Interconnexion France-Angleterre 2 (IFA2)

Stage 1 Marine Geoarchaeological Assessment

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Summary

Wessex Archaeology (WA) was commissioned by National Grid IFA 2 Ltd. on behalf of National Grid to undertake a Stage 1 geoarchaeological assessment of geotechnical data acquired in support of the Interconnexion France-Angleterre 2 (IFA2) which is a high voltage electrical interconnector between British and French transmission systems. This report covers parts of IFA2 that lie within the UK Exclusive Economic Zone which includes a high voltage alternating current (HVAC) link between Daedalus and Chilling in Southampton Water and a high voltage direct current (HVDC) cable route extending from Chilling, ~62 km offshore into the English Channel.

The English Channel is a gently sloping bedrock platform dissected by a complex network of palaeovalleys that formed during periods of lower sea level throughout the Pleistocene. Bedrock is exposed at the seabed, or present at shallow depths across large areas of the English Channel. The most significant thicknesses of sediment are typically found within palaeovalleys and comprise coarse-grained sands and gravels deposited by rivers. Seabed sediments in the English Channel are dominated by sands and gravels, becoming finer-grained in the nearshore areas of The Solent.

A total of 101 geotechnical vibrocore logs acquired during a survey campaign between October 2017 and January 2018 were reviewed to determine the geoarchaeological and palaeoenvironmental potential of deposits recovered. Associated Cone Penetration Tests and seismic profiles were used to support interpretations. Nineteen vibrocores did not recover deposits likely due to bedrock being present at the seabed. Forty-seven vibrocores were located along the HVAC cable corridor and thirty-five along the HVDC cable corridor.

The shallow geology recovered in vibrocores included weathered bedrock, Pleistocene sands and gravels and seabed sediments comprising sandy clay and sandy clay.

Weather bedrock of Barton Group or Bracklesham Group was recovered in 46 vibrocores. These deposits pre-date human occupation of Britain and therefore have low archaeological potential.

A total of 16 vibrocores recovered deposits interpreted to be Pleistocene in age. These deposits are characterised by interbedded silty sands, clayey silty gravel, sandy silty clay and clayey gravelly sand with frequent inclusions of shell. The majority of these vibrocores dissect a large palaeovalley that represents the former course of the River Solent (Palaeosolent).

The archaeological record associated with the River Solent's gravel terraces is rich based on the large number of artefacts preserved onshore (Ashton and Hosfield 2009). There is thus potential for archaeology to be preserved within the channel deposits associated with the Palaeosolent offshore. However, the likelihood of recovering an artefact within a core is low and the coarse clastic nature of the Pleistocene deposits means preservation of material suitable for palaeoenvironmental assessment is low restricting options for further geoarchaeological works. Furthermore, there is also evidence of reworking by marine processes. Therefore, while these deposits potentially contain archaeology, the geoarchaeological potential is low.

A total of 65 vibrocores recovered seabed sediments characterised by silty sand or silty clay in the nearshore and by gravelly sand further offshore. Offshore, seabed sediments typically reflect a lag deposit that formed during early Holocene sea-level rise when currents winnowed finer grained sediment leaving a coarse gravel behind. These deposits have low geoarchaeological potential as they relate to high energy marine processes during rapid sea-level rise. In the nearshore, seabed sediments are characterised by finer-grained sediments which are interpreted to reflect present-day estuarine processes operating in Southampton Water and The Solent. These deposits have low geoarchaeological potential.

Fourteen vibrocore logs noted occasional to rare organic stains or traces. Organics were observed in deposits interpreted to be bedrock, Pleistocene in age and seabed sediments. The presence of organic matter was not restricted to one particular deposit. Vibrocore photographs were reviewed to assess the amount and type of organic matter preserved. No organic matter was clearly visible on core photographs. In bedrock, glauconitic sediments typical of the Barton Group and Bracklesham Group are dark greenish grey in colour showing characteristics of organic matter. There is potential that Pleistocene deposits and seabed sediments may contain fragments of detrital organic matter. However, the potential for further geoarchaeological assessment on such material is low, these cores therefore have low geoarchaeological potential.

Based on the results of this Stage 1 marine geoarchaeological assessment, deposits recovered in vibrocores from the IFA2 HVDC and HVAC cable corridor have low geoarchaeological potential and no further Stage 2 geoarchaeological works are recommended.

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The report was prepared by Claire Mellett. Illustrations were prepared by Ken Lymer. Quality control was provided by Alexander Brown and the project was managed for Wessex Archaeology by Euan McNeill.

Interconnexion France-Angleterre 2 (IFA2)

Stage 1 Marine Geoarchaeological Assessment

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology (WA) was commissioned by National Grid IFA 2 Ltd. on behalf of National Grid to undertake a geoarchaeological assessment of geotechnical data acquired in support of the Interconnexion France-Angleterre 2 (IFA2) project.

1.1.2 IFA2 is a joint development between the National Grid and Réseau de Transport d'Électricité (RTE). It comprises a 1,000 MW high voltage direct current (HVDC) electrical interconnector between British and French transmission systems. The interconnector will be approximately 240 km in length and will connect the south coast of the UK with the Normandy region of France (**Figure 1**).

1.1.3 The project comprises two cable routes. The main HVDC interconnection extends between the French landfall north of Caen, at Merville-Franceville, in the Baie de Seine, and the English landfall at Daedalus in the Solent. In addition to the HVDC interconnection, there is a high voltage alternating current (HVAC) link from the converter station at Daedalus to a substation further up Southampton Water at Chilling, Brownwich (**Figure 1**).

1.1.4 The areas covered by this report include the nearshore between Daedalus and Chilling along the proposed HVAC link corridor (from herein referred to HVAC cable corridor), and offshore areas of The Solent and central English Channel along the proposed HVDC cable corridor (from herein referred to HVDC corridor) (**Figure 1**). This report relates to components of IFA2 that lie within the UK Exclusive Economic Zone (EEZ) covered by marine license MLA/2016/00209. Componants of IFA2 located in the French EEZ are beyond the scope of this report.

1.2 Summary of previous work

1.2.1 In support of the Environmental Impact Assessment (EIA), a marine archaeology desk-based assessment was undertaken (Headland Archaeology 2015a) along with a review of existing marine survey and geotechnical data (Headland Archaeology 2015a; 2015b).

1.2.2 Of particular relevance to geoarchaeology was the review of 131 vibrocores along the entire IFA2 cable corridor to assess geoarchaeological and palaeoenvironmental potential (Headland Archaeology 2015b). Of the 131 vibrocores, eight were identified as being of archaeological interest due to the presence of possible peat and organic deposits but only two (VC241 and VC243) were located within the UK EEZ. Upon visual inspection of these vibrocores, their geoarchaeological potential was dismissed (Headland Archaeology 2015b).

1.2.3 An archaeological Written Scheme of Investigation (WSI) was produced by Wessex Archaeology for the marine and intertidal parts of IFA2 located within the UK EEZ (Wessex Archaeology 2017a). The WSI was compiled based on the results of preceding archaeological assessments undertaken in support of the Environmental Impact Assessment (Headland Archaeology 2015a; 2015b). As part of the recommended mitigation measures in relation to the marine archaeological resource, the WSI proposed archaeological involvement in the planning, acquisition and review of any further geotechnical surveys.

1.2.4 Following on from the WSI (Wessex Archaeology 2017a), Heritage Method Statements for nearshore (Wessex Archaeology 2017b) and offshore (Wessex Archaeology 2017c) areas of IFA2 were produced. These Method Statements outlined the framework for undertaking geoarchaeological assessments of any new geotechnical data.

1.3 Scope of document

1.3.1 To help frame geoarchaeological investigations of this nature, WA 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 (**Table 1**).

1.3.2 This report outlines the results of a Stage 1 geoarchaeological assessment of geotechnical data collected in support of IFA2 from October 2017 to January 2018, as detailed in **Table 1**, with recommendations made for any further Stage 2 work if deemed necessary.

Table 1 Stages of geoarchaeological assessment and recording

Stage	Method	Description
1	Geoarchaeological Review	A desk-based archaeological review of the borehole, vibrocore and CPT logs generated by geotechnical contractors. Aims to establish the likely presence of horizons of archaeological interest and broadly characterise them, as a basis for deciding whether and what Stage 2 archaeological recording is required. The Stage 1 report will state the scale of Stage 2 work proposed.
2	Geoarchaeological Recording	Archaeological recording of selected retained or new core samples will be undertaken. This will entail the splitting of the cores, with each core being cleaned and recorded. The Stage 2 report will state the results of the archaeological recording and will indicate whether any Stage 3 work is warranted.
3	Sampling and Assessment	Dependent upon the results of Stage 2, sub-sampling and palaeoenvironmental assessment (pollen, diatoms and foraminifera) may be required. Subsamples will be taken if required. Assessment will comprise laboratory analysis of the samples to a level sufficient to enable the value of the palaeoenvironmental material surviving within the cores to be identified. Subsamples will also be taken and/or retained at this stage in case scientific dating is required during Stage 4. Some scientific dating (e.g. radiocarbon or Optically Stimulated Luminescence (OSL)) may be undertaken at this stage to provide chronological context. 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 any Stage 4 work is warranted.
4	Analysis and Dating	Full analysis of pollen, diatoms and/or foraminifera assessed during Stage 3 will be undertaken. Typically, Stage 4 will be supported by scientific dating (e.g. radiocarbon or OSL) of suitable subsamples. Stage 4 will result in an account of the successive environments within the coring area, a model of environmental change over time, and an outline of the archaeological implications of the analysis.

Stage	Method	Description
5	Final Report	If required Stage 5 will comprise the production of a final report of the results of the previous phases of work for publication in an appropriate journal. This report will be compiled after the final phase of archaeological work, whichever phase that is.

2 AIMS AND OBJECTIVES

2.1.1 The principle aims of the Stage 1 geoarchaeological review are as follows:

- Review geotechnical vibrocore logs to identify deposits of potential archaeological interest;
- Determine the importance of the deposits, with regard to their archaeological and palaeoenvironmental potential, and;
- Make recommendations (if necessary) for further Stage 2 geoarchaeological works.

2.1.2 This is to be undertaken in accordance with the WSI (Wessex Archaeology 2017a) and associated Heritage Method Statements (Wessex Archaeology 2017b; Wessex Archaeology 2017c).

3 GEOARCHAEOLOGICAL BACKGROUND

3.1 Introduction

3.1.1 The IFA2 HVDC and HVAC cable corridors are located in the central English Channel which is a gently sloping bedrock platform dissected by a complex network of palaeovalleys that formed during periods of lower sea level throughout the Pleistocene (Hamblin et al., 1992). During installation of the IFA2 HVDC and HVAC cables, Pleistocene and Holocene sediments may be encountered.

3.2 Solid geology

3.2.1 The solid geology of the English Channel is important in the context of geoarchaeological assessments as it outcrops at or lies immediately below the present-day seabed over large proportions of the region. Bedrock has no geoarchaeological potential but it may be recovered in vibrocores, and where it is overlain by Pleistocene sediments, it may be difficult to recognise the contact between the two.

3.2.2 Solid geology underlying the IFA2 corridor within the UK EEZ is dominated by weathered clays and fine sands of the Barton Group in The Solent and Approaches, and by Chalk with flint and discrete marl seams further offshore towards the UK-France meridian line (British Geological Survey, 2018). Along the margins of the Solent in the coastal zone, sand silt and clay of the Selsey Sand Formation (Bracklesham Group) are exposed in eroded cliff sections. The contact between Barton Group and older Bracklesham Group is not defined with confidence by the British Geological Survey (BGS) as it lies within the nearshore which historically, was difficult to map.

3.3 Pleistocene

3.3.1 The Pleistocene Epoch is one dominated by repeated glacial/interglacial cycles. While there is no evidence of glaciation in the English Channel, its palaeoenvironmental evolution would have been significantly influenced by changes in sea level associated with the growth and decay of major ice sheets throughout the Pleistocene. This led to repeated periods of subaerial exposure, which may have created environments suitable for hominin occupation, followed by drowning and submergence, at the glacial-interglacial timescale.

3.3.2 During periods of lower sea level, the English Channel became subaerially exposed and terrestrial river systems such as the Seine, Somme and Solent extended offshore creating a complex network of palaeovalleys. These rivers were tributaries of a larger system often referred to as the 'Channel River' which drained the Thames, Rhine and Meuse river systems through the Dover Straits from ~500 ka onwards (Smith 1989, Gibbard et al., 1988; Toucanne et al., 2009).

3.3.3 The most significant thicknesses of Pleistocene sediments preserved in the English Channel are confined to palaeovalleys (Gibbard et al., 1988; Hamblin et al., 1992), although not all palaeovalleys are filled and many 'empty' valleys can be seen in seafloor bathymetric data (Gupta et al., 2007). Coarse clastic (sand and gravels) fluvial sediments dominate the infill. However, finer-grained coastal to shallow marine sediments may also be present (Wessex Archaeology 2008, Mellett et al., 2013) Elsewhere repeated erosion over multiple glacial-interglacial cycles has led to bedrock exposures at or near to the seabed.

3.3.4 The IFA2 cable corridor crosses two main palaeovalley systems; the Northern Palaeovalley and the Palaeosolent.

3.3.5 The Northern Palaeovalley is a largely underfilled valley that extends from the Straits of Dover, westwards towards the Hurd Deep in the central English Channel. The Northern Palaeovalley is a significant geomorphological feature due to its association with the breaching of a chalk land bridge across the Dover Straits during the Middle Pleistocene. The timing and mechanism of breaching remains a discussion topic with models ranging from catastrophic flooding (Smith 1989, Gupta et al., 2007; 2017) to more gradual overspill and down cutting (Hijma et al., 2012, Mellett et al., 2013). The opening of Dover Straits and creation of Island Britain would have had significant palaeogeographic implications for the pattern of hominin (re)colonization of Britain (Ashton and Lewis 2002; Hijma et al., 2012).

3.3.6 The Palaoesolent is the now submerged palaeovalley system associated with the river Solent (Dyer 1975; Hamblin et al., 1992). Its former course runs east of the Isle of White, extending south into the English Channel where it meets the Northern Palaoevalley. The Palaeosolent is filled with sediment up to 25 m thick in places (James et al., 2011). It is expected to be filled with largely coarse grained fluvial sediments, although some more organic rich sediments such as peat with the potential to preserve palaeoenvironmental material, may be preserved along its margins (James et al., 2011; Headland Archaeology 2015b). Onshore, the Palaeosolent is of particular interest in the study of Palaeolithic Britain, with many handaxes being recovered from the Solent's gravel terraces (Ashton and Hosfield 2009). Its Palaeolithic course and extent are therefore of great interest as they may potentially preserve evidence of human occupation in the form of worked lithics.

3.3.7 Within the nearshore coastal zone, there is an apparent thinning or absence of palaeovalley sediments, possibly due to increased erosion by marine processes once sea levels stabilised around their present-day position during the Mid-Holocene. In the area between Daedalus and Chilling, West (1980) recorded the presence of a shallow sub-tidal bedrock platform confirming the absence of palaeochannel sediments in the nearshore. However, exposed cliffs along the margins of the Solent near Hill Head show late Pleistocene terrace gravels overlying weathered Bracklesham Group bedrock and there is potential these Pleistocene gravels may be preserved in protected locations within the nearshore.

3.3.8 A number of key Palaeolithic sites are located along the south coast of England (James et al., 2011). Key sites include Boxgrove in west Sussex where in-situ artefacts such worked flint, animal bone showing signs of butchering and hominin remains of Homo Heidelbergensis were found (Pope and Roberts 2005). Artefacts thought to be of a similar age were also found at Bembridge on the Isle of Wight (Preece et al., 1995). This site shows evidence that hominin groups were operating in the English Channel region approximately 500,000 years ago highlighting the potential for discovering Palaeolithic sites offshore.

3.4 Holocene

3.4.1 Rapid changes in sea level during the early Holocene flooded the English Channel palaeovalley network. Sediment infilling channels would have shifted from coarse sands and gravels to finer grained, possibly more organic rich deposits as vegetation developed in a warming climate. As sea levels continued to rise and palaeoshorelines migrated landward, river channels would have become estuaries until they were finally submerged in the mid Holocene. Preservation of former shorelines is expected to be low, but not impossible, as an Early Holocene drowned barrier coastal system is preserved offshore of Dungeness further east in the English Channel (Mellett et al., 2012).

3.4.2 The significant discovery of a Mesolithic settlement submerged just offshore of the village of Bouldner in the Isle of Wight (Momber et al., 2011), demonstrates the potential for preserving records of hominin occupation in what is now a marine zone.

4 METHODOLOGY

4.1 Data sources

4.1.1 Data was provided by the geotechnical contractor (Next Geosolutions), and included:

- Vibrocore logs (digital);
- Cone Penetration Test (CPT) logs (digital);
- An image of the sub-bottom seismic profile at the location of vibrocores and CPTs;
- Photographs of vibrocores (taken offshore);
- Location and water depth information, and;
- Vibrocore logs previously assessed by Headland (2015b).

4.2 Coring methodology/strategy

4.2.1 Geotechnical samples were recovered using a 3 m vibrocorer providing a near continuous record of the deposits in the shallow subsurface. Target depth was 3 m below the sea floor and recovery was variable. Where bedrock is present at or close to the seabed, recovery was typically less than ~1 m. In contrast, recovery was higher where fine-grained or sandy deposits were encountered with a maximum recovery of 3 m at AC-VC-C6-3_1.

4.2.2 Upon recovery to deck, vibrocores were cut into sections (maximum length ~1 m). Depending on the nature of the deposits, individual sections were selected for geotechnical testing and were sealed and stored for onshore analysis. Remaining sections were split, described and photographed by the geotechnical contractor offshore.

4.3 Review of geotechnical data

4.3.1 A total of 101 geotechnical vibrocore logs were reviewed by a trained geoarchaeologist to determine the geoarchaeological and palaeoenvironmental potential of deposits recovered (**Appendix 1**). Core photographs, corresponding CPT logs and seismic profiles were assessed to aid interpretations.

4.3.2 A summary of each vibrocore log is itemised in **Appendix 1**, which includes the following:

- Vibrocore location
- Water depth (m below Lowest Astronomical Tide [LAT])
- Description of deposits
- Depths of boundaries between deposits
- Interpretation of likely depositional environment and stratigraphy

4.3.3 Vibrocores were assigned either a high, medium or low status based on their perceived geoarchaeological significance and potential to preserve paleoenvironmental material, as itemised in **Appendix 1** and shown on **Figures 2a-f**.

4.3.4 Of greatest geoarchaeological potential are sediments from former terrestrial depositional environments, as well as certain features or inclusions of possible archaeological and palaeoenvironmental interest, specifically:

- Peat layers;
- Deposits containing other organic material such as wood fragments and roots etc.;
- Clay or silt deposits, especially those containing laminated features such as lacustrine varves or tidal rhythmites;
- Inorganic fossils (such as molluscs);
- Concentrations of charcoal;
- Individual artefacts such as pieces of flint or pottery (though finding these within core samples is rare), and;
- Any other feature that may indicate a terrestrial depositional environment.

5 RESULTS

5.1 Introduction

5.1.1 The results of the Stage 1 review involved an examination of 101 individual vibrocore logs, with the aim of identifying sediments of potential geoarchaeological interest, with recommendations made for further geoarchaeological work where necessary. The results are presented in **Appendix 1** and vibrocore locations shown on **Figures 2a-f**.

5.1.2 Of the 101 vibrocores reviewed, 47 are located along the HVAC cable corridor and 54 are located along the HVDC cable corridor (**Figures 2a-f**). Of those located along the HVDC cable corridor, 19 did not recover any deposits due to hard substrate associated with outcropping bedrock, or due to steeply dipping slopes along the margins of palaeovalleys. These 19 vibrocores have no geoarchaeological potential (see **Appendix 1**) and will not be discussed further. Results from the assessment of 47 HVAC vibrocores and 35 HVDC vibrocores are presented below. All depths are given in meters below seafloor (mbsf).

5.2 HVDC

5.2.1 A total of 35 vibrocores recovered sediments along the HVDC cable corridor, extending from the nearshore area around Chilling, approximately 62 km offshore into the English Channel (**Figures 2c-f**). Average recovery was 1 m, with a maximum recovery of 3 m at location DC-VC-22_6.

Solid geology

5.2.2 Stiff, high strength sandy silty clay and clayey sandy silt was the lowermost deposit recovered in 13 vibrocores (DC-VC-27_2, DC-VC-27_1, DC-VC-20_1, DC-VC-19_2, DC-VC-19_1, DC-VC-18_3, DC-VC-15_2, DC-VC-15_1, DC-VC-14_2, DC-VC-14_1, DC-VC-13_1, DC-VC-12_2, DC-VC-11_1). The thickness of this deposit ranges from 0.05 m at DC-VC-11_1 and 1.15 m at DC-VC-13_1. Geotechnical logs describe the colour of these deposits as being greenish grey which is confirmed by the photographs.

5.2.3 The high strength nature of these deposits indicates they are likely part of the underlying bedrock, albeit weathered which allowed it to be recovered with a vibrocorer. The colour and grainsize also supports the interpretation as bedrock as the underlying Barton Group comprises olive grey and greenish grey clays with varying sand content (British Geological Survey 2018). These deposits have no geoarchaeological potential as they predate occupation of Britain.

5.2.4 Stiff silty clays were also recovered in DC-VC-27_2 and DC-VC-27_1 which are located in the nearshore within 1.5 km of the present-day coast. These deposits show characteristics of weathered bedrock. Geological mapping of the Solent identified a shallow sub-tidal rock platform where interbedded clays silts and sands of the Bracklesham Group outcrop at seabed (West 1980).

Pleistocene deposits

5.2.5 Clayey sandy silt and clayey sand with occasional stains of organic material was observed at locations DC-VC-25_2 and DC-VC-25_1, reaching depths of 1.50 m below seafloor (mbsf). Organic stains were also observed in vibrocore DC-VC-22_1 within gravelly sand. Gravelly clayey silty sands were recovered in DC-VC-22_6 and DC-VC-21_2 and a sandy gravel with organic odour was recovered in DC-VC-20_2. Recovery was relatively high in these deposits reaching the maximum target depth of 3 m below sea floor (DC-VC-22_6).

5.2.6 These deposits are coarser grained than those interpreted as bedrock and they show signs of organic staining suggesting they were deposited within or near to a terrestrial environment. Those vibrocores recovering these deposits are all located in The Solent and they dissect a large palaeochannel representing the course of the river Solent during periods of lower sea-level (Palaeosolent). Sediment thickness within the Palaeosolent can reach depths up to 20 m within the HVDC corridor (Hamblin et al., 1992). The gravelly clayey silty sands recovered in DC-VC-25_2, DC-VC-25_1, DC-VC-22_1, DC-VC-22_6, DC-VC-21_2 and DC-VC-20_2 may represent palaeochannel fill of the Palaeosolent.

5.2.7 The lowermost deposits in DC-VC-17_2, DC-VC-17_1, DC-VC-16_2 and DC-VC-16_1 are described as silty sands reaching a depth of up to 0.73 mbsf. In vibrocore DC-VC-18_1, a sandy clay characterises the lower sediments. These vibrocores are not located within the margins of the Palaeosolent but appear to occupy an isolated hollow according to seismic data.

Holocene deposits

5.2.8 Three vibrocores (DC-VC-22_3, DC-VC-22_2, DC-VC-21_1) recovered gravelly sand and three recovered sandy gravel (DC-VC-10_5, DC-VC-13_2, DC-VC-18_2). Recovery was low in these deposits reaching a maximum depth of 0.45 mbsf. These deposits are interpreted to represent seabed sediments and the relatively low recovery is likely due to the shallow depth of bedrock in the English Channel.

5.2.9 At DC-VC-13_3, DC-VC-13_4, DC-VC-13_5 a relatively thin (0.25 m) deposit of sandy gravel is underlain by sandy clay deposits reaching a maximum depth of 0.30 mbsf. These deposits are also interpreted as seabed sediments with the sandy clay representing the upper surface of weathered bedrock where it is present at shallow depths below the seabed.

5.2.10 These coarse clastic sandy gravels and gravelly sands have low geoarchaeological potential as they represent reworking by present-day marine currents.

5.2.11 Sandy silty clay underlain by stiff sandy silty clay interpreted as bedrock was recovered in DC-VC-27_2 and DC-VC-27_1 reaching a maximum depth of 1.55 mbsf. In DC-VC-26_1 a deposit of sandy silty clay reaches a depth of 2.25 mbsf and is underlain by silty sand (2.50 mbsf). These vibrocores are located in the nearshore area within 1.5 km of the present-day coast. Seabed sediments at these locations are mapped as sandy mud (BGS Geology: marine sediments 250k) and it is likely the upper deposits recovered in these vibrocores are the result of present-day marine processes which have low geoarchaeological potential.

5.3 HVAC

5.3.1 A total of 47 vibrocores recovered sediments along the HVAC cable corridor, located in the nearshore area between Daedalus and Chilling (**Figures 2a-b**). Average recovery was 1.8 m, with a maximum recovery of 2.8 m at location AC-VC-C5-1_1.

Solid geology

5.3.2 Stiff clayey sandy silt and stiff silty sandy clay, both comprising shell fragments, were recovered in 27 of the vibrocores (**Appendix 1**). The lithology and strength of these deposits shows characteristics of Brackleshem Group rocks that outcrop at the seabed to form a sub-tidal rock platform (West 1980). Review of seismic data also supports the interpretation that bedrock is exposed at or near to the seabed.

5.3.3 In vibrocore AC-VC-C3-1_1 silty clayey sand with rare organic matter was observed between 0.70 mbsf and 2.55 mbsf. Core photographs do not show any clear evidence of in-situ or detrital organic matter but show the deposit to be dark greenish-grey in colour. Bracklesham Group rocks are often described as glauconitic which is a mineral with a characteristic dark green colour. These deposits were not described as stiff (typical of weathered bedrock) by the geotechnical contractor. However, appraisal of the core photographs and seismic profiles support an interpretation as bedrock.

5.3.4 The strength of deposits has been used to help identify where bedrock was recovered in cores. However, where bedrock is highly weathered, rock will show similar characteristics to sediment. Vibrocores AC-VC-C4-1_1 and AC-VC-C4-1_2 recovered silty sand, and clayey sand was recovered in AC-VC-C6-1_1 and AC-VC-C6-1_2. A review of core photographs demonstrate that these sediments display similar characteristics to deposits interpreted as rock. Furthermore, seismic data show bedrock outcropping near seabed. They have therefore been interpreted as bedrock.

Pleistocene deposits

5.3.5 Overlying bedrock in AC-VC-C4-4_1 and AC-VC-C4-4_2 are coarse clastic deposits that appear to be interbedded showing variation in depositional history. These deposits are 0.55 m thick in both cores and are characterised by silty sands and clayey sandy gravel. Gravel is centimetre scale and comprises various lithologies.

5.3.6 Pleistocene deposits of the Solent area consist of flint dominated gravels in a sand matrix deposited on a series of terraces. These can be seen in eroding cliffs along the margins of the Solent (West 1980) and there is potential for these deposits to extend into the nearshore within the Solent.

5.3.7 The coarse clastic deposits recovered in AC-VC-C4-4_1 and AC-VC-C4-4_2 may be submerged remnants of Pleistocene gravels associated with the ancient course of the river Solent during periods of lower sea level.

5.3.8 Vibrocore AC-VC-C5-1_1 also shows interbedding of coarse clastic deposits. However, there is higher shell content than observed at AC-VC-C4-4_1 and AC-VC-C4-4_2 possibly suggesting marine reworking of Pleistocene sands and gravel.

5.3.9 The lowermost deposits recovered in AC-VC-C4-1_1 and AC-VC-C4-1_2 were described as silty sand, in AC-VC-C4-2_1, they were described as clayey sand, and AC-VC-C6-2_1 recovered gravelly sandy silty clay. There is potential these deposits are weathered bedrock. However, a review of seismic data has shown these cores are located within a palaeochannel which may be filled with Pleistocene sediments.

Holocene deposits

5.3.10 Seabed sediments in the nearshore around the HVAC corridor are described by BGS as being sandy mud. Soft silty sandy clay with shell fragments characterises the uppermost deposits in 31 vibrocores (**Appendix 1**) with silty, occasionally clayey, sand with shell fragments characterising a further 10 vibrocores. These deposits vary in thickness from 0.10 m (AC-VC-C1-3_2) to 2.60 m (AC-VC-C2-2_1). These deposits are interpreted to represent seabed sediments formed by present-day marine processes and thus have low geoarchaeological potential. It is likely the fine-grained nature of the seabed sediments in this area is a result of erosion and weathering of the underlying bedrock that is exposed at or near to the seabed.

5.3.11 In vibrocores AC-VC-C6-1_2, AC-VC-C6-1_1, AC-VC-C4-5_1, AC-VC-C4-1_2 and AC-VC-C4-1_1, rare organic matter was recorded within these seabed sediments by the geotechnical contractor. A review of core photographs revealed there is no in-situ or detrital organic matter within these cores (**Appendix 2**). In AC-VC-C4-5_1, AC-VC-C4-1_2 and AC-VC-C4-1_1, the clay is dark grey which may indicate high organic content but these are modern sea bed sediments so it expected any organic material within then would result from, or be reworked by modern marine processes.

5.3.12 At the location of vibrocore AC-VC-C3-2_1 and AC-VC-C3-2_2 frequent organic matter was recorded on top of the stiff sandy silt interpreted as bedrock. Upon review of core photographs (**Appendix 2**) there is no clear sign of detrital or in-situ organic matter. The cores appear darker in colour at the contact between underlying bedrock and overlying marine sands, which may have been misinterpreted as organics by the geotechnical contractor responsible for the descriptions.

5.3.13 The lowermost deposits in AC-VC-C1-1_1 comprise silty gravelly sands with shell and in AC-VC-C2-1_1, AC-VC-C2-1_2, silty sand with shell. The presence of shell indicates deposition in a marine environment but these deposits are coarser grained than seabed sediments in the area, and are overlain by seabed sediments in AC-VC-C1-1_1 and AC-VC-C2-1_2. These deposits may be reworked Pleistocene sediments, possibly eroded and transported during early Holocene sea-level rise.

6 DISCUSSION

6.1 Geoarchaeological potential

6.1.1 A total of 101 vibrocore logs were reviewed, of which 82 recovered sediment and 19 were recorded as having no recovery likely due to the coarse nature of seabed sediments and/or the presence of bedrock at the seabed. Geotechnical logs, and corresponding seismic profiles and core photographs were reviewed to identify the character and distribution of deposits along the IFA2 HVAC and HVDC cable corridors. The stratigraphy of the shallow sub-surface is characterised by bedrock overlain by Pleistocene sediments where the cable corridor dissects the Palaeosolent, in turn overlain by seabed sediments that are fine-grained in the nearshore, becoming coarser as the cable corridor extends offshore. The perceived geoarchaeological significance of each of the deposits recovered is discussed below.

Solid geology

6.1.2 Of the 82 vibrocores assessed, a total of 46 recovered Barton Group or Bracklesham Group bedrock. The vibrocorer was able to recover bedrock as it was weathered where it outcropped at or near to the seabed. These deposits pre-date human occupation of Britain and therefore have low archaeological potential (**Appendix 1**).

Pleistocene deposits

6.1.3 A total of 16 vibrocores recovered deposits interpreted to be Pleistocene in age.

6.1.4 Seven of these are located along the HVAC cable corridor in the nearshore (AC-VC-C1-1_1, AC-VC-C2-1_1, AC-VC-C2-1_2, AC-VC-C4-2_1, AC-VC-C4-4_1, AC-VC-C4-4_2 and AC-VC-C5-1_1).

6.1.5 Four of these vibrocores recovered silty and clayey sands with shell which are interpreted as Pleistocene sediment. The presence of shell possibly indicates reworking by marine processes. These deposits potentially represent later stages of infill of the Palaoesolent, although they could also be early Holocene in age.

6.1.6 The remaining three vibrocores (AC-VC-C4-4_1, AC-VC-C4-4_2, AC-VC-C5-1_1) recovered interbedded silty sands, clayey silty gravel, sandy silty clay and clayey gravelly sand which are interpreted as being Pleistocene age, most likely forming part of the infilled Palaeosolent. Again, the presence of shell is observed indicating reworking.

6.1.7 Nine vibrocores recovered Pleistocene deposits along the HVDC cable corridor (DC-VC-16_1, DC-VC-16_2, DC-VC-17_1, DC-VC-17_2, DC-VC-18_1, DC-VC-21_2, DC-VC-22_6, DC-VC-25_1 and DC-VC-25_2).

6.1.8 Five of these vibrocores (DC-VC-16_1, DC-VC-16_2, DC-VC-17_1, DC-VC-17_2 and DC-VC-18_1) recovered silty sand or sandy clay. These vibrocores were located in a small seabed depression and were not associated with a paleochannel feature according to seismic profiles. These deposits may be Pleistocene or early Holocene in age.

6.1.9 Sediments dominated by clayey/silty sand and gravelly sand were recovered in DC-VC-21_2, DC-VC-22_6, DC-VC-25_1 and DC-VC-25_2. The seismic profile at core locations DC-VC-21_2 and DC-VC-22_6 indicates these cores intercept a palaoechannel feature. These deposits are interpreted to be Pleistocene in age, probably associated with the Palaeosolent.

6.1.10 The archaeological record associated with the River Solent's gravel terraces is rich based on the number of artefacts preserved onshore (Ashton and Hosfield 2009). There is thus potential for handaxes and other records of human activity to be preserved within the channel deposits associated with the Palaeosolent offshore. However, the likelihood of recovering an artefact within a core is low. The coarse clastic nature of the Pleistocene deposits means preservation of material suitable for palaeoenvironmental assessment is low restricting options for further geoarchaeological works as defined in **Table 1**. There is also evidence of reworking by marine processes. The geoarchaeological potential of these Pleistocene deposits is therefore classified as low.

Seabed sediments

6.1.11 A total of 65 vibrocores recovered seabed sediments characterised by silty sand or silty clay in the nearshore and by gravelly sand further offshore. Of these 65 vibrocores, 20 terminated within the seabed sediments. The remaining 65 also recovered Pleistocene deposits and or bedrock.

6.1.12 Offshore, seabed sediments typically reflect a lag deposit that formed during early Holocene sea-level rise when currents winnowed finer grained sediment leaving a coarse gravel behind (Hamblin et al., 1992). These deposits have low geoarchaeological potential as they relate to high energy marine processes during rapid sea-level rise.

6.1.13 In the nearshore, seabed sediments are characterised by finer-grained sediments which are interpreted to reflect present-day estuarine processes operating in Southampton Water and The Solent. These deposits have low geoarchaeological potential.

Organic matter

6.1.14 On fourteen of the 82 vibrocore logs (AC-VC-C2-4_1, AC-VC-C3-1_1, AC-VC-C3-2_1, AC-VC-C3-2_2, AC-VC-C3-3_1, AC-VC-C3-3_2, AC-VC-C4-1_1, AC-VC-C4-1_2, AC-VC-C4-5_1, AC-VC-C6-1_1, AC-VC-C6-1_2, DC-VC-22_1, DC-VC-25_1 and DC-VC-25_2), occasional to rare organic stains or traces were observed.

6.1.15 Organics were observed in deposits interpreted to be bedrock (AC-VC-C3-1_1, AC-VC-C3-2_1, AC-VC-C3-2_2, AC-VC-C4-1_1, AC-VC-C4-1_2, AC-VC-C6-1_1 and AC-VC-C6-1_2), Pleistocene (DC-VC-25_1 and DC-VC-25_2), and seabed sediments (AC-VC-C2-4_1, AC-VC-C3-3_1, AC-VC-C3-3_2, AC-VC-C4-5_1, DC-VC-22_1 and DC-VC-25_1). The presence of organic matter was not restricted to one particular deposit.

6.1.16 Vibrocore photographs were reviewed to assess the amount and type of organic matter preserved. No organic matter was clearly visible on core photographs suggesting that if present, any organic matter would be very small and likely detrital in origin. The potential for further geoarchaeological assessment on such material is low, these cores therefore have low geoarchaeological potential.

7 RECOMMENDATIONS

7.1.1 A Stage 1 review of 82 vibrocore logs from a 2017-2018 geotechnical survey campaign along the IFA2 HVAC and HVDC cable corridor identified three key deposits:

- Weathered bedrock (Barton Group or Bracklesham Group);
- Pleistocene sediments associated with the Palaeosolent, and;
- Seabed sediments.

7.1.2 Deposits representing weathered bedrock have low geoarchaeological potential as they pre-date hominin occupation of Britain. No further work is recommended on these vibrocores.

7.1.3 Pleistocene deposits, in particular palaeovalley infills associated with the Palaeosolent have the potential to preserve Palaeolithic and/or Mesolithic artefacts as there is a rich archaeological record associated with the Pleistocene terraces of the River Solent onshore. However, due to the clastic nature of these sediments and evidence of reworking, their geoarchaeological potential is considered low and no further work is recommended on these deposits.

7.1.4 Deposits interpreted as seabed sediments have low geoarchaeological potential as they formed due to marine processes during or after Holocene sea-level transgression. No further work is recommended.

7.1.5 Observations of traces or stains of organic matter in fourteen vibrocores is of geoarchaeological interest due to the potential to preserve palaeoenvironmental material. However, a review of core photographs did not identify any in-situ organic deposits that would be suitable for further geoarchaeological works. Therefore, these cores are considered to have low geoarchaeological potential.

7.1.6 The potential, and requirement for Stage 2 geoarchaeological works on 2017-2018 geotechnical vibrocores from the IFA2 HVAC and HVDC cable routes is low and there are no further recommendations.

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Appendix I

VC ID	Eastings (m)	Northings (m)	Water depth (m LAT)	Description	Geoarchaeological Potential	Interpreted depositional setting and stratigraphy
IFA2 HVAC cable corridor						
AC-VC-C1-1_1	622613	5630685	3.00	soft silty clay (1.50 m) silty gravelly sand with shell (2.40 m)	Low	Seabed sediments overlying Pleistocene with evidence of reworking
AC-VC-C1-2_1	623055	5630486	3.80	soft silty clay with shell (2.30 m)	Low	Seabed sediments
AC-VC-C1-3_1	624210	5630247	4.00	soft silty clay with shell (0.15 m) stiff sandy silt with shell (1.85 m)	Low	Seabed sediments overlying bedrock
AC-VC-C1-3_2	624210	5630245	4.00	soft silty clay with shell (0.10 m) stiff clayey sandy silt with shell (1.75 m)	Low	Seabed sediments overlying bedrock
AC-VC-C1-4_1	625097	5629927	4.40	stiff silty sandy clay with shell (1.6 m)	Low	Bedrock
AC-VC-C1-4_2	625099	5629928	4.40	stiff silty sandy clay with shell (1.4 m)	Low	Bedrock
AC-VC-C2-1_1	622339	5631020	3.40	soft gravelly clayey sandy silt with shell (0.70 m) silty sand with shell (1.75 m)	Low	Seabed sediments overlying Pleistocene with evidence of reworking
AC-VC-C2-1_2	622341	5631021	3.40	soft sandy silty clay with shell (0.50 m) silty sand with shell (1.40 m)	Low	Seabed sediments overlying Pleistocene with evidence of reworking
AC-VC-C2-2_1	622840	5630530	3.40	soft silty clay with shell (2.6 m)	Low	Seabed sediments
AC-VC-C2-3_1	623800	5630334	5.50	soft silty sandy clay with shell (0.75 m) stiff silty clay (1.55 m)	Low	Seabed sediments overlying bedrock
AC-VC-C2-3_2	623803	5630334	5.50	soft sandy silty clay (0.5 m) stiff silty clay (1.55 m)	Low	Seabed sediments overlying bedrock
AC-VC-C2-4_1	624794	5629996	4.00	clayey sand with shell and rare organic matter (0.30 m) stiff silty sandy clay with shell (1.30 m)	Low	Seabed sediments overlying bedrock
AC-VC-C2-4_2	624794	5629995	4.00	clayey sand with shell (0.35 m) stiff silty sandy clay with shell (1.35 m)	Low	Seabed sediments overlying bedrock

VC ID	Eastings (m)	Northings (m)	Water depth (m LAT)	Description	Geoarchaeological Potential	Interpreted depositional setting and stratigraphy
AC-VC-C2-5_1	625471	5629930	3.80	silty sand with shell (1.3m)	Low	Seabed sediments
AC-VC-C2-5_2	625469	5629932	3.80	silty sand with shell (1.75 m)	Low	Seabed sediments
AC-VC-C3-1_1	622123	5631210	3.60	sandy silty clay with shell (0.70 m) silty clayey sand with shell and rare organic matter (2.55 m)	Low	Seabed sediments overlying bedrock
AC-VC-C3-2_1	624214	5630179	4.50	silty sand with shell (0.35 m) stiff sandy silt with frequent organic matter (1.15 m)	Low	Seabed sediments overlying bedrock
AC-VC-C3-2_2	624213	5630178	4.50	silty sand with shell (0.35 m) stiff sandy silt with frequent organic matter (1.50 m)	Low	Seabed sediments overlying bedrock
AC-VC-C3-3_1	624485	5630096	3.20	soft clay with rare organic matter (0.15 m) stiff sandy silty clay with shell (1.35 m)	Low	Seabed sediments overlying bedrock
AC-VC-C3-3_2	624484	5630098	3.20	soft sandy clay with shell and rare organic matter (0.10 m) stiff sandy silty clay (1.45 m)	Low	Seabed sediments overlying bedrock
AC-VC-C3-4_1	625052	5629866	4.70	stiff sandy silty clay with shell (1.1 m)	Low	Bedrock
AC-VC-C3-4_2	625053	5629866	4.70	stiff sandy silty clay with shell (1.30 m)	Low	Bedrock
AC-VC-C3-5_1	625351	5629914	3.70	silty sand with shell (0.90 m)	Low	Seabed sediments
AC-VC-C3-5_2	625350	5629916	3.70	silty sand with shell (1.70 m)	Low	Seabed sediments
AC-VC-C4-1_1	621910	5631399	3.70	soft sandy clay with shell and frequent organic matter (0.60 m) silty sand (2.0 m)	Low	Bedrock
AC-VC-C4-1_2	621909	5631397	3.70	soft sandy clay with shell and frequent organic matter (0.65 m) silty sand (1.90 m)	Low	Bedrock
AC-VC-C4-2_1	622195	5631109	3.60	soft sandy clay with shell (0.80 m) clayey sand with shell (2.15 m)	Low	Seabed sediments overlying Pleistocene with evidence of reworking
AC-VC-C4-3_1	622860	5630480	3.50	soft silty clay with shell (2.70 m)	Low	Seabed sediments
AC-VC-C4-4_1	623241	5630390	3.50	soft silty sandy clay with shell (0.30 m) silty sand (0.50 m) clayey sandy gravel (0.70 m) silty sand (0.85 m) stiff sandy silty clay with shell (1.80 m)	Low	Seabed sediments overlying Pleistocene overlying bedrock

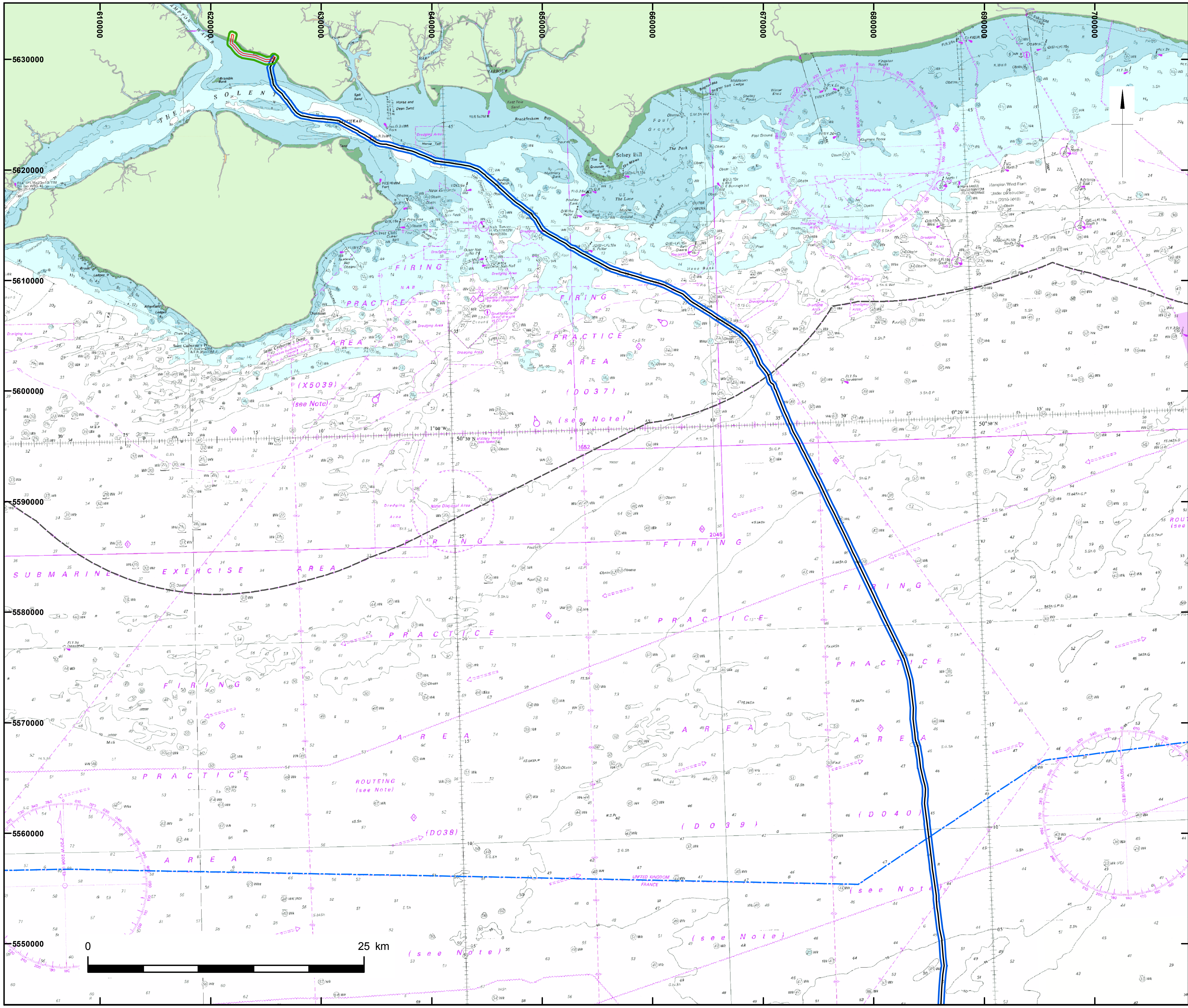
VC ID	Eastings (m)	Northings (m)	Water depth (m LAT)	Description	Geoarchaeological Potential	Interpreted depositional setting and stratigraphy
AC-VC-C4-4_2	623240	5630393	3.50	clayey sandy silty gravel (0.25 m) silty sand (0.40 m) clayey sandy gravel (0.55 m) stiff sandy silty clay with shell (1.20 m)	Low	Seabed sediments overlying Pleistocene overlying bedrock
AC-VC-C4-5_1	623889	5630278	5.30	soft sandy silty clay with shell and organic matter (0.25 m) stiff sandy clay with shell (2.65 m)	Low	Seabed sediments overlying bedrock
AC-VC-C4-6_1	624786	5629957	4.10	soft sandy clay with shell (0.20 m) stiff silty sandy clay with shell (1.40 m)	Low	Seabed sediments overlying bedrock
AC-VC-C4-6_2	624784	5629958	4.10	soft sandy clay with shell (0.50 m) stiff silty sandy clay with shell (1.35 m)	Low	Seabed sediments overlying bedrock
AC-VC-C5-1_1	622379	5630810	3.90	soft silty sandy clay with shell (0.80 m) silty sand with shell (1.50 m) silty gravelly sand with shell (1.85 m) silty sand with shell (2.15 m) clayey gravelly sand (2.80 m)	Low	Seabed sediments overlying Pleistocene with evidence of reworking
AC-VC-C5-2_1	623070	5630402	3.80	soft silty clay with shell (0.60 m) stiff silty clay (2.40 m)	Low	Seabed sediments overlying bedrock
AC-VC-C5-3_1	623834	5630266	5.20	soft silty sandy clay with shell (1.05 m) stiff silty clay (2.0 m)	Low	Seabed sediments overlying bedrock
AC-VC-C5-3_2	623834	5630264	5.20	soft silty sandy clay with shell (1.15 m) stiff silty clay (2.20 m)	Low	Seabed sediments overlying bedrock
AC-VC-C5-4_1	624916	5629888	4.70	soft silty sandy clay with shell (0.30 m) silty sand (0.35 m) stiff sandy silty clay with shell (0.65 m)	Low	Seabed sediments overlying bedrock
AC-VC-C5-4_2	624919	5629888	4.70	soft silty sandy clay with shell (0.25 m) stiff sandy silty clay with shell (0.75 m)	Low	Seabed sediments overlying bedrock
AC-VC-C6-1_1	621974	5631248	3.80	soft sandy silty clay with shell and frequent organic matter (0.80 m) clayey sand (1.90 m)	Low	Bedrock
AC-VC-C6-1_2	621975	5631245	3.80	soft sandy silty clay with shell and frequent organic matter (0.90 m) clayey sand (2.0 m)	Low	Bedrock
AC-VC-C6-2_1	622751	5630484	3.50	soft sandy silty clay with shell (1.60 m) soft gravelly sandy silty clay with shell (2.70 m)	Low	Seabed sediments overlying bedrock

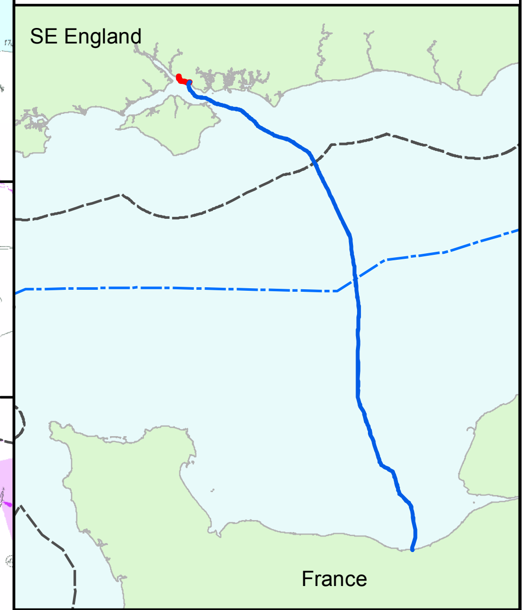
VC ID	Eastings (m)	Northings (m)	Water depth (m LAT)	Description	Geoarchaeological Potential	Interpreted depositional setting and stratigraphy
AC-VC-C6-3_1	623028	5630409	3.80	soft silty clay with shell (2.30 m) stiff silty clay with shell (2.70 m)	Low	Seabed sediments overlying bedrock
AC-VC-C6-4_1	623723	5630267	5.20	soft sandy silty clay with shell (1.25 m) stiff silty clay (2.40 m)	Low	Seabed sediments overlying bedrock
AC-VC-C6-5_1	624553	5630005	3.00	soft sandy silty clay with shell (1.15 m) stiff sandy silty clay with shell (2.15 m)	Low	Seabed sediments overlying bedrock
AC-VC-C6-6_1	625630	5629952	3.80	silty sand with shell (1.7 m)	Low	Seabed sediments
AC-VC-C6-6_2	625634	5629952	3.80	silty sand with shell (1.65 m)	Low	Seabed sediments
IFA2 HVDC cable corridor						
DC-VC-09_1	672571	5596637	57.70	no recovery	None	
DC-VC-09_2	672568	5596632	57.70	no recovery	None	
DC-VC-09_3	672568	5596641	57.70	no recovery	None	
DC-VC-10_1	670981	5600386	64.90	no recovery	None	
DC-VC-10_2	670989	5600386	64.90	no recovery	None	
DC-VC-10_3	670983	5600392	64.90	no recovery	None	
DC-VC-10_4	670989	5600390	64.90	no recovery	None	
DC-VC-10_5	670979	5600383	64.90	sandy gravel (0.05 m)	Low	Seabed sediments
DC-VC-11_1	670281	5601702	51.30	sandy gravel (0.25 m) stiff sandy clay (0.30 m)	Low	Seabed sediments overlying bedrock
DC-VC-11_2	670290	5601697	51.30	no recovery	None	
DC-VC-11_3	670289	5601701	51.30	no recovery	None	
DC-VC-12_1	669512	5602935	39.40	no recovery	None	
DC-VC-12_2	669501	5602930	39.40	clay (0.20 m)	Low	Bedrock
DC-VC-13_1	664838	5607262	30.50	sandy gravel (0.25 m) high strength gravelly sandy clay (1.40 m)	Low	Seabed sediments overlying bedrock

VC ID	Eastings (m)	Northings (m)	Water depth (m LAT)	Description	Geoarchaeological Potential	Interpreted depositional setting and stratigraphy
DC-VC-13_2	664831	5607263	30.50	sandy gravel (0.05 m)	Low	Seabed sediments
DC-VC-13_3	664837	5607266	30.50	sandy gravel (0.10 m) sandy clay (0.15 m)	Low	Seabed sediments
DC-VC-13_4	664834	5607259	30.50	sandy gravel (0.20 m) sandy clay (0.30 m)	Low	Seabed sediments
DC-VC-13_5	664839	5607258	30.50	sandy gravel (0.25 m) sandy clay (0.30 m)	Low	Seabed sediments
DC-VC-14_1	663994	5607777	35.70	sandy gravel (0.10 m) high strength clayey sandy silt (0.40 m)	Low	Seabed sediments overlying bedrock
DC-VC-14_2	664004	5607776	35.70	sandy gravel (0.10 m) high strength clayey sandy silt (1.00 m)	Low	Seabed sediments overlying bedrock
DC-VC-15_1	663264	5608291	36.50	sandy gravel (0.22 m) clayey sandy silt (1.00 m)	Low	Seabed sediments overlying bedrock
DC-VC-15_2	663261	5608285	36.50	sandy gravel (0.12 m) clayey sandy silt (0.80 m)	Low	Seabed sediments overlying bedrock
DC-VC-16_1	662016	5609115	31.70	sandy gravel (0.27 m) silty fine sand (0.60 m)	Low	Seabed sediments and Pleistocene depression
DC-VC-16_2	662014	5609120	31.70	sandy gravel (0.34 m) silty sand (0.70 m)	Low	Seabed sediments and Pleistocene depression
DC-VC-17_1	661372	5609431	33.40	sandy gravel (0.10 m) silty sand (0.73 m)	Low	Seabed sediments and Pleistocene depression
DC-VC-17_2	661373	5609428	33.40	sandy gravel (0.15 m) silty sand (0.73 m)	Low	Seabed sediments and Pleistocene depression
DC-VC-18_1	659266	5610132	32.50	sandy gravel (0.20 m) sandy clay (0.30 m)	Low	Seabed sediments and Pleistocene depression
DC-VC-18_2	659262	5610129	32.50	sandy gravel (0.30 m)	Low	Seabed sediments
DC-VC-18_3	659265	5610127	32.50	sandy gravel (0.89 m) clayey sandy silt (1.18 m)	Low	Seabed sediments overlying bedrock
DC-VC-19_1	657945	5610522	35.10	gravelly sand (0.60 m) high strength sandy clay (0.75 m)	Low	Seabed sediments overlying bedrock
DC-VC-19_2	657939	5610522	35.10	clayey gravelly sand (0.50 m) high strength sandy clay (1.40 m)	Low	Seabed sediments overlying bedrock

VC ID	Eastings (m)	Northings (m)	Water depth (m LAT)	Description	Geoarchaeological Potential	Interpreted depositional setting and stratigraphy
DC-VC-20_1	653815	5612343	14.80	sandy gravel (0.45 m) high strength sandy clay (1.00 m)	Low	Seabed sediments overlying bedrock
DC-VC-20_2	653816	5612346	14.80	sandy gravel with organic odour (1.35 m)	Low	Seabed sediments
DC-VC-21_1	653155	5612730	14.10	gravelly sand (0.45 m)	Low	Seabed sediments
DC-VC-21_2	653152	5612732	14.10	clayey gravelly sand (2.50 m)	Low	Pleistocene
DC-VC-22_1	649339	5615618	13.50	gravelly sand with traces of organic matter (0.55 m)	Low	Seabed sediments
DC-VC-22_2	649344	5615615	13.50	gravelly sand (0.30 m)	Low	Seabed sediments
DC-VC-22_3	649343	5615620	13.50	gravelly sand (0.30 m)	Low	Seabed sediments
DC-VC-22_4	649338	5615621	13.50	no recovery	None	
DC-VC-22_5	649342	5615624	13.50	no recovery	None	
DC-VC-22_6	649346	5615625	13.50	clayey gravelly sand (0.50 m) clayey silty sand (1.00 m) gravelly sand (3.00 m)	Low	Seabed sediments overlying Pleistocene
DC-VC-23_1	637702	5621832	19.30	no recovery	None	
DC-VC-23_2	637706	5621830	19.30	no recovery	None	
DC-VC-23_3	637700	5621838	19.30	no recovery	None	
DC-VC-23_4	637707	5621838	19.30	no recovery	None	
DC-VC-24_1	626802	5626435	11.40	no recovery	None	
DC-VC-24_2	626791	5626439	11.40	no recovery	None	
DC-VC-24_3	626790	5626446	11.40	silty sand (0.40 m)	Low	Seabed sediments
DC-VC-24_4	626794	5626444	11.40	no recovery	None	
DC-VC-25_1	625790	5627578	15.00	gravelly clayey sandy silt with occasional stains of organics (1.00 m) clayey sand with occasional stains of organic matter (1.50 m)	Low	Seabed sediments overlying Pleistocene

VC ID	Eastings (m)	Northings (m)	Water depth (m LAT)	Description	Geoarchaeological Potential	Interpreted depositional setting and stratigraphy
DC-VC-25_2	625792	5627580	16.00	clayey sandy silt (0.70 m) clayey sand with occasional stains of organics (1.00 m)	Low	Seabed sediments overlying Pleistocene
DC-VC-26_1	625516	5628559	2.10	sandy silty clay (2.25 m) silty sand (2.50 m)	Low	Seabed sediments
DC-VC-27_1	625478	5629515	2.10	sandy silty clay (0.40 m) stiff sandy silty clay (1.55 m)	Low	Seabed sediments overlying bedrock
DC-VC-27_2	625478	5629513	2.10	sandy silty clay (0.30 m) stiff sandy silty clay (1.35 m)	Low	Seabed sediments overlying bedrock





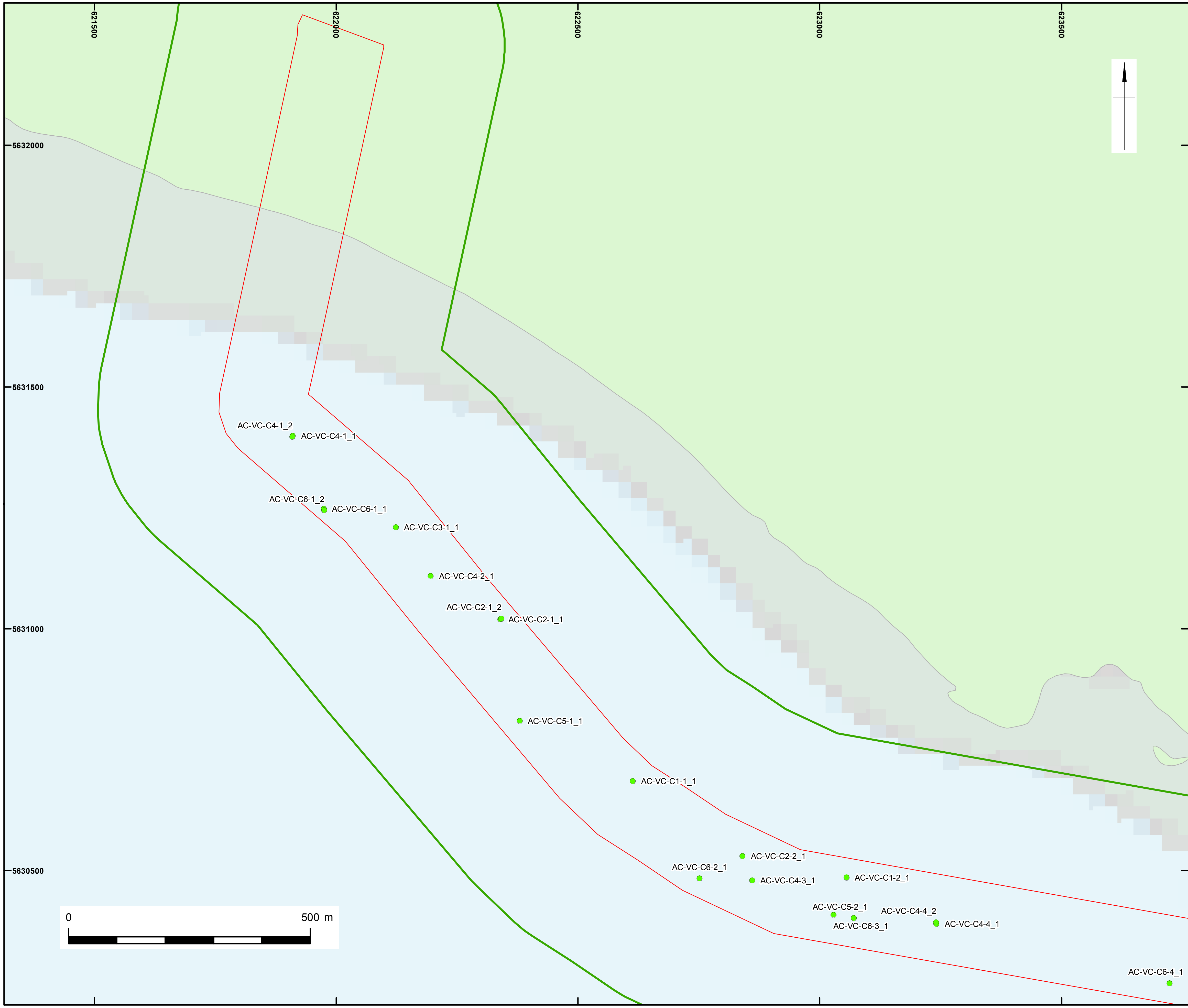
HVAC cable corridor
HVAC 250m buffer
HVDC cable route
HVDC 250m buffer
UK Territorial Seas
UK-France Median Line

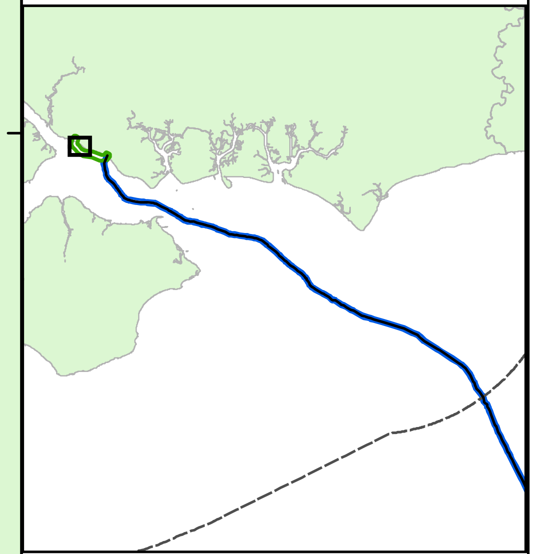
Coordinate system:
WGS84 UTM Zone 30N

Date:	06/08/2018
Revision Number:	0
Scale:	1:350,000 at A3
Illustrator:	KL
Path:	W:\Projects\202921\GIS \FigsMXD\geoarch\2018_08_06

Location map showing IFA2 HVDC and HVAC cable corridors

Figure 1





HVAC cable corridor

HVAC 250m buffer

Geotechnical sample and geoarchaeological potential

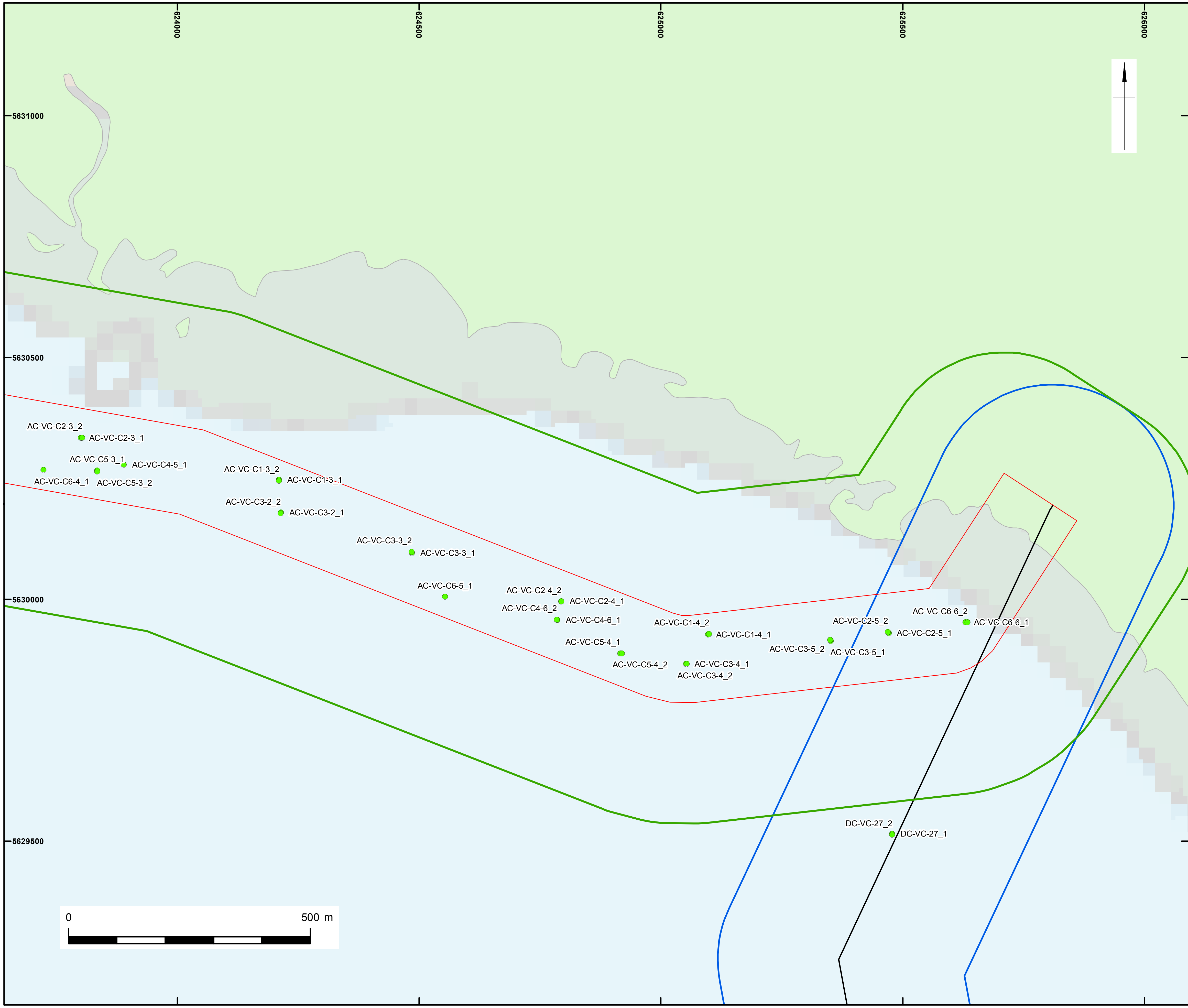
Low

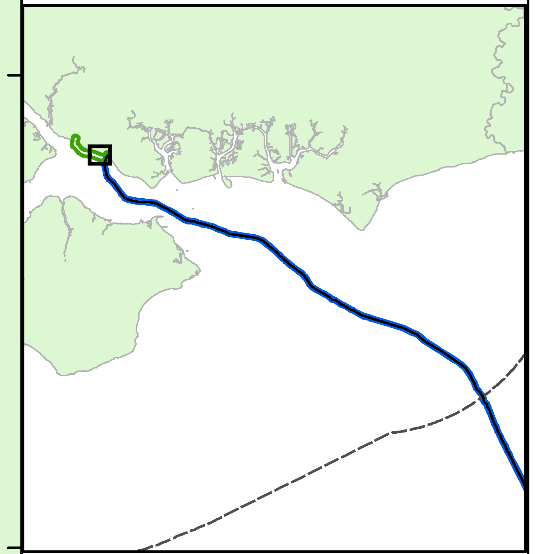
Coordinate system:
WGS84 UTM Zone 30N

Date:	07/08/2018
Revision Number:	0
Scale:	1:8000 at A3
Illustrator:	KL
Path:	W:\Projects\202921\GIS \FigsMXD\geoarch\2018_08_06

Geotechnical sample locations and geoarchaeological potential

Figure 2a





HVAC cable corridor

HVAC 250m buffer

HVDC cable route

HVDC 250m buffer

Geotechnical sample and geoarchaeological potential

Low

Coordinate system:
WGS84 UTM Zone 30N

Date:	07/08/2018
Revision Number:	0
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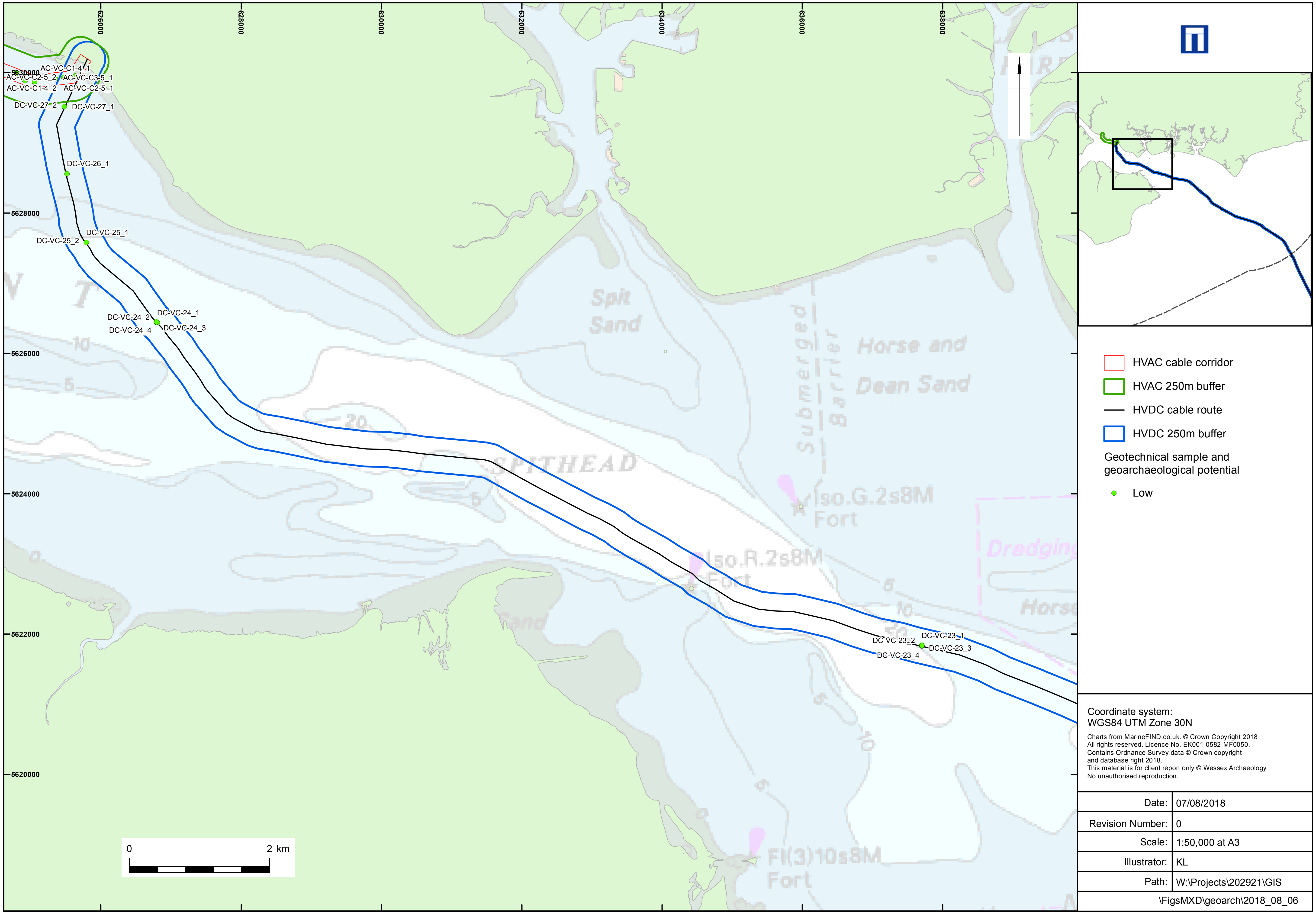
Geotechnical sample locations and geoarchaeological potential

Figure 2b



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Revision Number:	0
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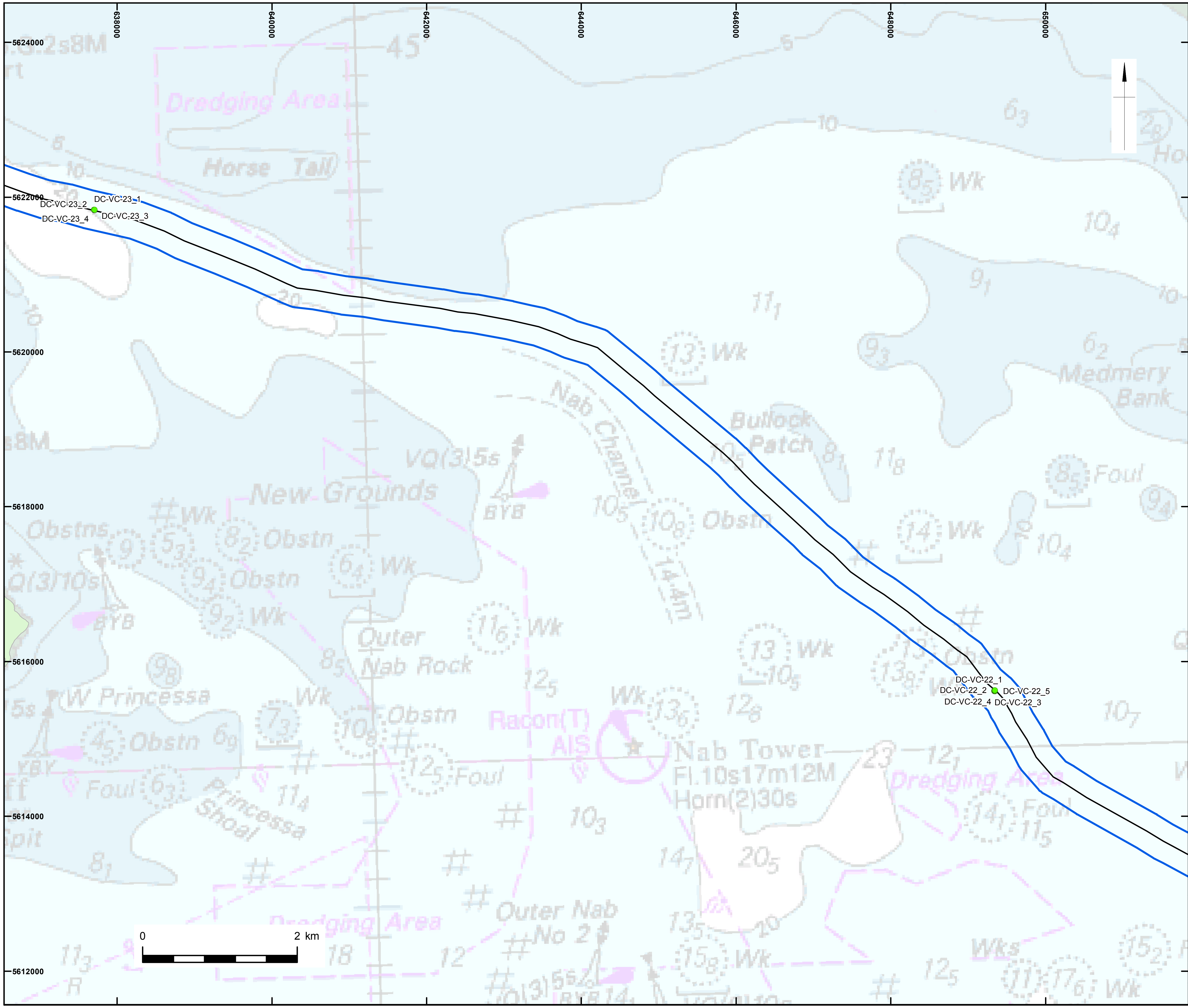
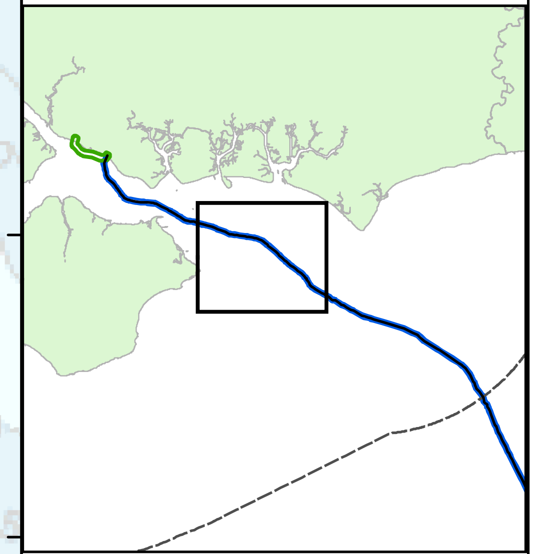
Geotechnical sample locations and geoarchaeological potential

Figure 2c





HVDC cable route

HVDC 250m buffer

Geotechnical sample and geoarchaeological potential

Low

Coordinate system:
WGS84 UTM Zone 30N

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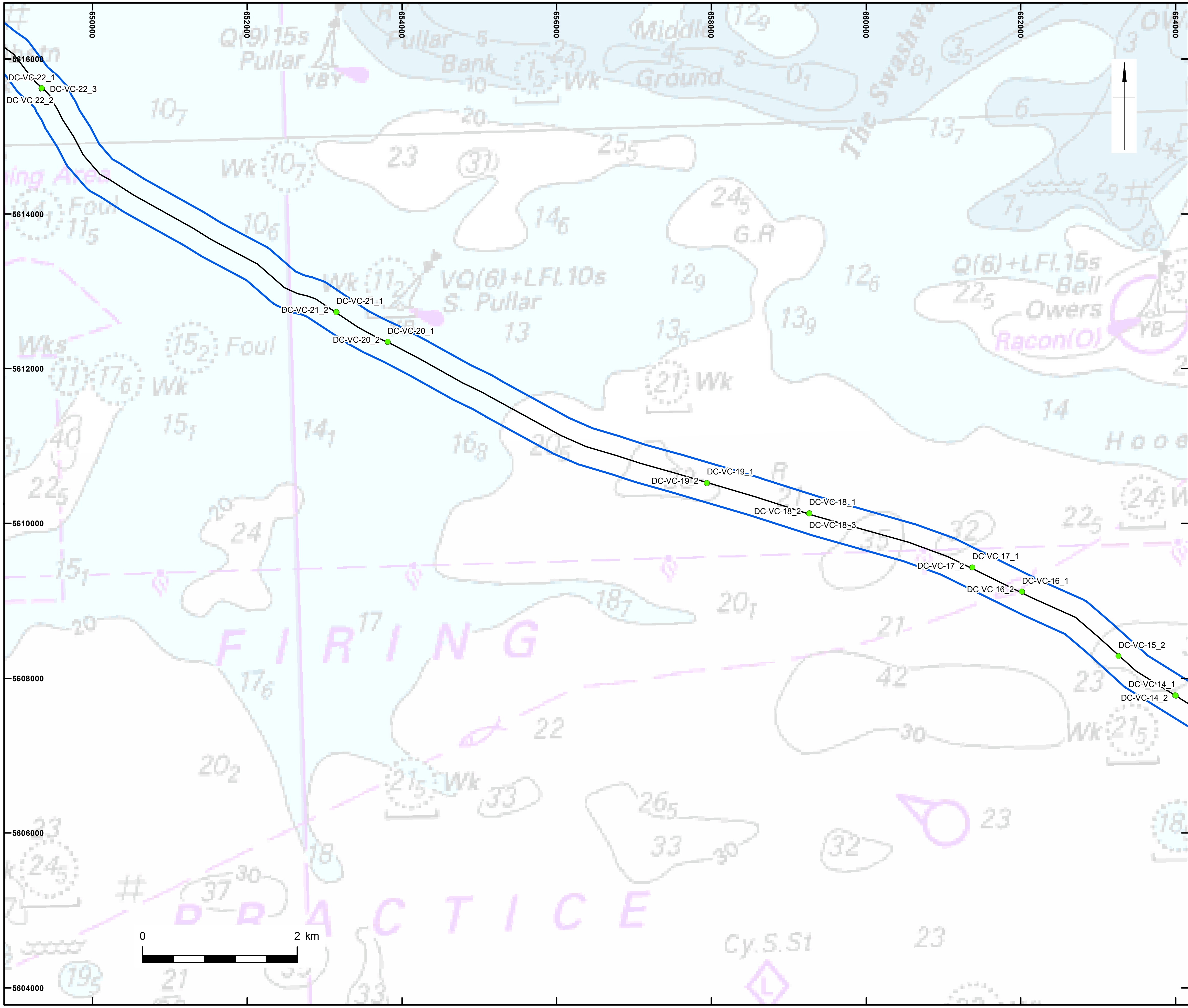
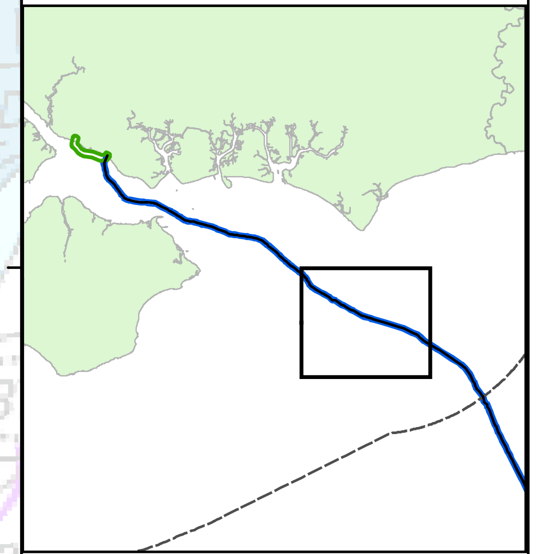
Geotechnical sample locations and geoarchaeological potential

Figure 2d





HVDC cable route

HVDC 250m buffer

Geotechnical sample and geoarchaeological potential

Low

Coordinate system:
WGS84 UTM Zone 30N

Date:	07/08/2018
Revision Number:	0
Scale:	1:50,000 at A3
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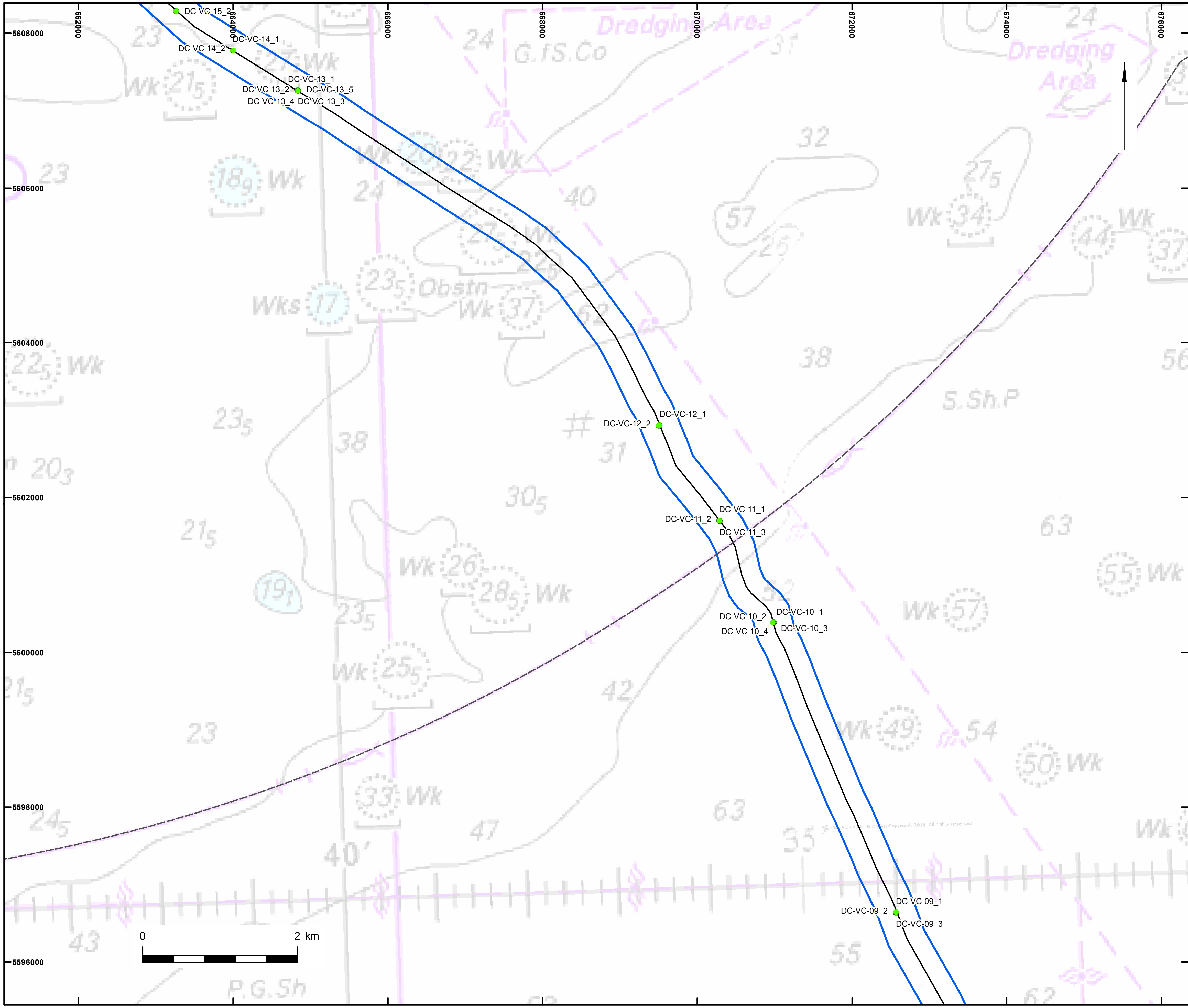
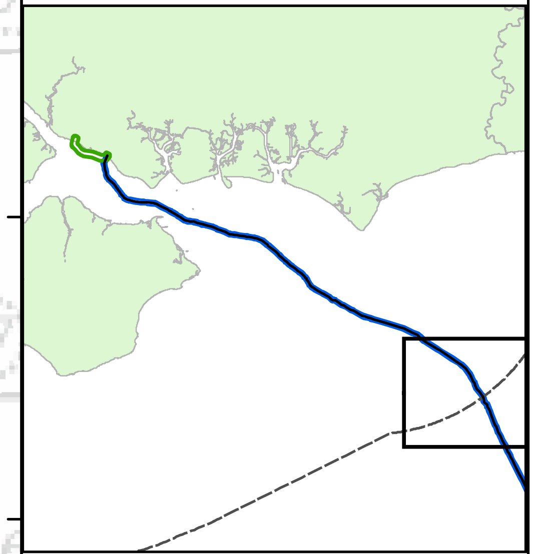
Path:	W:\Projects\202921\GIS \FigsMXD\geoarch\2018_08_06

Geotechnical sample locations and geoarchaeological potential

Figure 2e





HVDC cable route

HVDC 250m buffer

Geotechnical sample and geoarchaeological potential

Low

UK Territorial Seas

Coordinate system:
WGS84 UTM Zone 30N

Date:	07/08/2018
Revision Number:	0
Scale:	1:50,000 at A3
Illustrator:	KL
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Geotechnical sample locations and geoarchaeological potential

Figure 2f

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