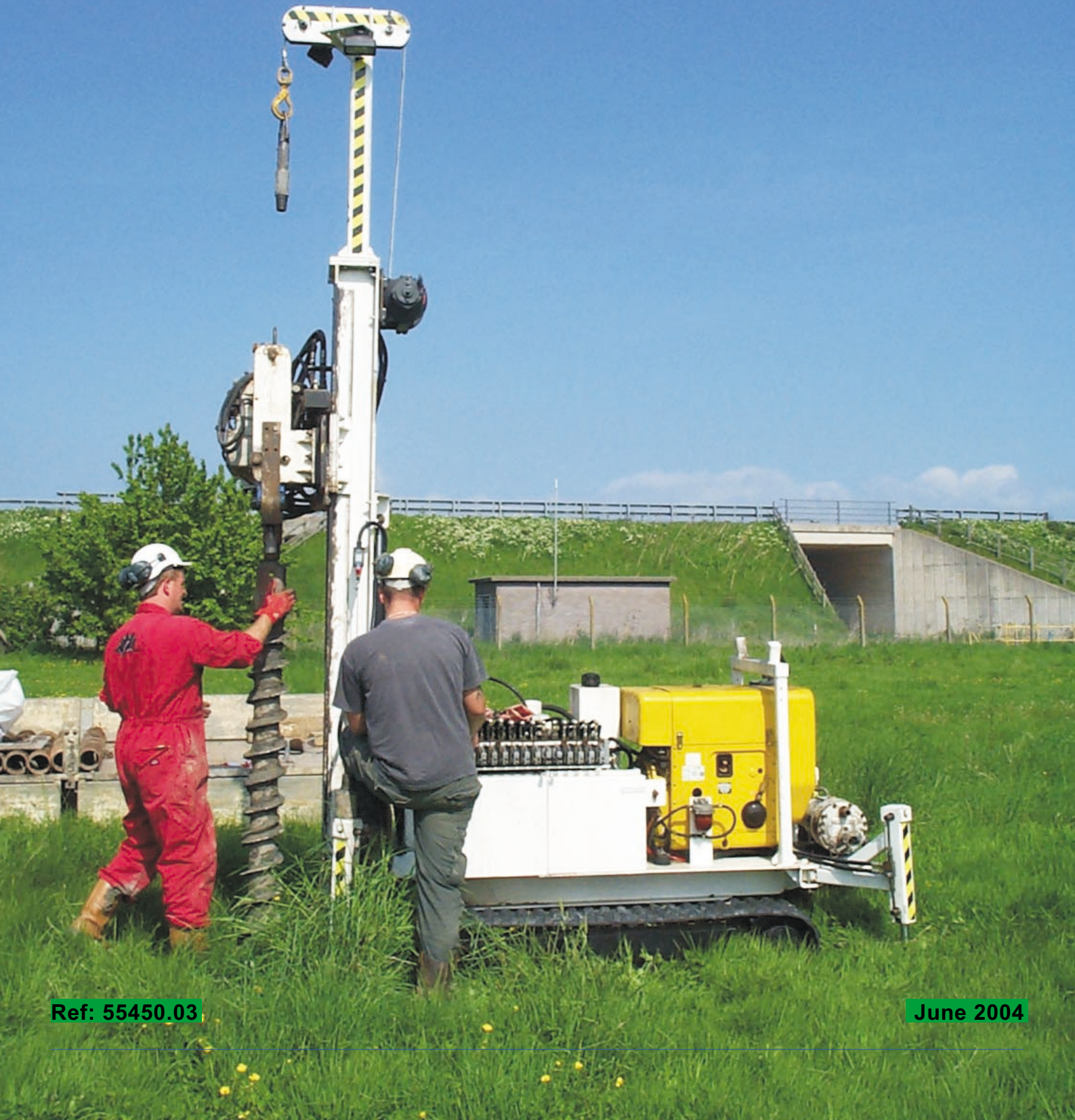


Former Enron Works, Severnside South Gloucestershire

Analysis of Borehole Cores



**FORMER ENRON WORKS
SEVERNSIDE
SOUTH GLOUCESTERSHIRE**

ANALYSIS OF BOREHOLE CORES

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REF 55450.03

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Figure 1 Site location plan and location of boreholes

Figure 2 Schematic section illustrating stratigraphic units observed

Appendix 1 Sediment Descriptions

Summary

Wessex Archaeology was commissioned by Terramond Limited to undertake a borehole survey and analysis of the excavated cores on land at the Former Enron Works, Severnside, centred on NGR 353700 183100. A planning application is to be submitted to South Gloucestershire Council for redevelopment involving the construction of a hard standing vehicle parking area (PT03/3452/F) and a workshop (PT03/3550/O) on the Site.

The Site is situated on the Henbury Level, an area of low lying, flat, artificially drained land forming part of the Avon Levels. Geotechnical test pits and boreholes excavated in 1997 on the adjacent Avlon Works identified localised peat deposits within post-glacial alluvial deposits, while a possible Iron Age/Romano-British buried soil was identified on a site some 0.5km to the north-east. However, there is, as yet, no evidence for archaeological remains of Prehistoric or Romano-British date on the Site itself.

A total of four cores were taken to a depth of 6m below local ground surface with the aim of ascertaining both the presence/absence of archaeological deposits and the geoarchaeological potential of the stratified sequences.

Analysis revealed a laterally consistent waterlogged local sequence which can be tied to the established mid-late Holocene sedimentological sequence already documented for the Severn Estuary. No direct evidence of human occupation of the immediate area was evident, however the presence of an inwashed charcoal horizon suggests human activity within the vicinity.

Periods of water recession and partial stabilisation of the local area are demonstrated by the presence of *Phragmites*, indicating emergent reed populations, and by the formation of peat, observed in all but the northernmost borehole, where *Phragmites* was noted in the same approximate stratigraphic position as the peat. Peat may have been formerly present, but removed by subsequent fluvial action or had not formed due to higher local water conditions.

The peat and charcoal horizons cannot be directly correlated to those in other sequences, and the peat horizons across the Middle Wentlooge Formation are neither planar nor continuous. Such horizons have been dated to between 5790-5590 cal BC and 930-520 cal BC.

There is potential to date the peat and compare this with previously dated Middle Wentlooge peat beds in the Severn Levels. More significant, however, would be a radiocarbon determination of the charcoal layer to attempt to relate this to known dated occupation/activity sites, especially those of later Bronze Age and Iron Age date.

Acknowledgements

Wessex Archaeology would like to thank Huw Thomas of Terramond Limited for commissioning this fieldwork. Thanks are also due to David Haigh, South Gloucestershire Archaeology and Conservation Officer, and Vanessa Straker of English Heritage for their assistance and advice during the design phase of the project.

Geoarchaeological analysis of the core samples was undertaken by Dr. Cathie Chisholm who also compiled the geoarchaeological section of this report. Environmental sections were edited by Dr. Mike Allen and the overall report compiled and edited by Rob Armour Chelu. Linda Coleman prepared the illustrations, and the project was managed on behalf of Wessex Archaeology by Rob Armour Chelu.

**FORMER ENRON WORKS
SEVERNSIDE
SOUTH GLOUCESTERSHIRE**

ANALYSIS OF BOREHOLE CORES

1 INTRODUCTION

1.1 Project Background

1.1.1 Wessex Archaeology has been commissioned by Terramond Ltd (The Client), to undertake a borehole survey and archaeological and geoarchaeological analysis of the borehole cores on the site the former Enron Works, Severnside, South Gloucestershire (**Figure 1**, hereafter ‘the Site’), centred on NGR 353700 183100.

1.1.2 This document presents the results of the geoarchaeological investigations and analysis in accordance with a Project Design (WA 2004b) submitted to and approved by South Gloucestershire County Council and subsequent to the completion of a Desk-based Assessment of the Site completed in 2004 (WA 2004a).

1.2 Planning Background

1.2.1 The proposed development is covered by planning applications to be submitted to South Gloucestershire Council. This is to involve the construction of a hard standing vehicle parking area (PT03/3452/F) and a workshop (PT03/3550/O) on the Site (**Figure 2**).

1.3 Site Location, Geology and Topography

1.3.1 The Site is located immediately south and west of an existing industrial site belonging to Terra Nitrogen UK Ltd. It is bounded to the north and west by a drainage ditch, which separates the Site from roads called Central Avenue to the north and Severn Road to the west. The Site is bounded to the south by a disused railway. Pipelines and a building of the former works are situated in the northern part of the Site. An area of hard standing separates two fields to the west. To the west of the Site lies an area of grassland, generally flat, which extends to some 2.6ha.

1.3.2 The Site is situated on the Henbury Level, an area of low lying, flat, artificially drained land, forming part of the Avon Levels. Extensive sea defences prevent inundation. The solid geology consists of Triassic/early Jurassic mudrocks, overlain by marine alluvium and gravels. This is overlain by a thick band of post-glacial alluvial deposits known as the Wentlooge Formation, comprising a series of estuarine silts/sands and peat up to 15m deep, formed by a long sequence of Holocene inundations, bog formations and dry episodes. Since post-Roman times, centuries of drainage and sea defence construction have resulted in the formation of a relatively stable terrestrial landscape, dominated by pastoral agriculture.

1.3.3 The Avon Levels are bounded to the east by uplands, which drain onto the fenland. The coastal margins of the Levels are slightly higher than the back-fen inland, and these have historically proved more attractive to settlement.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Archaeological and Historical Background

- 2.1.1 Human exploitation of the Levels has involved both exploitation of the wetland resources and the gradual reclamation and management of the land for agriculture. The visible landscape is largely of Medieval and later date. Archaeological evidence for pre-Medieval activity is typically buried within the alluvium.
- 2.1.2 Prior to the Medieval period, settlement was typically centred on the uplands that fringe the Levels to the east. However, there is increasing archaeological evidence for human exploitation of the Levels from the later Prehistoric (e.g. Bronze Age) period.
- 2.1.3 Land reclamation, the improvement of land through drainage and enclosure, was gradual and piecemeal, with the modern landscape the product of this process. Rippon (1997) has suggested a broad correlation between relief, history of reclamation, enclosure and drainage, and landscape type, in the form of a general trend from complex to simple field-boundary patterns over time.
- 2.1.4 The coastal areas of the Levels were settled first. The earliest settlements typically established around oval-shaped enclosed areas or ‘infields’, linked by trackways or droveways. These settlements gradually expanded through the enclosure of lobe-shaped parcels of land from the surrounding area. This piecemeal reclamation led to the development of a landscape which Rippon (1997) has termed ‘irregular’, characterised by an often dispersed settlement pattern with small, irregular fields, long, sinuous droveways with extensive roadside waste, and occasional patches of common. Natural watercourses were frequently incorporated into the post-reclamation drainage systems of such landscapes, and the lines of meandering natural channels are often preserved in the field boundaries. These ‘irregular’ landscapes appear to have developed from Late Saxon times to the 12th or 13th centuries.
- 2.1.5 The subsequent enclosure of the lower-lying back-fen and open fields was similarly piecemeal, and is typified by landscapes termed ‘intermediate’ by Rippon (1997), characterised by regularly arranged blocks of strip-fields laid out between long, often curving, and roughly parallel boundaries, and blocks of long, narrow, strip-like but enclosed parcels of land. The droveways are straighter than in ‘irregular’ landscapes, and became a focus for small-scale settlement, with farmsteads and cottages developing along them. There is little evidence for Medieval settlement in these areas, and the ridge and furrow which survives is limited in extent, the predominant land use seeming to be pasture. Rippon assigns no date range for these landscapes.
- 2.1.6 The final phase of enclosure on the Levels was associated with Post-medieval enclosure, often by Act of Parliament in the later 18th or early 19th centuries. These later landscapes are characterised by large blocks of rectilinear fields, laid out in a framework of straight, narrow roads with no roadside waste. There is little or no settlement in these landscapes.

2.2 Previous Archaeological Investigations

- 2.2.1 A number of archaeological assessments and surveys have been previously undertaken in connection with this part of the Avon Levels. Principal amongst these is the archaeological Desk-based Assessment undertaken in respect of the Site in 2004 (WA 2004a).
- 2.2.2 An earlier Desk-based Assessment was undertaken in respect of the development of a distribution park on land immediately to the north and east of the Avlon Works. This development area, known as the Western Approaches Park (WAP1) lies about 1km north-east of the Site. The desk-based assessment was submitted as part of an Environmental Statement in support of the WAP1 outline planning application. Further work has been carried out at the Avlon Works (Wessex Archaeology 2001, 2002), about 900m east-north-east of the Site.
- 2.2.3 Additional documentary research was also undertaken by Wessex Archaeology in connection with reserved matters applications in respect of a number of plots on the WAP1 development. This drew on research commissioned from the Glamorgan Gwent Archaeological trust (GGAT) for the Second Severn Crossing and WAP1 (GGAT 1997) projects.
- 2.2.4 A number of archaeological surveys and evaluations have also been undertaken in connection with the WAP1 development.

3 AIMS AND OBJECTIVES

- 3.1.1 The objective of the borehole survey was to establish within the constraints of the agreed strategy, as set out in the approved Project Design (WA 2004b), the presence or absence, location, extent, date, character, condition, and depth of any surviving remains which may be affected by the proposed development.
- 3.1.2 In addition, the survey examined deeply stratified deposits within the alluvium, which may preserve information on the palaeoenvironmental history of the Site through the preservation of organic remains.
- 3.1.3 The survey results contained within this document will inform the Local Planning Authority on the need for, and appropriateness of further evaluation and/or excavation in advance of development.

4 FIELDWORK STRATEGY

- 4.1.1 A full time professional member of Wessex Archaeology's staff was in attendance during excavation of a series of four borehole cores (**Figure 1**) by specialist sub-contractors. Undisturbed sleeved cores were removed from the Site by the monitoring archaeologist, and returned to Wessex Archaeology's offices for analysis.
- 4.1.2 Boreholes 1 and 2 were located within the footprint of the proposed building to examine potential impact of the piled foundations upon any buried archaeological resource. Boreholes 3 and 4 were positioned away from the proposed building, to the north, to act both as a 'control', allowing examination of the wider context into which the proposed

building is to be constructed. Boreholes were positioned on a 40m grid, although ground conditions dictated an 80m interval between Boreholes 2 and 3.

5 FIELDWORK METHODOLOGY

5.1 Fieldwork

5.1.1 All Site attendance and recording was conducted in compliance with the standards outlined in the Institute of Field Archaeologists' *Standard and Guidance for an Archaeological Watching Brief* (as amended 1994).

5.1.2 Arrangements have been made with Bristol City Museum for deposition of the archive and finds, subject to agreement with the landowners. In this instance it is considered appropriate to await the results of any further fieldwork on the Site in relation to the current proposal before deposition of the archive.

5.2 Survey

5.2.1 Borehole locations were surveyed using a Total Station and their position tied in to the Ordnance Survey National Grid.

6 BOREHOLE CORE ANALYSIS

6.1 Introduction

6.1.1 Four sequences within sleeved cores were recovered from the Site and removed for geoarchaeological examination, as stated in the Project Design (WA 2004b), in order to address the following issues:

- the establishment, within the constraints of the agreed strategy, of the presence or absence, location, extent, date, character, condition, and depth of any surviving remains which may be affected by the proposed development.
- the examination of deeply stratified deposits within the alluvium, which may preserve information on the palaeoenvironmental history of the site through the preservation of organic remains.
- to inform the Local Planning Authority on the need for, and appropriateness of further evaluation and/or excavation in advance of development.

6.1.2 The Site is situated on the Henbury Level, an area of low lying (*c.* 6.6m aOD), flat, artificially drained land, forming part of the Avon Levels. Extensive sea defences prevent inundation. The solid geology consists of Triassic/early Jurassic mudrocks, overlain by marine alluvium and gravels. This in turn is overlain by a thick band of post-glacial alluvial deposits known as the Wentlooge Formation (Allen 1987; 1990; Allen and Rae 1987), comprising a series of estuarine alluvium and peat up to 15m deep, formed by a long sequence of Holocene inundation.

6.2 Methodology

- 6.2.1 Examination of the cores was undertaken in accordance with the approved Project Design (WA 2004b).
- 6.2.2 The retained sequences were described and major sedimentary units defined, thus providing the basis for recording the sedimentary architecture and sedimentary history of the Site. The results were related to the broader sedimentary history of the area where possible. No further assessment of the geoarchaeological elements is proposed at this stage, however, samples have been retained to allow for further assessment should this be deemed appropriate.
- 6.2.3 The cores were split lengthways, opened and the surface cleaned with a scalpel. Standard description was undertaken, according to Hodgson (1976) and colour established using Munsell colours (Appendix 1). The sediments were assigned to units within each core and an attempt made to correlate these units between cores (illustrated in **Figure 2**). Comparison was made to sedimentary sequences previously established in the area (Allen 1987; 1990; Allen and Rae 1987, Allen and Scaife / WA 2001, Gardiner *et al.* 2002; Moore *et al.* 2002, Wessex Archaeology 2002, 2004b)

6.3 Description of Results

- 6.3.1 Four 6m sequences were recovered and described (**Appendix 1**). Fine minerogenic sediments (clay silts, fine sand; Wentlooge) were found to dominate although a thin peat unit was also observed in all but the northernmost sequence, at *c.*4.50-5.00m depth (2.1-1.6m aOD). A layer of charcoal inwash was recorded at *c.*2.20m depth (4.4m aOD) in all four sequences. A high degree of consistency with little lateral variation between the four cores across the Site was noted. It has, therefore, been possible to divide the stratigraphy into units (1-7, **Appendix 1**) illustrated in **Figure 2**.
- 6.3.2 A base of blue-grey sandy silts divided into thin, uniform flood couplets (unit 7) was generally overlain by humic silts and peat (unit 6). A second layer of sandy silts in flood couplets (unit 5) was recorded above a series of olive and blue-grey laminated clays and silts (units 4-3), with unit 3 containing the charcoal inwash. Unit 2, to *c.* 2.00m (4.6m aOD), comprised reddish brown clay silts on which a modern (alluvial gley) topsoil (unit 1) had formed.

6.4 Interpretation

- 6.4.1 Sediments of the Upper (units 1-2) and Middle Wentlooge (units 3-7) Formation, from the mid-late Holocene, are recorded. The Upper Wentlooge comprising characteristically red-brown clay silts, and the Lower Wentlooge of olive to blue-grey clays, silts and fine sands with a single, thin peat unit. Both are believed to be of estuarine alluvial origin, formed from fine overbank sedimentation on the floodplain. Of note are uniform, repeated flood couplets throughout the lower sediments described, indicating repeated and rhythmic inundation, with sorting into bands of sediments each of which fine upwards due to sorting in the flood waters.
- 6.4.2 Periods of water recession and partial stabilisation of the local area are demonstrated by the presence of *Phragmites*, indicating emergent reed populations, and by the formation of

the peat unit observed in all but the northernmost borehole, where *Phragmites* was noted in the same approximate stratigraphic position as the peat. Peat may have been formerly present, but removed by subsequent fluvial action or had not formed due to higher local water conditions. A sharp boundary at the base indicates a relatively rapid drop in water level/ fluvial input to allow the waterlogged low energy environment conducive to peat formation.

- 6.4.3 The wetlands have been used for a variety of economic activities from early prehistory but such stabilisation might have allowed humans greater access to the local area. In one or more cores, a phase of increased flooding represented by pale grey clay silts interrupted peat development, bisecting the unit. Humic silts above the peat indicate a gradual increase in the inundation of the peat surface, with an increasing minerogenic inwash although, to the north, a degree of truncation has occurred.
- 6.4.4 Charcoal inwash occurred at *c.* 2.20m (4.4m aOD) in all sequences observed. The charcoal layer was most defined in Borehole 1 to the south, where laminations within the charcoal suggest lateral run-off from a nearby source. These laminations became more diffuse moving north, with swirls of the charcoal rich sediment indicating initial turbulent flow/ inwash from the progressively distant source. Some organic matter may also occur in these dark layers and in Borehole 2 probable root voids were observed through the underlying layer, indicating partial stabilisation and vegetation encroachment coeval with the charcoal deposition. Despite this inwash, no buried soil such as the Bronze Age soils recorded at Katherine Farm (Allen *et al.* 2002), Cabot Park, Little Googs, Kites Corner (Locock 1999; 2001; Locock *et al.* 1998) etc, was present.
- 6.4.5 Lateral consistency of key horizons suggests they might be used as local marker horizons at relatively stable and predictable depth in the immediate area.

7 DISCUSSION

- 7.1.1 A laterally consistent waterlogged local sequence has been described which can be tied to the established mid-late Holocene sedimentological sequence already documented for the Severn Estuary. No direct evidence of human occupation of the immediate area is evident, however the presence of comminuted charcoal inwash suggests activity within the vicinity.
- 7.1.2 The peat and charcoal horizons cannot be directly correlated to those in other sequences, and the peat horizons across the Middle Wentlooge Formation are neither planar nor continuous. Such horizons have been dated to between 5790-5590 cal BC and 930-520 cal BC (Allen *et al.* 2002, table 3). There is potential to date the peat unit and compare this with previously dated Middle Wentlooge peat beds in the Severn (see Locock 1999; Allen *et al.* 2002). More significant, however, would be a radiocarbon determination of the charcoal layer to attempt to relate this to known dated occupation/activity sites, especially those of later Bronze Age and Iron Age date (cf. Gardiner *et al.* 2002, 23).
- 7.1.3 Although the sedimentary sequence may contain pollen, foraminifera and diatom data, the Upper and Middle Wentlooge sequence has been well studied elsewhere where it is better associated with human activity (as discussed in Gardiner *et al.* 2002 and Allen and Scaife 2001). Further assessment of this material is unlikely to add significantly to known data.

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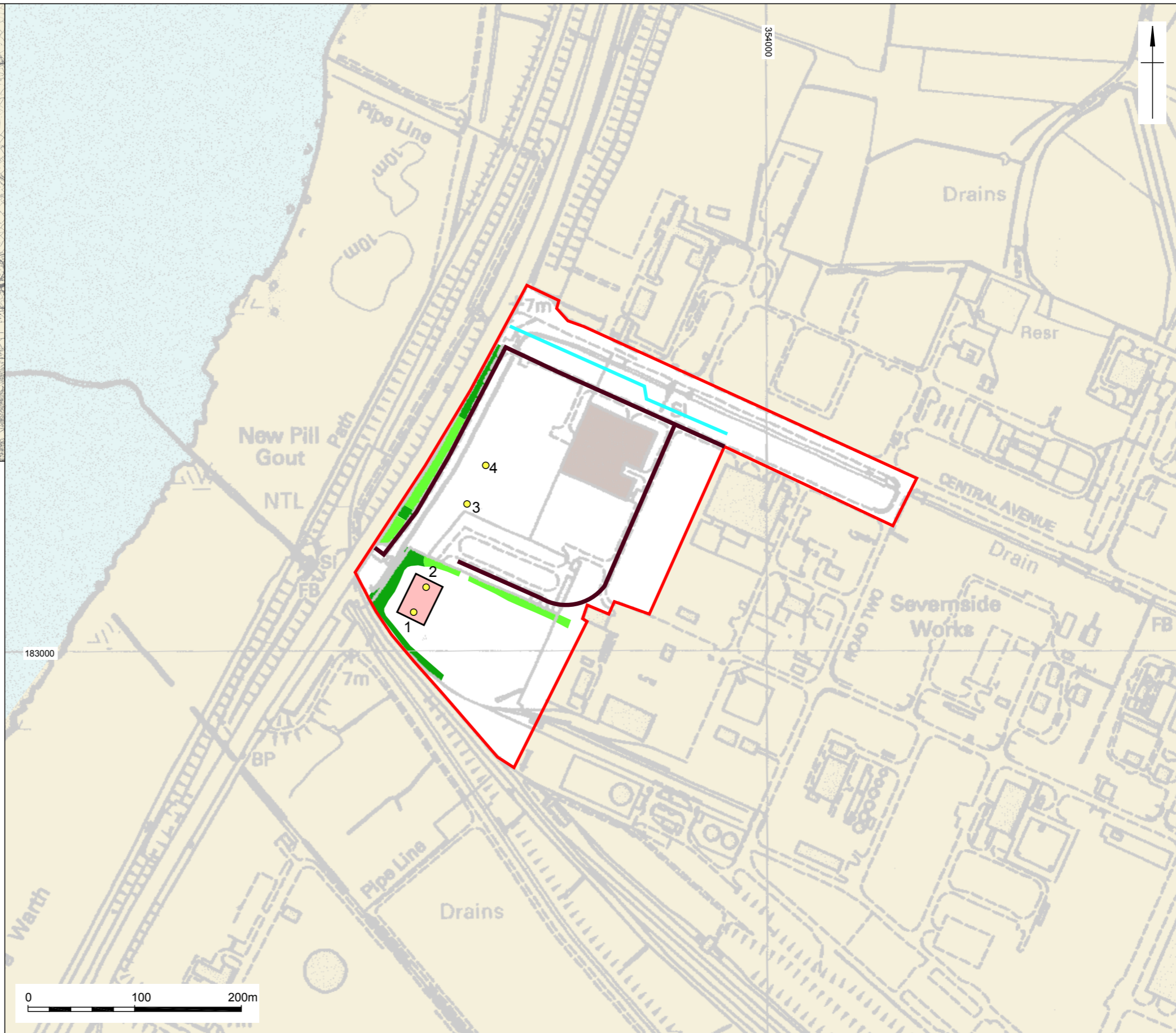
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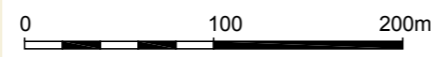
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Wessex Archaeology June 2004



- The Site
- Boreholes
- Existing building
- New building
- Proposed estate roads
- Existing trees retained
- New tree planting
- Existing ESSO pipeline

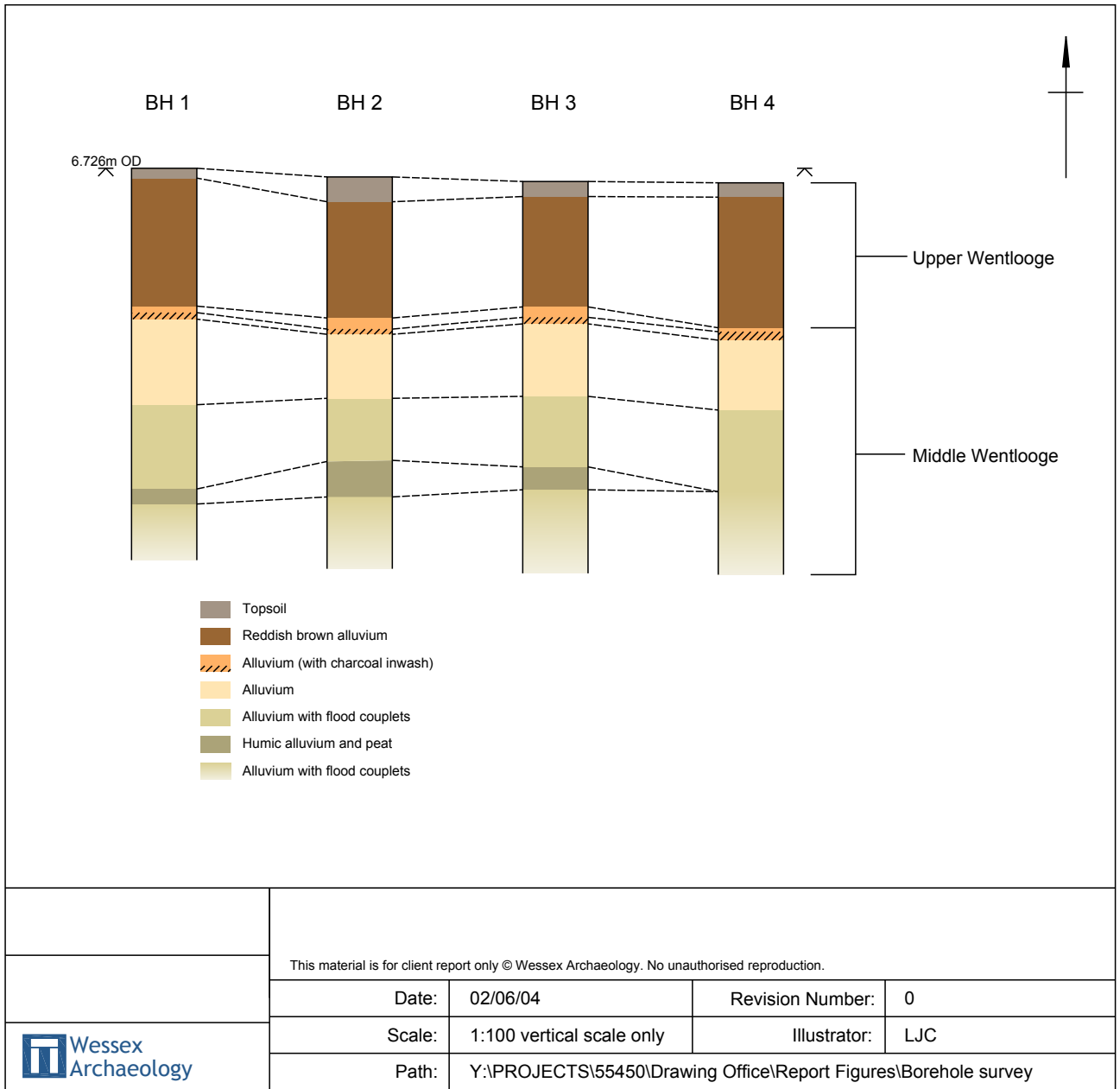


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Site location plan and location of boreholes

Figure 1



Schematic section illustrating the stratigraphic units observed

Figure 2

Appendix 1 Sediment Descriptions

Individual cores were taken in 1.5m lengths, however some were reduced in length by compression, which is noted where significant

BOREHOLE 1

0cm=6.726m aOD

Depth ¹ (cm)	Samples taken	Description	Unit	Formation	
0-15		10YR 3/2 very dark greyish brown silty clay, increasingly organic and crumbly to top but no clear structure/ B horizon. Modern vegetation in top 2cm, numerous fine fleshy roots (some extending into underlying stratum to 64cm). 1 fragment machined ?tile at 10cm, 2.5cm sub-rounded flint at 14cm, no other inclusions visible. Clear boundary <u>Modern topsoil formed on alluvium</u>	1	Upper Wentlooge	
15-211		7.5YR 4/6 strong brown (reddish brown) stiff silty clay with common fine Fe and organic/ Mn? mottling. Increasingly red colouration to base of unit, with a corresponding increase in small Fe nodules. Very coarse blocky peds, inter-ped faces coated with pale blue grey silts <u>Alluvium</u>	2		
211-231	C14 231cm	10YR 6/2 light brownish grey smooth, finely laminated silty clay, gradual boundary. At 221-222cm, 226-226.5cm dark grey horizons consisting of organic staining and/or very fine comminuted charcoal with sharp boundaries occurred. A 4mm defined black band of charcoal occurred at 231cm, abrupt boundary <u>Alluvium with phases of charcoal in-wash</u>	3	Middle Wentlooge	
231-362		231-300cm 2.5YR 5/2 greyish brown smooth massive grey clay silt with common coarse 7.5YR 6/8 reddish yellow Fe mottles, decreasing with depth, gradual transition 300-329cm 10YR 6/2 light brownish grey unconsolidated, waterlogged clay silt. Clear boundary 345-349cm 10YR 5/1 grey fine sandy silt, faint flood couplets visible, gradual transition 349-362cm 2.5YR 5/2 greyish brown stiff massive grey silty clay gradual transition <u>Alluvium</u>	4		
NB 3-4.5m, 150 cm sediment compressed into 107cm					
362-491		10YR 5/1 grey fine sandy silt with clear c.1.5mm regular horizontal banding into flood couplets. Gradual transition <u>Alluvium</u>	5		
491-514	[C14 and pollen]	491-496cm 10YR 4/2 dark greyish brown humic clay silt, decreasing organic content up unit 496-499cm 10YR 2/1 black crumbly silty peat, no visible inclusions. Sharp boundary 499-501cm 10YR 4/1 dark grey humified silty clay. Clear boundary 501-514 10YR 6/2 light brownish grey silt with dark grey (humic/ comminuted charcoal?) laminations and horizontal <i>Phragmites</i> fragments <u>Humic alluvium and peat</u>	6		
514-600		10YR 5/1 grey fine sandy silt with clear c.1.5mm regular horizontal banding into flood couplets, rare vertical ? <i>Phragmites</i> root <u>Alluvium</u>	7		

BOREHOLE 2

0cm=6.630m aOD

<i>Depth¹ (cm)</i>	<i>Samples taken</i>	<i>Description</i>	<i>Unit</i>	<i>Formation</i>
0-38		0-9cm missing ?compression 9-18cm 10 YR 2/1 black mixed and loose silty clay 18-38cm 10YR 3/2 very dark greyish brown silty clay, increasingly organic and crumbly to top but no clear structure/ B horizon. Faint fine Fe mottling. Modern vegetation at 18-22cm, numerous fine fleshy roots (some extending into underlying stratum to 67cm). No inclusions, clear boundary <u>Dumped material and modern topsoil formed on alluvium</u>	1	Upper Wentlooge
38-216		7.5YR 4/6 strong brown (reddish brown) stiff silty clay with common fine Fe. Mn? Mottling below 72cm. Increasingly red colouration to base of unit, with a corresponding increase in small Fe nodules. Very coarse blocky peds, inter-ped faces coated with pale blue grey silts. Clear boundary <u>Alluvium</u>	2	
216-241		10YR 6/2 light brownish grey smooth, finely laminated silty clay, gradual boundary. Contained substantial fine comminuted charcoal from 233-234cm, including one 0.5cm crumbly (reworked?) fragment, with a lesser amount from 234-241cm and a diffuse, swirling boundary <u>Alluvium with charcoal in-wash</u>	3	Middle Wentlooge
241-339		2.5YR 5/2 greyish brown smooth massive grey silty clay gradual transition. Occasional strong Fe staining (7.5YR 5/8 strong brown) along probable vertical root voids, continuing into the underlying sediment to 365cm. Clear boundary <u>Alluvium</u>	4	
339-434		10YR 5/1 grey fine sandy silt with clear c.1.5mm regular horizontal banding into flood couplets. Clear transition <u>Alluvium</u>	5	
434-490		434-438cm 10YR 4/2 dark greyish brown humic clay silt, decreasing organic content up unit 438-442cm 10YR 2/1 black humified silty peat, occasional <i>Phragmites</i> stems. Concentration of molluscs including marsh taxa on upper surface. 442-450cm missing due to compression. Top of underlying core, 450-479cm comprised sloppy, unconsolidated olive and grey silts and peat so it is unclear whether the peat was a single continuous or divided unit in this core 479-480cm peat, as above. Sharp boundary 480-490cm 10YR 4/1 dark grey humified silty clay, numerous horizontal <i>Phragmites</i> stem fragments. Clear boundary <u>Humic alluvium and peat</u>	6	
490-600		490-536cm 10YR 5/1 grey fine sandy silt with clear c.1.5mm regular horizontal banding into flood couplets 536-556cm as above and below but with increased dark (humic?) and medium sand inclusion into flood couplets. Rare vertical roots 556-600cm 10YR 5/1 grey fine sandy silt with clear c.1.5mm regular horizontal banding into flood couplets <u>Alluvium</u>	7	

BOREHOLE 3

0cm=6.560m aOD

<i>Depth¹(cm)</i>	<i>Samples taken</i>	<i>Description</i>	<i>Unit</i>	<i>Formation</i>
0-23		10YR 3/2 very dark greyish brown silty clay, increasingly organic and crumbly to top but no clear structure/ B horizon. Modern vegetation, numerous fine fleshy roots (to 100cm). Rare 1-3mm charcoal fragments from 0-28cm. 1.5cm fragment CBM (brick/tile) at 18-19.5cm. Clear boundary <u>Modern topsoil formed on alluvium</u>	1	Upper Wentlooge
23-192		7.5YR 4/6 strong brown (reddish brown) stiff silty clay with common fine Fe and organic/ Mn? mottling. Increasingly red colouration to base of unit, with a corresponding increase in small Fe nodules. Clear boundary <u>Alluvium</u>	2	
192-218		192-198cm 10YR 6/2 light brownish grey smooth, finely laminated silty clay, gradual boundary. 198-211cm as above, stained with dark grey fine comminuted charcoal 211-218cm 7.5YR 2/0 black silty clay with substantial fine comminuted charcoal. Horizontal laminations and lenses of charcoal and alluvium without charcoal to base <u>Alluvium with substantial charcoal in-wash</u>	3	Middle Wentlooge
218-329		2.5YR 5/2 greyish brown smooth finely laminated grey clay silt with common coarse 7.5YR 6/8 reddish yellow Fe and blue mottles, decreasing with depth, gradual transition <u>Alluvium</u>	4	
329-437		10YR 5/1 grey fine sandy silt with clear c.1.5mm regular horizontal banding into flood couplets. Sharp ?erosional contact <u>Alluvium</u>	5	
437-472		437-443cm 10YR 4/2 dark greyish brown streaked humic clay silt, containing common plant macrofossils and molluscs including marsh taxa to top NB 443-450cm missing due to compression (shortened core) 450-459cm sediment lost apparently due to water saturation 459-463cm 10YR 2/1 humified silty peat, no visible inclusions. gradual boundary 463-467cm 2.5YR 5/2 greyish brown. Sharp, erosional boundary 467-472cm 10YR 2/1 crumbly humified silty peat, with small plant fragments. Gradual boundary <u>Humic alluvium and peat</u>	6	Middle Wentlooge
472-600		472-477cm 10YR 5/1 grey clay silt 477-600 10YR 5/1 grey silty sand with clear c.1.5mm regular horizontal banding into flood couplets. Average particle size fining upward from 10%-45% silt. Occasional deep humified root voids to 534cm. Large fragment of <i>Phragmites</i> 497-500cm <u>Alluvium (fining upwards)</u>	7	

BOREHOLE 4

0cm=6.540m aOD

<i>Depth¹(cm)</i>	<i>Samples taken</i>	<i>Description</i>	<i>Unit</i>	<i>Formation</i>
0-22		10YR 3/2 very dark greyish brown silty clay, increasingly organic and crumbly to top but no clear structure/ B horizon. Modern vegetation, numerous fine fleshy roots (to 100cm). Rare sub-angular gravels 0.2-2cm. Gradual boundary <u>Modern topsoil formed on alluvium</u>	1	Upper Wentlooge
22-220		7.5YR 4/6 strong brown (reddish brown) stiff silty clay with common fine Fe and organic/ Mn? mottling. Increasingly red colouration to base of unit, with a corresponding increase in small Fe nodules. Clear boundary <u>Alluvium</u>	2	
220-239		220-226cm 10YR 6/2 light brownish grey smooth, finely laminated silty clay, common faint coarse Fe mottles to top, gradual boundary. 226--239cm as above, stained with dark grey fine comminuted charcoal, 0.5cm darker band at 230cm . Diffuse boundary <u>Alluvium with charcoal in-wash</u>	3	Middle Wentlooge
239-346		2.5YR 5/2 greyish brown stiff (finely laminated from 239-287cm) grey clay silt with common coarse 7.5YR 6/8 reddish yellow Fe mottles, decreasing with depth, gradual transition <u>Alluvium</u>	4	
346-470		346-415cm 10YR 5/1 grey silty clay 415-465cm 10YR 5/2 dark grey fine sandy silt NB wet and partially unconsolidated) containing from 420-450cm numerous horizontal and vertical plant fragments including wood at 450-455cm and <i>Phragmites</i> . Abrupt boundary 465-470cm 10YR 5/4 yellowish brown clay silt with humified plant material. Abrupt boundary <u>Alluvium</u>	5	
470-600		10YR 5/1 grey silty sand with clear c.1.5mm regular horizontal banding into flood couplets. 1 large humified wood fragment at 483cm <u>Alluvium</u>	7	