

**ACTON DIVEUNDER AND YARD, ACTON, LONDON BOROUGH OF EALING, W3 9QF
(CROSSRAIL) (SITE CODE: TWR13): GEOARCHAEOLOGICAL FIELDWORK REPORT**

CENTRAL NGR: TQ 1931 8099

COMMISSIONING CLIENT: PRE-CONSTRUCT ARCHAEOLOGY LTD

LAARC SITE CODE: TWR13

PREPARED BY: DR P. ALLEN, DR C.P. GREEN & D.S. YOUNG MSc
QUATERNARY SCIENTIFIC (QUEST)

CONTRACTOR: Quaternary Scientific (Quest)
Wager Building
School of Archaeology, Geography and Environmental
Science
University of Reading
Berkshire
RG6 6AB

Tel: 0118 378 7978

Email: d.s.young@reading.ac.uk

Website: www.reading.ac.uk/quest

DOCUMENT HISTORY:

REVISION	DATE	PREPARED BY	SIGNED	APPROVED BY	SIGNED	REASON FOR ISSUE
v2	24/05/16	D. Young		R. Batchelor		Amendments to v1
v1	01/07/14	P. Allen, C. Green & D Young		R. Batchelor		First issue

CONTENTS

1.1	NON-TECHNICAL SUMMARY	2
1.2	INTRODUCTION	3
1.2.1	Project background	3
1.2.2	Planning background	3
1.2.3	Site description	4
1.2.4	Summary of previous Crossrail studies	4
1.2.5	Archaeological and historical development of the site	4
1.2.6	Geoarchaeological context and potential	5
1.2.7	Research aims and objectives	8
1.3	METHODS	9
1.4	RESULTS, INTERPRETATION AND DISCUSSION OF THE GEOARCHAEOLOGICAL INVESTIGATIONS	10
1.5	RECOMMENDATIONS.....	13
1.6	ACKNOWLEDGEMENTS	13
1.7	REFERENCES	13
1.8	OASIS FORM	29

1.1 NON-TECHNICAL SUMMARY

Geoarchaeological investigations were carried out on the 16th and 17th July 2014 at the site of the proposed Acton diveunder in the form of seven geoarchaeological trial pits put down to formation (the level of the diveunder surface) or the surface of the London Clay bedrock. The Trial Pits were put down along the part of the route of the diveunder identified as of geoarchaeological potential in the written scheme of investigation for the site (Young & Green, 2014). In general, the results of the investigations were found to be consistent with those of the previous geotechnical borehole investigations. The London Clay surface was recorded in five of the Trial Pits (TP1 to TP5), where it was recorded generally increasing in depth from east (24.8m OD in TP1; 24.9m OD in TP2) to west (23.3m OD in TP4; 23.9m OD in TP5). The thickness of the Gravel generally increased in thickness from east to west, recorded as 1.9 (TP1), 1.9 (TP2), 2.5 (TP3), 3.55 (TP4) and 2.5m thick (TP5). In none of the Trial Pits was there any indication of finer-grained material (silt or clay) that might contain biological remains such as Mollusca, bone or small vertebrates. A programme of sieving from selected Trial Pits did not yield any lithic artefacts, nor was any observed during the recording of the Trial Pits. No further geoarchaeological investigations are recommended in the area of the proposed excavations associated with the route of the Acton diveunder.

1.2 INTRODUCTION

This report summarises the findings arising out of the geoarchaeological fieldwork undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at Acton Diveunder and Yard, Acton, London Borough of Ealing (National Grid Reference: TQ 1931 8099; Figure 1). Quaternary Scientific were commissioned by Pre-Construct Archaeology to undertake the geoarchaeological investigations.

1.2.1 Project background

Quaternary Scientific (Quest) were commissioned by Pre-Construct Archaeology Ltd on behalf of BAM Nuttall to produce a document that updates the terms of and forms an addendum to the Site-Specific Written Scheme of Investigation (SS-WSI) for Acton Diveunder, Acton, London Borough of Ealing, W3 9QF TQ 1931 8099 (*Acton Diveunder and Yard Archaeology Site-Specific Written Scheme of Investigation WAD1B-HEN-PLN-AKB-000004*, Network Rail 2012). This report relates to the proposed geoarchaeological investigations in this WSI, related to the excavation work carried out at the site of the Acton Diveunder (Figure 1). It is intended to consider the geoarchaeological potential of the site, and has been prepared following examination of:

- The existing SS-WSI for the site (Acton Diveunder and Yard Archaeology Site-Specific Written Scheme of Investigation WAD1B-HEN-PLN-AKB-000004, Network Rail 2012)
- The geology and past impacts of the site, including information regarding areas of previous truncation in the cuttings;
- Total area/depth of proposed excavation works;
- The programme for excavation works;
- The new geotechnical boreholes (Factual Geotechnical Report on Ground Investigation 4190 – Acton Diveunder Final, BAM Ritchies, 2010)
- Existing geotechnical boreholes at the site (Soil Mechanics, 2010)
- Existing BGS archive boreholes (www.bgs.ac.uk/opengeoscience).
- Recently exposed sections in the archaeologically sensitive Lynch Hill Gravel at the site

1.2.2 Planning background

The overall framework within which the geoarchaeological work was undertaken is set out in the Environmental Minimum Requirements (EMR) for Crossrail (<http://www.crossrail.co.uk/the-railway/getting-approval/parliamentary-bill/environmental-minimum-requirements-including-crossrail-construction-code>). The requirements being

progressed follow the principles of Planning Policy Statement 5: Planning for the Historic Environment (2010). Accordingly the nominated undertaker or any contractors will be required to implement certain control measures in relation to archaeology before construction work begins.

The strategy for archaeological works has been set out in the Crossrail Generic Written Scheme of Investigation (WSI) - document number CR-PN-LWS-EN-SY-00001. The Generic WSI presents the strategy for archaeology design, evaluation, mitigation, analysis, dissemination and archive deposition that will be adopted for the design and construction of Crossrail and provides a general statement of objectives, standards and structure for the planning and implementation of archaeological works.

1.2.3 Site description

The proposed works are near to Acton Station in West London (Figure 1), at the rail entrance to the DB Schenker rail yard. BAM Nuttall are constructing a 'Diveunder' to divert the Up Relief passenger line underneath the Head Shunt line, thus improving passenger train times through the busy freight area. The first stage of the works will be to install two concrete guide walls along the length of the underpass to retain the existing infrastructure, prior to the removal of the earth in between the walls. Once the concrete piles have been installed the earth between them will be removed using a 25T 360° Excavator. The top layer of predominantly made up ground, but including in part the archaeologically sensitive Lynch Hill Gravel, will be stripped back and removed from site, thus exposing the London Clay bedrock.

1.2.4 Summary of previous Crossrail studies

The Archaeological and built heritage assessment work undertaken to date includes desk-based studies and site visits. The findings from this work were reported in the original Crossrail Environmental Statement (Volume 3 Paragraph 9.14.24-9.14.25) and Specialist Technical Reports (Assessment of Archaeology Impacts, Part 5 of 6, Western Route Section: Maidenhead to Westbourne Grove 2005). The Environmental Statement details the archaeological potential of the site and identified that the diveunder would remove potential archaeological remains. This continues to be the case.

1.2.5 Archaeological and historical development of the site

The railway and station are situated in a cutting whose depth decreases through the freight

yard and sidings to the north (see Past Impacts, below). Much of the land surrounding the site is taken up by suburban housing although adjacent to the north, beyond the railway freight yard, are sports fields, a playground and allotments. Acton Main Line is a small suburban station at the east end of the site, accessed from a ticket office on the southern part of Horn Lane over-bridge. Although originally opened in 1868, the present structures appear to be of 20th century date.

Truncation from the existing permanent way (principally the railway cutting and the freight yard to the north of it) is deepest in the western half of the site (ca. 3m deep on the southern side and up to 5m to the north). Here it has removed most of the brickearth (BGS mapping shows some - probably truncated - brickearth survival in the western part of the freight yard and in the southern face of the cutting). The latter has also increasingly cut into the underlying gravels. In this western area, the permanent way will have removed virtually all archaeological remains. In the eastern half of the site, the permanent way directly overlies London Clay, with less truncation (the cutting is ca. 2m deep, decreasing to ca. 1m in the former stream valley adjacent to the station).

The late 19th-century Ordnance Survey map suggests less quarrying overall in this area, compared to further west. BGS mapping shows an area of 'worked ground' in the western end of the freight yard, north of the main line tracks, that extends for a distance of ca. 240m east of the Twyford Avenue Bridge. However, it also maps brickearth across this area, so the depth of truncation is uncertain. There is no evidence that ground below the existing railway was affected and boreholes in the vicinity show ca. 1m of made ground, indicating historic development rather than large-scale landfilling.

1.2.6 Geoarchaeological context and potential

For much of both west and east London, the built-up area is on a sequence of terraces left as the Thames successively cut down to lower levels (Figure 2). British Geological Survey (BGS) mapping (1:50,000 Sheet 256 North London, 1994; Figure 3) shows the area around the railway cutting underlain by the Langley Silt, described as 'brickearth, sandy clay and silt', resting on Lynch Hill Gravel overlying bedrock London Clay (Table 1). The site lies close to the north-east corner of a broad spread of Lynch Hill Gravel between the River Brent to the west, and the Stamford Brook to the east. The geological map indicates the absence of the Langley Silt from the immediate area of the cutting itself, clearly as a direct result of the excavation of the cutting (see above and Figure 3). Summary lithological data for the existing

geotechnical and BGS archive boreholes are displayed in Table 2.

Table 1: Summary data for the stratigraphic sequence at the Acton Diveunder site.

Era	Period	Marine Oxygen Isotope Stage	Unit	Age (yrs)
Quaternary	Pleistocene	Devensian	Langley Silt	? ca. 30,000
		Un-named MIS 10-9-8	Lynch Hill terrace sand and gravel	ca. 300,000
Tertiary	Palaeocene	Eocene	London Clay	ca. 55,000,000

The worksite comprises part of the shallow cutting occupied by the existing railway between Acton Main Line and Ealing Broadway in west London. The ground surface within the cutting is between 26.75m and 27.0m OD. A transect of 14 geotechnical boreholes (BAM Ritchies, 2010; Figure 4) shows that this level reflects the presence of a variable but generally small thickness of Made Ground. The base of the Made Ground is mainly between 25.57m and 26.39m OD falling to 23.97m OD at the western end of the site where the Made Ground is thicker.

At the eastern end of the site, the geotechnical boreholes (Figure 4) pass directly from Made Ground into London Clay (BH101, BH102, ADC09, ADC07, BH105), or through a thin remnant of Lynch Hill Gravel into London Clay (BH104 Lynch Hill Gravel 0.7m; ACD03 Lynch Hill Gravel: 0.6m). Further west, over a distance of ca. 350m, six boreholes pass from Made Ground into a more substantial occurrence of Lynch Hill Gravel, ranging from 1.65m (Borehole BH107) to 2.75m (Borehole BH106) in thickness. Recent excavations in the eastern part of this area confirm the borehole record, and exposed the Lynch Hill Gravel as a massive, rather uniform, sandy, predominantly medium gravel, underlying Made Ground and resting with a sharp contact on yellowish brown to reddish brown weathered London Clay. The weathered horizon is uniformly about 0.5m thick and passes down through a well-marked transition into the un-weathered London Clay. The base of the Lynch Hill Gravel, traced over a distance of 100m+, forms a contact with the London Clay that undulates gently with a relief amplitude of no more than 2.0m. To the west of BH109, the most westerly borehole (ACD04) passes through a thick layer of Made Ground directly into London Clay.

The Langley Silt was not recorded in any of the boreholes in the transect, or seen in recent exposures at the site, indicating that along the centre line of the cutting the excavation truncated the geology below the Langley Silt/Lynch Hill Gravel contact. A thin (0.5m) occurrence of the Langley Silt was recorded in a borehole (BH103) offset to the north of the

transect. The base of the thin remnants of Lynch Hill Gravel at the eastern end of the site is at about 25.8m OD. Further west, where the gravel is thicker, the base is between 23.37m (BH106) and 24.51m (BH107). Outside the railway cutting, the ground surface is at about 29-31m OD. BGS archive boreholes (www.bgs.ac.uk/opengeoscience) ca. 50m to the northwest (TQ18SE158), ca. 500m to the west (TQ18SE160) and ca. 400m south of the site (TQ18SE259) indicate the presence of Lynch Hill Gravel to a depth of between 5.5m and 6.7m below the ground surface (ca. 23.5-24.3m OD, i.e. closely similar to the levels recorded in the geotechnical boreholes from within the site).

Archaeological investigations in Creffield Road, about 150m south of the railway cutting (Brown, 1886; 1887) recovered Levallois artefacts from deposits which would now be described as the Langley Silt and the upper part of the Lynch Hill Gravel. Brown (1886; 1887) described sediments below a surface at 100 feet OD (30.48m OD) with brickearth to depths between 4 feet and 7 feet (1.2-2.1m) overlying gravel seen to a depth of 13 feet (4.0m, 26.48m OD). Brown also recovered hand-axes from the gravel at the Creffield Road site and Wymer (1968) lists 69 hand-axes from 'Ealing and Acton', but does not identify any specific sites, apart from Creffield Road, near the present area of interest. Brown (1886, 1887) reported from several small gravel pits in Creffield Road, a 'working floor to be lying on a seam of black-stained gravel immediately beneath the overlying brickearth'. Brown (1887) also reported 10 or 12 flint artefacts from the Lynch Hill gravels, 8 or 10 from the upper part and 2 from the lower. Later excavation at Creffield Road (Bazely *et al.*, 1991) exposed the Langley Silt and the gravels of the Lynch Hill terrace, but recovered artefacts only from the Langley Silt.

No organic horizons have been recorded in the Lynch Hill Gravel in this part of the Thames Valley. More recent investigations in Creffield Road at TQ 195 808 (Bazely *et al.*, 1991), about 100m to the west of Brown's site, confirmed the presence of the Langley Silt overlying Lynch Hill Gravel and recovered a single Levallois flake and large amounts of Mesolithic flintwork. Recent geotechnical investigations (BAM Ritchies, 2010; Soil Mechanics, 2010) have shown that the Langley Silt and the upper part of the Lynch Hill Gravel were removed from the Acton Diveunder site during the excavation of the railway cutting, which is the location of the proposed engineering work. Nearby archive boreholes indicate that the undisturbed Lynch Hill Gravel in this area was probably about 3.0m thick. Thus, between geotechnical boreholes BH105 and BH109 within the Acton Diveunder site, gravel representing more than half this thickness survives. Experience in archaeological

investigations of the Lynch Hill Gravel to the west of the present site (Collins, 1978) suggests that Lower Palaeolithic artefacts are more common towards the base of the gravel, with more than 60 per cent of the flintwork coming from depths of more than 13 feet (4.0m) below the ground surface (analysis by Collins of information associated with artefacts in the J.Allen Brown Collection in the British Museum). Thus, given the potential of the surviving portions of the Lynch Hill Gravel at the Acton Diveunder site to contain Lower Palaeolithic artefacts, it is necessary to investigate the surviving portions of the Lynch Hill Gravel at the site, which includes the sediments equivalent to the lower part of the Gravel identified by Collins (1978).

1.2.7 Research aims and objectives

The aim of the geoarchaeological investigations were (1) to clarify the nature of the sub-surface stratigraphy across the area of the proposed excavations, and (2) to evaluate the potential of the sequences to contain evidence for Palaeolithic archaeology or biological remains.

Table 1: Summarised lithological data for the existing geotechnical boreholes at and near to the Acton Diveunder and Yard site. All elevation data shown as metres above Ordnance Datum. Approximate elevation data shown in italics. No OD data was available for borehole TQ38SE259.

Borehole	Made Ground (m OD)	Langley Silt (m OD)	Lynch Hill Gravel (m OD)	London Clay (m OD)
BAM Ritchies (2010) boreholes				
BH101	26.77 to 25.57	-	-	25.57 to 22.77
BH102	26.91 to 26.16	-	-	26.16 to 22.91
BH103	27.51 to 26.01	26.01 to 25.51	-	25.51 to 23.51
BH104	26.96 to 26.16	-	26.16 to 25.86	25.86 to 22.96
BH105	26.94 to 25.94	-	-	25.94 to 19.94
BH106	26.87 to 26.12	-	26.12 to 23.37	23.37 to 19.87
BH107	26.87 to 26.02	-	26.02 to 24.37	24.37 to 23.37
BH108	29.00 to 27.50	-	27.50 to 25.00	-
BH109	26.82 to 26.32	-	26.32 to 24.22	24.22 to 22.82
Soil Mechanics (2010) boreholes				
ACD02A/B	27.01 to 26.14	-	26.14 to 24.29	24.29 to 6.89
ACD03	27.05 to 26.39	-	26.39 to 25.79	25.79 to 6.99
ACD04	26.83 to 23.97	-	-	23.97 to 11.32

Borehole	Made Ground (m OD)	Langley Silt (m OD)	Lynch Hill Gravel (m OD)	London Clay (m OD)
ACD05	26.78 to 26.27	-	26.27 to 24.02	24.02 to 1.27
ACD06	26.83 to 26.08	-	26.08 to 23.83	23.83 to 6.83
ADC07	27.00 to 26.25	-	-	26.25 to 6.85
ADC09	26.92 to 25.85	-	-	25.85 to 11.23
BGS boreholes				
TQ18SE158	32.00 to 31.30	31.30 to 29.60	29.60 to 26.50	-
TQ18SE259	No OD height			
TQ18SE160	-	31.30 to 26.88	26.88 to 24.59	24.59 to 20.63

1.3 METHODS

Seven Trial Pits (TP1 to TP7; see Figure 3) were put down to various depths, to a maximum of 3.7m, to the London Clay or to formation level (the level of the diveunder surface). For health and safety reasons no pit was entered beyond a depth of 1.0m. Observations of the deeper parts of the pits were made from the ground surface, and strata thicknesses estimated from a surveyor's staff lowered into the pit at its maximum depth. The geology was recorded by a field log at a scale of 1m to 4 cm (1:25) and photographed.

The surface exposed by the machine blade was examined visually, where possible, for changes in the sedimentology of the deposits and for fossil material and the contents of the bucket for worked flint, bone and other fossil material. In practice, Trial Pits TP1 to TP4 were affected by ingress of water and collapse of the sides at a depth of only 1.0m, and a box-shutter had to be used beyond that depth. In these cases the water prevented inspection of the pit floor and the collapse of the sides at either end of the shutter meant that material being brought up by the digger was contaminated by material collapsing in from above. Trial Pits TP6 and TP7 were only put down to 2.0 and 1.5m bgs (below ground surface) respectively as they were sunk to the formation level only, where the diveunder was shallower. Small samples from selected Trial Pits (totalling 30 litres) were taken off-site for sieving through 100, 50 and 20mm mesh sizes to examine the sediments for biological remains and artefacts.

1.4 RESULTS, INTERPRETATION AND DISCUSSION OF THE GEOARCHAEOLOGICAL INVESTIGATIONS

The results of the geoarchaeological investigations are displayed in Tables 3 to 9 and Figures 3 to 20. In general, the results of the investigations are consistent with those of the previous geotechnical borehole investigations as outlined above. The London Clay surface was recorded in five of the Trial Pits (TP1 to TP5), where it was recorded generally increasing in depth from the east (24.8m OD in TP1; 24.9m OD in TP2) to the west (23.3m OD in TP4; 23.9m OD in TP5). The lower London Clay surface is reflected in the thickness of the Gravel, which generally increases in thickness from east to west, recorded as 1.9 (TP1), 1.9 (TP2), 2.5 (TP3), 3.55 (TP4) and 2.5m thick (TP5). The base of the Made Ground (the truncated surface of the Gravel in all Trial Pits) is relatively even across the site, recorded at between 26.85 and 26.4m OD.

In none of the trial pits was there any indication of finer-grained material (silt or clay) that might contain biological remains such as Mollusca or small vertebrates. No bone material was found. A limited sieving programme, of 30 litres from 4 selected Trial Pits, did not yield any lithic material, nor was any observed during the actual sinking of the Trial Pits. A view to the north bank of the cutting, which had been re-exposed when an access line was re-aligned, showed ca. 2m of Langley Silt overlying ca. 2m of sand and gravel of the Lynch Hill terrace (see Figures 3 and 20). Sieving through a 10mm mesh sieve of the 30 litres in total of samples from Trial Pits TP1, TP5, TP6 and TP7 yielded no artefacts.

Observation of the upper part of the re-exposed north face of the cutting showed that all parts of the diveunder are below the level of the Langley Silt, and only the lowest 3 to 4m of the gravels and sands of the Lynch Hill terrace are affected by the diveunder. Inspection of the topmost 1.0m of sediment in all the Trial Pits showed the strata to be horizontally bedded with, in several of the pits, the gravel clasts increasing in size from 3-6cm to 10-15cm. For Trial Pits TP1 to TP4, below 1.0m bgs, limited detailed information was available because a box-shutter had to be used. Trial Pits TP5 to TP7 were drier, but below 1.0m bgs the material was mostly sandy gravel with a maximum clast size of 8cm, a size that might contain worked flakes, but not large enough for more elaborate lithics such as hand-axes.

Table 3: Lithostratigraphic description of Trial Pit TP1, Acton Diveunder and Yard, Acton, London Borough of Ealing. Ground surface ca. 27.0m OD, excavated to a depth of 2.2m bgs (Figures 4, 5). This pit established a stratigraphy for the site.

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
1.1	0.00-0.30	27.00-26.70	0.30	Made ground	
1.2	0.30-0.65	26.70-26.35	0.35	Gravelly sand, flints up to 5 cm long 10YR5/4 (yellowish brown)	
1.3	0.65-0.80	26.35-26.20	0.15	Medium sand, horizontally bedded 10YR5/6 (yellowish brown)	
1.4	0.80-1.00	26.20-26.00	0.20	Sandy gravel, flints up to 3 cm	
1.5	1.00-2.20	26.00-24.80	1.20	Obscured by box-shutter Gravelly sand or sandy gravel, flints becoming larger with depth to 15 cm	5 litres
				London Clay	

Table 4: Lithostratigraphic description of Trial Pit TP2 at Acton Diveunder and Yard, Acton, London Borough of Ealing. Ground surface ca. 27.0m OD, excavated to a depth of 2.1m bgs (Figures 6, 7, 8).

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
2.1	0.00-0.20	27.00-26.80	0.20	Made ground	
2.2	0.20-0.25	26.80-26.75	0.05	Sandy gravel	
2.3	0.25-0.47	26.75-26.53	0.22	Medium sand, horizontally bedded 10YR5/6 (yellowish brown)	
2.4	0.47-0.60	26.53-26.40	0.13	Clayey sand 10YR5/6 (yellowish brown)	
2.5	0.60-1.00	26.40-26.00	0.40	Medium sand, horizontally bedded 10YR5/6 (yellowish brown)	
2.6	1.00-2.10	26.00-24.90	1.10	Obscured by box-shutter Gravelly sand or sandy gravel, flints becoming larger with depth, up to 10 cm	
				London Clay	

Table 5: Lithostratigraphic description of Trial Pit TP3 at Acton Diveunder and Yard, Acton, London Borough of Ealing. Ground surface ca. 27.0m OD, excavated to a depth of 2.7m bgs (Figures 9, 10).

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
3.1	0.00-0.20	27.00-26.80	0.20	Made ground	
3.2	0.20-0.35	26.80-26.65	0.15	Sandy gravel, flints up to 6 cm long	
3.3	0.35-0.55	26.65-26.45	0.20	Medium sand, horizontally bedded with some cross-bedding	
3.4	0.55-1.10	26.45-25.90	0.55	Sandy gravel, flints mostly up	

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
				to 3 cm long, some to 6 cm	
3.5	1.10-2.70	25.90-24.30	1.60	Obscured by box-shutter Mostly medium sand.	
				London Clay	

Table 6: Lithostratigraphic description of Trial Pit TP4 at Acton Diveunder and Yard, Acton, London Borough of Ealing. Ground surface ca. 27.0m OD, excavated to a depth of 3.7m bgs (Figures 11, 12).

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
4.1	0.00-0.15	27.00-26.85	0.15	Made ground	
4.2	0.15-0.55	26.85-26.45	0.40	Sandy gravel, flints up to 6 cm long	
4.3	0.55-0.75	26.65-26.25	0.20	Open framework gravel (no sand matrix)	
4.4	0.75-3.70	26.25-23.30	2.95	Obscured by box-shutter Sandy gravel, flints mostly up to 3 cm long in upper part, becoming larger with depth	
				London Clay	

Table 7: Lithostratigraphic description of Trial Pit TP5 at Acton Diveunder and Yard, Acton, London Borough of Ealing. Ground surface ca. 27.0m OD, was excavated to a depth of 3.1m bgs (Figures 13, 14).

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
6.1	0.00-0.60	27.00-26.40	0.60	Made ground	
6.2	0.60-1.20	26.40-25.80	0.60	Sandy gravel, flints up to 6 cm long	
6.3	1.20-1.40	25.80-25.60	0.20	Lens of medium sand at one end of pit	
6.4	1.20-3.10	25.60-23.90	1.70	Gravelly sand	10 litres
				London Clay	

Table 8: Lithostratigraphic description of Trial Pit TP6 at Acton Diveunder and Yard, Acton, London Borough of Ealing. Ground surface ca. 27.0m OD, excavated to a depth of 2.0m bgs (Figures 15,16).

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
7.1	0.00-0.15	27.00-26.85	0.15	Made ground	
7.2	0.15-0.35	26.85-26.65	0.20	Sandy gravel, horizontally bedded 10YR6/4 (light yellowish brown)	
7.3	0.35-2.00	26.65-25.00	1.65	Sandy gravel, horizontally bedded, flints up to 8 cm long 10YR6/6 (brownish yellow)	10 litres
				(Formation)	

Table 9: Lithostratigraphic description of Trial Pit TP7 at Acton Diveunder and Yard, Acton, London Borough of Ealing. Ground surface ca. 27.0m OD, excavated to a depth of 1.5m bgs (Figures 17, 18).

Unit	Depth (m bgs)	Depth (m OD)	Thickness	Description	Sample
8.1	0.00-0.35	27.00-26.65	0.35	Made ground	
8.2	0.35-0.47	26.65-26.53	0.12	Sandy gravel, horizontally bedded 10YR6/4 (light yellowish brown)	
8.3	0.47-1.50	26.53-25.50	1.03	Sandy gravel, horizontally bedded, flints up to 8 cm long 10YR6/6 (brownish yellow)	5 litres
				(Formation)	

1.5 RECOMMENDATIONS

As the lowermost material of the Lynch Hill terrace gravels could not be assessed because of water ingress and sidewall collapse, or formation was reached, it is not possible to judge whether lithic artefacts are present, but as larger material was noted in the lower parts of the gravel, up to 15cm, there may be a potential for such material to be present. However, the instability of the Trial Pits and the narrowness of the footprint of the diveunder indicate that safe working conditions would be difficult to achieve. Given that the excavations carried out in better conditions in Creffield Road, reported by Brown (1886, 1887) and Bazely *et al.* (1991), recovered little from the Lynch Hill gravels and that the critical level, the junction of the Langley Silt and the Lynch Hill gravels, can be seen to be at a higher level in the adjacent re-exposed cutting, it is not suggested that any further geoarchaeological investigations are carried out in the area of the proposed excavations associated with the route of the Acton diveunder.

1.6 ACKNOWLEDGEMENTS

We are grateful to Helen Hawkins at Pre-Construct Archaeology for commissioning Quaternary Scientific to carry out the geoarchaeological investigations, and to Neil Goulding (Site Environmental Manager, BAM Nuttall Ltd) for comments on the first version of this report. The on-site work was carried out by Dr C.P. Green and Dr Peter Allen (Quaternary Scientific).

1.7 REFERENCES

Bridgland, D.R. (1994) *Quaternary of the Thames*. Chapman & Hall, London.

BAM Ritchies (2010) Factual Geotechnical Report on Ground Investigation 4190 – Acton

Diveunder. *Unpublished Report*.

Bazely, R., Green, C. and McGregor, D. (1991) Excavation of an early prehistoric site at Creffield Road, Acton. *London & Middlesex Archaeological Society Transactions* **42**: 17-31.

Brown, J.A. (1886) The Thames Valley surface deposits of the Ealing district and their associated Palaeolithic floors. *Quarterly Journal of the Geological Society of London* **42**:192-200.

Brown, J.A. (1887) *Palaeolithic Man in North West Middlesex*. Macmillan, London.

Collins, D. (1978) *Early Man in West Middlesex*. HMSO, London.

Network Rail (2012) Acton Diveunder and Yard Archaeology Site-Specific Written Scheme of Investigation WAD1B-HEN-PLN-AKB-000004. *Unpublished Report*.

Soil Mechanics (2010) Acton Diveunder and Airport Junction, London (factual report for Scott Wilson). *Unpublished Report*.

Wymer, J.J. (1968) *Lower Palaeolithic Archaeology in Britain*. John Baker, London

Young, D.S. and Green, C.P. (2014) Acton Diveunder and Yard, Acton, London Borough of Ealing, W3 9QF (Crossrail): Addendum to the Site Specific Written Scheme of Investigation.

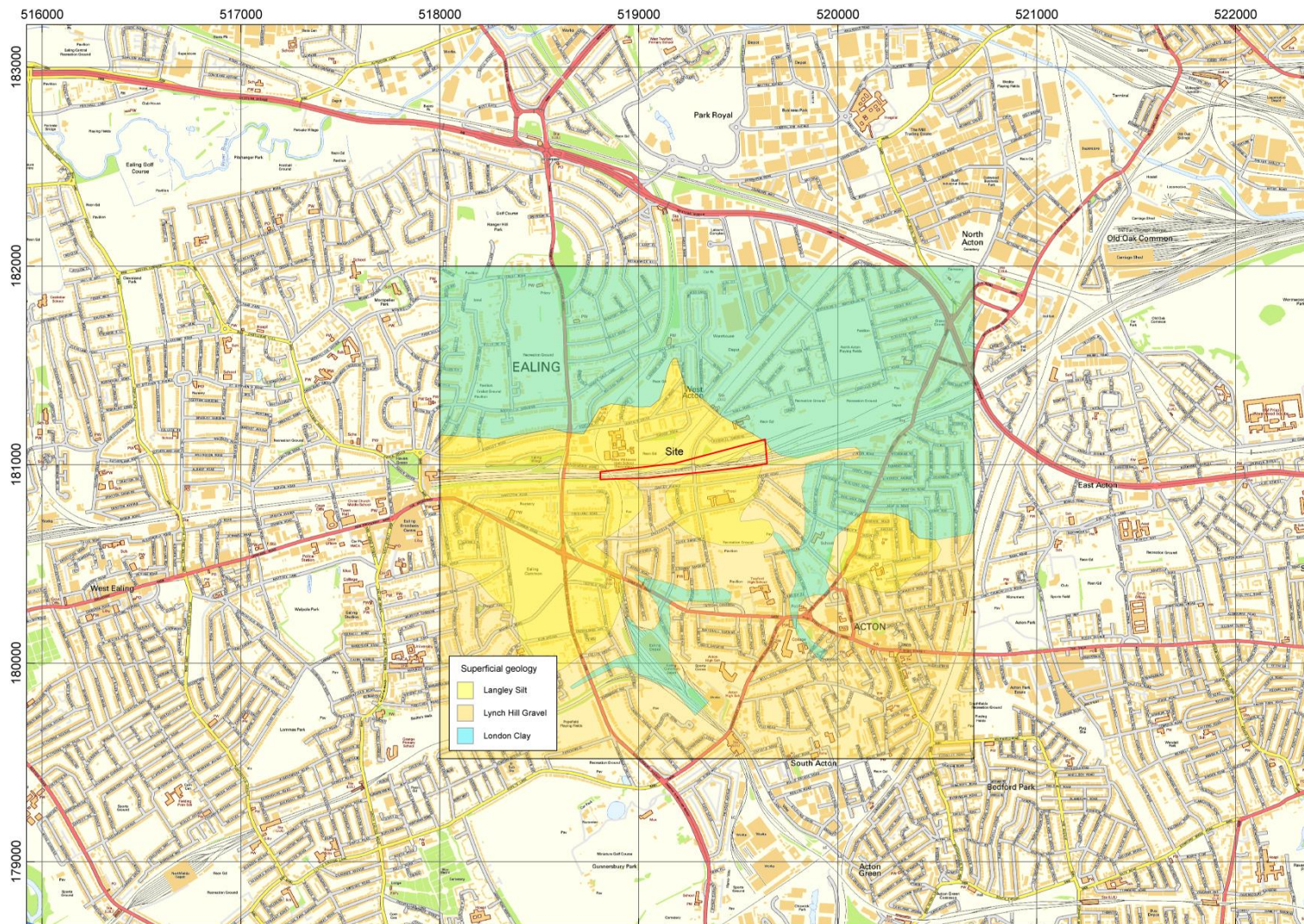


Figure 1: Site location and superficial geology at the Acton Diveunder and Yard site (geological data from www.bgs.ac.uk/opengeoscience). Contains Ordnance Survey data © Crown copyright and database right [2013]

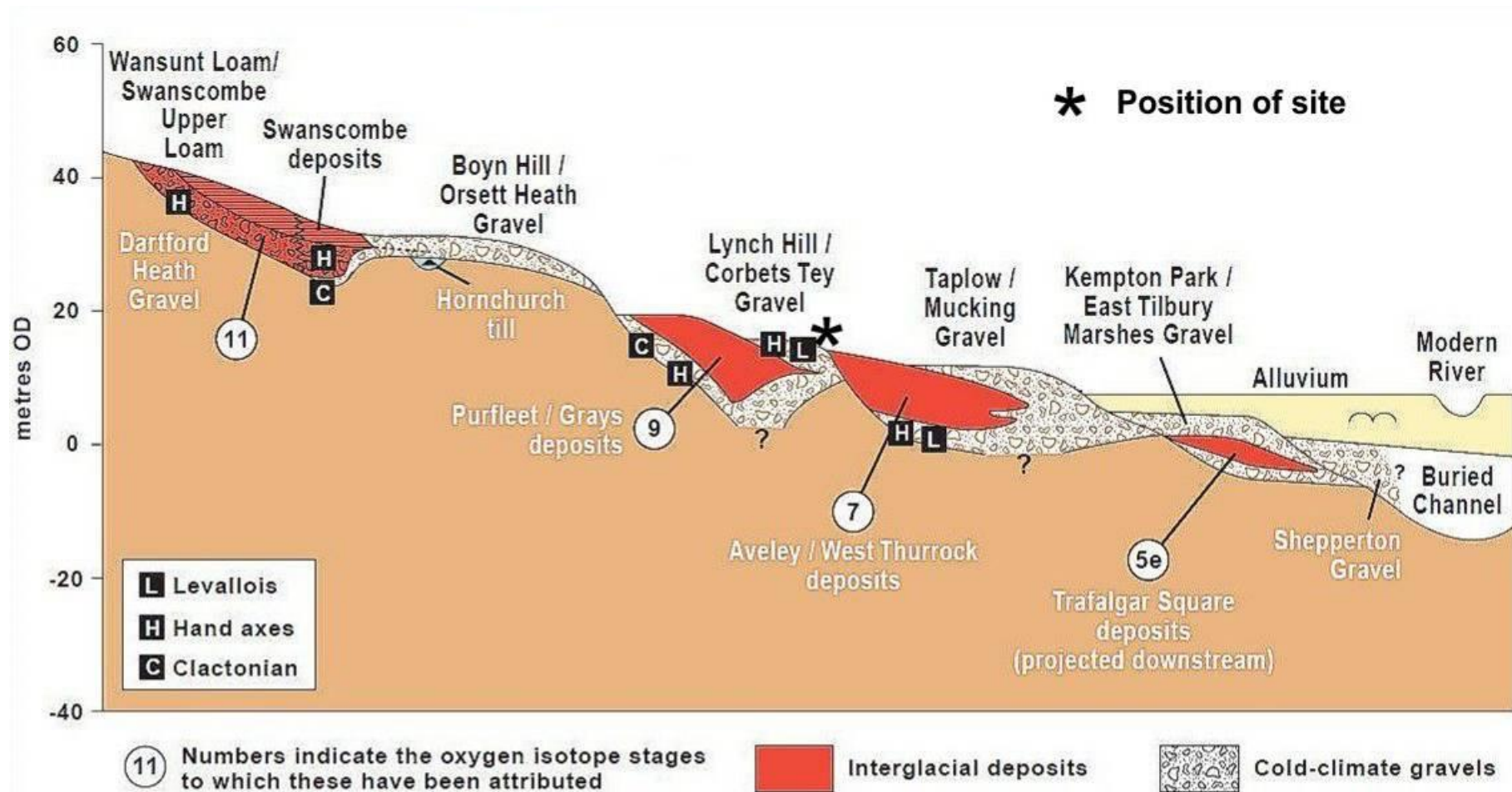


Figure 2: The Thames Terrace Sequence and Archaeology (after Bridgland, 1994)

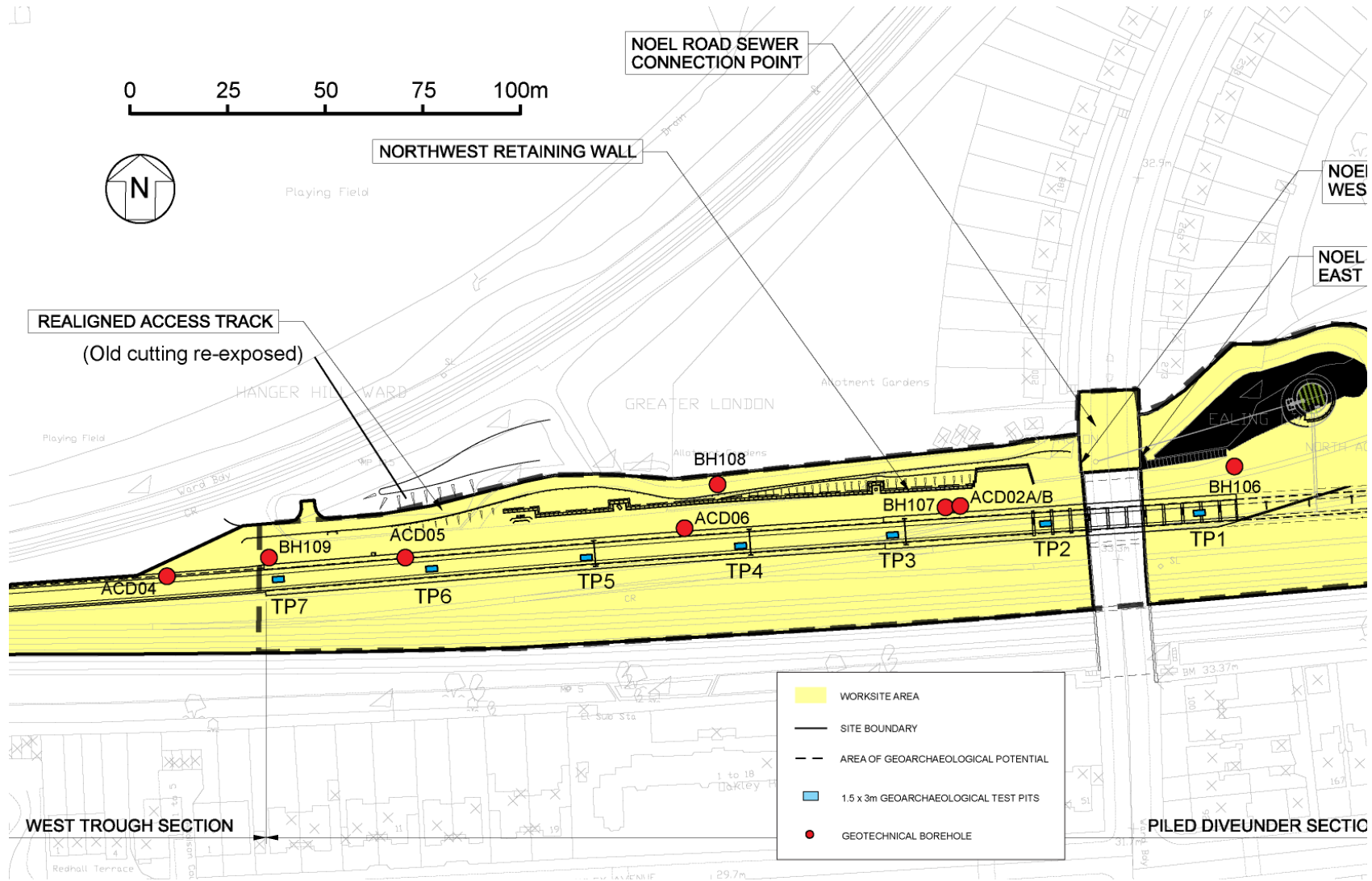


Figure 3: Location of the Trial Pits at Acton Diveunder and Yard, Acton, London Borough of Ealing

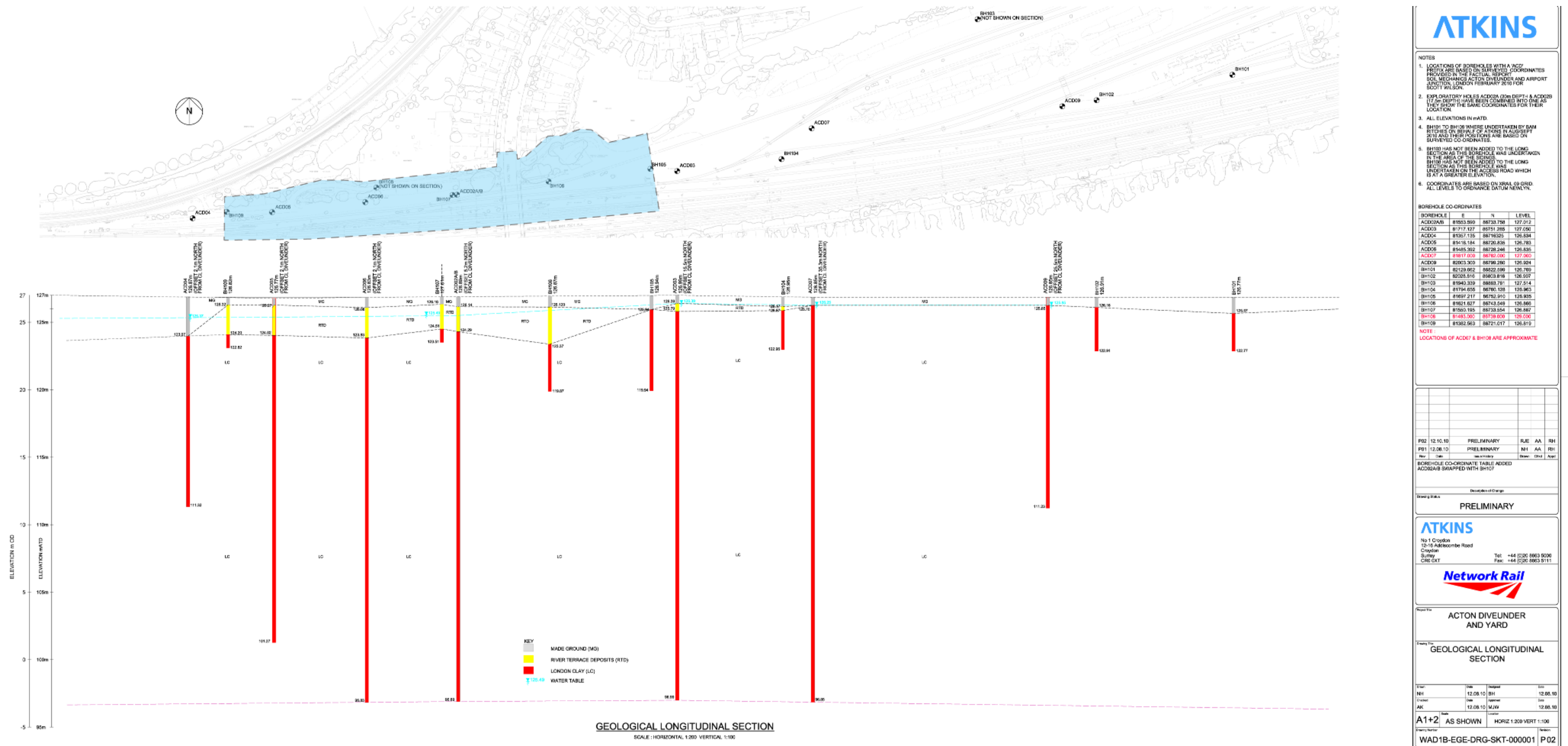


Figure 4: Site map incorporating the existing geotechnical data (BAM Ritchies, 2010; Soil Mechanics, 2010) from within the site. Adapted from an original figure produced by BAM Ritchies (2010).



Figure 5: Annotated photograph of Trial Pit TP1

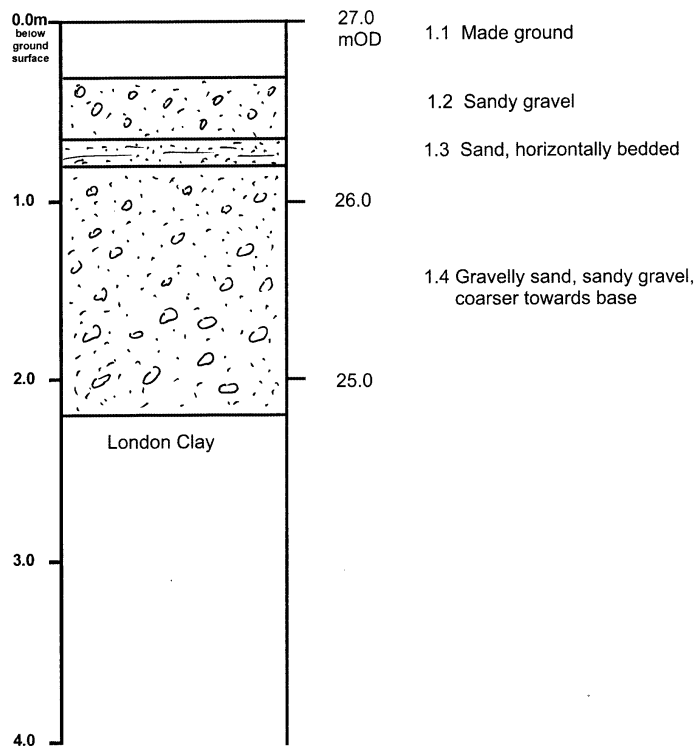


Figure 6: Log for Trial Pit TP1

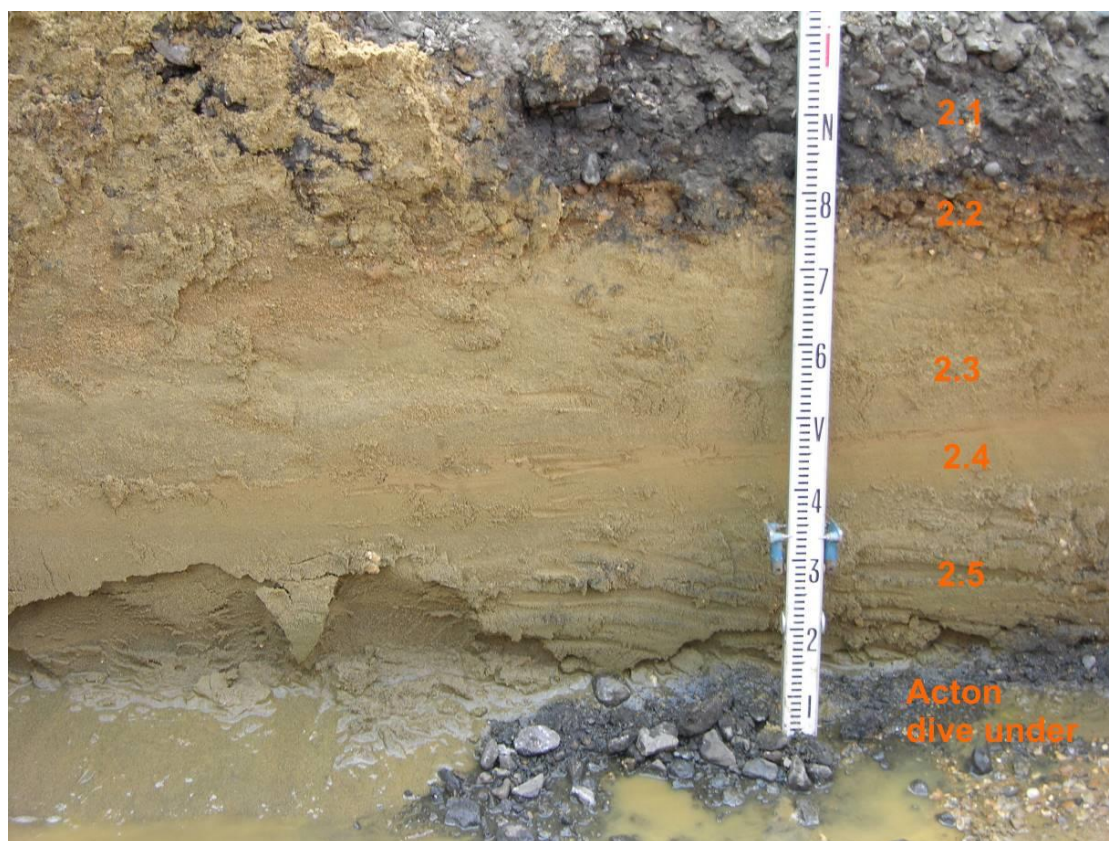


Figure 7: Annotated photograph of Trial Pit TP2 (upper part of the sequence)



Figure 8: Annotated photograph of Trial Pit TP2 (lower part of the sequence)

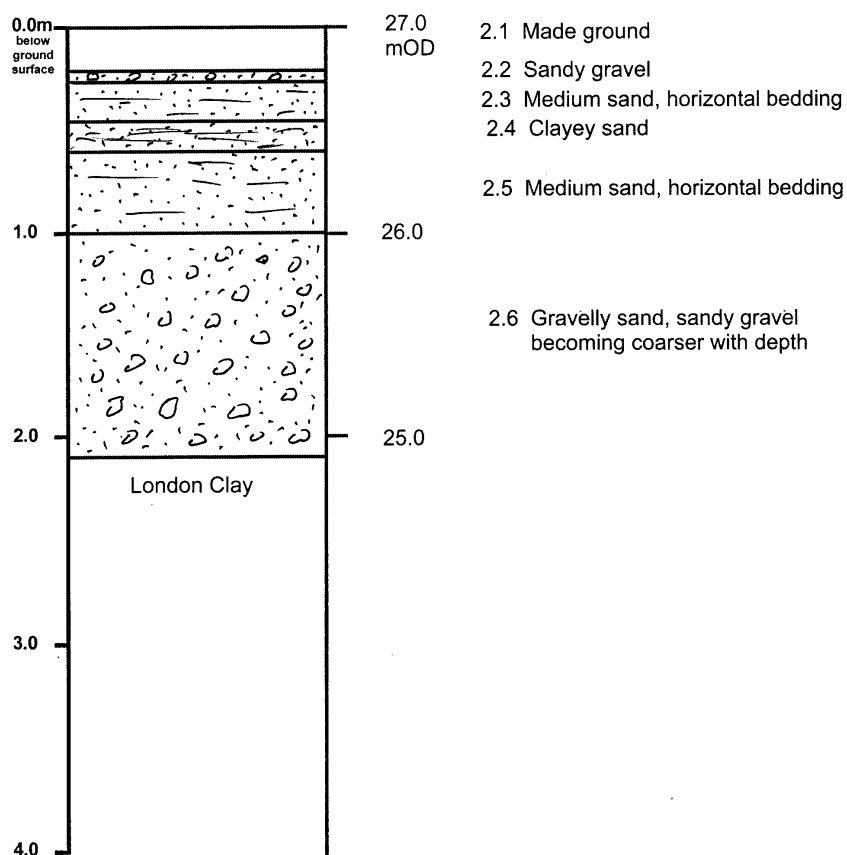


Figure 9: Log for Trial Pit TP2

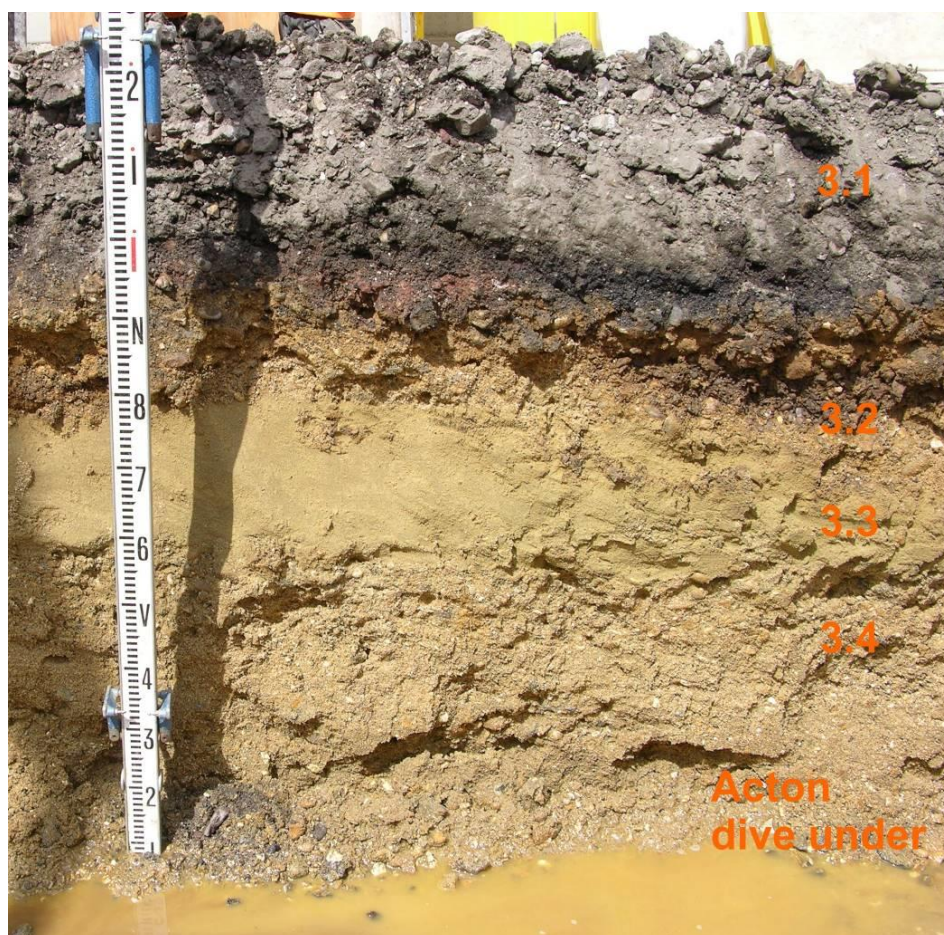


Figure 10: Annotated photograph of Trial Pit TP3

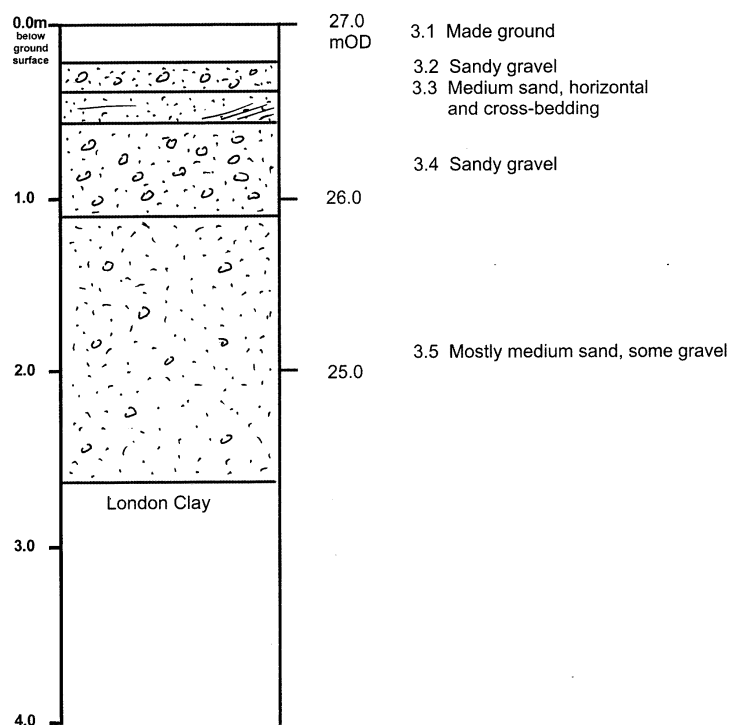


Figure 11: Log for Trial Pit TP3

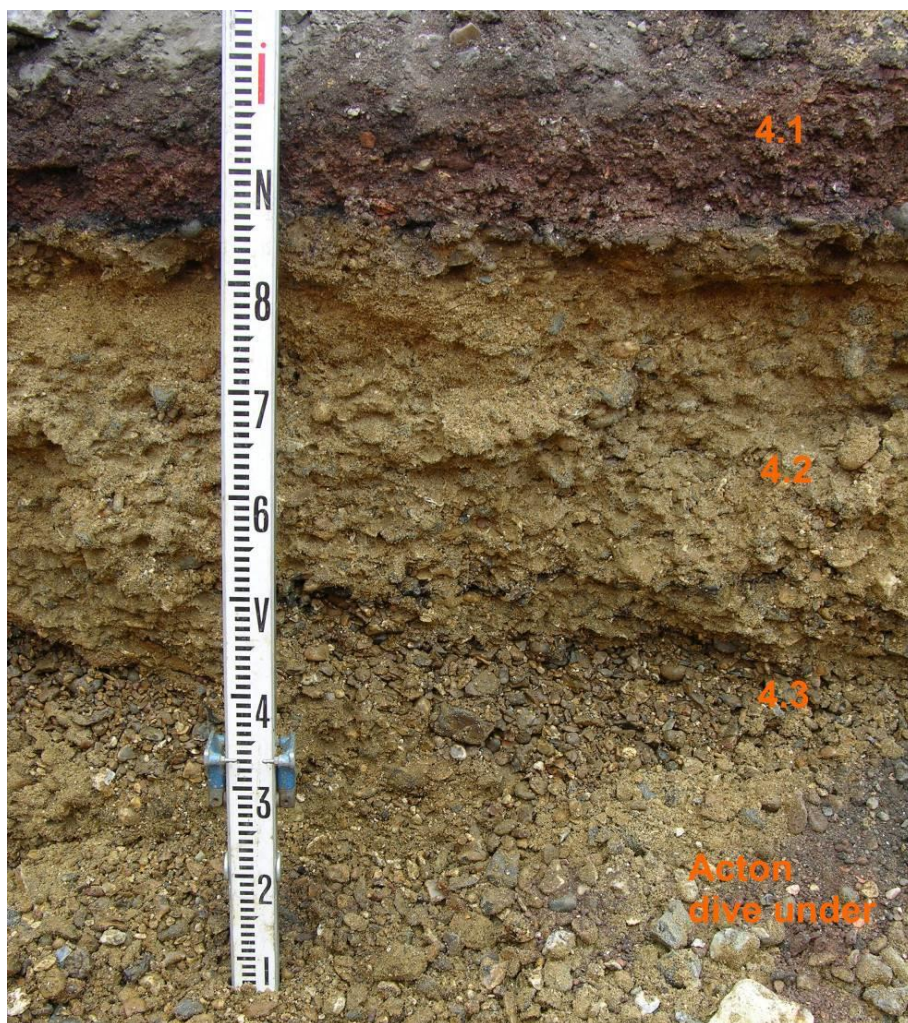


Figure 12: Annotated photograph of Trial Pit TP4

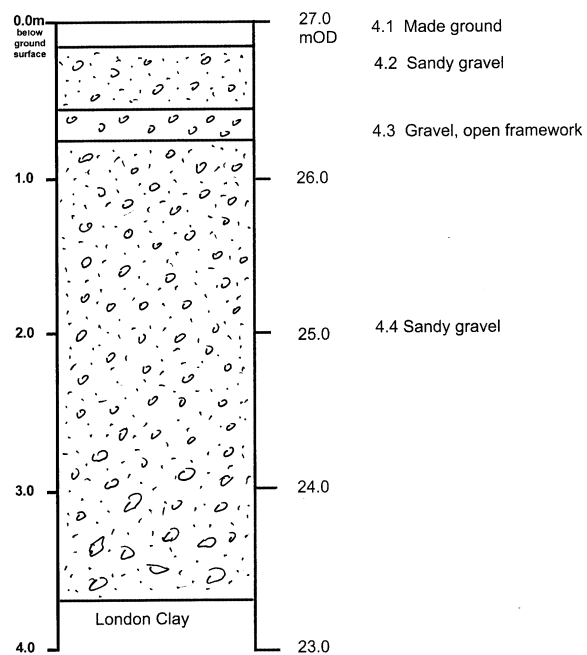


Figure 13: Log for Trial Pit TP4

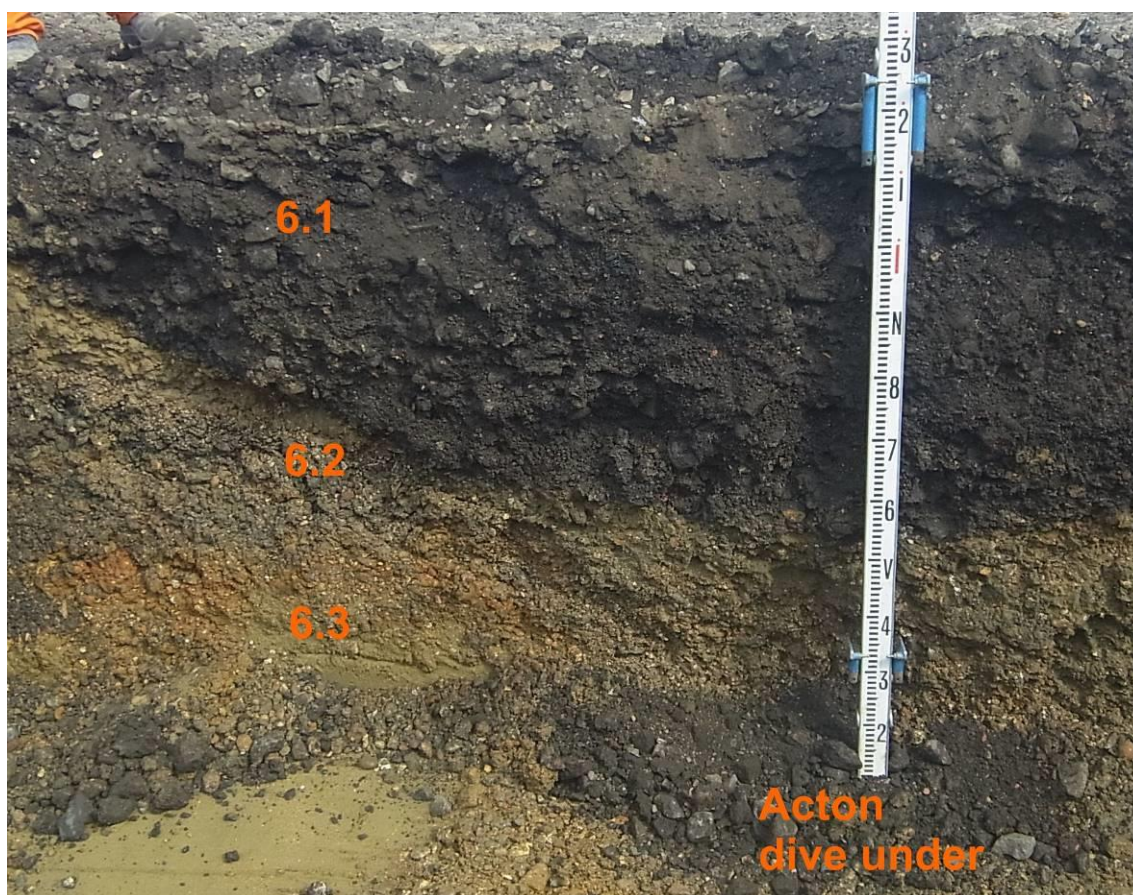


Figure 14: Annotated photograph of Trial Pit TP5

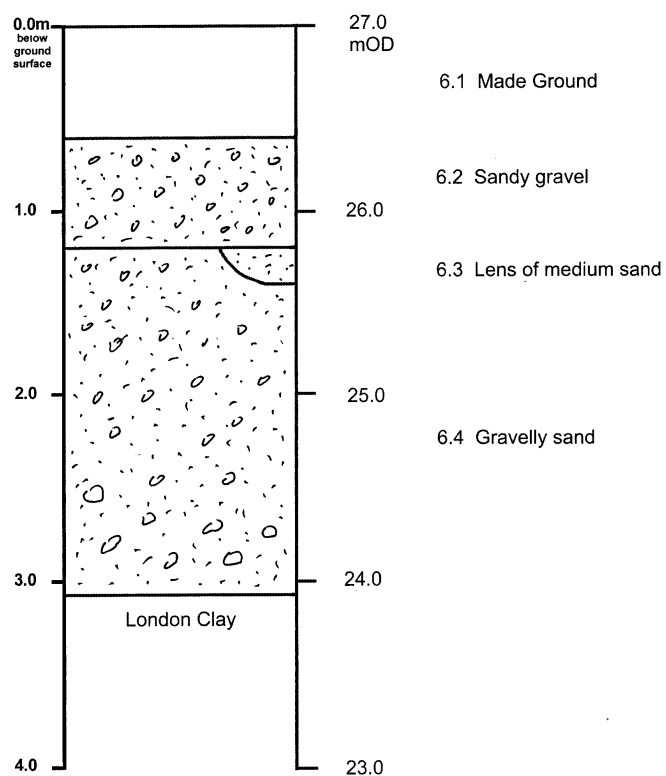


Figure 15: Log for Trial Pit TP5

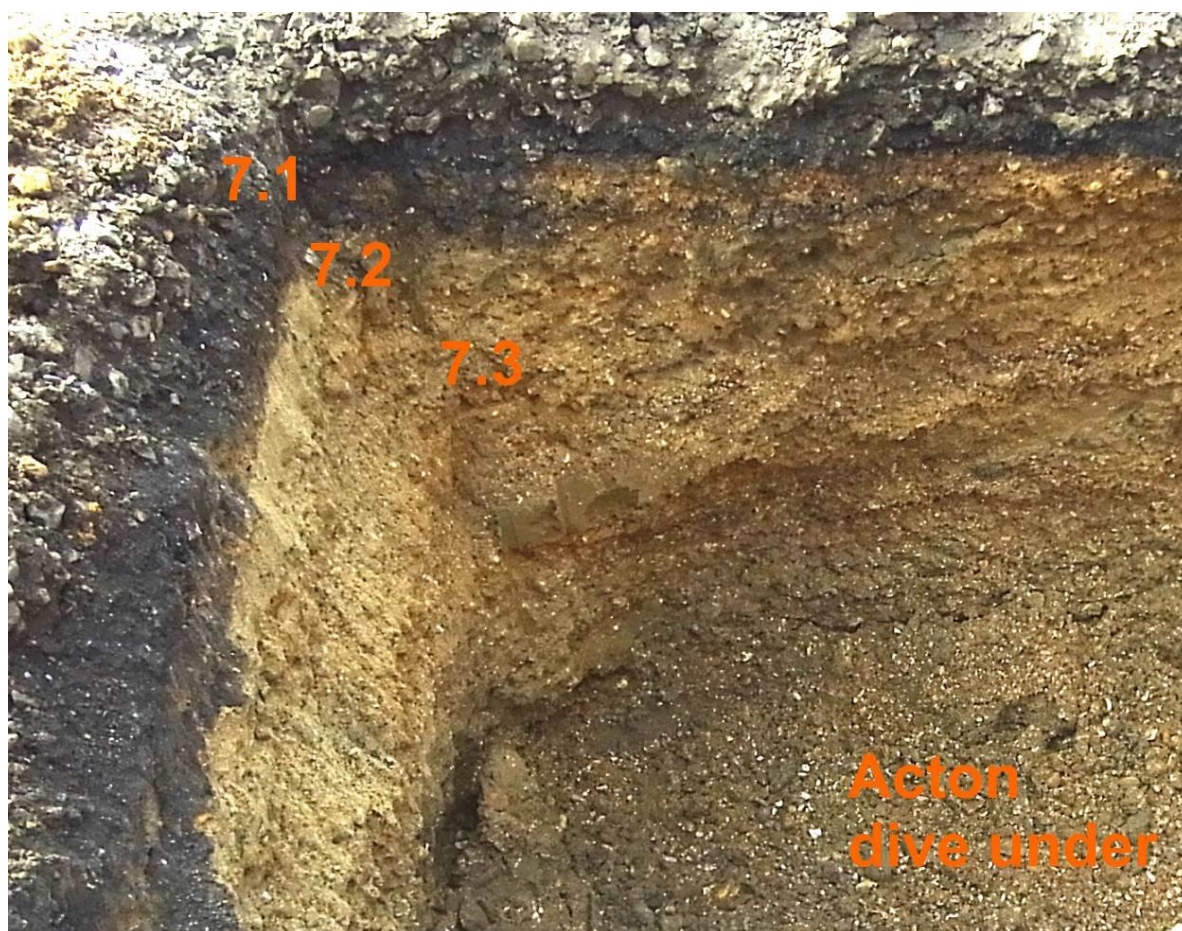


Figure 16: Annotated photograph of Trial Pit TP6

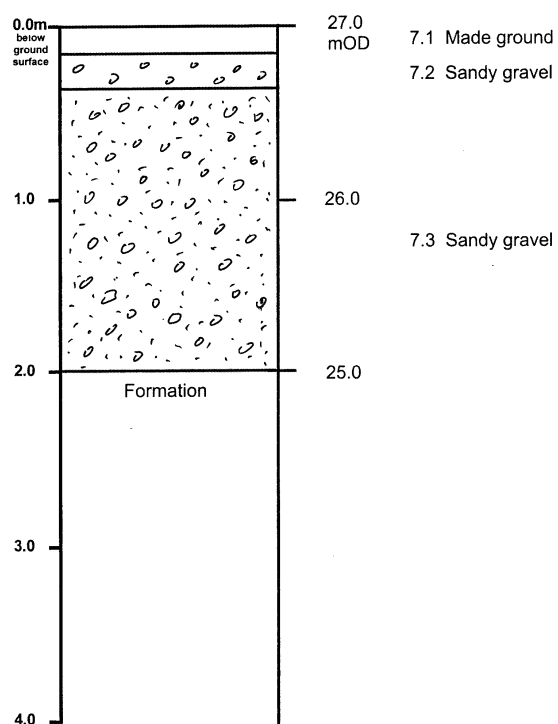


Figure 17: Log for Trial Pit TP6

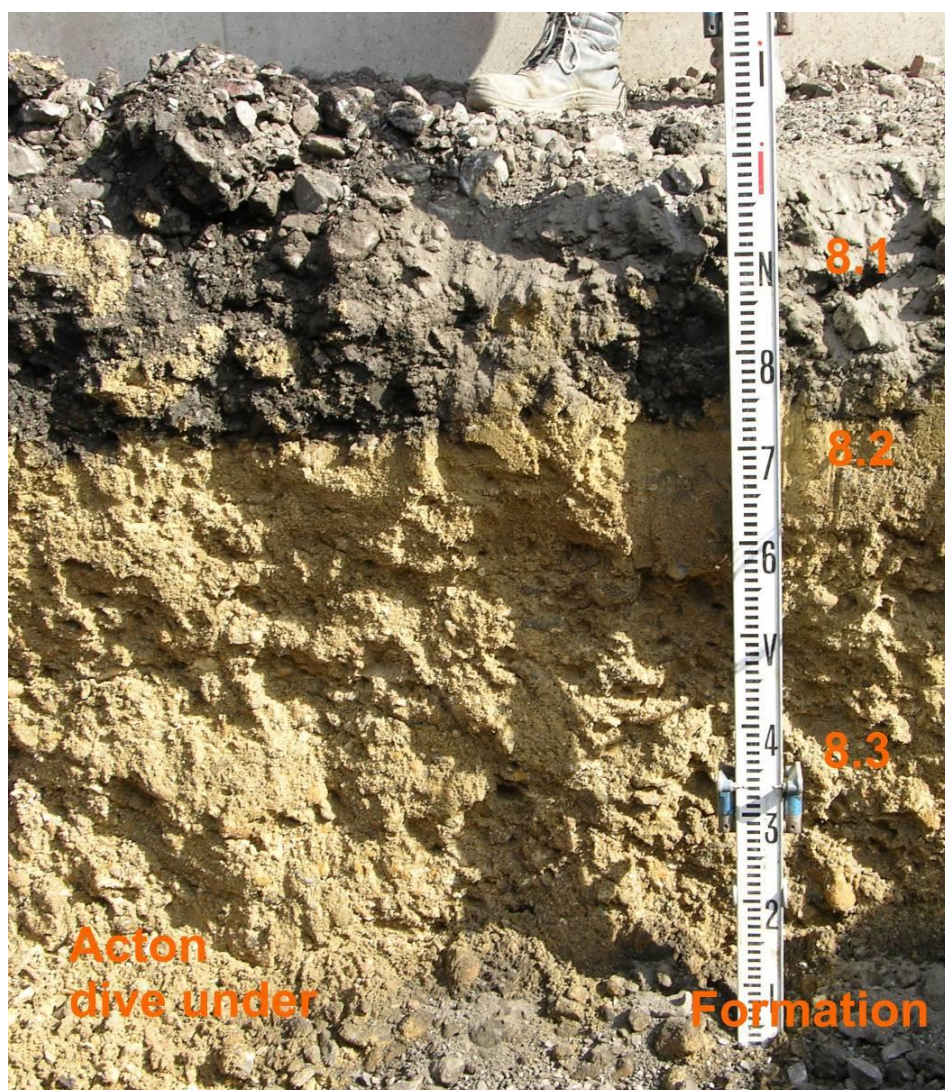


Figure 18: Annotated photograph of Trial Pit TP7

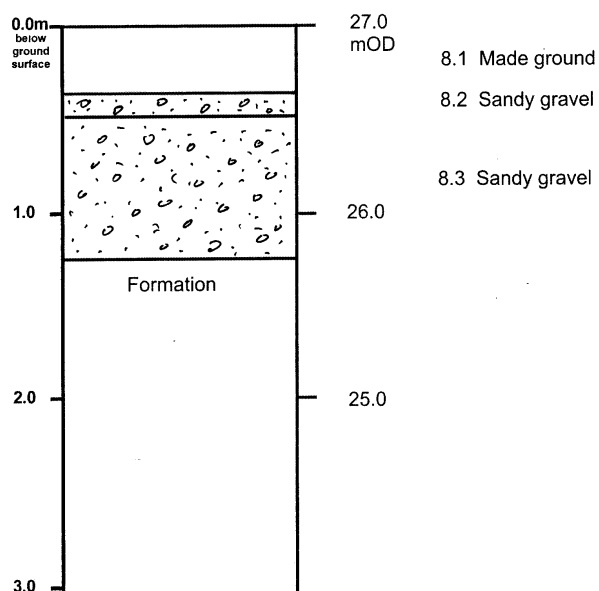


Figure 19: Log for Trial Pit TP7



Figure 20: Annotated photograph of the upper part of the re-exposed cutting, showing Langlely Silt and Lynch Hill terrace sand and gravel

1.8 OASIS FORM

OASIS ID: quaterna1-252699

Project details

Project name Acton Diveunder

Short description of the project Geoarchaeological investigations were carried out on the 16th and 17th July 2014 at the site of the proposed Acton diveunder in the form of seven geoarchaeological trial pits put down to formation (the level of the diveunder surface) or the surface of the London Clay bedrock. The Trial Pits were put down along the part of the route of the diveunder identified as of geoarchaeological potential in the written scheme of investigation for the site (Young and Green, 2014). In general, the results of the investigations were found to be consistent with those of the previous geotechnical borehole investigations. The London Clay surface was recorded in five of the Trial Pits (TP1 to TP5), where it was recorded generally increasing in depth from east (24.8m OD in TP1; 24.9m OD in TP2) to west (23.3m OD in TP4; 23.9m OD in TP5). The thickness of the Gravel generally increased in thickness from east to west, recorded as 1.9 (TP1), 1.9 (TP2), 2.5 (TP3), 3.55 (TP4) and 2.5m thick (TP5). In none of the Trial Pits was there any indication of finer-grained material (silt or clay) that might contain biological remains such as Mollusca, bone or small vertebrates. A programme of sieving from selected Trial Pits did not yield any lithic artefacts, nor was any observed during the recording of the Trial Pits. No further geoarchaeological investigations are recommended in the area of the proposed excavations associated with the route of the Acton diveunder.

Project dates Start: 01-06-2014 End: 24-05-2016

Previous/future work No / No

Any associated project reference codes TWR13 - Sitecode

Type of project Environmental assessment

Survey techniques Landscape

Project location

Country England

Site location GREATER LONDON EALING ACTON Acton Diveunder and Yard, Acton
Postcode W3 9QF
Site coordinates TQ 1931 8099 51.514726518939 -0.280373234199 51 30 53 N 000 16 49
 W Point

Project creators

Name of Quaternary Scientific (QUEST)

Organisation

Project brief Pre-Construct Archaeology
originator

Project design Dr C.P. Green
originator

Project D.S. Young
director/manager

Project supervisor Dr P. Allen

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 May 2016