making sense of heritage

Race Bank Offshore Wind Farm

Stage 1 & 2
Geoarchaeological Assessment

WA ref: 62559.02
January 2014

geoservices

RACE BANK OFFSHORE WIND FARM

Stage 1 & 2
Geoarchaeological Assessment

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RACE BANK OFFSHORE WIND FARM

Stage 1 & 2
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RACE BANK OFFSHORE WIND FARM

Stage 1 & 2
Geoarchaeological Assessment

Summary

Wessex Archaeology was commissioned by Centrica Renewable Energy Ltd to undertake a geoarchaeological assessment of sediments retrieved during geotechnical investigations at the proposed Race Bank Offshore Wind Farm site. This has comprised the assessment of stratified sediments from 43 offshore boreholes.

Pleistocene sediments (**Unit 2**) including glacial till and glacio-fluvial sediments are thought to have been deposited during the Devensian under glacial conditions precluding human activity in the region, and are contemporary with Lower and Middle Palaeolithic archaeological periods.

These deposits are overlain by post-glacial and Holocene fluvial and estuarine alluvium (**Unit 3**) probably recording glacial, lacustrine fluvial and estuarine environments during a period of lower relative sea level spanning the Late Upper Palaeolithic and Mesolithic archaeological periods.

There is therefore significant potential for **Unit 3** sediments – especially **Subunit 3a** – to preserve direct palaeoenvironmental and palaeogeographical evidence.

RACE BANK OFFSHORE WIND FARM

Stage 1 & 2
Geoarchaeological Assessment

Acknowledgements

Centrica Renewable Energy Ltd commissioned this report. The borehole survey was undertaken by Coastline Surveys. Wessex Archaeology would like to thank the staff of these organisations, and Aidan Flint of RPS for his assistance during the project icluding staff from EGS and Geolabs for their assistance.

Richard Payne carried out the geoarchaeological assessment of recovered geotechnical samples and undertook the Stage 2 recording, geoarchaeological assessment and compilation of this report, the illustrations were prepared by Ken Lymer and Caroline Budd managed the project for Wessex Archaeology.

RACE BANK OFFSHORE WIND FARM

Stage 1 and 2
Geoarchaeological Assessment

1 INTRODUCTION

1.1 Background

1.1.1 Wessex Archaeology (WA) was commissioned by Centrica Renewable Energy Limited to undertake geoarchaeological recording of vibrocore samples undertaken as part of the Race Bank Offshore Windfarm geotechnical investigation. The joint Stage 1 and Stage 2 geoarchaeological assessment of sediment samples from 84 offshore vibrocore locations occurred during September 2013. The locations of the assessed sediments can be seen on **Figure 2**. This report comprises a geoarchaeological assessment and recommendations for further work.

1.2 Aims and objectives

1.2.1 The aims and objectives of this investigation are as follows:

- *To inform the Environmental Impact Assessment;*
- *To inform a better and more detailed understanding of the geomorphology and geoarchaeology in the vicinity of the pipeline route;*
- *To log the deposition sequence of the sediments, and determine the environment in which this took place;*
- *To inform an archaeological deposit model for the pipeline route;*
- *To evaluate the potential for past human activity;*
- *To determine the archaeological potenital of the identified deposits;*
- *To identify sub-samples of sequences of archaeological interest that can be considered in decisions about palaeoenvironmental assessment, analysis and scientific dating.*

2 METHODOLOGY

2.1.1 The method for the geoarchaeological assessment of the geotechnical samples followed the five Stages set out in **Appendix 1**. Geotechnical logs were made available which was supplemented by onsite recording at Geolabs Watford.

2.1.2 Of the eighty four borehole records entered into Rockworks forty two vibrocore locations were available for Stage 1 and 2 recording. The geoarchaeological recording of the offshore vibrocores was assessed on the 3rd, 4th 5th and 6th September 2013 at Geolabs in Watford.

2.1.3 The core samples were examined and basic sedimentary characteristics recorded, including sediment type, depositional structure, texture and colour. A depth below seabed was assigned to each sediment horizon and the character, structure and form of the sediment described. Full descriptions of the core samples are presented in **Appendix 2**. No sub-samples of the cores were taken at this stage.

2.1.4 A further eleven cores (KP0.2, KP0.4, KP0.6, KP0.8, KP1.0, KP1.2, KP1.4, KP1.6, KP1.8, KP2.0 and KP0.20ws were taken from locations within the intertidal zone. The borehole records from the cores recorded by Fugro, together with photographs taken at the time of recording were examined and the deposit information together with the vibrocore borehole information was entered into a Rockworks database.

2.1.5 Subsequent to the examination of the cores at Geolabs in Watford and the deposit information supplied by Fugro a list of cores that could provide further information following more detailed analysis was compiled.

2.1.6 This staged approach (**Appendix 1**) to the geoarchaeological assessment of offshore geotechnical data conforms to archaeological standards which are set out in English Heritage guidelines regarding environmental archaeology (English Heritage 2002), geoarchaeology (English Heritage 2007) and management of archaeological projects (English Heritage 2006). More specifically this approach has formed the basis of the COWRIE (Collaborative Offshore Wind Research into the Environment) guidance document on the archaeological use of geotechnical data, (Gribble and Leather for EMU 2011). The stages also conform to the Crown Estate guidelines for Written Schemes of Investigation for offshore renewables projects (Wessex Archaeology 2010a).

3 BACKGROUND

3.1 Development Background

1.1.1. The proposed wind farm site lies within the southern North Sea, approximately 30km north of Wells-next-the-Sea, North Norfolk, and is mainly bounded by the Race Bank (to the south) and North Ridge (to the north) sand banks. The site location and proposed wind turbine positions are shown on **Figure 1**.

3.2 Geoarchaeological Background

3.2.1 The following background summary covers the geological formations known to exist in the region of the study area. The age estimates are given related to the established British and Northwest European stage names. Within the Pleistocene epoch these are also supplemented, where known, with the now more prevalent and comparable Marine Isotope Stages (MIS), where odd numbers indicate an interglacial period and even numbers a glacial period. Ages in years within the Pleistocene epoch are expressed in millions of years ago (MA), thousands of years ago (ka) and within the Holocene epoch as years before present (BP).

3.2.2 The geological bedrock throughout this entire area of the southern North Sea is Upper Cretaceous (Campanian) Chalk, the upper surface of which provides a distinctive lower boundary, on both seismic records and in boreholes, for the Pleistocene and more recent sequences present in the area.

3.2.3 The overlying Pleistocene sediments can be of varying thickness throughout the region, ranging from a thin veneer (and occasionally absent within major erosion features such as Silver Pit) to greater than 100m thick (Cameron *et al.* 1992). The nature of these sediments reflects the repeated glacial/interglacial cycles that have occurred in this area

since the Anglian Period (*c*. 478,000 BP), which have resulted in the deposition of sequences of lodgement and ablation tills punctuated by episodes of erosion by glacial outwash and deposition of shallow marine sediments. These sequences are generally separated by marked erosion surfaces created by repeated ice sheet advance.

3.2.4 The Holocene terrestrial (fluvial, estuarine and coastal) environments and the probability that the areas have been inhabited have been inferred from the relatively shallow bathymetry and the finds made by fishermen of terrestrial sediments such as peat, terrestrial mammal bones and prehistoric archaeological finds across the Southern North Sea (e.g. Reid 1913, Godwin and Godwin 1933, Coles 1998). Many reconstructions of this former landscape have been made largely focussing on postulated former river courses. With the advent of ^{14}C dating combined with geophysical and geological surveys increasingly accurate regional reconstructions of Holocene palaeoenvironments have been made (Jelgersma 1979, Gaffney *et al*. 2009, Wessex Archaeology 2012a). The British Geological Survey (Cook 1991, Brown 1986) have mapped a number of the larger features such as the Silver Pit and Sole Pit thought to have formed major features during the early Holocene. Some of these scaphiform valleys are infilled with the Botney Cut formation. More detailed mapping of these terrestrial features using oil industry geophysical data in the area has been undertaken as part of the NSPP in conjunction with the early Holocene palaeolandscape (Gaffney *et al*. 2007, 2009).

3.2.5 Sea level curves indicate that the wind farm site would have been completely inundated by the most recent marine transgression by approximately 6,000 BP (Shennan *et al* 2009). The erosive power of this most recent marine transgression will have been much less than during previous glacial advances, so the potential remains for the preservation of relict land surfaces, post-dating the last glacial maximum, across the survey area. This possibility is supported by the identification of scattered, relict palaeochannels within the survey area during the geophysical data assessment (WA 2009).

3.2.6 The recent seabed sediments of the area mainly comprise reworked deposits of sand and gravel, with the formation of large-scale stable bedforms such as Race Bank and North Ridge sandbanks.

4 RESULTS

4.1.1 The following results section summarises the sediments noted and recorded within the geotechnical samples which were subject to assessment at Geolab premises. Depths are given in metres relative to seabed level.

4.1.2 Photographs of vibrocores and organic-rich sediments are presented in **Section 8.**

4.1.3 The preliminary geotechnical logs and preliminary field plots were supplied and integrated into the geoarchaeological assessment and Rockworks models (**Appendix 2 and 3**) in order to produce these preliminary results summarised below. Section models of the lithology are presented in **Figures 3 - 8.** A series of geological units were interpreted within the samples (**Table 1**).

4.1.4 The interpreted stratigraphy of the geotechnical sections are presented in **Figure 3 - 8** with linear correlations highlighted between the units.

Unit 1: Chalk

4.1.5 This formation was recorded and identified within vibrocores VC-EX-061, VC-EX-061A, VC-EX-069, VC-EX-069A (see section 8), VC-EC-077, VC-EX-077A, VC-EX-078, VC-EX-

082, VC-EX-082A and VC-EX-087. This confirmed the presence of Cretaceous chalk at these depths, though the unit itself is not considered archaeologically important.

Unit 2a: Glacio-fluvial sediments

4.1.6 These deposits were identified within vibrocores VC-EX-034, VC-EX-059 (see section 8), VC-IN-32, the extent of the units was not reached in any of the three cores. The unit comprises yellowish brown fine to coarse occasionally gravely silty sand, the formation is interpreted as being deposited in relatively low-energy fluvial, estuarine or shallow coastal environments.

Unit 2b: Glacial Till

4.1.7 These deposits were identified within vibrocores VC-IN-03 (see section 8), VC-IN-03A, VC-IN-07, VC-IN-09A, VC-IN-21, VC-IN-22, VC-IN-23A, VC-IN-24A, VC-IN-34A, VC-IN-35, VC-IN-37A, VC-IN-38, VC-IN-39, VC-IN-41A and VC-IN-45. The extent of the unit was not reached in any of the fifteen cores. The deposit was characterised as a thick layer of a stiff clayey matrix with frequent inclusions of chalk and flint, and interpreted as glacial sediments, predominantly late Devensian glacial till. Rooting was observed in four vibrocores: VC-IN-21, VC-IN-22, VC-IN-39 AND VC-IN-45 (see section 8) and indicated a palaeosol in the form of a marshy terrestrial environment supported by the presence of organic-rich sediments overlying the till. With the exception of VC-IN-39 where seabed sediments overlying the till indicate that any palaeosol which had formed had been eroded away. The terrestrial sediments are probably of Late Pleistocene or Early Holocene date. This factor is significant for the reconstruction of post-glacial palaeogeography and palaeoenvironmental analyses aimed at understanding the landscape during the Later Upper Palaeolithic and Early Mesolithic of the region.

Unit	Subunit	Description	Interpretation	Archaeological Potential
1	**-**	Upper Cretaceous Chalk	Bedrock	• None
2	**2a**	Glacial/periglacialy derived sands and gravels	Glacio-fluvial sediments overlying chalk bedrock	• None/very low
	2b	Glacial Till	Clay & gravel Diamicton with glacio-fluvial sediments	• Derived artefacts. • Upper surface of till may preserve terrestrial sediment of Later Upper Palaeolithic and Early Mesolithic interest
3	**3a**	Organic-rich deposits	Peat or fine-grained organic sediments	• Palaeoenvironmental & palaeogeogrpahical value; *in situ* archaeological materials; sea-level index points • *In situ* Later Upper Palaeolithic and Mesolithic material • Derived artefacts
	3b	Fluvial-Estuarine Sediments	Sandy, silty, clayey bedded & laminated sediments w/ bedded organics & peats	• *In situ* sediments of palaeoenvironmental and palaeogeographical value • *In situ* Later Upper Palaeolithic and Mesolithic material • Derived artefacts
4	**-**	Seabed Sediments	Holocene shelly sand and gravel	• Modern artefacts
5	**-**	Saltmarsh	Soft, silty sandy clay with abundant rootlets	• Modern artefacts

Table 1: Identified geological units.

Unit 3a: Organic-rich deposits

4.1.8 For the purpose of highlighting the palaeoenvironmental significance of buried peats for the investigation of post-glacial palaeolandscapes the particularly well-defined organic-rich sediments (typically bedded or laminated fine-grained sediments) or well-developed peats have been grouped together as **Subunit 3a**. These organic-rich deposits have been identified in vibrocores: VC-03, VC-EX-21, VC-EX-034, VC-IN-18, VC-IN-18A, VC-IN-21 (see section 8), VC-IN-22, VC-IN-30, VC-IN-32, VC-IN-37A and VC-IN-38. These deposits are of particular interest for high-resolution palaeoenvironmental analysis, geochronology, palaeogeographical reconstruction and relative sea-level index points as they relate to terrestrial geomorphology inundated by sea level rise. Stratigraphically these organic-rich layers are preserved at various elevations within **Subunit 3b** fluvial and estuarine sediments reflecting local variations in the distribution of terrestrial environs and changes to fluvial regimes and estuarine development.

Unit 3b: Fluvial Estuarine Sediments

4.1.9 These deposits were identified within vibrocores VC-03, VC-08, VC-EX-017, VC-EX-019, VC-EX-021, VC-EX-034 (see section 8), VC-EX-40A, VC-EX-042A, VC-IN-16, VC-IN-19, VC-IN-32, VC-IN-37A, VC-IN-44 and VC-IN-45. The thickness of the unit recorded varied from 5.2m in VC-08 to 0.12m in VC-IN-32. The deposit was typically characterised as a dark grey silty sand often with alternating light and dark bands and containing marine mollusc shell. In some vibrocores abundant organic patches together with evidence of

occasional rooting and burrowing indicated biological activity within a coastal environment, which was overlain by bedded organic rich silty sand with molluscs suggesting a shallow low-energy environment.

4.1.10 The **Unit 3** sediments as a whole provide a well-stratified basis for focusing palaeoenvironmental analyses and for establishing a set of nearshore sea-level index points in support of more robust relative sea-level reconstructions which typically based on terrestrial control points (e.g. Shennan *et al*. 2006, Bradley *et al*. 2011, Bradley 2011).

Unit 4: Seabed Sediment

4.1.11 The Unit 4 seabed sediments varied in thickness from 0m up to 2.38m with the deeper depths indicating where a sand wave may have been cored (see section 8). The unit is characterised by sandy sediments which varied from finer to coarser components, containing shelly fragments of molluscs including bivalve and gastropods.

4.2 Unit 5: Saltmarsh deposits

4.2.1 These deposits were representative of sediments laid down within the upper intertidal zone. Material had accumulated to provide a surface that was dry throughout enough of the tidal cycle to allow salt tolerant grasses and other vegetation to establish itself. The saltmarsh deposits were encountered in Boreholes KP0.2, KP0.4, KP0.6, KP0.8, KP0.20ws and KP1.0 from 3.39m OD at its upper surface in KP0.2 to 1.83m OD at its base in KP1.0. Boreholes KP1.2, KP1.4, KP1.6, 1.8 and 2.0 were located lower down the intertidal zone at an elevation unfavourable for saltmarsh development due to the increased level of marine inundation compared to higher up the foreshore.

5 DISCUSSION & ARCHAEOLOGICAL POTENTIAL

5.1.1 Based on the regional baseline and recording of sediments summarised above the following comments relating specifically to the archaeological and geoarchaeological potential of the formations are described below and summarised in **Table 1**.

5.1.2 The Chalk bedrock (**Unit 1**) is too old to be of archaeological interest, however, terrestrial sediments such as soils and/or pre-Devensian artefactual evidence relating to Lower and Middle Palaeolithic archaeological periods may be present at its surface. No soil formation or artefacts were noted in the geotechnical logs.

5.1.3 The Pleistocene sediments (**Unit 2**) comprising glacio-fluvial sediments and glacial till are thought to have been deposited during the Devensian (Late Weischelian) under glacial conditions precluding human activity in the region, and are contemporary with the Lower and Middle Palaeolithic archaeological periods. In general, glacial till is not regarded as having much archaeological significance, however there is potential for the possibility of encountering derived artefacts, reworked from their original context at the top of this unit.

5.1.4 The deposits of **Unit 3** are characterised by post-glacial and Holocene fluvial and estuarine alluvial deposits that are a record of glacial, lacustrine, fluvial and estuarine environments during a period of lower relative sea level spanning the Late Upper Palaeolithic and Mesolithic archaeological periods. Peat deposits, such as those identified in VC-IN-18, VC-IN-18A, VC-IN-21, VC-IN-22, VC-IN-30, VC-IN-32, VC-IN-37A and VC-IN-38, together with the organic clays and silts are often found to grade into each other and can be difficult to definitively separate. They are terrestrial deposits and record a gradual shift from a fluvial regime to lagoon and then marshland immediately prior to the Flandrian marine transgression. These deposits cover a period of time from the late Palaeolithic to the early Mesolithic, so can potentially be of high archaeological potential.

5.1.5 Further to this, the highly organic nature of the **Unit 3** deposits suggests that these units are of a potentially high palaeoenvironmental importance. The presence of wood fragments and peat suggests that other microscopic palaeoenvironmental indicators such as pollen could also be well preserved. Analysis of such organic material can be invaluable in aiding reconstruction of palaeoenvironments at a time when there was human activity in the area.

5.1.6 The seabed sediments (**Unit 4**) interpreted across the transect have potential for encountering reworked artefactual, faunal and floral material such as large mammal remains and many of the finds that have been retrieved by fishermen from the North Sea will have derived from similar deposits. Robust archaeological material such as bone, flint and in a submerged context, wood can survive within these types of sediments and whilst may they may not be *in situ*, these types of finds are of interest due to their rarity. Within and on top of these seabed sediments is the likely location of more recent maritime archaeological remains, which are not the subject of this report.

5.1.7 The saltmarsh sediments (**Unit 5**) were encountered at the south west end of the transect from between 3.39 – 1.83m OD and were modern in origin and though they may contain re-deposited artefacts the sediments themselves are of little relevance to this report.

6 POTENTIAL FURTHER WORK

6.1 Sampled Material

6.1.1 Following the examination of the recovered deposits and deposit records a list of cores that would warrant further more detailed examination was compiled and are listed below:

MV Neptune
Inner Array
VC-IN-16
VC-IN-18
VC-IN-18A
VC-IN-21
VC-IN-22
VC-IN-30
VC-IN-32
VC-IN-37A
VC-IN-38
VC-IN-39
VC-IN-44
VC-IN-45

Export Cable
VC-EX-019
VC-EX-021
VC-EX-034
VC-EX-042A

MV Shakedog
VC-03

6.1.2 Until the samples requested for further assessment and analysis can be viewed no recommendations can be made. As the potential for further palaeoenvironmental analysis will depend on the amount and state of the samples after the further testing to be undertaken by Geolabs has been carried out.

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8 PLATES: SEDIMENT PHOTOGRAPHY

VC-EX-069A. Seabed deposits over chalk bedrock

VC-EX-059. Seabed deposits over Glacio-fluvial deposits

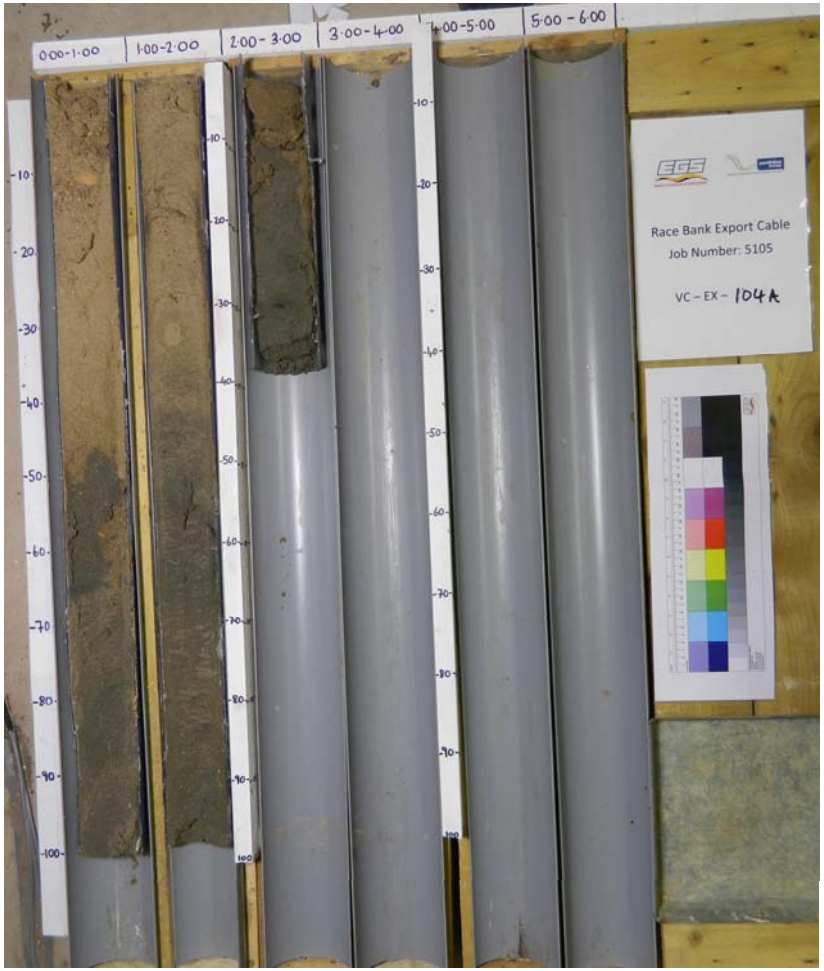
VC-IN-03. Seabed deposits over Glacial till.

VC-IN-45. Seabed deposits over Glacial till with area of rooting at top of till.

VC-IN-21. Peat formed over rooted terrestrial surface over Glacial till.

VC-EX-034. Seabed deposits over banded estuarine deposits.

VC-EX-104A. 2.38m of sand indicating possible marine sand wave deposit.



APPENDIX 1: GEOARCHAEOLOGICAL FRAMEWORK

To help frame geoarchaeological investigations of this nature, Wessex Archaeology has developed a five stage approach, encompassing different levels of investigation appropriate to the results obtained, accompanied by formal reporting of the results at the level achieved. The stages are summarised below:

Stage 1: Planning	Archaeological assessment of cores and logs generated by geotechnical contractors. This assessment will establish the presence and location of sediment units with likely archaeological, palaeo-environmental and/or dating potential, as a basis for deciding what Stage 2 archaeological recording is required. The Stage 1 report will state the scale of Stage 2 work proposed. Should no further works be required a brief Stage 1 report outlining the results of the assessment will be prepared.
Stage 2: Core Recording	Each core containing sediment units identified as having archaeological, palaeo-environmental or dating potential in Stage 1 will be split, with half of each core being cleaned and recorded. The stratigraphy of each core will be recorded, a basic sediment description for each of the units will be made and those units of particular archaeological/palaeo-environmental interest will be highlighted. The Stage 2 report will state the nature and scope of any Stage 3 analyses required to characterise and interpret the sediment units in order to build an outline Quaternary deposit model and thus identify areas of potential archaeological significance.
Stage 3: Sub-sampling & Assessment	Sub-sampling and assessment of any units of archaeological and/or palaeo-environmental interest. Sub-samples for the assessment of microfossil environmental indicators (pollen, diatoms, ostracods and/or foraminifera) will be taken from one core-half, with the other core-half retained intact should further sub-sampling be required. Assessment will comprise analysis (identification and quality of preservation) of a series of sub-samples to enable the value of the palaeo-environmental material surviving within the cores to be identified. Sub-samples will also be taken and retained at this stage in case radiocarbon dating is required during Stage 4. Scientific dating may be undertaken at this stage if warranted. The Stage 3 report will set out the results of each laboratory assessment together with an outline of the archaeological implications of the combined results, and will indicate whether and Stage 4 work is warranted.
Stage 4: Analysis & Dating	Full analysis of pollen, diatoms, ostracods and/or foraminifera assessed during Stage 3. Typically, Stage 4 will be supported by scientific dating of suitable sub-samples. Should Stage 3 assessment indicate that there is no further analytical work required on the microfossil assemblages, consideration will still be given for a programme of radiocarbon analyses to provide a chronological framework for the deposits encountered unless no suitable samples could be procured. The Stage 4 report will provide an account of the palaeo-environment(s) at each relevant coring location within a chronological framework (absolute or relative) and an outline of the archaeological implications of the analysis.
Final Reporting	If the archaeological results are sufficiently significant, a final report will be compiled covering all aspects of the palaeo-topography and prehistory of the area affected by the development, incorporating the results of each stage. If the archaeological results are not significant then the relevant Stage Report(s) will constitute the final documents for the investigation. If required, the Final Report will include relevant data generated by the baseline assessment and geophysical (sub-bottom) review, in order to place the results of the core recording and analysis within the context of the broad pattern of deposits within the area. The report will comprise as detailed a Quaternary deposit model for the area as possible, and address the implications of that model in terms of archaeological potential.

APPENDIX 2: STAGE 2 GEOARCHAEOLOGICAL RECORDING

Location:	314143.82 5860262.27	**Borehole ID:**	VC-03	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 2.29		10YR 6/3 pale brown fine sand becoming grey brown from 0.6, some disrupted fine darker banding from 0.5 – 1 and better preserved fine dark banding from 1.5 – 2.0, clear lower banding.	Seabed	4
2.29 – 3.9		Gley 1 4/N dark grey silty sand containing alternating lighter and darker bands interspersed with occasional 2.5Y 6/2 light brownish grey silty sand bands, clear lower boundary.	Fluvial-Estuarine sediments	3b
3.9 – 4.0		10YR 6/1 grey sand, marine shell fragments, clear lower boundary	Fluvial-Estuarine sediments	
4.0 – 4.5		10YR 6/4 light yellowish brown sand with very fine black laminations <0.002 from 4.0 – 4.10 and alternating lighter and darker banding throughout, clear lower boundary.	Fluvial-Estuarine sediments	3b
4.5 – 5.45		2.5Y 4/1 dark grey sand with abundant organic patches <0.01 and occasional rooting/burrows, becoming grey coarse sand from 5.0 – 5.45.	Organic-rich deposits	3a

Location:	314699.75 5862518.67	**Borehole ID:**	VC-08	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 5.2		2.5Y 5/1 grey sand alternating lighter and darker bands throughout, becoming grey brown from 3.5 – 5.2, deposit turns brown on drying. Dark organic silty sand bands from 1.6 – 2.5	Fluvial estuarine deposits	3b

Location:	317276.5 5866354.97	**Borehole ID:**	VC-EX-017	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Units**
Mbg	mOD			
0 – 1.95		7.5YR 6/3 light brown silty sand containing fragments of marine shell and fine dark bands from 1.0 – 1.95. Clear lower boundary.	Fluvial / Estuarine sediments	3b
1.95 – 2.3		10YR 5/2 greyish brown clayey silty sand, gradual lower boundary.		
2.3 – 2.7		10YR 6/4 light yellowish brown gravelly silty sand.		

Location:	317779.47 5867290.6	**Borehole ID:**	VC-EX-019	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	
Mbg	mOD			
0 – 1.8		Gley 1 4/N dark grey organic silty sandy clay, containing common small mussel shells with a diffuse lower boundary.	Fluvial / Estuarine sediments	3b
1.8 – 2.85		7.5YR 5/3 brown coarse sand with SR stones <0.03, some finer sand banding at 2.15 – 2.35, sand becomes coarser towards base, fragments of marine shell evident throughout.	Fluvial / Estuarine sediments	3b

Location:	318269.74 5868116.92	Borehole ID:	VC-EX-021	Comments: 62559 Race Bank
Level (top):		Drg:		

Depth		Sediment description	Interpretation	Unit
Mbg	mOD			
0 – 0.2		7.5YR 5/6 strong brown fine sand, with fragments of marine shell at base, clear lower boundary.	Seabed sediments	4
0.2 – 2.2		2.5Y 3/1 very dark grey organic silty sand containing small mussel shells, occasional lighter and darker banding, large fibrous roots visible from 0.4 – 0.6, gradual lower boundary.	Organic rich deposits	3a
2.2 – 3.25		10YR 5/6 yellowish brown coarse sand SR/R stone inclusions <0.03	Fluvial / Estuarine sediments	3b

Location:	321314.32 5873334.98	Borehole ID:	VC-EX-034	Comments: 62559 Race Bank
Level (top):		Drg:		

Depth		Sediment description	Interpretation	Unit
Mbg	mOD			
0 – 0.4		10YR 6/6 brownish yellow fine/coarse sand, fragments of marine shell, fine dark band at 0.38, clear lower boundary.	Seabed sediments	4
0.4 – 1.68		2.5Y 5/2 greyish brown coarse sand with 0.05 deep dark grey organic clay bands at 0.6 and thin grey silty clay bands throughout, clear lower boundary.	Organic rich deposits	3a
1.68 – 4.24		Alternating bands of 2.5Y 6/1 grey silty sand and Gley 1 5/N grey organic silty sandy clay, with fine grey silty clay sand bands at 1.3, clear lower boundary.	Fluvial / Estuarine sediments	3b
4.24 – 5.43		10YR 5/6 yellowish brown coarse sand becoming coarser with depth containing SR/R pebbles and occasional grey silty sand patches.	Glacio / fluvial sediments	2a

Location:		322977.86 5874511.45	**Borehole ID:**	VC-EX-40A	**Comments: 62559 Race Bank**
Level (top):			**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.54		7.5YR 5/3 brown coarse sand, containing fragments of marine shell, gradual lower boundary.	Seabed sediments	4
0.54 – 4.40		2.5Y 4/1 grey brown becoming dark grey coarse sand with occasional darker silty sand band.	Fluvial / Estuarine sediments	3b

Location:		323627.76 323627.76	**Borehole ID:**	VC-EX-042A	**Comments: 62559 Race Bank**
Level (top):			**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.3		10yr 5/6 yellowish brown sandy gravel with fragments of marine shell and a clear lower boundary.	Seabed sediments	4
0.3 – 0.52		2.5Y 5/1 grey silty clay with abundant fragments of marine shell towards top, some finer sandier banding at base, clear lower boundary.	Fluvial / Estuarine sediments	3b
0.52 – 0.74		2.5Y 6/3 light yellowish brown gravel with large SA/SR flint and chalk inclusions <0.10, clear lower boundary.	Fluvial / Estuarine sediments	3b
0.74 – 1.35		5Y 3/1 very dark grey clayey sand becoming silty clay with SA flint inclusions <0.05. Organic sandy band from 1.10 – 1.15 becoming coarser from 1.10 – 1.35.	Fluvial / Estuarine sediemnts	3b

Location:	325485.13 5875544.94	**Borehole ID:**	VC-EX-044A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Units**
Mbg	mOD			
0 – 0.22		2.5Y 4/1 dark grey silty sand, occasional SR stone inclusions <0.02, occasional marine shell fragments, clear lower boundary.	Seabed sediments	4
0.22 – 0.62		10YR 5/6 yellowish brown sandy gravel, SA/SR chalk and flint inclusions <0.05	Seabed sediments	

Location:	328186.48 5878586.65	**Borehole ID:**	VC-EX-055A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Units**
Mbg	mOD			
0 – 0.40		Gley 1 3/10Y very dark greenish grey coarse sand with fragments of marine shell.	Seabed sediments	4

Location:	328593.13 5880448.06	**Borehole ID:**	VC-EX-059	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 1.0		10YR 6/6 brownish yellow coarse sand with fragments of marine shell, becoming more grey brown with depth, gradual lower boundary.	Seabed sediments	4
1.0 – 2.0		10YR 6/2 light brownish grey coarse sandy gravel, SA/SR/R stone inclusions <0.03.	Glacio / Fluvial sediments	2a

Location:		329083.24 5881339.09	**Borehole ID:**	VC-EX-061A	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.15		10YR 6/3 pale brown sandy gravel, SA/SR chalk and flint inclusions <0.003 common marine shell fragments, clear lower boundary			Seabed sediments	4
0.15 – 0.35		Weathered chalk			Chalk	1

Location:		332428.76 5884960.48	**Borehole ID:**	VC-EX-069A	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.16		10YR 5/3 brown silty sandy gravel, common marine shell, clear lower boundary,			Seabed sediments	4
0.16 – 1.10		Chalk			Chalk	1

Location:		335124.47 5887923.03	**Borehole ID:**	VC-EX-077	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.09		2.5Y 4/2 dark grey silty sand, common marine shell fragments, clear lower boundary.			Seabed sediments	4
0.09 – 0.5		2.5Y 6/1 grey firm clay with abundant chalk fragments <0.03			Weathered chalk	1

Location:	335645.54 5888741.39	**Borehole ID:**	VC-EX-078	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.2		10YR 4/4 soft dark yellowish brown silty sand, SA/SR stone inclusions <0.03, common marine shell fragments, clear lower boundary.	Seabed sediments	4
0.2 – 1.35		Chalk	Chalk	1

Location:	336403.13 5889289.92	**Borehole ID:**	VC-EX-080A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.42		7.5YR 6/6 reddish yellow sandy gravel, marine shell fragments, grey silty sand patches, SR/R pebbles <0.04, gradual lower boundary.	Seabed sediments	4
0.42 – 0.67		10YR 5/6 yellowish brown coarse sand becoming fine with depth.	Seabed sediments	4

Location:	346349.21 5898027.09	**Borehole ID:**	VC-EX-104A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 2.38		10YR 6/1 grey sand, few small SR stone inclusions <0.02 at top, sand turns to 10YR 7/4 very pale brown on drying.	Seabed sediments	4

Location:	348286.57 5903856.36	**Borehole ID:**	VC-EX-110A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.14		10YR 6/4 light yellowish brown sandy gravel, with rare marine shell fragments. SR stone inclusions < 0.04. Clear lower boundary.	Seabed sediments	4
0.14 – 0.7		7.5YR 3/2 dark brown stiff silty clay, with no visible structure, containing occasional SA-SR chalk and flint fragments <0.01.	Glacial till	2b

Location:	349716.13 5900279.65	**Borehole ID:**	VC-EX-125A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.28		10YR 6/4 light yellowish brown sandy gravel, with rare marine shell fragments. SR stone inclusions < 0.04. Clear lower boundary.	Seabed sediments	4
0.28 – 1.57		7.5YR 3/2 dark brown stiff silty clay, with no visible structure, containing occasional SA-SR chalk and flint fragments <0.01.	Glacial till	2b

Location:	353052.24 5910519.77	**Borehole ID:**	VC-IN-03	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.4		10YR 6/4 light yellowish brown sandy gravel, with rare marine shell fragments. SR stone inclusions < 0.04, some sorting with larger towards base. Clear lower boundary.	Seabed sediments	4

Location:		353052.24 5910519.77	**Borehole ID:**	VC-IN-03	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0.4 – 1.13		7.5YR 3/2 dark brown stiff silty clay, with no visible structure, containing occasional SA-SR chalk and flint fragments <0.01.			Glacial till	2b

Location:		353053.77 5910520.74	**Borehole ID:**	VC-IN-03A	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.22		10YR 6/4 light yellowish brown sandy gravel, with rare marine shell fragments. SR stone inclusions < 0.04. Clear lower boundary.			Seabed sediments	4
0.22 – 0.7		7.5YR 3/2 dark brown stiff silty clay, with no visible structure, containing occasional SA-SR chalk and flint fragments <0.01.			Glacial till	2b

Location:		354003.65 5911402.27	**Borehole ID:**	VC-IN-07	**Comments: 62559 Race Bank.**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.25		10YR 6/4 light yellowish brown sandy gravel, with rare marine shell fragments. SR stone inclusions < 0.04. Clear lower boundary.			Seabed sediments	4
0.25 – 0.68		7.5YR 3/2 dark brown stiff silty clay, with no visible structure, containing occasional SA-SR chalk and flint fragments <0.01.			Glacial till	2b

Location:		354867.47 5911255.71	**Borehole ID:**	VC-IN-09A	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.2		7.5YR 5/2 brown sandy gravel, SA-SR stone inclusions <0.01, occasional shell fragments, clear lower boundary.			Seabed sediments	4
0.2 – 0.7		7.5YR 3/2 dark brown stiff silty clay, with no visible structure, containing occasional SA-SR chalk and flint fragments <0.01.			Glacial till	2b

Location:		354901.94 5906970.54	**Borehole ID:**	VC-IN-16	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.54		2.5Y 7/4 pale yellow fine – coarse sand with occasional SA stone inclusions <0.01, common shell fragments, clear lower boundary.			Seabed sediments	4
0.54 – 5.49		Gley 1 3/10Y very dark greenish grey soft to firm silty sand becoming Gley 1 4/10Y from 4.2 with alternating fine bands of darker material			Estuarine	3b

Location:		355078.59 5906128.22	**Borehole ID:**	VC-IN-18	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.65		7.5YR 6/3 light brown sand becoming coarser with depth, with occasional SR stone and a sharp lower boundary.			Seabed sediments	4
0.65 – 0.75		7.5YR 2.5/1 black/dark brown fibrous peat with a clear lower boundary.			Peat	3a

Location:	355078.59 5906128.22	Borehole ID:	VC-IN-18	Comments: 62559 Race Bank
Level (top):		Drg:		

Depth		Sediment description	Interpretation	Unit
Mbg	mOD			
0.75 – 0.85		Gley 1 4/5GY dark greenish grey soft clay, containing organic patches and rooting from peat above.	Organic estuarine clay	3a

Location:		Borehole ID:	VC-IN-18A	Comments: 62559 Race Bank
Level (top):		Drg:		

Depth		Sediment description	Interpretation	Unit
Mbg	mOD			
0 – 0.55		7.5YR 6/3 light brown sand becoming coarser with depth, with occasional SR stone and a sharp lower boundary.	Seabed sediments	4
0.55 – 0.65		7.5YR 2.5/1 black/dark brown fibrous peat with a clear lower boundary.	Peat	3a
0.65 – 0.78		Gley 1 4/5GY dark greenish grey soft clay, containing organic patches and rooting from peat above.	Organic estuarine clay	3a

Location:	355817.55 5904895.67	Borehole ID:	VC-IN-19	Comments: 62559 Race Bank
Level (top):		Drg:		

Depth		Sediment description	Interpretation	Unit
Mbg	mOD			
0 – 0.5		10YR 6/6 brownish yellow fine/coarse sand with fragments of marine shell and a gradual lower boundary. Darker silty sand patches at 0.1 and 0.5.	Seabed sediments	4
0.5 – 1.6		7.5YR 6/1 grey coarse sand with fragments of marine shell and darker banding from 1.3, with a gradual lower boundary.	Seabed sediments	
1.6 – 1.91		Gley 2 5/5 PB bluish grey firm clayey sand with fragments of marine shell	Fluvial / Estuarine sediments	3b

Location:		356733.73 5906332.27	**Borehole ID:**	VC-IN-21	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.25		2.5YR 2.5/1 reddish black fibrous peat with a gradual lower boundary.			Peat	3a
0.25 – 0.43		Gley 1 3/N very dark grey sandy clay containing fibrous roots from overlying peat, with a clear lower boundary.			Organic estuarine clay	3a
0.43 – 1.31		7.5YR 4/2 brown stiff clay with frequent chalk SA fragments <0.01 and large fibrous roots from 0.43 – 0.85.			Quaternary	2b

Location:		357534.73 5905850.35	**Borehole ID:**	VC-IN-22	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.10		7.5YR 5/6 strong brown coarse sand containing fragments of marine shell, with a clear lower boundary.			Seabed sediments	4
0.10 – 0.25		7.5YR 3/1 very dark grey fibrous peat with a clear lower boundary.			Peat	3a
0.25 – 0.4		5YR 4/1 dark grey/brown organic clay with disrupted organic bands, and a gradual lower boundary.			Peat/organic clay	3a
0.4 – 1.5		5YR 4/1 dark grey/brown silty clay with common organic patches, becoming sandy clay at base			Quaternary	2b

Location:	358219.65 5905050.95	**Borehole ID:**	VC-IN-23A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.20		7.5YR 5/4 brown coarse sand with marine shell fragments, clear lower boundary.	Seabed sediments	4
0.2 – 1.0		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02	Quaternary	2b

Location:	357821.92 5904302.42	**Borehole ID:**	VC-IN-24A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.18		10YR 6/2 light brownish grey sandy gravel with SR stone inclusions <0.03 and marine shell fragments, clear lower boundary.	Seabed sediments	4
0.18 – 1.0		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02	Glacial till	2b

Location:	353885.69 5906623.38	**Borehole ID:**	VC-IN-25	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 2.0		10YR 5/2 greyish brown fine /coarse sand with common SR/R stone inclusions <0.02, becoming greyer from 1.6 – 2.	Seabed sediments	4

Location:	357233.64 5902993.55	Borehole ID:	VC-IN-30	Comments: 62559 Race Bank
Level (top):		Drg:		

Depth		Sediment description	Interpretation	Unit
Mbg	mOD			
0 – 0.14		7.5YR 4/1 dark grey loose silty sand containing shell and organic fragments, clear lower boundary.	Seabed sediments	4
0.14 – 0.28		5YR 2.5/1 black, organic silty clay, gradual lower boundary.	Peat	3a
0.28 – 0.38		Gley 1 2.5/N black organic silty clay, gradual lower boundary.	Peat	
0.38 – 1.0		10YR 4/2 dark greyish brown clayey sand, containing occasional organic patches and rooting from overlying peat, with occasional SA chalk fragments <0.01 from 0.85.	Peat/Quaternary	3a

Location:	360765.19 5904038.68	Borehole ID:	VC-IN-32	Comments: 62559 Race bank
Level (top):		Drg:		

Depth		Sediment description	Interpretation	Unit
Mbg	mOD			
0 – 0.5		7.5YR 6/4 light brown coarse sand becoming fine with depth, with SR stone inclusion <0.01 and fragments of marine shell and a gradual lower boundary.	Seabed sediments	4
0.5 – 0.68		10YR 5/3 brown silty sand with a diffuse lower boundary.	Seabed sediments	
0.68 – 0.8		10YR 5/1 grey soft clay with abundant marine shell and a gradual lower boundary.	Estuarine clay	3b
0.8 – 0.95		2.5Y 4/1 dark grey organic clay with fragment of woody material <0.04 at 0.82, diffuse lower boundary.	Peat	3a
0.95 – 1.10		10YR 3/3 dark brown silty sand, woody fragment <0.03 at 1.0, with a diffuse lower boundary.	Quaternary (buried soil?)	3a

Location:	360765.19 5904038.68	**Borehole ID:**	VC-IN-32	**Comments: 62559 Race bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
1.10 – 2.4		10YR 4/4 dark yellowish brown sand becoming 10YR 4/2 dark greyish brown silty clay from 1.5 – 2.1	Quaternary	2a

Location:	361197.21 5902851.24	**Borehole ID:**	VC-IN-34A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.17		10YR 5/4 yellowish brown coarse sand with marine shell fragments and dark organic patches(modern) from 0 – 0.05, with a clear lower boundary.	Seabed sediments	4
0.17 – 0.85		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02	Quaternary	2b

Location:		**Borehole ID:**	VC-IN-35	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.2		7.5YR 5/1 grey silty sand containing fragments of marine shell and dark grey organic patches, clear lower boundary.	Seabed	4
0.2 – 1.15		5YR 4/1 dark grey firm clay with occasional SA chalk inclusions <0.01	Quaternary	2b

Location:		359206.6 5901424.64	**Borehole ID:**	VC-IN-37A	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.4		7.5YR 6/6 reddish yellow sandy gravel, with SA stone inclusions <0.01 and fragments of marine shell, clear lower boundary.			Seabed	4
0.4 – 0.67		5YR 2.5/1 black organic silty clay, clear lower boundary.			Peat	3a
0.67 – 0.8		Gley 1 4/N dark grey firm silty clay with a gradual lower boundary.			Estuarine	3b
0.8 – 1.95		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02			Quaternary	2b

Location:		359770.65 5900701	**Borehole ID:**	VC-IN-38	**Comments: 62559 Race Bank**	
Level (top):			**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 0.12		7.5YR 5/1 grey silty sand containing fragments of marine shell, with a clear lower boundary.			Seabed sediments	4
0.12 – 0.33		7.5YR 5/4 brown coarse sand containing fragments of marine shell, with some finer dark banding, and a clear lower boundary.			Seabed sediments	
0.33 – 0.48		10YR 2/1 black organic silty clay (peat), marine shell fragments at top, organic fibrous material at base, with a clear undulating lower boundary.			Peat	3a
0.48 – 0.77		2.5Y 4/2 dark greyish brown sandy gravel, some rooting evident from above, SA/SR stone inclusions <0.02, with a clear lower boundary.			Quaternary	3a
0.77 – 1.45		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02			Quaternary	2b

Location:	359491.08 5899938.12	**Borehole ID:**	VC-IN-39	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.45		2.5Y 4/1 dark grey sand becoming dark grey and organic, fragments of marine shell, gradual lower boundary.	Seabed sediments	4
0.45 – 1.5		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02, evidence of fine rooting at top of unit suggests possible Palaeo surface from 0.35 – 0.45.	Quaternary	2b

Location:	358860.28 5903596.38	**Borehole ID:**	VC-IN-41A	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.45		7.5YR 5/4 brown sand containing marine shell fragments and occasional dark grey organic patches, with a clear lower boundary.	Seabed sediments	4
0.45 – 0.6		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02	Quaternary	2b

Location:	357878 5902213.61	**Borehole ID:**	VC-IN-44	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.5		7.5YR 6/6 reddish yellow sand containing fragments of marine shell, with a diffuse lower boundary.	Seabed sediments	4
0.5 – 1.6		7.5YR 5/1 grey sand with fragments of marine shell, becoming coarse from 1.0, with a diffuse lower boundary.	Fluvial / Estuarine sediments	3b
1.6 – 2.0		10YR 5/2 greyish brown silty sand with alternating dark grey bands approx. 0.02 in depth. Fragments of marine shell evident throughout.	Fluvial / Estuarine sediments	3b

Location:	358202.97 5901077.81	**Borehole ID:**	VC-IN-45	**Comments: 62559 Race Bank**
Level (top):		**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.4		7.5YR 5/6 strong brown coarse sand containing fragments of marine shell, with a clear lower boundary and darker organic patches.	Seabed sediments	4
0.4 – 0.6		10YR 5/2 greyish brown sandy clay with a clear lower boundary	Fluvial / Estuarine sediments	3b
0.6 – 1.9		7.5YR 4/2 brown stiff clay with common SA chalk fragments <0.02, evidence of rooting near top of unit indicate that a soil may have developed, but no longer survives.	Glacial till	2b

Location:	313593.291 5855457.62	**Borehole ID:**	KP0.2	**Comments: 62559 Race Bank**
Level (top):	3.39m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 - 1	3.39 – 2.39	Soft greyish brown, slightly sandy clay with thin laminations of silty sand with rare rootlets and rare pockets of dark brown organic matter.	Saltmarsh	5
1 - 2	2.39 – 1.39	Soft grey brown sandy silt, rare rootlets, rare shell fragments, organic patch at 1.13	Estuarine	4

Location:	313708.651 5855619.05	**Borehole ID:**	KP0.4	**Comments: 62559 Race Bank**
Level (top):	3.62m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 1.06	3.62 – 2.56	Soft brown clay, frequent roots, patches of red brown clayey silt	Saltmarsh	5
1.06 – 1.5	2.56 – 2.12	Soft grey brown clay with occ darker brown patches	Estuarine	4

Location:	313643.84 5855854.45	**Borehole ID:**	KP0.6	**Comments: 62559 Race Bank**
Level (top):	3.36m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.5	3.36 – 2.86	Soft grey brown sandy silty clay interbedded with widely spaced fine silty sand bands	Saltmarsh	5
0.5 – 2.0	2.86 – 1.36	Soft grey brown becoming dark grey sandy silt with rare fine laminae, rootlets and shell fragments	Estuarine	4

Location:	313765.039 5856014.87	**Borehole ID:**	KP0.8	**Comments: 62559 Race Bank**
Level (top):	3.11m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.4	3.11 – 2.71	Soft brown clay with roots	Saltmarsh	5
0.4 – 1.45	2.71 – 1.66	Soft brown clay with pockets of grey black clay, occ mollusc shells	Estuarine	4
1.45 – 2.0	1.66 – 2.11	Soft dark brownish grey sandy silt	Estuarine	4

Location:	313593.291 5855457.62	**Borehole ID:**	KP0.20ws	**Comments: 62559 Race Bank**
Level (top):	3.38m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 1.2	3.38 – 2.18	Soft dark grey brown clay abundant rootlets and fine sandy laminations	Saltmarsh	5
1.2 – 2.7	2.18 – 0.68	Soft to firm dark grey to black silty sandy clay abundant bivalve shells	Estuarine	4
2.7 – 3.7	0.68 – -0.32	Dark grey brown silty sand with rare bivalve shell	Estuarine	4
3.7 – 4	-0.32 – -0.62	Grey brown fine sand	Glacio-Fluvial sands	2a

Location:	313694.679 5856251.16	**Borehole ID:**	KP1.0	**Comments: 62559 Race Bank**
Level (top):	2.68m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.85	2.68 – 1.83	Very soft brown silty sandy clay frequent roots and rootlets	Saltmarsh	5
0.85 – 1.7	1.83 – 0.98	Very soft dark brown grey to black sandy silt interbedded with thick beds of soft black silty clay with rare roots	Estuarine	4
1.7 – 2.0	0.98 – 0.68	Dark brown grey to black very silty sand	Estuarine	4

Location:	313821.948 5856410.48	**Borehole ID:**	KP1.2	**Comments: 62559 Race Bank**

Level (top):	2.22m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.15	2.22 – 2.07	Soft brown silty sandy clay, thick bands of red brown silty fine sand	Estuarine	4
0.15 – 0.30	2.07 – 1.92	Soft brown dark grey to black sandy silt	Estuarine	4
0.3 – 0.75	1.92 – 1.47	Soft dark grey brown to black silty clay	Estuarine	4
0.75 – 1.4	1.47 – 0.82	Dark grey brown to black very silty clayey sand, occ mollusc shell	Estuarine	4
1.4 – 2.0	0.82 – 0.22	Soft dark greyish brown-black sandy silt with t hin bands of v soft silty clay	Estuarine	4

Location:	313745.65 5856648	**Borehole ID:**	KP1.4	**Comments: 62559 Race Bank**
Level (top):	1.87m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.2	1.87 – 1.67	Soft black clay with rare shell fragments	Estuarine	4
0.2 – 1.4	1.67 – 0.47	Soft dark grey brown sandy silt with interbedded	Estuarine	4
1.4 – 1.5	0.47 – 0.37	Very soft v dark grey brown to black clay	Estuarine	4
1.5 – 1.82	0.37 – 0.05	Very soft dark grey brown sandy clayey silt with rare mollusc shells and shell fragments	Estuarine	4
1.82 – 2.0	0.05 – -0.13	V soft v dark grey brown – black clay	Estuarine	4

Location:	313877.351 5856806.69	**Borehole ID:**	KP1.6	**Comments: 62559 Race Bank**
Level (top):	1.56m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.3	1.56 – 1.26	Very soft dark greyish brown sandy silt, black clay lenses, rare mollusc shells and shell fragments	Estuarine	4
0.3 – 0.5	1.26 – 1.06	Very soft grey brown silty clay	Estuarine	4
0.5 - 1.56	1.06 – 0	Very soft dark greyish brown to black sandy silt interbedded with thin bands of soft black clay with rare shell fragments	Estuarine	4
1.56 – 1.95	0 – -0.39	Very soft dark grey brown mottled black clay with occ lenses of sandy silt	Estuarine	4
1.95 – 2.0	-0.39 – -0.44	Very soft black sandy silt with frequent mollusc shells	Estuarine	4

Location:	313798.227 5857044.76	**Borehole ID:**	KP1.8	**Comments: 62559 Race Bank**
Level (top):	1.16m OD	**Drg:**		

Depth		**Sediment description**	**Interpretation**	**Unit**
Mbg	mOD			
0 – 0.3	1.16 – 0.86	Very soft light brown grey silt	Estuarine	4
0.3 – 0.6	0.86 – 0.56	Very soft brown grey sandy silt, rare mollusc shells	Estuarine	4
0.6 – 0.75	0.56 – 0.41	Very soft brown grey to black sandy silty clay	Estuarine	4
0.75 – 1.8	0.41 - -0.64	Soft brown grey sandy to v sandy silt interbedded with v soft black silty clay bands, occ mollusc shells	Estuarine	4
1.8 – 2.5	-0.64 – -1.34	Very soft brownish grey to black sandy silty clay	Estuarine	4

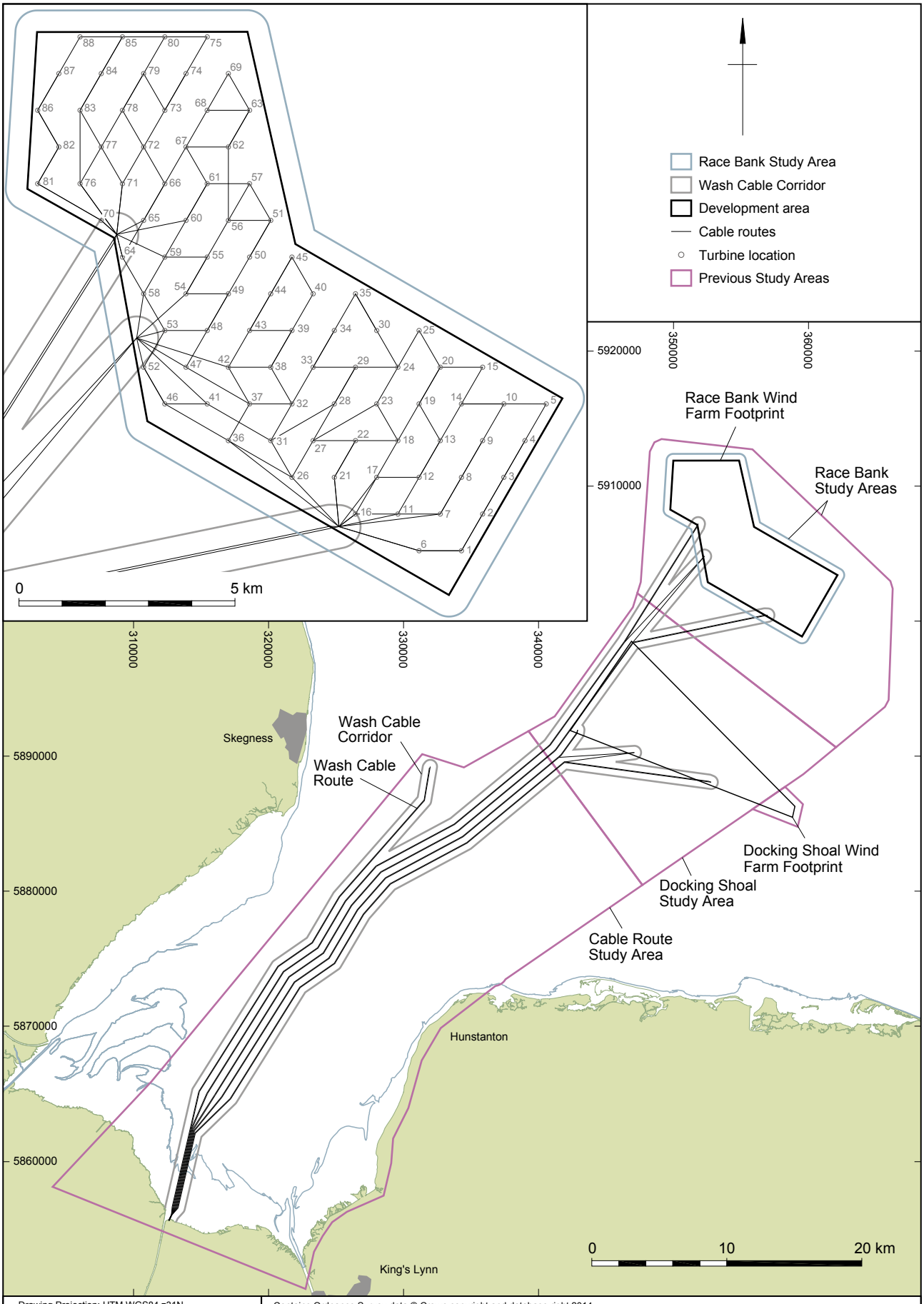
Location:		313935.165 5857203.28	**Borehole ID:**	KP2.0	**Comments: 62559 Race Bank**	
Level (top):		0.87m OD	**Drg:**			
Depth		**Sediment description**			**Interpretation**	**Unit**
Mbg	mOD					
0 – 1.5	0.87 – -0.63	Soft dark grey brown to black sandy silt with pockets of soft black clay			Estuarine	4
1.5 – 2.0	-0.63 – -1.13	Very soft dark greyish brown to black sandy silt, rare fragments of black organic material, occ mollusc shell			Estuarine	4

APPENDIX 3: BOREHOLE LOCATIONS

Borehole ID	Easting	Northing	Elevation m OD	Total Depth
VC-03	314143.8	5860262	-1.93	5.45
VC-08	314699.8	5862519	-4.13	5.2
VC-EX-017	317274.5	5866356	-11.43	2.7
VC-EX-019	317777.9	5867290	-12.13	2.85
VC-EX-021	318270	5868118	-11.93	3.25
VC-EX-034	321315.1	5873334	-26.93	5.43
VC-EX-040A	322975.8	5874512	-28.43	4.4
VC-EX-042A	323628.8	5874865	-32.43	1.35
VC-EX-044A	325484.6	5875545	-31.83	0.62
VC-EX-055A	328183.8	5878584	-27.93	0.4
VC-EX-059	328593.5	5880449	-41.23	2
VC-EX-061A	329082.9	5881340	-29.83	0.35
VC-EX-069A	332428.8	5884960	-34.13	1.1
VC-EX-077	335124.5	5887923	-23.87	0.5
VC-EX-078	335645.6	5888741	-30.53	1.35
VC-EX-080A	336404.2	5889291	-30.13	0.67
VC-EX-104A	346348.8	5898026	-11.53	2.38
VC-EX-110A	348286.5	5903854	-23.33	0.7
VC-EX-125A	349715.4	5900280	-21.93	1.57
VC-IN-03	353052.2	5910520	0	1.13
VC-IN-03A	353053.8	5910521	0	0.7
VC-IN-07	354004.1	5911402	-19.13	0.68
VC-IN-09A	354868.9	5911257	-16.63	0.7
VC-IN-16	354909.3	5906982	-24.53	5.49
VC-IN-18	355078.1	5906125	-23.63	0.85

VC-IN-18A	355078.6	5906128	-23.63	0.78
VC-IN-19	355819.7	5904894	-22.23	1.91
VC-IN-21	356733.3	5906332	-23.93	1.31
VC-IN-22	357535.7	5905852	-24.53	1.5
VC-IN-24A	357823.8	5904303	-23.03	1
VC-IN-25	353888.1	5906622	-18.53	2
VC-IN-30	357233.4	5902996	-21.73	1
VC-IN-32	360764.1	5904039	0	2.4
VC-IN-34A	361199.3	5902852	-20.83	0.85
VC-IN-35	360295.4	5903278	-22.83	1.15
VC-IN-37A	359208.6	5901426	0	1.95
VC-IN-38	359773.5	5900703	-21.13	1.45
VC-IN-39	359494.5	5899938	-20.23	1.5
VC-IN-41A	358858.1	5903598	0	0.6
VC-IN-44	357877.5	5902215	-22.23	2
VC-IN-45	358202.6	5901079	-20.43	1.9
VC-IN-23A	358220.6	5905051	0	1
VC-EX-01	313979	5859266	-1.43	2.3
VC-EX-05B	314407.3	5861655	-2.63	5.4
VC-EX-09	315026.4	5863121	-5.33	5.4
VC-EX-011	315532.5	5863965	-7.03	3.2
VC-EX-025	319211.2	5869869	-13.43	2.6
VC-EX-029	320292.3	5871610	-16.93	1.84
VC-EX-035	321821.3	5874060	-25.83	5.5
VC-EX-041	323566.9	5875046	-31.73	3.91
VC-EX-043A	324820.5	5875237	-30.23	0.82
VC-EX-051	327335	5877831	-26.43	1.4
VC-EX-056	328169.1	5879574	-39.43	0.2
VC-EX-082A	337192.5	5889820	-28.93	0.95
VC-EX-087	340129.4	5890263	-13.67	4.05

VC-EX-088	340981	5890467	-9.63	1.4
VC-EX-115	349764.2	5906017	-17.53	1.55
VC-EX-129A	353351.9	5901592	-12.63	0.65
VC-EX-132A	356190.9	5901543	-18.83	0.24
VC-IN-001A	352336.4	5911762	-16.73	0.4
VC-IN-04	351655.8	5910477	-16.03	1.8
VC-IN-06A	353383.8	5909786	-16.23	0.4
VC-IN-011A	353756.2	5909095	-16.63	1.5
VC-IN-012	354291.3	5908474	-18.23	1.95
VC-IN-014	353608.8	5908262	-20.43	2
VC-IN-27	355799.5	5902996	0	1.75
VC-IN-42	359043.4	5902737	0	1
VC-IN-46	357213	5901613	-20.43	1.45
VC-IN-47	357193.7	5900330	-18.23	1.7
VC-IN-048A	351923.5	5909230	0	0.6
VC-IN-51	352442.6	5906724	-15.33	1.1
VC-IN-56	354298.7	5904976	-16.43	0.6
VC-IN-059	356316.9	5901184	-15.03	0.65
KP0.2	313593.3	5855458	3.39	2
KP0.4	313708.7	5855619	3.62	1.5
KP0.6	313643.8	5855854	3.36	2
KP0.8	313765	5856015	3.11	2
KP0.20WS	313593.3	5855458	3.38	4
KP1.0	313694.7	5856251	2.68	2
KP1.2	313821.9	5856410	2.22	2
KP1.4	313745.7	5856648	1.87	2
KP1.6	313877.4	5856807	1.56	2
KP1.8	313798.2	5857045	1.16	2.5
KP2.0	313935.2	5857203	0.87	2



Drawing Projection: UTM WGS84 z31N.

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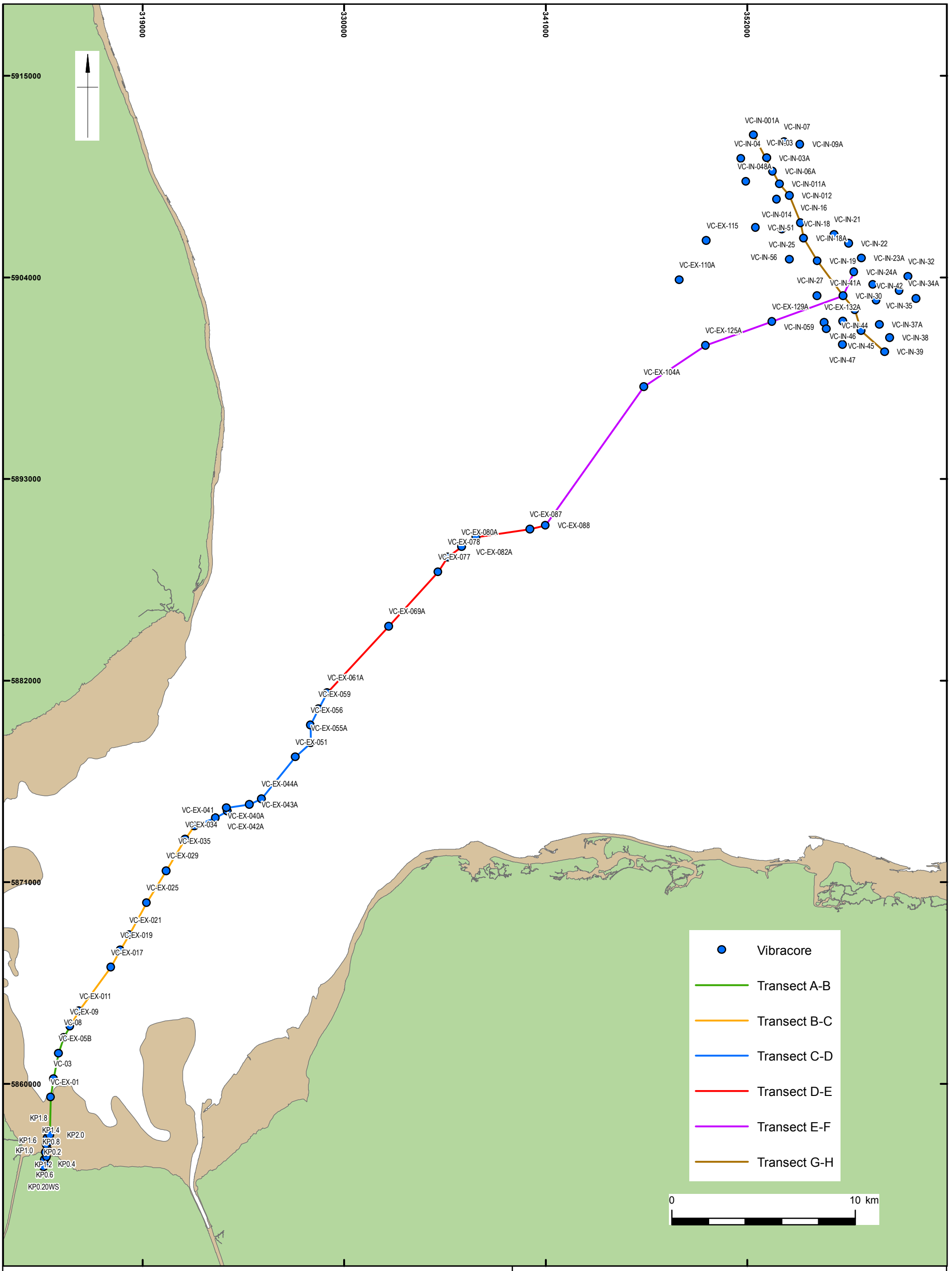
Scale:	1:400,000 & 1:125,000 @A4	Illustrator:	KJB/KL
Path:	W:\Projects\62559\DrawingOffice\Stage 1-2\14-01-14\Figure01.dwg		

Site location and proposed wind turbine positions

Figure 1



Drawing projection: UTM WBS84 z31N

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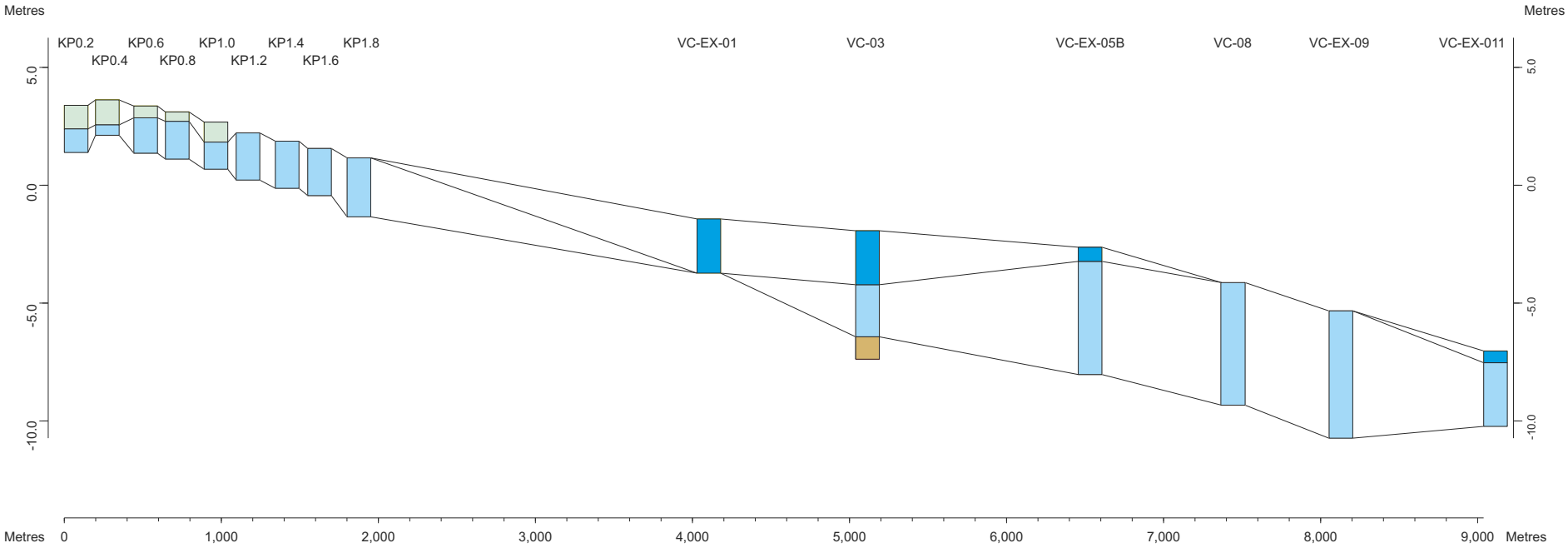
Vibrocore borehole locations

Figure 2



- Saltmarsh
- Seabed
- Fluvial/Estuarine
- Organic-rich desposits
- Glacio-fluvial sediments
- Glacial till
- Chalk

Date:	15/01/14	Revision Number:	0
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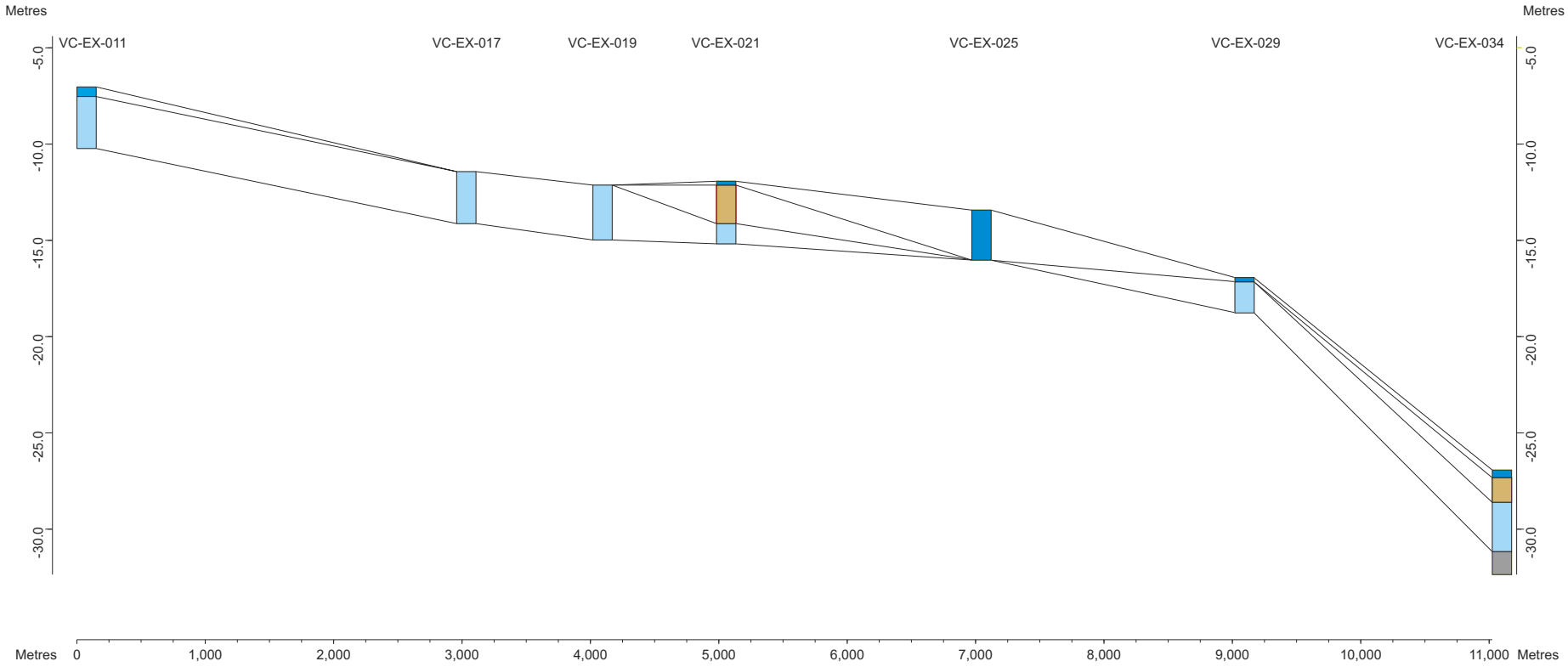
Transect A-B

Figure 3



Saltmarsh
Seabed
Fluvial/Estuarine
Organic-rich desposits
Glacio-fluvial sediments
Glacial till
Chalk

Date:	15/01/14	Revision Number:	0
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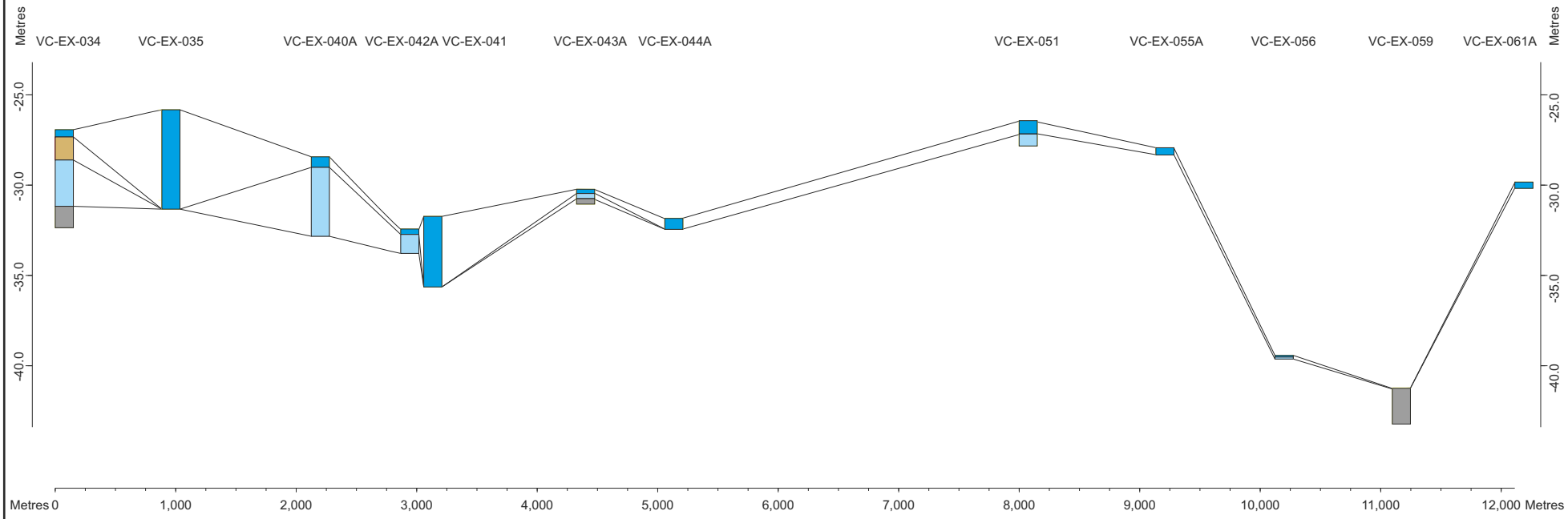
Transect B-C

Figure 4



- Saltmarsh
- Seabed
- Fluvial/Estuarine
- Organic-rich desposits
- Glacio-fluvial sediments
- Glacial till
- Chalk

Date:	15/01/14	Revision Number:	0
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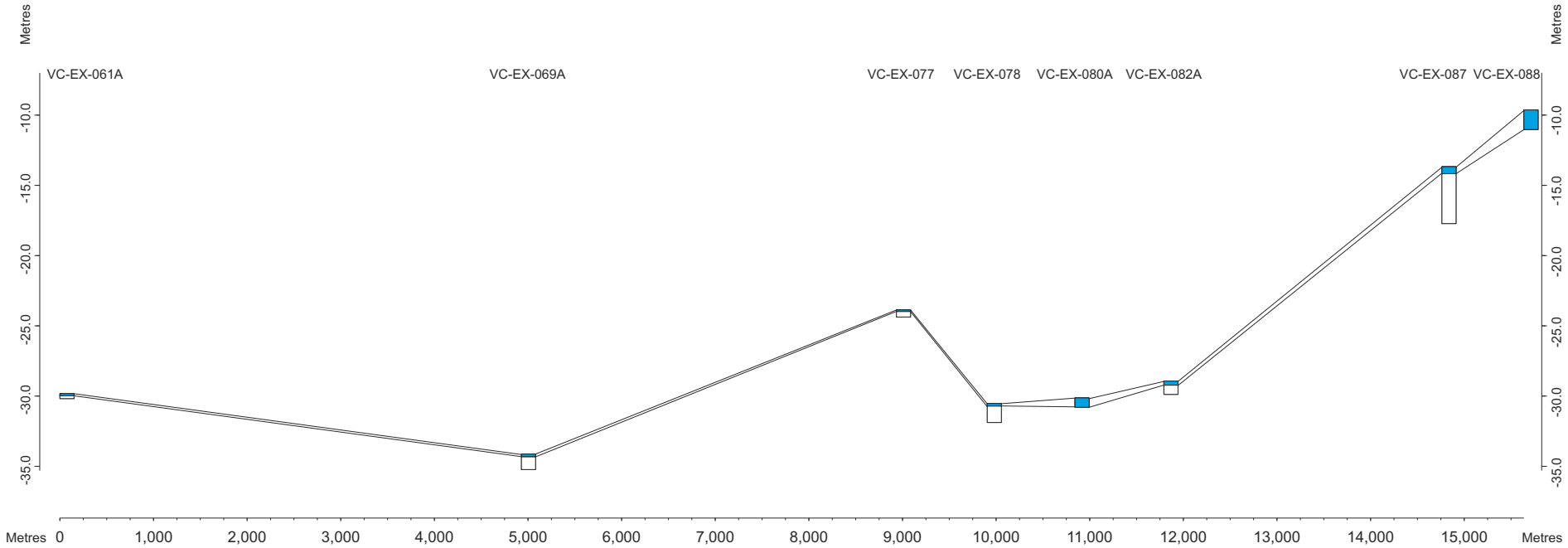
Transect C-D

Figure 5



- Saltmarsh
- Seabed
- Fluvial/Estuarine
- Organic-rich desposits
- Glacio-fluvial sediments
- Glacial till
- Chalk

Date:	15/01/14	Revision Number:	0
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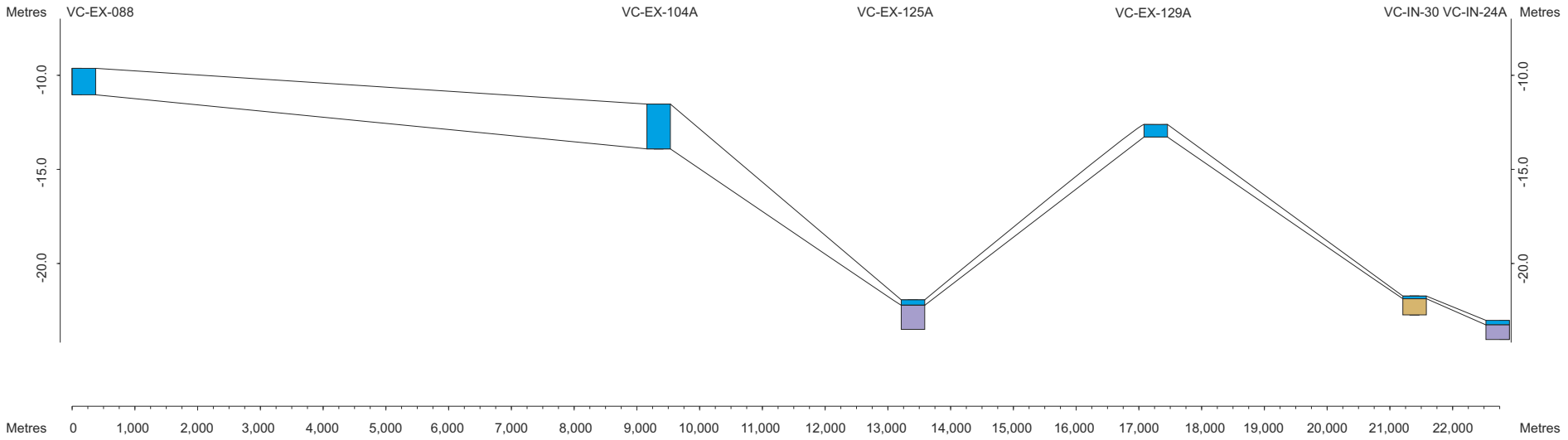
Transect D-E

Figure 6



- Saltmarsh
- Seabed
- Fluvial/Estuarine
- Organic-rich desposits
- Glacio-fluvial sediments
- Glacial till
- Chalk

Date:	15/01/14	Revision Number:	0
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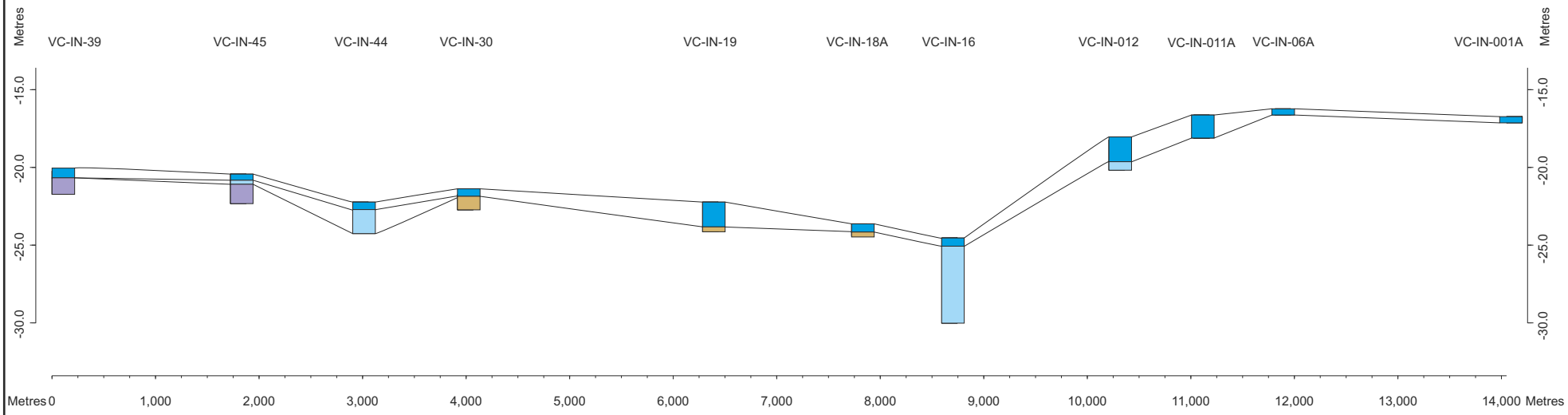
Transect E-F

Figure 7

Metres



- Saltmarsh
- Seabed
- Fluvial/Estuarine
- Organic-rich desposits
- Glacio-fluvial sediments
- Glacial till
- Chalk

Date:	15/01/14	Revision Number:	0
Scale:	see above	Illustrator:	KL
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Transect G-H

Figure 8

wessex archaeology

salisbury rochester sheffield edinburgh

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