

EALING STUDIOS, EALING GREEN, LONDON BOROUGH OF EALING

Geoarchaeological Fieldwork Report

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1 NON-TECHNICAL SUMMARY

A programme of geoarchaeological fieldwork was carried out at the site in February 2017 to monitor a series of geotechnical boreholes and test pits, with subsequent deposit modelling of the sub-surface stratigraphy. These investigations were carried out in order to (1) clarify the nature of the sub-surface stratigraphy; (2) clarify the nature, depth, extent and date of any Langley Silt and Lynch Hill Gravel deposits; (3) investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity; and (4) provide recommendations for any further archaeological investigations at the site (if necessary). The results of the investigations revealed a sequence of Lynch Hill Gravel, overlain by a thin (<0.6m thick) and patchily present horizon of silty, clayey sand, and Made Ground. The material overlying the Lynch Hill Gravel in eight of the sixteen interventions is predominantly sandy, lacks the features typical of 'brickearth' structure, and contained no evidence of calcium carbonate reprecipitation. On this basis, although a separate unit can be identified overlying the Lynch Hill Gravel at the site, it seems most likely that this unit is the product of disturbance and mixing affecting near surface deposits, and probably incorporating both Lynch Hill material and remnants of the Langley Silt. In addition, these deposits are thin (<0.6m in thickness), patchily present, and are probably truncated in places by the overlying Made Ground. Only one struck flint was recovered from the processed bulk samples and this in poor condition and of uncertain origin. The Palaeolithic archaeological potential of the site is therefore considered to be negligible, and no further investigation of these sediments is recommended.

2 INTRODUCTION

2.1 Introduction

This report summarises the findings arising out of the geoarchaeological fieldwork and subsequent assessment undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at Ealing Studios, Ealing Green, London Borough of Ealing (National Grid reference: TQ 17520 80250). Should the exercise described within this WSI identify significant archaeological remains requiring further programmes of archaeological works, further mitigation methodologies will be developed, with the need for budget and timescale allowances within the construction programme. Further archaeological mitigation measures will necessarily be accompanied by appropriate WSI documentation prepared and submitted for signoff by GLAAS, prior to relevant works commencing. This document has been prepared in accordance with relevant guidelines set out by the Chartered Institute for Archaeologists (CIfA), Historic England and the Greater London Archaeological Advisory Service (GLAAS) (see section 7).

2.2 Site context

The site lies to the north of the River Thames, about 2.7 km north of the confluence of the Thames with its north bank tributary the River Brent. Topographically the site forms part of an extensive terrace remnant now occupied by the urban areas of Ealing and Acton. The natural ground surface at the site slopes down from NE to SW from ca. 30m ca. 26m OD (OS 1:10650 Middlesex XV 1868). The site is underlain by terrace sediment mapped by the British Geological Survey as Lynch Hill Gravel (BGS 1:50,000 Sheet 256 North London 1994 and Sheet 270 South London 1998). Across large parts of this terrace remnant, BGS shows the Lynch Hill Gravel overlain by the Langley Silt, described as 'sandy clay and silt ('Brickearth')'. The Langley Silt is not mapped by BGS at the Ealing Studios site, but trial pits put down near the southern boundary of the site by PCA (2002) exposed between 0.3m and 0.55m of 'brickearth' with a surface level between 27.0m and 27.32m OD, overlying sand and gravel with a surface level between 26.54 and 27.12m OD. A total of six cable percussion boreholes (5–20m in depth) and five test pits (2.6–4.5m in depth) were put down during geotechnical investigations at the site in 2000 (Norwest Holst, 2000). These investigations revealed a thickness of between 0.4 and 1.5m of Made Ground, overlying deposits of either 'sandy gravel'/'gravelly sand' (Lynch Hill Gravel) or in places 'firm gravelly clay' (possible Langley Silt). The surface of the London Clay was recorded below these units at depths of between 22.48 and 23.92m OD.

2.3 Palaeolithic archaeological potential

The terrace remnant on which the Ealing Studios site is located has a long history of Palaeolithic archaeological investigation. In the late 19th century, when the urban development of Ealing and Acton was taking place, the discovery of substantial numbers of Palaeolithic artefacts was recorded, chiefly by J. Allen Brown (1884; 1886; 1887). The discoveries fall into two groups. Individual artefacts were recovered by Brown from temporary exposures in the gravels of his 'high terrace' (Lynch Hill Gravel), generally at depths ranging from 12–18 feet (ca. 3.7–5.5m) below the ground surface. Brown (1887) records find spots in roads all around the Ealing Studios site. Roe (1968) records 112 handaxes from Ealing and 51 from Acton, together with 399 other Palaeolithic

artefacts from these two areas. There are occasional references to the recovery of mammalian remains from the gravels of this area: for example, Brown (1887 pp. 60-61) records that Colonel Lane Fox recovered a tooth of *Elephas primigenius* (woolly mammoth) from a pit in the vicinity of Chaucer Road, Acton.

In addition to the recovery of artefacts from the 'high terrace', Brown recorded a site at Creffield Road in Acton about 1.5km to the east of the Ealing Studios site where he 'obtained nearly 500 implements, worked flakes and waste fragments at a depth of 6 feet from the surface.' (Brown 1887, pp.56-7). These artefacts are now recognised as Levallois in origin and Roe (1968) lists 732 Levallois flakes from Creffield Road and 15 Levallois cores together with another 119 artefacts from this site, including two handaxes. Brown believed that the 'land surface' with which this Levallois material was associated could be traced more widely in the Acton and Ealing area. The Creffield Road locality was investigated on two occasions in the latter part of the last century (Burleigh 1976, Bazely, Green & McGregor 1991) but on neither occasion was Brown's Palaeolithic 'floor' recognised.

2.4 Aims and objectives

On the basis of the above, there is potential for the discovery of Palaeolithic archaeological or biological remains at the Ealing Studios site. Additional records are therefore required in order to enhance our understanding of the sub-surface stratigraphy, and to carry out a suitable assessment of its palaeoenvironmental and Palaeolithic archaeological potential. Three significant research aims relevant to the geoarchaeological investigations at the site were therefore outlined within the WSI for the site (RPS/QUEST, 2017):

1. To clarify the nature of the sub-surface stratigraphy across the site;
2. To clarify the nature, depth, extent and date of any Langley Silt and Lynch Hill Gravel deposits;
3. To investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity.

In order to address these aims, the following objectives were proposed:

1. To monitor the geotechnical boreholes and hand-dug test pits at the site (Figure 2);
2. To examine selected horizons within the sediments encountered in the boreholes and hand-dug test pits for Palaeolithic artefacts;
3. To use the stratigraphic data from the new geotechnical interventions, and existing geotechnical data to produce a deposit model of the major depositional units across the site, and to characterise the depositional sequence in more detail;
4. To make recommendations for any further archaeological/palaeoenvironmental investigations at the site.
5. To publish the results of the site investigations, depending on the significance of the findings.

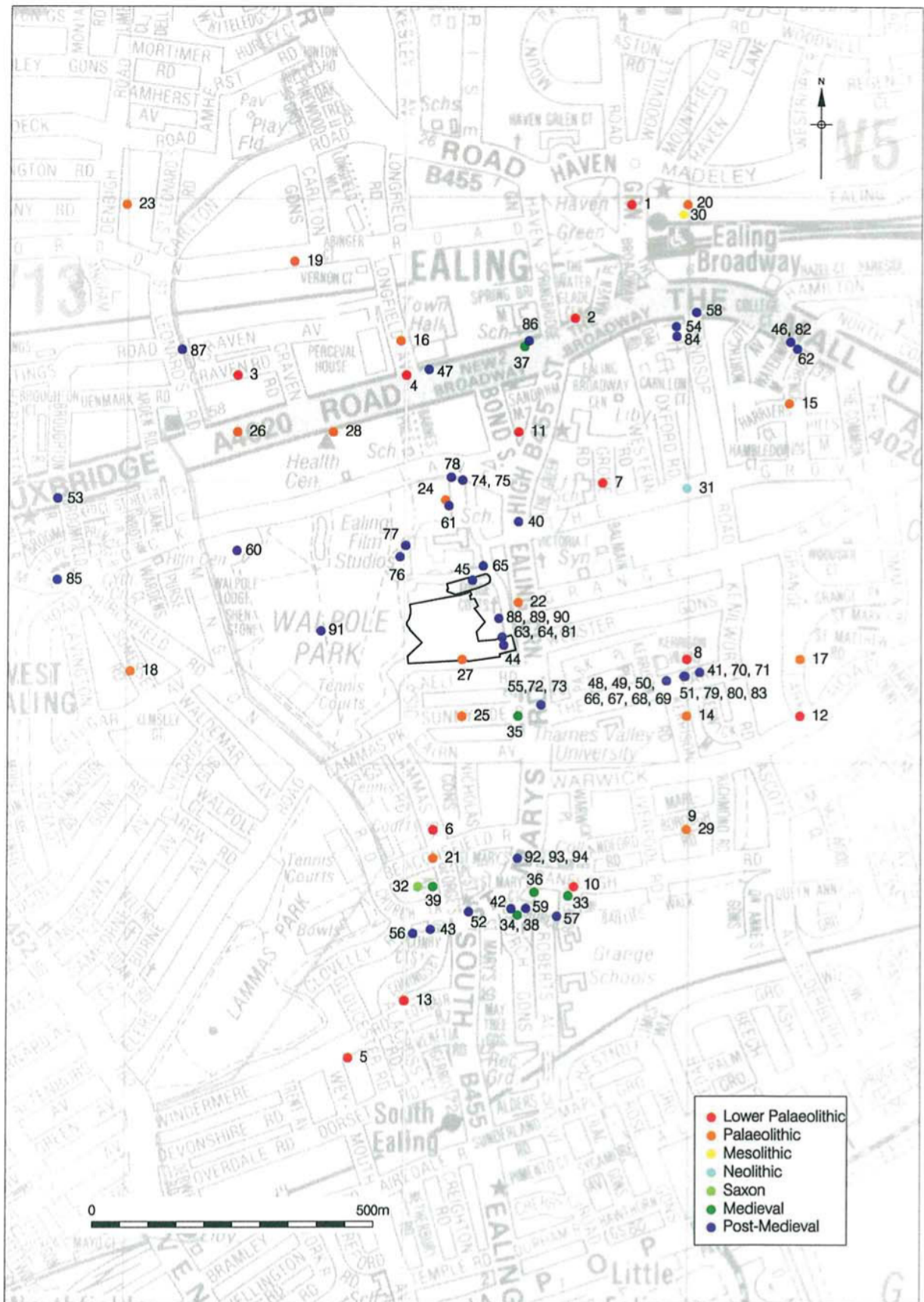


Figure 1: Location of the Ealing Studios site, Ealing Green, London Borough of Ealing, showing GLHER data for the surrounding area. Reproduced from PCA (2000).



Figure 2: Location of the boreholes (BH101-104), window samples (WS101-107) and test pits (TH01-06) monitored by Quaternary Scientific at Ealing Studios, London Borough of Ealing.

3 METHODS

3.1 Field investigations

The boreholes (BH101-104), window samples (WS101-107) and test pits (TH01-06) put down at the site in February 2017 by Geotechnical Engineering Ltd were monitored in the field by Quaternary Scientific. The lithostratigraphy of these interventions was described in the field using standard procedures for recording unconsolidated 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 selected 'grab' or core samples 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 are displayed in Tables 2 to 17.

3.2 Deposit modelling

The subsequent deposit model was based on a review of the 16 borehole, window sample and test pit records (Figure 2; Table 1). Sedimentary units from the boreholes were classified into four main groups: (1) Bedrock, (2) Gravel, (3) Silty/clayey sand and (4) Made Ground. The classified data for groups 1-5 were then input into a database with the RockWorks geological utilities software. Models of surface height were generated for the Gravel (Figure 3), with thickness models for the overlying Langley Silt and Made Ground. All models were generated using an Inverse Distance Weighting (IDW) method within ArcMap 10. Because the interventions are not uniformly distributed over the area of investigation, the reliability of the models generated using ArcMap is variable. However, the distribution of the records is generally good, and provides sufficient coverage of the site to model the deposits with a high degree of certainty. Because of the 'smoothing' effect of the modelling procedure, the modelled levels of stratigraphic contacts may differ slightly from the levels recorded in logs and section drawings.

3.3 Wet Sieving

A minimum of five litres of sediment from five selected bulk samples were wet sieved through a 10mm mesh, in order to identify any lithic artefacts. These samples were focussed on the silty/clayey sand unit overlying the Gravel, although bulk samples could not be obtained at all locations where this unit was identified – the sieved samples were from this unit in boreholes WS103, WS105 and BH101. Gravel clasts retained on the 10mm mesh were retained and dried and inspected by an experienced lithic specialist.

3.4 Particle Size Distribution Analysis

10g (wet weight) of material from selected samples of the silty/clayey sand were submitted for particle size distribution analysis. Prior to analysis by laser granulometry (range 0.01-2000 microns) a representative sample was gathered from the main sample. This is then mixed with a spatula to form a homogenous 'paste'. A subsample was placed on a plastic watchglass and a weak dispersant solution (ca. 0.5ml 3.3% Calgon) was added in order to aid dispersion of the material (Blott *et al.*,

2004). Physical disaggregation on a clean watchglass with a rubber pestle was carried out. Any particles observed to be greater than 2mm were removed. The sample was then washed with distilled water into the analyser. Particle size distribution measurements for particles falling within the size range 0.01 to 2000 microns was measured by laser granulometry using a Malven Mastersizer 3000. The results are displayed in Table 18 and Figure 6.

4 RESULTS & INTERPRETATION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS, DEPOSIT MODELLING, PARTICLE SIZE ANALYSIS AND LITHIC INSPECTION

A summary of the geotechnical and geoarchaeological data used in the deposit models is shown in Table 1, with the results of the lithostratigraphic descriptions shown in Tables 2 to 17. The results of the deposit modelling are displayed in Figures 3 to 5; Figure 3 is surface elevation model for the Gravel, whilst Figures 4 and 5 are thickness models for the silty/clayey sand unit and Made Ground, respectively. The results of the particle size analysis are shown in Table 18. The results of the deposit modelling indicate that the number and spread of logs across the site itself is sufficient to permit modelling with a high level of certainty across the area of investigation.

The full sequence of sediments recorded in the borehole and test pit records comprises:

Made Ground (in places with modern topsoil)

Silty/clayey sand – locally present, resting on the underlying Gravel

Gravel (Lynch Hill Gravel); truncated in places

4.1 Lynch Hill Gravel

The Lynch Hill Gravel was recorded in all sixteen of the monitored interventions. It was deposited during the Wolstonian (Saalian) glacial period (Marine Isotope Stage (MIS) 8; 280-350,000 years before present) and comprises 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. At the present site, the deposits are generally comprised of sandy flint gravel or gravelly sand, with more sandy units generally occurring towards the top of the sequence, perhaps indicative of a gradual reduction in flow rate towards the end of its deposition.

The surface of the Gravel (Figure 3) is generally higher in the eastern area of the site, where it is recorded at between 27.4 and 26.98m OD in the area of BH103, BH104, WS102, WS103, TH01 and WS107; from here it falls slightly towards the west, generally to between 26.6 and 27.0m OD in the area of BH101, BH102, WS104, WS105 and TH04. In one test pit, TH02, the Gravel surface is recorded at 25.8m OD; however, the Gravel is directly overlain by Made Ground and the lower gravel surface here may be a result of deeper truncation by the overlying deposits. The surface of the Lynch Hill Gravel was recorded towards the southern area of the site by PCA (2002) at levels consistent with the present investigation (26.54 to 27.12m OD).

4.2 Silty/clayey sand

Overlying the Lynch Hill Gravel in eight of the sixteen sequences (BH101, BH104, WS101, WS105, WS106A, TH01, TH04 and TH05) is a horizon of variably silty, clayey and predominantly sandy material with occasional gravel inclusions. This unit is relatively thin, recorded between 0.08 (WS101) and 0.6m (BH101) thick (Figure 4), and lacks the features typical of 'brickearth' structure

(blocky with numerous tubes and voids), and contained no evidence of calcium carbonate reprecipitation. The results of the particle size analysis (Table 18; Figure6) confirm that this unit in boreholes BH101 and WS105 is dominantly sandy - mostly between 60% and 75% sand (median 66.7%). In comparison, the sand values recorded by Gibbard for Langley Silt (1985 p.58, Table 1, n=9) range from 10.6% to 52.6% (median 20.0%). At the present site, silt values range from 17.58 to 57.03% (median 24.8%); whilst Gibbard (1985) records 31.7 to 68.1% (median 57.3%); the only sample that resembles the silt-rich nature of the Langley Silt recorded elsewhere by Gibbard (1985) is the uppermost sample from WS105 (27.70 to 27.40m OD). Because of the difficulty of separating silt and clay in particle size analysis, it is sometimes useful to look at the combined silt and clay values: at the present site these are 25 to 71% (median 32.4%), whilst Gibbard (1985) records 47 to 89% (median 77.6%).

It seems most likely therefore that this unit is the product of disturbance and mixing affecting near surface deposits, and probably incorporates both Lynch Hill material and remnants of the Langley Silt.

Five selected samples of retained silty/clay sand in BH101, WS103 & WS105 were sieved off site for the recovery of potential lithic remains. Each sample contained a handful of gravels all identified as natural rounded river pebbles, probably from terrace gravels. The only possible exception was a struck flake from WS103 between 0.5-0.8. However, this was small and badly detached, and although conchoidally fractured was probably detached mechanically, possibly by the borehole rig. Alternatively, it could be intrusive or from contamination as there is also a piece of clinker or coke in that sample, which is probably modern.

4.3 Made Ground

Between 0.2 (TH01) and 1.8m (TH02) of Made Ground overlies either the silty/clayey sand or the Lynch Hill Gravel at the site. In places the Made Ground has clearly truncated the natural sequence, in particular in the location of test pit TH02, resulting in artificial surfaces for the underlying units (in the case of TH02, the surface of the Lynch Hill Gravel is clearly lower than might be expected). Significantly disturbed deposits of the Gravel or silty/clayey sand are often recorded towards the base of the Made Ground, indicative of some re-deposition of the natural deposits.

Table 1: Borehole attributes for those records used in the deposit model, Ealing Studios, London Borough of Ealing.

Name	Easting	Northing	Elevation	Made Ground thickness (m)	Top of silty/clayey sand (m bgl)	Top of Lynch Hill Gravel (m bgl)
BH101	517513.85	180270.67	28.30	1.10	1.10	1.70
BH102	517536.96	180203.45	27.30	0.85	Not present	0.85
BH103	517618.23	180290.90	28.30	1.20	Not present	1.20
BH104	517627.12	180,240.77	28.18	0.80	0.80	1.20
WS101	517553.83	180289.39	28.40	1.47	1.47	1.55
WS102	517617.99	180276.36	28.70	1.60	Not present	1.60
WS103	517602.30	180262.47	28.20	0.80	Not present	0.80
WS104	517562.80	180211.02	27.40	0.80	Not present	0.80
WS105	517561.95	180249.07	28.20	0.75	0.75	1.20
WS106A	517612.43	180224.24	28.07	1.20	1.20	1.50
WS107	517642.74	180212.91	28.00	0.60	Not present	0.60
TH01	517627.76	180220.87	27.80	0.20	0.20	0.70
TH02	517597.46	180212.77	27.60	1.80	Not present	1.80
TH04	517571.57	180225.69	28.10	1.00	1.00	1.30
TH05	517554.21	180276.19	28.20	0.80	0.80	1.20
TH06	517557.14	180287.01	28.30	1.00	1.10	1.00

Table 2: Results of the lithostratigraphic description of BH101; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.30 to 28.05	0.00 to 0.25	Concrete	MADE GROUND
28.05 to 27.20	0.25 to 1.10	Brown sandy silty gravel with brick fragments	
27.20 to 26.60	1.10 to 1.70	As2 Ag1 Ga1; orange brown silty sandy clay with a trace of sand and occasional gravel clasts. Some manganese staining. Sharp contact in to:	SILTY/CLAYEY SAND
26.60 to 26.50	1.70 to 1.80	Ga4; greenish grey sand. Sharp contact in to:	LYNCH HILL GRAVEL
26.50 to 26.10	1.80 to 2.20	Ga2 Gg2; orange sand and gravel. Clasts are flint, sub-angular to well-rounded, average diameter 40mm.	

Table 3: Results of the lithostratigraphic description of BH102; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
27.30 to 26.45	0.00 to 0.85	Concrete over brown silty clay with brick fragments	MADE GROUND
26.45 to 26.10	0.85 to 1.20	Ga2 Gg2; orange sand and gravel. Clasts are flint, sub-angular to well-rounded, average diameter 30mm.	LYNCH HILL GRAVEL

Table 4: Results of the lithostratigraphic description of BH103; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.30 to 28.10	0.00 to 0.20	Tarmac over concrete	MADE GROUND
28.10 to 27.50	0.20 to 0.70	Brick rubble	
27.50 to 27.10	0.70 to 1.20	Brown silty clay with brick fragments	
27.10 to 26.80	1.20 to 1.50	Ga2 Gg2; orange sand and gravel. Clasts are flint, sub-angular to well-rounded, average diameter 40mm.	LYNCH HILL GRAVEL

Table 5: Results of the lithostratigraphic description of BH104; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.18 to 27.38	0.00 to 0.80	Concrete over brown silty clay with brick fragments	MADE GROUND
27.38 to 26.98	0.80 to 1.20	As3 Ag1; light brownish grey silty clay with iron staining, some fine flint gravel clasts. Some inclusions of slightly organic material. Sharp contact in to:	SILTY/CLAYEY SAND
26.98 to 26.68	1.20 to 1.50	Gg3 Ga1; orange sandy gravel. Clasts are flint, sub-angular to well-rounded, average diameter 30mm.	LYNCH HILL GRAVEL

Table 6: Results of the lithostratigraphic description of WS101; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.40 to 26.93	0.00 to 1.47	Dark greyish brown soil with brick fragments, gravel and modern roots.	TOPSOIL/ MADE GROUND
26.93 to 26.85	1.47 to 1.55	As2 Ag1 Ga1; grey silty sandy clay. Sharp contact in to:	SILTY/CLAYEY SAND
26.85 to 26.40	1.55 to 2.00	Gg3 Ga1; brownish orange sandy gravel. Clasts are flint, sub-angular to well-rounded, average diameter 40mm.	LYNCH HILL GRAVEL

Table 7: Results of the lithostratigraphic description of WS102; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.70 to 27.10	0.00 to 1.60	Tarmac over concrete, brick rubble, sand and gravel	MADE GROUND
27.10 to 26.80	1.60 to 1.90	Ga2 Gg2; sand and gravel. Clasts are flint, sub-angular to sub-rounded, average diameter 20mm. Diffuse contact in to:	LYNCH HILL GRAVEL
26.80 to 26.10	1.90 to 2.60	Ga3 Gg1; greenish grey gravelly sand. Clasts are flint, sub-angular to well-rounded, average diameter 20mm. Diffuse contact in to:	
26.10 to 25.70	2.60 to 3.00	Ga2 Gg2; sand and gravel. Clasts are flint, sub-angular to sub-rounded, average diameter 20mm.	

Table 8: Results of the lithostratigraphic description of WS103; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.20 to 27.95	0.00 to 0.25	Tarmac over concrete and brick rubble	MADE GROUND
27.95 to 27.40	0.25 to 0.80	Brown silty clay with charcoal and brick fragments.	SILTY/CLAYEY SAND (REWORKED)
27.40 to 27.10	0.80 to 1.10	Gg2 Ag1 As1 Ga+; orange silty clayey gravel with a trace of sand. Clasts are flint, sub-angular to sub-rounded, average diameter 40mm.	LYNCH HILL GRAVEL

Table 9: Results of the lithostratigraphic description of WS104; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
27.40 to 26.60	0.00 to 0.80	Made Ground of concrete, brick rubble, sand and gravel	MADE GROUND
26.60 to 26.20	0.80 to 1.20	Ga2 Gg2; orange coarse sand and flint gravel. Diffuse contact in to:	LYNCH HILL GRAVEL
26.20 to 25.40	1.20 to 2.00	Ag2 Ga2 Gg+; greenish brown silty sand with occasional gravel clasts. Some more gravel-rich (Gg3 Ga1) units. Diffuse contact in to:	
25.40 to 24.90	2.00 to 2.50	Ga3 Gg1 Ag+; orangey brown gravelly sand with a trace of silt. Clasts are flint, sub-angular to rounded, average diameter 20mm. Diffuse contact in to:	
24.90 to 23.60	2.50 to 3.80	Gg3 Ga1; sandy gravel. Clasts are flint, sub-angular to well-rounded, average diameter 40mm. Sharp contact in to:	
23.60 to 23.40	3.80 to 4.00	As4; stiff brown clay	LONDON CLAY

Table 10: Results of the lithostratigraphic description of WS105; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.20 to 27.80	0.00 to 0.40	Concrete over brown silty clay with brick fragments	MADE GROUND
27.80 to 27.45	0.40 to 0.75	Gravelly fill	
27.45 to 27.00	0.75 to 1.20	Ag3 Ga1; orange brown sandy gravel	SILTY/CLAYEY SAND
27.00 to 26.64	1.20 to 1.56	Ga4; greenish grey sand. Sharp contact in to:	LYNCH HILL GRAVEL
26.64 to 26.20	1.56 to 2.00	Ga2 Gg2; brown sand and gravel. Clasts are flint, sub-angular to rounded, average diameter 20mm. Diffuse contact in to:	

Table 11: Results of the lithostratigraphic description of WS106A; Ealing Studios, London Borough of Ealing.

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.07 to 26.87	0.00 to 1.20	Concrete over brown silty clay with brick fragments	MADE GROUND
26.87 to 26.57	1.20 to 1.50	Ga2 Ag1 As1 Gg+; greenish brown sandy clay with occasional gravel clasts. Diffuse contact in to:	SILTY/CLAYEY SAND
26.57 to 26.27	1.50 to 1.80	Ga2 Gg2 As+; greenish grey sand and gravel with a trace of clay. Clasts are flint, sub-angular to rounded, average diameter 10mm. Sharp contact in to:	
26.27 to 26.07	1.80 to 2.00	Ga3 Ag1 Gg+; greenish grey silty sand with occasional gravel clasts. Diffuse contact in to:	LYNCH HILL GRAVEL
26.07 to 25.07	2.00 to 3.00	Gg3 Ga1; sandy gravel. Clasts are flint, sub-angular to well-rounded, average diameter 30mm (up to 60mm)	

Table 12: Results of the lithostratigraphic description of WS107; Ealing Studios, London Borough of Ealing.

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.00 to 27.40	0.00 to 0.60	Dark greyish brown soil with brick fragments, gravel and modern roots.	TOPSOIL/MADE GROUND
27.40 to 26.15	0.60 to 1.85	Ga2 Gg1 As1; brown gravelly clayey sand. Clasts are flint, angular to sub-angular, average diameter 30mm. Some modern roots. Diffuse contact in to:	LYNCH HILL GRAVEL
26.15 to 26.00	1.85 to 2.00	Gg2 Ga1 As1; dark reddish brown clayey sandy gravel. Clasts are flint, sub-angular to rounded, average diameter 30m	

Table 13: Results of the lithostratigraphic description of TH01; Ealing Studios, London Borough of Ealing.

Depth (m OD)	Depth (m bgl)	Description	Interpretation
27.80 to 27.60	0.00 to 0.20	Concrete over brown silty clay with brick fragments	MADE GROUND
27.60 to 27.10	0.20 to 0.70	Ag2 As2; grey clayey silt. Sharp contact in to:	SILTY/CLAYEY SAND
27.10 to 26.90	0.70 to 0.90	Gg3 Ga1 As+; orange sandy gravel with a trace of clay. Clasts are flint, sub-angular to sub-rounded, up to 60mm in diameter. Diffuse contact in to:	LYNCH HILL GRAVEL
26.90 to 26.70	0.90 to 1.20	Gg2 Ga1 As1; orangey grey sandy clayey gravel. Clasts are flint, sub-angular to well-rounded, average diameter 40mm (up to 60mm). Diffuse contact in to:	
26.70 to 26.10	1.20 to 1.70	Gg2 Ga1 As1; orangey grey sandy clayey gravel. Clasts are flint, sub-angular to well-rounded, average diameter 60mm (up to 60mm)	

Table 14: Results of the lithostratigraphic description of TH02; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
27.60 to 25.80	0.00 to 1.80	Made Ground of concrete over gravel and brick rubble	MADE GROUND
25.80 to 25.70	1.80 to 1.90	Ga3 Gg1; greyish orange gravelly sand. Clasts are flint, sub-angular to sub-rounded, average diameter 30mm	LYNCH HILL GRAVEL

Table 15: Results of the lithostratigraphic description of TH04; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.10 to 27.70	0.00 to 0.40	Tarmac over concrete	MADE GROUND
27.70 to 27.10	0.40 to 1.00	Gravel and concrete rubble fill	
27.10 to 26.80	1.00 to 1.30	As2 Ag2; orangey brown silt and clay. Diffuse contact in to:	SILTY/CLAYEY SAND
26.80 to 26.60	1.30 to 1.50	Ga4 Ag+ Gg+ As+; orangey brown sand with occasional gravel clasts and traces of silt and clay. Some greenish lenses.	LYNCH HILL GRAVEL
26.60 to 26.20	1.50 to 1.90	Ga4 Ag+; greenish grey sand with a trace of silt	

Table 16: Results of the lithostratigraphic description of TH05; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.20 to 27.80	0.00 to 0.40	Tarmac over concrete	MADE GROUND
27.80 to 27.40	0.40 to 0.80	Gravelly fill	
27.40 to 27.00	0.80 to 1.20	As2 Ag2; orangey brown silt and clay. Diffuse contact in to:	SILTY/CLAYEY SAND
27.00 to 26.60	1.20 to 1.60	Ga2 Gg2; sand and gravel. Clasts are flint, angular to sub-rounded, average diameter 20mm.	LYNCH HILL GRAVEL

Table 17: Results of the lithostratigraphic description of TH06; Ealing Studios, London Borough of Ealing

Depth (m OD)	Depth (m bgl)	Description	Interpretation
28.30 to 27.30	0.00 to 1.00	Made Ground of concrete over gravel and brick rubble	MADE GROUND
27.30 to 26.60	1.00 to 1.70	As2 Ag1 Ga1; reddish brown silty sandy clay; becoming sandier with depth.	? LYNCH HILL GRAVEL

Table 18: Results of the particle size distribution analysis of selected samples of the silty/clayey unit at Ealing Studios, London Borough of Ealing.

Borehole	Depth (m bgl)	Depth (m OD)	% Clay (0.01-2 µm)	% Silt (2-63 µm)	% Sand (63-2000 µm)
WS105	0.50 to 0.80	27.70 to 27.40	13.84	57.03	29.13
	0.80 to 1.00	27.40 to 27.20	7.80	25.54	66.66
	1.00 to 1.20	27.20 to 27.00	7.37	24.16	68.47
BH101	1.20 to 1.21	27.10 to 27.09	8.97	26.97	64.06
	1.28 to 1.29	27.02 to 27.01	9.21	29.96	60.83
	1.36 to 1.37	26.94 to 26.93	7.50	22.72	69.78
	1.44 to 1.45	26.86 to 26.85	9.70	37.55	52.75
	1.52 to 1.53	26.78 to 26.77	8.88	20.49	70.63
	1.60 to 1.61	26.70 to 26.69	7.88	17.58	74.54
	1.68 to 1.69	26.62 to 26.61	7.49	18.47	74.04

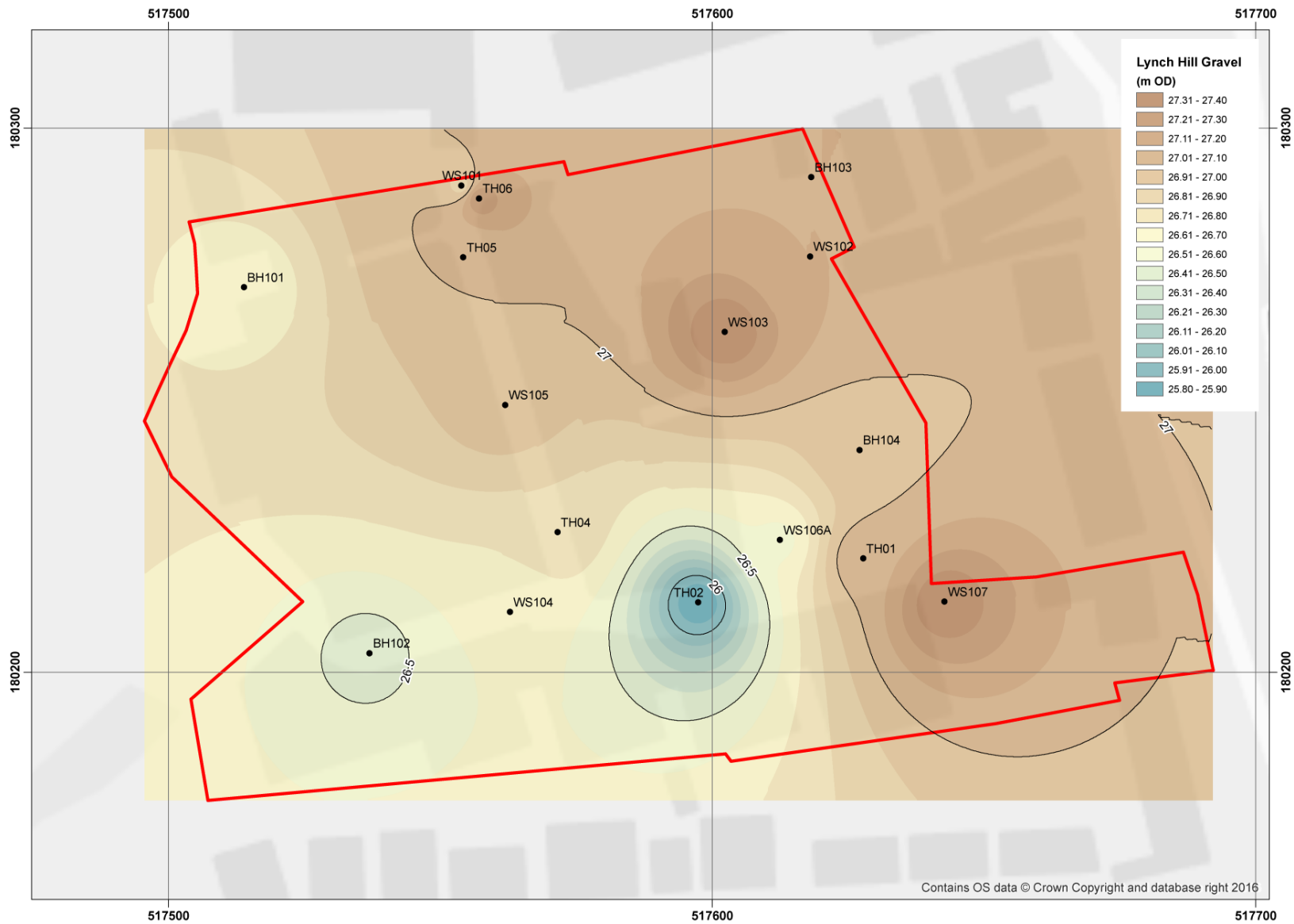


Figure 3: Modelled surface of the Lynch Hill Gravel (m OD).



Figure4: Modelled thickness of the silty/clayey sand (m).

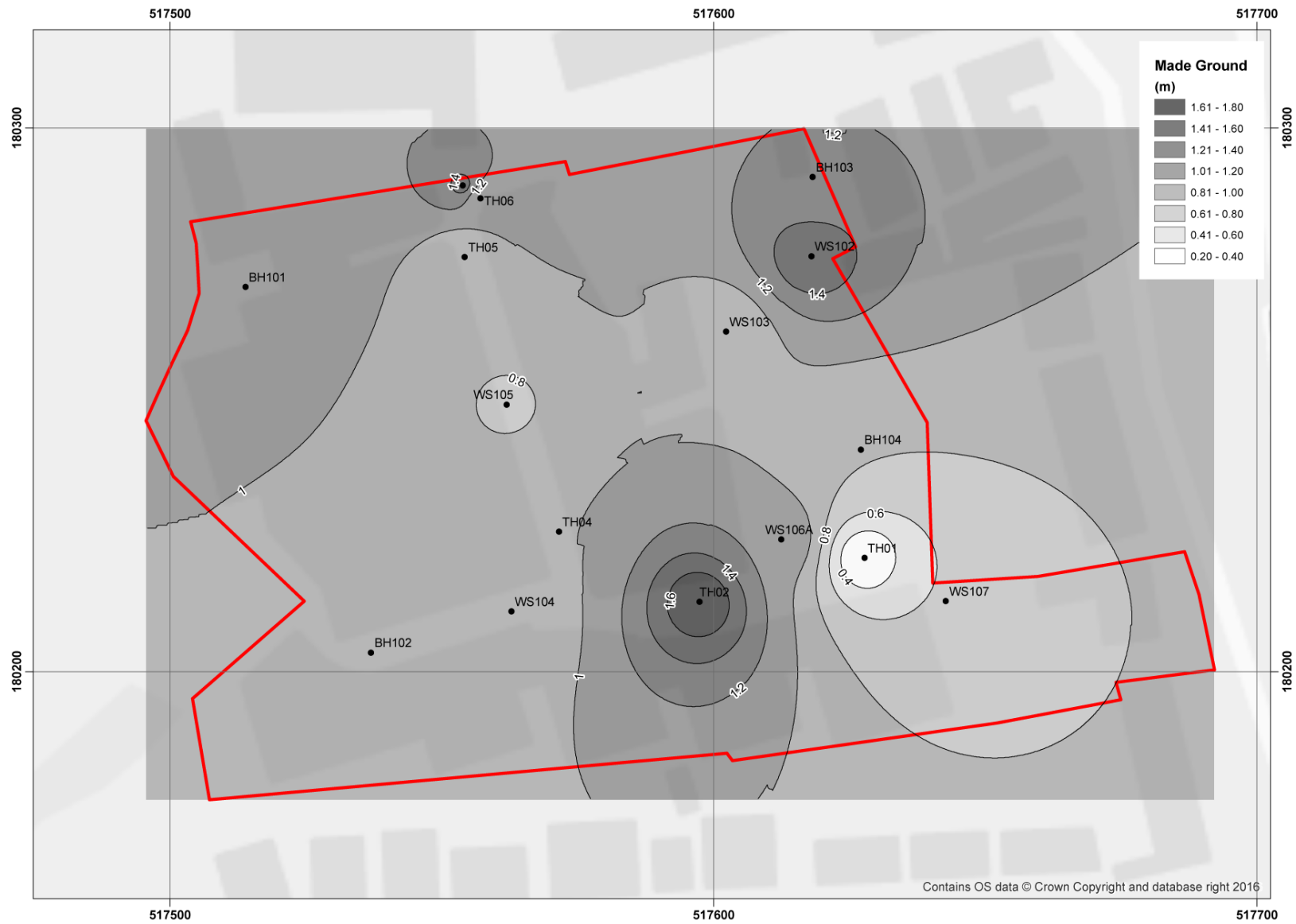


Figure 5: Modelled thickness of the Made Ground (m).

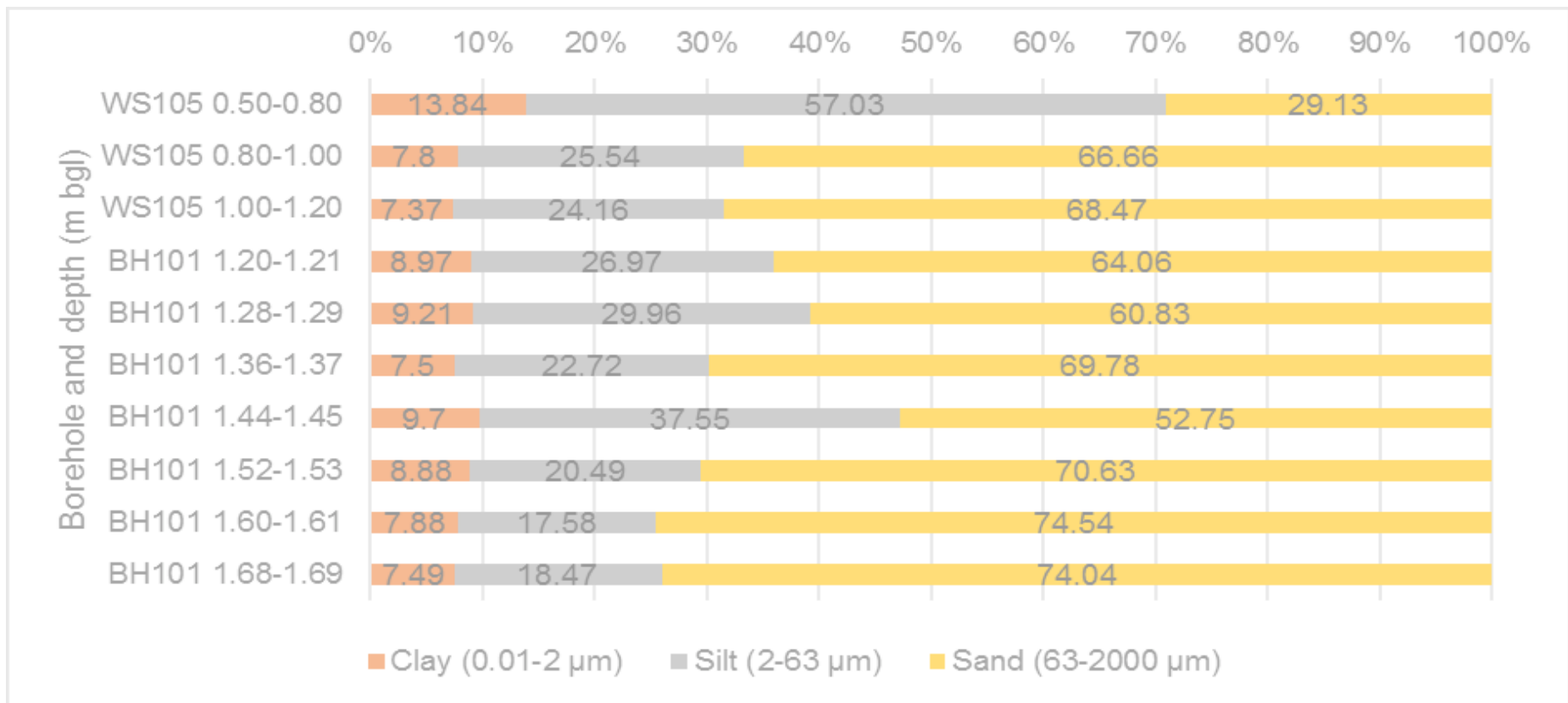


Figure 6: Results of the particle size distribution analysis of selected samples of the silty/clayey unit at Ealing Studios, London Borough of Ealing.

5 DISCUSSION & CONCLUSIONS

The aim of the geoarchaeological investigations at the site were (1) to clarify the nature of the sub-surface stratigraphy; (2) to clarify the nature, depth, extent and date of any Langley Silt and Lynch Hill Gravel deposits; (3) to investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity; and (4) to provide recommendations for any further archaeological investigations at the site (if necessary).

The geoarchaeological investigations have revealed a sequence of Lynch Hill Gravel, overlain by a thin (<0.6m thick) and patchily present horizon of silty, clayey sand, and Made Ground. The principle focus of this investigation was the nature and extent of the silty, clayey sand overlying the Gravel at the site. On the basis of the lithostratigraphic descriptions and particle size analysis, this unit is predominantly sandy, and lacks the features typical of 'brickearth' structure (blocky with numerous tubes and voids), and contained no evidence of calcium carbonate reprecipitation. On this basis, although a separate unit can be identified overlying the Lynch Hill Gravel at the site, the bulk of this material is a silty, clayey (and often gravelly) sand with some thin silt rich horizons and a thin (<0.3m) and patchy uppermost silty layer. It seems most likely therefore that the unit overlying the Lynch Hill Gravel is the product of disturbance and mixing affecting near surface deposits, and probably involving both Lynch Hill material and remnants of the Langley Silt. Bearing in mind the lack of typical 'brickearth' structure even in the more silty parts of the deposit, it seems unlikely that any *in situ* Langley Silt is present at the site.

In addition, in parts of the site the natural sequence appears to be truncated by the overlying Made Ground, particularly in the location of test pit TH02, resulting in artificial surfaces for the underlying units (in the case of TH02, the surface of the Lynch Hill Gravel is clearly lower than might be expected). Significantly disturbed deposits of the Gravel or Langley Silt (containing components of the overlying ground-raising material) are often recorded towards the base of the Made Ground, indicative of some re-deposition of the natural deposits.

Processed bulk samples from this material revealed only a handful of natural rounded river pebbles, probably from terrace gravels. The only possible exception was a struck flake from WS103 between 0.5-0.8. However, this was small and badly detached, and although conchoidally fractured was probably detached mechanically, possibly by the borehole rig. Alternatively, it could be intrusive or from contamination as there is also a piece of clinker or coke in that sample, which is probably modern.

6 RECOMMENDATIONS

The results of the geoarchaeological investigations indicate that the deposits overlying the Lynch Hill Gravel at the site most likely represent the product of disturbance and mixing affecting near surface deposits, and probably incorporate both Lynch Hill material and remnants of the Langley Silt. In addition, these deposits are thin (<0.6m in thickness), patchily present, and are probably truncated in places by the overlying Made Ground.

Only one struck flint was recovered from the processed bulk samples, and this in poor condition and of uncertain origin.

The Palaeolithic archaeological potential of the site is therefore considered to be negligible, and no further investigation of these sediments is recommended.

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8 APPENDIX 1: OASIS

OASIS ID: [quaterna1-280364](#)

Project details

Project name	Ealing Studios, Ealing Green
Short description of the project	A programme of geoarchaeological fieldwork was carried out at the site in February 2017 to monitor a series of geotechnical boreholes and test pits, with subsequent deposit modelling of the sub-surface stratigraphy. These investigations were carried out in order to (1) clarify the nature of the sub-surface stratigraphy; (2) clarify the nature, depth, extent and date of any Langley Silt and Lynch Hill Gravel deposits; (3) investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity; and (4) provide recommendations for any further archaeological investigations at the site (if necessary). The results of the investigations revealed a sequence of Lynch Hill Gravel, overlain by a thin (<0.6m thick) and patchily present horizon of silty, clayey sand, and Made Ground. The material overlying the Lynch Hill Gravel in eight of the sixteen interventions is predominantly sandy, lacks the features typical of 'brickearth' structure, and contained no evidence of calcium carbonate reprecipitation. On this basis, although a separate unit can be identified overlying the Lynch Hill Gravel at the site, it seems most likely that this unit is the product of disturbance and mixing affecting near surface deposits, and probably incorporating both Lynch Hill material and remnants of the Langley Silt. In addition, these deposits are thin (<0.6m in thickness), patchily present, and are probably truncated in places by the overlying Made Ground. The Palaeolithic archaeological potential of the site is therefore considered to be negligible, and no further investigation of these sediments is recommended.
Project dates	Start: 01-01-2017 End: 24-03-2017
Previous/future work	Yes / Not known
Type of project	Environmental assessment
Survey techniques	Landscape

Project location

Country	England
Site location	GREATER LONDON EALING EALING Ealing Studios, Ealing Green
Postcode	W5 5EP
Site coordinates	TQ 17520 80250 51.508450877892 -0.306407198814 51 30 30 N 000 18 23 W Point

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project originator	brief RPS
Project design originator	D.S. Young
Project director/manager	C.R. Batchelor
Project supervisor	D.S. Young

Type of Developer
sponsor/funding
body

Project archives

Physical Archive No
Exists?

Digital Archive No
Exists?

Paper Archive LAARC
recipient

Paper Contents "Environmental"

Paper Media "Report"
available

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

Entered on 24 March 2017