

TOWER BRIDGE MAGISTRATES COURT, TOOLEY STREET, LONDON BOROUGH OF SOUTHWARK SE1 (SITE CODE: TEY14): GEOARCHAEOLOGICAL FIELDWORK REPORT

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INTRODUCTION

This report summarises the findings arising out of the geoarchaeological investigations undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at Tower Bridge Magistrates Court, Tooley Street, London Borough of Southwark SE1 (Site Code: TEY14; National Grid Reference: TQ 3359 7989; Figure 1). The site is located on the floodplain of the estuarine Thames at an elevation of *ca.* 4.4-5.1m OD, *ca.* 300m south of the modern waterfront and *ca.* 200m from St Saviour's Dock, which lies to the east of the site and is aligned from southwest to northeast, marking the former course of the Neckinger River, a minor south bank tributary of the Thames. The site lies on the eastern flank of a former 'island' or 'eyot' - the Horsleydown Eyot - that rose slightly above the general level of the natural floodplain of the Thames. The crest of the Horsleydown Eyot is thought to coincide approximately with the alignment of Queen Elizabeth Street, which forms the northern boundary of the site. The superficial geology here is mapped by the British Geological Survey (BGS; www.bgs.ac.uk/opengeoscience) as a small area of Kempton Park Gravel, overlying London Clay bedrock. Alluvium, described as 'silty, peaty or sandy clay' is shown as the superficial geology *ca.* 100m to the east of the site, and surrounding the area mapped as Kempton Park Gravel.

No geotechnical information is available for the site. However, previous geoarchaeological investigations in the area of the Horsleydown Eyot have revealed sands and gravels at the base of the sequence, which were probably largely deposited during the final stages of the last (Devensian) cold episode (Green *et al.*, 1999a). These sands and gravels appear originally to have formed a valley floor differentiated by upstanding bars and intervening channels. This topography has been progressively buried during the Holocene, by mainly fine-grained estuarine and fluvial sediments, and the original relief is now only faintly apparent (Green *et al.*, 1999a). The sands and gravels are relatively close to the surface where former bars or islands (eyots) are present but are at greater depths beneath former channels; between the River Thames and the former Tower Bridge Magistrates Court site, the surface of the underlying sands and gravels rises from *ca.* -5m OD close to the modern

south bank of the Thames to -1.2m OD near the crest of the Horsleydown Eyot.

Investigations on the northern flank of the Horsleydown Eyot (Hawkins, 1995; Green *et al.*, 1997, 1999b) show that the sands and gravels are overlain by fine-grained sediments of Holocene age, including peat, sands, silts and clays. In the sediment sequence to the north of the Horsleydown Eyot a discontinuous peat horizon is present, either resting directly on the sand and gravel or separated from it by estuarine sediments (Green *et al.*, 1999a). Green *et al.* (1997) describe a thin (14cm) peat layer underlain by 1.6m of estuarine sediment and overlain by 1.85m of alluvium. The peat surface is at 0.31m OD, and radiocarbon dating provided an age for the peat of between 3235 cal BP and 2910 cal BP. Hawkins (1995), in the same area, recorded peat with a surface at 0.42m OD.

The archaeological evidence from sites on the northern flank of the Horsleydown Eyot suggested to Hawkins (1995) that the peat horizon there might overlie a land surface of Neolithic age and be associated with occupation during the Bronze Age. On the more elevated parts of the Horsleydown Eyot, where Holocene sediments are thin or absent and where there is no evidence of peat formation, Bronze Age occupation is indicated by spreads of burnt flint from which a Thermoluminescence (TL) date of 3,620 BP \pm 930 has been obtained (Green *et al.*, 1999b). At Three Oak Lane (Green *et al.*, 1999a; Branch and Schwenninger, 2000) ca. 50m to the east of the present site, peat was identified between ca. 0.1 and 0.5m OD. Radiocarbon dating indicated that the peat accumulated during the Bronze Age (ca. 3500-2800 cal. BP), whilst Bronze Age artefacts (including a flint flake (?scraper) and evidence from the palaeobotanical record (including possible woodland clearance, burning of vegetation, cereal cultivation and perhaps pastoralism) were indicative of occupation of the site at this time. At 10-16 Lafone Street (Bates, 1996) ca. 25m to the east of the former Tower Bridge Magistrates Court, prehistoric archaeology was identified in the form of intercutting grooves interpreted as ard marks, stakeholes, burnt and struck flint and sherds of pot provisionally dated to the late Neolithic/Early Bronze Age. A peat deposit was identified across the site, overlying the archaeological horizons described above and from which burnt and struck flints and pottery fragments were recovered.

Six significant geoarchaeological aims were outlined within the Written Scheme of Investigation for the site (Young, 2014) as follows:

1. To record the depth and thickness of the main stratigraphic units;
2. To establish whether any Prehistoric deposits (peat and/or alluvium) exist on the site above the Gravel surface;

3. To clarify the nature, depth, extent and date of any alluvium and peat;
4. To provide a provisional chronological framework for peat initiation and cessation at the site, and compare this with other sites in the area of the Horsleydown Eyot;
5. To provide a reconstruction of the environmental history of the site and its environs;
6. To establish any indications of human activity.

The objective of the field investigations was to address the first three of these aims, by monitoring selected geotechnical investigations being undertaken at the site to obtain a record of the sub-surface stratigraphy (Figure 2). In addition, the potential for the sequence for achieving aims 4-6 will be considered, and detailed recommendations for laboratory-based assessment and analysis (if necessary) will be made.

METHODS

Field investigations and lithostratigraphic descriptions

Four geotechnical boreholes (BH1 to BH4) were put down at the site in December 2014 and January 2015 (Figure 2). Of these, two selected boreholes (BH1 and BH4) were monitored for geoarchaeological purposes. The sediment extracted from these boreholes was described in the field using standard procedures for recording unconsolidated sediment and peat (Tröels-Smith, 1955), noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts). The procedure involved: (1) recording the physical properties, most notably colour; (2) recording the composition e.g. gravel, fine sand, silt and clay; (3) recording the degree of peat humification, and (4) recording the unit boundaries e.g. sharp or diffuse. The results are displayed in Tables 1 and 2 and in Figure 3. Also shown in Figure 3 are the results of the geotechnical descriptions of boreholes BH2 and BH3.

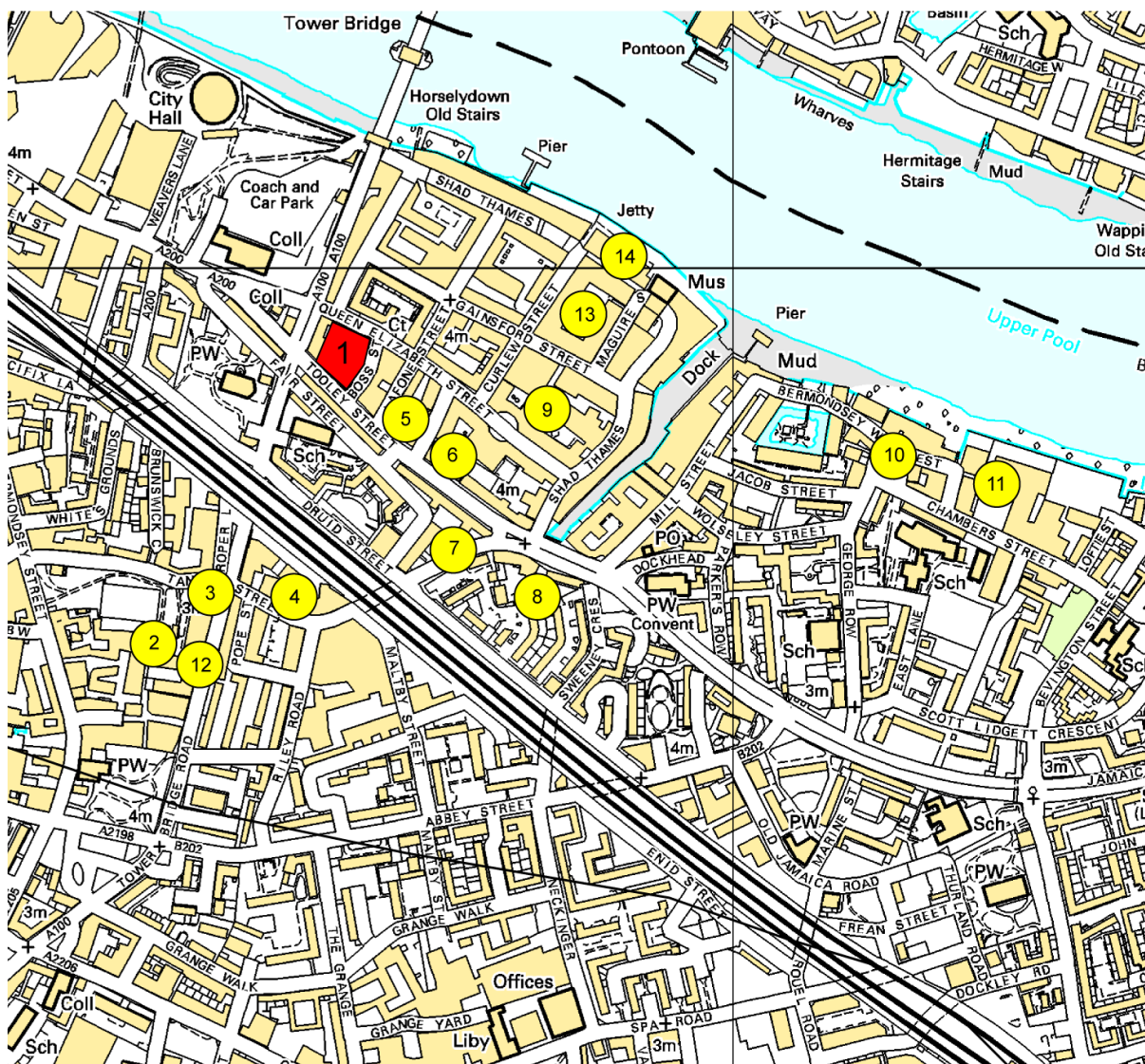


Figure 1: Location Tower Bridge Magistrates Court, Tooley Street, London Borough of Southwark in relation to nearby sites: (1) 175 Bermondsey Road (BDK00; Green and Branch, 2002); (2) 159-161 Tower Bridge Road/36-40 Tanner Street (TWE98; Elsdon et al., unpublished?); (3) 167 Tower Bridge Road (TWD99; Branch et al., 2000); (4) 49-51 Tanner Street (TAT99; Branch and Green, 2000); (5) 10-16 Lafone Street (LAF96; Bates, 1996); (6) Three Oak Lane (TKL99; Green et al., 1999a; Branch and Schweninger, 2000); (7) 53-65 Tanner Street (TNN03; Branch et al., 2004); (8) Phoenix Wharf (PHW88; Merriman, 1992); (9) Grinders and Operators, Butler’s Wharf (GFD97; Green et al., 1997, 1999b); (10) George Row (BWT96; Branch and Green, 1997); (11) Bermondsey Wall West (BCB01; Branch, 2004); (12) 157 Tower Bridge Road (Batchelor et al., 2009); (13) West Courtyard (Ridgeway & Meddens, 2001); and (14) Spice Quay (Ridgeway & Meddens, 2001). Contains Ordnance Survey data © Crown copyright and database right [2009].



Figure 2: Location of the geotechnical boreholes and archaeological trench at Tower Bridge Magistrates Court, Tooley Street, London Borough of Southwark. Original figure provided by CgMs Consulting (Meager, 2014).

RESULTS, INTERPRETATION AND DISCUSSION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS

The results of the lithostratigraphic descriptions of boreholes BH1 and BH4 are displayed in Tables 1 and 2 and in Figure 3. The results of the geotechnical descriptions of boreholes BH2 and BH3 are also shown in Figure 3.

The basal unit recorded at the site is a horizon of sandy gravel, recorded in all four boreholes (BH1 to BH4) and most likely equivalent to the Kempton Park Gravel (Middle Devensian) or Shepperton Gravel (Late Devensian) of Gibbard (1985), deposited within a high energy braided river environment. The Gravel surface is recorded at between 0.00 and -2.60m OD. With the exception of borehole BH4 the Gravel surface appears to rise gently towards the north (see Figure 3), from -0.80m OD in borehole BH1 and -0.50m OD in BH2 to 0.00m OD in BH4, consistent with the apex of the Horsleydown Eyot lying approximately on the alignment of Queen Elizabeth Street. However, towards the northeast of the site in borehole BH4 the Gravel surface is recorded at -2.4m OD, representing a sharp fall in the Gravel surface in this direction. In the absence of additional borehole records in this area (including BGS archive boreholes), it can only be tentatively suggested that this depression in the Gravel surface may be indicative of a former channel in this area. Further to the northeast, Gravel surfaces were recorded at a maximum elevation of 0.04m OD at the West Courtyard site (Ridgeway & Meddens, 2001) before falling towards the Thames on the northern flank of the Eyot to below -1.39m OD at the Grinders and Operators site (Ridgeway & Meddens, 2001), and to between -4.45 and -4.95m OD at Spice Quay (Ridgeway & Meddens, 2001). In this area Green *et al* (1999b) obtained an Optically Stimulated Luminescence (OSL) date of 18,510 BP \pm 3,660 from sands in the upper part of the sand and gravel, confirming that the Gravel here was of Late Devensian age and equivalent to the Shepperton Gravel (Gibbard, 1985).

The Gravel is overlain in all four boreholes by a sequence of mineral-rich sediments. These sediments are predominantly coarse-grained, initially dominated by silty and in places gravelly sand, becoming increasingly silt and clay-rich upwards. This sequence is indicative of deposition in an alluvial environment, with the flow of water decreasing from moderately fast (perhaps in an estuarine channel) to slow and/or even stagnant water (clay/silty clay), perhaps on an alluvial floodplain. An archaeological trench excavated by Pre-Construct Archaeology (Haslam, 2015), put down to a depth of 0.85m OD in the area of boreholes BH3 and BH4 revealed natural sand at its base (probably equivalent to the silty sand recorded in the adjacent boreholes), in to which two features of prehistoric date had been cut and subsequently interpreted as a linear ditch or channel.

In contrast to sites elsewhere on the Horsleydown Eyot, including at Three Oak Lane (ca. 50m to the east; Green *et al.*, 1999a; Branch and Schwenninger, 2000) and 10-16 Lafone Street (ca. 25m to the east; Bates, 1996) no peat or organic horizons were recorded within the alluvium. The contact between the alluvium and overlying Made Ground is relatively even across the site, lying at between 0.9 and 0.6m OD. This level is indicative of some truncation of the natural sequence, since the natural surface of the floodplain in this area appears to have been at ca. 2.8m OD (Green *et al.*, 1999a). The Made Ground recorded in the boreholes (some of which may incorporate the archaeological horizons recorded in Trench 1) is between 3 and 4m thick across the site, so that the modern surface lies at between 3.9 in the south (BH1) to 4.8m OD in the northern area of the site (BH3).

Table 1: Results of the lithostratigraphic description of borehole BH1, Tower Bridge Magistrates Court, Tooley Street, London Borough of Southwark.

Depth (m OD)	Depth (m bgs)	Composition
3.90 to 3.60	0.00 to 0.30	Tarmac overlying concrete (Made Ground)
3.60 to 1.40	0.30 to 2.50	Black silty clay with frequent mortar and brick fragments (Made Ground)
1.40 to 1.20	2.50 to 2.70	Black silty clay with frequent mortar, brick fragments and oyster shell (Made Ground)
1.20 to 0.90	2.70 to 3.00	Dark grey silty clay with some gravel; charcoal, brick and pottery inclusions (Post-Medieval fill/Made Ground)
0.90 to 0.80	3.00 to 3.10	Ga1 Ag1 As1 Gg1; orangey brown sand, silt, clay and gravel. Flint clasts up to 30mm in diameter, well-rounded to sub-angular. Diffuse contact in to:
0.80 to 0.60	3.10 to 3.30	Ga2 Ag2 Gg+; grey sand and silt with occasional gravel clasts. Diffuse contact in to:
0.60 to 0.40	3.30 to 3.50	Ga2 Ag2 Gg+; orange sand and silt with occasional gravel clasts. Diffuse contact in to:
0.40 to 0.00	3.50 to 3.90	Ga4 Ag+; orange sand with a trace of silt. Fragment of bone (ca. 30mm in length) at 0.25m OD. Diffuse contact in to:
0.00 to -0.60	3.90 to 4.50	Ga4 Ag+ Gg+; orangey grey sand with a trace of silt and occasional gravel clasts. Diffuse contact in to:
-0.60 to -0.80	4.50 to 4.70	Ga3 Gg1; orangey brown gravelly sand. Flint clasts up to 8mm in diameter, sub-angular to rounded. Diffuse contact in to:
-0.80 to -2.60	4.70 to 6.50	Gg3 Ga1; sandy gravel. Flint clasts up to 60mm in diameter, sub-angular to well-rounded.

Table 2: Results of the lithostratigraphic description of borehole BH4, Tower Bridge Magistrates Court, Tooley Street, London Borough of Southwark.

Depth (m OD)	Depth (m bgs)	Composition
4.60 to 4.30	0.00 to 0.30	Tarmac overlying concrete (Made Ground)
4.30 to 0.70	0.30 to 3.90	Made Ground
0.70 to 0.50	3.90 to 4.10	As3 Ag1; grey silty clay. Diffuse contact in to:
0.50 to 0.30	4.10 to 4.30	As3 Ag1; brown silty clay. Diffuse contact in to:
0.30 to 0.10	4.30 to 4.50	Ga3 Ag1; orangey brown silty sand with some horizontal bedding. Diffuse contact in to:
0.10 to -2.40	4.50 to 7.00	Ga2 As1 Ag1 Gg+; orangey brown clayey silty sand with occasional gravel clasts. Some horizontal bedding.
-2.40 to -2.60	7.00 to 7.20	Gg3 Ga1; sandy gravel. Flint clasts up to 80mm in diameter, sub-angular to well-rounded. Diffuse contact in to:
-2.60 to -3.50	7.20 to 8.10	Gg3 Ga1; sandy gravel. Flint clasts up to 50mm in diameter, sub-angular to well-rounded.

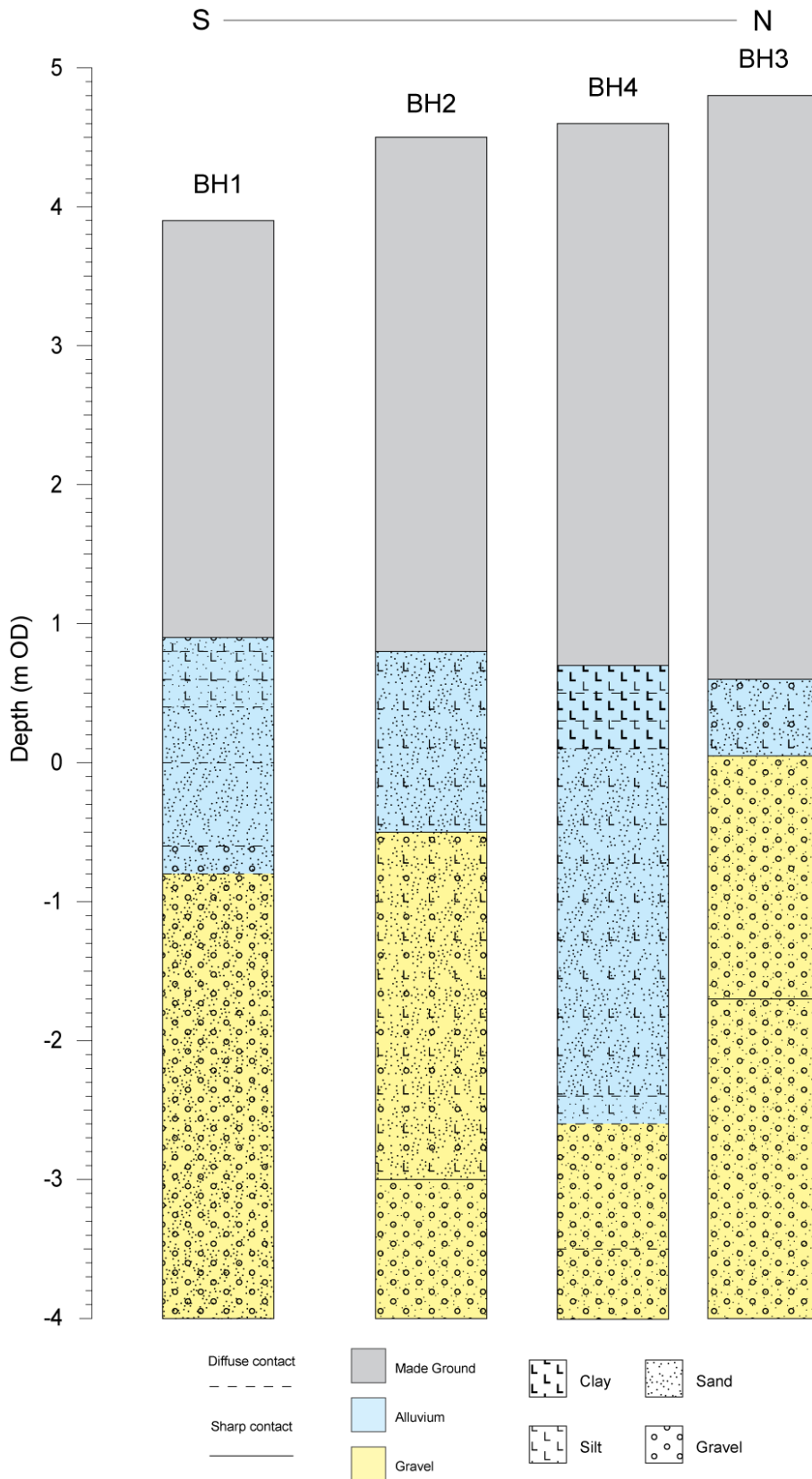


Figure 3: South-north transect of boreholes at Tower Bridge Magistrates Court, Tooley Street, London Borough of Southwark incorporating the results of the geoarchaeological monitoring (boreholes BH1 and BH4) and the geotechnical descriptions (BH2 and BH3).

CONCLUSIONS & RECOMMENDATIONS

The main aims of the fieldwork were to investigate the first three significant geoarchaeological aims as outlined in the Written Scheme of Investigation for the site (Young, 2014) as follows:

1. To record the depth and thickness of the main stratigraphic units;
2. To establish whether any Prehistoric deposits (peat and/or alluvium) exist on the site above the Gravel surface;
3. To clarify the nature, depth, extent and date of any alluvium and peat.

The results have revealed that the surface of the Gravel lies at between -2.60 and 0.00m OD and is overlain by a sequence of mineral-rich sediments that become finer upwards. In general, the Gravel surface rises northwards from -0.8 to 0.00m OD, consistent with an apex of the Horsleydown Eyot that lies just to the north of the Tower Bridge Magistrates Court site. The Gravel surface of -2.6m OD identified in borehole BH4 represents a significant depression in the Gravel surface, which may be indicative of a former channel towards the northeast of the site. The surface of the alluvial sediments lies at between -0.4 and 0.9m OD, overlain by thicknesses of between 3.0 and 4.0m of Made Ground. No peat was recorded in any of the four boreholes.

Due to the predominantly coarse-grained nature of the alluvium, and the absence of any organic horizons, no further environmental archaeological investigations are recommended at the site.

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