CLEVE HILL SOLAR PARK

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CLEVE HILL SOLAR PARK, GRAVENEY, KENT: GEOARCHAEOLOGICAL BOREHOLE STUDY

Prepared for Cleve Hill Solar Park Ltd and Cotswold Archaeology

Nick Watson and Keith Wilkinson

ARCA
Department of Archaeology and Anthropology
University of Winchester
Winchester
SO22 4NR
http://www.arcauk.com

ARCA

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SUMMARY

Fifty-nine manual and four mechanical boreholes were drilled at the proposed site for Cleve Hill Solar Park, Graveney, Kent, in February and March 2018. The deposits encountered were divided into five main stratigraphic units that pertained to the Holocene and overlay the northward dipping London Clay Formation (LCF). These units were: intertidal muds, channel sands, gravels, colluvium and modern Made Ground. The great majority of the sediments were fine grained intertidal deposits that outcropped across the site between +2.14m OD at BH 30 in the south and +0.77m OD in BH A in the north. At the base of Graveney and Cleve Hills in the south, thin intertidal muds onlapped the rising LCF at the margin of the Marshes. The thickness of the deposits increased to greater than 8m in the north at the foot of the Sea Wall. The deposits consisted of interbedded light grey and very dark grey muds with rare horizontal laminae of silt/very fine sand, and occasional examples of Hydrobia ulvae *(a brackish water mollusc) and* Cerastoderma edule *(the edible cockle – a marine species of Mollusca). The muds represent an accreting saltmarsh and tidal flat environment in response to rising sea level.*

Nine Deposit Zones were identified and classified according to their archaeological and palaeoenvironmental potential. Of these four are considered to be significant:

Deposit Zone 1: where a deep sequence of intertidal muds has a low to moderate palaeoenvironmental potential;
Deposit Zone 3: where the environment of deposition (a deep channel) most closely resembles the location of the Graveney boat discovery;
Deposit Zone 4: marking the southern margin of the Marshes and the junction of dry land with waterlogged land where archaeological features might be found; and
Deposit Zone 7: where creek and bank deposits may also have limited archaeological potential.

1. INTRODUCTION

1.1 This report discusses the results of a geoarchaeological borehole study of land north and west of Cleve Hill, Graveney, Kent (henceforth 'the site'). The works were carried out by ARCA on behalf of Cotswold Archaeology and their client, Cleve Hill Solar Park Ltd between 1 February and 9 March 2018. The work presented here was in accordance with a Written Scheme of Investigation (WSI) approved by Simon Mason of Kent County Council (KCC) on 24 January 2018 (Wilkinson 2018), which in turn conformed to Historic England (2015) guidance on geoarchaeology.

1.2 The scheme proposed by Cleve Hill Solar Park Ltd will see the installation of ground mounted PV panels, a battery storage facility and associated infrastructure. The total area subject to the planning application (henceforth 'the study area') comprises 360 ha (Figure 1).

1.3 Cleve Hill is located on the north Kent coast, 1.5 km north-east of Faversham and 0.5 km north of Graveney, while the study area and is centred on National Grid Reference (NGR) 603892 163948 (Figure 1). The landscape encompassed by the site comprises a low rise [to +17m Ordnance Datum (OD)] (collectively Cleve Hill and Graveney Hill) in the eastern part of the site, and a flat surrounding plain elsewhere (Figure 2). The latter varies in elevation between +3.0 and +0.7m OD and is presently cultivated.

1.4 The British Geological Survey map the bedrock geology of the site as London Clay Formation, i.e. blue grey silts and clays that formed in a marine environment during the Ypresian stage of the Eocene (56-48 million years ago) (British Geological Survey 2018a, 2018b). Holocene (11,700 year ago-present) 'alluvium' is mapped as overlying the London Clay across the whole site except above *c.* +5m OD on Cleve and Graveney Hills where the latter has a surface outcrop. 'Alluvium' is a generic category used by the British Geological Survey to mean any deposits forming in flowing water during the Holocene period (British Geological Survey 2018b), but in the present case the 'Alluvium' is actually a product of intertidal processes. There are no existing records in the British Geological Survey borehole database from the site and its immediate surrounds, but two boreholes from 'The New Sportsman', Graveney, 1 km to the north-east of the study area indicate that the Alluvium has a

contact with London Clay at 2-3m below ground level (bgl) (British Geological Survey 2018a).

1.5 Little previous archaeological fieldwork has taken place on the site, but a Desk-Based Assessment (DBA) carried out by Wessex Archaeology (2017) highlights the presence of World War II military structures, and 19th century and post-medieval structural features and field boundaries. Other than a medieval midden found during a watching brief as part of geotechnical works in advance of the London Array Grid Connection, sub-surface archaeological remains have not been found (Wessex Archaeology 2017).

1.6 The aims of the geoarchaeological work report here are (Wilkinson 2018, 1-2):

1.6.1 Characterise the Quaternary[1] lithostratigraphic sequence on the site (spatially and vertically);

1.6.2 Provide a provisional assessment of the archaeological and palaeoenvironmental potential of the Quaternary strata;

1.6.3 Assess the impact of the proposed development on the Quaternary strata and associated archaeologically-relevant materials.

1.7 The WSI stated that the aims of Section 1.6 would be addressed by (Wilkinson 2018, 2):

1.7.1 Integrating the existing lithostratigraphic resource within a RockWorks database;

1.7.2 Carrying out a borehole survey of the study area, describing the strata encountered using standard geological methods and adding the lithostratigraphic data that are collected to the RockWorks database;

1.7.3 Plotting cross sections of the borehole lithostratigraphy to show the vertical distribution of Quaternary strata on the site;

1.7.4 Developing surface and stratigraphic thickness models derived from the borehole data;

1.7.5 Producing an integrated geoarchaeological assessment report, which would:

(i) Divide the site into zones of differing archaeological and palaeoenvironmental potential;

[1] The Quaternary comprises the Pleistocene (2.4 million to 11.7 thousand years ago) and Holocene, but only deposits of the latter are currently mapped on the site.

(ii) Assess the impact of the proposed development on deposits of archaeological and palaeoenvironmental interest, and;

(iii) Make recommendations (if appropriate) for further geoarchaeological work to refine understanding of the stratigraphic sequence and distribution of Quaternary deposits across the site so as to better assess their archaeological potential/significance and the impact of the proposed development.

1.7.6 Archiving the lithostratigraphic data

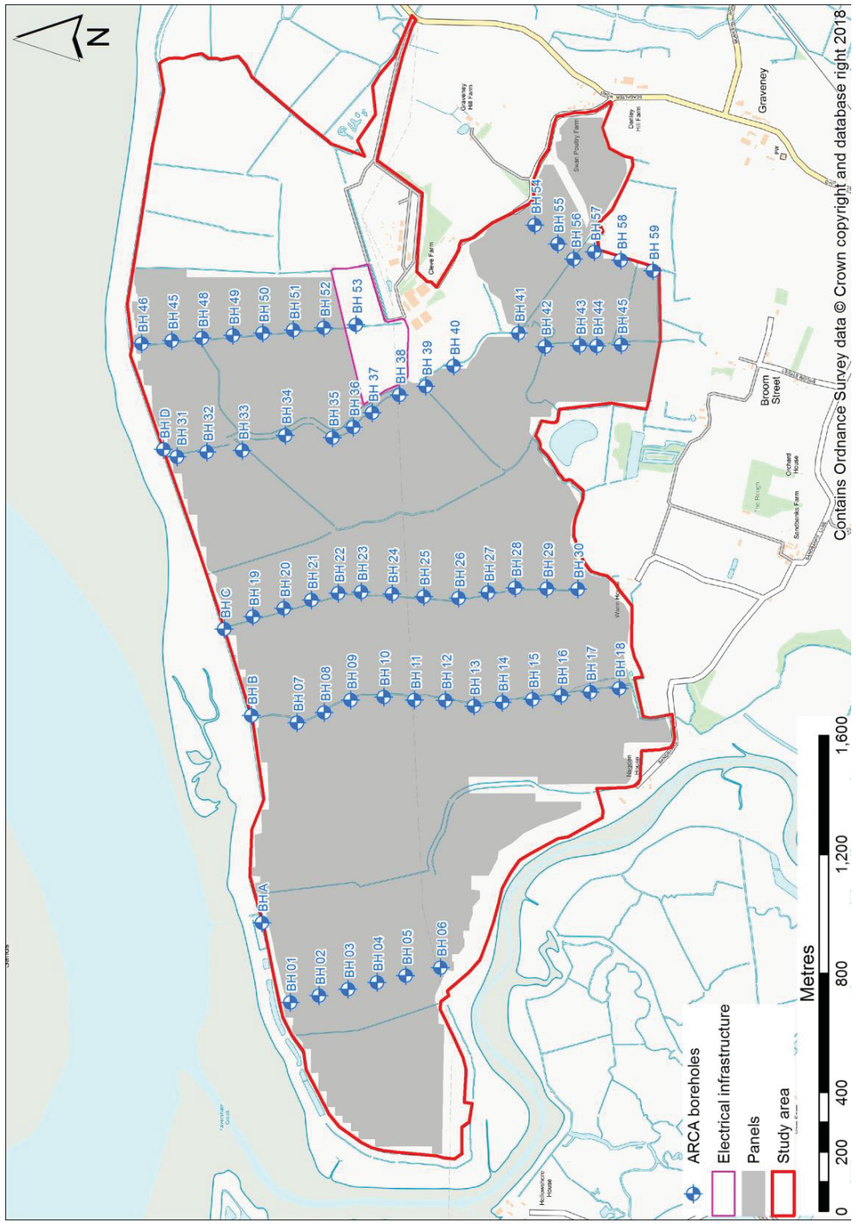

Figure 1. The Cleve Hill Solar Park site and the ARCA geoarchaeological boreholes, plotted against the planned infrastructure.

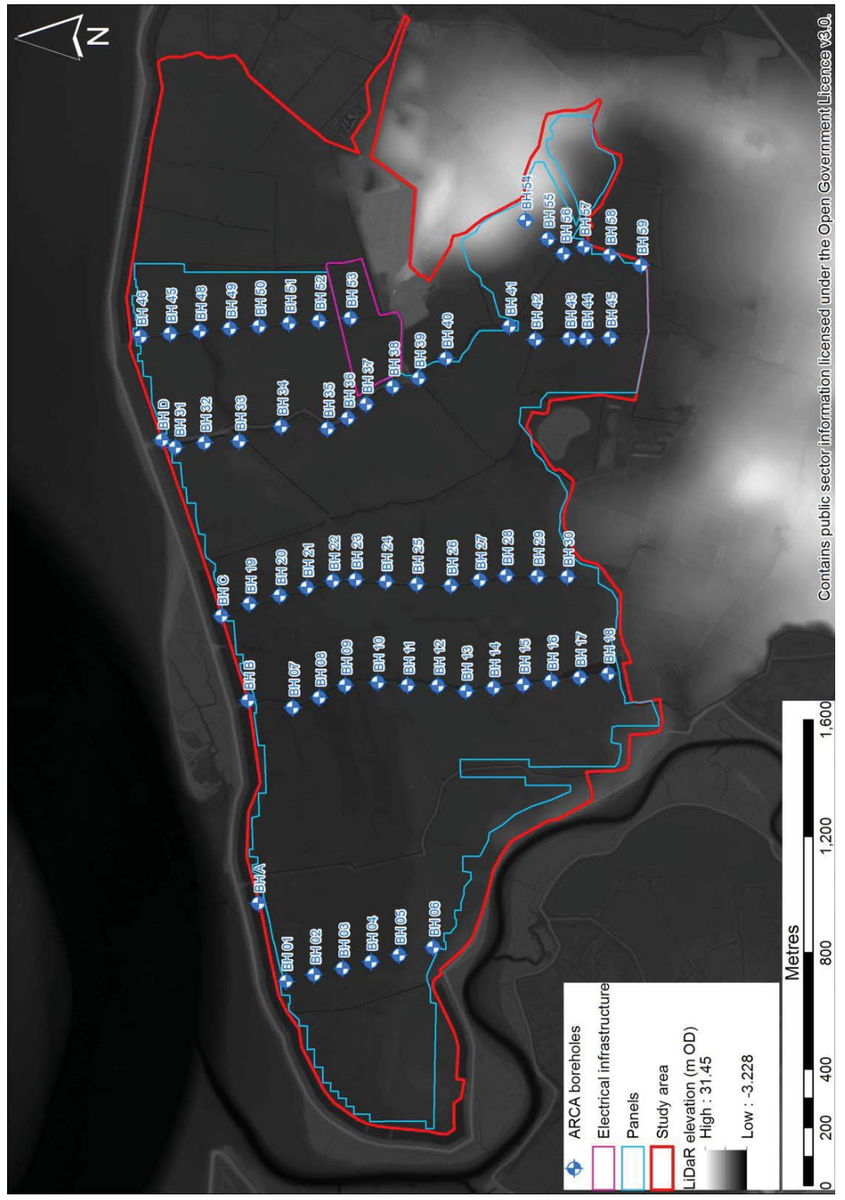

Figure 2. LiDaR imagery for the Cleve Hill Solar Park site showing the topography.

2. METHODOLOGY

2.1 Desktop

2.1.1 The WSI called for records from the British Geological Survey borehole database within 1 km of the study area boundary to be transcribed into a RockWorks 15 database (British Geological Survey 2018a, RockWare 2012). Only two such records exist, i.e. from 'The New Sportsman' in Graveney (Section 1.4), and both were added to the RockWorks database holding the geoarchaeological data.

2.1.2 Furthermore the WSI indicated that lithostratigraphic data from geotechnical studies associated with the scheme would also be added to the RockWorks database once they became available. However, data from the cone penetrometry survey undertaken at the same time as the present borehole study are not presently available, while a geotechnical survey (test pits and cable percussion-drilled boreholes) will commence in late March 2018.

2.2 Fieldwork

2.2.1 Six Transects of boreholes at 100m intervals were planned in the project GIS (Wilkinson 2018, 3, 7). The location of each borehole was then surveyed and marked in the field on 1 February 2018 using a Leica System 1200 GPS (precision = ±0.02m).

2.2.2 Boreholes (BH) in Transect 1 (BH 01-06) and two boreholes in Transect 6 (BH 54-55) were drilled in their intended locations during the initial phase of fieldwork (12-23 February 2018). However, wet conditions (which made working in ploughed parts of the study area extremely difficult) and a request to avoid areas in which crops had been planted meant that the other boreholes were moved to the sides of a series north-south orientated tracks passing through the site. As a result the boreholes had to be resurveyed on their completion (on 8-9 March) (Appendix 1). Their actual location is shown in Figure 1.

2.2.3 BH 01-59 were drilled using manual augers, together with 1m long extension rods. The relatively dry sediment/soil at the top of the sequence, i.e. oxidised silt/clays, was sampled with Edelmann heads and the underlying reduced silt/clay sequence was examined with gouge augers. The entire Holocene sequence or 5m depth (whichever is the lesser) was sampled at each borehole location using these devices. Sediment retained in the

gouge auger heads was photographed against an appropriate scale and then recorded using standard geological criteria (Jones et al. 1999, Munsell 2000, Tucker 2011). Boreholes were then back filled with the arisings immediately on completion of drilling.

2.2.4 BH A-D were drilled with an Atlas Copco Cobra petrol-powered hammer and either Eijkelkamp gouge augers of 75 and 60mm diameter (BH B, BH D and the uppermost 3m of BH C) or a 54mm diameter core sampler [BH A and deposits beneath 3m bgl in BH C]. These mechanical boreholes were placed at the northern ends of Transects 1-4, i.e. where the manual boreholes had not reached bedrock. The mechanical boreholes were advanced to the London Clay bedrock or 8m bgl, whichever was encountered first. Sediment retrieved in the gouge auger heads was photographed and described to standard geological criteria (Tucker 1982, Jones et al. 1999, Munsell Color 2000). These arisings were then used to refill the boreholes. Sleeved core samples collected in the core sampler were sealed and labelled on site and removed to ARCA's Winchester laboratory for further study. BH A and BH C were refilled with a mixture of arisings (e.g. from the cutting shoe that fronts the core sampler) and Bentonite pellets. This second phase of fieldwork was carried out on 8-9 March.

2.3 Post-fieldwork

2.3.1 In the laboratory the plastic tubing containing cores from BH A and BH C was cut open using a bench-mounted stone saw and then a pallet knife was used to slice the cores in two. One longitudinal half of each core was labelled, wrapped in plastic film and placed in storage. Sediments in the other half were hand cleaned using a scalpel, photographed and described as set out in Sections 2.2.3-2.2.4.

2.3.2 Lithological and positional data collected during the two phases of fieldwork (Sections 2.2.3-2.2.4) and the laboratory description of cores from BH A and BH C (Section 2.3.1) were combined with those from the two existing borehole records (Section 2.1.1) in a RockWorks 15 database (RockWare 2012). That software was then used to plot the cross sections.

2.4 Archive

2.4.1 The material archive comprises 13m of core from BH A (8m) and BH C (5m, i.e. 3-8m bgl). These cores will remain in storage at

the University of Winchester pending decisions on further assessment until 9 March 2019 whereupon they will be discarded with no further notification.

2.4.2 The digital archive consists of the RockWorks database (in Microsoft Access format); structural elevation and stratigraphic thickness models in ESRI Shape format; photographs of the gouge auger chambers and cores in JPG format and this report in PDF format. These digital archives are stored both on the University of Winchester server (backed up to tape on a weekly basis, with a duplicate server in Germany) and on an external hard drive stored outside the University of Winchester. A copy of the digital archive will be passed to relevant curatorial bodies on approval of the present report.

2.4.3 OASIS records will be completed for individual/associated groups of geoarchaeological boreholes on approval of this report.

3. RESULTS

3.0.1 The sedimentary sequence found in the boreholes is divided into six stratigraphic units. The units identified from youngest to oldest are:

1. Modern Made Ground (Drain dredging and modern track surface deposits).
2 Colluvium (Holocene deposit).
3a. Oxidised intertidal silt/clays with a topsoil/plough soil developed in the top and tidal bar deposits (Holocene deposits).
3b. Reduced intertidal silt/clays (Holocene deposits).
4. Fine grained alluvium (Holocene deposit).
5. Gravels (Late Pleistocene or Early Holocene reworked deposits).
6. London Clay Formation (Palaeogene bedrock)

These units are described in stratigraphic order below and lithostratigraphic cross-sections are illustrated in Figures 4 to 9.

3.1 London Clay Formation

3.1.1 The London Clay Formation (LCF) was recorded in 43 boreholes (see Figures 3 to 9 below). It sub-cropped below the superficial deposits between -6.82m OD (7.91m bgl) in BH C in the north of the site, and +8.34m OD (1.70m bgl) in BH 54 in the south on Graveney Hill. In general and excluding Graveney Hill, the LCF sub-cropped at *c.* 0m OD in the south and then fell in elevation sloping towards The Swale in the north. In the east, Transect 5 recorded a smooth surface dipping from Cleve Hill Substation to *c.* -2.5m OD in BH 46. To the west the surface was irregular with evidence of channels cut into it, and the elevation of the bedrock fell significantly northwards. In Transect 1 in the west, bedrock lay at an elevation lower than *c.* -7m OD (>8m bgl) in BH A and beyond the reach of the mechanical drill.

3.1.2 The LCF exhibited two main lithologies (see Figure 3 below): a stiff to hard blueish grey (Gley 2 5/10B) silt/clay with rare to occasional fine pebble-sized olive brown (2.5 Y 4/3) lenses; and in two boreholes, BH 28 and BH 44, a stiff to hard black (5 Y 2.5/1) silt/clay so coloured probably from humic acids leaching out of the overlying deposits. The former lithology was often soft and the brown lenses appeared as streaks and/or patches, before becoming very stiff and impenetrable. Frequently the

hardness of the LCF precluded the retrieval of a sample in the hand gouge auger.

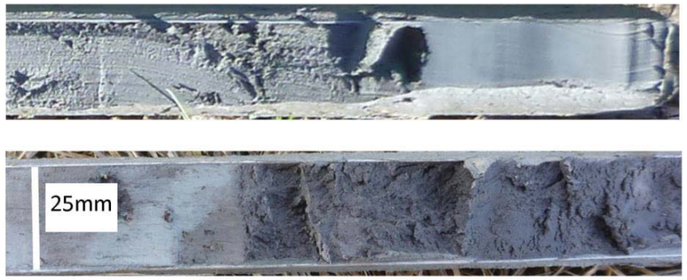

Figure 3. London Clay Formation bedrock as it appeared in the hand auger gouge. Top: bluish grey bedrock on the right overlain by very fine sandy intertidal silt/clay. Bottom: black bedrock overlain by grey and very dark grey intertidal silt/clays.

3.1.3 The LCF was unconformably overlain by Holocene intertidal deposits in the majority of the boreholes except on Graveney Hill where colluvium and gravel were recorded in BH 54 and BH 55 respectively; and in BH 35 to BH 38 where (impenetrable) gravels are presumed to overlie the bedrock.

3.2 Reworked Gravels

3.2.1 Gravel deposits were encountered in five boreholes in the hand auger survey; BH 35 to BH 38 and BH 55 located on Graveney Hill (see Figures 7 and 9 below). The gravel lay between -0.79m OD (1.83m bgl) in BH 37 and -0.17m OD (1.60m bgl) in BH 38 on Graveney Marshes. On Graveney Hill the gravel was found at +0.62m OD.

3.2.2 The lithology of the gravel, as far as could be ascertained, was sub-angular to well-rounded flint grains, granules and fine pebbles.

3.2.3 The gravel was unconformably overlain by Holocene intertidal deposits in BH 35 to BH 38 and by colluvium in BH 55.

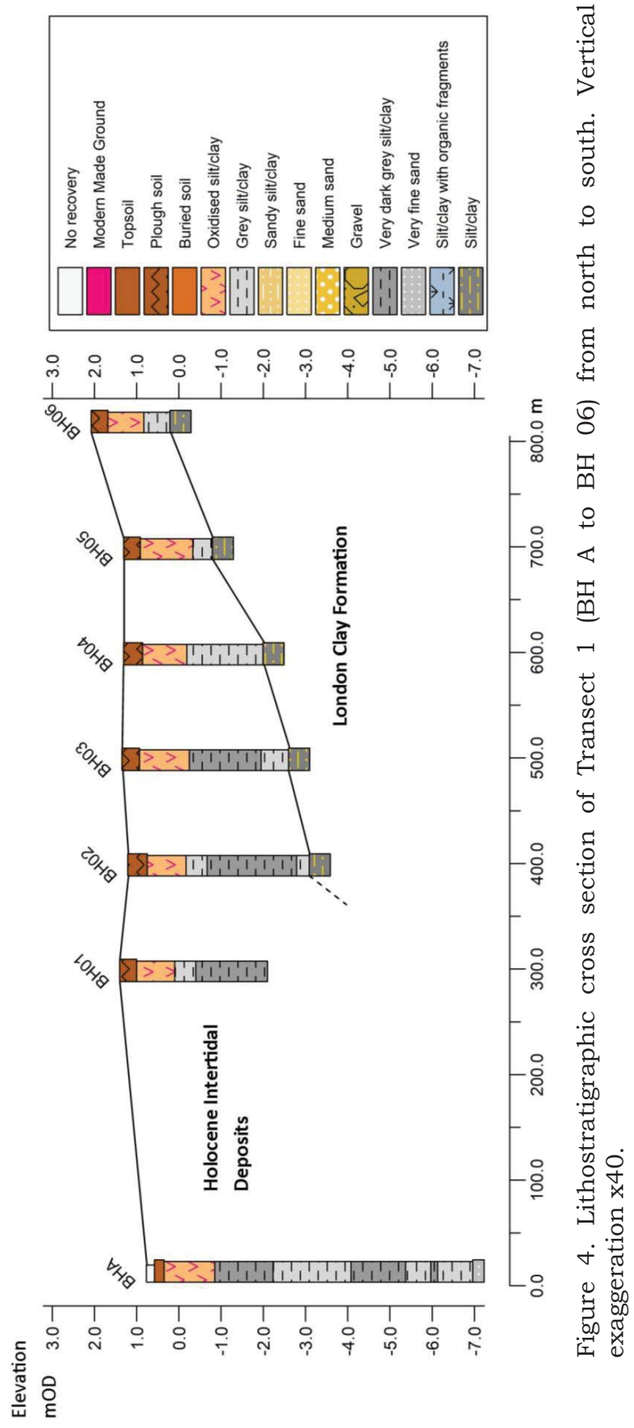

Figure 4. Lithostratigraphic cross section of Transect 1 (BH A to BH 06) from north to south. Vertical exaggeration x40.

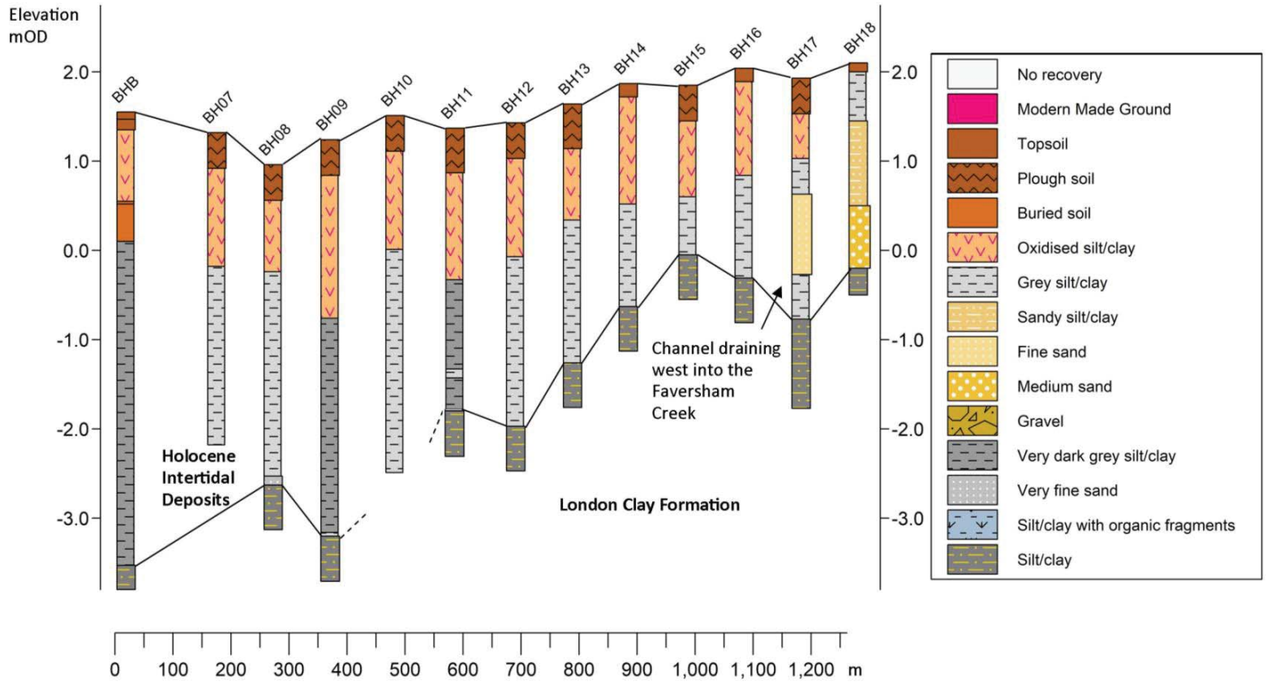

Figure 5. Lithostratigraphic cross section of Transect 2 (BH B to BH 18) from north to south. Vertical exaggeration x154.

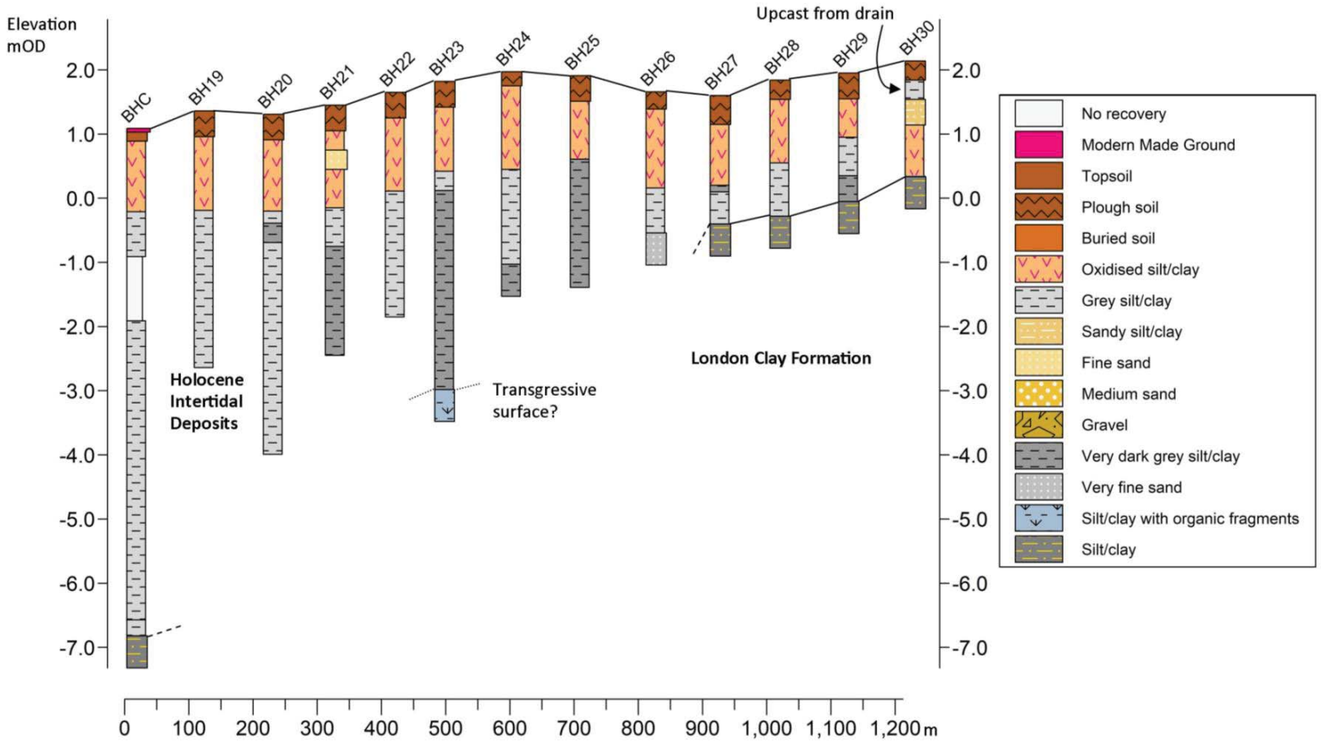

Figure 6. Lithostratigraphic cross section of Transect 3 (BH C to BH 30) from north to south. Vertical exaggeration x100.

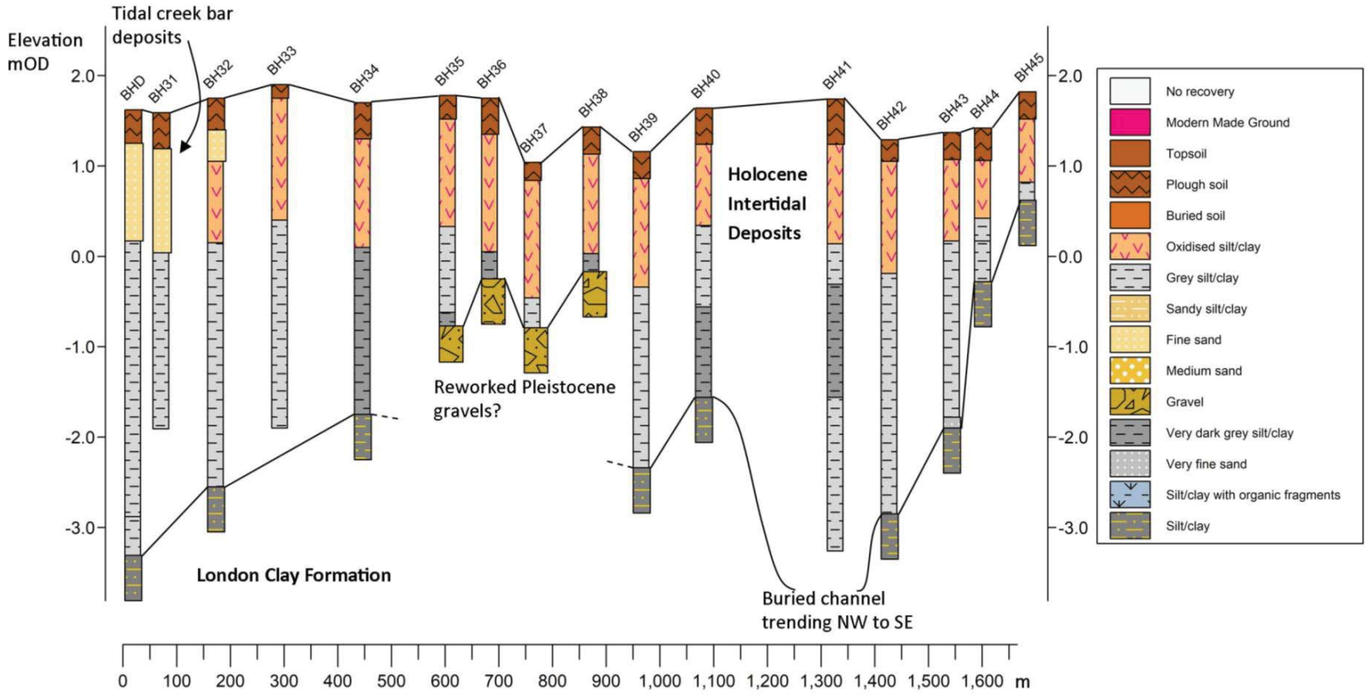

Figure 7. Lithostratigraphic cross section of Transect 4 (BH D to BH 45) from north to south. Vertical exaggeration x168.

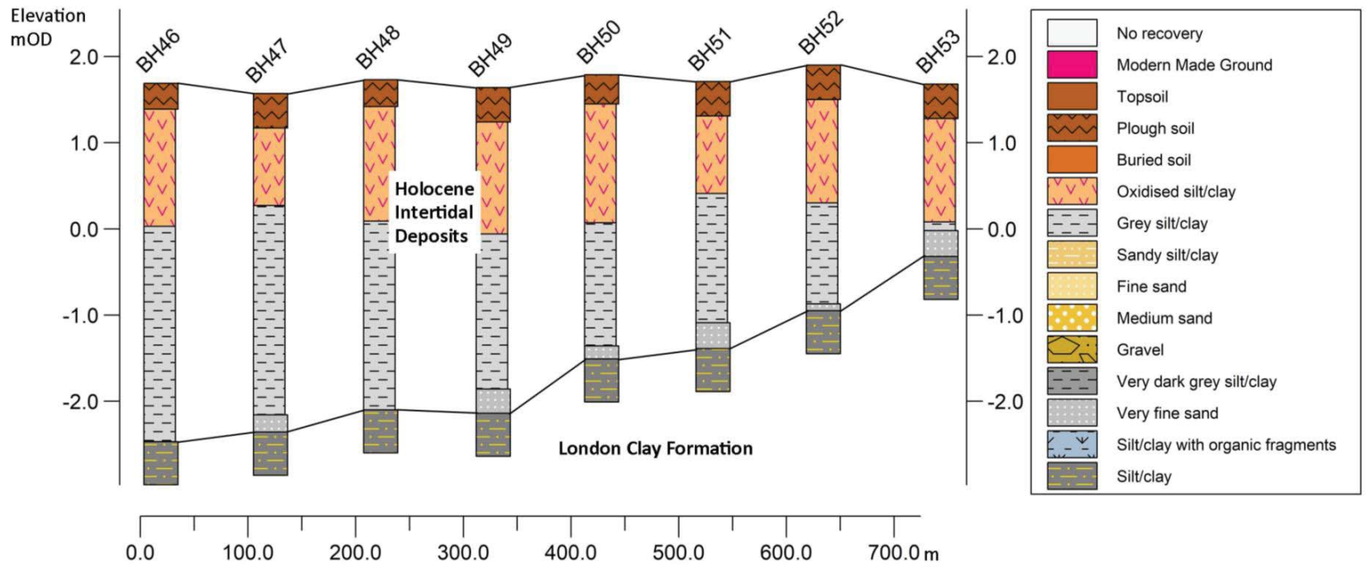

Figure 8. Lithostratigraphic cross section of Transect 5 (BH 46 to BH 53) from north to south. Vertical exaggeration x80.

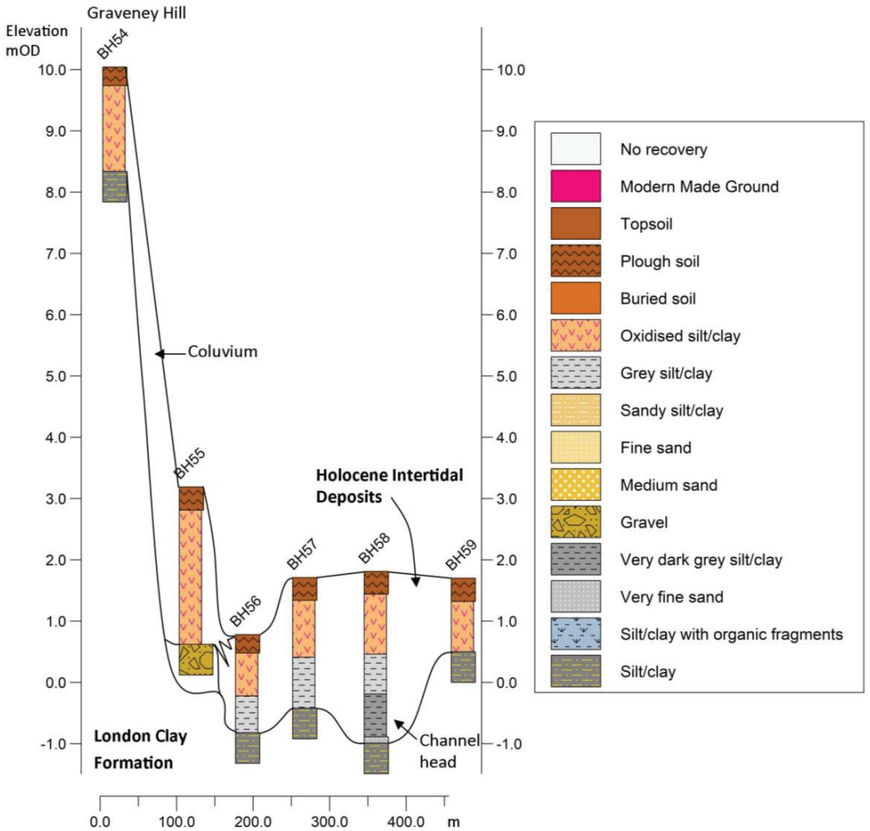

Figure 9. Lithostratigraphic cross section of Transect 6 (BH 54 to BH 59) from north to south. Vertical exaggeration x80.

3.3 Fine Grained Alluvium

3.3.1 In BH 23 a bluish grey (Gley 2 6/5B) silt/clay 0.5m thick, with occasional granular-sized plant fragments, was recorded underlying the intertidal deposits at -2.98m OD (4.8m bgl). The unique colour, the singular presence of plant fragments and its elevation suggest that it may represent Holocene alluvium laid down by a northward flowing tributary of the ancient River Swale and preserved within a concavity in the bedrock prior to the marine transgression and deposition of intertidal deposits.

3.3.2 The fine grained alluvium was unconformably overlain by intertidal deposits.

3.4 Intertidal Deposits

3.4.1 The intertidal deposits outcropped across the site from Nagden Marshes in the west, Graveney Marshes in the centre to Cleve Marshes in the east (see Figures 4 to 9). The deposits were recorded in 57 boreholes and increased in thickness from the south to the north. The minimum thickness was 1.20m in BH 59 and the maximum was 7.91m in BH C (in BH A in the west the bedrock was not proved and a thickness of greater than 8m was recorded). The maximum elevation of the outcrop was +2.14m OD at BH 30 in the south and the minimum was +0.77m OD in BH A in the north; a difference of only 1.37m and evidence of the level modern day surface of the Marshes.

3.4.2 The intertidal deposits consisted of a stack of fine grained sediment that was divisible into two main units distinguished on colour. The lower unit was grey to very dark grey (5 Y 5/1 to 5 Y 3/1) and the upper unit was an orangish brown (10 YR 4/3 with 5 YR 4/6 mottles). The boundary between the units was generally sharp at *c.* 1.50m bgl and represented the elevation of the water table. The upper unit was oxidised as a result of redox reactions driven by a fluctuating water table that oxidise the ferric iron compounds in the clay to their ferrous state and colour it brown (see Figures 10 and 11 below). This is a diagenetic process (i.e. it is post-depositional) that affects the original sedimentary chemical characteristics and not the mode of deposition. Deeper, where the sediment was permanently saturated, anoxic conditions persist and the clay was bluish grey in colour as a result of the presence of the mineral vivianite (hydrated iron phosphate) or darker grey as a result of humic compounds (see Figure 11 below).

Figure 10. Iron oxide mottling and some black manganese oxide (arrow) in the boundary between the upper oxidised intertidal sediments and the lower reduced fraction (increasing grey clay on the right).

Figure 11. Oxidised deposits overlying the reduced deposits: very dark grey silt/clays in the upper right and lighter grey silt/clays in the core below. (1 to 3m bgl BH A).

3.4.3 In the lower unit of reduced silt/clay very fine sands were frequently recorded as a fine bed (*c.* 0.10m thick) at the base of the unit. In one location (BH D) a lag deposit of broken marine shell (*Cerastoderma edule* and *Ostrea edulis*) was incorporated within the sand overlying the bedrock. In general, rare laminae of very fine sand were found irregularly distributed throughout the reduced silt/clay. The unit was also distinguished by the presence of spots, pebble-sized patches or more rarely sets of fine bands (<50mm), and thick beds (up to *c.* 3.5m in BH B) of very dark grey humic silt/clay; no macroscopic organic material was present. Occasionally both the grey and very dark grey sub-units contained examples of the minute, halophytic mollusc *Hydrobia ulvae* typically found in great numbers on the upper reaches of tidal mudflats (Kerney, 1999) (see Figure 12 below). Articulated shells of the edible cockle were occasionally recovered also.

Figure 12. The tidal mudflat mollusc *Hydrobia ulvae* in BH 28.

3.4.4 The upper unit of the intertidal deposits was heavily oxidised and in the top half metre bioturbated by fine roots. Deeper in the unit the silt/clay occasionally parted at boundaries with very fine sand laminae although the twisting action of the auger screw usually destroyed them.

3.4.5 In BH 17 and BH 18 (Transect 2) an upward fining sand unit lay at +1.45m OD (BH 18) with a maximum thickness of 1.65m (BH 18). It appeared to fill a recut channel that occupies a more ancient course eroded in top of the bedrock and drained westward towards the present location of the Faversham Creek (see Figure 5 above). Similar deposits were found in BH D, BH 31 and BH 32 in Transect 4 (see Figure 6 above) where they consisted of very well sorted fine sand *c.* 1m thick. These deposits were recorded at +1.40m OD (0.35m bgl in BH 32). The sand beds probably represent bar deposits within the channels of tidal creeks. Their high elevation, particularly the latter in Transect 4, suggests that they were laid down just prior or during land reclamation in the medieval period.

3.4.6 The modern soil profile had developed in the top *c.* 0.40m of the upper oxidised unit of the intertidal deposits delineated, in general, by a sharp boundary. This unit was a dark brown (10 YR 3/3) silt/clay with very poorly developed granular-sized peds and represented a plough soil. It contained rare granules of cbm (ceramic building material) and very rare pebble-sized clasts of angular brick. Two types of flint clast were recorded: rare, angular, fine to medium flint nodules ultimately derived from the Seaford Chalk Formation *c.* 2 km to the south; and rare, well-rounded black flints from the Upnor Formation of the

Lambeth Group *c.* 1 km to the south. The plough soil was bioturbated by frequent fine roots and root holes.

3.4.7 In BH B and BH 30 the intertidal deposits were overlain by modern upcast from drain dredging. BH C was capped by modern track surface deposits.

3.5 Colluvium

3.5.1 A colluvial deposit was recorded in the BH 54 and BH 55 on the slope of Graveney Hill (Transect 6). In BH 54 it was 1.70m thick and in BH 55 2.57m thick. It was an oxidised and firm, light yellowish brown (10 YR 6/4) silt/clay that overlay LCF in BH 54 towards the top of the hill, and gravels in BH55 towards the base of the hill.

3.6 Modern Made Ground

3.6.1 A buried soil was recorded in BH B at +0.55m OD (1m bgl) (see Figure 5). It was 0.45m thick and had a 30mm surface of very pale brown (10 YR 8/2) calcareous silt/clay in granular-sized aggregates with moderate-sized sub-rounded granular clasts. The underlying silt/clay unit was marked by a sharp boundary and was dark yellowish brown (10 YR 4/4) in colour with frequent coarse sand-sized iron oxide stains. Fine roots were present.

3.6.2 The buried soil was overlain by oxidised silt/clays with a modern soil profile in the top. The location next to the major east west drain and immediately south of the Sea Wall suggests that the buried soil had resulted from human activity, be it dredging or work on the sea defences in the recent past.

3.6.3 At BH 30 in the south of the site the plough soil was found to be developed within a reduced silt/clay unit (see Figure 3 above) that overlay an oxidised sandy silt/clay unit; that is to say the usual stratigraphy was reversed. The location of the auger hole beside the head of a drain suggests that work on dredging the drain was most probably the cause.

3.6.4 In BH C a 60mm cap of gravel of sub-angular pebbles in a humic, brown silt/clay matrix overly the top soil. A metalled track was located next to the borehole and was most probably the origin of the gravel unit.

4. ASSESSMENT

4.0.1 The text in the sub-sections below reviews the lithostratigraphic evidence against the relevant aims of Section 1.6.

4.1 Lithostratigraphic sequence

4.1.1 The London Clay Formation forms an irregular and incised basement to the Quaternary sediments of the ancient Swale Valley. The site lies at the southern edge of the flood plain of The Swale, and just to the north of and below the Cleve and Graveney Hills. The basal sediments covering the erosion surface are, in the main, fine grained intertidal deposits associated with the sea level rise in the Holocene (see Figure 13 below). Immediately to the south of the site and approximately delimited by the 5m OD contour, is the line of pinch out of these sediments where they onlap against the rising LCF.

4.1.2 Slender evidence was recovered in BH 23 for the existence of earlier fine grained alluvial sediments with peat fragments that may pertain to the Early Holocene floodplain of the ancient Swale. On a transgressive coast saltmarsh formation would be expected over a basal peat, however this alluvium was not recovered in any of the deeper mechanically drilled boreholes (BH A, BH B, BH C and BH D) and its presence may be only residual. There are no major river valleys in the vicinity of the site where a basal peat could form as a result of fresh water backing up as sea level rose. Nor is it possible to recognise any periods of stasis, transgression or regression that intercalated peats would make evident.

4.1.3 In the centre of Transect 4, four auger holes recorded gravel (see Figure 7 above and Section 3.2). The nature and date of this deposit is unclear; it may be a reworked late Pleistocene/Early Holocene gravel terrace or a channel bar (although there were no overlying sands) associated with the ancient precursor of the meandering drain along which the auger holes were located. This drain would appear to be the modern analogue to a tidal creek that once drained a small, local embayment at the head of the Graveney Marshes, south and west of Graveney Hill and overlooked by Graveney Church. Were this deposit a terrace then it may relate to gravel in BH 55, *c.* 800m south east, that appears to occupy a bench on the west slope of Graveney Hill (see Figure 9 above) and lies at +0.62m OD, i.e. *c.* 0.80m higher.

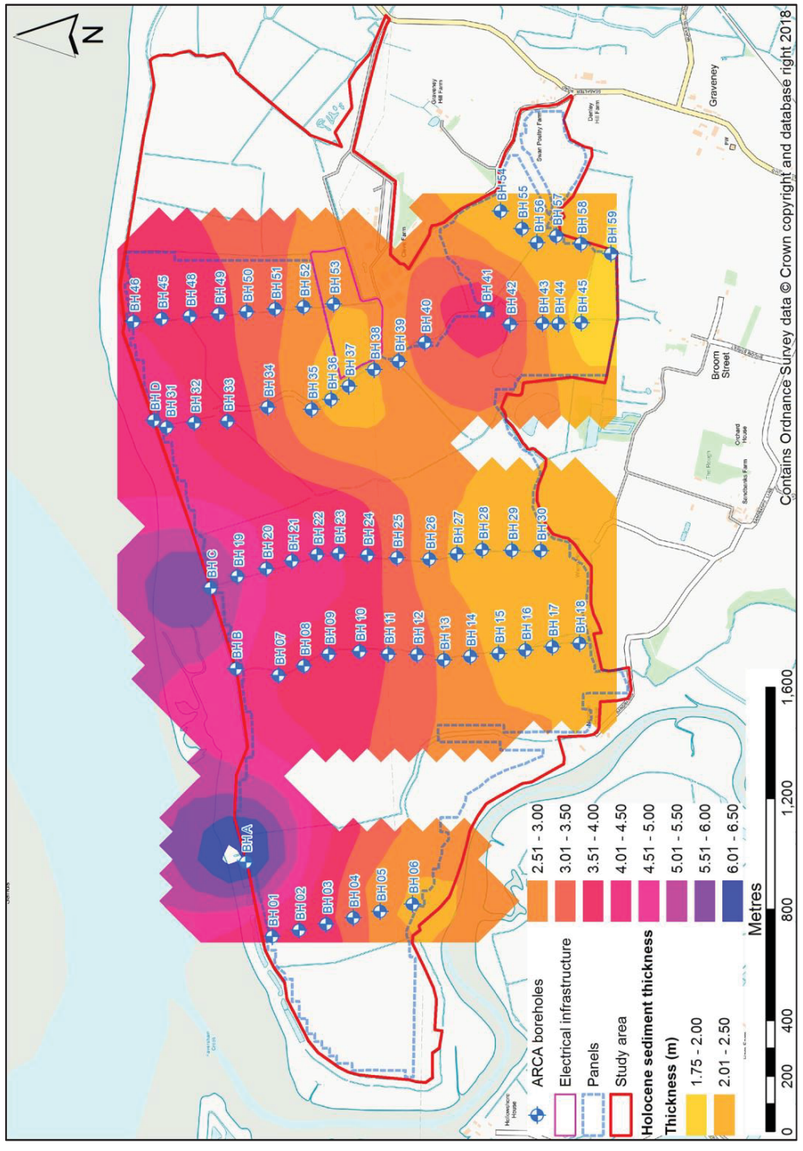

Figure 13. Map of the Holocene sediment thickness on the site.

4.1.4 The great majority of the sedimentary sequence preserved on the site pertains to deposits that were laid down in the intertidal zone (see Figure 13 above). These deposits are the result of a rising tidal frame in response to isostatic adjustment: not only does the Earth's surface rebound from the release of the weight of the Pleistocene ice sheet, but eustatic sea level changes take place as more water enters the system. A brackish environment of tidal mud flats, saltmarsh and tidal creeks is formed, the latter supplying a modicum of fresh water from the limited watershed to the south. Bartholdy (2012, 151) defines saltmarsh as 'vegetated areas located between coastal hinterlands and daily (or permanently) flooded coastal areas.' Flooding by high waters is partial or complete during the spring/neap tidal cycle. The vertically accreting sediment stack on the site, and prior to medieval land reclamation, was a product of external sediment supply of mineralogical mud,[2] silt and very fine sand, and internal supply derived from decaying saltmarsh vegetation. After reclamation sedimentation was derived from flooding creeks, primarily alluvial and probably slight, and artificial additions that may have been made to improve soil quality.

4.1.5 The intertidal deposits are divisible into two sedimentary facies: the first is derived from sheet flow over vegetated surfaces and the second associated with channel flow in the vicinity of tidal creeks.

4.1.6 The first facies represents marsh and tidal flat, however the distinction between the two in the sedimentary record is difficult to discern. They are both environments of mud and brackish water and will tend to replace each other depending upon changes in inundation. On the site, darker and consequently more humic strata were recorded (Munsell: 5 Y 3/1) and may represent areas of marsh in contrast to lighter strata representing tidal flat. *Hydrobia ulvae* and *Cerastoderma edule*, both molluscs typical of tidal flats, tended to be associated with the lighter coloured strata. A difference in lithology was noted between the two strata; horizontal, very fine laminae of mud and silt cuplets were found only in the lighter strata and point to rhythmic tidal deposition, though these laminae were rare. Rooting and desiccation cracks can also help in distinguishing the two environments but neither were preserved. Colour alone is not sufficient to distinguish between marsh and tidal flat

[2] Mud is a mixture of silt and clay sized particles.

because of the redeposition of plant material and its subsequent humification.

4.1.7 The second facies is coarser grained sand deposits representative of channel bar formation in tidal creeks. There were two main areas of deposition both associated with the present day meandering drains/creeks: the northern terminal of the drain/creek traced by Transect 4 and at the southern terminal of Transect 2 (see Figures 5 and 7 above). The high elevation of both deposits within their respective stratigraphy suggests that they were laid down in the centuries just prior to reclamation; the siliciclastic sediment was perhaps derived from the mobilisation by agriculture of Head within the catchment.[3] The buried channel of the drain/creek beside Transect 4 can be traced southwards, for example, BH 41 (Transect 4, Figure 7) on the Marsh and BH 58 (Transect 6, Figure 9) at the foot of Graveney Hill. The sand recorded in Transect 2 appears to occupy a recut channel draining west towards Faversham Creek.

4.1.8 The uppermost intertidal deposits are heavily oxidised as a result of historic land reclamation and the draining of the Marshes that ended diurnal tidal inundation. The drying out of the deposits and the renewed influence of mainly fresh water flooding from the creeks has allowed soil biota to flourish with the consequent development of a soil profile. The high concentration of coarse clastic rock fragments (Seaford Chalk flint nodules and Upnor flint gravel, see Section 3.4.6) in the profile, particularly so on the slopes of Graveney Hill and the adjacent fields, is greater than might be expected from artificial soil improvement though manuring. Possibly high level Pleistocene gravel terraces or Head once existed and have since been ploughed out. Agriculture, encouraging mass movement of sediment, was the most probable cause of the colluvial deposit that blankets the hill slope. Brick and cbm were also ubiquitous and were probably derived in part from the demolition of sheep folds.

4.1.9 The evidence for modern Made Ground is limited to fine grained sediment derived from dredging of the drains where in one location (BH B Transect 2, Figure 4) a buried soil was preserved.

[3] Head is a Pleistocene mass movement deposit found at the base of slopes.

4.2 Archaeological and palaeoenvironmental potential

4.2.1 Introduction

To illustrate the archaeological and palaeoenvironmental potential of the deposits on the site nine Deposit Zones have been identified (see Figure 14 below). The location of each Zone is based on the modelled thickness of the Holocene deposits illustrated in Figure 13 above. In RockWorks the modelling employed an inverse distance algorithm which created an 'area of influence' for each borehole. To do this, within the area of the RockWorks' project dimensions (approximately equal to the area of the site) each borehole is plotted surrounded by the predicted area of Holocene sediment. To avoid over extrapolating data to regions where there is none (areas where no boreholes were drilled), a limit of 11% of the project dimensions is set per borehole, and the values of the surrounding grid nodes are then recorded as zero. Where the sub-surface features are linear, for example channel sands, then their occurrence in two neighbouring boreholes will allow a reasonable assessment of directionality to be made and a Deposit Zone can be assigned with some confidence. Deposits that are areal in nature, for example the intertidal muds, can also be assessed with some confidence even where the distance between boreholes that record the deposit are greater than the designated 11% because the deposit is deemed ubiquitous across the Marshes. Similarly, thickness can also be judged because, in general, the bedrock, which governs thickness, slopes down to the north. The ubiquity of the muds will, however, disguise features such as buried creeks unless recorded in a borehole.

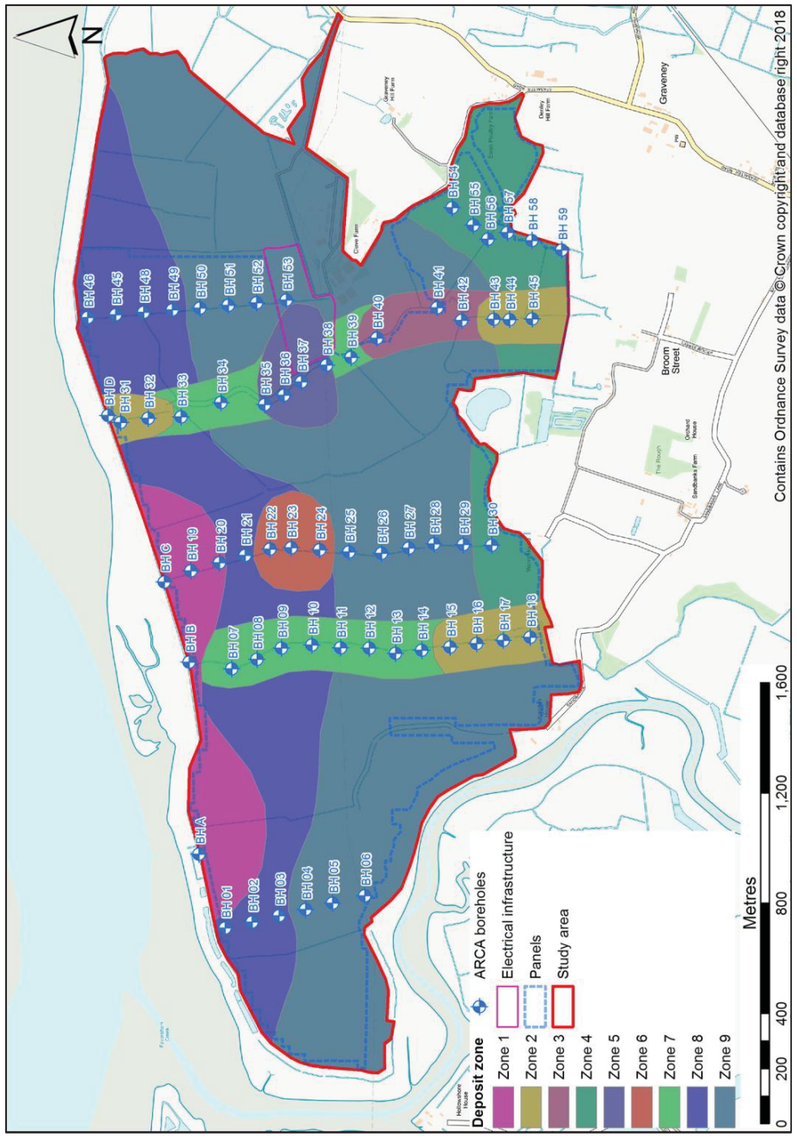

Figure 14. Map of the Deposit Zones on the site.

4.2.2 *Deposit Zone 1*

Deposit Zone 1 represents thickly stratified intertidal deposits recovered through mechanical drilling (BH A to BH C). The deposits are greater than 4m in thickness (>8m in BH A) and lie in the very north of the site where the bedrock is dipping steeply towards the middle of the ancient Swale valley. As these deposits lie at the extremity of the land reclaimed and were proximal to the influence of tides and waves then the potential for archaeology is low. On the other hand, they represent a long and continual sequence of reduced intertidal muds that may preserve diatom evidence, for example. Whether diatoms or comparable proxies would reveal more about environments of deposition than has already been determined from the lithology and chance molluscan finds is debateable. These deposits therefore have a low to moderate palaeoenvironmental potential.

4.2.3 *Deposit Zone 2*

Deposit Zone 2 represents channel sands that lie less than 2m bgl. They were recorded in Transect 3 (BH 17 and BH 18) and Transect 4 (BH D, BH 31 and BH 30). The sands are, in the main, oxidised which is not conducive to the preservation of organics. As a consequence evidence of any wooden quays built within the channel and/or sunken boats would not survive and the potential for wooden archaeology is low. Oxidation and the coarse grained nature of the sands is not conducive to the preservation of palaeoenvironmental proxies and the potential of their preservation is, therefore, also low.

4.2.4 *Deposit Zone 3*

Deposit Zone 3 represents channel muds that lie deeper than 2m bgl. These deposits fill a palaeochannel of the drain/creek that borders Transect 4 (BH 41 to BH 43) in a mid-position on the Marshes. There are over 2m of reduced muds below the water table which are favourable to the preservation of fluvial/marine archaeological structures and artefacts. On the site this Zone is the most comparable to the location of the Anglo Saxon Graveney boat discovered in 1971, 2.2 km due east (Evans and Fenwick 1971). The position of the boat was also alongside a meandering drain/creek on the Marshes. The potential for archaeology is therefore low to moderate in Zone 3. These reduced deposits will have a low to moderate palaeoenvironmental potential constrained by the caveat discussed in Section 4.2.2 (Deposit Zone 1) above.

4.2.5 Deposit Zone 4

Deposit Zone 4 represents thin intertidal deposits that onlap the LCF in the south of the site. They are less than 2m thick. The Zone also includes the colluvial deposits located on Graveney Hill (Transect 6, BH 54 and BH 55). The onlapping intertidal deposits are predominantly oxidised (in the top 1.5m) and will not preserve organic material either artefactual or natural. The Zone traces the edge of the Marshes in the south and represents the interface between dryland, and the opportunity for occupation that would have existed, and the generally inhospitable waterlogged land. The present day location of Warm House at the terminal of Transect 3 on the 5m contour is evidence of, if not the desirability, then certainly the possibility of occupation on the margin. The potential for inorganic archaeology is therefore low to moderate. Palaeoenvironmental proxies will only survive in the deeper fraction of the Zone and their overall potential for preservation is therefore low.

4.2.6 Deposit Zone 5

Deposit Zone 5 represents thin intertidal deposits that lie over gravels (Transect 4, BH 35 to BH 38). These deposits are under 2m thick and pertain to the oxidised upper fraction of the intertidal silt/clays. The exact nature of the gravels is unclear, however, they were laid down under a high energy regime that would have been inhospitable to human occupation. Nevertheless, it is possible that later in the Holocene this Zone provided a localised solid and dryer area within a developing saltmarsh that may have been exploited. The potential for archaeology is therefore low to moderate. The palaeoenvironmental potential of the majority of the overlying muds is low as a result of their oxidised nature.

4.2.7 Deposit Zone 6

Deposit Zone 6 represents moderately thick intertidal deposits that lie over alluvium (Transect 3, BH 23). This very localised Zone, based on the evidence of a single borehole only, records evidence of macroscopic organic remains at *c.* 5m bgl that may pertain to an early floodplain. The potential for archaeology at this depth and on a waterlogged floodplain is low. The fragmentary nature of the organic material recovered (there was no peat bed) mitigates against any optimistic grading of the palaeoenvironmental potential which must be set as low.

4.2.8 Deposit Zone 7

Deposit Zone 7 represents creek deposits and the creek banks (Transects 2 and 4). This Zone delineates the two main route ways through the saltmarsh and later reclaimed land to the sea. Movement could be by water and along the fractionally drier levies on the creek banks. The modern south-north track traces the crest of an early embankment (marked 'Centre of Old Sea Wall' on the OS County Series 1:2500, 1866) built alongside one of the creeks (Transect 4). The potential for late prehistoric to post-medieval archaeology associated with the two meandering drains/creeks on the site is therefore low to moderate. The potential for the recovery of palaeoenvironmental remains is, however, low on account of the oxidation of the deposits.

4.2.9 Deposit Zone 8

Deposit Zone 8 represents the moderately thick intertidal deposits located in an east to west band towards the north of the site. The thickness of the deposits is 3-4m and they lie over the LCF. The intertidal silt/clays in this Zone represent the accreting saltmarsh and tidal flats and no significant features within this environment have been recognised. Although exploitation of the marsh for its natural resources would have been intermittent no occupation can be countenanced. As a consequence the potential for archaeology is low. The palaeoenvironmental potential based on only *c.* 2m of reduced muds is also low.

4.2.10 Deposit Zone 9

Deposit Zone 9 represents the thin intertidal deposits located in an east to west band in the centre and towards the south of the site. The thickness of the deposits is *c.* 2m and they lie over the LCF. The intertidal silt/clays in this Zone also represent the accreting saltmarsh and tidal flats and no significant features within this environment have been recognised. The same qualification regarding human exploitation and occupation noted for Zone 8 also applies to this Zone. The result is that the potential for archaeology is low and the potential to recover palaeoenvironmental proxies is also low because the majority of the deposits are oxidised.

4.3 Impact of the proposed development on Quaternary strata

4.3.1 The foundations of the module tables (see Figure 10 above and Figure 1 in the WSI) are expected to be steel rods that will penetrate to *c.* 2m bgl. These will affect the upper oxidised deposits of intertidal mud in Deposit Zones 1-5 and 7-9. Of these Zones, 3, 4 and 7 are significant as they represent respectively: deep channel mud similar to the Graveney boat location; the southern margin of the Marshes and the junction between dry and waterlogged land; and the creek and bank deposits. The potential for archaeology is low to moderate and the palaeoenvironmental potential is low in these areas.

4.3.2 The foundations of the compound designated for Electrical infrastructure (see Figure 10 above and Figure 1 in the WSI) are expected to be deeper and will affect Deposit Zones 5, 7 and 9. Of these Zones, 5 and 7 are significant as they represent respectively thin intertidal deposits over gravel, a Zone that *may* have been a dryer locality within the accreting saltmarsh; and creek and bank deposits that have a low to moderate potential for archaeology. The palaeoenvironmental potential is low.

5. CONCLUSIONS

5.1 On the site the Holocene sedimentary stack forms a wedge that thickens northwards towards The Swale following the dip of the LCF. The thickness grades from *c.* 1m in the south to greater than 8m in the north. The great majority of the deposits are fine grained intertidal muds that represent an accreting saltmarsh and tidal flat environment in response to rising sea level. A modern soil profile has developed in the top of the stack since drainage and land reclamation that began in the medieval period.

5.2 Nine Deposit Zones have been identified the most important of which are: Deposit Zone 1 where a deep sequence of intertidal muds has a low to moderate palaeoenvironmental potential; Deposit Zone 3 where the environment of deposition most closely resembles the location of the Graveney boat discovery; Deposit Zone 4 marking the southern margin of the Marshes where archaeology may be found; and finally Deposit Zone 7 where creek and bank deposits may also hold potential for archaeology.

6. ACKNOWLEDGEMENTS

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6.2 The fieldwork reported here was carried out by Nick Watson, Matthew Palmer, David Ashby and Dr Keith Wilkinson. Laboratory assessment was undertaken by Nick Watson

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APPENDIX 1: BOREHOLE LOCATIONS

Borehole	Easting	Northing	Elevation (m OD)
BH 01	602422.06	164342.60	1.40
BH 02	602444.62	164245.18	1.21
BH 03	602467.18	164147.76	1.35
BH 04	602489.73	164050.33	1.31
BH 05	602512.29	163952.91	1.31
BH 06	602539.36	163836.00	2.08
BH 07	603363.47	164318.73	1.32
BH 08	603397.72	164227.93	0.96
BH 09	603439.08	164138.68	1.24
BH 10	603450.11	164027.43	1.51
BH 11	603439.85	163924.43	1.37
BH 12	603438.40	163820.12	1.43
BH 13	603418.90	163724.03	1.64
BH 14	603431.17	163628.68	1.87
BH 15	603442.38	163526.22	1.85
BH 16	603454.44	163430.36	2.04
BH 17	603466.28	163332.79	1.93
BH 18	603478.12	163235.22	2.10
BH 19	603719.62	164467.25	1.36
BH 20	603748.39	164363.47	1.31
BH 21	603775.47	164270.79	1.45
BH 22	603798.46	164180.21	1.65
BH 23	603802.64	164103.56	1.82
BH 24	603795.65	163999.64	1.97
BH 25	603787.52	163892.80	1.91
BH 26	603782.16	163775.06	1.66
BH 27	603801.26	163676.83	1.60
BH 28	603816.85	163585.07	1.84
BH 29	603814.60	163478.14	1.95
BH 30	603812.23	163374.73	2.14
BH 31	604257.34	164722.62	1.59
BH 32	604273.37	164622.20	1.75
BH 33	604278.13	164503.12	1.90
BH 34	604329.76	164357.96	1.70
BH 35	604322.00	164199.79	1.78
BH 36	604356.89	164129.41	1.75
BH 37	604405.26	164066.39	1.04
BH 38	604465.38	163974.69	1.43
BH 39	604494.13	163886.00	1.16
BH 40	604563.06	163792.36	1.64
BH 41	604673.87	163573.62	1.74
BH 42	604628.47	163484.17	1.29
BH 43	604631.80	163368.04	1.37

APPENDIX 2: BOREHOLE LITHOLOGY

Bore	Top	Base	Lithology	Comments
BH01	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Rare granules of cbm. Rare, angular, fine pebble-sized flint. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH01	0.40	1.30	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare fine pebble-sized smooth and finely ridged thin shelled bivalves (broken) and cockle (whole). (Oxidised intertidal deposits). Diffuse boundary to:
BH01	1.30	1.80	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Gradual boundary to:
BH01	1.80	3.50	Very dark grey silt/clay	5 Y 3/1 Very dark grey to 5 Y 2.5/1 Black, soft humic silt/clay. (Reduced intertidal deposits). (End of BH, collapsed).
BH02	0.00	0.46	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Rare granules of cbm. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH02	0.46	1.38	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide

				mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH02	1.38	1.88	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH02	1.88	4.00	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (End 0f BH, collapsed).
BH02	4.00	4.30	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits).
BH02	4.30	4.40	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).
BH03	0.00	0.42	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Rare, medium pebble-sized nodule of flint. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH03	0.42	1.60	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare broken fine cockle. (Oxidised intertidal deposits). Diffuse boundary to:
BH03	1.60	3.30	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH03	3.30	3.95	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH03	3.95	4.04	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).
BH04	0.00	0.45	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed

				granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH04	0.45	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH04	1.50	3.30	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH04	3.30	3.35	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).
BH05	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH05	0.40	1.64	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare fine pebble-sized smooth and finely ridged thin shelled bivalves (broken). (Oxidised intertidal deposits). Diffuse boundary to:
BH05	1.64	2.10	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH05	2.10	2.20	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).

BH06	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH06	0.40	1.25	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH06	1.25	1.87	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH06	1.87	1.92	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).
BH07	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Rare, angular, fine pebble of flint. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH07	0.40	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH07	1.50	3.50	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). (End of BH, collapse).
BH08	0	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:

BH08	0.4	1.20	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH08	1.2	3.49	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH08	3.49	3.59	Very fine sand	5 Y 5/1 Grey very fine sand. (Reduced intertidal deposits).
BH08	3.59	3.64	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).
BH09	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Rare, angular, fine pebble of flint. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH09	0.40	2.00	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH09	2.00	4.40	Very dark grey silt/clay	5 Y 3/1 Very dark grey, soft, humic silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH09	4.40	4.41	Silt/clay	Hard base no recovery probably; LCF. (End of BH).
BH10	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Rare, angular, fine pebble of flint. Rare fine pebble of brick. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:

BH10	0.40	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare fine pebble-sized cockle shell fragment (Oxidised intertidal deposits). Diffuse boundary to:
BH10	1.50	4.00	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Rare granule of cockle shell (Reduced intertidal deposits). (End of BH, collapsed).
BH11	0.00	0.50	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH11	0.50	1.70	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH11	1.70	2.70	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH11	2.70	2.80	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay and rare very fine sand laminae. (Reduced intertidal deposits). Diffuse boundary to:
BH11	2.80	3.15	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH11	3.15	3.16	Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH12	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Rare, sub-angular, fine pebble of flint.

				Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH12	0.40	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare cockle shell fragment. (Oxidised intertidal deposits). Diffuse boundary to:
BH12	1.50	3.40	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH12	3.40	3.50	Silt/clay	Gley 2 5/10B Blueish grey soft becoming stiff silt/clay with 2.5 Y 4/3 Olive brown fine lenses. (LCF). (End of BH).
BH13	0.00	0.50	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH13	0.50	1.30	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH13	1.30	2.90	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH13	2.90	3.40	Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH14	0.00	0.15	Topsoil	10 YR 3/3 Dark brown silt/clay. Poorly developed peds. Frequent fine roots and root holes. Rare, sub-angular, fine

				pebble of flint. (Topsoil, on grass away from ploughed field). Gradual boundary to:
BH14	0.15	1.35	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare cockle shell fragment. (Oxidised intertidal deposits). Diffuse boundary to:
BH14	1.35	2.50	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. At 2.3-2.5m black humic stains, greenish grey colours, rare coarse sand-sized? plant fragment. (Reduced intertidal deposits).
BH14	2.50	2.51	Silt/clay	Very stiff, no recovery probable LCF. (End of hole BH).
BH15	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH15	0.40	1.25	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH15	1.25	1.90	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH15	1.90	2.00	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).

BH16	0.00	0.15	Topsoil	10 YR 3/3 Dark brown silt/clay. Frequent fine roots and root holes. (Topsoil on grass away from ploughed field). Gradual boundary to:
BH16	0.15	1.20	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH16	1.20	2.35	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay with rare very fine sand in fine lenses. (Reduced intertidal deposits). Diffuse boundary to:
BH16	2.35	2.85	Silt/clay	Gley 2 5/10B Blueish grey soft becoming stiff silt/clay with 2.5 Y 4/3 Olive brown fine lenses. (LCF). (End of BH).
BH17	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH17	0.40	0.90	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH17	0.90	1.30	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH17	1.30	2.20	Fine sand	5 Y 5/1 Grey very fine sand. Sharp boundary to:
BH17	2.20	2.70	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:

BH17	2.70	3.70	Silt/clay	Gley 2 5/10B Blueish grey soft silt/clay with 2.5 Y 4/3 Olive brown fine lenses. Very wet. (probably LCF). (End of BH).
BH18	0.00	0.10	Topsoil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Topsoil on grass away from ploughed field). Gradual boundary to:
BH18	0.10	0.65	Grey silt/clay	2.5 Y 5/2 Greyish brown silt/clay. (Upcast from drain). Sharp boundary to:
BH18	0.65	1.60	Sandy silt/clay	10 YR 4/4 Dark yellowish brown, firm sandy silt/clay (Upcast from drain). Gradual boundary to:
BH18	1.60	2.30	Medium sand	2.5 YR 4/2 Dark greyish brown medium sand. Diffuse boundary to:
BH18	2.30	2.60	Silt/clay	2.5 Y 5/1 Grey with fine pebble-sized patches of 2.5 Y 5/6 Light olive brown, soft silt/clay becoming very stiff at 2.6m. (LCF)
BH19	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH19	0.40	1.55	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH19	1.55	4.00	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay, rare black stains and rare *Hydrobia ulvae*. (Reduced intertidal deposits). (End of BH, collapse).

BH20	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH20	0.40	1.51	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH20	1.51	1.70	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. At 1.68-1.70m frequent *Hydrobia ulvae*. (Reduced intertidal deposits). Diffuse boundary to:
BH20	1.70	2.00	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH20	2.00	5.30	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay irregularly interbedded black organic staining. Rare cockle shell fragments. (Reduced intertidal deposits). (End of BH).
BH21	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH21	0.40	0.70	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH21	0.70	1.00	Fine sand	10 YR 5/6 Yellowish Brown fine sand with frequent, fine

				shell fragments. Sharp boundary to:
BH21	1.00	1.60	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH21	1.60	2.20	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH21	2.20	3.90	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). (End of BH, collapse)
BH22	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH22	0.40	1.54	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare fine shell fragments. (Oxidised intertidal deposits). Diffuse boundary to:
BH22	1.54	3.50	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay with rare black stains. (Reduced intertidal deposits). (End of BH, collapse).
BH23	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH23	0.40	1.40	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine

				sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH23	1.40	1.70	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH23	1.70	4.80	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay, slightly coarser grained between 3.60 - 3.70m. Rare fine shell fragments. (Reduced intertidal deposits). Unknown boundary to:
BH23	4.80	5.30	Silt/clay with organic fragments	Gley 2 6/5B Blueish grey firm silt/clay with occasional grains of wood and granular-sized peat fragments. (End of BH).
BH24	0.00	0.22	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Fine pebble of well-rounded black flint. (Plough soil). Sharp boundary to:
BH24	0.22	1.52	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH24	1.52	3.00	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH24	3.00	3.50	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). (End of BH, collapse).

BH25	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH25	0.40	1.30	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH25	1.30	3.30	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). (End of BH, collapse).
BH26	0.00	0.27	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH26	0.27	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH26	1.50	2.20	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. At 1.91-2.20m poorly developed thick laminae of very fine sand. (Reduced intertidal deposits). Gradual boundary to:
BH26	2.20	2.70	Very fine sand	5 Y 4/1 Dark grey, stiff fine sand.
BH27	0.00	0.45	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:

BH27	0.45	1.40	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH27	1.40	1.50	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH27	1.50	2.00	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay with rare very fine sand. (Reduced intertidal deposits). Sharp boundary to:
BH27	2.00		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH28	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Compacted no ped structure. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH28	0.30	1.29	Oxidised silt/clay	5 Y 5/1 Grey reduced silt/clay predominates with iron oxide mottles.
BH28	1.29	2.12	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. At 1.70-1.75m frequent *Hydrobia ulvae.* (Reduced intertidal deposits). Gradual boundary to:
BH28	2.12	2.62	Silt/clay	5 Y 2.5/1 Black very stiff silt/clay. (Humic colouring to top of LCF?)
BH29	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH29	0.40	1.00	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide

				mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH29	1.00	1.60	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH29	1.60	2.00	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH29	2.00	2.01	Silt/clay	Hard base no recovery; probably LCF.
BH30	0.00	0.30	Plough soil	10 YR 4/3 Brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil/ Topsoil). Sharp boundary to:
BH30	0.30	0.60	Grey silt/clay	5 Y 5/1 Grey silt/clay with 25% mottles of iron oxide. (Upcast from drain). Sharp boundary to:
BH30	0.60	1.00	Sandy silt/clay	5 Y 4/1 firm, fine sandy silt/clay with iron oxide mottles. (Upcast from drain). Sharp boundary to:
BH30	1.00	1.80	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH30	1.80	2.08	Silt/clay	Gley 2 5/10B soft silt/clay with brownish streaks and patches becomes very stiff. White very fine sand -sized grains at base (selenite?). (LCF). (End of BH).
BH31	0.00	0.40	Plough soil	10 YR 4/3 Brown silt/clay. Very poorly developed granular peds. Fine pebble-sized angular flint clast. Frequent fine roots and root holes. (Plough soil/ Topsoil). Sharp

				boundary to:
BH31	0.40	1.55	Fine sand	2.5 Y 4/3 Olive brown, soft, well sorted fine sand becomes grey at base (water table level). (Channel sands). Sharp boundary to:
BH31	1.55	3.50	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). (End of BH, collapse).
BH32	0.00	0.35	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH32	0.35	0.70	Fine sand	10 YR 4/6 Dark yellowish brown fine sand. (Channel sands). Sharp boundary to:
BH32	0.70	1.60	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH32	1.60	4.30	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH32	4.30	4.40	Silt/clay	10 YR 5/4 Yellowish brown, soft silt/clay becoming very stiff (Probable LCF).
BH33	0.00	0.15	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH33	0.15	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide

				mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH33	1.50	3.80	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay, becomes stiff with no recovery. (Reduced intertidal deposits). (End of BH).
BH34	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH34	0.40	1.60	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH34	1.60	3.45	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH34	3.45	3.60	Silt/clay	10 YR 5/4 Yellowish brown, soft silt/clay becoming very stiff (Probable LCF).
BH35	0.00	0.26	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Rare granule of cbm. (Plough soil). Sharp boundary to:
BH35	0.26	1.45	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:

BH35	1.45	2.40	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH35	2.40	2.55	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH35	2.55	2.95	Gravel	Well-rounded fine flint pebble and grains and granules of flint recovered.
BH36	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH36	0.40	1.70	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH36	1.70	2.00	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH36	2.00	2.50	Gravel	Gravel, no recovery. (Hard deposit. Repositioned BH to check depth, same result at 2.00m bgl). (End of BH.)
BH37	0.00	0.20	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH37	0.20	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide.

				(Oxidised intertidal deposits). Diffuse boundary to:
BH37	1.50	1.83	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH37	1.83	1.84	Gravel	Well-rounded fine, black flint pebble and grains and granules of flint and possibly quartzite recovered. (End of BH)
BH38	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH38	0.30	1.40	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH38	1.40	1.60	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH38	1.60	1.61	Gravel	No recovery. (End of BH).
BH39	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Rare fine pebble of sub-angular flint. (Plough soil). Sharp boundary to:
BH39	0.30	1.50	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide.

				(Oxidised intertidal deposits). Diffuse boundary to:
BH39	1.50	3.50	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Rare granular fragment of mussel? shell. (Reduced intertidal deposits). Diffuse boundary to:
BH39	3.50	3.60	Silt/clay	10 YR 5/4 Yellowish brown, soft silt/clay becoming stiff (Probable LCF).
BH40	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Rare fine pebble of sub-angular flint. (Plough soil). Sharp boundary to:
BH40	0.40	1.30	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH40	1.30	2.20	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH40	2.20	3.20	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH40	3.20		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH41	0.00	0.50	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH41	0.50	1.60	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide

				mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH41	1.60	2.05	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH41	2.05	3.30	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH41	3.30	5.00	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). (End of BH).
BH42	0.00	0.24	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Rare fine pebble of sub-angular flint. (Plough soil). Sharp boundary to:
BH42	0.24	1.48	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH42	1.48	4.14	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH42	4.14	4.50	Silt/clay	Gley 2 5/10B Blueish grey soft silt/clay with brownish streaks and patches becomes very stiff. (LCF). (End of BH).
BH43	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Rare fine pebble of sub-angular flint. (Plough soil). Sharp boundary to:

BH43	0.3	1.20	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH43	1.20	3.15	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH43	3.15	3.27	Very fine sand	5 Y 4/1 Dark grey, firm fine sand. Sharp boundary to:
BH43	3.27		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH44	0.00	0.36	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Rare fine pebble of sub-angular flint. (Plough soil). Sharp boundary to:
BH44	0.36	1.00	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare fine pebble of angular flint. (Oxidised intertidal deposits). Diffuse boundary to:
BH44	1.00	1.25	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH44	1.25	1.70	Grey silt/clay	2.5 Y 3/1 Very dark grey mottled with 2.5 Y 4/3 Olive brown silt/clay. Rare coarse sand-sized plant fragments.
BH44	1.70	1.76	Silt/clay	5 Y 2.5/1 Black very stiff silt/clay. (Humic colouring to top of LCF?)

BH45	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Rare fine pebble of sub-angular flint. (Plough soil). Sharp boundary to:
BH45	0.30	1.00	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare fine pebble of angular flint. (Oxidised intertidal deposits). Diffuse boundary to:
BH45	1.00	1.20	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH45	1.20		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH46	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH46	0.30	1.66	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH46	1.66	4.16	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Diffuse boundary to:
BH46	4.16		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH47	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:

BH47	0.40	1.30	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH47	1.30	3.73	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Fine sand lens at 1.74-1.76m. (Reduced intertidal deposits). Diffuse boundary to:
BH47	3.73	3.93	Very fine sand	5 Y 4/1 Dark grey, firm fine sand. Sharp boundary to:
BH47	3.93		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH48	0.00	0.31	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Fine pebble-sized sub-angular brick fragment. (Plough soil). Sharp boundary to:
BH48	0.31	1.64	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Rare fine pebble-sized fragment of cockle shell (Oxidised intertidal deposits). Diffuse boundary to:
BH48	1.64	3.83	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Occasional fine sand towards the base (Reduced intertidal deposits). Sharp boundary to:
BH48	3.83	3.85	Silt/clay	Gley 2 5/10B Blueish grey, very stiff, silt/clay (LCF). (End of BH).

BH49	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH49	0.40	1.70	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH49	1.70	3.50	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Occasional fine sand towards the base (Reduced intertidal deposits). Sharp boundary to:
BH49	3.50	3.78	Very fine sand	5 Y 4/1 Dark grey, firm fine sand. Sharp boundary to:
BH49	3.78		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH50	0.00	0.34	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH50	0.34	1.72	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH50	1.72	3.15	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Occasional fine sand towards the base (Reduced intertidal deposits). Sharp boundary to:
BH50	3.15	3.30	Very fine sand	5 Y 4/1 Dark grey, firm fine sand. Sharp boundary to:
BH50	3.30	3.47	Silt/clay	Gley 2 5/10B Blueish grey soft silt/clay with brownish streaks and patches becomes very stiff. (LCF). (End of BH).

BH51	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH51	0.40	1.30	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH51	1.30	2.80	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Occasional granular-sized shell fragments (Reduced intertidal deposits). Sharp boundary to:
BH51	2.80	3.10	Very fine sand	5 Y 4/1 Dark grey, firm fine sand and occasional granular shell fragments. Sharp boundary to:
BH51	3.10		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH52	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. Medium pebble-sized nodular flint clast. (Plough soil). Sharp boundary to:
BH52	0.40	1.60	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH52	1.60	2.77	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH52	2.77	2.85	Very fine sand	5 Y 4/1 Dark grey, firm fine sand and rare *Hydrobia ulvae*.

				Sharp boundary to:
BH52	2.85		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH53	0.00	0.40	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH53	0.40	1.60	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH53	1.60	1.70	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH53	1.70	2.00	Very fine sand	5 Y 4/1 Dark grey, firm fine sand. Sharp boundary to:
BH53	2.00		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH54	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH54	0.30	1.70	Oxidised silt/clay	10 YR 6/4 Light yellowish brown, firm silt/clay. (Colluvium) Sharp boundary to:
BH54	1.70	1.75	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).
BH55	0.00	0.38	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH55	0.38	2.57	Oxidised silt/clay	10 YR 6/4 Light yellowish brown, firm silt/clay grades into 10 YR 3/2 Very dark greyish brown (manganese oxide) with

				orange mottles of iron oxide. Becomes 10 YR 5/8 Yellowish brown towards base. (Oxidised colluvium).
BH55	2.57	2.60	Gravel	Recovered fine to medium pebble-sized angular black flint fragments probably broken by auger. (Gravel terrace?). End of BH).
BH56	0.00	0.30	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH56	0.30	1.00	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH56	1.00	1.60	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Basal 0.3m darker in colour with grains of black ?plant matter. (Reduced intertidal deposits). Sharp boundary to:
BH56	1.60		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH57	0.00	0.37	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH57	0.37	1.30	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:

BH57	1.30	2.13	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Sharp boundary to:
BH57	2.13		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH58	0.00	0.37	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH58	0.37	1.35	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. (Oxidised intertidal deposits). Diffuse boundary to:
BH58	1.35	2.00	Grey silt/clay	5 Y 5/1 Grey, soft silt/clay. Sharp boundary to:
BH58	2.00	2.70	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft humic silt/clay. (Reduced intertidal deposits). Sharp boundary to:
BH58	2.70	2.80	Very fine sand	5 Y 4/1 Dark grey, firm fine sand. Sharp boundary to:
BH58	2.80		Silt/clay	Hard base no recovery; probably LCF. (End of BH).
BH59	0.00	0.38	Plough soil	10 YR 3/3 Dark brown silt/clay. Very poorly developed granular peds. Frequent fine roots and root holes. (Plough soil). Sharp boundary to:
BH59	0.38	1.20	Oxidised silt/clay	10 YR 4/3 firm to stiff silt/clay with occasional very fine sand set probably in laminae and disrupted through action of auger. Irregular distribution throughout. 50% iron oxide mottles of 5 YR 4/6 Yellowish red irregularly distributed throughout. Rare black grains of manganese oxide. Occasional medium pebble-sized nodular flint clast and angular flint clast towards the top. (Oxidised intertidal deposits). Diffuse boundary to:

BH59	1.20	1.27	Silt/clay	Gley 2 5/10B Blueish grey very stiff silt/clay. (LCF). (End of BH).
BHA	0.00	0.19	No recovery	Void compaction
BHA	0.19	0.42	Topsoil	10 YR 3/3 Dark brown firm to stiff silt/clay. No ped structure visible (compacted). Frequent fine roots. Sharp boundary to:
BHA	0.42	1.62	Oxidised silt/clay	10 YR 4/4 Dark yellowish brown firm silt/clay, soft at base. Dark red iron oxide grains. Rare grain-sized shell fragments. (Oxidised intertidal fines). Diffuse boundary to:
BHA	1.62	3.00	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft silt/clay. Homogenous and unstructured unit. Unknown boundary to:
BHA	3.00	4.85	Grey silt/clay	5 Y 5/1 Grey soft silt/clay with occasional darker staining. Frequent very fine, horizontal sand laminae irregularly spaced. Rare fine pebble-sized crushed cockle shell at 4.6m. (Reduced intertidal fines). Sharp boundary to:
BHA	4.85	6.14	Very dark grey silt/clay	5 Y 3/1 Very dark grey soft silt/clay. Homogenous and unstructured unit. Pebble-sized oyster valve at 5.9m. Sharp boundary to:
BHA	6.14	6.74	Grey silt/clay	5 Y 4/1 Dark grey soft silt/clay with rare very fine sand laminae in thin sets. (Reduced intertidal fines). Sharp boundary to:
BHA	6.74	6.90	Very dark grey silt/clay	5 Y3/1 Very dark grey soft silt/clay with rare horizontal very fine sand laminae. (Reduced intertidal fines). Sharp boundary to:
BHA	6.90	7.73	Grey silt/clay	5 Y 5/1 Grey soft silt/clay
BHA	7.73	8.00	Very fine sand	5 Y 5/1 Grey soft silt/clay with lenses and fine beds of very fine sand. End of BH.

BHB	0.00	0.08	Topsoil	10 YR 3/2 Very dark greyish brown humic silt/clay with frequent fine to medium roots. Well sorted. (O horizon). Diffuse boundary to:
BHB	0.08	0.20	Topsoil	10 YR 4/3 Brown silt/clay, well sorted. Rare fine roots. Angular ped aggregates. (A horizon). Diffuse boundary to:
BHB	0.20	1.00	Oxidised silt/clay	10 YR 4/4 Dark yellowish brown silt/clay with frequent coarse sand-sized iron oxide stains. Rare fine roots. Well sorted. (B horizon/ intertidal fines). Sharp boundary to:
BHB	1.00	1.03	Buried soil	10 YR 8/2 Very pale brown calcareous silt/clay in granular-sized aggregates with moderate sub-rounded granular clasts (calcareous). Rare fine plant roots. Moderately sorted. (Surface). Sharp boundary to:
BHB	1.03	1.45	Buried soil	10 YR 4/4 Dark yellowish brown silt/clay with frequent coarse sand-sized iron oxide stains. Well sorted. (B horizon/ intertidal fines). Sharp boundary to:
BHB	1.45	5.08	Very dark grey silt/clay	5 Y3/1 Very dark grey, well sorted silt/clay with rare fine sand-sized quartz grains (Intertidal deposit). Sharp boundary to:
BHB	5.08	5.35	Silt/clay	5 Y 4/1 Dark grey stiff silt/clay. (London Clay Formation). End of BH.
BHC	0.00	0.06	Modern Made Ground	10 YR 3/2 Very dark greyish brown matrix-supported gravel of sub-angular pebbles in a humic silt/clay matrix. Poorly sorted. (Made Ground). Sharp boundary to:
BHC	0.06	0.20	Topsoil	10 YR 4/3 Brown humic silt/clay with moderate fine roots and occasional coarse sand-sized to granular-sized carbonate and brick clasts. Moderately well sorted. (A Horizon). Diffuse boundary to:

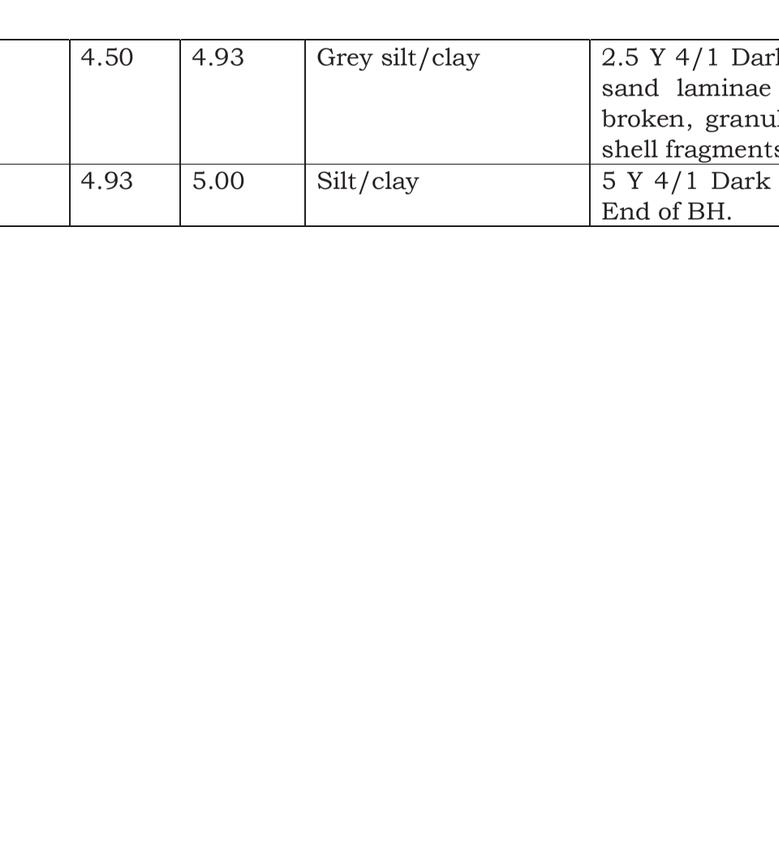
BHC	0.20	1.30	Oxidised silt/clay	10 YR 5/3 Brown silt/clay stained 7.5 YR 5/6 Strong brown with rare fine pebble-sized marine mollusc shell below 1m. (Oxidised unit). Diffuse boundary to:
BHC	1.30	2.00	Grey silt/clay	5 Y 4/1 Dark grey silt/clay with occasional granular-sized marine mollusc shell.
BHC	2.00	3.00	No recovery	Void.
BHC	3.00	7.66	Grey silt/clay	5 Y 4/1 Dark grey soft silt/clay with frequent diffuse horizontal bands of dark stained silt/clay (*c.* 50mm wide) Rare fine pebble-sized oyster and cockle shell, broken. (Reduced intertidal fines). Sharp boundary to :
BHC	7.66	7.91	Grey silt/clay	10 YR 4/2 Dark greyish brown stiff silt/clay with horizontal, short laminae and grain to granular-sized lenses of black silt/clay (reworked London Clay Formation). Diffuse boundary to:
BHC	7.91	8.00	Silt/clay	10 YR 4/2 Dark greyish brown stiff , homogenous silt/clay. (London Clay Formation). End of BH.
BHD	0.00	0.37	Plough soil	10 YR 4/2 Dark greyish brown firm silt/clay. No clear ped structure. Rare granules of cockle shell. Rare fine pebble-sized angular flint. Occasional iron oxide mottles. Frequent fine roots. Diffuse boundary to:
BHD	0.37	1.45	Fine sand	10 YR 5/4 Yellowish brown, firm, very fine sand. Very well sorted. No clear bioturbation but vertical fine mottles. Gradual boundary to:
BHD	1.45	4.50	Grey silt/clay	2.5 Y 4/1 Dark grey soft silt/clay with rare granules of cockle shell fragments and *Hydrobia ulvae*. Rare black humic staining below 3m and rare very fine sand throughout, not in laminae.

BHD	4.50	4.93	Grey silt/clay	2.5 Y 4/1 Dark grey soft silt/clay with horizontal, very fine sand laminae irregularly spaced. At base lag deposit of broken, granule to pebble-sized mussel, oyster and cockle shell fragments. Sharp boundary to:
BHD	4.93	5.00	Silt/clay	5 Y 4/1 Dark grey, stiff silt/clay (London Clay Formation). End of BH.

APPENDIX 3: CORE PHOTOGRAPHS FROM THE MECHANICAL DRILLING:

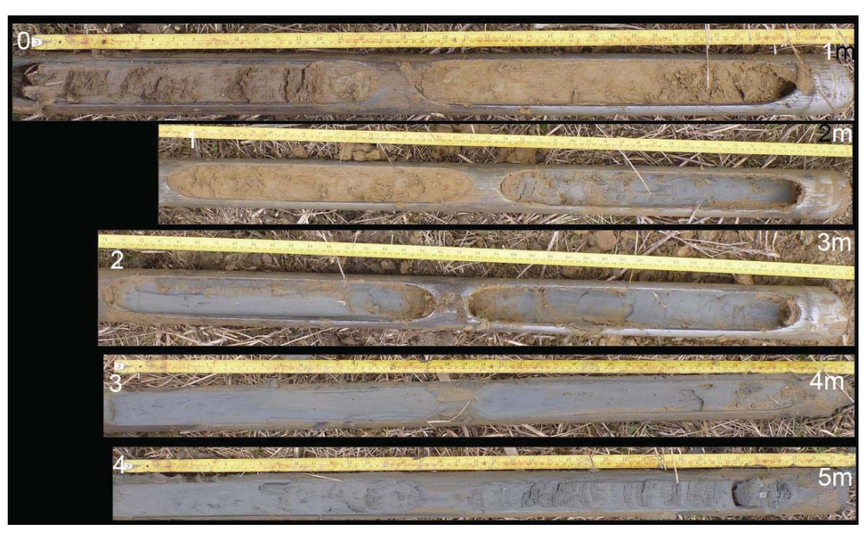
BH A

BH B



BH C

BH D



Cleve Hill Solar Farm, Graveney Kent

Written Scheme of Investigation for a Programme of Archaeological Works

for
Cleve Hill Solar Park Limited

CA Project: 770820

October 2018

Andover Cirencester Exeter Milton Keynes

Cleve Hill Solar Park Graveney Kent

Outline Written Scheme of Investigation for a Programme of Archaeological Works

CA Project: 770820

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CONTENTS

1. INTRODUCTION

1.1 This document sets out details of a Written Scheme of Investigation (WSI) by Cotswold Archaeology (CA) for a programme of archaeological works, comprising a detailed archaeological watching brief, historic building recording and a metal detector survey, at Cleve Hill, Graveney, Kent (centred on National Grid Reference (NGR) 603510 163919) at the request of Cleve Hill Solar Park Ltd.

1.2 The development will comprise the installation of a series of ground mounted solar PV panels. Associated works are likely to include access tracks, other ancillary equipment such as transformers, a substation, underground cabling, security measures, and landscaping. To-date the evaluation stages of the archaeological works has comprised a desk based assessment, a geo-archaeological borehole survey and a watching brief during geo-technical investigations. The documentation associated with the above works (along with this WSI) are to be submitted in support of the DCO application for the installation of the photovoltaic (PV) solar array within the proposed Development footprint. This document and any subsequent reports for the works identified above will be submitted to Simon Mason Principal Archaeological Officer (PAO) at Kent County Council (KCC) for his review/approval.

1.3 This WSI has been guided in its composition by Standard and guidance: Archaeological field evaluation (CIfA 2014), Archaeological Watching Brief (CIfA 2014a), the Management of Research Projects in the Historic Environment (MORPHE): Project Planning Note 3 (EH 2008), the Management of Research Projects in the Historic Environment (MORPHE): Project Manager's Guide (EH 2006) and any other relevant standards or guidance contained within Appendix B. The composition of the WSI has also been informed in its composition by a desk-based assessment produced by Wessex Archaeology (WA 2017). The works will also be undertaken in accordance with the KCC standard specification part B for archaeological watching briefs.

The site

1.4 The Site comprises an irregular parcel of land of approximately 360 hectares (ha located on the north Kent coast, 500m to the north of Graveney, 3 km to the north-east of Faversham and 5.2 km to the west of Whitstable (Figure 1). The majority of the Site is currently under arable cultivation and consists of 20 fields of varying size

and shape. The majority of the fields are enclosed by drainage ditches and vehicular access through the centre of the proposed development can be achieved via a raised trackway. Some of the boundaries at the southern part of the proposed development are delineated by mature trees. A set of overhead cables traverse the proposed development from the substation in the east to Faversham Creek in the west. The proposed development is bordered by the sea wall and the Swale Channel to the north, the sea wall and Faversham Creek to the west, an electricity substation, open land and Seasalter Road to the east and agricultural land (belonging to Sandbanks Farm) and the village of Graveney to the south (WA 2017).

1.6 The proposed development varies in height from 1.8m aOD close to Faversham Creek and the Swale in the west, to the highest point at Graveney Hill in the east at approximately 15m aOD. The current works are focussed around the Cleve Hill Substation Compound.

1.7 The underlying bedrock geology throughout the Site is mapped as the London Clay Formation: clay and silt formed 34-56 million years ago in the Palaeogene period, overlain by alluvium formed 2 million years ago in the Quaternary period (British Geological Survey, Geology of Britain Viewer 2017).

2. ARCHAEOLOGICAL BACKGROUND

2.1 The archaeological background below is drawn from an archaeological desk-based assessment of the proposed development produced by Wessex Archaeology (WA 2017).

2.2 Three phases of intrusive investigation were carried out within or immediately adjacent to the site as part of the London Array Grid Connection (**WA143**); the first two phases of work being undertaken by Wessex Archaeology in 2007 and 2008. The first phase was an archaeological watching brief upon five geotechnical test pits (**Figure 2**; 67610V). No archaeological features were recorded, although a probable alluvial sequence associated with the former Saltmarsh was observed. Burnt flint was also identified within the plough soil (Wessex Archaeology 2007), indicative, if nothing else of transient prehistoric activity within the wider area. The next phase of work comprised a strip, map and sample excavation over the temporary access road and foundation pits. Modern features were identified comprising a drainage ditch

and sea defence bank. Alluvial deposits were recorded beneath the topsoil (Wessex Archaeology 2008a). The third phase of work comprised a further watching brief on 16 geotechnical test pits. The lower lying test pits demonstrated an alluvial sequence associated with the former salt marsh, with one, producing evidence of an ancient shoreline. The ancient shoreline recorded within this phase works corresponds with the location of the 'old foreshore' identified in a subsequent PCA investigation in 2011. A small number of possible archaeological features were identified including a possible shell midden dating to the medieval period. Burnt and worked flints were collected from the topsoil (Wessex Archaeology 2008b).

2.3 A geophysical survey for the London Array was also carried out in 2008 (**WA144**) over an area to the south of the works discussed above, but it did not identify any features of probable archaeological origin (Archaeological Surveys Ltd 2008). This survey was undertaken on the higher ground of the London Array footprint and demonstrates that a geophysical survey on the even less productive alluvial deposits of the Cleve Hill footprint would be unlikely to yield data that would be helpful in targeting areas of watching brief.

2.4 Further work was undertaken for the London Array by PCA in 2008 comprising an Archaeological Evaluation of 53 trenches which revealed ditches, pits and postholes containing Iron Age pottery in the north-eastern part of the Site. The presence of domestic material suggested some form of settlement. A few features of unknown date as well as a gravel surface (possibly a causeway) were also identified, as well as Iron Age and medieval pottery sherds recovered from an alluvial layer (PCA 2008). It is possible that such potential could survive within/extend into the current site.

2.5 Following this an archaeological watching brief was undertaken in the same area. This comprised the stripping of topsoil in the north-eastern part of the Site where features were found during the evaluation. No features were found in this area during the watching brief as the features were preserved beneath the subsoil; however Roman pottery, brick, medieval pottery, a 17th century brick fragment and an 18th century crotal bell were recovered during the process. Also recovered during the watching brief were 19 WWII German shells and the tailfin of a British WWII 9 inch mortar. The excavation of a pile trench was also monitored but nothing was observed (PCA 2010).

2.6 In 2011 four trenches were excavated for the export cables and monitoring undertaken of the exploration works for unexploded ordnance. A deposit of sand thought to represent the alignment of the ancient swale foreshore was identified E-W across all four trenches, which corresponded with the ancient shoreline identified within a Wessex Archaeology test pit (MBH10; Wessex Archaeology 2008). Two pieces of oak which appear to have been placed within a channel between earthen banks were interpreted to be part of a possible fish trap. The UXO survey identified two cut features that were perhaps part of the dummy harbour created for the bombing decoy. Several 20mm shells were also found during this phase of work (PCA 2011).

2.7 A non-intrusive survey was undertaken in 2009 comprising a Historic Building Recording of WWII structures within the eastern part of the Development site close to Cleve Farm. This comprised the recording of a pillbox and the 'Starfish' Decoy operation post prior to their demolition (**WA64** & **WA69**; PCA 2009).

2.8 A Geo-archaeological Borehole Survey was undertaken in February 2018 comprising 59 Boreholes across the Site. The boreholes did not identify any deposits of high archaeological or palaeo-environmental potential, however the organic mud deposits which may represent the preservation of the saltmarsh, could be deemed to have moderate potential. Channel fill sands identified could possibly represent abandoned tidal creeks and gravel deposits identified may indicate the presence of a buried Pleistocene terrace within transect 4 (ARCA 2018). No peat beds were found during these works.

2.9 Also in 2018 a watching brief was undertaken during the sinking of geo-technical pits and whilst these were devoid of archaeological evidence, two pits did record evidence of peat lenses; these logs are in the south-west corner of the proposed substation compound footprint. It is possible that this part of the compound is located on the edge of a bed that developed further round the corner of Cleve Hill and that any plant material is subsequently a little reworked.

2.10 Overall only limited evidence for prehistoric – medieval activity has been recorded from within the Site. Finds were recovered from the ground surface of the Site during a field walking exercise, which included a Neolithic tranchet axe, worked and burnt flints and Iron Age and Romano-British pottery fragments (WA 2017). This apparent lack of evidence may reflect limited activity in the area as a result of the

marshland having been prone to frequent inundation and therefore often unsuitable for habitation. Settlement activity is therefore likely to have been focussed upon the higher ground at the eastern edge of the proposed development at Cleve Hill and Graveney Hill – such as the previously recorded Iron Age activity. The level of inundation since the last Ice Age, will have enabled the build-up of waterlogged deposits and the accumulation of peat layers containing potentially important palaeo-environmental evidence, however such deposits are for the most part likely to survive at considerable depth below the current ground surface.

2.11 Graveney is recorded in the Domesday Book as a sizable settlement and it is therefore likely that a somewhat smaller settlement may have existed there at the end of the Anglo-Saxon period. Salt production at Graveney is recorded at the time of the Domesday Book and Ordnance Survey mapping records 'medieval salt workings' to the east of the proposed development (WA 2017). Indeed the road that runs northwards from the village of Graveney to the coast is called Seasalter Road, suggesting there was a pre-existing track where salt would have been transported inland. Mounds of unknown date and function are recorded from aerial photos and these may also relate to salt production from the medieval period onwards. Whilst no pre-medieval evidence for salt production has been identified from within the proposed development site, it is possible that these activities may also have taken place at an earlier date.

2.12 It is likely that Graveney Marsh was reclaimed during the medieval or early post-medieval period and historic mapping shows a possible former sea wall or flood defence embankment to lie within the proposed development site. A medieval midden was recorded during a watching brief on geotechnical investigations for the London Array Grid Connection at the eastern extent of the proposed development. The possible midden contained oyster shell and three sherds of medieval pottery, indicative of medieval activity on the reclaimed marshland (WA 2017).

2.13 Prior to the twentieth century, the proposed development was used for pasture with natural, semi-natural and manmade drainage channels forming the boundaries of the land parcels. Sheepfolds, sheepwashes, farm buildings and wildfowl decoys have all been recorded within the proposed development dating to the post-medieval and early modern periods; historic mapping illustrates that changes to field boundaries also took place during this time. Many of the former natural and

manmade channels are clearly visible as cropmarks on googlemaps images (Google images 2002-2017).

2.14 In the early part of WWII, Kent was at the fore during the Battle of Britain and the last fighting recorded on British soil took place at Graveney Marsh in September 1940 between the crew of a crashed German aircraft and a patrol from the London Irish Rifles billeted at the Sportsman Pub, located close to the eastern boundary of the proposed development. A German Junkers is recorded as having crashed within the proposed development and it is thought likely that the battle took place within the proposed footprint. The aircraft was subsequently removed for immediate examination, but it is thought possible that part of the undercarriage, may have remained buried. Any surviving parts of the aircraft are protected as military remains. Other WWII military assets recorded within the proposed development comprise two pillboxes (one of which has been demolished), possible anti-glider ditches, castellated trenches, and a 'starfish' decoy (WA 2017). All these locations where likely to be impacted will require investigation.

3. AIMS AND OBJECTIVES

3.1 Summary of proposed works (as outlined in 1.1 above):

- Watching Brief during groundwork
- Building Recording of WWII Pillbox
- Metal Detector Survey of WWII crash site

3.2 The objectives of the archaeological mitigation are to:

- record the nature of the main stratigraphic units encountered
- assess the overall presence, survival and potential of structural and industrial remains
- assess the overall presence, survival, condition, and potential of artefactual and ecofactual remains
- to monitor groundworks which penetrate below the topsoil, and to identify, investigate and record all significant buried archaeological deposits revealed on the site during the course of the development groundworks;

3.3 The specific aims of the work are to (See Figure 1):

- record any evidence of Late Iron Age/Romano British activity at the western extent (**WA05**) of the development or perhaps even earlier prehistoric activity (albeit it perhaps not in situ) in close proximity to the proposed Substation/construction compound location (**WA09**)
- record any evidence of medieval domestic/fishing activity as previously indicated by the presence of a shell midden (**WA09**)
- to record any evidence of salt mounds as previously recorded in the north of the site close to the sea wall (**WA111**)
- where the opportunity is provided to record and date more closely evidence of a pit group of possible medieval date (**WA117**)
- to record any evidence of sheepfolds (probably post-medieval) as previously indicated by records **WA29** and **WA112**
- to record any evidence of a sheepwash or similar (probably post-medieval) as previously indicated by records **WA31**
- to record any evidence for the foundations of since demolished post-medieval buildings such as those for Kye Cottage (**WA31**) and Decoy House (**WA21**)
- to record any evidence for the foundations of since demolished post-medieval buildings such as those for Kye Cottage (**WA31**) and Decoy House (**WA21**)
- to record any evidence of enclosure activity as indicated by (**WA119**)
- to record any evidence of the landing place near Faversham Creek (**WA17**)
- to record any remains of WWII defences where they are encountered
- the protected military crash site (**WA74**) may potentially be impacted by the design; therefore a metal detector survey will be undertaken prior to any groundwork in the area. It is thought all surface remains of the aircraft were successfully removed but it remains possible that parts of the under-carriage for example may still lie buried. Though again such remains may now be buried at depth. Permission for any works will need to be sought from the appropriate authorities
- HBR survey to record surviving pillbox (**WA75**) in its setting
- To record any further evidence of the castellated trench system previously recorded (**WA89**)
- To record any further evidence of the Graveney Hill WWII bombing decoy site previously recorded (**WA64**)

- recover artefactual evidence to date any evidence of past settlement that may be identified
- sample and analyse environmental remains to create a better understanding of past land use and economy
- compare results with those previously undertaken at the site
- ensure that any finds are considered in their local context and where appropriate analysis (of pottery for example) should be undertaken by a local/regional specialist
- Where deep impacts are proposed there should be a determination to establish the degree of complexity of the horizontal and/or vertical stratigraphy present within the later Pleistocene/Holocene deposits – to help further augment the site wide deposit model already established – where appropriate to recover/record any early prehistoric remains encountered; where and as necessary consult/organise specialist recording by ARCA (geo-archaeologists) and additional specialists where appropriate
- Should significant deep deposits be encountered consideration will be given to the suitability of any sediment units encountered for optically stimulated luminescence dating (OSL) – sampling for this will be undertaken on site where appropriate
- record any land divisions identified and compare them with historic mapping
- Sample any mounds identified (if not contaminated) and assess their nature/character and date

4. METHODOLOGY

Targeted Detailed Watching Brief

4.1 The watching brief comprises the observation by a suitably experienced archaeologist of intrusive groundwork below the topsoil, in areas of the design as detailed below. Non-archaeologically significant deposits will be removed by the contractors under archaeological supervision. Where mechanical excavators are used, these will be equipped with a toothless bucket.

4.2 If archaeological deposits are encountered they will be planned and recorded in accordance with Technical Manual 1 *Fieldwork Recording Manual*. Each context will be recorded on a pro-forma context sheet by written and measured description; principal deposits will be recorded by drawn plans (scale 1:20 or 1:50, or

electronically using Leica GPS as appropriate) and drawn sections (scale 1:10 or 1:20 as appropriate). Should detailed feature planning be undertaken using GPS this will be carried out in accordance with Technical Manual 4 *Survey Manual*. Photographs digital colour (and B&W colour slide where appropriate) will be taken. All finds and samples will be bagged separately and related to the context record. All artefacts will be recovered and retained for processing and analysis in accordance with Technical Manual 3 *Treatment of Finds Immediately after Excavation*.

4.3 In the event of archaeological deposits being found for which the resources allocated are not sufficient to support treatment to a satisfactory and proper standard or which are of sufficient significance to merit an alternative approach such as contingency excavation or physical preservation, the client and the KCC PAO will be contacted immediately. Destructive work in that area will cease until agreement has been reached on an appropriate archaeological response.

Areas of WB Investigation

4.4 The watching brief will be undertaken throughout the main elements of impact of the Solar Park development detailed below. The watching brief maybe curtailed (following agreement with KCCs PAO) in those areas where archaeological potential is not being encountered.

4.5 All cable trench routes (up to 1.1m in depth) will be archaeologically monitored unless prior deep ground impacts (such as for the transformer stations) have already indicated low archaeological potential in specific locations of the Site.

4.6 The entire main east/west access route (anticipated depth of impact of 600 mm) will be monitored during the overburden strip with special attention being paid when close to historically significant assets such as the duck decoys, star fish decoy etc. which may survive in the upper topography of the site albeit most probably heavily truncated or disturbed/landscaped. Monitoring maybe curtailed with the agreement of KCC's PAO if archaeological potential is proven to be persistently absent.

4.7 Where deep excavation for transformers is proposed (up to 2.3 m in depth) all such locations will be monitored and where they coincide with the estimated locations of channel fill sands (which could potentially represent abandoned tidal creeks and gravel deposits and/or indicate the presence of a buried Pleistocene terrace such as that identified in Transect 4 of the borehole survey (ARCA 2018)) ARCA will be

present to record any exposed sections for subsequent assessment and analysis. Other areas, where deep exposures of deposits will potentially need to be recorded by ARCA are in Zones 1, 3, 4 and 7 (See Figure 2).

- Zone 1: deep sequence of intertidal muds have low-moderate potential for palaeo-environmental data
- Zone 3: Deep channel closely resembling that from which the Graveney Boat was recovered
- Zone 4: Marks the southern margin of the marshes and the interface with dry slightly elevated topography – archaeological features may survive in waterlogged ground
- Zone 7: Creek and bank deposits may have limited archaeological potential

4.8 Groundwork associated with the electrical compound, including the installation of the temporary construction compound, in the far east of the Site will be monitored; where deep impact is proposed in the south-east corner of the substation footprint, ARCA will be present to record any exposure of peat lenses similar to those revealed during the geotechnical watching brief earlier this year.

4.9 Monitoring locations and excavation areas will be set out on OS National Grid (NGR) co-ordinates using a Leica GPS and scanned for live services by trained staff using CAT and Genny equipment in accordance with the Cotswold Archaeology *Safe System of Work for avoiding underground services*. The final 'as dug' areas will be recorded with GPS.

4.10 In those areas identified above works will initially comprise the mechanical removal of non-archaeologically significant soils, under constant archaeological supervision, using a toothless ditching bucket. The generated spoil will be monitored in order to recover artefacts. Hand-cleaning of the stripped surface, to better define any identified archaeological deposits/features, will be undertaken where necessary. In all the areas identified for monitoring, machining will be conducted under archaeological supervision and will cease when the first archaeological horizon or natural substrate is revealed (whichever is encountered first). All archaeological features will be recorded in plan using Leica GPS.

4.11 Examination of any features identified, will concentrate on recording (where possible) such evidence in plan and especially any structural sequences. Particular emphasis will be placed upon retrieving a stratigraphic sequence and upon obtaining

details of the phasing of any remains. All funerary/ritual activity and domestic/industrial deposits will be **100%** excavated. All discrete features (post holes, pits) will be sampled by hand excavation (average sample to be a minimum of **50%**) unless their common/repetitious nature suggests they are unlikely to yield significant new information. All linear features (ditches, pathways etc) will be sampled to a maximum of **10%**. Bulk horizontal deposits will as a minimum be **10% by area** hand excavated, after which a decision may be taken (in conjunction with the KCC PAO) to remove the remainder with machinery. Priority will be attached to features which yield sealed assemblages which can be related to the chronological sequence of the site.

4.12 All archaeological features revealed will be planned and recorded in accordance with CA Technical Manual 1 *Fieldwork Recording Manual*. Each context will be recorded on a pro-forma context sheet by written and measured description; principal deposits will be recorded by drawn plans (scale 1:20 or 1:50, or electronically using Leica GPS or Total Station (TST) as appropriate) and drawn sections (scale 1:10 or 1:20 as appropriate). Where detailed feature planning is undertaken using GPS/TST this will be carried out in accordance with CA Technical Manual 4 *Survey Manual*. Photographs (digital colour) will be taken as appropriate. All finds and samples will be bagged separately and related to the context record. All artefacts will be recovered and retained for processing and analysis in accordance with CA Technical Manual 3 *Treatment of Finds Immediately after Excavation*.

4.13 Due care will be taken to identify deposits which may have environmental potential, and where appropriate, a programme of environmental sampling will be initiated. Samples will be taken, processed and assessed for potential in accordance with CA Technical Manual 2 *The Taking and Processing of Environmental and Other Samples from Archaeological Sites*.

4.14 If human remains are encountered, the client and the archaeological advisor to the LPA will be informed immediately. Where excavation of human remains is undertaken, this will be conducted following the provisions of the Coroners Unit in the Ministry of Justice.

4.15 CA will comply fully with the provisions of the Treasure Act 1996 and the Code of Practice referred to therein.

Artefact retention and discard

4.16 Artefacts from topsoil and subsoil and un-stratified contexts will normally be noted but not retained unless they are of intrinsic interest (e.g. worked flint or flint debitage, featured pottery sherds, and other potential 'registered artefacts'). All artefacts will be collected from stratified excavated contexts.

Human remains

4.17 In the case of the discovery of human remains (skeletal or cremated), at all times they should be treated with due decency and respect. Where human remains are encountered, these will not be excavated unless their disturbance by the development is unavoidable. In cases where exhumation of human remains is deemed unavoidable/necessary, this will be conducted following the provisions of the Coroners Unit in the Ministry of Justice. All excavation and post-excavation processes will be in accordance with the standards set out in *CIfA Technical Paper No 7 Guidelines to the Standards for recording Human Remains* (CIfA 2004).

Environmental remains

4.18 Due care will be taken to identify deposits which may have environmental potential, and where appropriate, a programme of environmental sampling will be initiated. This will follow the Historic England environmental sampling guidelines outlined in *Environmental Archaeology, A guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (English Heritage 2011), and *CA Technical Manual 2: The Taking and Processing of Environmental and Other Samples from Archaeological Sites.* The sampling strategy will be adapted for the specific circumstances of the site, in close consultation with the CA Environmental Officer.

4.19 The processing of the samples will be done in conjunction with the relevant specialist following the Historic England general environmental processing guidelines (English Heritage 2011). Flotation or wet sieve samples will be processed to 0.25mm. Other more specialist samples such as those for pollen will be prepared by the relevant specialist. Further details of the general sampling policy and the methods of taking and processing specific sample types are contained within *CA Technical Manual 2: The Taking and Processing of Environmental and Other Samples from Archaeological Sites*.

Treasure

4.20 Upon discovery of Treasure CA will notify the client and the curator immediately. CA will comply fully with the provisions of the Treasure Act 1996 and the Code of Practice referred to therein. Findings will be reported to the coroner within 14 days.

Historic Building Recording

4.21 Prior to the construction phase, A Historic Building survey of a WWII pillbox (**WA 75**) will be undertaken to Level II standard as defined in Understanding Historic Buildings; A guide to good recording practice (English Heritage 2006). The pillbox is to be retained, but adapted to use as a bat roost.

4.22 The drawn record will include measured plans as existing, indicating the form and location of any structural features and/or detail of historic significance including any evidence for fixtures of significance, including alterations/enhancements; drawings showing measured elevations and cross-sections, long sections necessary to aid the understanding of the building's design, development or function; and a site plan at 1:500 or 1:1250 relating the building to other structures, topographical and landscape features.

4.23 The photographic record will include general views of the buildings, shots of their external appearance and the overall appearance of principal room/s and circulation areas.

4.24 The written account will include the location of the structure; the date and circumstances of the record and name of recorder; an account of the buildings' form, function, date, and development sequence; and the names of architects/builders/ patrons and owners will be given, where known. Internal recording will be subject to a Health and Safety Assessment. The work of recording would include a detailed inspection of the structures in their current form, together with a full photographic and written record being compiled. Access will be required to both the interior and exterior of the buildings concerned. Plans/elevations of the buildings will also be required, and it is assumed that standard plans can be sourced. It would not be our intention, or indeed a requirement at this level, to carry out any more extensive research with regard to the pillbox, but sources available online and any previous reports will be utilised to inform the report.

4.25 The survey will of course, also record the setting of the pillbox (to be a 360º photo record), recording on the one hand shots towards pill box from locations from where it is visible from the north, east and west, and on the other hand recording fields of view/fire from within pillbox. Sam Wilson, CA's battlefield expert, will be asked to advise on fields of fire and likely range of fire.

Level 2 Survey

Plans/Drawings (it is assumed that plans and elevations can be sourced)

- Sketched plan, section, elevation or detail drawings.
- Measured plans as existing. Plans will show the form and location of any structural features of historic significance, such as blocked doors, windows, masonry joints, and other changes in floor and ceiling levels, and any evidence for fixtures of significance.
- Measured drawings recording the form or location of other significant structural detail,
- Measured cross-sections, long-sections or elevational sections illustrating the vertical relationships within the pillbox (floor and ceiling heights, or the form of roof supports, for example).
- Measured elevations, where these are necessary to an understanding of the pillbox's design, development or function and not more readily obtained by photography.
- A site plan, typically at 1:500 or 1:1250, relating the building to other structures and to related topographical and landscape features.

Photography

We would use digital photography in accordance with the standard set out in the Historic England Guidance 'Digital Image Capture and File Storage: Guidelines for Best Practice' (2105).

- A general view or views of the pillbox (in its wider setting or landscape).
- The pillbox's external appearance.
- The overall appearance of the principal room/s and circulation areas.

Written Account/Report

The report will utilise any heritage reports provided by the client, in addition to the results of any preliminary research undertaken utilising online sources, and will comprise:

- The building's precise location, both as a National Grid reference and in address form.
- A note of any designation (Conservation Area). Non-statutory designations (local list etc) may be added.
- The date of the record, the name(s) of the recorder(s) and, if an archive has been created, its location.

Metal Detecting Survey

4.26 A metal detecting survey will be undertaken over an area of *c*. 1ha centered on the WWII Crash Site (**WA 74**). As the location is a protected crash site, the survey will only be allowed to progress once a license has been requested and subsequently obtained from the Department of Commemorations and Licensing (MOD). Initial contact has been made with Deborah Morgan at the DCL to discuss the nature of a potential future request. Once the license has been obtained the proposed survey area will first be assessed as to whether ground conditions (e.g. crop cover, weathering, ploughing regime) are suitable for metal detecting, so that the maximum level of coverage can be undertaken. It should be noted that the area is very prone to hard frosts (recorded during the geoarch survey) and any survey should be programmed to be undertaken either before or after the winter period. Landowner permissions will be sought through the client or their agents.

4.27 Metal detecting will take place over the fields using transects established at 10m intervals and related to the OS grid. Every artefact of possible archaeological significance will be marked and find spot surveyed using a Leica GPS. Bags will be marked with the site code and a unique registered artefact number. The location of the transects will be established using standard survey techniques and plotted using GPS.

4.28 The metal detectorists will cover a two metre wide transect as a basis for artefact collection. The initial survey will be along one axis of the transect line, with the secondary survey along the opposing axis. A CA Project Officer, Sam Wilson, (who specializes in surveying Battlefield sites) will lead the survey and ensure uniformity of results. Sam Wilson will be accompanied by a geomatics officer. Where possible, and subject to Health and Safety and insurance requirements, the local Metal Detecting Club will be invited to assist in the survey, subject to the approval of and

following discussions with the Finds Liaison Officer for KCC. Sam Wilson will also liaise with Mark Harrison of Historic England, who has undertaken a lead role in the Forgotten Frontline Project. Recording will be undertaken in non-ferrous mode.

4.29 In the event that UXO is encountered it will be appropriately reported and the authorities informed.

5. STAFF AND TIMETABLE

5.1 This project will be under the management of Richard Greatorex, Principal Fieldwork Manager, BA Hons, MIfA, Cotswold Archaeology (Andover Office).

5.2 The staffing structure will be organised thus: the Project Manager will direct the overall conduct of the proposed work as required during the archaeological programme. Day to day responsibility however will rest with the Project Leaders who will be on-site throughout the project.

5.3 The field team will consist of a Project Leaders, supplemented by additional Archaeologists as required).

5.4 The duration of the fieldwork will be dependent upon the contractor's programme.

5.5 Specialists who will be invited to provide advice and report on specific aspects of the project as necessary are:

Ceramics	Ed McSloy MCIfA (CA)
Metalwork	Ed McSloy MCIfA (CA)
Flint	Jacky Sommerville PCIfA (CA)
Animal Bone	Andy Clarke (CA)/
	Matty Holmes BSc MSc ACIfA (freelance)
Human Bone	Sharon Clough MCIfA (CA)
Environmental Remains	Sarah Wyles PCIfA (CA)
Conservation	Pieta Greeves BSc MSc ACR
	(Drakon Heritage and Conservation)
Geoarchaeology	Dr Keith Wilkinson (ARCA)
Building Recording	Peter Davenport MCIfA, FSA (CA)

5.6 Depending upon the nature of the deposits and artefacts encountered it may be necessary to consult other specialists not listed here. A full list of specialists currently used by Cotswold Archaeology is contained within Appendix A.

6. POST-EXCAVATION, ARCHIVING AND REPORTING

6.1 Following completion of fieldwork, all artefacts and environmental samples will be processed, assessed, conserved and packaged in accordance with CA Technical Manuals and the relevant recipient Museum guidelines. A recommendation will be made regarding material deemed suitable for disposal/dispersal in line with the relevant recipient Museums' collection policy.

6.2 An illustrated report will be compiled on the results of the fieldwork and assessment of the artefacts, palaeo-environmental samples etc. The report will include:

(i) an abstract containing the essential elements of the results preceding the main body of the report, and a summary of the project's background;
(ii) description and illustration of the site location;
(iii) a methodology of the works undertaken;
(iv) integration of, or cross-reference to, appropriate cartographic and documentary evidence and the results of other research undertaken, where relevant to the interpretation of the watching brief results;
(v) a description of the project's results;
(vi) an interpretation of the results in the appropriate context;
(vii) a summary of the contents of the project archive and its location (including summary catalogues of finds and samples);
(viii) a site location plan at an appropriate scale on an Ordnance Survey, or equivalent, base-map;
(ix) a plan showing the location of the areas observed and exposed archaeological features and deposits in relation to the site boundaries;
(x) plans of each area in which archaeological features are recognised. These will be at an appropriate scale to allow the nature of the features exposed to be shown and understood. Plans will show the orientation of features recorded in relation to north. Section drawing locations will be shown on these plans. Archaeologically

sterile areas will not be illustrated unless this can provide information on the development of the site stratigraphy or show palaeoenvironmental deposits that have influenced the site stratigraphy;

(xi) section drawings of areas/trenches and features will be included where appropriate, with OD heights and at scales appropriate to the stratigraphic detail being represented. These will show the orientation of the drawing in relation to north/south/east/west. Archaeologically sterile trenches will not be illustrated unless they provide significant information on the development of the site stratigraphy or show palaeoenvironmental deposits that have influenced the site stratigraphy;

(xiii) photographs showing significant features and deposits that are referred to in the text. All photographs will contain appropriate scales, the size of which will be noted in the illustration's caption;

(xiv) a consideration of evidence within its wider local/regional context;

(xv) a summary table and descriptive text showing the features, classes and numbers of artefacts recovered and soil profiles with interpretation;

(xvi) specialist assessment or analysis reports where undertaken;

6.3 Specialist artefact and palaeoenvironmental assessment will take into account the wider local/regional context of the archaeology and will include:

(i) specialist aims and objectives
(ii) processing methodologies (where relevant)
(iii) any known biases in recovery, or problems of contamination/residuality
(iv) quantity of material; types of material present; distribution of material
(v) for environmental material, a statement on abundance, diversity and preservation
(vi) summary and discussion of the results to include significance in a local and regional context

6.4 Copies of the draft report will be distributed to the Client or their Representative and to KCC's PAO thereafter for verification and approval. Thereafter, copies of the approved report will be issued to the Client, KCC's PAO and the local Historic Environment Record (HER). Reports will be issued in digital format (PDF/PDFA as appropriate) except where hard copies have been specifically requested, and will be supplied to the HER along with shapefiles containing location data for the areas investigated, if required.

6.5 An ordered, indexed, and internally consistent site archive will be prepared and deposited in accordance with *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation* (Archaeological Archives Forum 2007) and the relevant museum guidelines.

Academic dissemination

6.6 As the limited scope of this work is likely to restrict its publication value, it is anticipated that a short publication note only will be produced, suitable for inclusion within an appropriate local archaeological journal [Kent Archaeological Society online publication]. Subject to any contractual constraints, a summary of information from the project will also be entered onto the OASIS online database of archaeological projects in Britain including the upload of a digital (PDF) copy of the final report, which will appear on the Archaeology Data Service (ADS) website once the OASIS record has been verified.

Public dissemination

6.7 In addition to the ADS website, a digital (PDF) copy of the final report will also be made available for public viewing via Cotswold Archaeology's *Archaeological Reports Online* web page, generally within 12 months of completion of the project (http://reports.cotswoldarchaeology.co.uk/).

Archive deposition

6.8 CA will make arrangements with the appropriate museum (accession number TBC) for the deposition of the site archive and, subject to agreement with the legal landowner(s), the artefact collection. The appropriate museum will be consulted at this stage concerning their requirements and notified in advance of the expected time limits for deposition of the archive.

7. HEALTH AND SAFETY

7.1 CA will conduct all works in accordance with the Health and Safety at Work Act 1974 and all subsequent Health and Safety legislation, CA Health and Safety and Environmental policies and the CA Safety, Health and Environmental Management System (SHE), as well as any Principal Contractor's policies or procedures. A site-

specific Construction Phase Plan (form SHE 017) will be formulated prior to commencement of fieldwork.

8. INSURANCES

8.1 CA holds Public Liability Insurance to a limit of £10,000,000 and Professional Indemnity Insurance to a limit of £10,000,000.

9. MONITORING

9.1 Notification of the start of site works will be made to the KCC PAO so that there will be opportunities to visit the site and check on the quality and progress of the work.

10. QUALITY ASSURANCE

10.1 CA is a Registered Organisation (RO) with the Chartered Institute for Archaeologists (RO Ref. No. 8). As a RO, CA endorses the *Code of Conduct* (CIfA 2014) and the *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology* (CIfA 2014). All CA Project Managers and Project Officers hold either full Member or Associate status within the CIfA.

10.2 CA operates an internal quality assurance system in the following manner. Projects are overseen by a Project Manager who is responsible for the quality of the project. The Project Manager reports to the Chief Executive who bears ultimate responsibility for the conduct of all CA operations. Matters of policy and corporate strategy are determined by the Board of Directors, and in cases of dispute recourse may be made to the Chairman of the Board.

11. PUBLIC ENGAGEMENT, PARTICIPATION AND BENEFIT

11.1 The construction phase of this project will not afford opportunities for on-site public engagement due to the over-riding concerns for Health and Safety. However, the metal detector survey which will be undertaken prior to construction, will afford some limited public involvement through the engagement with local metal detector groups

who will be invited to assist in the implementation of the survey. Subject to further agreement, it is the intention of the client to erect heritage information panels/boards at appropriate locations around the site. The client may also seek to offer support to such projects as the Defence of the Realm Project and/or the Forgotten Frontline, which have specific associations with the site and its immediate environs. The results will be made publicly available on the ADS and Cotswold Archaeology websites, as set out in Section 6 above, in due course.

12. STAFF TRAINING AND CPD

12.1 CA has a fully documented mandatory Performance Management system for all staff which reviews personal performance, identifies areas for improvement, sets targets and ensures the provision of appropriate training within CA's adopted training policy. In addition, CA has developed an award-winning Career Development Programme for its staff, which ensures a consistent and high quality approach to the development of appropriate skills.

12.2 As part of the company's requirement for Continuing Professional Development, all members of staff are also required to maintain a Personal Development Plan and an associated log which is reviewed within the Performance Management system. All staff are subject to probationary periods on appointment, with monthly review; for site-based staff additional monthly Employee Performance Evaluations measure and record skills and identify training needs.

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APPENDIX A: COTSWOLD ARCHAEOLOGY SPECIALISTS

Ceramics

Neolithic/Bronze Age	Ed McSloy BA MCIFA (CA) Emily Edwards (freelance) Dr Elaine Morris BA PhD FSA MCIFA (University of Southampton)
Iron Age/Roman	Ed McSloy BA MCIFA (CA) Kayt Marter Brown BA MSc MCIFA (freelance)
(Samian) (Amphorae stamps)	Gwladys Montell MA PhD (freelance) Dr David Williams PhD FSA (freelance)
Anglo-Saxon	Paul Blinkhorn BTech (freelance) Dr Jane Timby BA PhD FSA MCIFA (freelance)
Medieval/post-medieval	Ed McSloy BA MCIFA (CA) Kayt Marter Brown BA MSc MCIFA (freelance) Stephanie Ratkai BA (freelance) Paul Blinkhorn BTech (freelance) John Allan BA MPhil FSA (freelance)
South West	Henrietta Quinnell BA FSA MCIFA (University of Exeter)
Clay tobacco pipe	Reg Jackson MLitt MCIFA (freelance) Marek Lewcun (freelance)
Ceramic Building Material	Ed McSloy MCIFA (CA) Dr Peter Warry PhD (freelance)

Other Finds

Small Finds	Ed McSloy BA MCIFA (CA)
Metal Artefacts	Katie Marsden BSc (CA) Dr Jörn Schuster MA DPhil FSA MCIFA (freelance) Dr Hilary Cool BA PhD FSA (freelance)
Lithics	Ed McSloy BA MCIFA (CA) Jacky Sommerville BSc MA PCIFA (CA)
(Palaeolithic)	Dr Francis Wenban-Smith BA MA PhD (University of Southampton)
Worked Stone	Dr Ruth Shaffrey BA PhD MCIFA (freelance) Dr Kevin Hayward FSA BSc MSc PhD PCIFA (freelance)
Inscriptions	Dr Roger Tomlin MA DPhil, FSA (Oxford)
Glass	Ed McSloy MCIFA (CA) Dr Hilary Cool BA PhD FSA (freelance) Dr David Dungworth BA PhD (freelance; English Heritage)
Coins	Ed McSloy BA MCIFA (CA) Dr Peter Guest BA PhD FSA (Cardiff University) Dr Richard Reece BSc PhD FSA (freelance)
Leather	Quita Mould MA FSA (freelance)
Textiles	Penelope Walton Rogers FSA Dip Acc. (freelance)
Iron slag/metal technology	Dr Tim Young MA PhD (Cardiff University) Dr David Starley BSc PhD
Worked wood	Michael Bamforth BSc MCIFA (freelance)

Biological Remains	
Animal bone	Dr Philip Armitage MSc PhD MCIFA (freelance) Dr Matilda Holmes BSc MSc ACIFA (freelance)
Human Bone	Sharon Clough BA MSc MCIFA (CA)
Environmental sampling	Sarah Wyles BA PCIFA (CA) Sarah Cobain BSc MSc ACIFA (CA) Dr Keith Wilkinson BSc PhD MCIFA (ARCA)
Pollen	Dr Michael Grant BSc MSc PhD (University of Southampton) Dr Rob Batchelor BSc MSc PhD MCIFA (QUEST, University of Reading)
Diatoms	Dr Tom Hill BSc PhD CPLHE (Natural History Museum) Dr Nigel Cameron BSc MSc PhD (University College London)
Charred Plant Remains	Sarah Wyles BA PCIFA (CA) Sarah Cobain BSc MSc ACIFA (CA)
Wood/Charcoal	Sarah Cobain BSc MSc ACIFA(CA) Dana Challinor MA (freelance)
Insects	Enid Allison BSc D.Phil (Canterbury Archaeological Trust) Dr David Smith MA PhD (University of Birmingham)
Mollusca	Sarah Wyles BA PCIFA (CA) Dr Keith Wilkinson BSc PhD MCIFA (ARCA)
Ostracods and Foraminifera	Dr John Whittaker BSc PhD (freelance)
Fish bones	Dr Philip Armitage MSc PhD MCIFA (freelance)
Geoarchaeology	Dr Keith Wilkinson BSc PhD MCIFA (ARCA)
Soil micromorphology	Dr Richard Macphail BSc MSc PhD (University College London)
Scientific Dating	
Dendrochronology	Robert Howard BA (NTRDL Nottingham)
Radiocarbon dating	SUERC (East Kilbride, Scotland) Beta Analytic (Florida, USA)
Archaeomagnetic dating	Dr Cathy Batt BSc PhD (University of Bradford)
TL/OSL Dating	Dr Phil Toms BSc PhD (University of Gloucestershire)
Conservation	Karen Barker BSc (freelance) Pieta Greaves BSc MSc ACR (Drakon Heritage and Conservation)

APPENDIX B: ARCHAEOLOGICAL STANDARDS AND GUIDELINES

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Andover Office
Stanley House
Walworth Road
Andover
Hampshire
SP10 5LH

t: 01264 347630

Cirencester Office
Building 11
Kemble Enterprise Park
Cirencester
Gloucestershire
GL7 6BQ

t: 01285 771022

Exeter Office
Unit 53
Basepoint Business Centre
Yeoford Way
Marsh Barton Trading Estate
Exeter
EX2 8LB

t: 01392 826185

Milton Keynes Office
Unit 8 - The IO Centre
Fingle Drive
Stonebridge
Milton Keynes
Buckinghamshire
MK13 0AT

t: 01908 564660

e: enquiries@cotswoldarchaeology.co.uk