border archaeology

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Archaeological Field Evaluation

On behalf of

33-35 Monier Road LLP

Concerning

Land at Nos. 33-35 Monier Road
Bow
London
E3 2PR

October 2016

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1 Executive Summary

Border Archaeology Ltd (BAL) was instructed to carry out a programme of Archaeological Field Evaluation and Geoarchaeological Investigation & Sampling of land at Nos. 33-35 Monier Road Bow London E3 2PR with respect to proposed residential development.

The evaluation was conducted on open ground which had previously been occupied by post-medieval housing until the 1960s, followed by industrial premises. The industrial premises were reduced to rubble in May 2016. No evidence of the earlier housing was revealed during the demolition.

Made ground deposits in excess of 3.6m depth were identified in the trenches, many of these were tilted to form possible tip lines. No features or deposits of archaeological significance were identified during the evaluation.

The borehole survey carried out in conjunction with the trial trenches found made up ground to 4m to 4.5m below ground level. Below this was a natural sequence of marsh and alluvial deposits over the bedrock which was found at -4.25m AOD (i.e. 11m below present ground level). These deposits contained well-preserved organic matter which yield two radio carbon dates, and a pollen and diatom sequence which was partially analysed to give a broad history of the development of the surrounding landscape of the Lea Valley.

2 Introduction

This report has been prepared by Border Archaeology Ltd (BA) on behalf of 33-35 Monier Road LLP and summarises the results of a programme of Archaeological Field Evaluation (AFE) comprising two trenches on the plots of Nos. 33-35 Monier Road Bow London E3 2PR. The evaluation was carried out with respect to a proposed residential development.

The site had the potential for encountering deeply buried prehistoric deposits, based on the results of a recent borehole survey (Corcoran *et al.* 2011), which placed it within the Lower Lea Valley and within landscape zone LZ2.1.

A Desk-based Assessment (DBA) undertaken by BA in 2014 identified moderate potential for prehistoric and Roman archaeological deposits.

The AFE was carried out between May 25th and May 26th 2016.

Two trenches were excavated totalling 60m^2 on a site of approximately 1200m^2. Trench 001 was located towards the SW of the plot and measured 10.0m × 4.0m. Trench 002 was located towards the SE of the plot and measured 10.0m × 2.0m. The trenches were excavated to 1.2m depth and later taken down to 3.6m in order to resolved depth and potential of archaeological layers.

The specifics of this programme of archaeological trenching followed discussions with John Gould Esq. Archaeology Advisor Historic England, who monitored the works, including visits on 25th and 26th May.

No features or deposits of archaeological significance were identified during the evaluation.

3 Site Description

The site occupies a low-level position at the corner of Monier Road and Remus Road and comprises an area of approximately 1200m^2. It is bounded to the W by Remus Road, to the E by Smeed Road, to the S by Monier Road and to the N by industrial units fronting onto part of the Hackney cut navigation. The southern part of the site was formerly occupied by a range of modern buildings of brick and concrete construction, which until recently were used as an education/training centre and studio, with extensive yard and outbuildings to the rear (formerly occupied by industrial premises).

The Lower Lea Valley in which the site is located has been subject to geoarchaeological investigation as part of the Lea Valley Mapping Project (Corcoran *et al*. 2011), which divides the Lea Valley into a series of Landscape Zones. These are characterised by their Holocene landscape history based chiefly on sedimentary evidence derived from borehole records. The Monier Road site lies within Landscape Zone LZ2.1, described as comprising channels and floodplain with occasional prominences.

Fig. 1: Site location

3.1 Soils and Geology

The Geological Survey map (Sheet 256 North London, 1993, 1: 50,000) shows the site as being underlain by made ground overlying Holocene alluvium, which, in turn, overlies Kempton Park River Terrace Gravels. The underlying solid geology consists of London Clay and deposits of Lambeth Group (formerly Woolwich and Reading Beds) comprising mottled clay with sand and pebble beds.

4 Archaeological Background

The Greater London Historic Environment Record and the National Monuments Record were consulted during the preparation of the DBA (BA 2014b) to determine the nature and extent of the archaeological resource within the specific study area with reference to a search radius of 300m (centred upon NGR TQ 37101 84102) (BA 2014b). A total of 10 monuments and 12 archaeological events were identified within the designated search area; however, a small number of additional sites and archaeological events in the wider locality of the study area were also considered for contextual purposes.

The DBA provides a detailed description of previous archaeological work carried out in the area in conjunction with consultation of historic map information, based on the examination of available sources of archaeological and historical information. The following provides a summary of this information:

4.1 Prehistory

There is limited evidence for prehistoric occupation in the immediate vicinity of the site, in terms of recorded sites and find-spots. However, significant evidence of changing environmental conditions dating back to the Mesolithic was identified during geoarchaeological investigations on the Omega Works site at Roach Road.

4.2 Roman

Archaeological evidence has indicated the existence of a large Roman civilian settlement at Old Ford, flanking both sides of the Roman road from London to Colchester, the extent of which remains uncertain. Recent excavations at Crown Wharf indicate the potential for Roman occupation deposits to survive in this area, which could potentially contain evidence of pottery posthole alignments and timber structures, possibly associated with bridges or wharfs adjoining the River Lea.

4.3 Medieval

There is a marked absence of archaeological and documentary evidence for medieval occupation in the vicinity of the study area, which appears to have remained sparsely occupied marshland and meadow up to the 19th century. It is considered possible that evidence of changing environmental conditions during the medieval period might be preserved in the deep sequence of alluvial deposits which extends across much of this area. There is also limited potential for the presence of drainage ditches or other flood-management features within the specific study area.

4.4 Post-medieval

Historic maps of the area prior to *c.*1880 show a drainage channel close to the NE boundary of the site. Terraced housing was constructed on the site in about 1880 and demolished in the early-mid 1960s.

The Assessment concluded that the archaeological potential of the site overall was moderate, based on recent archaeological investigations in the vicinity of the study area, which have identified the potential for encountering evidence of alluvial silt and peat deposits of palaeoenvironmental significance and Roman occupation features and deposits (including timber structures). It is likely that these lie beneath deep deposits of post-medieval or modern made ground and disturbed alluvium, quite possibly extending to a depth in excess of 4m in places.

5 Aim and Objectives

The overall aim of the evaluation was to determine, as far as is reasonably possible, the location, extent, date, character, condition, significance and quality of any surviving archaeological remains likely to be threatened by the proposed development, and to produce an appropriate mitigation strategy for further archaeological investigation.

Specific objectives were to determine:

- The survival of archaeologically relevant levels
- The presence of archaeological deposits representing activity of any period
- The presence of deposits relating to prehistoric and Roman activity
- The presence of deposits containing evidence of past environments

6 Methodology

The programme of archaeological work was carried out in accordance with practices set out in the Chartered Institute for Archaeology (CI*f*A) guidance of *Standard and Guidance for archaeological field evaluation* (CI*f*A 2014a) and *Standard and Guidance for the collection, documentation, conservation and research of archaeological materials* (CI*f*A 2014b). BA adheres to the CI*f*A *Code of conduct* (2014d) and to *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Lee 2015).

Due to the threat of potential incursions of fly-tipping next to the site and in & around the area, roughly half of the site area was barricaded by large heaps of crushed stone and concrete arising from demolition of the buildings which formerly occupied the site. These formed linear heaps on three sides of the site and severely reduced the area available for trenching. The initial trench plan was thus subsequently amended to three and ARCA's activities were likewise amended to reflect the restriction of working area.

Trench 001 was located in the SW corner of the site and Trench 002 in the SE corner. Both were oriented NW/SE. Trenching was excavated using a 360° tracked machine equipped with a 1.8m-wide toothless bucket. Trench 001 measured 10m × 4.36m and was initially excavated to a depth of 1.20m below ground level (BGL). Upon consultation with John Gould (GLAAS), it was agreed to further excavate the trench to reveal deeper deposits.

The trench was thus widened to approximately 4.36m to accommodate a step for reasons of safety before excavation to a depth of 2.40m BGL. After recording and prior to backfilling it was agreed with John Gould that a further 1.20m would be excavated in the base of the trench to create a sequence of deposits to 3.60m BGL. This was photographed from the surface only for health and safety reasons. Trench 002 measured 9.3m × 1.80m × 1.20m (*fig. 2*).

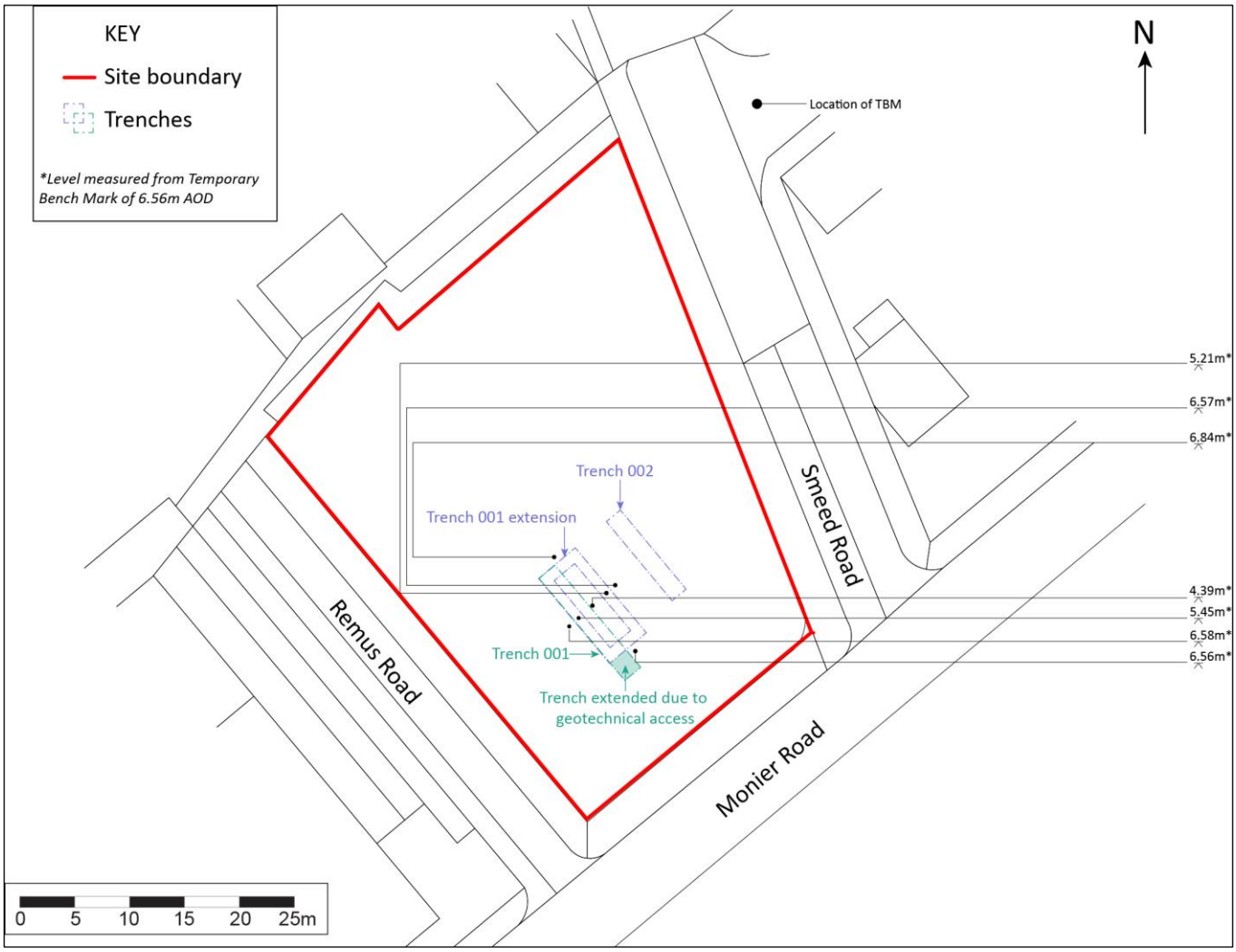

Fig 2: Trench location plan

7 Results

No features of archaeological significance were identified during the course of the evaluation; no artefactual evidence was recovered and no deposits containing potential palaeoenvironmental/palaeoeconomic data were revealed. Detailed descriptions of the trenches are outlined in Section 7.3.

7.1 Trench 001

No features of archaeological significance were identified within the trench.

The uppermost context identified was modern crushed brick and concrete demolition debris (001000). This was 0.28m thick and spread over the entirety of the trench area and site as far as an area of concrete hard-standing at the northern end. This material overlay a black mixed layer of demolition debris and garden soils (001001) of 0.30m

thickness. Beneath this was an intermittent layer of fine greenish-grey silt (001002), 0.10m thick, possibly representing a cess leak from drains. Under this was a fairly thick (0.60m) layer of brown clay (001003), with a yellow sandy lens (001004) within it (*fig. 4*). These deposits were all horizontally deposited to a depth of approximately 1.20m below ground level and represented activity following reclamation of a relatively marshy area.

Plate 1: Trench 001 looking NW

The deposits below 1.20m were all tilted approximately 45° from the horizontal and down towards the S. The sequence from S to N (later to earlier) was as follows. A brownish-orange clay (001005) of *c*.1.0m thickness extending into the southern end section of the trench overlay dark grey/black silt (001006), 0.38m thick; mid-brown clay (001007), 0.38m thick; fine grey sandy rubble (001008), 0.12m thick; a further brown clay deposit (001009), 0.30m thick and light orange silty sandy (001010), 0.50m thick.

The next bulk brown clay deposit (001013) was 0.82m thick and had two smaller deposits on top of it. Dark grey-brown clay (001011) was 0.21m thick and also sealed by (001010). It sealed mid orange-brown silt (001012), 0.30m thick. Continuing the sequence behind/below (001013) was dark grey/black sandy silt (001015), 0.38m thick, and orange-brown sand (001014). These both sealed greenish-brown clay (001016), 0.36m thick, brown, orange-flecked clay (001017), 0.58m thick, and coarse orange sandy gravel (001018), at least 0.30m thick and containing frequent pebbles and cobbles.

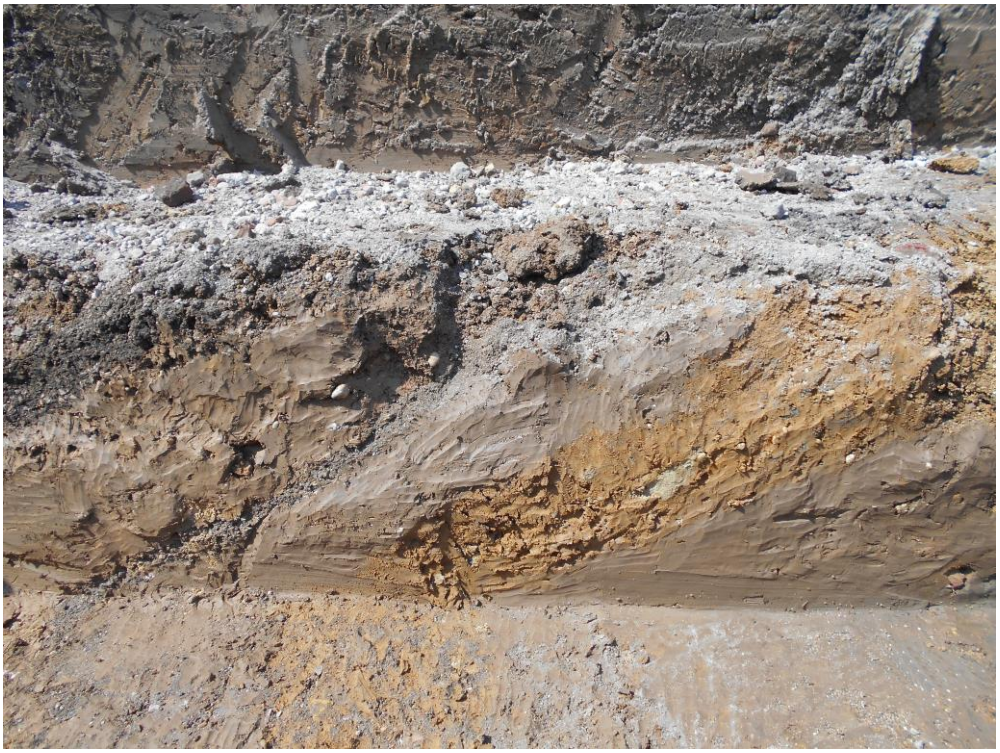

Plate 2: Tip-lines present in Trench 001

Plate 3: Extension Trench 001

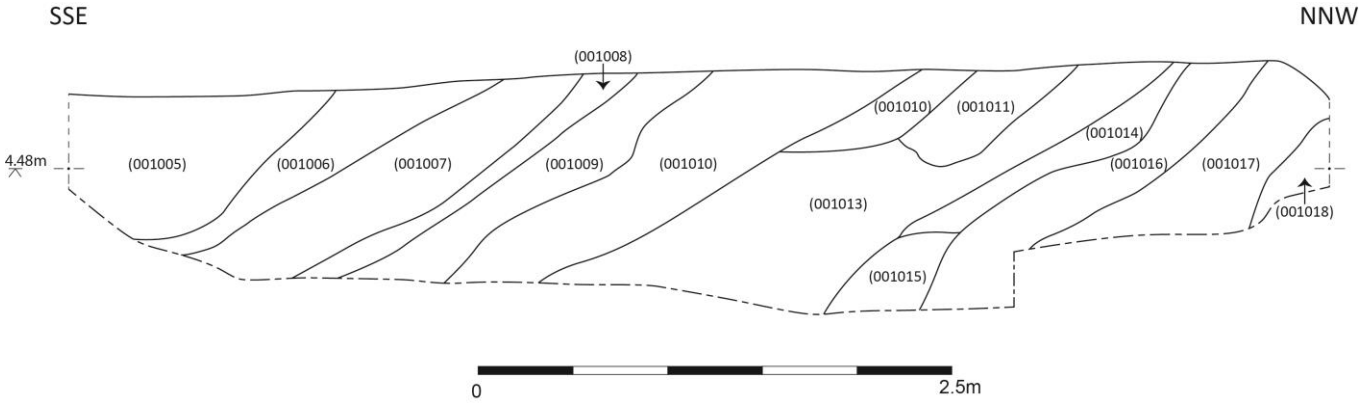

Fig 3: SSW -facing section of Trench 001

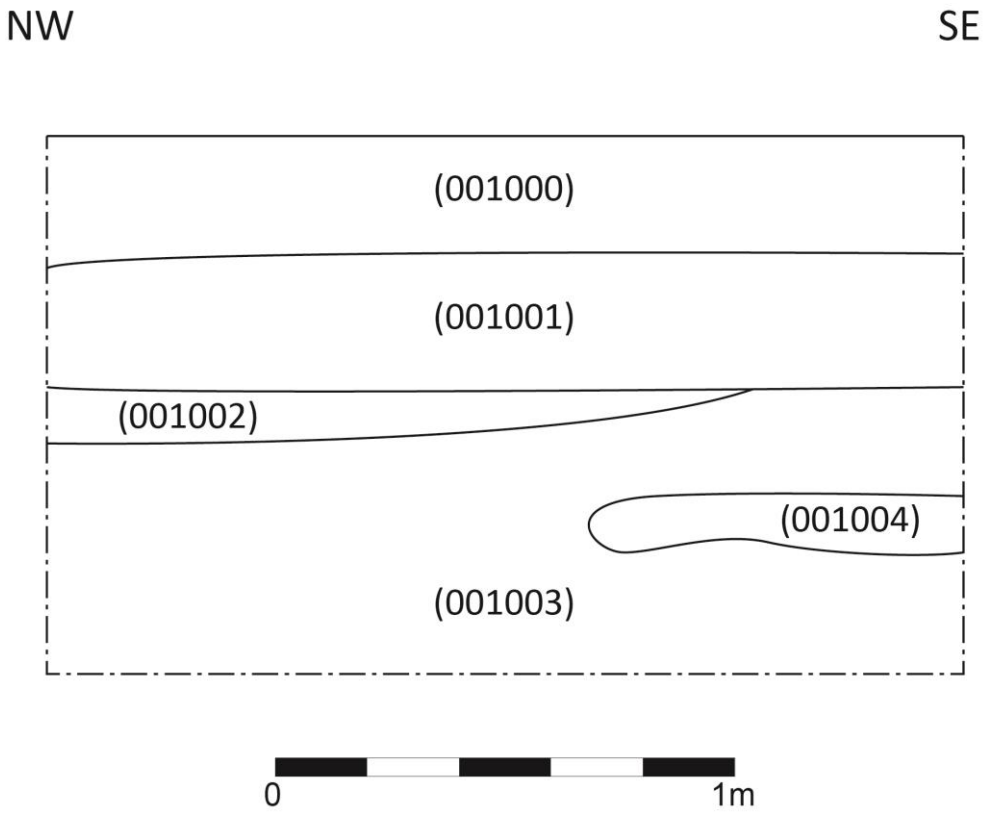

Fig. 4: SW-facing profile Trench 001

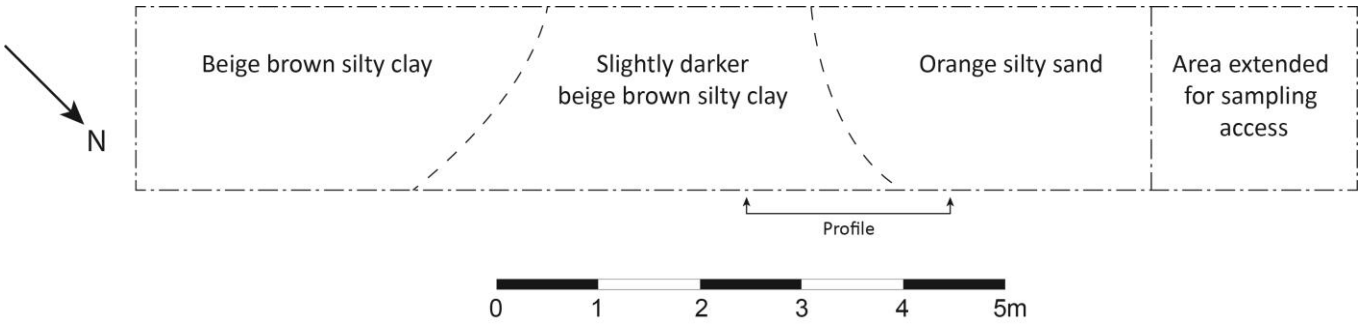

Fig. 5: Composite plan of Trench 001 showing location of profile (fig. 4)

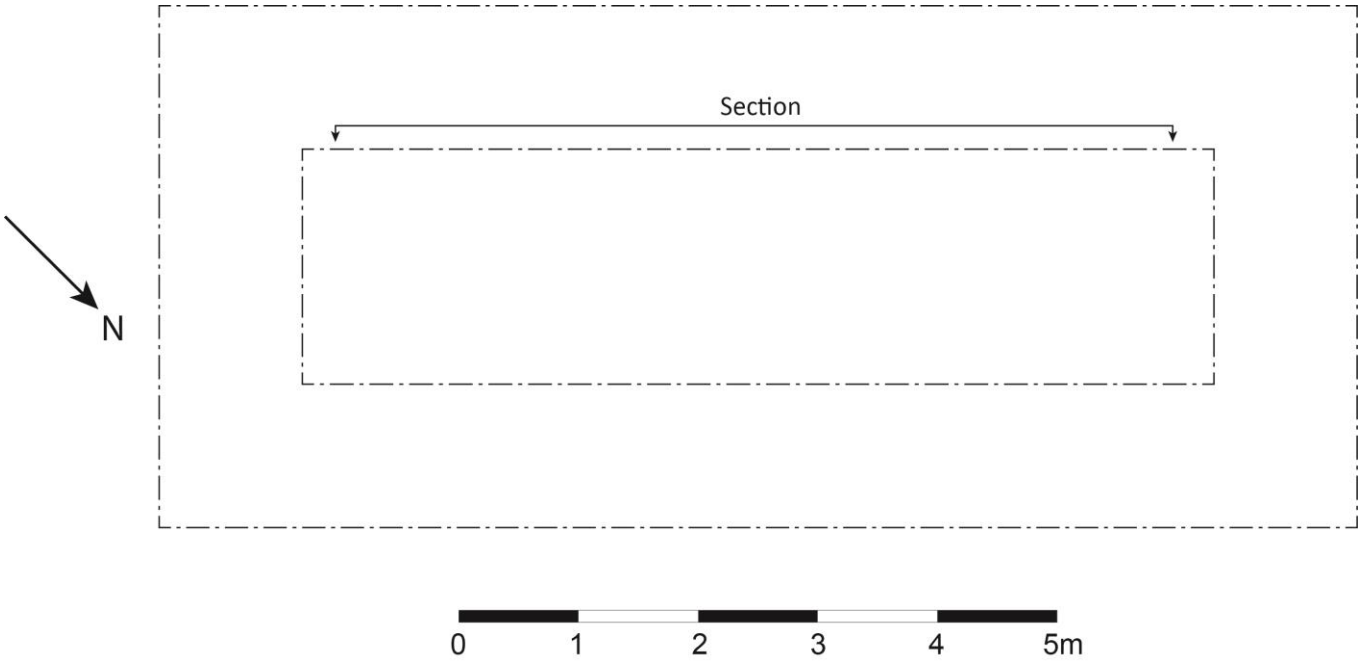

Fig. 6: Composite plan of Trench I extension showing location of section (fig. 3)

7.2 Trench 002

No features of archaeological significance were identified within the trench.

The uppermost context was identified as modern demolition debris consisting of crushed stone and concrete (002000). This material was present to an approximate depth of 0.32m BGL and covered the entirety site as far as an area of concrete hard-standing in the northern part of the site (not recorded). Beneath this was a black, relatively soft material 0.60m thick (002001), a mixed demolition-and-garden-soil layer contemporary with the 19th -century dwellings demolished in the 1960s. No evidence of these buildings was encountered, which would suggest the foundations had been relatively shallow and removed in their entirety prior to construction of the industrial units. Beneath this was a 0.23m-thick mid-brown silt-clay (002002) imported onto the site to make up the ground level. This lay over a grey sandy fine rubble deposit (002003). The horizon between these two deposits tilted in

the same direction as those seen in Trench 001. These two deposits together may represent part of a sequence of deposits associated with backfilling of a large negative feature, followed by reclamation for construction.

Plate 4: View NW of Trench 002

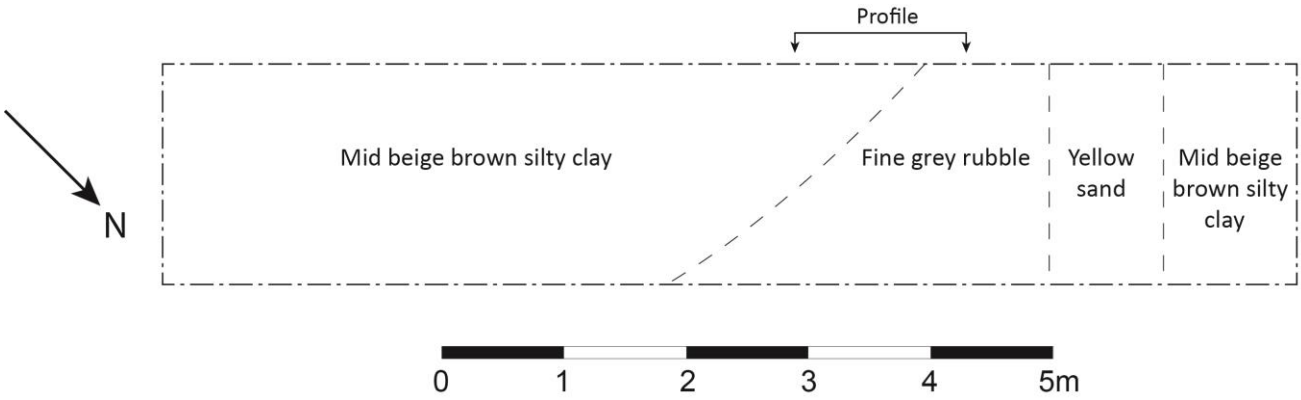

Fig. 7: Composite plan of Trench 002 showing location of profile (fig. 8)

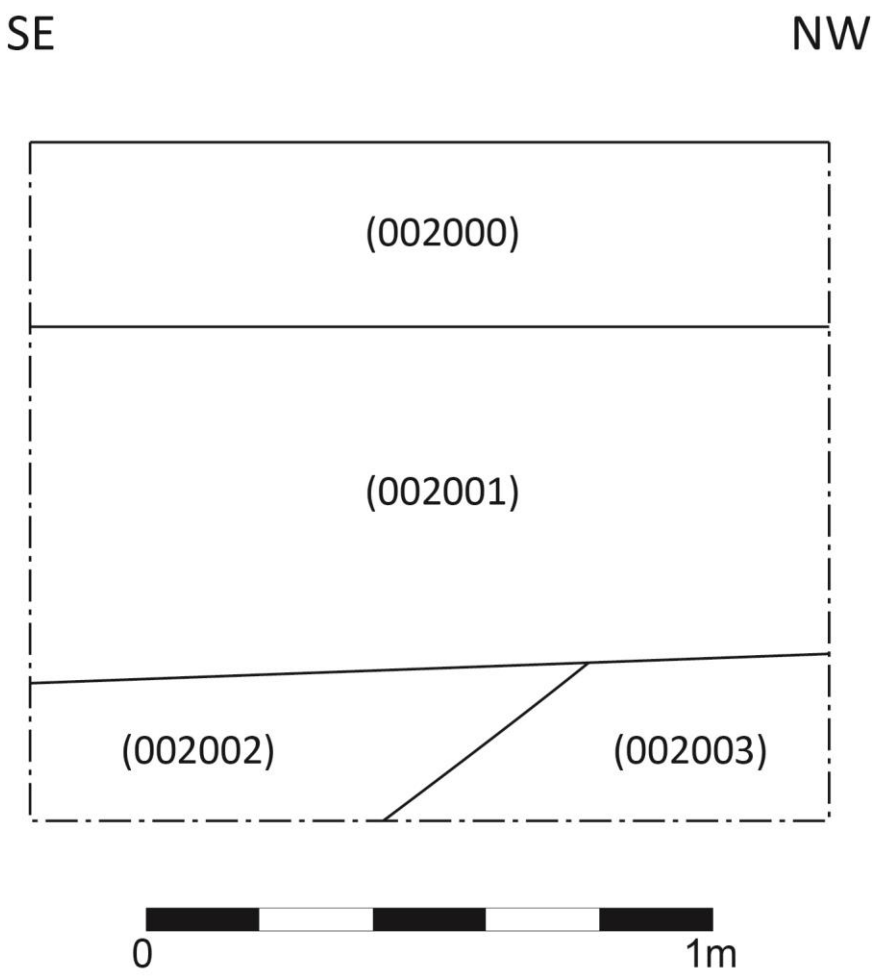

Fig. 8: NE-facing profile Trench 002

7.3 Table of results

Item	Trench No	Orientation and Trench NGR	Context No	Type	F/B	F/O	Context Information	Interpretation	Finds	Date	Comments
1	001	NW-SE A: TQ 37107 84104 B: TQ 37107 84114	(001000)	Deposit	-	-	Crushed brick & concrete rubble. Avg. D 0.28m.	Demolition	-	Modern	NAI
2			(001001)	Deposit	-	-	Friable black silt; yellow clay patches. Avg. D 0.30m.	Made ground	-	Modern	NAI
3			(001002)	Deposit	-	-	Firm mid greyish-brown silt-clay; slightly greenish, possibly cess. Avg. D 0.10m.	Made ground	-	Modern	NAI
4			(001003)	Deposit	-	-	Firm mid-brown clay. Avg. D 0.60m.	Made ground	-	Post-medieval	NAI
5			(001004)	Deposit	-	-	Yellow sand lens within (001003). Avg. D 0.10m.	Made ground	-	Post-medieval	NAI
6			(001005)	Deposit	-	-	Firm mid-brown silt-clay; orange flecking. Avg. D 1.0m.	Made ground	-	Post-medieval	NAI
7			(001006)	Deposit	-	-	Dark grey, near-black sandy silt. Avg. D 0.38m.	Made ground	-	Post-medieval	NAI
8			(001007)	Deposit	-	-	Firm mid-brown clay, orange flecking. Avg. D 0.38m	Made ground	-	Post-medieval	NAI
9			(001008)	Deposit	-		Loose light grey sand & rubble; occasional charcoal. Avg. D 0.12m	Made ground	-	Post-medieval	NAI
10			(001009)	Deposit	-	-	Firm mid beige-brown clay. Avg. D 0.30m	Made ground	-	Post-medieval	NAI
11			(001010)	Deposit	-	-	Loose light orange silty sand. Avg. D 0.50m	Made ground	-	Post-medieval	NAI
12			(001011)	Deposit	-	-	Firm mid-dark greyish-brown clay. Avg. D 0.21m	Made ground	-	Post-medieval	NAI

Item	Trench No	Orientation and Trench NGR	Context No	Type	F/B	F/O	Context Information	Interpretation	Finds	Date	Comments
13			(001012)	Deposit	-	-	Friable mid-orange-brown silt. Avg. D 0.30m	Made ground	-	Post-medieval	NAI
14			(001013)	Deposit	-	-	Firm mid-brown clay. Avg. D 0.82m	Made ground	-	Post-medieval	NAI
15			(001014)	Deposit	-	-	Friable mid orange-brown sand. Avg. D 0.24m	Made ground	-	Post-medieval	NAI
16			(001015)	Deposit	-	-	Friable dark grey, near-black silt. Avg. D 0.38m	Made ground	-	Post-medieval	NAI
17			(001016)	Deposit	-	-	Firm mid greenish-brown clay. Avg. D 0.36m	Made ground	-	Post-medieval	NAI
18			(001017)	Deposit	-	-	Firm mid-brown clay; orange flecking. Avg. D 0.58m	Made ground	-	Post-medieval	NAI
19			(001018)	Deposit	-	-	Mid orange sandy gravel; frequent small-medium cobbles & pebbles. Avg. D 0.30m	Made ground	-	Post-medieval	NAI
20	002	NW-SE A: TQ 37114 84104 B: TQ 37114 84114	(002000)	Deposit	-	-	Crushed brick & concrete rubble. Avg. D 0.32m	Demolition	-	Modern	NAI
21			(002001)	Deposit	-	-	Friable black silt; yellow clay pockets. Avg. D 0.60m	Made ground	-	Modern	NAI
22			(002002)	Deposit	-	-	Firm mid yellowish-brown clay. Avg. D 0.23m	Made ground	-	Modern	NAI
23			(002003)	Deposit	-	-	Loose light grey sand & rubble. Avg. D 0.28m	Made ground	-	Post-medieval	NAI

8 Conclusions

The evaluation results confirmed that this area has been extensively modified during the post-medieval period. Trench 001 was excavated to a depth of 3.60m BGL (including the mat of crushed demolition material still on site). An absence of structural evidence suggests the removal of earlier foundations prior to construction activity during the 1960s.

The sequence of tipped clay and silt deposits is suggestive of landscaping activity, presumably of post-medieval date. Deposits (002002/3) may represent a backfilled negative feature; however, the date and function of this possible feature remain unclear.

It is possible that these deposits may relate to later backfilling activity associated with the programme of land reclamation and construction that is documented as taking place from the 1870s onwards, associated with the laying out of Monier Road and adjacent streets (BA 2014b).

Due to the presence of these backfill features it may not be appropriate to extrapolate the depth of deposits within this site and apply the information to adjacent sites. If negative features are present and have been backfilled, the areas between such features may comprise islands of gravel or clay where archaeological deposits may survive at depths significantly less than 3.60m. However, the borehole evidence does show a similar depth of made ground across the approximately 30m × 50m study area.

The evaluation trenches did not reach the geological substrate; no finds or features of archaeological significance were identified during the course of the evaluation.

However, the results of the geoarchaeological borehole survey in conjunction with ground-investigation borehole data (*Appendix 1*) were more positive. The geoarchaeological boreholes produced a good pollen sequence and two radiocarbon dates which add considerably to the knowledge of the Holocene environment of the floodplain of the River Lea in this area.

Made ground truncated the natural sequence of alluvial deposits between 1m to 2m OD, i.e. between 4m and 6m below the present surface. The made ground contained modern clasts of concrete indicative of a 20th -century date.

The cores reached the underlying Palaeogene bedrock at around -4m OD, or 11m below the ground surface. The intervening layers were floodplain build-up of alluvial and marsh deposits. Two radiocarbon dates were obtained of 5315-5209 cal. BC just above a palaeosol, at broadly 0m OD and 1640-1935 cal. AD within an alluvium deposit at 2m OD.

Sediments were further dated and analysed by pollen and diatom analysis. The lowest levels in the sequence were dominated by pine, overlain by deciduous wood species, with an increasing alder presence over time. Sedge fen

and reed swamp species were the most frequent *taxa* at higher levels. The highest levels around the 1640-1935 cal. AD date recorded grasses, including cereals and species of disturbed ground.

Diatoms were present in the upper three of six samples in the alluvium. The lowest of these contained species reflecting estuarine conditions whilst the overlying had species typical of freshwater and brackish conditions.

It is concluded that the Lea Valley Gravel was laid down by the ancient braided River Lea during the Late Devensian period (i.e. the end of the Ice Age). As the gravel floodplain stabilized, fine-grained material, probably including loess (wind-blown silts), was deposited and soil-formation may have begun. Pine wood on the higher ground yielded to deciduous woodland. A high water table led to the formation of sedge fen and reed swamp on the floodplain, with only minor alder woodland prior to 7200 cal. BP. Minor channels, deriving probably from tributary confluences from the W, were in evidence within this marsh environment.

A rising water table possibly due to rising sea level, caused estuarine conditions to migrate up the Lower Lea Valley with the deposition of silt/clays. However, the dissolution of diatom frustules at this depth means that this presumed rise in salinity cannot be confirmed. These deposits contain frequent particles of peat at lower levels but higher they became homogenous as the source of the peat was buried. Fine-grained alluviation continued across an environment of mudflats, with occasional and ephemeral channels draining the terraces to the W. Organic material is again present by the modern period, trapped in or colonizing a small depression in the alluvium. Diatoms indicate a marine influence to the alluvium that shifts towards fresher water conditions, whilst pollen points to a landscape fully influenced by human action, as would be expected for this date.

9 Copyright

10 Bibliography

Border Archaeology, 2014a, *Archaeological Field Recording Manual*

Border Archaeology, September 2014b, *Detailed Archaeological Assessment, 33-35 Monier Road, Bow, London*. Report No. BA1444MRB

Border Archaeology, 2016, *Written Scheme of Investigation for a Programme of Archaeological Field Evaluation at 33-35 Monier Road, Bow, London*

CIfA, 2014a, *Standard and Guidance for archaeological field evaluation*

CIfA, 2014b, *Standard and guidance for the collection, documentation, conservation and research of archaeological materials*

CIfA, 2014c, *Standard and Guidance for the creation, compilation, transfer and deposition of archaeological archives*

CIfA, 2014d, *Code of conduct*

Corcoran, J., Halsey, C., Spurr, G., Burton, E. & Jamieson, J., 2011, *Mapping Past Landscapes in the Lower Lea Valley*, MOLA Monograph **55**, London

Lee, E., 2015, *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide*, Historic England

MoLAS, 2002, *A Research Framework for London Archaeology*

11 Appendix 1: Geoarchaeological Assessment of Boreholes

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11.1 Summary

In June 2016, ARCA monitored the drilling of three geoarchaeological boreholes at Nos. 33–35 Monier Road Bow London. In conjunction with five borehole logs from ground-investigation work by Jomas Associates Ltd, the Lea Valley Gravel Member was determined to sub crop at between -1.1m OD and -0.27m OD. Overlying this Member was a suite of paludal and fine-grained alluvial deposits that were truncated by deep Made Ground strata at between +1.2m OD and +3m OD. Evidence was recorded in BH2 for a possible loessic palaeosol overlain by organic mud at +0.41m OD. Peaty strata were recorded at a similar elevation in BH3. These deposits were subsequently buried by fine-grained alluvium that, on occasion, showed evidence of minor channel formation probably draining the higher terraces to the W.

Diatom evidence was preserved only in the upper strata and points towards estuarine conditions at 164 –1935 cal. AD succeeded by more freshwater conditions. Pollen was preserved throughout the paludal (pertaining to marshy ground) and fine-grained alluvium and indicates pine wood dated to the Late Mesolithic period, 5315–5209 cal. BC and broadly contemporary with the possible palaeosol, succeeded by a mixed deciduous woodland. At this date, sedge-fen and reed-swamp dominated the floodplain. Low values for Alder, however, imply that this woodland type was rare. A clear anthropogenic signal was recorded in the upper alluvial strata with high values of herbaceous pollen, including cereal and open/disturbed ground species. Minor values for tree pollen suggests clearance.

11.2 Introduction

In June 2016, at the request of Border Archaeology Ltd, three geotechnical boreholes were drilled at Nos. 33–35 Monier Road Bow London E3 2PR (henceforth known as the 'site') as part of a programme of archaeological field evaluation in advance of a proposed housing development.

This document assesses the stratigraphic sequence recovered from the site. It is arranged as follows: first a brief account is provided of the geographic, geological and methodological background to the geoarchaeological project; secondly the borehole stratigraphy is described in detail; thirdly the chronology and biostratigraphy is discussed and finally the potential of the sample resource in the boreholes to address the questions outlined in Section 12.2.1 is assessed. A bibliography and appendices containing sample type and depth, and the locations of the boreholes and the lithological descriptions of the stratigraphy, complete the document.

The site is located in the River Lea valley, *c*. 4km from its confluence with the River Thames. It is bounded on the S by Monier Road and the E by Remus Road and occupies an area of *c*. 1200 m^2. The site lies at *c*. +7m on flat ground

on the W margin of the valley and is centred on TQ 37097 84115. The junction of the River Lea with the River Lea Navigation (Hackney Cut) lies *c*. 300m to the SE and the Hertford Union Canal 100m to the NW. Elevation of the land rises quite sharply to the W out of the valley and onto the Taplow Gravels of the Thames River terrace at *c*. +14m OD. At the time of the work, all the buildings on the site had been demolished and the ground surface had been prepared as a piling mat.

The British Geological Survey (BGS) map the site as lying on superficial deposits of unlithified clays, silts, peats and sand that date to the Holocene Epoch 10–0 ka (thousand calendar years ago). Underlying these deposits is the Lambeth Group bedrock that consists of predominantly clay with variable amounts of sand and gravel, limestones, lignites, sandstone and conglomerate. The bedrock is part of the Palaeogene Period and dates from the Thanetian Age to the Ypresian Age 59.2–47.8 Ma (million years ago). Immediately to the W of the site, the BGS map the Kempton Park Gravel Member dated to the Late Ipswichian/Early Devensian Stage (*c*. 120–30 ka) of the Pleistocene Epoch. The higher Taplow Gravel Member, which was laid down in the Wolstonian Stage, rests further W.

Gibbard (1994, 110) proposed the member name of 'Lea Valley Gravel' for the gravel and sands underlying the modern floodplain. They date to the Late Devensian 18–10 ka. He has suggested also that the Kempton Park Gravel Member be called the Leyton Gravel Member where it occurs in the Lea valley (Gibbard 1994, 94). These informal stratigraphic names are followed in this report.

The site is within the Lea Valley Mapping Project (LVMP) and is located on 'Map 2: The Bow Back Rivers' (Spurr & Jamieson 2011, *fig 41*). It is described as lying on valley floor deposits on the western side of Terrain 1 Landscape Zone LZ 2.1. The presence of these deposits has been inferred from borehole core records that were used in the project to characterize different Quaternary landscapes (Landscape Zones) within the valley.

The surface of the Lea Valley Gravel Member is irregular, sub-cropping at +2– +2.5m OD in the N of the area and *c*. +0.4m OD in the S (Spurr & Jamieson 2011, 64). Deeper areas of gravel are present and indicate the main channel and tributary confluences. On the W of the valley and lying E of the site, the ancient braided River Lea has dissected a low terrace (LZ 2.2) creating isolated areas of elevated gravel. Spurr and Corcoran (2011, 193–4) describe this terrace as dissected by tributaries flowing from the Wt rather than a major N/S channel, with the consequence that the site lies on the slightly higher terrace ground (LZ2.2) upon which peaty wetland is recorded. To the N of the site, the LVMP records a remnant of the high W terrace (LZ 2.4) of the valley side, where the Pleistocene river has cut off an early promontory. The high terrace immediately W of the site is composed first by the Leyton Gravel Member that is estimated to sub-crop at +5m OD (Gibbard 1994, 51 *fig. 22*) with a thickness of *c*. 5m and then the higher and earlier Taplow Gravel Member of the River Thames.

The neighbouring sites of Nos. 79-85 Monier Road and Neptune Warf - both E of the site - have recently been investigated (Batchelor & Hill 2016). Organic rich deposits from the former date from *c*. 6000 cal. BP to 1000 cal. BP and the results concur with the work by Corcoran *et al.* (2011). The Omega Works Phase III located 500m NE (Spurr 2006) are included in the LVMP and date similar deposits from 9000 cal. BP to 1000 cal. BP. The results from the work discussed in this report are also in agreement and peat deposits are reported that date from *c*. 7200 cal. BP to present. As Batchelor and Hill (2016, 3) point out, however, the peat and organic-rich deposits are not contemporaneous, even over the short distances between deposit sequences at these four sites.

11.2.1 The objectives of the geoarchaeological work at the site were to:

- Determine the Holocene sedimentary sequence on the site
- Assess the archaeological, palaeoenvironmental and geoarchaeological potential of the Holocene sedimentary units encountered
- Make recommendations for further investigation of high potential strata at a later stage

11.3 Methodology

Three geoarchaeological boreholes - BH1, BH2 and BH3 - were drilled by Geotechnical Engineering Ltd using a Pioneer2 rig and two operators and under the supervision of an ARCA geoarchaeologist (*fig. 9*). The rig was equipped with a dynamic sampler (i.e. capable of both pressure-based and rotary drilling - see *Geotechnical Engineering* (2015) for technical details). Each location was tested for buried services with a CAT scanner. Drilling commenced from the ground surface and continued until the Lea Valley Gravel Member was reached at *c*. 8m BGL. The Pioneer rig collected continuous cores in 60–112mm -diameter Perspex tubes from cased boreholes. The borehole cores were transported to Geotechnical Engineering Ltd offices at Quedgeley Gloucestershire, where they were described by ARCA geoarchaeologists using standard geological criteria (Tucker 1982; Jones *et al.* 1999; Munsell Color 2000). Borehole core BH2 was selected for sub-sampling and transported to the ARCA laboratories at the University of Winchester, where it is in storage. Full stratigraphic descriptions are presented in Appendix 3.

Ground investigation was carried out on the site by Jomas Associates Ltd (*fig. 9*). Four window sample boreholes were drilled through the made ground and into the fine-grained alluvium to a depth of +1.55m OD in WS1, WS3 and WS4 and to +2m OD in WS2. A fifth borehole was drilled by cable percussion to the bedrock at -4.3m OD. None of the window sample boreholes penetrated the underlying Lea Valley Gravel Member nor the bedrock (Drillers' records are included in Appendix 3).

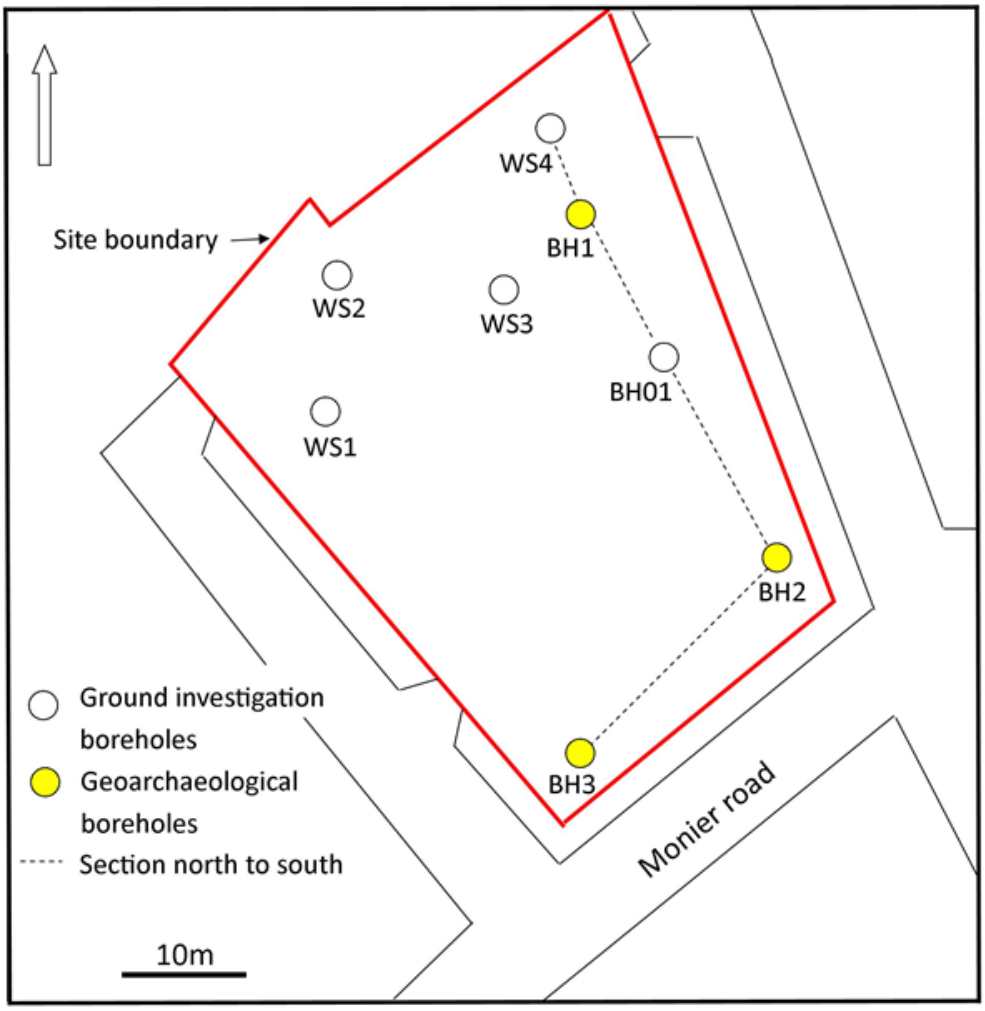

Fig. 9: Borehole locations

Lithological descriptions and positional data from the site were combined within a RockWorks database (RockWare 2013). The RockWorks software package was then used to plot the lithological cross section (*fig. 10*).

11.4 Borehole Stratigraphy

The stratigraphy described in this section includes not only the geoarchaeological boreholes but also the ground-investigation boreholes drilled on the site: a total of eight boreholes. Only general inferences will be drawn from the ground-investigation boreholes as the records are limited and interpretation is difficult, particularly of borehole BH01, where the manner of recovery of the sediments via the cable and percussion method was crude. Four major stratigraphic units (formal and informal members) were recorded in the borehole stratigraphy (*fig.* 10). These are reviewed below in chronological order.

11.4.1 Lambeth Group

The Lambeth Group formed on the margin of a deep-water marine basin in the mid Palaeogene Period. Repeated transgressions and regressions led to the development of laterally and vertically variable lithologies as depositional environments were altered through cycles of erosion, soil formation and river down-cutting, followed by inundation by the sea and marine sedimentation (Entwisle *et al*. 2013).

Rockhead of the Lambeth Group was not encountered in the geoarchaeological boreholes. It was recorded in BH01 of the ground-investigation boreholes as stiff dark grey clay at an elevation of -4.3m OD.

The Lambeth Group is unconformably overlain by Quaternary sediments in BH01.

11.4.2 Lea Valley Gravel Member

Deposits of fluvial gravel and sand were encountered in BH1, BH2, BH3 and BH01 and sub-cropped between -1.1m OD and -0.27m OD in BH01 and BH1, respectively. These deposits are part of the Lea Valley Gravel Member and a thickness of 3.2m was recorded in BH01, which includes 0.9m of sandy clay. This finer grained deposit is included as part of the Gravel Member because it was sandy and bereft of organic matter, the latter a characteristic of the overlying fine-grained, floodplain alluvium in all the boreholes.

The low elevation of the gravels encountered at the site confirms that they are indeed the Lea Valley Gravels Member rather than the Leyton Gravel Member that is mapped immediately to the W. This latter gravel would occupy a higher elevation and would probably be truncated by the made ground, were it to occur on the site (see Introduction). On the basis of lithology only, the two gravels are almost indistinguishable (compare, for example, pebble counts cited by Gibbard 1994, 92, 112).

On the site, the Lea Valley Gravel Member consisted of 5 Y 4/2 Olive grey to 5 Y 2.5/1 Black, poorly sorted, medium sand-sized quartz and flint grains to granular-sized and medium pebble-sized black flint clasts. The clasts were sub-angular to rounded. A very rare fine pebble-sized, rounded clast of quartz was also noted.

The Lea Valley Gravel Member is overlain by predominantly fine-grained alluvial and paludal (pertaining to marshy ground) deposits.

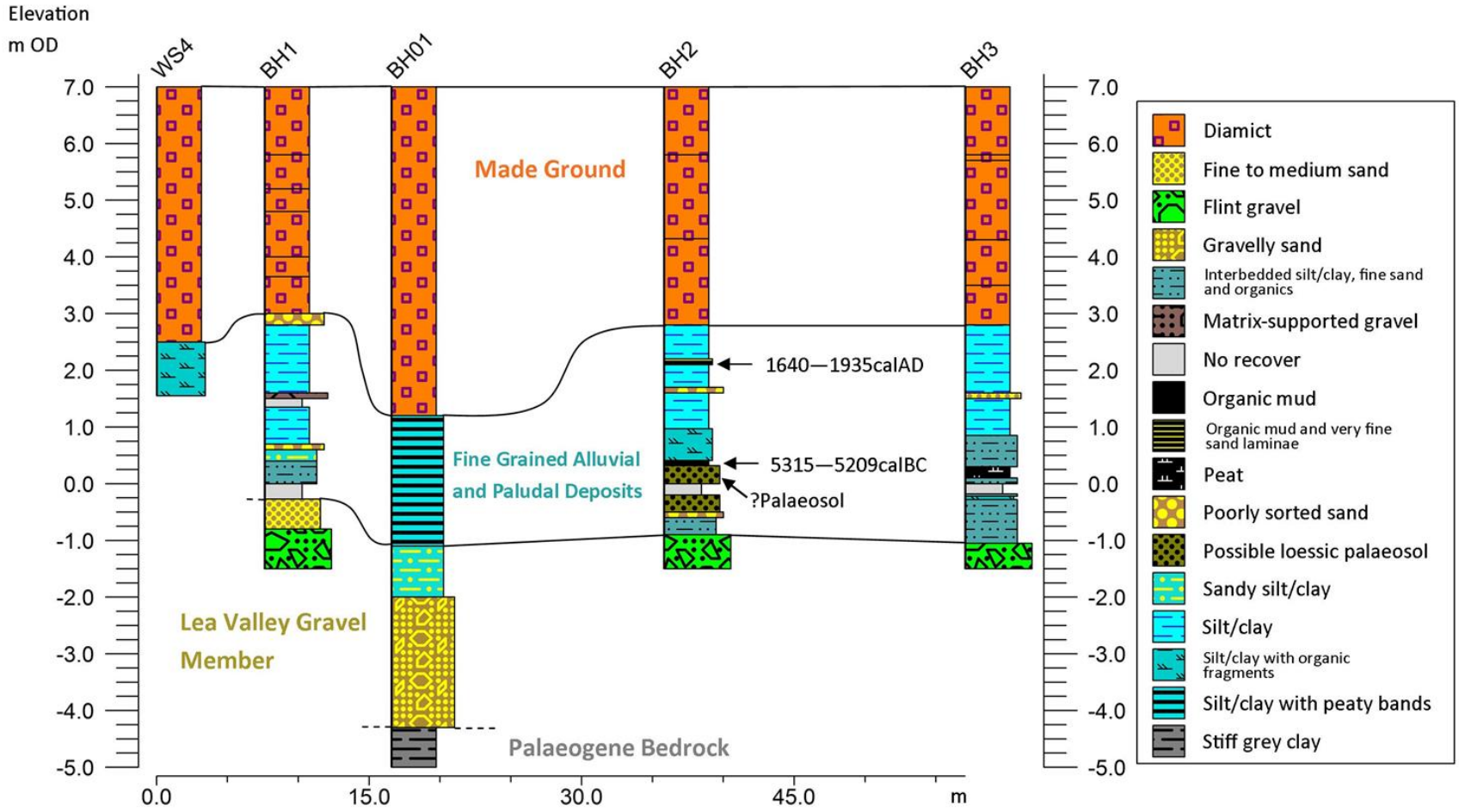

Fig 10: Lithological section across the site from N to S

11.4.3 Fine-grained alluvium and paludal deposits

At the site, fine-grained alluvial strata sub-crop in all eight boreholes between +1.2m OD (BH01) and +3m OD (BH1). The thickness of the deposits varies between 2.3m (BH01) and 3.85m (BH3). In WS1, WS2, WS3 and WS4, the total depth of the strata is not recorded because the boreholes ended at *c*. +2.5m OD and therefore short of the underlying Lea Valley Gravel Member.

An interbedded unit colored dark greyish-brown (2.5 Y 4/2) composed of fine sand, silt/clay and comminuted organic material is recorded as overlying the Lea Valley Gravel Member in BH1, BH2 and BH3. Fragments of wood were also noted. This deposit represents the initial accretion of fine-grained alluvium on the Lea Valley floodplain on the site. The presence of sand and organics suggests deposition within a network of minor channels draining areas where peat had already become established.

An emergent terrestrial environment is recorded in BH2, where there is evidence of a soil horizon developed in an olive green (10 Y 3/4) colored, very fine sand bed, *c*. 0.32m thick, that sub-crops at +0.32m OD. The deposit may represent reworked loess. The borehole appears to have sampled an interfluve, as this possible loessic palaeosol is not recorded in the other boreholes.

Overlying the palaeosol in BH2 and developed over minor channel interbedded sands, silt/clays and organics in BH3, is a black, highly organic stratum. In BH2, it is recorded as an organic mud, 0.09m thick, that sub-crops at +0.41m OD. In BH3, it is a well-humified peat, 0.2m thick, that sub-crops at +0.30m OD. A pebble-sized wood clast was preserved within the organic mud stratum in BH2 and was dated to 5315 – 5209 cal. BC (see Section 12.5 below). These organic strata point to the presence on and near the site of peaty wetlands.

In BH3, the peat stratum is truncated by succeeding deposits of minor channel fill (interbedded sands, sit/clays and allochthonous [derived from afar] organics). Finer grained alluvium overlies the organic mud in BH2. In both boreholes, a rising water table and concomitant, minerogenic, fluvial sedimentation is recorded. These silt/clay deposits contain frequent fragments of peaty material that became entrained from the submerging peaty wetlands.

In BH1, BH2 and BH3, clean, dark greyish-blue (5 Y 4/1) silt/clays are recorded at +0.7m OD, +0.97m OD and +0.85m OD, respectively, and represent floodplain overbank deposition. Entrained organic material is no longer present, suggesting that within the environs of the site the peat had been buried.

The total thickness of minerogenic alluvium that overlies the peat in BH3 is 2.5m and in BH2, overlying the organic mud, it is 2.39m. A similar thickness is recorded in BH1, where it overlies a channel fill deposit rather than peat/organic mud. In BH01,2.3m of 'soft brown peat/ grey silt' is recorded in the drillers' log (Appendix 12.11.3).

At *c*.+1.7m OD, a very shallow channel-fill deposit of fine to coarse sand is recorded in BH1, BH2 and BH3 and represents an ephemeral mudflat channel or channels that probably drained the higher terrace sands to the W.

A later, very shallow channel developed within the alluvium recorded in BH2 at *c*. +2.2m OD. The fill of this channel is organic and included a wood fragment that dates to 1640 – 1935 cal. AD (see Section 12.5 below). The channel or basin was an ephemeral damp environment where vegetation flourished briefly before being buried by accreting alluvium on the floodplain.

The fine-grained alluvium and paludal deposits are truncated by made ground in all the boreholes.

11.4.4 Made Ground

'Made Ground' is a term used by the BGS to describe superficial deposits of variable composition that are man-made (BGS 2016a).

Made Ground strata occur at the top of all the boreholes on the site. The thickness of the strata is between 4m and 5.8m in BH1 and BH01, respectively. They unconformably overlie the fine-grained alluvium which is truncated displaying very sharp boundaries.

The Made Ground strata consist of 10 YR 4/4 Dark yellowish-brown to 10 YR 3/1 Very dark grey, stiff diamicts with fine to medium sand and occasional sub-rounded flint, mortar, brick and concrete clasts. The diamict matrices are silt/clay with varying quantities of minerogenic sand-sized particles. Modern clasts of concrete were recorded throughout the Made Ground strata. No archaeological material was recovered.

11.5 Chronology

Borehole and Elevation (m OD)	**Material dated**	**Lab code**	**δ ^{13}C ‰**	**Conventional radiocarbon age (±1σ)BP**	**2σ calibrated date cal BC/AD**
BH2 +2.12	wood	SUERC-68032 (GU41473)	-26.1	226 ± 29	1640 (42.15%) 1684 cal AD 1736 (41.6%) 1805 cal AD 1935 cal AD (11.7%)…
BH2 +0.40	wood	SUERC-68033 (GU41474)	-29.1	6265 ± 29	5315 (95.4%) 5209 cal BC

Table 1. Results of AMS 14C dating. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

The results of the AMS 14C dating are shown in Table 1 above. Analysis was carried out by SUERC (Scottish Universities Environmental Research Centre).

The wood sample from the organic mud stratum in BH2 dates to 5315 – 5209 cal. BC. Assuming that the death of the tree is broadly contemporaneous with the deposition of the mud, then, by extrapolation, the peat stratum in BH3, which is at approximately the same elevation and 20m distant, can be assigned a similar date. Peat formation therefore was in progress during the Late Mesolithic.

The date obtained on a wood sample from higher in the fine-grained alluvial sequence has a date of 1640 – 1935 cal. AD.

11.6 Biostratigraphy

The complete pollen and diatom assessment report prepared by Batchelor and Hill (2016) is deposited with this report. In addition to Appendix 1, which lists sample type and elevation OD, a summary of the major findings is presented in this section (*fig. 11*).

11.6.1 Vegetation history: pollen

Eight subsamples from BH2 were assessed for pollen. Each subsample has a specific code referring to depth below ground level, for example, 5.41m (*see Appendix* 1). There was a high concentration and preservation of remains in the majority of the samples and all but the sample from 5.41m are suitable for further analysis.

Between 6.72m and 6.16m below ground level, five samples pertained to the early (lower) deposits of fine-grained alluvium. They correspond with the possible loessic palaeosol, the overlying organic mud and the silt/clay with organic fragments in it, entrained as the water table rose.

These samples were dominated by *Pinus* (pine). The organic mud and silt/clay deposits showed that a mixed deciduous woodland then developed, with *Quercus* (oak), *Corylus* -type (e.g. hazel), *Ulmus* (elm) and *Alnus* (alder) increasing over time.

The herbaceous assemblage – *Poaceae* (grasses) and *Cyperaceae* (sedges), with *Asteraceae* (daisies) and *Lactuceae* (dandelions) – coupled with the aquatic and spore taxa – comprising *Filicales* (ferns) with sporadic occurrences of *Typha latifolia* (bulrush), *Sparganium* -type (bur-reed) and *Polypodium vulgare* (polypody) – demonstrate that sedge fen and reed swamp dominated the floodplain. Low values for alder, however, imply that this woodland was rare.

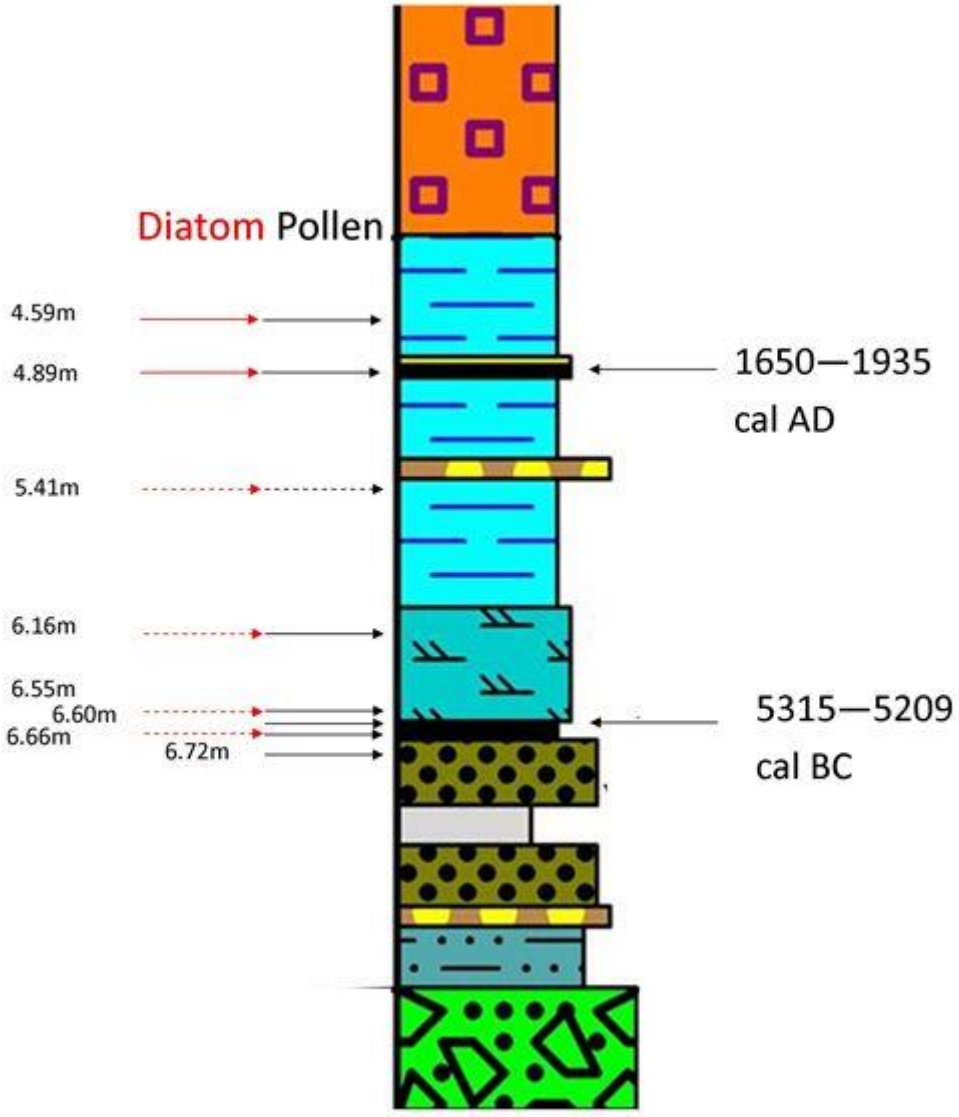

Fig. 11. Pollen and diatom samples taken from BH2. Broken arrows indicate null or poor preservation. 14C AMS dates taken from wood in organic mud overlying a possible palaeosol towards the base, and from wood in an organic stratum preserved in the fine-grained alluvium at the top of the sequence.

Two samples (4.89m and 4.59m) pertain to the top of the fine-grained alluvium and date to 1640 – 1935 cal. AD. These recorded high values of herbaceous pollen pointing to an important anthropogenic influence and include: *Poaceae* and *Cyperaceae* with *Cereale* -type (e.g. barley) and indicators of open/disturbed ground, *Asteraceae* (daisies), *Lactuceae* (dandelions), *Plantago lanceolata* (ribwort plantain), *Chenopodium* -type (e.g. fat hen), *Rumex acetosa/acetosella* (sorrel) and *Polygonum aviculare* (knotgrass). Trees and shrubs comprised only individual grains, which suggest clearance.

Microcharcoal was present in the samples indicating burning but whether natural or not is unknown.

11.6.2 Hydrological history: diatoms

Six diatom samples were assessed. Diatoms were present only in the three samples that pertained to the upper deposits of fine-grained alluvium: 4.59m, 4.89m and 5.41m. In the first two, they were greatly abundant and of high diversity. No diatoms were present in the three samples from the lower deposits of fine-grained alluvial and paludal strata, possibly due to dissolution of the silica frustules.

Planktonic taxa typify the lower sample 4.89m which dates to 1640 – 1935 cal. AD. Freshwater taxa were typical; however, species more often found in estuarine conditions (*Rhaphoneis amphiceros*, *Actinoptychus undulata*, *Paralia sulcata*) were present that imply a greater marine influence with depth.

In contrast, however, the overlying sample 4.59m was characterized by freshwater taxa, with some tolerant of brackish conditions. Benthic species (bottom-dwelling) dominated, typically *Syneda ulna*, which is common in fresh and brackish water.

11.7 Assessment

11.7.1 Holocene stratigraphy on the site

On the site, the Lea Valley Gravel Member was laid down by the ancient braided River Lea during the Late Devensian. As the gravel floodplain stabilized, fine-grained material, probably including an important fraction of loess, was deposited and soil formation may have begun. On the higher ground, pine woods were present that gave way to deciduous woodland. A high water table, however, led to the formation of sedge fen and reed swamp on the floodplain, with only minor alder woodland prior to 7200 cal. BP. Minor channels, deriving probably from tributary confluences from the W, were in evidence within this paludal environment.

A rising water table possibly due to rising sea level caused estuarine conditions to migrate up the Lower Lea Valley, with the deposition of silt/clays. Unfortunately, dissolution of diatom frustules at this depth means that this presumed rise in salinity cannot be confirmed. At first, these deposits contain frequent particles of peat but later they become homogenous as the source of the peat is buried. Fine-grained alluviation continues across an environment of mudflats, with occasional and ephemeral channels draining the terraces to the W. By the modern period, organic material is again present, trapped in or colonizing a small depression in the alluvium. Diatoms indicate a marine influence to the alluvium that shifts towards fresher water conditions, whereas pollen points to a landscape fully influenced by human action, as would be expected for this date.

11.7.2 Deposit Modelling

The BGS borehole database (BGS 2016b) indicates that there are only three accessible borehole records on the Lea Valley floodplain within 300m of the site. These, in conjunction with the four boreholes discussed here that record the Lea Valley Gravel Member, are insufficient to provide a meaningful model of the Early Holocene topography

within the environs of the site. With the expected publication of more data from Nos. 79-85 Monier Road and Neptune Warf, and possible future development in the area, this situation is expected to change.

11.7.3 Archaeological and palaeoenvironmental significance

Given the Palaeogene age of the Lambeth Group, these strata have no archaeological nor palaeoenvironmental significance.

The Lea Valley Gravel Member has low archaeological potential. The braided river environment was not conducive to human occupation, even though people were present at the time the Gravel Member was laid down. The Gravel Member may contain lenses and beds of fine-grained material that could contain biological remains, although none where recorded in this work. It is known that the Gravels contain evidence of the fossiliferous Arctic Beds; however, at present their known location is on the opposite side of the Lea Valley to the site. It is concluded therefore that the Gravels have a low palaeoenvironmental potential.

The lower deposits of the fine-grained alluvial strata that include a possible loessic palaeosol and organic mud strata have *low archaeological potential*. The nature of the palaeosol is unclear; however, the presence of paludal deposits that point to sedge fen and reed swamp suggest environments of intermittent exploitation by people.

The lower deposits of the fine-grained alluvial strata that include a possible loessic palaeosol and organic mud strata have *high palaeoenvironmental potential*, as has been demonstrated in Section 12.6 above.

The later deposits of fine-grained alluvium have *low archaeological potential* because they most probably represent a fluvial estuarine environment not conducive to human occupation.

The later deposits of fine-grained alluvium have *high palaeoenvironmental potential*, particularly towards the top where both pollen and diatom preservation, is very good.

11.8 Recommendations

The concentration and preservation of the pollen from the site is sufficient for a full analysis. The vegetation history of the site will add to evidence from neighbouring sites Nos. 79–85 Monier Road, Neptune Wharf and the Omega Works Phase III. The diatom assessment revealed the potential for elucidating the effect of Holocene sea level change on the area. The variable presence of diatoms will restrict sampling to the later fine-grained alluvium, which should be sampled at a higher resolution to better understand the depositional environments.

It is recommended that further diatom samples are taken and, where possible, plant macrofossil samples and waterlogged wood identification undertaken. A full pollen analysis is also recommended, as are further 14C dates. The detail for this suite of analyses should be drawn up with specialists at Quaternary Scientific (QUEST), University of Reading.

The effectiveness of geoarchaeological borehole drilling to retrieve important samples from early Holocene stratigraphy that is deeply buried below made ground is strongly advocated. The potential for such work within the surrounding area of the site is recommended.

11.9 Acknowledgements

ARCA would like to thank Messrs. Neil Shurety and George Children of Border Archaeology, Dr. Rob Batchelor of Quaternary Scientific (QUEST), University of Reading and Dr. Eleanor Standley of the University of Oxford for their help during the course of this project.

11.10 Bibliography

Batchelor, C. R. & Hill, T., 2016, *35 Monier Road, London Borough of Tower Hamlets Pollen and Diatom Assessment Report*, Quaternary Scientific (QUEST) Unpublished Report June 2016; Project Number 107/16

BGS (2016a) 'British Geological Survey lexicon of named rock units'. http://www.bgs.ac.uk/lexicon/ [Accessed 01/08/16)]

BGS (2016b) http://mapapps.bgs.ac.uk/geologyofbritain/home.html [Accessed 02/08/16]

Campbell, S., Hunt, C.O., Scourse, J.D., Keen, D.H. & Croot, D.G., 1999, 'Southwest England', in Bowen, D.Q. (ed.) *A revised correl ation of Quaternary deposits in the British Isles*. Geological Society Special Report **23**, London, 66-78.

Corcoran, J., Halsey, C., Spurr, G., Burton, E. & Jamieson, D., 2011, *Mapping past landscapes in the Lower Lea Valley: A geoarchaeological study of the Quaternary sequence*, Museum of London Archaeology, MOLA Monograph **55**.

Entwisle, D. C. Hobbs P. R. N., Northmore, K. J., Skipper, J., Raines, M. R., Self, S. J., Ellison, R. A., & Jones, L. D., 2013, *Engineering Geology of British Rocks and Soils – Lambeth Group*. British Geological Survey Open Report OR/13/006. 316pp

Garnham, A., 2015, *Preliminary Geo-environmental and Geotechnical Ground Investigation for 33–35 Monier Road, London E3 2PR*. Unpublished report by Jomas Associates Ltd.

Geotechnical Engineering http://www.geoeng.co.uk/index.asp?q=our-equipment/pioneer2 Accessed 08/08/16

Gibbard, P., 1994, *The Pleistocene history of the Lower Thames Valley*, Cambridge

Jones, A.P., Tucker, M.E. & Hart, J.K., 1999, 'Guidelines and recommendations', in Jones, A.P., Tucker, M.E. & Hart, J.K. (eds.) *The description and analysis of Quaternary stratigraphic field sections*. Quaternary Research Association technical guide **7**, London, 27 – 76.

Munsell Color, 2000, *Munsell soil color charts*. Munsell Color, New Windsor (NY).

Rockware (2013) RockWorks v15. http://www.rockware.com (Accessed 15 April 2014).

Spurr, G. and Corcoran, J., 2011, 'Ground truthing', in Corcoran *et al*., 2011, 191 – 202.

Spurr, G. & Jamieson, D., 2011, 'Map 2: the Bow back rivers', in Corcoran *et al*., 2011), 62–74.

Spurr, G., 2006, Omega Works Phase III, Crown Wharf, Roach Road, London E3, London Borough of Tower Hamlets: A Geoarchaeological Report. MoLAS Unpublished Report, August 2006.

Tucker, M.E. (2011) Sedimentary rocks in the field. Wiley, Chichester

11.11 Appendices

11.11.1 Appendix 1: 14C AMS, Pollen & Diatom Samples

Depth below ground level m	Elevation +m OD	Sample type
4.58-4.59	2.42-2.41	Pollen diatom
4.88-4.89	2.12-2.11	Pollen diatom ^{14}C
5.40-5.41	1.60-1.59	Pollen diatom
6.15-6.16	0.85-0.84	Pollen diatom
6.53-6.54	0.47-0.46	Pollen diatom
6.59-6.60	0.41-0.40	Pollen ^{14}C
6.65-6.66	0.35-0.34	Pollen diatom
6.71-6.72	0.29-0.28	Pollen

11.11.2 Appendix 2: Borehole Locations

Borehole	Easting	Northing
BH1	537101	184131
BH2	537114	184106
BH3	537100	184090
BH01	537105	184123
WS1	537081	184117
WS2	537081	184127
WS3	537094	184126
WS4	537098	184138

11.11.3 Appendix 3: Lithostratigraphy of the boreholes

Borehole	Top	Base	Lithology	Comments
BH1	0.00	1.20	Diamict	Gravelly clay - Drillers record. (Made ground). Unknown boundary to:
BH1	1.20	1.80	Diamict	10 YR 4/4 Dark yellowish-brown diamict with rare, cobble-sized brick clasts. (Made

				ground). Sharp boundary to:
BH1	1.80	2.20	Diamict	2.5 Y 3/1 Very dark grey diamict. (Made ground). Sharp boundary to:
BH1	2.20	3.00	Diamict	2.5 Y 3/2 Very dark greyish-brown diamict. (Made ground). Sharp boundary to:
BH1	3.00	3.35	Diamict	10 YR 4/4 Dark yellowish-brown diamict. (Made ground). Sharp boundary to:
BH1	3.35	4.00	Diamict	2.5 Y 3/1 Very dark grey diamict with rare pebble-sized concrete fragments. (Made ground). Unknown boundary to:
BH1	4.00	4.20	Poorly sorted sand	2.5 Y 4/1 Dark grey, fine to coarse sand with frequent shell fragments. (Channel sands). Sharp boundary to:
BH1	4.20	5.40	Silt/clay	5 Y 4/1 Dark grey silt/clay with rare black organic specks. (Alluvium). Sharp boundary to:
BH1	5.40	5.50	Matrix-supported gravel	5 Y 4/2 Olive grey, poorly sorted sandy gravel with brick cobble and granules. ((?)made ground/ contamination)
BH1	5.50	5.65	No recover	Void
BH1	5.65	6.30	Silt/clay	5 Y 4/1 Dark grey silt/clay (bluish shade). (Alluvium). Sharp boundary to:
BH1	6.30	6.40	Poorly sorted sand	2.5 Y 4/1 Dark grey, fine to coarse sand with frequent shell

				fragments. (Channel sands). Sharp boundary to:
BH1	6.40	6.60	Sandy silt/clay	2.5 Y 3/1 Very dark grey silt/clay. Rare sub angular granules of flint. Sharp boundary to:
BH1	6.60	7.00	Interbedded silt/clay, fine sand and organics	2.5 Y 4/2 Dark greyish-brown silt/clay with lighter and darker beds 10mm scale. Frequent granular to cobble-sized wood. Occ. granular plant fragments. Very fine sand lenses/ laminae. Sharp boundary to:
BH1	7.00	7.27	No recover	Void
BH1	7.27	7.80	Fine to medium sand	2.5 Y 4/1 Dark grey, fine to medium sand. (Channel fill). Sharp boundary to:
BH1	7.8	8.5	Flint gravel	5 Y 4/2 Olive grey to 5 Y 2.5/1 Black, poorly sorted sandy gravel of medium sand-sized quartz and flint grains and granular to medium pebble-sized black flint clasts, sub-angular to rounded. (Channel gravel). End of BH.
BH2	0	1.2	Diamict	Gravelly clay-Drillers record. (Made ground). Unknown boundary to:
BH2	1.2	2.68	Diamict	10 YR 3/4 Dark yellowish-brown silt/clay with occasional pebbles of sub-angular brick. Frequent black staining. Pebble-

				sized mortar fragments. Sharp boundary to:
BH2	2.68	4.2	Diamict	10 YR 4/2 Dark greyish-brown silt/clay with occasional brick clast, concrete cobble and mortar fragment. Black staining. (Made ground). Sharp boundary to:
BH2	4.2	4.8	Silt/clay	5 Y 3/1 Very dark grey silt/clay. (Alluvium) *4.58-4.59m pollen and diatom sub sample*. Sharp boundary to:
BH2	4.8	4.9	Organic mud and very fine sand laminae	5 Y 2.5/1 Black, interbedded fine sand and silt/clay laminae stained black. Rare, black, horizontal laminae with plant fibres. *4.88-4.89m pollen and diatom sub sample, and AMS sub sample on wood.* Sharp boundary to:
BH2	4.9	5.3	Silt/clay	5 Y 3/1 Very dark grey silt/clay. (Alluvium). Sharp boundary to:
BH2	5.3	5.4	Poorly sorted sand	5 Y 4/2 Olive grey, poorly sorted, fine to coarse sand with frequent shell fragments. Sharp boundary to:
BH2	5.4	6.03	Silt/clay	5 Y 4/1 Dark grey silt/clay. (Alluvium). *5.40-5.41m pollen and diatom sub sample*. Sharp boundary to:

BH2	6.03	6.59	Silt/clay with organic fragments	5 Y 4/1 Dark grey becoming 3/1 Very dark grey silt/clay with occasional granular-sized lenses of peat. (Alluvium). *6.15-6.16m and 6.53-6.54m pollen and diatom sub sample.* Sharp boundary to:
BH2	6.59	6.68	Organic mud	5 Y 2.5/1 Black, well humified peat/ organic mud. Wood cobble. (Peat). *6.59-6.60m pollen sub-sample, and 6.60m AMS sub-sample on wood. 6.65-6.66m pollen and diatom sub sample.* Sharp boundary to:
BH2	6.68	7	Possible loessic palaeosol	10 Y 3/4 Dark olive, compact, very fine sand with minor silt/clay fraction. Silty texture not plastic. Homogenous and friable. Drier. Occasional vertical plant fibres ((?)root). *6.71-6.72m pollen sub-sample* ((?)palaeosol in loess). Unknown boundary to:
BH2	7	7.2	No recover	Void
BH2	7.2	7.5	Possible loessic palaeosol	5 Y 4/2 Olive, compact, very fine sand with minor silt/clay fraction. Silty texture not plastic. Poorly preserved, possible continuation of unit above. ((?)palaeosol in loess). Sharp boundary to:

BH2	7.5	7.6	Poorly sorted sand	5 Y 4/2 Olive grey, poorly sorted, fine to coarse sand. (Channel fill). Sharp boundary to:
BH2	7.6	7.9	Interbedded silt/clay, fine sand and organics	5 Y 4/2 Olive, very poorly developed horizontally laminated clay and very fine sand: colour tending to 10 Y 3/4 Dark olive. Wood pebble. Occasional laminae of peat fragments. (Channel fill). Sharp boundary to:
BH2	7.9	8.5	Flint gravel	5 Y 4/2 Olive grey to 5 Y 2.5/1 Black, poorly sorted sandy gravel of medium sand-sized quartz and flint grains and granular-to-medium pebble-sized black flint clasts, sub-angular to rounded (Channel gravel). End of BH.
BH3	0	1.2	Diamict	Gravelly clay-Drillers record. (Made ground). Unknown boundary to:
BH3	1.2	1.3	Diamict	10 YR 5/3 Brown diamict with frequent granular to cobble-sized concrete clasts. (Made ground). Sharp boundary to:
BH3	1.3	2.7	Diamict	10 YR 4/4 Dark yellowish-brown silt/clay with rare pebble-sized brick and rock fragments. (Made ground). Sharp boundary to:

BH3	2.7	3.5	Diamict	10 YR 5/2 Greyish brown silt/clay with rare sub rounded flint pebbles. (Made ground). Sharp boundary to:
BH3	3.5	4.2	Diamict	10 YR 3/1 Very dark grey diamict with fine to medium sand and occasional sub-rounded flint and brick clasts. (Made ground). Sharp boundary to:
BH3	4.2	5.4	Silt/clay	10 YR 4/1 Dark grey silt/clay with rare wood granule. Very fine to medium sand increases towards base forming lenses. (Alluvium). Sharp boundary to:
BH3	5.4	5.5	Fine to medium sand	5 Y 4/1 Dark grey fine to medium sand with frequent shell fragments. (Channel sands). Unknown boundary to:
BH3	5.5	6.15	Silt/clay	5 Y 4/1 Dark grey silt/clay with fine organic particles increasing towards base and blue shade to the silt/clay. (Alluvium). Sharp boundary to:
BH3	6.15	6.7	Interbedded silt/clay, fine sand and organics	2.5 Y 4/2 Dark greyish-brown silt/clay with lighter and darker beds 10 mmm scale. Frequent granular to cobble-sized wood. Occasional granular plant fragment. Very fine sand lenses/ laminae. Sharp boundary to:

BH3	6.7	6.9	Peat	5 Y 3/1 Very dark grey, very compact, well humified peat. Rare, fine, sand sized fibres. (Peat). Sharp boundary to:
BH3	6.9	7	Interbedded silt/clay, fine sand and organics	2.5 Y 4/2 Dark greyish-brown silt/clay with lighter and darker beds 10mm scale. Frequent granular to cobble-sized wood. Occasional granular plant fragments. Very fine sand lenses/laminae. Medium pebble of friable, white (?)tufa. (Channel fill). Unknown boundary to:
BH3	7	7.18	No recover	Void
BH3	7.18	7.22	Interbedded silt/clay, fine sand and organics	2.5 Y 4/2 Dark greyish-brown silt/clay with lighter and darker beds 10mm scale. Frequent granular to cobble-sized wood. Occasional granular plant fragments. Very fine sand lenses/ laminae. (Channel fill). Sharp boundary to:
BH3	7.22	7.28	Silt/clay with organic fragments	5 Y 4/1 Dark grey silt/clay with occasional organic specks. Bluish shade. (Alluvium). Sharp boundary to:
BH3	7.28	8.05	Interbedded silt/clay, fine sand and organics	Multi-colored 5 Y 5/1 Grey to 2.5 4/2 Dark greyish brown and 3/3 Dark olive brown bedded unit of fine-to-coarse sands and

				silt/clay tending to10 Y 3/4 Olive. Rare wood granules and degraded wood pebbles. (Channel fill). Sharp boundary to:
BH3	8.05	8.50	Flint gravel	5 Y 4/2 Olive grey to 5 Y 2.5/1 Black, poorly sorted sandy gravel of medium sand-sized quartz and flint grains and granular-to-medium pebble-sized black flint clasts, sub angular to rounded. (Channel gravel). End of BH.
BH01	0.00	5.80	Diamict	Dark green/grey sandy clay/clayey sand with brick. (Made ground)
BH01	5.80	8.10	Silt/clay with peaty bands	Soft brown PEAT/Grey SILT
BH01	8.10	9.00	Sandy silt/clay	Soft brown sandy CLAY
BH01	9.00	11.30	Gravelly sand	Brown SAND and GRAVEL
BH01	11.30	12.00	Stiff grey clay	Stiff becoming very stiff grey CLAY.
WS1	0.00	4.50	Diamict	Soft dark orange/brown silty CLAY with frequent brick fragments
WS1	4.50	5.45	Silt/clay with organic fragments	Soft dark blue/green silty organic CLAY. End of BH.
WS2	0.00	4.60	Diamict	Orange-brown very fine-to-medium sandy CLAY with fine to medium flints and brick fragments.
WS2	4.60	5.00	Silt/clay with organic fragments	Dark blue/green silty organic CLAY. End of BH.

WS3	0.00	4.40	Diamict	Soft green-brown silty CLAY with much flint and brick.
WS3	4.40	5.45	Silt/clay with organic fragments	Soft dark blue/green silty organic CLAY. End of BH.
WS4	0.00	4.50	Diamict	Soft dark blue/ black sandy ashy CLAY with brick fragments
WS4	4.50	5.45	Silt/clay with organic fragments	Soft dark blue/green silty organic CLAY. End of BH.

Report Title		Report Ref	
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Report written by	Jeremy Mordue BSC ACI*f*A		
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