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WESTBURY ESTATE, WANDSWORTH ROAD, LONDON BOROUGH OF LAMBETH

Geoarchaeological Deposit Model Report

NGR: TQ 29190 76205
Site Code: WWO18
Date: 9th July 2018
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1. NON-TECHNICAL SUMMARY

The aims of the geoarchaeological investigations at the Westbury Estate site were (1) to clarify the nature of the sub-surface stratigraphy across the site; and (2) to clarify the nature, depth, extent and date of any alluvium and peat deposits. In order to achieve this aim, a programme of geoarchaeological monitoring and deposit modelling of the surface elevation and thickness of the major stratigraphic units at the site was carried out, incorporating data from the new observed boreholes and new and existing geotechnical data in the area of the site.

The sequence in the area of Site 2 to the southwest is composed primarily of Kempton Park Gravel, overlain by Langley Silt and Made Ground. From a palaeoenvironmental perspective, the potential of this area of the site is therefore limited, although from a Palaeolithic archaeological perspective a more detailed examination of the Langley Silt here, in the form of trial pits, would be appropriate. In the area of Site 1 to the northeast, the Gravel topography falls to the southeast towards the Battersea Channel. Here, a sequence of Holocene alluvium is recorded overlying the Gravel, including potential peat or organic horizons with associated palaeoenvironmental potential. During the present investigation only two sequences recorded the full alluvial sequence, due to site constraints including asbestos contamination and buried concrete slabs. Although an additional geoarchaeological borehole sequence in the area of Site 1 would be beneficial, in order to examine the alluvial sequence in more detail, on the basis of the Generic Quantitative Risk Assessment provided by WSP (2018) a significant risk from asbestos contamination has been identified in this area of the site, and no further geoarchaeological boreholes are recommended.

2. INTRODUCTION

2.1 Introduction

This report summarises the findings arising out of the geoarchaeological fieldwork and deposit modelling undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at the Westbury Estate, Wandsworth Road, London Borough of Lambeth (National Grid Reference (NGR): centred on TQ 29190 76205; Site Code: WWO18; Figure 1). The work was commissioned by CgMs Heritage (part of the RPS Group). The site lies within the area of the Battersea Channel Project, Nine Elms: exploration of the buried prehistoric landscape, more information on which can be found at https://content.historicengland.org.uk/content/docs/planning/battersea-channel-project.pdf.

2.2 Site context

The area of investigation is located to the south of the River Thames, occupying an area of land that lies *ca.* 1km from the present waterfront (see Figure 1). The study site consists of two separate areas of land along the Wandsworth Road and part of the Westbury Estate, separated by around 100m (CgMs, 2017). The eastern site, known as Site 1, currently consists of open space adjacent to the Wandsworth Road, whilst the western site, known as Site 2, is currently occupied by a row of garages set below the street level (CgMs, 2017). The eastern Site 1 lies at an elevation of approximately 5m OD at the Wandsworth Road, falling towards the north to around 3m OD. The western Site 2 is split into two levels, consisting of street level (*ca.* 7m OD) and the garage level (*ca.* 4m OD) (CgMs, 2017).

The area of both Site 1 and Site 2 is mapped by the British Geological Survey (BGS) as Alluvium, described as Clay, Silt, Sand and Peat, obscured by Made Ground (http://mapapps.bgs.ac.uk/geologyofbritain/home.html), and can be regarded therefore as part of the historic floodplain of the River Thames. Previous geoarchaeological investigations in this general area of Lambeth and Wandsworth (see Dawson *et al.*, 2009; Morley, 2009; Corcoran *et al.*, 2007; Branch *et al.*, 2010) have revealed that a number of channels, bisecting areas of higher gravel 'islands' (eyots), existed in the Battersea area during the Late Devensian/early Holocene. Morley (2009/2010) show the Westbury Estate site located towards the western end of the so-called Battersea Channel, an area of low-lying gravel topography in which thick sequences of alluvium (in some places containing peat) have accumulated. At the present site, a geotechnical investigation comprising a total of 17 Static Piezocone Penetration Tests (CPTU) show a sequence of London Clay bedrock, overlain by sandy gravel, and variable thicknesses of silty clay alluvium. However, the exact thicknesses and levels of these units is unclear in these logs, and further stratigraphic records are required in order to clarify the nature of the sedimentary sequence at the site. At the Nine Elms Delivery Office site (MoLA, 2015), *ca.* 50m to the northeast of the Westbury Estate, the Gravel was shown rising towards from around -1.5m OD towards the northwest, to *ca.* 1m OD towards the southeast. The Gravel was overlain by alluvium (in places organic) to the north, and possible Langley Silt towards the south (MoLA, 2015). Subsequent investigations at this site indicated that the palaeoenvironmental potential of the deposits was low (MoLA, 2016).

Beneath the floodplain in the wider area of Lambeth and Wandsworth, up to 7.6m of Made Ground and alluvium has been recorded resting on the Shepperton Gravel. A series of geoarchaeological Perry & Skelton, 1997; Dawson *et al*., 2009; Branch *et al*., 2010; Young *et al*., 2012) and geotechnical investigations (Figure 1) have been carried out at the site of Battersea Power Station, which reveal considerable variation in the height of the Shepperton Gravel surface, and the thickness of the overlying alluvial and peat deposits (Branch *et al*., 2010). This is in part due to the variable height of the Shepperton Gravel, but is also related to successive stages of industrial development that have caused truncation of the stratigraphic sequence. At Wandsworth Road and Pascal Street (Young & Green, 2013), a site lying near the confluence of the Battersea Channel and the River Thames, the Shepperton Gravel surface was recorded at between *ca*. -2.5 and -3.0m OD. This was consistent with investigations at the 120-146 Stewarts Road site to the south of the present site (Morley, 2009/2010; Figure 1), where the Gravel surface within the Battersea Channel was recorded at between *ca*. -2.8 and -3.0m OD. At Wandsworth Road and Pascal Street (Young & Green, 2013) a peat horizon was recorded between *ca*. -1.0 and 0.5m OD, whilst at the 120-146 Stewarts Road site (Morley, 2009/2010) peat was recorded between *ca*. -1.25 and -1.75m OD and subsequently radiocarbon dated to 7670-7510 cal BP (the Mesolithic cultural period). Despite being higher than the peat recorded at Battersea Power Station, this radiocarbon date is indicative of significantly earlier peat accumulation, and suggests a different sedimentary history in this part of the Battersea Channel. During previous work at Battersea Power Station (Branch *et al*., 2010) relatively thin peat horizons radiocarbon dated to the early to late Neolithic were identified at -2.92 to -2.97m OD within the Phase 1 area (ABH8; 6310-6180 cal BP), and at -2.09 to -2.16m OD (ABH2; 5320 to 4960 cal BP) and -1.52 to -1.56m OD (ABH7; 4000 to 3690 cal BP) within the Phase 2 area.

2.3 Palaeoenvironmental and archaeological significance

The Westbury Estate site thus offers the potential to provide detailed records of spatial and temporal changes in the environment due to the possible presence of alluvial (and potentially peat) sequences. As outlined above, several geoarchaeological and palaeoenvironmental investigations have taken place within the area of the Battersea Channel Project, within which this site lies (e.g. Perry & Skelton, 1997; Dawson *et al*., 2009; Branch *et al*., 2010; Young *et al*., 2012; Young & Green, 2013; Young, 2015a; Young, 2015b; Young, 2016b). These investigations have revealed considerable variation in the nature and thickness of the stratigraphic units across the local area, with peat deposits dating from the late Mesolithic through to the Bronze Age. Such variations in these deposits are significant as they represent different environmental conditions that would have existed in a given location. For example: (1) the varying surface of the Shepperton/Kempton Park Gravel may represent the location of former channels and bars; (2) the presence of peat represents former terrestrial or semi-terrestrial land-surfaces, and (3) the alluvium represent periods of changing hydrological conditions. Thus by studying the sub-surface stratigraphy across the site in greater detail, it will be possible to build an understanding of the former landscapes and environmental changes that took place across space and time.

Organic-rich sediments (in particular peat) also have high potential to provide a detailed reconstruction of past environments on both the wetland and dryland. In particular, they provide

the potential to increase knowledge and understanding of the interactions between hydrology, human activity, vegetation succession and climate. Significant vegetation changes include the Mesolithic/Neolithic decline of elm woodland, the Neolithic colonisation and decline of yew woodland; the Late Neolithic/Early Bronze Age growth of elm on peat, and the general decline of wetland and dryland woodland during the Bronze Age. Such investigations are carried out through the assessment/analysis of palaeoecological remains (e.g. pollen, plant macrofossils & insects) and radiocarbon dating.

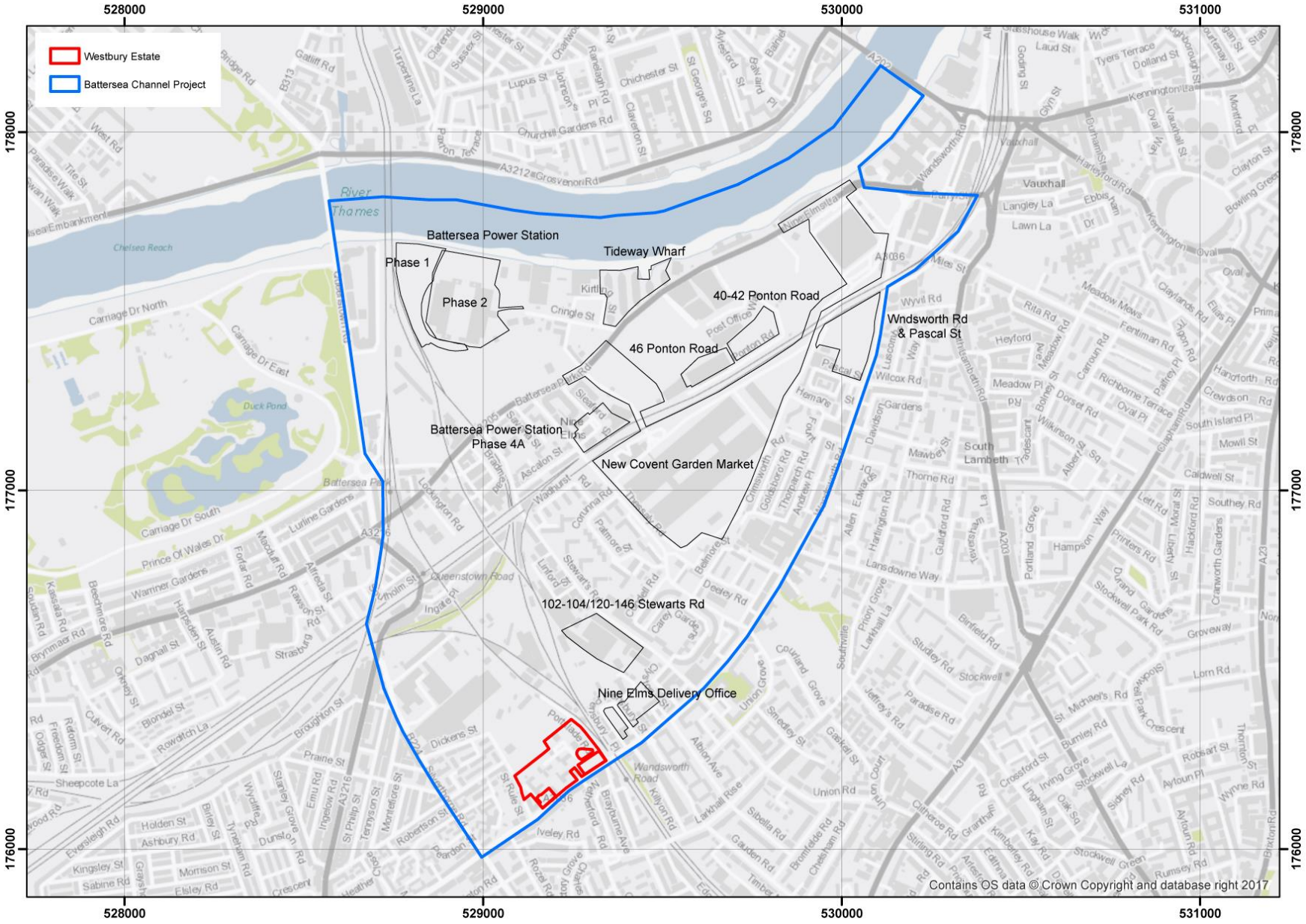
Finally, areas of high gravel topography, soils and peat represent potential areas that might have been utilised or even occupied by prehistoric people, evidence of which may be preserved in the archaeological (e.g. features and structures) and palaeoenvironmental record (e.g. changes in vegetation composition). The results arising from the investigations at the site can be compared and integrated with records from adjacent sites within the area of the Battersea Channel Project.

2.4 Aims and objectives

A programme of geoarchaeological monitoring of geotechnical investigations and subsequent deposit modelling was recommended within the Written Scheme of Investigation for the site (Young, 2018), the aims of which were:

1. To clarify the nature of the sub-surface stratigraphy across the site;
2. To clarify the nature, depth, extent and date of any alluvium and peat deposits;
3. To investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity;
4. To investigate whether the sequences contain any evidence for natural and/or anthropogenic changes to the landscape (wetland and dryland);
5. To integrate the new geoarchaeological record with other recent work in the area of the Battersea Channel Project.

In order to address the first two of these aims, two geotechnical boreholes were put down at the site by a qualified geoarchaeologist, and the stratigraphic data from the new and existing records used to produce a deposit model of the major depositional units across the site. This report makes recommendations with regards to achieving aims 3 to 5 outlined above.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529000
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178000
177000
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Westbury Estate
Battersea Channel Project
Battersea Power Station
Phase 1
Phase 2
Tideway Wharf
40-42 Ponton Road
46 Ponton Road
Wndsworth Rd
& Pascal St
Battersea Power Station
Phase 4A
New Covent Garden Market
102-104/120-146 Stewarts Rd
Nine Elms Delivery Office
River
Thames
Contains OS data © Crown Copyright and database right 2017

Figure 1: Location of the Westbury Estate and other nearby geoarchaeological investigations: Battersea Power Station (Branch *et al*., 2010); Battersea Power Station Phase 1 (Young *et al*., 2012a), Phase 2 (Young, 2016b) & Phase 4A (Young, 2016a); Tideway Wharf (Green & Young, 2011); Wandsworth Road & Pascal Street (Batchelor *et al*., 2018); 102-104 /120-146 Stewarts Road (Morley, 2009/2010); New Covent Garden Market (Wessex Archaeology, 2015); 40-42 Ponton Road (Young, 2015a); 46 Ponton Road (Young, 2015b) and Nine Elms Delivery Office (MoLA 2015; 2016). The area of the Battersea Channel Project (BCP) is also shown.

Figure 2: Location of the boreholes used in the deposit model at the Westbury Estate, Wandsworth Road, London Borough of Lambeth. Orientation of the southwest-northeast transect also shown (see Figure 12).

3. METHODS

3.1 Field investigations and lithostratigraphic descriptions

A total of 20 boreholes were put down by WSP during geotechnical investigations at the site in May 2018, of which two (one in Site 1 and one in Site 2) were monitored in the field (boreholes WS103 and WS113) by Quaternary Scientific. The lithostratigraphy of the monitored boreholes was described in the field using standard procedures for recording unconsolidated sediment and organic sediments, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts) (Tröels-Smith, 1955). The procedure involved: (1) cleaning the sample using a scalpel; (2) recording the physical properties, most notably colour using a Munsell Soil Colour Chart; (3) recording the composition; gravel (Grana glareosa; Gg), fine sand (Grana arenosa; Ga), silt (Argilla granosa; Ag) and clay (Argilla steatoides); (4) recording the degree of peat humification and (5) recording the unit boundaries e.g. sharp or diffuse. The results of the geoarchaeological descriptions of the boreholes are displayed in Tables 1 and 2.

3.2 Deposit modelling

The deposit model was based on a review of 26 borehole records for the area of the Westbury Estate site (see Figure 2). These incorporated seven BGS archive boreholes (www.bgs.ac.uk/geoindex/) and the 20 new geotechnical boreholes for the Site 1 and Site 2 areas of the site. A model was also produced for the wider area (see Figures 13 and 14), for which borehole and test pit records were utilised from various geotechnical and geoarchaeological investigations in the wider area of the Battersea Channel Project (see Figure 1).

Modelling was undertaken using RockWorks 16 geological utilities software. The term 'deposit modelling' describes any method used to depict the sub-surface arrangement of geological deposits, but particularly the use of computer software to create contoured maps or three dimensional representations of contacts between stratigraphic units. The first requirement is to classify the recorded borehole sequences into uniformly identifiable stratigraphic units. At the Westbury Estate site, the sedimentary units were classified into three groupings: (1) Gravel, (2) Langley Silt, (3) Lower Alluvium, (4) Peat, (5) Upper Alluvium and (6) Made Ground. Models of surface height were generated for the Gravel, Langley Silt, Lower Alluvium, Peat and Upper Alluvium (Figures 3, 4, 6, 7 and 9), with models of the thickness of the Langley Silt, Peat, Total Alluvium and Made Ground also modelled (Figures 5, 8, 10 and 11) using a nearest neighbour routine. A two-dimensional southwest-northeast stratigraphic profile was also generated using Rockworks 16 for selected boreholes across the site (Figure 12). A model of the surface of the Gravel (Figure 13) and peat thickness (Figure 14) was generated for the wider area using the same technique.

How effectively Rockworks portrays the relief features of stratigraphic contacts or the thickness of sediment bodies depends on the number of data points (boreholes/test pits) per unit area, and the extent to which these points are evenly distributed across the area of interest. The portrayal is also affected by the significance assigned to these data points, in terms of the extent of the area around the point to which the data are deemed to apply. This can be predetermined for each data

set, and in the present case the value chosen for each data point (borehole) is equivalent to an area of 50m radius for all models except that for the wider area (100m). The boreholes are relatively well distributed over the area of investigation, although part of the northward spur of the site (along Sleaford Street) was not covered by borehole data. In general, reliability improves towards the core area of boreholes where mutually supportive data are likely to be available from several adjacent data points. Reliability is also affected by the quality of the stratigraphic records, which in turn are affected by the nature of the sediments and/or their post-depositional disturbance during previous stages of land-use on the site. Finally, because of the 'smoothing' effect of the modelling procedure, the modelled levels of stratigraphic contacts may differ slightly from the levels recorded in borehole logs.

4. RESULTS & INTERPRETATION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS & DEPOSIT MODELLING

The results of the lithostratigraphic descriptions of the monitored boreholes are shown in Tables 1 to 3, with the deposit models displayed in Figures 3 to 12. Figures 3 to 11 are surface elevation and thickness models for each of the main stratigraphic units, whilst Figure 12 is a two-dimensional southwest-northeast transect of selected boreholes across the area of the site. The results of the deposit modelling indicate that the number and distribution of the records is sufficient to permit modelling with a relatively high level of reliability across the majority of the Site 1 and Site 2 areas; however, it is noted that due to site constraints (e.g. asbestos and concrete slabs) relatively few records proceeded beyond the Made Ground in the area of Site 1.

Overlying the London Clay bedrock, the full sequence of sediments recorded in the boreholes comprises:

Made Ground – widely present
Upper Alluvium – present in the area of Site 1
Peat/Organic Clay – locally present in the area of Site 1
Lower Alluvium – locally present in the area of Site 1
Langley Silt – widely present in the area of Site 2
Gravel – widely present

4.1 Gravel

Gravel was present in all the boreholes that penetrated to the base of the Holocene/Devensian sequence (one borehole in the area of Site 1, and three boreholes in the Area of Site 2). In the area of Site 2 to the southwest the Gravel surface is recorded at between -0.16 (WS113) and 0.16m OD (WS114) and is considered to represent the Kempton Park Gravel of Gibbard (1984), deposited during the Middle to Late Devensian (80,000 to 30,000 years before present). In Site 1 towards the northeast the surface of the Gravel is considerably lower, recorded here at -1.97m OD in borehole WS103; here this unit is considered to represent the Shepperton Gravel of Gibbard (1984), deposit during the Late Devensian Late Glacial (15,000-10,000 years before present). Both Gravel units comprise the sands and gravels of a high-energy braided river system which, while active, would have been characterised by longitudinal gravel bars and intervening low-water channels in which finer-grained sediments might have been deposited. Such a relief pattern would have been present on the valley floor at the beginning of the Holocene when a lower-energy fluvial regime was being established.

4.2 Langley Silt (Brickearth)

A horizon of generally poorly sorted clayey, sandy and in places gravelly silt was recorded overlying the higher levels of the Kempton Park Gravel in selected boreholes in the area of Site 2 to the southwest (WS113-WS115) and in BGS archive boreholes to the south and north of here (TQ27NE319/C and TQ27NE319/G), although there is some uncertainty as to the identification of

this unit within the logs associated with the BGS archive boreholes. In general the Langley Silt was recorded at between *ca*. 0.0 and 2.0m OD (Figures 5 and 12), present in thickness of up to *ca*. 2m (Figure 6). The Langley Silt was not recorded in the area of Site 1.

This unit is considered to represent the Devensian Langley Silt or 'brickearth', an often substantially reworked (by colluvial/alluvial processes) aeolian, periglacial deposit of wind-blown silt and clay. This unit is frequently recorded overlying the Kempton Park Gravel in southern Britain. It has a silt content ranging up to *ca*. 70%, and is generally regarded as a mixture of windblown silt, redistributed by surface wash, and mixed with local fine-grained sediment (for example derived from the bedrock London Clay).

4.3 Lower Alluvium

Deposits typical of the Lower Alluvium were recorded in two sequences in the area of Site 1 to the northeast, overlying the lower Gravel topography here (WS102A and WS103). In WS103 this unit rests directly on the Shepperton Gravel, although it formed the basal unit in WS102A. The deposits of the Lower Alluvium are described as predominantly silty or clayey, tending to become increasingly sandy downward in most sequences. The Lower Alluvium frequently contains detrital wood or plant remains, and in many cases is described as organic and with occasional Mollusca remains. The surface of the Lower Alluvium (Figure 6) was recorded at -0.87 (WS103) and -1.56m OD (WS102A).

The sediments of the Lower Alluvium are indicative of deposition during the Early to Mid-Holocene, when the main course of the Thames was probably confined to a single meandering channel. During this period, the surface of the Shepperton Gravel was progressively buried beneath the sandy and silty flood deposits of the river. The richly-organic nature of the Lower Alluvium suggests that this was a period during which the valley floor was occupied by a network of actively shifting channels, with a drainage pattern on the floodplain that was still largely determined by the relief on the surface of the underlying Shepperton Gravel.

4.4 Peat/Organic Clay

Overlying the Lower Alluvium in boreholes WS102A and WS103 in the area of Site 1 to the northeast (in the area of lower Gravel topography) was a unit of Peat or Organic Clay. In geotechnical log WS102A this unit is described as a clayey peat, whilst in WS103 (observed in the field) it was described as an organic silty clay. The surface of this unit was relatively even, recorded at -0.47m OD in WS103 and -0.51m OD in WS102A (see Figure 7), and it was present in thicknesses of between 1.05 (WS102A) and 0.4m (WS103) (Figure 8).

Where peat and highly organic units are recorded they are indicative of a transition towards semi-terrestrial (marshy) conditions, supporting the growth of sedge fen/reed swamp and/or woodland communities across the floodplain. On the basis that 1m of peat represents around 1000 years of accumulation (a typical figure in lowland fens), the peat at the present site may represent up to 1000 years of continuous peat accumulation. However, it should be noted that the organic content

recorded in the sequence observed in the field (WS103) was considered to be less than 25%, indicating that full semi-terrestrial conditions are unlikely to have developed here.

4.5 Upper Alluvium

The deposits of the Upper Alluvium were recorded in three sequences towards the centre and east of the site (WS103, TQ27NE319/E and TQ27NE706), resting directly on the Gravel or the Organic Clay. The deposits of the Upper Alluvium are described as predominantly silty or clayey and very occasionally organic-rich. The surface of the Upper Alluvium is recorded at between -0.2 (TQ27NE706) and 1.08m OD (TQ27NE319/E) (Figure 9). The sediments of the Upper Alluvium are indicative of deposition within low energy fluvial and/or semi-aquatic conditions during the Holocene. The high mineral content of the sediments may reflect increased sediment loads resulting from intensification of agricultural land use from the later prehistoric period onward, combined with the effects of rising sea level.

The combined Holocene alluvial sequence, incorporating the Lower Alluvium, peat and Upper Alluvium is generally thicker (between *ca*. 2 and 3m) where the Shepperton Gravel surface is lower in the area of Site 1 to the northeast (Figure 10). Alluvium is generally absent towards the southwest in the area of Site 2, where the Kempton Park Gravel is recorded overlain by Langley Silt.

4.6 Made Ground

Between *ca*. 1 and 3m of Made Ground caps the sequence in both areas of the site (Figure 11).

Table 1: Lithostratigraphic description of borehole WS103, Westbury Estate, Wandsworth Road, London Borough of Lambeth.

Depth (m OD)	Depth (m bgs)	Description	Interpretation
2.93 to 0.78	0.00 to 2.15	Made Ground of topsoil over concrete and brick rubble in matrix of dark brown silty clay.	MADE GROUND
0.78 to 0.33	2.15 to 2.60	As3 Ag1 Ga+ Gg+; brown silty clay with traces of sand and gravel. Possible disturbance. Diffuse contact in to:	
0.33 to 0.13	2.60 to 2.80	As3 Ag1 Ga+; dark blueish grey silty clay with a trace of sand. Some brick fragments.	
0.13 to -0.47	2.80 to 3.40	As3 Ag1 Dh+; blueish grey silty clay with a trace of detrital herbaceous material. Diffuse contact in to:	UPPER ALLUVIUM
-0.47 to -0.87	3.40 to 3.80	As2 Sh1 Ag1 Dh+ Dl+; greyish brown organic silty clay with traces of detrital herbaceous material and wood. Diffuse contact in to:	ORGANIC CLAY
-0.87 to -1.07	3.80 to 4.00	Ag2 As1 Dh1; grey clayey silty with detrital herbaceous material. Diffuse contact in to:	LOWER ALLUVIUM
-1.07 to -1.97	4.00 to 4.90	Ag3 As1 Ga+; grey clayey silt with a trace of sand. Sharp contact in to:	
-1.97 to -2.07	4.90 to 5.00	Gg2 Ga1 As1; dark blueish grey sandy clayey gravel. Clasts are flint, sub-angular to well-rounded, average diameter 40mm.	SHEPPERTON GRAVEL

Table 2: Lithostratigraphic description of borehole WS113, Westbury Estate, Wandsworth Road, London Borough of Lambeth.

Depth (m OD)	Depth (m bgs)	Description	Interpretation
3.34 to 1.94	0.00 to 1.40	Made Ground of topsoil over brown clay, sand and gravel with frequent brick, mortar fragments and some bone.	MADE GROUND
1.94 to 1.84	1.40 to 1.50	Ga2 As2; orangey grey sand and clay. Diffuse contact in to:	LANGLEY SILT
1.84 to 1.74	1.50 to 1.60	As3 Ag1 Ga+; brown silty clay with a trace of sand. Sharp contact in to:	
1.74 to 1.64	1.60 to 1.70	Gg4; flint gravel. Average diameter 30mm. Sharp contact in to:	
1.64 to 1.44	1.70 to 1.90	As2 Ag1 Ga1; brown sandy silty clay. Sharp contact in to:	
1.44 to 1.29	1.90 to 2.05	Ga3 Gg1 As+; brownish grey gravelly sand with a trace of clay. Gravel is flint, less than 10mm in diameter, sub-angular to rounded. Sharp contact in to:	
1.29 to -0.16	2.05 to 3.50	As3 Ag1; orangey brown silty clay. Diffuse contact in to:	
-0.16 to -0.46	3.50 to 3.80	Gg3 Ga1; brown sandy gravel. Clasts are flint, sub-angular to well-rounded, average diameter 20mm.	KEMPTON PARK GRAVEL

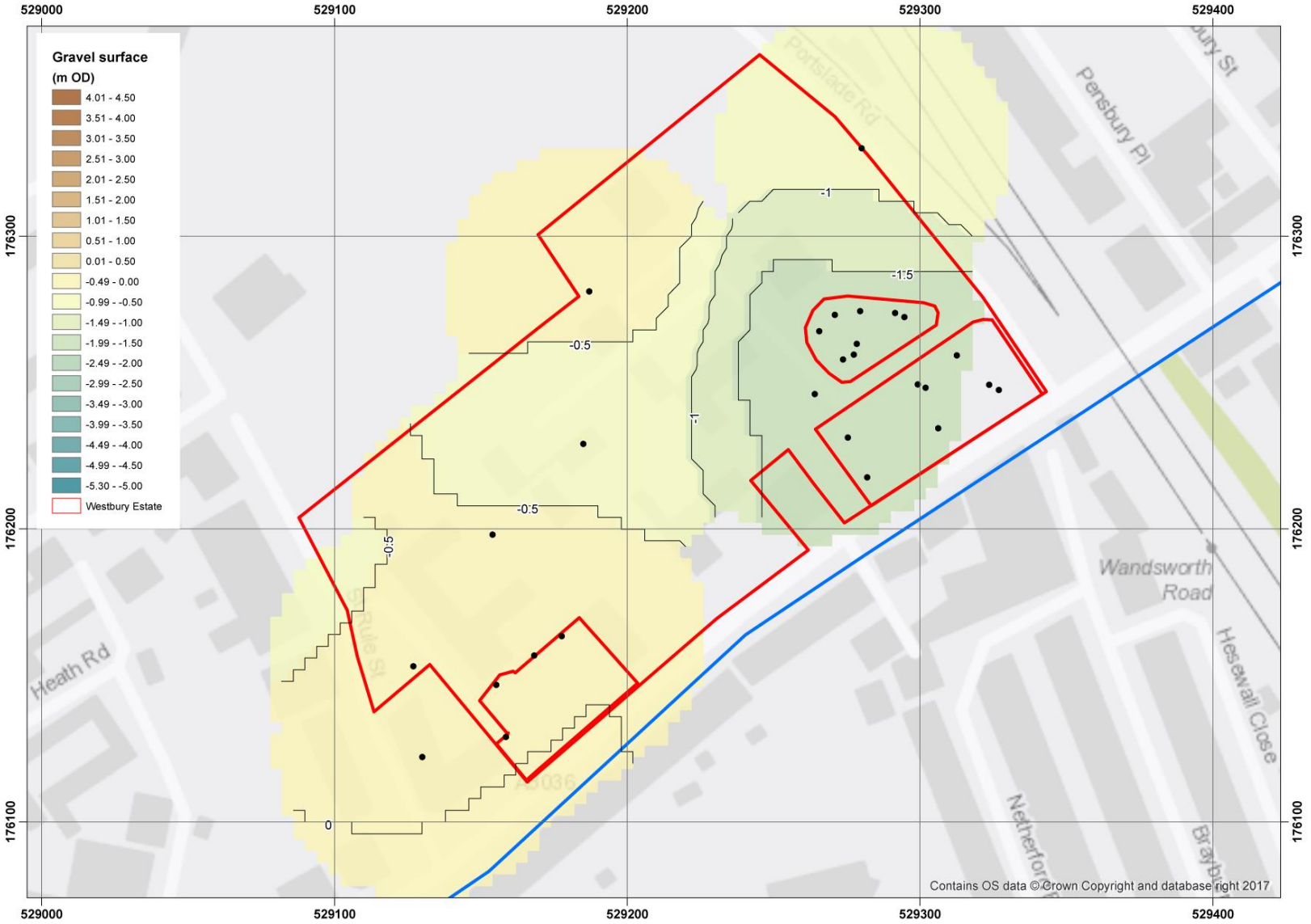

Figure 3: Gravel surface (contour heights in m OD).

Figure 4: Lower Alluvium surface (contour heights in m OD).

Figure 5: Langley Silt surface (contour heights in m OD).

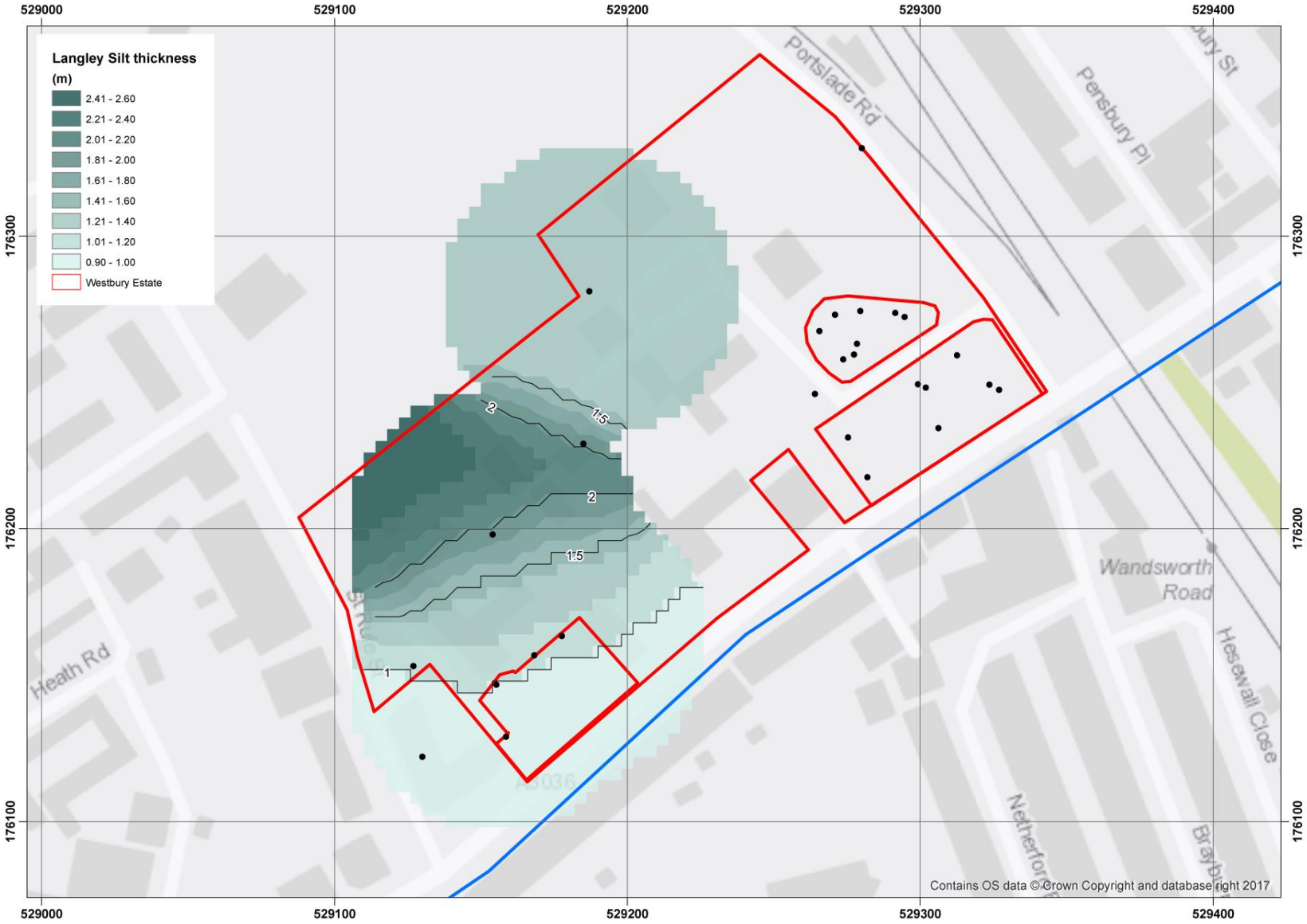

Figure 6: Langley Silt surface thickness (contour heights in m).

Figure 7: Peat/Organic Clay surface (contour heights in m OD).

Figure 8: Peat/Organic Clay thickness (contour heights in m).

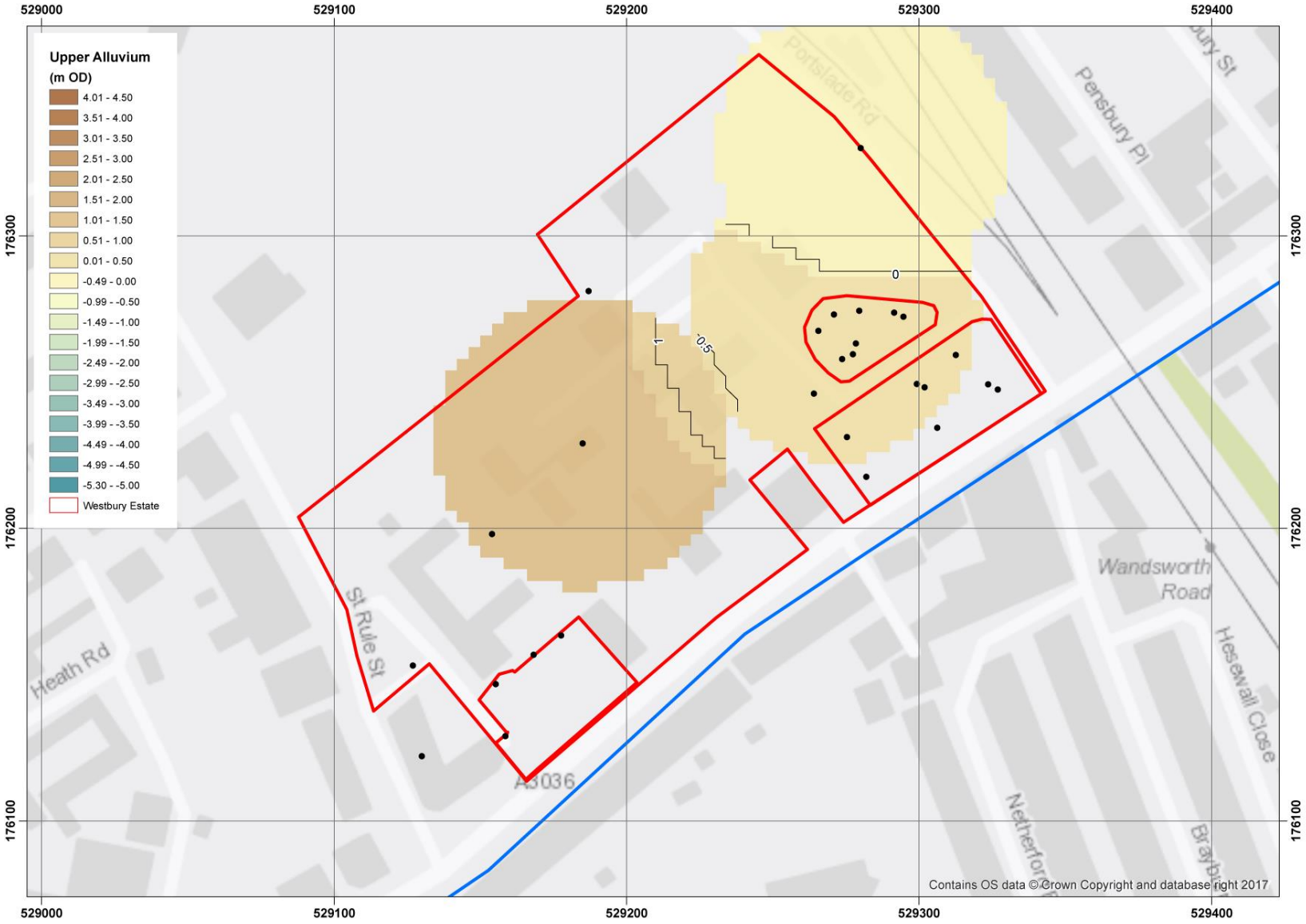

Figure 9: Upper Alluvium surface (contour heights in m OD).

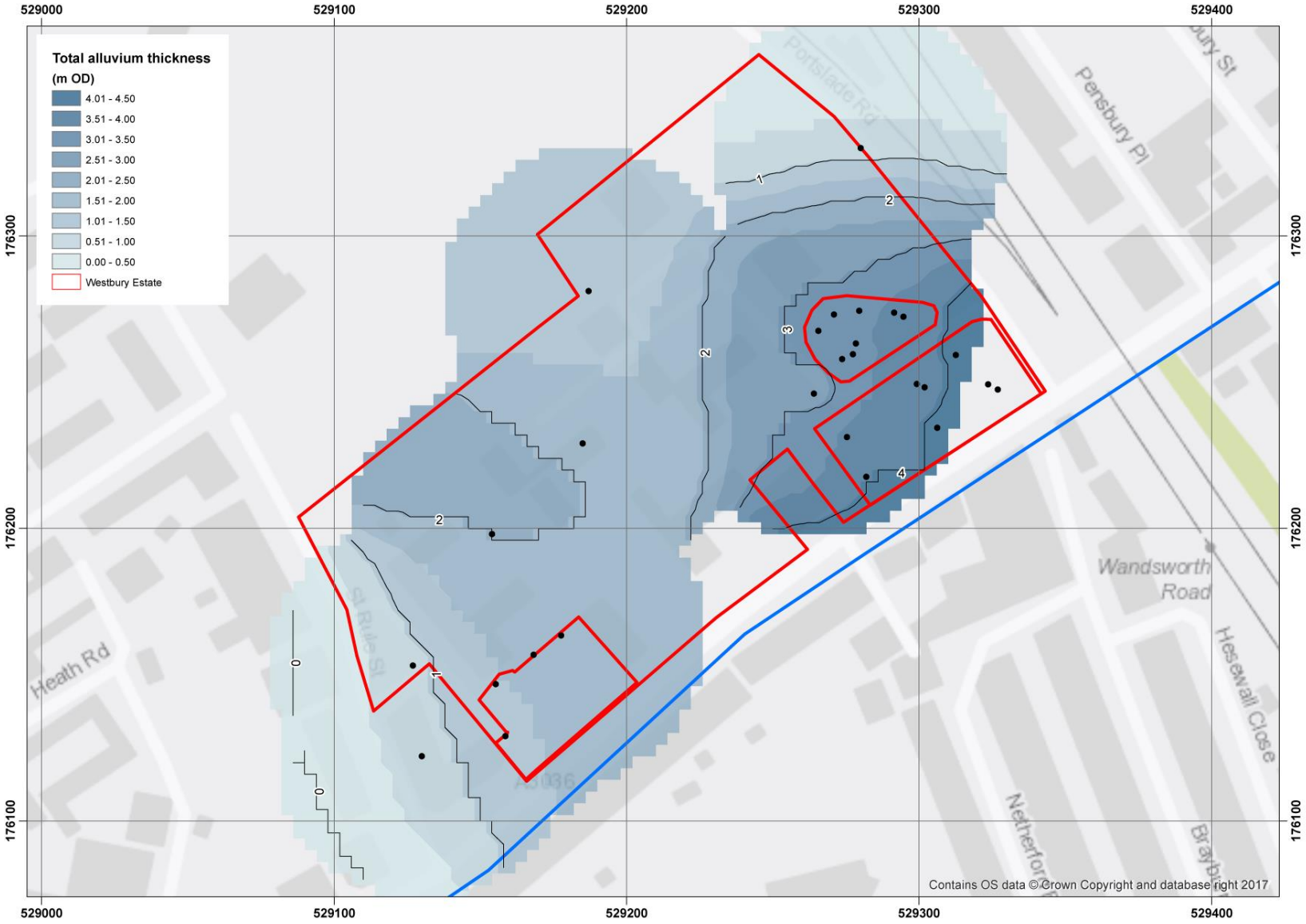

Figure 10: Total alluvium thickness (contour heights in m).

Figure 11: Made Ground thickness (contour heights in m).

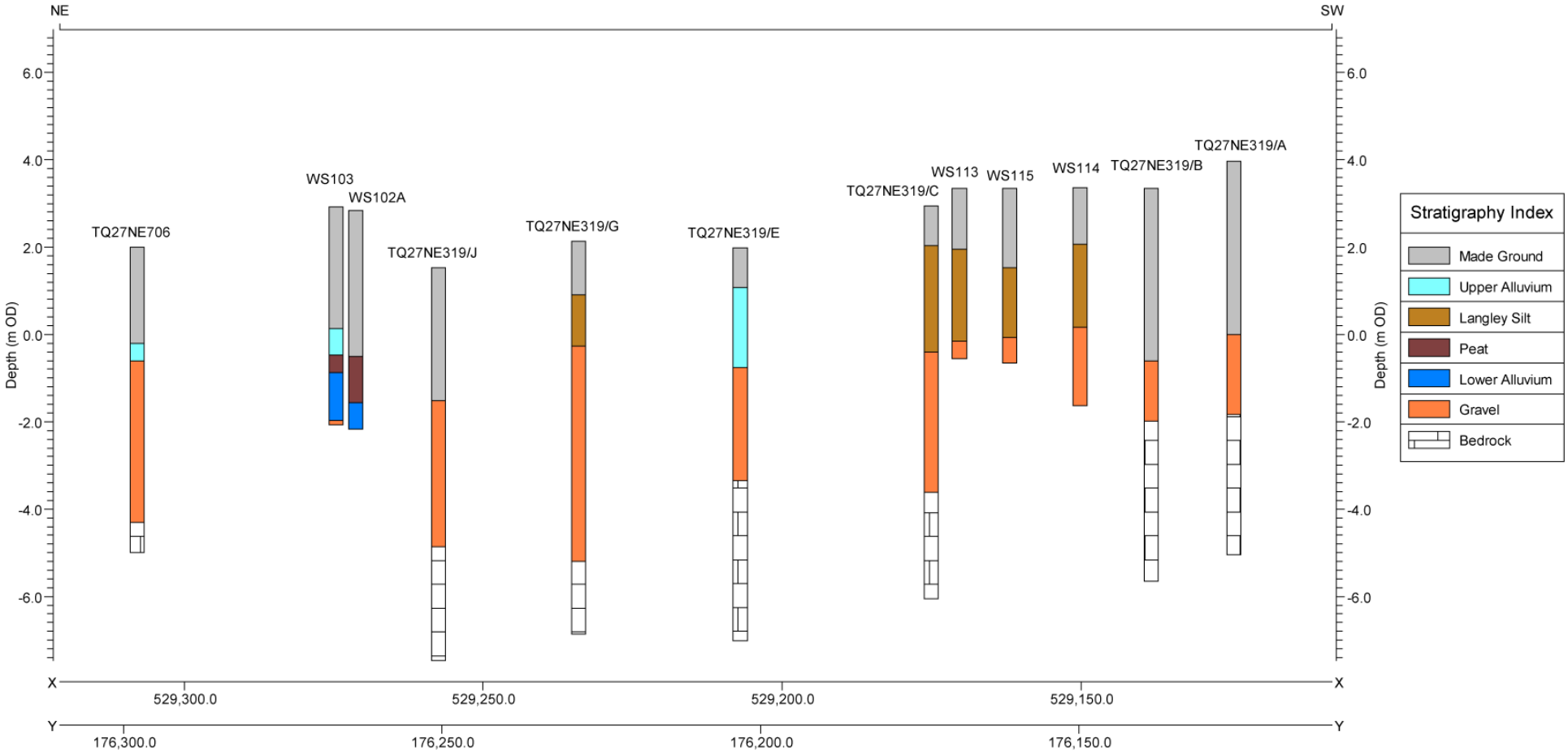

Figure 12: Southwest-northeast transect of boreholes across the Westbury Estate, Wandsworth Road, London Borough of Lambeth.

5. DISCUSSION AND CONCLUSIONS

The aims of the geoarchaeological investigations at the Westbury Estate site were (1) to clarify the nature of the sub-surface stratigraphy across the site; and (2) to clarify the nature, depth, extent and date of any alluvium and peat deposits. In order to achieve this aim, a programme of geoarchaeological monitoring and deposit modelling of the surface elevation and thickness of the major stratigraphic units at the site was carried out, incorporating data from the new observed boreholes and new and existing geotechnical data in the area of the site.

Previous geoarchaeological investigations (Dawson *et al.*, 2009; Morley, 2009/2010; Corcoran *et al.*, 2007; Branch *et al.*, 2010; Young *et al.*, 2012a) have revealed that a number of channels, bisecting areas of higher gravel 'islands' (eyots), existed in the Battersea area during the Late Devensian/Early Holocene, and the present area of investigation is located within the projected course of the so-called Battersea Channel, an area of low-lying gravel topography in which thick sequences of alluvium (in some places containing peat) have accumulated (e.g. see Morley, 2009/2010 and Batchelor *et al.*, 2018). The results of the geoarchaeological investigations at the Westbury Estate site have thus contributed to our understanding of the Quaternary stratigraphic sequence in this area, and in the wider area of the Battersea Channel Project more generally. The basal units recorded within the boreholes at the site are the Middle to Late Devensian Kempton Park Gravel, recorded at between -0.16 and 0.16m OD m OD within Site 2 to the southwest, and the Late Devensian Shepperton Gravel, recorded towards the northeast within Site 1 at -1.97m OD. The lower Gravel topography to the northeast of the site is considered to represent that of the Battersea Channel, which may therefore traverse the north-eastern area of the site (Site 1) extending towards the north-western area of the Nine Elms Delivery Office site (MoLA, 2016; see Figure 1), but lie to the southeast of Site 2 (see Figure 13 for a revised possible alignment of the Channel, after Morley, 2009/2010 and Batchelor *et al.*, 2018). However, additional data would be required to the north of the site in order to fully understand the alignment of the Battersea Channel, and the Early Holocene landscape, in this area. This level for the Shepperton Gravel is consistent with that identified elsewhere within the Channel; in the area of Wandsworth Road and Pascal Street, a site lying near the confluence of the Battersea Channel and River Thames, the Shepperton Gravel surface was recorded at between *ca.* -2.5 and -3.0m OD (Batchelor *et al.*, 2018), whilst at 120-146 Stewarts Road (Morley, 2009/2010; see Figure 1) the Gravel surface was recorded at between *ca.* -2.8 and -3.0m OD. In the north-western area of the Nine Elms Delivery Office site, thought to lie within the Battersea Channel (MoLA, 2016), the Gravel surface was recorded at between -0.23 and -1.88 m OD.

The level for the surface of the Kempton Park Gravel in the area of Site 2 to the southeast are consistent with those recorded at other sites in this area, where it is generally recorded at between *ca.* -0.3 and 0.9m OD, elevations typical of the surface of the 'Battersea Eyot'. This feature has previously been modelled extending north-eastwards, encompassing the area of 40-42 (Young, 2015a), 46 Ponton Road (Young, 2015b) and New Covent Garden Market (Wessex Archaeology, 2015) (see Figure 13). Overlying the Kempton Park Gravel between *ca.* 0 and 2m OD in the area of Site 2 is the Devensian Langley Silt (often referred to as 'Brickearth'). Although the

palaeoenvironmental potential of this unit is very limited, with regards to its archaeological potential, elsewhere in London Palaeolithic artefacts have been recovered from the Langley Silt (for example at Creffield Road; Brown, 1886; 1887; Bazely *et al.*, 1991). With regard to the Kempton Park Gravel, no Palaeolithic artefacts appear to have been recorded anywhere from this Gravel unit (see Wymer 1999, Map 9). The apparent absence of archaeological remains in this unit as a whole is consistent with the generally accepted absence from Britain of either Neanderthals or modern humans during the Ipswichian, and their sparse and discontinuous presence during the whole of the post-Ipswichian period into which the Kempton Park Gravel may fit stratigraphically.

In the area of Site 1 the lower Gravel topography of the Shepperton Gravel is overlain by Holocene alluvial deposits between *ca*. 2 and 3m thick, typically composed of a tripartite sequence of Lower Alluvium, Peat/Organic Clay and Upper Alluvium. In geotechnical log WS102A a clayey peat was recorded between -0.51 and -1.16m OD, whilst in WS103 (observed in the field by a geoarchaeologist) it was described as an organic silty clay, between -0.47 and -0.87m OD. In comparison, during previous work at Battersea Power Station (Branch *et al.*, 2010) relatively thin peat horizons radiocarbon dated to the early to late Neolithic were identified at -2.92 to -2.97m OD within the Phase 1 area (ABH8; 6310-6180 cal BP), and at -2.09 to -2.16m OD (ABH2; 5320 to 4960 cal BP) and -1.52 to -1.56m OD (ABH7; 4000 to 3690 cal BP) within the Phase 2 area. At the Wandsworth Road and Pascal Street site (Young & Green, 2013) a peat horizon was recorded between *ca*. -1.0 and 0.5m OD, whilst at the 120-146 Stewarts Road site (Morley, 2009/2010) peat was recorded between *ca*. -1.25 and -1.75m OD and subsequently radiocarbon dated to 7670-7510 cal BP (the Mesolithic cultural period). Despite being higher than the peat recorded at the Battersea Power Station site, the radiocarbon date from 120-146 Stewart's Road is indicative of significantly earlier peat accumulation, and suggests a different sedimentary history in this part of the Battersea Channel. There is thus some uncertainty as to the age of any peat or organic units at the present site.

6. RECOMMENDATIONS

The sequence in the area of Site 2 is composed primarily of Kempton Park Gravel, overlain by Langley Silt and Made Ground. From a palaeoenvironmental perspective, the potential of this area of the site is therefore limited, although from a Palaeolithic archaeological perspective a more detailed examination of the Langley Silt here, in the form of trial pits, would be appropriate. It would be beneficial if the excavation of these trial pits was monitored by a geoarchaeologist familiar with Pleistocene sediments and Palaeolithic artefacts.

In the area of Site 1, the Gravel topography falls to the southeast towards the Battersea Channel. Here, a sequence of Holocene alluvium is recorded overlying the Gravel, including potential peat or organic horizons with associated palaeoenvironmental potential. During the present investigation only two sequences recorded the full alluvial sequence, due to site constraints including asbestos contamination and buried concrete slabs, and there is some uncertainty as to the character of the organic sediments (see above). Although an additional geoarchaeological borehole sequence in the area of Site 1 would be beneficial, in order to examine the alluvial sequence in more detail, on

the basis of the Generic Quantitative Risk Assessment provided by WSP (2018) a significant risk from asbestos contamination has been identified in this area of the site and no further boreholes are recommended. Regulation 6 of the Control of Asbestos Regulations 2012 require an assessment of work which exposes employees to asbestos. The WSP (2018) Generic Quantitative Risk Assessment indicates significant asbestos findings including in the form of asbestos cement, insulation board and thermal insulation and loose fibres. A material risk assessment of these items suggests the following: (1) Asbestos cement – low risk of releasing fibres when disturbed; (2) Asbestos insulation board – medium risk of releasing fibres when disturbed; and (3) Asbestos thermal insulation and loose fibres – high risk of releasing fibres when disturbed. Based on the hierarchy of risk controls, it is therefore recommended that no intrusive work is undertaken in this area of the site for geoarchaeological purposes.

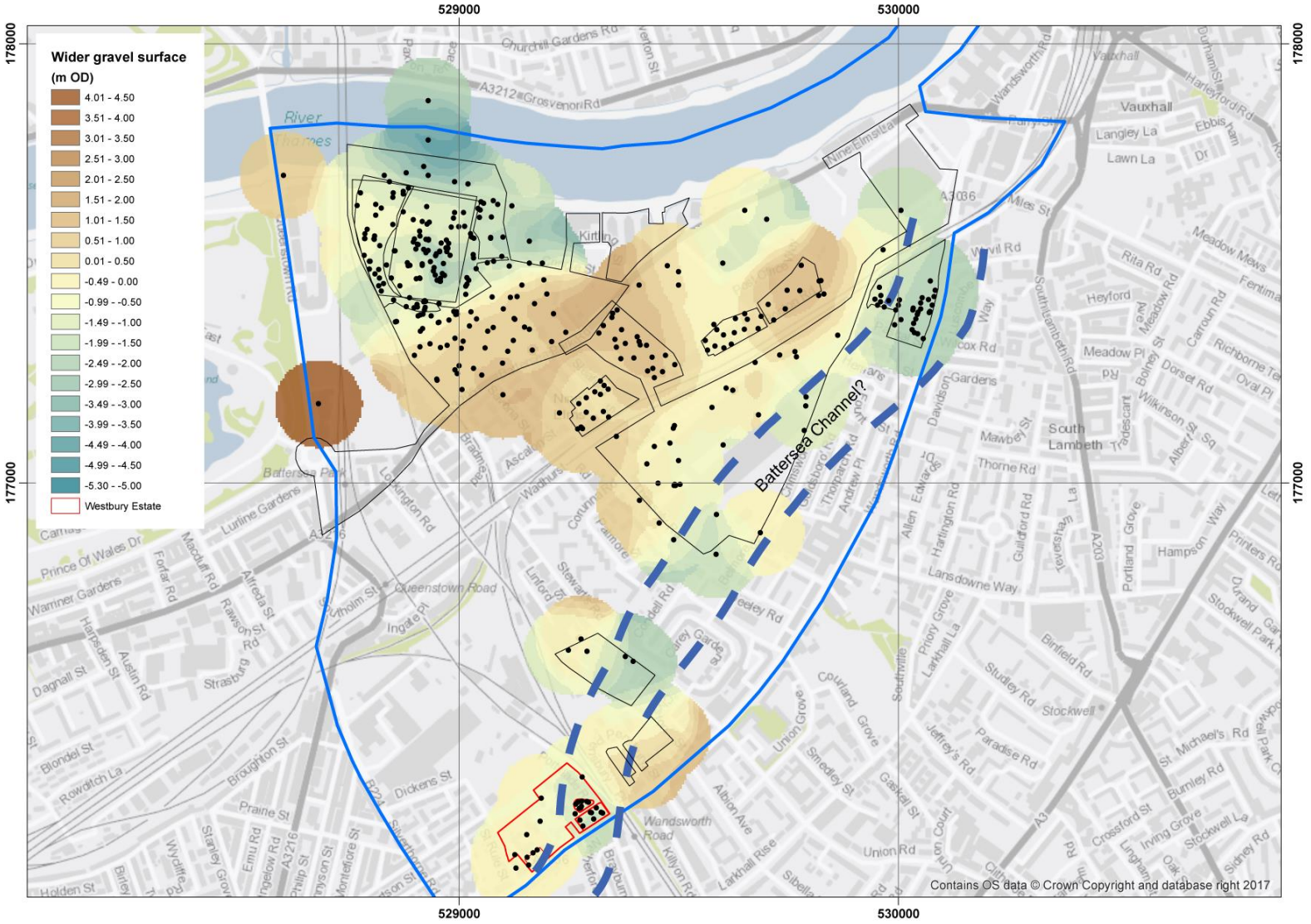

Figure 13: Shepperton/Kempton Park Gravel surface across the wider area (incorporating data from other sites within the area of the Battersea Channel Project; see Figure 1). Revised possible alignment of the Battersea Channel also shown (after Morley, 2009/2010 and Batchelor *et al.*, 2018).

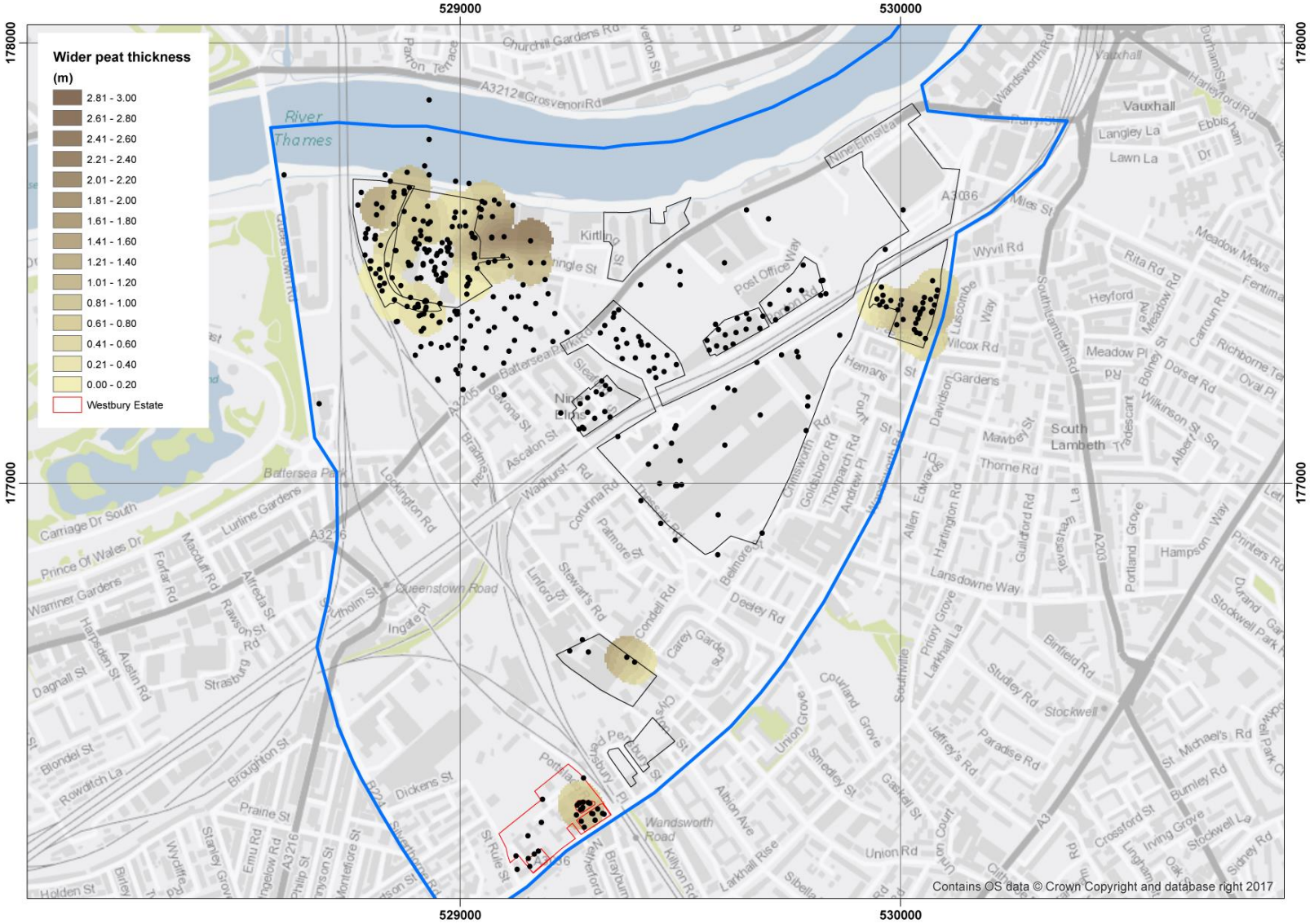

Figure 14: Peat thickness across the wider area (incorporating data from other sites within the area of the Battersea Channel Project; see Figure 1).

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8. OASIS FORM

OASIS ID: quaterna1-319888

Project details

Project name	Westbury Estate
Short description of the project	The aims of the geoarchaeological investigations at the Westbury Estate site were (1) to clarify the nature of the sub-surface stratigraphy across the site; and (2) to clarify the nature, depth, extent and date of any alluvium and peat deposits. In order to achieve this aim, a programme of geoarchaeological monitoring and deposit modelling of the surface elevation and thickness of the major stratigraphic units at the site was carried out, incorporating data from the new observed boreholes and new and existing geotechnical data in the area of the site. The sequence in the area of Site 2 is composed primarily of Kempton Park Gravel, overlain by Langley Silt and Made Ground. From a palaeoenvironmental perspective, the potential of this area of the site is therefore limited, although from a Palaeolithic archaeological perspective a more detailed examination of the Langley Silt here, in the form of trial pits, would be appropriate. In the area of Site 1, the Gravel topography falls to the southeast towards the Battersea Channel. Here, a sequence of Holocene alluvium is recorded overlying the Gravel, including potential peat or organic horizons with associated palaeoenvironmental potential. Although an additional geoarchaeological borehole sequence in the area of Site 1 would be beneficial, in order to examine the alluvial sequence in more detail, on the basis of the Generic Quantitative Risk Assessment provided by WSP (2018) a significant risk from asbestos contamination has been identified in this area of the site and no further boreholes are recommended.
Project dates	Start: 01-01-2018 End: 14-06-2018
Previous/future work	No / Not known
Any associated project reference codes	WWO18 - Sitecode
Type of project	Environmental assessment
Survey techniques	Landscape

Project location

Country	England
Site location	GREATER LONDON WANDSWORTH WANDSWORTH Westbury Estate, Wandsworth Road
Postcode	SW83ND
Site coordinates	TQ 29190 76205 51.469542910995 -0.139801223827 51 28 10 N 000 08 23 W Point

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project brief originator	CgMs Consulting
Project design originator	D.S. Young
Project director/manager	D.S. Young
Project supervisor	D.S. Young
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive Exists?	No
Paper Archive recipient	LAARC
Paper Contents	"Stratigraphic"
Paper Media available	"Report"

Entered by	Daniel Young (d.s.young@reading.ac.uk)
Entered on	27 June 2018