

# BRENT CROSS, CRICKLEWOOD REGENERATION AREA, LONDON BOROUGH OF BARNET

## Geoarchaeological Deposit Model Report

**NGR:** TQ 2310 8760

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## 1. NON-TECHNICAL SUMMARY

A programme of geoarchaeological fieldwork and deposit modelling was carried out within the area of palaeoenvironmental potential at the Brent Cross site in order to (1) clarify the nature of the sub-surface stratigraphy across the site; (2) clarify the nature, depth, extent and likely date of any former land surfaces, alluvial and peat deposits; and (3) to make recommendations for any further geoarchaeological, palaeoenvironmental or archaeological investigations. The results of these investigations indicate that the sedimentary sequence at the site comprises the bedrock London Clay, overlain within the valley of the River Brent by gravel, floodplain alluvium, and Made Ground. Outside of the area of the floodplain, and rising above an elevation of around 41m OD, the bedrock is overlain by Head deposits most likely of colluvial origin, and Made Ground. On the floodplain itself, a horizon of Holocene alluvium is recorded, generally present at elevations of between *ca.* 33 and 41m OD. The sediments of the Alluvium are mineral-rich, and indicative of deposition within low energy fluvial and/or semi-aquatic conditions. No organic units were recorded within the new geoarchaeological boreholes, indicating that where such units are recorded within the previous geotechnical boreholes, these are likely to be highly localised, representing either thin organic units or trace (probably detrital) inclusions. The palaeoenvironmental potential of the Brent Cross site is therefore considered to be very limited, and no further geoarchaeological or palaeoenvironmental investigations in this area are recommended.

## 2. INTRODUCTION

### 2.1 Site context

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 Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet (National Grid Reference (NGR): TQ 2310 8760; Figures 1 & 2). Quaternary Scientific were commissioned by Waterman Infrastructure & Environment Ltd to undertake the geoarchaeological investigations. The Brent Cross Cricklewood Regeneration Area comprises a 151 hectare site towards the south-west of the London Borough of Barnet (Figure 1). The area is divided into a series of sub-phases each relating to specific areas of the site, and specific areas within them. The archaeological and palaeoenvironmental potential of each sub-phase has been considered previously within various Desk-Based Assessments (DBA's) and Written Schemes of Investigation (WSI's) (Waterman, 2014; 2016). Within these documents, and in part as a result of a previous geotechnical site-investigation and deposit modelling exercise carried out by AECOM, an area of palaeoenvironmental potential was identified along the course of the River Brent (see outline in Figure 1).

The ground across much of the area of palaeoenvironmental potential originally formed part of the natural floodplain of the River Brent, and is mapped by the British Geological Survey as being underlain by river alluvium, comprising clay, silt, sand and gravel. Towards the eastern end of the study area, Pleistocene Taplow Gravel is recorded beyond the margins of the alluvium. The bedrock beneath the entire area is mapped as the Paleogene London Clay ([www.bgs.ac.uk](http://www.bgs.ac.uk)). Over 250 boreholes/test-pits have been put down across the site by Structural Soils and Waterman since 2006; 64 of these are well-distributed across the area of palaeoenvironmental interest (see Figure 2). Initial analysis of these records suggests that the London Clay bedrock has an upper surface ranging between 32.8 and 44.10m OD. Sand and Gravel deposits overlie the London Clay in just under half of the sequences, representative of the Pleistocene River Terrace Gravels. Overlying the Gravels, or directly resting on the London Clay, is a unit of Gravelly Clay. This unit is frequently present across the site, despite its similar composition to the Pleistocene River Terrace Gravels. Finally, overlying the Gravelly Clay, Gravels and/or London Clay, is a unit of finer mineral-rich deposits consisting of clays, silts and sands. Evidence for peat and/or organic-rich sediment occurs in approximately one third of the records, in either the uppermost clays, silts and sands or lower Gravelly Clay. In almost all cases, only rare quantities are recorded, with frequent reference to 'organic veins'. Those records in which such features are identified are highlighted in Figure 12. A variable quantity of Made Ground up to 6m thick caps the sequence, almost certainly truncating the natural sequence in several instances.

In the vast majority of cases, the uppermost clays, silts and sands and lower Gravelly Clay most likely represent alluvial deposits. This is certainly the case in those records in which a rare organic component is recognized. However, the possibility that brickearth might be present cannot be discounted, both the Gravelly Clay and overlying clays, silts and sands are interpreted as Head in a

few isolated records. Thus, further records are required across the site to clarify the nature of the sub-surface stratigraphy.

## **2.2 Geoarchaeological, palaeoenvironmental and archaeological significance**

The existing records indicate variation in the height and thickness of the main stratigraphic units across the site. Such variations are significant as they represent different environmental conditions that would have existed in a given location. For example: (1) the varying surface of the London Clay / River Terrace Gravels may represent the location of former channels and bars (as outlined above); and (2) the Alluvium represents periods of channel activity / changing hydrological conditions. Thus by studying the sub-surface stratigraphy across the site and wider area in greater detail, it will be possible to build our understanding of the former landscapes and environmental changes that took place across space and time.

Organic-rich sediments (in particular Peat) appear not to be relatively rare, but if identified have 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 during the Holocene 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 have successfully been 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 potential for archaeological remains on the Brent Cross site has been considered as part of the archaeological DBA & WSI (Waterman, 2016).

## **2.3 Aims and objectives**

On the basis of the geoarchaeological, palaeoenvironmental and archaeological potential of the site outlined above, further records are required to enhance our understanding of the sub-surface stratigraphy of the Brent Cross site, and for any further assessment/analysis of the deposits (if necessary).

Five significant research aims relevant to the geoarchaeological investigations at the site are outlined here:

1. To clarify the nature of the sub-surface stratigraphy across the site;
2. To clarify the nature, depth, extent and likely date of any former land surfaces, alluvial 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 local area for publication in an academic journal.

In order to address the first two of these aims, a total of eight geoarchaeological boreholes were put down at the site, as outlined within the Written Scheme of Investigation (Batchelor & Young, 2017). The stratigraphic data from these new geoarchaeological boreholes, and existing geotechnical records, has been used to produce a deposit model of the major depositional units across the site, and recommendations have been made for any further geoarchaeological, palaeoenvironmental and archaeological investigation at the mitigation stage.



-  Site Boundary
-  Watching Brief
-  Palaeo-environmental



Project Details	WIE11488-101: Brent Cross Phase 1A North
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Figure 1: Location of the Brent Cross site, highlighting the area of palaeoenvironmental potential (green). Figure provided by Waterman Infrastructure & Environment Ltd.

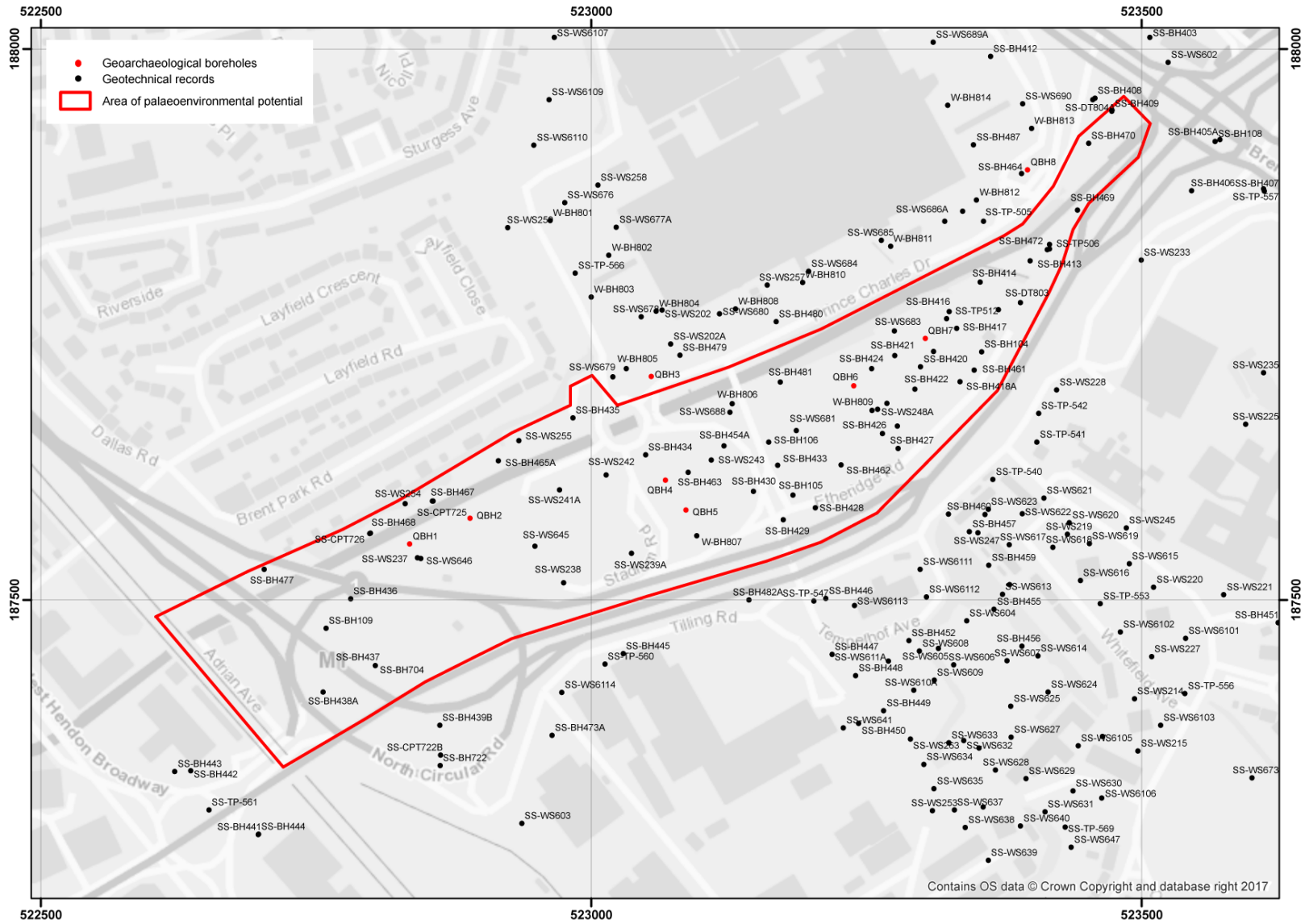


Figure 2: Location of the new ge archaeological boreholes and existing geotechnical records within the area of palaeoenvironmental potential at Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.



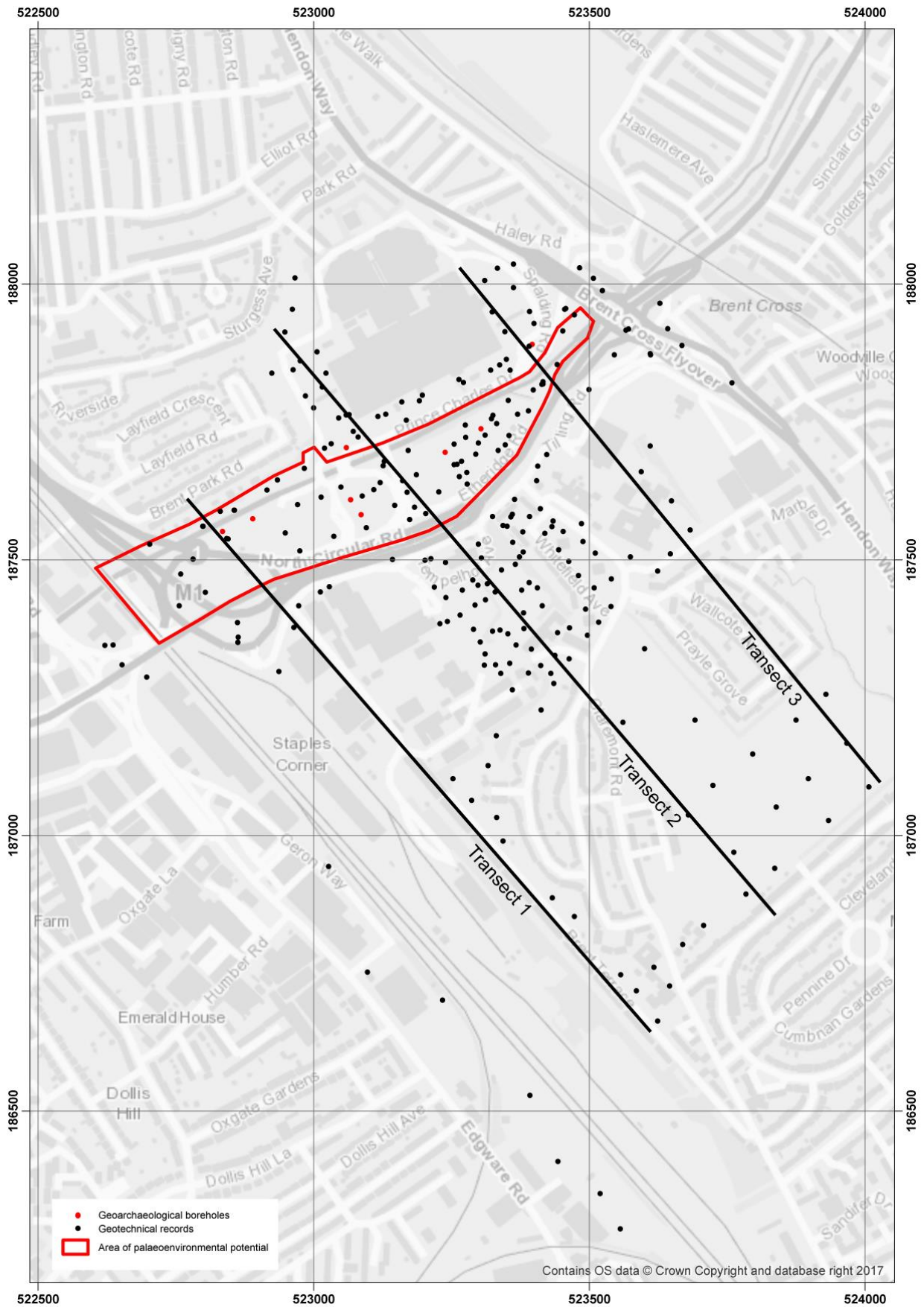


Figure 3: Distribution of the borehole/test pit records used in the deposit model for the site at Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet, showing the location of Transects 1-3.

## 3. METHODS

### 3.1 Field investigations

A total of eight geoarchaeological boreholes (boreholes QBH1 to QBH8) were put down at the site in October 2017 by Quaternary Scientific (Figure 2). The borehole core samples were recovered using an Eijkelkamp window sampler and gouge set using an Atlas Copco TT 2-stroke percussion engine. This coring techniques provide a suitable method for the recovery of continuous, undisturbed core samples and provides sub-samples suitable for not only sedimentary and microfossil assessment and analysis, but also macrofossil analysis. Spatial co-ordinates for each borehole were obtained using a Leica Differential GPS (see Table 1).

Table 1: Spatial data for the new geoarchaeological boreholes at Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.

Name	Easting	Northing	Elevation (m OD)
QBH1	522835.01	187550.73	41.44
QBH2	522890.00	187574.18	42.03
QBH3	523058.63	187703.85	42.35
QBH4	523068.80	187608.58	42.35
QBH5	523085.96	187581.54	42.54
QBH6	523238.39	187694.44	42.79
QBH7	523303.42	187737.47	40.40
QBH8	523396.42	187890.46	43.21

### 3.2 Lithostratigraphic description

Field-based lithostratigraphic descriptions of the new borehole samples was carried out using standard procedures for recording unconsolidated sediment and peat, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts). The procedure involved: (1) cleaning the samples with a spatula or scalpel blade and distilled water to remove surface contaminants; (2) recording the physical properties, most notably colour; (3) recording the composition e.g. gravel, fine sand, silt and clay; (4) recording the degree of peat humification, and (5) recording the unit boundaries e.g. sharp or diffuse. The results of the lithostratigraphic descriptions are displayed in Tables 2 to 9.

### 3.3 Deposit modelling

The deposit model for Brent Cross was based on a review of 265 borehole and test pit logs, including the eight two new geoarchaeological boreholes and 257 geotechnical records (see Figure 2 and Appendix 1). Sedimentary units from the boreholes/test pits were classified into four main groups: (1) Bedrock, (2) Gravel, (3) Alluvium/Head and (4) Made Ground. The classified data for groups 1-4 were then input into a database within the RockWorks 16 geological utilities software, the output from which was displayed using ArcMAP 10. On the basis that it is difficult to distinguish between the alluvium and Head in the geotechnical logs, these units have been combined for deposit modelling purposes; however, the extent of these units across the site is described in more detail below, and they are distinguished in the two-dimensional borehole transects.

Models of surface height were generated for the Bedrock (Figure 4), Gravel (Figure 5) and Alluvium/Head (Figure 6) using an Inverse Distance Weighted algorithm. Thickness of the alluvium/Head (incorporating both the alluvial and colluvial deposits) and Made Ground (Figures 7 and 8) were also modelled (also using an Inverse Distance Weighted algorithm). Northwest to southeast borehole transects across the southern, central and northern areas of the site are displayed in Figures 9 to 11 respectively.

Because the boreholes are not uniformly distributed over the area of investigation, the reliability of the models generated using RockWorks is variable. In general, reliability improves from outlying areas where the models are largely supported by scattered archival records towards the core area of commissioned boreholes. Within the area of palaeoenvironmental potential the distribution of records is generally good, although some gaps in the model do exist towards the southwest of this area.

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 and section drawings. As a consequence of this, the modelling procedure has been manually adjusted so that only those areas for which sufficient stratigraphic data is present will be modelled. In order to achieve this, a maximum distance cut-off filter equivalent to a 50m radius around each record is applied to all deposit models with the more ubiquitous bedrock, for which a 100m radius is used. In addition, it is important to recognise that multiple sets of boreholes are represented, put down at different times and recorded using different descriptive terms and subject to differing technical constraints in terms of recorded detail including the exact levels of the stratigraphic boundaries.

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

The results of the lithostratigraphic descriptions of the new geoarchaeological boreholes are displayed in Tables 2 to 9, with the results of the deposit modelling displayed in Figures 4 to 11. Figures 4 to 8 are surface elevation and thickness models for each of the main stratigraphic units, both for the area of palaeoenvironmental potential and the wider area of Brent Cross; Figures 9 to 11 are two-dimensional northwest-southeast transects across southern central and northern area of the site and wider area, respectively. The results of the deposit modelling indicate that the number and spread of the logs is sufficient to permit modelling with a high level of certainty across the majority of the area of palaeoenvironmental potential, although some gaps in the model do exist towards the southeast of the site.

The full sequence of sediments recorded in the boreholes comprises:

Made Ground

Head – widely present outside of the area of palaeoenvironmental potential

Alluvium – widely present within the area of palaeoenvironmental potential; very rarely organic

Gravel – widely present within the area of palaeoenvironmental potential

Bedrock

### 4.1 London Clay (Bedrock)

The deposits of the London Clay bedrock, usually described as a very firm, occasionally silty or sandy clay, are recorded as the basal unit across the area of investigation. Within the valley of the River Brent and the area of palaeoenvironmental potential the surface of the bedrock generally lies at between ca. 33 and 38m OD (Figure 4), perhaps slightly deeper towards the west (downstream). Outside of the valley of the River Brent the London Clay surface rises to ca. 46m OD towards the north, and to ca. 56m OD towards the south (see Figure 4).

The London Clay was recorded in four of the eight geoarchaeological boreholes, its surface recorded at 35.79 (QBH1), 37.05 (QBH3), 40.19 (QBH5) and 37.79m OD (QBH6). Where the alluvium directly overlies the London Clay bedrock without an intervening Gravel horizon (see below) it is, in places, difficult to define the contact between the weathered upper surface of the bedrock and the overlying alluvium. This is particularly true of the geotechnical logs, although this contact was also difficult to define in selected geoarchaeological boreholes (e.g. QBH6).

### 4.2 Gravel

Overlying the London Clay bedrock, a horizon of sandy, in places silty gravel was recorded towards the base of the sequence within the valley of the River Brent. Within the area of palaeoenvironmental potential and the historic floodplain of the River, the surface of the gravel is generally recorded at between ca. 34 and 39m OD (Figure 5). Within this area, this unit is considered equivalent to the Shepperton Gravel of Gibbard (1985), deposited during the Late

Glacial (Marine Isotope Stage (MIS) 2; 15,000 to 10,000 years before present) and comprising the sands and gravels of a high-energy braided river system which, while it was 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. This Gravel horizon was encountered in only one of the geoarchaeological boreholes within this area (QBH4), its surface lying at 38.73m OD.

Towards the northeast of the site, and rising above the historic floodplain of the Brent, the Gravel rises to between ca. 42 and 47m OD (see Figure 5); here, the gravel is considered to represent the deposits of the older (Wolstonian; MIS6) Taplow Gravel terrace. The Taplow Gravel was encountered in borehole QBH8, its surface at 43.11m OD. A unit of sandy, silty gravel was encountered towards the south of the wider area in geotechnical borehole SS-WS639, between 45.53 and 44.53m OD; this deposit may represent either a remnant of the Taplow Gravel terrace, or a gravel-rich unit of Head (see below); for deposit modelling purposes the former was adopted for this borehole.

#### **4.3 Alluvium**

Overlying the Gravel across much of the area of palaeoenvironmental potential is a horizon of generally silty clay alluvium, present at elevations of between ca. 33 and 41m OD. This unit was recorded in geoarchaeological boreholes QBH1, QBH3, QBH4, QBH5 and QBH6, its upper surface lying at between ca. 37 and 41m OD (Figure 6) and present in thickness of between ca. 1 and 4m (Figure 7). The sediments of the Alluvium are indicative of deposition within low energy fluvial and/or semi-aquatic conditions during the Holocene, in the majority of cases forming at a distance from any active channels on the floodplain of the River Brent. 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.

The sediments of the Alluvium are very occasionally organic, although no distinct peat or organic-rich units were recorded within the new geoarchaeological boreholes. A total of 21 of the previous geotechnical boreholes note organic matter within the Alluvium, in many cases described either as 'organic veins' or 'occasional organic matter' (see Figure 12); these are most likely equivalent to the traces of detrital organic material recorded within the Alluvium in geoarchaeological boreholes QBH1, QBH3, QBH5 and QBH6. Pockets of peat, or alluvium described as organic, were recorded in boreholes SS-WS242 and SS-WS646. These organic units appear to be highly localised within the Alluvium, and where recorded, may represent only either very thin units or trace inclusions.

#### **4.4 Head (colluvium)**

A unit described as a variably sandy and gravelly clay overlies the London Clay bedrock, generally outside of the area of palaeoenvironmental potential and off the floodplain of the River Brent, although in places it is difficult to distinguish between this unit and the lower-lying floodplain alluvium in the geotechnical logs. This unit generally lies at elevations above ca. 41m OD (this

contour is shown in Figure 6), its surface rising to ca. 55m OD towards the south (see Figure 7). This unit is considered equivalent to the Head deposits described by the BGS, and is probably derived mainly from the processes of solifluction and/or hillwash and soil creep.

Thin 'peat' units were recorded within two of the previous geotechnical boreholes at levels correlating with the Head elsewhere, including SS-WS101 between 47.19 and 47.09m OD and SS-WS230 between 47.8 and 47.6m OD; however, in both boreholes these deposits directly underlie the Made Ground, and may represent either redeposited material that forms part of the Made Ground, or thin buried soil horizons. Again, these units are both thin and only locally present.

#### **4.5 Made Ground**

Between ca. 1 and 7m of Made Ground caps the sequence across the area of palaeoenvironmental potential (Figure 8). In some areas the Made Ground truncates the entire alluvial sequence and rests directly on the London Clay, although these are not common within the area of palaeoenvironmental potential.

**Table 2: Lithostratigraphic description of borehole QBH1, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.**

Depth (m OD)	Depth (m bgl)	Composition	Unit
41.44 to 38.84	0.00 to 2.60	Made Ground of tarmac over brick and concrete rubble.	MADE GROUND
38.84 to 38.44	2.60 to 3.00	Redeposited London Clay with some brick, concrete fragments and glass.	
38.44 to 37.44	3.00 to 4.00	Redeposited alluvium (grey silty clay matrix) with concrete and brick fragments.	
37.44 to 37.24	4.00 to 4.20	Ag2 As2 Sh+; dark greyish blue silt and clay with a trace of organic matter. Some black mottling. Diffuse contact in to:	ALLUVIUM
37.24 to 35.79	4.20 to 5.65	As3 Ag1; greyish blue silty clay. Diffuse contact in to:	
35.79 to 35.74	5.65 to 5.70	As4 Gg+; greyish brown very firm clay with occasional small gravel clasts. Diffuse contact in to:	LONDON CLAY
35.74 to 35.44	5.70 to 6.00	As4 Ag+; greyish brown very firm clay with a trace of silt. Some brown mottling.	

**Table 3: Lithostratigraphic description of borehole QBH2, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.**

Depth (m OD)	Depth (m bgl)	Composition	Unit
42.03 to 39.23	0.00 to 2.80	Made Ground of tarmac over brick and concrete rubble.	MADE GROUND
39.23 to 39.03	2.80 to 3.00	Redeposited London Clay with some brick, concrete fragments and glass.	
39.03 to 38.26	3.00 to 3.77	Brick and concrete rubble.	
38.26 to 38.13	3.77 to 3.90	Redeposited London Clay.	
38.13 to 38.03	3.90 to 4.00	Brick (pushed down?)	
38.03	4.00	Obstruction	

**Table 4: Lithostratigraphic description of borehole QBH3, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.**

Depth (m OD)	Depth (m bgl)	Composition	Unit
42.35 to 41.15	0.00 to 1.20	Made Ground of tarmac over brick and concrete rubble and gravel in matrix of brown sandy silty clay.	MADE GROUND
41.15 to 40.95	1.20 to 1.40	Redeposited sandy gravel.	
40.95 to 39.85	1.40 to 2.50	Grey silty clay with brick and gravel.	
39.85 to 39.70	2.50 to 2.65	As4 Ag+ Ga+; grey, firm clay with traces of silt and sand. Diffuse contact in to:	ALLUVIUM
39.70 to 38.85	2.65 to 3.50	As4 Ag+ Ga+ Gg+; brown clay with traces of sand, silt and occasional gravel clasts.	
38.85 to 37.05	3.50 to 5.30	Ag3 As1 Dh+ Sh+; dark blueish grey clayey silt with traces of detrital herbaceous material and organic matter. Diffuse contact in to:	
37.05 to 36.47	5.30 to 5.88	As4 Ag+; blueish grey very firm clay with a trace of silt and some orange mottling. Diffuse contact in to:	LONDON CLAY
36.47 to 36.35	5.88 to 6.00	As4 Ag+; orangey grey very firm clay with a trace of silt.	

**Table 5: Lithostratigraphic description of borehole QBH4, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.**

Depth (m OD)	Depth (m bgl)	Composition	Unit
42.35 to 40.35	0.00 to 2.00	Tarmac over Made Ground of brick and gravel in matrix of brown silty clay.	MADE GROUND

Depth (m OD)	Depth (m bgl)	Composition	Unit
40.35 to 39.40	2.00 to 2.95	Brick and gravel in matrix of dark brown silty clay.	
39.50 to 39.35	2.95 to 3.00	As3 Ag1; grey silty clay. Diffuse contact in to:	ALLUVIUM
39.35 to 38.73	3.00 to 3.62	As3 Ag1; greyish brown silty clay. Diffuse contact in to:	
38.73 to 38.35	3.62 to 4.00	Gg2 As2; greyish brown gravel and clay. Clasts are flint, sub-angular to rounded, up to 30mm in diameter.	GRAVEL

Table 6: Lithostratigraphic description of borehole QBH5, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.

Depth (m OD)	Depth (m bgl)	Composition	Unit
42.54 to 41.34	0.00 to 1.20	Made Ground of tarmac over brick and concrete rubble and gravel in matrix of brown silty clay.	MADE GROUND
41.34 to 40.54	1.20 to 2.00	Redeposited London Clay, brick and gravel.	
40.54 to 40.19	2.00 to 2.35	Ag2 As2 Dh+ Ga+ Gg+; grey silt and clay with a trace of detrital herbaceous material, sand and occasional gravel clasts. Diffuse contact in to:	ALLUVIUM
40.19 to 39.54	2.35 to 3.00	As4 Ga+ Ag+; grey grading in to orangey brown, stiff clay with traces of sand and silt.	LONDON CLAY

Table 7: Lithostratigraphic description of borehole QBH6, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.

Depth (m OD)	Depth (m bgl)	Composition	Unit
42.79 to 41.39	0.00 to 1.40	Made Ground of tarmac over brick, mortar and clinker in matrix of dark brown silty clay.	MADE GROUND
41.39 to 40.79	1.40 to 2.00	As4 Ag+ Ga+; brown very firm clay with traces of silt and sand.	
40.79 to 40.19	2.00 to 2.60	Made Ground of brick, mortar and clinker in matrix of dark brown silty clay.	
40.19 to 39.79	2.60 to 3.00	As2 Ag1 Gg1; olive grey silty gravelly clay (gravel is chalk and flint). Diffuse contact in to:	ALLUVIUM
39.79 to 38.84	3.00 to 3.95	As4 Ag+; brown very firm clay with a trace of silt. Diffuse contact in to:	
38.84 to 38.29	3.95 to 4.50	As4 Ag+ Gg+; brownish blue firm clay with a trace of silt and some fine gravel sized chalk fragments. Diffuse contact in to:	
38.29 to 38.23	4.50 to 4.56	Ag3 As1 Sh+; brown clayey silt with a trace of organic matter. Diffuse contact in to:	
38.23 to 37.79	4.56 to 5.00	Ag3 As1; blueish grey clayey silt. Diffuse contact in to:	
37.79 to 36.79	5.00 to 6.00	As1 Ag1; very firm blue grey silty clay.	LONDON CLAY

Table 8: Lithostratigraphic description of borehole QBH7, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.

Depth (m OD)	Depth (m bgl)	Composition	Unit
40.40 to 38.40	0.00 to 2.00	Made Ground of tarmac over brick and concrete rubble and gravel in matrix of brown sandy silty clay.	MADE GROUND
38.40	2.00	Obstruction (borehole abandoned)	



Table 9: Lithostratigraphic description of borehole QBH8, Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet.

Depth (m OD)	Depth (m bgl)	Composition	Unit
43.21 to 43.11	0.00 to 0.10	Tarmac hardstanding	MADE GROUND
43.11 to 42.41	0.10 to 0.80	Gg3 As1; clayey gravel. Clasts are flint, sub-angular to well-rounded, up to 60mm in diameter.	TAPLOW GRAVEL

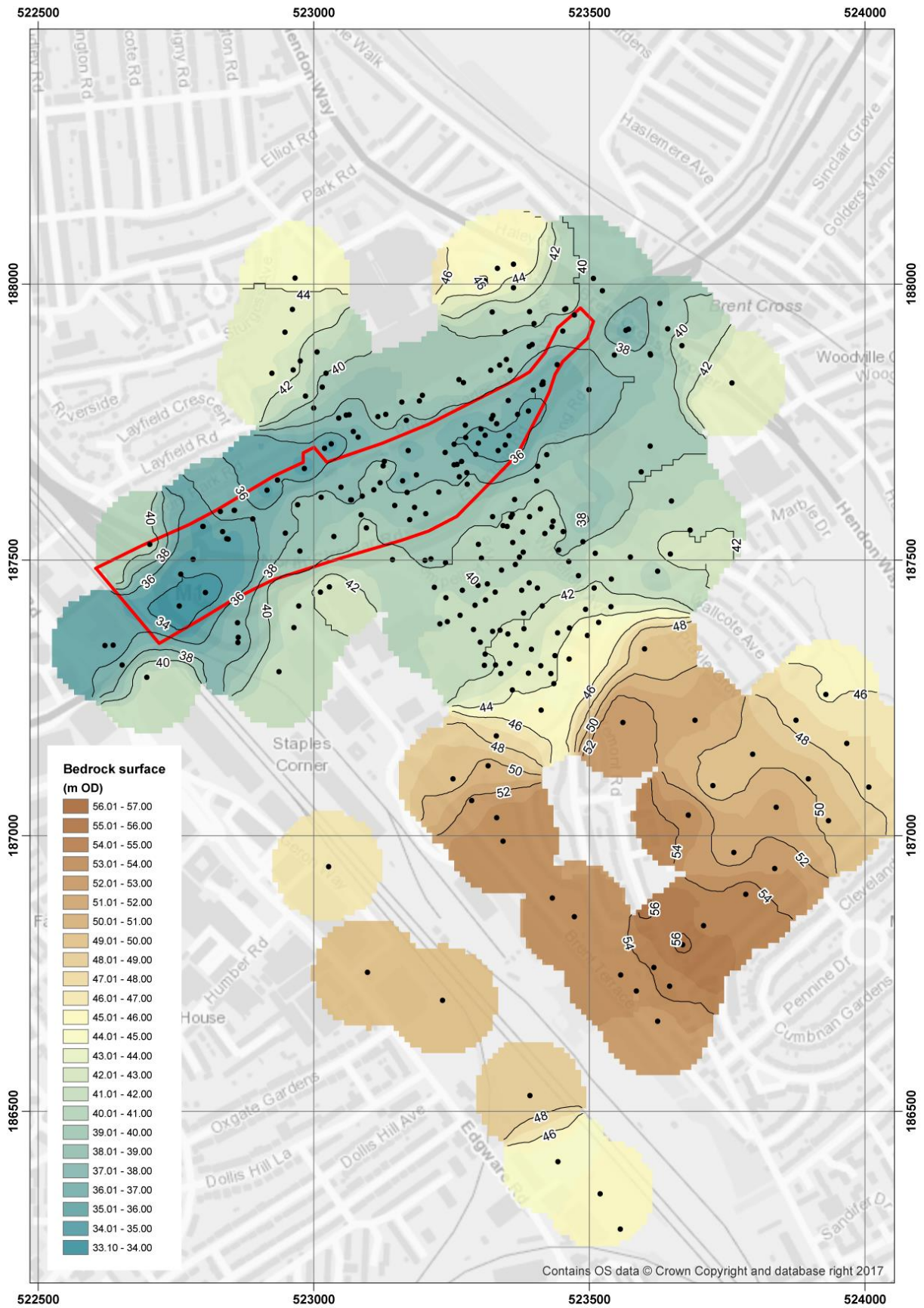


Figure 4: Top of the Bedrock (m OD)

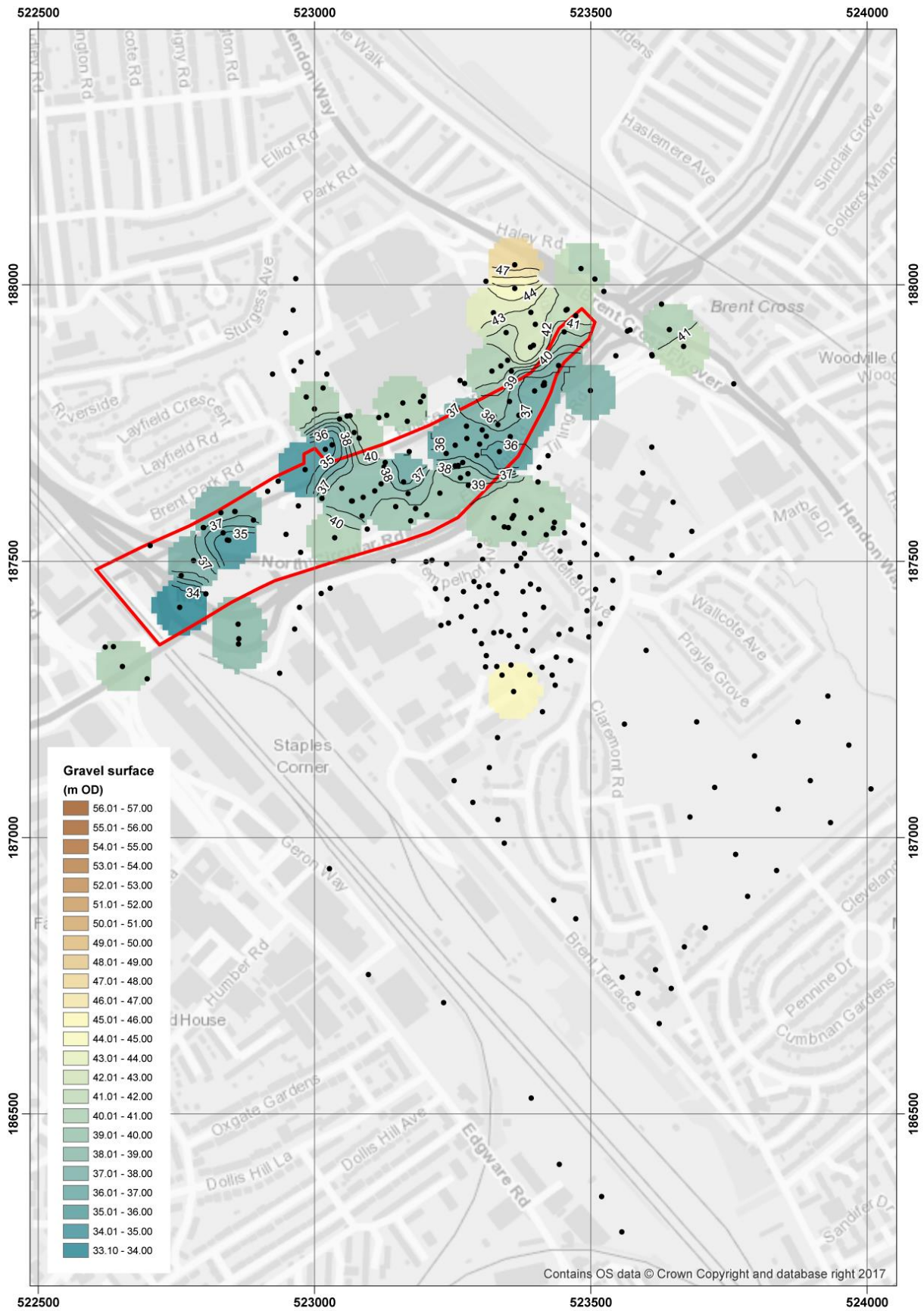


Figure 5: Top of the Gravel (m OD)

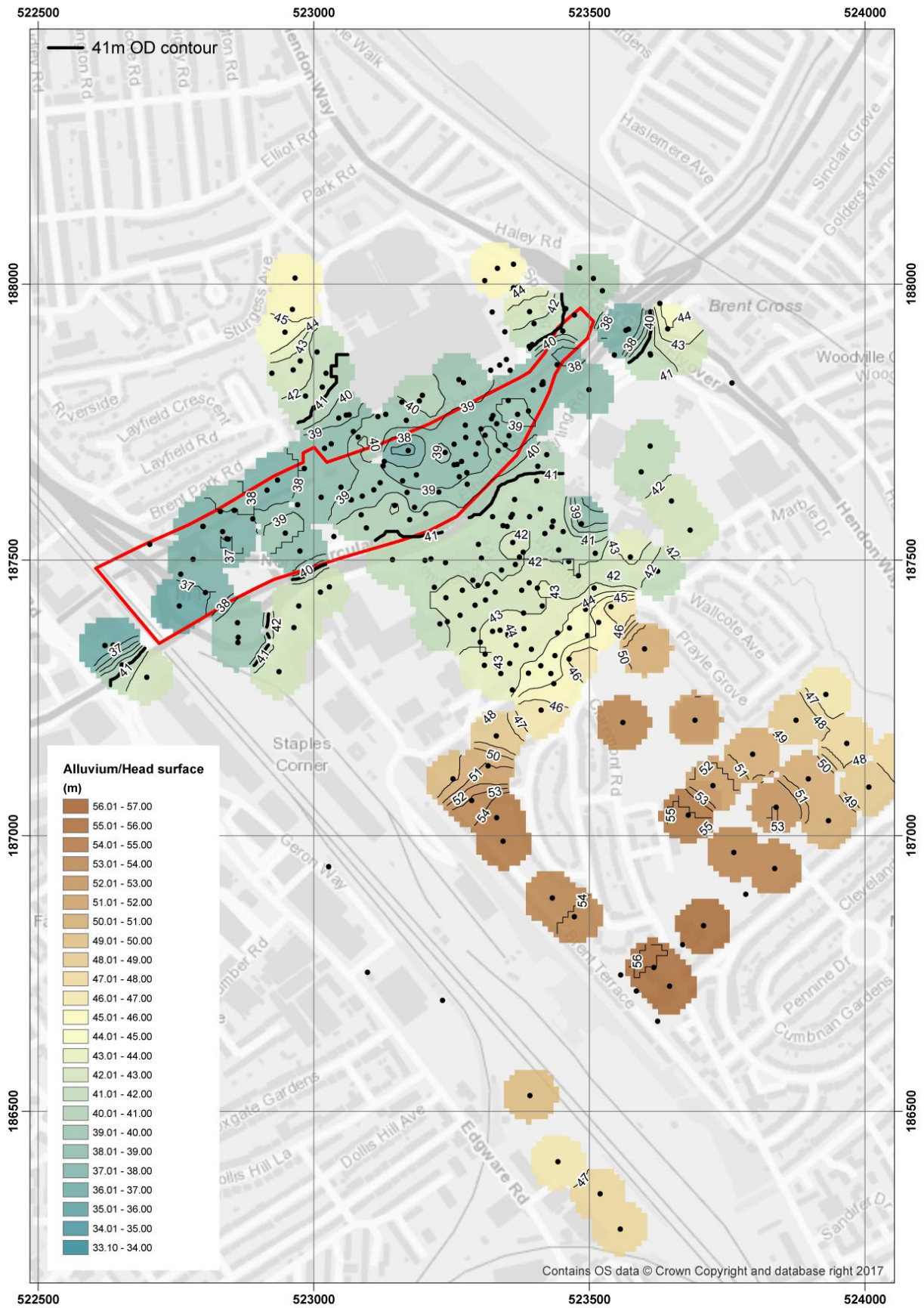


Figure 6: Top of the Head/Alluvium (m OD), showing the 41m OD contour for these units (see text).

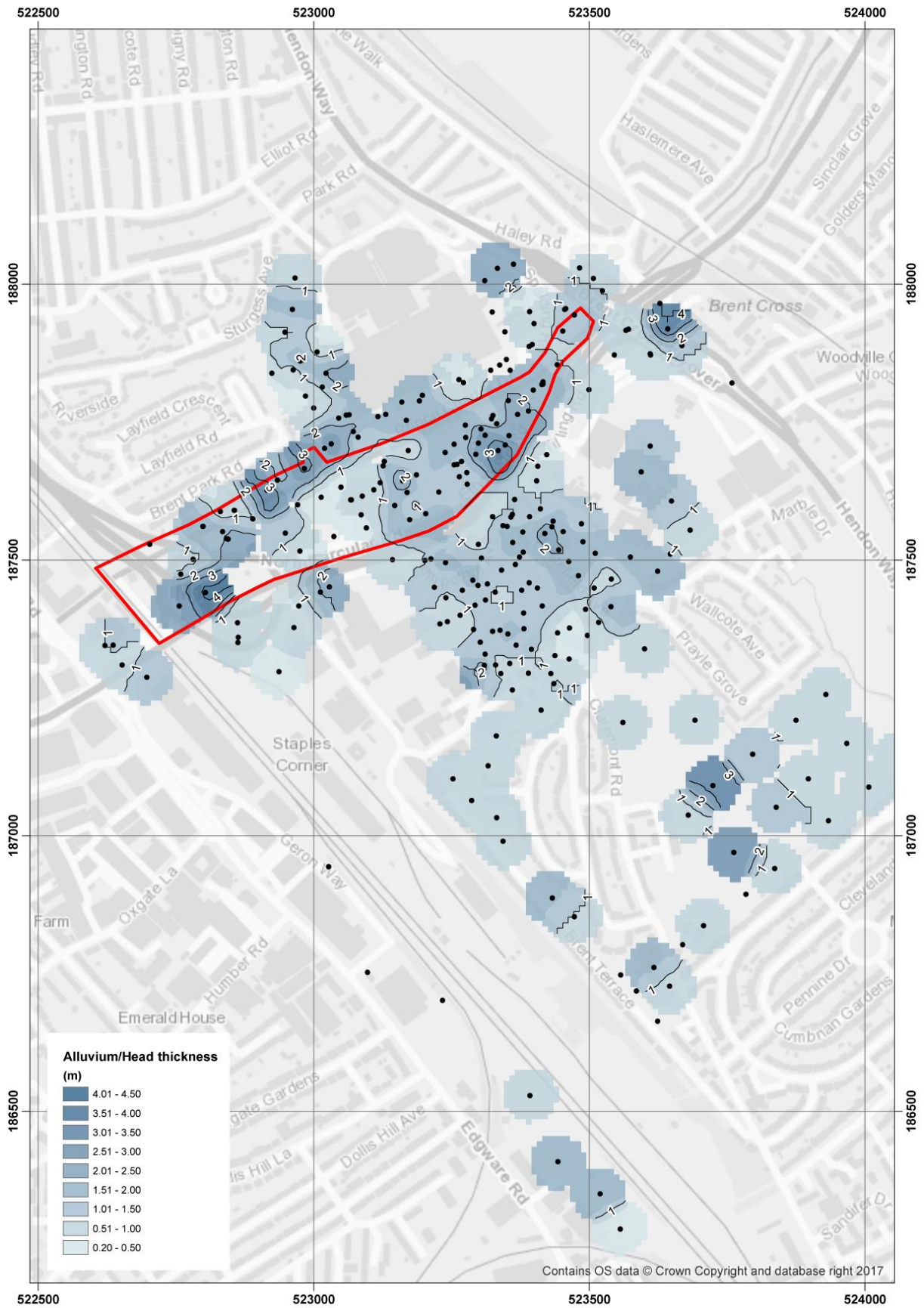


Figure 7: Thickness of the Head/Alluvium (m)

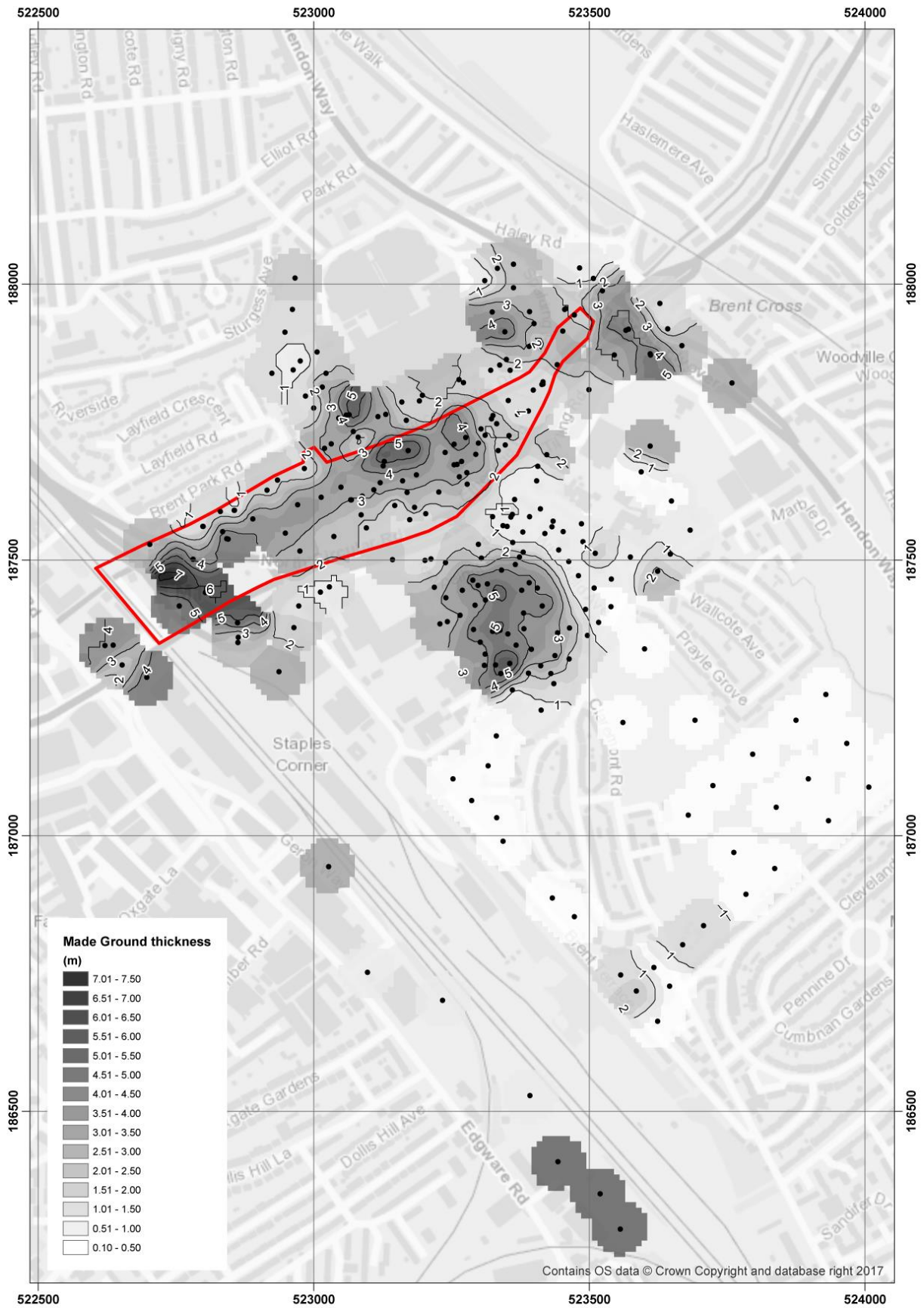


Figure 8: Thickness of the Made Ground (m)

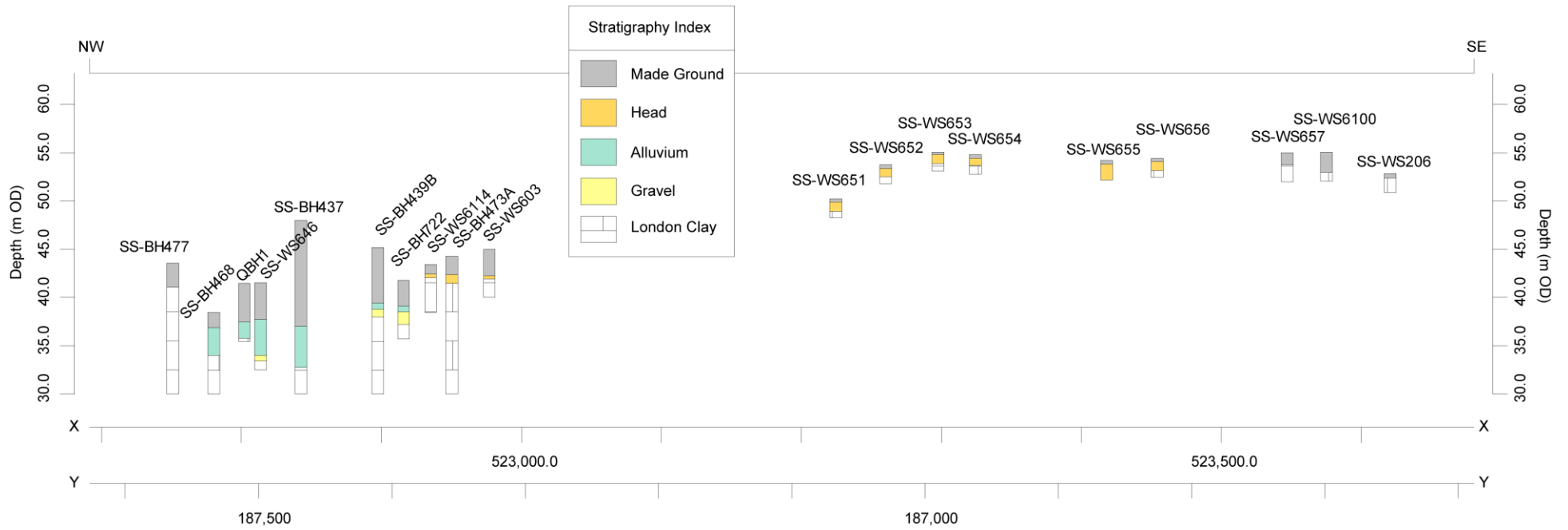


Figure 9: Northwest-southeast transect of boreholes across the southern area of the site (Transect 1)

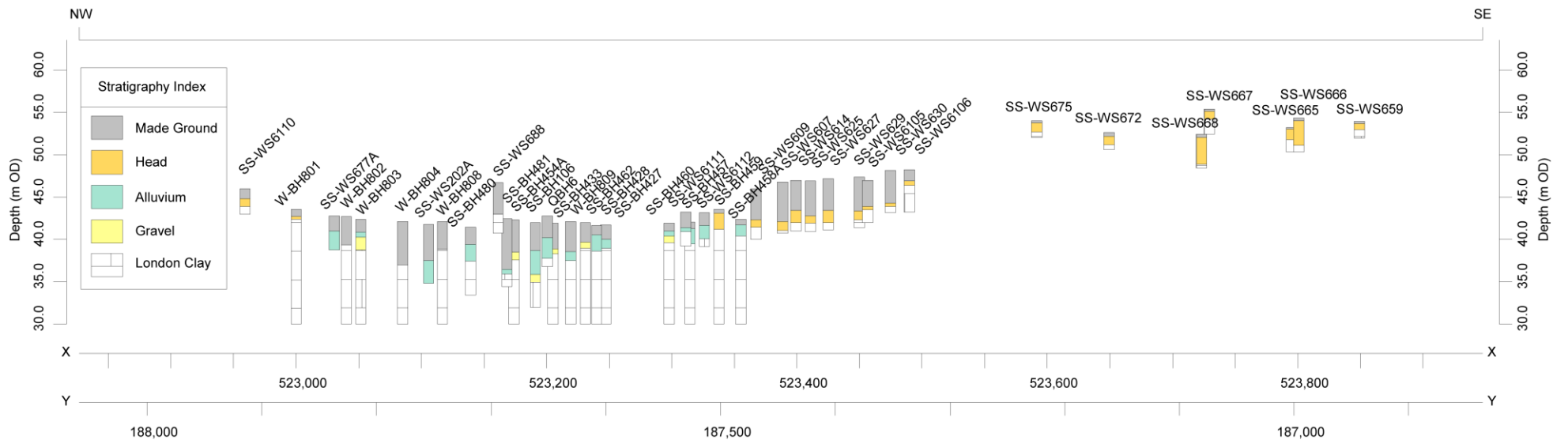


Figure 10: Northwest-southeast transect of boreholes across the central area of the site (Transect 2)



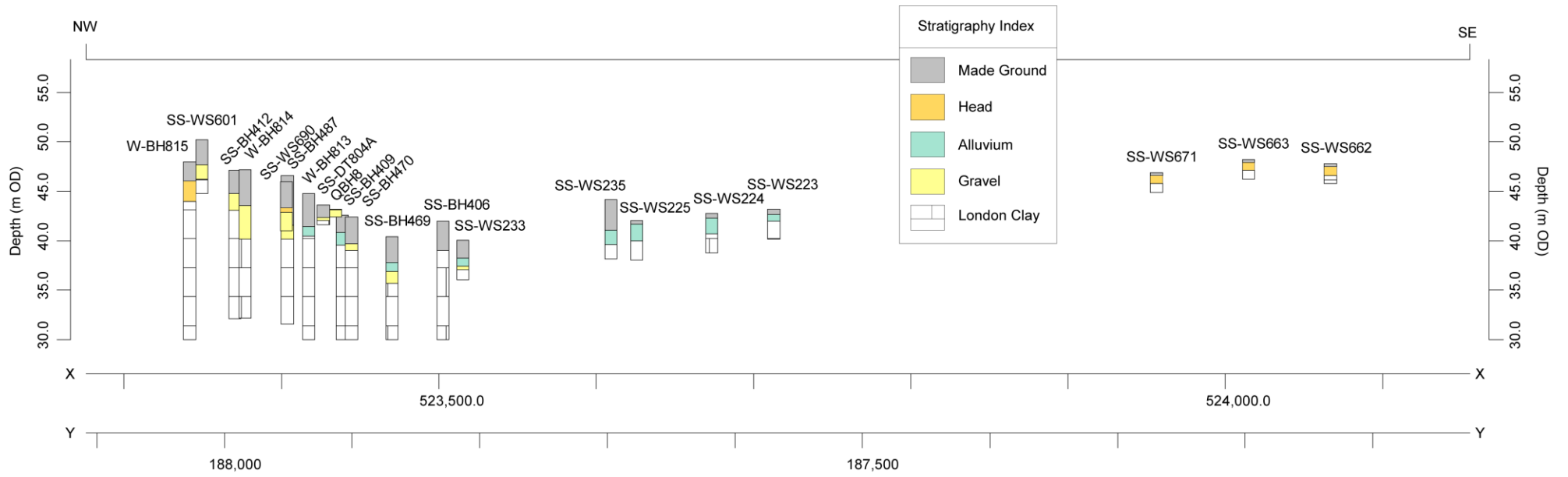


Figure 11: Northwest-southeast transect of boreholes across the northern area of the site (Transect 3)

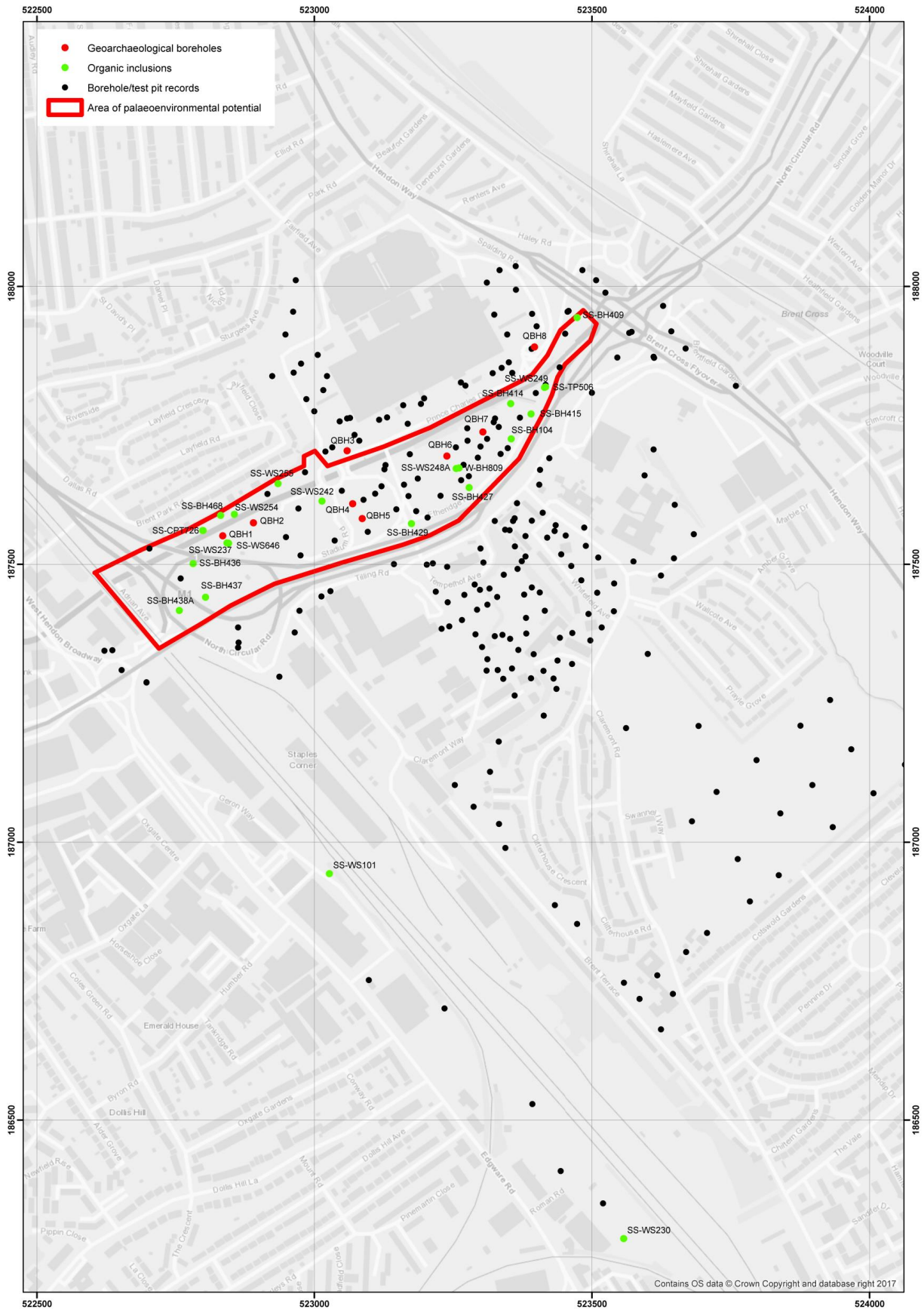


Figure 12: Location of those boreholes in which organic inclusions are noted in the geotechnical records at Brent Cross, Cricklewood Regeneration Area, London Borough of Barnet. These inclusions most likely represent either very thin, highly localised deposits, or detrital inclusions of limited palaeoenvironmental potential.

## 5. DISCUSSION & CONCLUSIONS

A programme of geoarchaeological fieldwork and deposit modelling was carried out within the area of palaeoenvironmental potential at the Brent Cross site in order to (1) clarify the nature of the sub-surface stratigraphy across the site; (2) clarify the nature, depth, extent and likely date of any former land surfaces, alluvial and peat deposits; and (3) to make recommendations for any further geoarchaeological, palaeoenvironmental or archaeological investigations. In order to address these aims, a total of eight geoarchaeological boreholes were put down at the site. These were described in the field and integrated with stratigraphic data from existing records to produce a deposit model of the major depositional units across the site.

The results of these investigations indicate that the sedimentary sequence at the site comprises the bedrock London Clay, overlain within the valley of the River Brent by gravel, floodplain alluvium, and Made Ground. Outside of the area of the floodplain, and rising above an elevation of around 41m OD, the bedrock is overlain by Head deposits most likely of colluvial origin, and Made Ground. The surface of the bedrock lies at between ca. 33 and 38m OD within the valley of the River Brent and the area of palaeoenvironmental potential, beyond this area rising to ca. 46m OD to the north, and to ca. 56m OD to the south.

Underlying the floodplain of the River Brent the Gravel is considered equivalent to the Late Devensian Shepperton Gravel of Gibbard (1985), its surface lying at between ca. 34 and 39m OD. Towards the northeast of the site, and rising above the historic floodplain of the Brent, the Gravel rises to between ca. 42 and 47m OD and is considered to represent the deposits of the older (Wolstonian) Taplow Gravel terrace. On the floodplain itself, a horizon of Holocene alluvium is recorded, generally present at elevations of between ca. 33 and 41m OD. The sediments of the Alluvium are mineral-rich, and indicative of deposition within low energy fluvial and/or semi-aquatic conditions. No organic units were recorded within the new geoarchaeological boreholes, indicating that where such units are recorded within the previous geotechnical boreholes, these are likely to be highly localised, representing either thin organic units or trace (probably detrital) inclusions.

Off the floodplain and generally at elevations of above ca. 41m OD Head deposits are recorded overlying the London Clay, most likely of colluvial origin and of an unknown date (but possibly incorporating sediments of both Late Devensian and Holocene age). This unit is mineral-rich, and is generally described as a poorly sorted, variably sandy, gravelly clay. It is of note that this unit is difficult to distinguish between this and the lower-lying floodplain alluvium in the geotechnical logs, and deposits of the Head may also be recorded within selected boreholes on the floodplain.

## 6. RECOMMENDATIONS

The Holocene alluvium that has accumulated on the floodplain of the River Brent appears to be mineral-rich, and any organic material present is thin, highly localised and/or detrital in nature. The palaeoenvironmental potential of the Brent Cross site is therefore considered to be very limited, and no further geoarchaeological or palaeoenvironmental investigations in this area are recommended.

In terms of the archaeological potential of the site, the floodplain itself is not likely to have been a desirable location for human occupation, since it is likely to have been inundated frequently by floodwater. However, where the ground rises up off the floodplain (broadly in the area of the 41m OD contour shown in Figure 6), such a location might have provided a more attractive spot at the interface between the floodplain and the higher, drier ground to the north and south. However, it is of note that this interface probably lies beyond the margins of the area of palaeoenvironmental potential that forms the focus of this report.

## 7. REFERENCES

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## 8. APPENDIX 1: DEPOSIT MODEL DATA

Name	Easting	Northing	Elevation (m OD)	Total depth (m)
<i>New geoarchaeological boreholes</i>				
QBH1	522835.01	187550.73	41.44	6.00
QBH2	522890.00	187574.18	42.03	4.00
QBH3	523058.63	187703.85	42.35	6.00
QBH4	523068.8	187608.58	42.35	4.00
QBH5	523085.96	187581.54	42.54	3.00
QBH6	523238.39	187694.44	42.79	6.00
QBH7	523303.42	187737.47	40.4	2.00
QBH8	523396.42	187890.46	43.21	0.80
<i>Existing geotechnical records</i>				
SS-BH104	523354.60	187725.20	40.54	25.00
SS-BH105	523183.20	187594.90	41.97	24.00
SS-BH106	523161.40	187643.00	41.98	10.00
SS-BH109	522759.00	187474.00	41.37	25.00
SS-WS237	522842.30	187538.00	41.43	7.00
SS-WS238	522975.10	187515.50	41.43	4.00
SS-WS239A	523036.60	187542.20	42.71	4.00
SS-WS241A	522971.30	187599.90	42.69	5.00
SS-WS242	523013.70	187613.40	42.18	5.00
SS-WS243	523109.20	187626.80	42.34	4.00
SS-WS248A	523260.30	187672.90	42.13	7.00
SS-WS249	523416.50	187818.80	39.82	5.00
SS-WS254	522831.00	187587.30	39.54	3.00
SS-WS255	522934.40	187644.60	39.62	4.00
SS-BH409	523473.00	187943.70	42.55	44.50
SS-BH413	523398.60	187807.80	39.75	25.00
SS-BH414	523353.30	187788.60	40.07	45.00
SS-BH415	523389.90	187769.90	40.26	30.20
SS-BH416	523325.10	187761.80	40.53	30.00
SS-BH417	523332.00	187746.60	40.76	30.00
SS-BH418A	523335.10	187698.20	40.70	30.45
SS-BH419	523310.90	187725.40	40.49	34.00
SS-BH420	523299.20	187711.60	42.80	30.70
SS-BH421	523275.90	187721.70	42.68	30.15
SS-BH422	523294.20	187691.30	42.18	30.20
SS-BH423	523268.50	187678.30	42.08	30.50
SS-BH424	523254.70	187709.80	42.67	35.00
SS-BH425	523278.30	187657.90	42.40	9.50
SS-BH426	523264.50	187650.80	42.28	55.52
SS-BH427	523278.70	187637.30	41.73	34.55
SS-BH428	523203.70	187583.60	41.65	14.90
SS-BH429	523174.50	187572.60	41.92	30.00

Name	Easting	Northing	Elevation (m OD)	Total depth (m)
SS-BH430	523147.40	187598.60	42.63	45.00
SS-BH433	523169.40	187622.20	41.90	35.50
SS-BH434	523049.40	187631.80	42.17	55.50
SS-BH435	522983.30	187665.10	39.20	25.00
SS-BH436	522781.40	187500.90	41.36	20.00
SS-BH437	522804.00	187440.20	47.98	29.00
SS-BH438A	522756.50	187416.30	40.78	20.12
SS-BH454A	523120.70	187639.70	42.29	35.00
SS-BH461	523348.00	187708.40	40.60	15.00
SS-BH462	523226.90	187622.60	41.96	15.00
SS-BH463	523088.20	187615.60	42.36	14.50
SS-BH465A	522915.60	187626.20	39.50	15.65
SS-BH468	522799.40	187560.50	38.47	15.00
SS-BH469	523441.70	187853.90	40.40	15.50
SS-BH470	523451.80	187914.50	42.38	46.50
SS-BH472	523416.40	187822.70	39.85	35.00
SS-BH477	522702.90	187527.70	43.55	25.80
SS-BH481	523171.80	187697.80	42.44	8.00
SS-BH704	522803.80	187440.30	47.97	6.10
SS-CPT725	522855.80	187589.50	38.52	1.20
SS-CPT726	522798.70	187560.30	38.47	1.20
SS-TP506	523414.30	187817.90	39.85	1.20
SS-TP512	523322.70	187755.40	40.65	2.50
SS-WS645	522948.90	187548.50	42.60	5.00
SS-WS646	522845.30	187537.60	41.51	9.00
SS-WS647	523436.10	187275.30	46.28	3.00
SS-WS681	523186.30	187653.80	41.94	5.00
SS-WS683	523275.30	187744.10	43.01	7.00
W-BH803	523000.00	187775.00	42.39	15.00
W-BH806	523128.00	187678.00	41.24	15.45
W-BH807	523096.00	187558.00	42.60	15.45
W-BH809	523255.00	187672.00	42.14	15.45
SS-BH102	523234.10	186700.40	50.56	25.00
SS-BH103	523759.20	187820.40	46.53	25.00
SS-BH108	523566.90	187916.10	41.29	21.60
SS-WS101	523027.00	186943.00	50.14	10.45
SS-WS201	523519.90	186349.80	52.05	7.00
SS-WS202	523064.30	187763.00	42.10	7.00
SS-WS202A	523072.00	187732.40	41.81	7.00
SS-WS203	523443.30	186407.90	51.42	7.00
SS-WS204	523392.40	186528.20	50.70	4.00
SS-WS206	523624.00	186662.70	52.84	2.00
SS-WS214	523493.50	187410.20	44.60	1.80
SS-WS215	523496.80	187362.50	46.85	2.00

Name	Easting	Northing	Elevation (m OD)	Total depth (m)
SS-WS217	523647.50	187510.30	44.13	2.50
SS-WS219	523432.70	187559.50	43.29	3.00
SS-WS220	523511.00	187511.50	44.25	3.00
SS-WS221	523574.70	187504.60	43.89	3.00
SS-WS223	523683.40	187553.60	43.16	3.00
SS-WS224	523649.00	187606.50	42.77	4.00
SS-WS225	523594.50	187659.30	42.02	4.00
SS-WS227	523509.20	187448.40	43.78	3.00
SS-WS228	523422.90	187690.60	41.28	4.00
SS-WS230	523556.70	186286.30	52.40	6.00
SS-WS232	523645.80	186726.70	55.92	2.00
SS-WS233	523499.70	187808.40	40.04	4.00
SS-WS235	523610.80	187706.20	44.14	6.00
SS-WS245	523486.10	187565.40	43.11	4.00
SS-WS247	523351.30	187560.70	41.93	2.00
SS-WS251	523097.90	186751.60	50.90	3.00
SS-WS253	523309.90	187308.30	46.56	6.00
SS-WS256A	523337.40	187853.00	41.51	3.00
SS-WS257	523159.80	187785.90	41.33	4.00
SS-WS258	523006.00	187876.50	42.70	3.00
SS-WS259	522924.20	187838.10	44.62	3.00
SS-WS263	523289.90	187373.40	46.79	6.00
SS-BH401	523627.90	187964.70	41.29	1.20
SS-BH402B	523668.40	187888.00	45.44	15.45
SS-BH403	523507.60	188010.60	41.49	15.00
SS-BH404	523482.70	188028.90	41.54	15.50
SS-BH405A	523571.20	187917.90	41.28	30.00
SS-BH406	523545.60	187871.50	41.98	26.00
SS-BH407	523611.60	187871.20	46.01	41.50
SS-BH408	523457.60	187955.60	43.61	15.20
SS-BH412	523362.80	187993.60	47.09	15.00
SS-BH439B	522862.30	187385.90	45.20	45.10
SS-BH441	522697.60	187286.90	47.43	30.00
SS-BH442	522636.30	187344.70	40.22	30.05
SS-BH443	522621.70	187344.10	40.17	20.00
SS-BH444	522697.70	187287.00	47.41	30.00
SS-BH445	523029.00	187451.00	43.92	10.00
SS-BH446	523213.20	187501.20	42.85	56.30
SS-BH447	523218.70	187450.30	44.39	35.00
SS-BH448	523240.20	187431.10	45.57	21.00
SS-BH449	523265.70	187399.10	45.01	15.00
SS-BH450	523242.90	187387.60	44.74	15.00
SS-BH451	523624.10	187479.10	43.81	20.00
SS-BH452	523288.60	187463.00	45.83	15.00



Name	Easting	Northing	Elevation (m OD)	Total depth (m)
SS-BH455	523365.90	187491.30	45.76	15.20
SS-BH456	523391.40	187457.80	47.08	15.00
SS-BH457	523343.60	187561.70	42.06	56.50
SS-BH458A	523380.00	187513.70	42.40	15.00
SS-BH459	523361.20	187531.50	43.59	30.00
SS-BH460	523324.60	187577.70	41.90	35.00
SS-BH464	523391.10	187887.20	43.07	30.20
SS-BH467	522856.50	187589.80	38.51	15.00
SS-BH471A	523642.70	187918.90	45.46	39.90
SS-BH473A	522964.30	187376.90	44.28	20.00
SS-BH479	523080.60	187722.10	41.58	8.00
SS-BH480	523167.90	187752.60	41.43	8.00
SS-BH482A	523143.20	187499.80	43.04	35.20
SS-BH487	523347.30	187913.10	46.55	15.00
SS-BH722	522862.70	187349.50	41.81	6.10
SS-CPT712	523357.60	187577.50	42.03	1.20
SS-CPT722B	522863.30	187358.90	42.44	1.20
SS-DT803	523370.00	187763.40	40.36	3.30
SS-DT804A	523455.70	187954.20	43.61	2.00
SS-TP-505	523356.30	187843.70	41.03	1.20
SS-TP-540	523365.00	187609.20	41.85	2.60
SS-TP-541	523405.00	187643.00	42.00	1.50
SS-TP-542	523406.40	187669.30	41.40	1.20
SS-TP-547	523202.40	187498.80	42.57	1.20
SS-TP-553	523462.60	187496.40	43.07	2.70
SS-TP-554	523464.40	187375.90	46.82	2.80
SS-TP-556	523539.40	187415.00	47.48	2.50
SS-TP-557	523610.70	187873.10	46.13	2.20
SS-TP-560	523012.40	187441.50	43.34	3.00
SS-TP-561	522652.80	187309.00	42.77	2.50
SS-TP-566	522985.60	187796.80	42.84	2.30
SS-TP-569	523430.60	187293.70	46.60	2.60
SS-WS601	523362.40	188036.20	50.19	5.45
SS-WS602	523524.20	187988.10	43.30	5.45
SS-WS603	522936.90	187297.10	45.01	5.00
SS-WS604	523341.00	187480.90	46.00	6.00
SS-WS605	523315.30	187455.90	47.43	7.00
SS-WS606	523329.20	187440.90	48.21	7.00
SS-WS607	523377.70	187444.80	46.76	6.00
SS-WS608	523298.20	187453.40	45.90	6.00
SS-WS609	523311.70	187427.00	45.99	6.00
SS-WS610A	523292.90	187417.80	45.97	6.00
SS-WS611A	523270.10	187444.30	46.65	5.00
SS-WS613	523373.60	187504.80	45.72	6.00

Name	Easting	Northing	Elevation (m OD)	Total depth (m)
SS-WS614	523405.80	187448.90	47.00	6.00
SS-WS615	523488.70	187532.80	42.03	3.00
SS-WS616	523444.50	187517.50	42.10	3.00
SS-WS617	523379.90	187550.10	42.37	3.00
SS-WS618	523419.30	187547.60	42.20	3.00
SS-WS619	523452.50	187551.10	42.25	3.00
SS-WS620	523434.40	187570.00	42.06	3.00
SS-WS621	523411.30	187592.30	42.16	3.00
SS-WS622	523391.60	187578.00	42.17	3.00
SS-WS623	523360.70	187582.10	42.10	3.00
SS-WS624	523415.10	187416.10	47.42	6.00
SS-WS625	523381.20	187403.20	46.90	6.00
SS-WS626	523352.40	187365.40	48.96	7.00
SS-WS627	523381.60	187375.10	47.16	6.00
SS-WS628	523367.40	187345.30	47.73	6.00
SS-WS629	523395.00	187337.60	47.39	6.00
SS-WS630	523437.70	187326.30	48.17	5.00
SS-WS631	523412.30	187307.60	47.35	5.00
SS-WS632	523338.50	187372.30	49.40	7.00
SS-WS633	523324.80	187370.20	48.67	7.00
SS-WS634	523302.10	187350.50	46.76	6.00
SS-WS635	523311.50	187328.60	46.55	5.00
SS-WS636	523356.00	187312.00	49.41	8.00
SS-WS637	523330.00	187309.00	49.10	8.00
SS-WS638	523339.90	187293.20	48.77	7.00
SS-WS639	523360.70	187263.40	45.93	3.00
SS-WS640	523390.10	187294.50	45.96	4.00
SS-WS641	523229.10	187383.60	44.60	4.00
SS-WS648	523413.10	187227.30	47.22	2.00
SS-WS649	523331.80	187180.30	48.54	2.00
SS-WS650	523316.30	187126.00	51.34	2.00
SS-WS651	523252.70	187102.50	50.23	2.00
SS-WS652	523286.50	187063.20	53.78	2.00
SS-WS653	523332.30	187032.00	55.07	2.00
SS-WS654	523343.80	186989.30	54.78	2.00
SS-WS655	523432.80	186886.50	54.20	2.00
SS-WS656	523473.20	186852.50	54.43	2.00
SS-WS657	523557.30	186746.90	54.97	3.00
SS-WS658	523784.20	186892.90	55.08	3.00
SS-WS659	523836.40	186940.00	53.96	2.00
SS-WS660	523933.60	187026.50	50.92	2.00
SS-WS661	524006.80	187087.70	48.97	2.00
SS-WS662	524063.70	187138.80	47.76	2.00
SS-WS663	523967.00	187166.70	48.19	2.00

Name	Easting	Northing	Elevation (m OD)	Total depth (m)
SS-WS664	523896.90	187102.50	50.87	2.00
SS-WS665	523839.00	187051.10	53.21	2.90
SS-WS666	523762.40	186969.30	54.35	4.00
SS-WS667	523679.80	187036.90	55.42	3.00
SS-WS668	523724.30	187090.10	52.46	4.00
SS-WS669	523796.30	187147.10	51.31	2.00
SS-WS670	523875.10	187209.00	49.04	2.00
SS-WS671	523928.90	187255.50	46.87	2.00
SS-WS672	523691.80	187208.70	52.61	2.00
SS-WS673	523600.30	187338.20	50.67	2.00
SS-WS675	523561.10	187205.00	54.03	2.00
SS-WS676	522975.80	187860.80	43.35	3.00
SS-WS677A	523022.80	187838.20	42.78	4.00
SS-WS678	523045.50	187756.90	41.94	4.00
SS-WS679	523019.70	187702.30	41.47	5.00
SS-WS680	523116.70	187759.60	42.19	5.00
SS-WS684	523197.40	187798.30	42.22	4.00
SS-WS685	523263.70	187826.60	42.17	4.50
SS-WS686A	523321.00	187843.60	41.54	2.00
SS-WS688	523125.90	187670.20	46.75	6.00
SS-WS689A	523310.60	188006.40	47.36	2.00
SS-WS690	523391.90	187950.30	45.98	5.00
SS-WS697	523707.20	186836.10	57.08	3.00
SS-WS698	523669.30	186801.80	57.73	3.00
SS-WS699	523617.70	186760.20	56.44	2.00
SS-WS6100	523585.70	186717.80	55.04	3.00
SS-WS6101	523540.00	187465.10	42.16	2.00
SS-WS6102	523480.60	187470.80	42.26	3.00
SS-WS6103	523517.20	187386.00	45.41	2.00
SS-WS6105	523442.30	187367.50	46.98	5.00
SS-WS6106	523463.90	187320.00	48.21	5.00
SS-WS6107	522966.40	188010.80	46.77	3.00
SS-WS6109	522961.70	187954.10	46.83	4.00
SS-WS6110	522947.90	187912.90	46.00	3.00
SS-WS6111	523298.90	187527.80	43.21	4.00
SS-WS6112	523304.50	187502.70	43.17	4.00
SS-WS6113	523239.10	187494.90	43.67	4.80
SS-WS6114	522973.30	187415.90	43.44	5.00
W-BH801	522962.70	187844.30	43.59	55.50
W-BH802	523016.00	187813.00	42.74	15.00
W-BH804	523059.00	187762.00	42.11	35.00
W-BH805	523032.00	187710.00	41.33	15.00
W-BH808	523131.00	187764.00	42.11	35.00
W-BH810	523192.00	187788.00	41.47	15.00

Name	Easting	Northing	Elevation (m OD)	Total depth (m)
W-BH811	523272.00	187821.00	41.57	36.00
W-BH812	523350.00	187863.00	41.79	15.00
W-BH813	523400.00	187928.00	44.74	15.00
W-BH814	523324.00	187949.00	47.15	15.00
W-BH815	523333.30	188028.70	47.94	61.00

## 9. APPENDIX 2: OASIS

### OASIS ID: quaterna1-303889

#### Project details

Project name	Brent Cross, Cricklewood Regeneration Area
Short description of the project	A programme of geoarchaeological fieldwork and deposit modelling was carried out within the area of palaeoenvironmental potential at the Brent Cross site in order to (1) clarify the nature of the sub-surface stratigraphy across the site; (2) clarify the nature, depth, extent and likely date of any former land surfaces, alluvial and peat deposits; and (3) to make recommendations for any further geoarchaeological, palaeoenvironmental or archaeological investigations. The results of these investigations indicate that the sedimentary sequence at the site comprises the bedrock London Clay, overlain within the valley of the River Brent by gravel, floodplain alluvium, and Made Ground. Outside of the area of the floodplain, and rising above an elevation of around 41m OD, the bedrock is overlain by Head deposits most likely of colluvial origin, and Made Ground. On the floodplain itself, a horizon of Holocene alluvium is recorded, generally present at elevations of between ca. 33 and 41m OD. The sediments of the Alluvium are mineral-rich, and indicative of deposition within low energy fluvial and/or semi-aquatic conditions. No organic units were recorded within the new geoarchaeological boreholes, indicating that where such units are recorded within the previous geotechnical boreholes, these are likely to be highly localised, representing either thin organic units or trace (probably detrital) inclusions. The palaeoenvironmental potential of the Brent Cross site is therefore considered to be very limited, and no further geoarchaeological or palaeoenvironmental investigations in this area are recommended.
Project dates	Start: 01-09-2017 End: 13-12-2017
Previous/future work	No / Not known
Type of project	Environmental assessment
Survey techniques	Landscape

#### Project location

Country	England
Site location	GREATER LONDON BARNET BARNET Brent Cross, Cricklewood

Regeneration Area  
Postcode NW4 3HP  
Study area 151 Hectares  
Site coordinates TQ 2310 8760 51.573323251608 -0.223462569025 51 34 23 N 000 13 24 W  
Point

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### Project creators

Name of Quaternary Scientific (QUEST)

Organisation

Project brief Consultant  
originator

Project design Dr C.R. Batchelor  
originator

Project C.R. Batchelor  
director/manager

Project supervisor D.S. Young

Type of Developer  
sponsor/funding  
body

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### Project archives

Physical Archive No  
Exists?

Digital Archive No  
Exists?

Paper Archive LAARC  
recipient

Paper Contents "Environmental", "Stratigraphic"

Paper Media "Report"  
available

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Entered by Daniel Young (d.s.young@reading.ac.uk)

Entered on 13 December 2017