m Dense medium to coarse SAND intermixed with fine subangular fine to coarse gravels with many shell fragments 0.2 - 2.0 m: Stiff dark brown CLAY with few subangular fine gravels.	2.30	2.00	373603.61	5937343.31	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4A-VC-03	0.0 – 1.5 m: Dense brown gravelly SAND with few shell fragments 1.5 – 3.2 m: Firm to Stiff dark brown sandy CLAY with traces of shell fragments	3.40	3.20	375530.26	5939900.53	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4A-VC-04	0.0 – 1.0 m: Medium Dense dark grey very sandy gravel with many shell fragments 1.0 – 2.6 m: Firm to Very Stiff dark SAND with traces of shell fragments	2.80	2.60	370392.39	5934538.56	Unit A and C	Penetrates Units A and C, located within area previously interpreted as wetland/lake deposits of geoarchaeological potential. Recommended for Phase Two.	High
R4A-VC-05R	0.0 – 5.45 m: medium Dense black SAND with traces of shell fragments	5.45	5.45	377736.36	5938537.14	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
R4A-VC-06	0.0 – 0.4 m: Dense grey slightly gravelly SAND with few shell fragments 0.4 – 2.1 m: Stiff to Very stiff grey slightly sandy CLAY with few gravels	2.30	2.10	372772.55	5932408.20	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4A-VC-07	0.0 – 2.2 m: Medium Dense dark grey gravelly SAND with clay fragments 2.2 – 3.0 m: medium Dense light grey very clayey GRAVEL with sand pocket 3.0 – 3.35 m: Very Stiff light grey gravelly CLAY with sand pocket	3.35	3.35	378055.81	5933617.25	Unit A, and C	Penetrates Units A and C, located within area previously interpreted as wetland/lake deposits of geoarchaeological potential, also located within a tunnel valley. Recommended for Phase Two.	High
R4A-VC-08R	0.0 – 2.1 m: Stiff dark brown slightly sandy Clay with few gravels and traces of shell fragments	2.50	2.10	378836.35	5934688.72	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4A-VC-09	0.0 – 5.1 m: Soft to Stiff dark brown slightly sandy CLAY with few gravels and few shell fragments	5.70	5.10	371300.80	5930350.61	Unit A and C	Penetrates Units A and C, located within area previously interpreted as wetland/lake deposits of geoarchaeological	High

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
							potential. Recommended for Phase Two.	
R4A-VC-10	0.0 – 0.8 m: Medium Dense grey very gravelly SAND with few clay pockets 0.8 – 2.3 m: Stiff grey sandy CLAY with few gravels	3.00	2.70	375714.18	5930170.85	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4A-VC-11	0.0 – 1.0 m: Medium Dense dark grey very clayey GRAVEL with traces of shell fragments 1.0 – 2.3 m: Stiff dark grey slightly sandy CLAY with gravel	2.50	2.30	374864.09	5933599.21	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4A-VC-12	0.0 – 2.4 m: Very Dense grey GRAVEL and SAND with many shell fragments 2.4 – 4.2 m: Very Dense very dark grey gravelly SAND with many shell fragments 4.2 – 5.05 m: Very Dense grey very clayey SAND with gravel and shell fragments	5.10	5.05	379875.09	5929403.63	Unit A and C	Penetrates Units A and C, located within area previously interpreted as wetland/lake deposits of geoarchaeological potential, also located within or on the edge of a tunnel valley. Recommended for Phase Two.	High

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
R4A-VC-13	0.0 – 4.85 m: Medium Dense grey SAND with few shell fragments and traces of gravel	5.00	4.85	379851.01	5927887.33	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None
R4B-VC-01A	0.0 – 4.2 m: Dense to Very Dense grey gravelly SAND with shell fragments	4.50	4.20	380009.12	5937303.53	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None
R4B-VC-02A	0.0 – 4.3 m: Medium Dense to Dense grey very gravelly SAND with shell fragments	4.80	4.70	381085.10	5939383.03	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None
R4B-VC-03	0.0 -3.8 m: Dense grey very gravelly SAND with many shell fragments	4.60	4.40	385698.10	5935988.07	Unit A and C	Penetrates Units A and C, located between MA3006 and MA3005 as well as on the edge of area previously interpreted as fluvial channel deposits of geoarchaeological potential. Recommended for Phase Two.	High
R4B-VC-04	0.0 – 3.2 m: Firm to Stiff brown sandy and CLAY with gravel and traces of shell fragments	3.75	3.50	382052.81	5936066.55	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
R4B-VC-05	0.0 – 3.8 m: Stiff very dark grey slightly sandy CLAY with gravel and many shell fragments	3.80	3.55	383492.65	5939232.42	Unit A and C	Penetrates Units A and C, located on the edge of MA3006 as well as on the edge of area previously interpreted as fluvial channel deposits of geoarchaeological potential. Recommended for Phase Two.	High
R4B-VC-06	0.0 – 1.65 m: Stiff dark brown slightly sandy CLAY with few gravels and many shell fragments	1.90	1.65	386405.71	5939727.12	Unit A and C	Penetrates Units A and C, located on the edge of MA3006 as well as on the edge of area previously interpreted as fluvial channel deposits of geoarchaeological potential. Not recommended for Phase Two because of shallow penetration.	Low
R4B-VC-07	0.0 – 1.60: Medium Dense dark grey very gravelly SAND with shell fragments 1.6 – 5.5 m: Medium Dense dark grey SAND with traces of shell fragments	5.80	5.50	385148.56	5943713.61	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
R4B-VC-08A	0.0 – 5.5 m: Dense grey gravelly SAND with many shell fragments	5.70	5.50	388768.18	5944951.58	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None
R4B-VC-09	0.0 – 1.6 m: Stiff brown slightly sandy CLAY with gravel and few shell fragments	2.20	1.60	385811.61	5930871.44	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4B-VC-10	0.0 – 2.85 m: Soft to Firm brown sandy CLAY with few gravels and many shell fragments	3.00	2.80	383657.55	5932975.67	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4B-VC-11	0.0 – 4.3 m: Medium Dense brown very gravelly SAND with traces of shell fragments	4.70	4.30	389052.50	5929284.47	Unit A and C	Penetrates Units A and C, located south of MA3005, (fluvial channel) Recommended for Phase Two.	High
R4B-VC-12	0.0 – 1.6 m: Medium dense to Dense grey SAND with few gravels and many shell fragments 1.6 – 2.39 m: Stiff to Very Stiff brown slightly sandy CLAY with	2.60	2.39	390919.30	5937636.17	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
	few gravels and traces of shell fragments							
R4B-VC-13	0.0 – 2.9 m: Dense grey gravelly SAND with many shell fragments 2.9 – 3.9 m: Stiff dark grey slightly sandy CLAY with traces of shell fragments	3.75	3.90	387875.69	5938502.18	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4B-VC-14	0.0 – 0.7 m: Medium Dense brown SAND with few clay pockets and many shell fragments 0.7 – 1.75 m: Stiff brown slightly sandy CLAY with many shell fragments	2.00	1.75	390125.35	5930629.06	Unit A and C	Penetrates Units A and C, located south of MA3005, (fluvial channel) Recommended for Phase Two.	High
R4B-VC-15A	0.0 – 3.2 m: Stiff to very Stiff grey slightly sandy CLAY with many shell fragments	3.60	3.20	379950.47	5941024.51	Unit C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4B-VC-16	0.0 – 1.2 m: Very Stiff brown slightly sandy CLAY with many shell fragments and few gravels	1.30	1.15	382686.68	5940786.83	Unit A and C	Penetrates Units A and C, located on the edge of MA3006 as well as on the edge of area previously interpreted as fluvial channel deposits of	High

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
							geoarchaeological potential. Recommended for Phase Two.	
R4B-VC-17A	0.0 – 4.1 m: Dense dark grey gravelly SAND with shell fragments	4.40	4.10	388863.02	5939909.75	Unit A	Penetrates Unit A only, not recommended for Phase Two.	None
R4B-VC-18	0.0 – 1.83 m: Stiff grey slightly sandy CLAY with few gravel and shell fragments	1.90	1.83	388656.75	5934075.91	Unit A and C	Penetrates Units A and C, located between MA3004 and MA3005 as well as on the edge of an area previously interpreted as fluvial channel deposits of geoarchaeological potential. Recommended for Phase Two.	High
R4B-VC-19	0.0 – 1.8 m: Medium Dense brown SAND with traces of shell fragments 1.8 - 3.6 m: Medium dense brown sandy GRAVEL with traces of shell fragments	4.00	3.60	383153.57	5928059.31	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4B-VC-20	0.0 – 5.5 m: Medium Dense very dark gravelly SAND with many shell fragments	5.80	5.50	386611.60	5936094.22	Unit A	Penetrates Unit A only, located within MA3005 and a tunnel valley, however not	None

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
							recommended for Phase Two.	
R4B-VC-21A	0.0 – 2.35 m: Stiff brown slightly sandy CLAY with gravel and many shell fragments	2.50	2.35	384093.64	5930409.18	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-01R	0.0 – 0.65 m: Medium Dense dark grey slightly silty SAND with pockets of gravel and traces of shell fragments	1.40	0.65	398074.16	5947489.82	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two. This now falls outside the new Array area.	Low
R4C-VC-02A	0.0 – 1.7 m: Stiff to dark grey slightly sandy CLAY with pocket of gravel and traces of shell fragments	1.85	1.70	399091.01	5944720.20	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-03A	0.0 – 1.93 m: Stiff to Very Stiff dark grey slightly sandy CLAY with pockets of gravel and traces of shell fragments	2.50	1.93	394541.46	5944842.11	Unit C	Penetrates Unit C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
R4C-VC-04	0.0 – 1.3 m: Stiff to Very Stiff grey slightly sandy CLAY with few gravels and many shell fragments	1.30	1.30	392596.30	5943573.64	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-05A	0.0 – 1.5 m: Stiff dark grey slightly sandy CLAY with few gravels	1.70	1.50	396167.72	5942366.59	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-06A	0.0 – 1.6 m: Medium Dense dark grey SAND with many shell fragments 1.6 – 3.45 m: Stiff to very Stiff dark grey slightly sandy CLAY with few gravels	3.60	3.45	400539.62	5940283.38	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-07R	0.0 – 3.3 m: Stiff very dark brown slightly sandy CLAY with gravel and many shell fragments	3.60	3.30	397177.78	5937992.77	Unit A and C	Penetrates Units A and C, located within of MA3000, (fluvial channel) Recommended for Phase Two.	High
R4C-VC-08A	0.0 – 1.4 m: Stiff to very Stiff black sandy CLAY with gravel and traces of shell fragments	1.75	1.40	394416.08	5932542.37	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not	Low

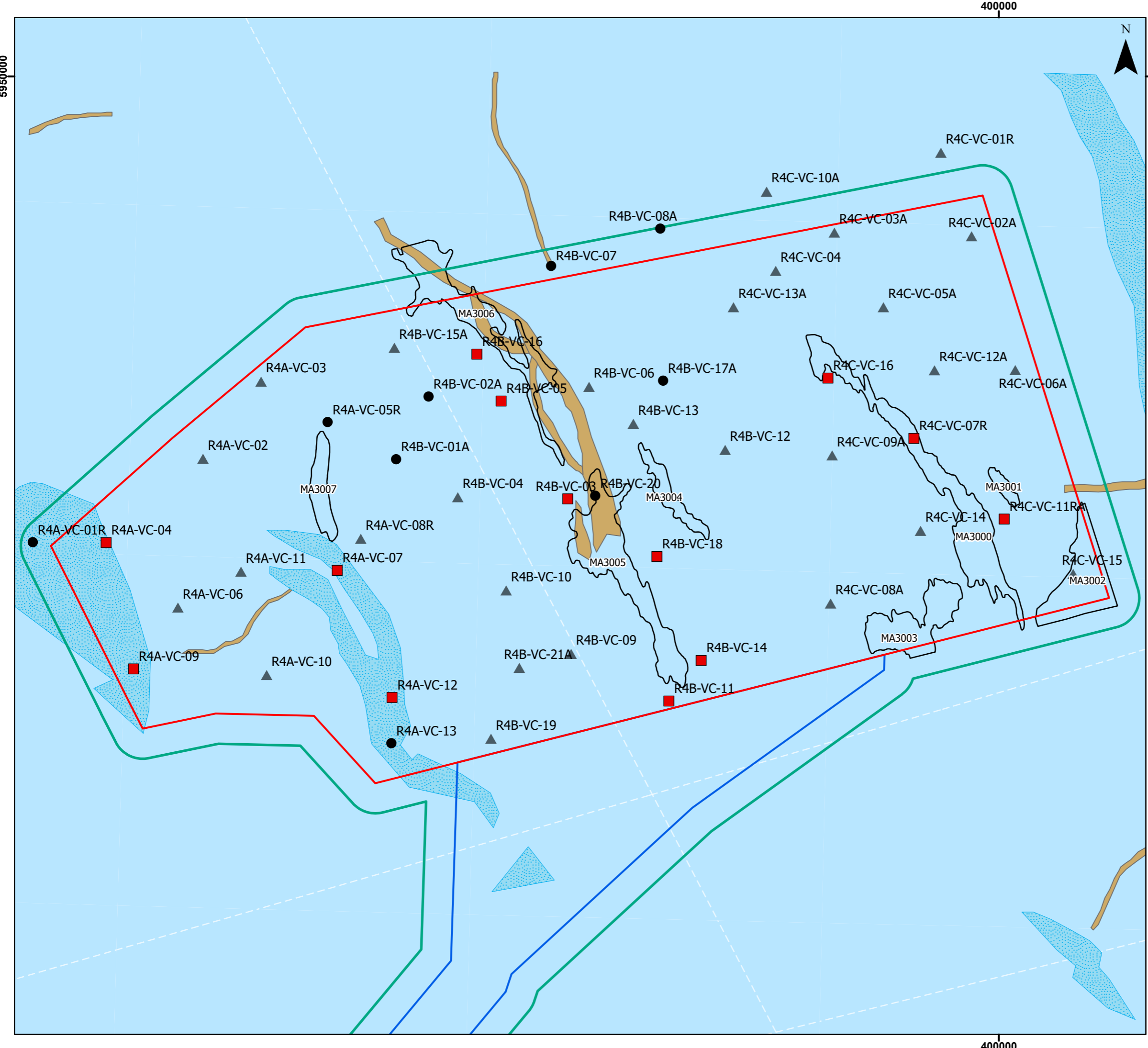
Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
							recommended for Phase Two.	
R4C-VC-09A	0.0 – 2.85 m: Stiff dark grey slightly sandy CLAY with few gravels and traces of shell fragments	3.00	2.85	394467.97	5937452.82	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-10A	0.0 – 1.5 m: Stiff to Very Stiff dark grey slightly sandy CLAY with few gravels and traces of shell fragments	1.90	1.50	392293.32	5946199.95	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two. This now falls outside the new Array area.	Low
R4C-VC-11RA	0.0 – 2.3 m: Stiff dark grey slightly sandy CLAY with gravel and shell fragments	2.40	2.30	400174.98	5935319.10	Unit A and C	Penetrates Units A and C, located between MA3000 and MA3001 as well as 2km from area previously interpreted as fluvial channel deposits of geoarchaeological potential. Recommended for Phase Two.	High

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
R4C-VC-12A	0.0 – 2.3 m: Stiff to Very Stiff light brown slightly sandy CLAY with few gravel and shell fragments	2.45	2.30	397860.79	5940276.13	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-13A	0.0 – 2.3 m: Medium Dense brown SAND with many shell fragments and traces of gravel	2.10	1.95	391195.10	5942366.97	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-14	0.0 – 3.45 m: Stiff brown slightly sandy CLAY with few gravels and traces of shell fragments	3.70	3.45	397398.99	5934951.91	Unit A and C	Penetrates Units A and C, located in area of low geoarchaeological potential. Not recommended for Phase Two.	Low
R4C-VC-15	0.0 – 4.7 m: Medium Dense dark grey SAND with gravel and few shell fragments	4.90	4.70	402460.32	5933522.62	Unit A	Penetrates Unit A only, located within MA3002 (wetland or lake environment), however not recommended for Phase Two.	Low
R4C-VC-16	0.0 – 1.13 m: Stiff grey slightly sandy CLAY with gravels and many shell fragments	1.30	1.13	394328.53	5939993.56	Unit A and C	Penetrates Unit C, located on the edge of MA3000, (fluvial	High

Core ID	Soil description	Penetration (m)	Recovery (m)	Easting	Northing	Units penetrated	Interpretation	Priority
							channel) Recommended for Phase Two.	

5 Discussion

47. Fifty geotechnical VCs were collected in the AfL Array Area, using a vibrocorer to a maximum target depth of 6m. These cores were subsequently assessed according to the methodology set out in Section 3. After being assessed for geoarchaeological potential individually, the nine cores determined to have no geoarchaeological potential were labelled as **none**, 28 were defined as having **low** geoarchaeological potential and 13 were defined as having a **high** geoarchaeological potential and are considered valuable for understanding the palaeoenvironmental context of the Project.
48. Table 1.2 presents the results from the assessment of all collected cores and the sub-bottom data collected for the Project as well as palaeolandscapes features previously identified.
49. The thirteen cores assessed as being of **high** geoarchaeological potential are associated with features previously identified.
50. R4A-VC-01R, R4A-VC-04, R4A-VC-07, R4A-VC-09, R4A-VC-12 are all located within two palaeo-wetland areas in the western edge of the Array Area. These palaeo-wetland areas were identified by the NSPP (University of Birmingham, 2011) project and cores collected from this area have the potential to be important in further understanding the regional prehistoric environment.
51. R4B-VC-03, R4B-VC-05, R4B-VC-11RA, R4B-VC-14, R4B-VC-16 and R4B-VC-18 are all located in or around a complex network of palaeochannels in the centre of the Array Area, MA3004, MA3005, and MA3006. All cores penetrate Unit A, and Unit C, which is composed of dark, stiff clays, apart from R4B-VC-11 where an indication of Unit C (sand) is noted in the log. The feature was also identified by NSPP (University of Birmingham, 2011).
52. R4C-VC-07R, R4C-VC-11R and R4C-VC-16 are all located in or around a fluvial Lower Palaeolithic, possibly Holocene channel system identified within the SBP data (MA3000 and MA3001) as well as by NSPP (University of Birmingham, 2011). The three cores penetrate Units A and C.
53. Two of the cores are outside the revised Order Limits, however, were within the AfL Array Area therefore have remained in this report. These are R4C-VC-10A and R4C-VC-01R and were both deemed to be of low priority.



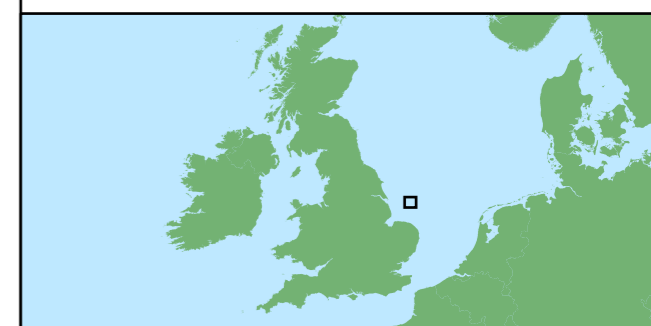
Legend

- Array Area
- Offshore Export Cable Corridor
- 1km Buffer

Priority

- High
- Low
- None

- SBP Palaeochannels (MA3000-MA3007)
- NSPP Lakes
- NSPP Fluvial Channels



Coordinate System: WGS 1984 UTM Zone 31N

0 3 6 km

Scale: 1:120,000

A3 Page Size

Environmental Statement

Vibrocores displayed by geoarchaeological priority

Figure 13.3



Date: 09/02/2024
 Produced By: LR
 Revision: 0.1



Contains ESRI Basemapping;
 World Topographic Map: Esri
 UK, Esri, TomTom, Garmin,
 Foursquare, GeoTechnologies,
 Inc, MET/NASA, USGS

Document Path: O:\Active_Tenders\1900 - Goble GIG-Total Outer Dowsing OWP\GIS\ODOW_ESR1900_ODOW_ESR1900_ODOW_ESR1900_ODOW_ESR1900

6 Recommendations for Phase Two assessments

54. It is recommended that 13 cores should be recorded during Phase Two. This will involve the splitting and recording of the **high** geoarchaeological potential cores listed in Table 1.3.
55. Phase two assessments are to be undertaken in line with the phased approach outlined in COWRIE (2011) guidance, post consent, should consent be given as agreed in the WSI.

Table 1.3 Vibrocores defined as having **high** potential

Core ID	Soil description	Easting	Northing	Units penetrated	Associated with palaeo-feature	Priority
R4A-VC-04	0.0 – 1.0 m: Medium Dense dark grey very sandy gravel with many shell fragments 1.0 – 2.6 m: Firm to Very Stiff dark SAND with traces of shell fragments	370392.39	5934538.56	Unit A and C	Palaeo-wetland area in the western edge of the Array Area Previously identified by the NSPP (University of Birmingham, 2011).	High
R4A-VC-07	0.0 – 2.2 m: Medium Dense dark grey gravelly SAND with clay fragments 2.2 – 3.0 m: medium Dense light grey very clayey GRAVEL with sand pocket 3.0 – 3.35 m: Very Stiff light grey gravelly CLAY with sand pocket	378055.81	5933617.25	Unit A, and C	Palaeo-wetland area in the western edge of the Array Area Previously identified by the NSPP (University of Birmingham, 2011).	High
R4A-VC-09	0.0 – 5.1 m: Soft to Stiff dark brown slightly sandy CLAY with few gravels and few shell fragments	371300.80	5930350.61	Unit A and C	Palaeo-wetland area in the western edge of the Array Area Previously identified by the NSPP (University of Birmingham, 2011).	High
R4A-VC-12	0.0 – 2.4 m: Very Dense grey GRAVEL and SAND with many shell fragments	379875.09	5929403.63	Unit A and C	Palaeo-wetland area in the western edge of the Array Area Previously identified by the NSPP (University of Birmingham, 2011).	High

Core ID	Soil description	Easting	Northing	Units penetrated	Associated with palaeo-feature	Priority
	2.4 – 4.2 m: Very Dense very dark grey gravelly SAND with many shell fragments 4.2 – 5.05 m: Very Dense grey very clayey SAND with gravel and shell fragments					
R4B-VC-03	0.0 -3.8 m: Dense grey very gravelly SAND with many shell fragments	385698.10	5935988.07	Unit A and C	MA3004, MA3005 and MA3006, a complex network of palaeochannels. Also identified by NSPP (University of Birmingham, 2011).	High
R4B-VC-05	0.0 – 3.8 m: Stiff very dark grey slightly sandy CLAY with gravel and many shell fragments	383492.65	5939232.42	Unit A and C	MA3004, MA3005 and MA3006, a complex network of palaeochannels. Also identified by NSPP (University of Birmingham, 2011).	High
R4B-VC-11	0.0 – 4.3 m: Medium Dense brown very gravelly SAND with traces of shell fragments	389052.50	5929284.47	Unit A and C	MA3004, MA3005 and MA3006, a complex network of palaeochannels. Also identified by NSPP (University of Birmingham, 2011).	High
R4B-VC-14	0.0 – 0.7 m: Medium Dense brown SAND with few clay pockets and many shell fragments 0.7 – 1.75 m: Stiff brown slightly sandy CLAY with many shell fragments	390125.35	5930629.06	Unit A and C	MA3004, MA3005 and MA3006, a complex network of palaeochannels. Also identified by NSPP (University of Birmingham, 2011).	High
R4B-VC-16	0.0 – 1.2 m: Very Stiff brown slightly sandy CLAY with many shell fragments and few gravels	382686.68	5940786.83	Unit A and C	MA3004, MA3005 and MA3006, a complex network of palaeochannels. Also identified by NSPP (University of Birmingham, 2011).	High

Core ID	Soil description	Easting	Northing	Units penetrated	Associated with palaeo-feature	Priority
R4B-VC-18	0.0 – 1.83 m: Stiff grey slightly sandy CLAY with few gravel and shell fragments	388656.75	5934075.91	Unit A and C	MA3004, MA3005 and MA3006, a complex network of palaeochannels. Also identified by NSPP (University of Birmingham, 2011).	High
R4C-VC-07R	0.0 – 3.3 m: Stiff very dark brown slightly sandy CLAY with gravel and many shell fragments	397177.78	5937992.77	Unit A and C	MA3000 and MA3001, a fluvial Lower Palaeolithic, possibly Holocene channel system. Also identified by NSPP (University of Birmingham, 2011).	High
R4C-VC-11RA	0.0 – 2.3 m: Stiff dark grey slightly sandy CLAY with gravel and shell fragments	400174.98	5935319.10	Unit A and C	MA3000 and MA3001, a fluvial Lower Palaeolithic, possibly Holocene channel system. Also identified by NSPP (University of Birmingham, 2011).	High
R4C-VC-16	0.0 – 1.13 m: Stiff grey slightly sandy CLAY with gravels and many shell fragments	394328.53	5939993.56	Unit A and C	MA3000 and MA3001, a fluvial Lower Palaeolithic, possibly Holocene channel system. Also identified by NSPP (University of Birmingham, 2011).	High

7 References

COWRIE (2011), Offshore Geotechnical Investigation and Historic Environment Analysis : Guidance for the Renewable Energy Sector. <https://www.historicenvironment.scot/media/2376/2011-01-offshore-geotechnical-investigations-and-historic-environment-analysis-guidance-for-the-renewable-energy-sector.pdf> [Accessed: April 2023]

Historic England (2015), 'Geoarchaeology; using Earth Sciences to understand the Archaeological Record'. <https://historicengland.org.uk/images-books/publications/geoarchaeology-earth-sciences-to-understand-archaeological-record/heag067-geoarchaeology/> [Accessed: April 2023].

Historic England (2020), Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits [HEAG272 Deposit Modelling and Archaeology \(historicengland.org.uk\)](https://historicengland.org.uk/heag272-deposit-modelling-and-archaeology/) [Accessed: April 2023].

The Crown Estate (2021), 'Archaeological Written Schemes of Investigation for Offshore WindFarm projects'. <https://www.thecrownestate.co.uk/media/3917/guide-to-archaeological-requirements-for-offshore-wind.pdf> [Accessed: February 2023].

University of Birmingham (2011) North Sea Palaeolandscape Project [dataset]. <https://doi.org/10.5284/1000397>. [Accessed: March 2023].

GEOxyz (2023), Offshore and Nearshore Geophysical and Geotechnical Results & Charts (Vol. 5).