161 ILDERTON ROAD, LONDON BOROUGH OF SOUTHWARK

Environmental Archaeological Assessment Report

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1. NON-TECHNICAL SUMMARY

A programme of environmental archaeological assessment was undertaken of a borehole sequence from the Ilderton Road site in order (1) to clarify the nature, depth, extent and date of the alluvial sequence; (2) to investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity; (3) to investigate whether the sequences contain any evidence for natural and/or anthropogenic changes to the landscape (wetland and dryland), including those related to sea level change. The results of the geoarchaeological deposit modelling indicate that the sediments recorded at the site were similar to those recorded elsewhere in the Lower Thames Valley, and specifically within the area of Bermondsey Lake. The site lies on the margins of the lower Gravel topography that characterises Bermondsey Lake: The Late Devensian Shepperton Gravel surface falls from *ca*. -1.3m OD towards the north, to *ca*. -3.9m OD towards the south. In the southern area of the site the Gravel is overlain by a sequence of Lateglacial Interstadial and Holocene alluvial sediments, including a sequence of calcareous deposits and peat; towards the north however the Made Ground directly overlies the Sand or Gravel, probably truncating the alluvial sequence.

The accumulation of the calcareous deposits towards the base of the sequence at Ilderton Road began during the earlier part of the Greenland (Windermere) Interstadial; the results of the palaeobotanical assessment for this part of the sequence are indicative of a marsh fen-type environment at this time dominated by sedges, grasses and aquatic taxa, with a lightly wooded wider landscape including dwarf willow shrubs. Later, open birch woodland with willow occupied the surrounding landscape. These assemblages are representative of the pioneer plant communities that one might expect to see at this time, and are very similar to those recorded at the Bramcote Green site during the Lateglacial Interstadial (Thomas & Rackham, 1996). One significant difference between the assemblages is the high values of alder recorded here within the sequence of calcareous/Marl deposits; this result is significant, as the expansion of alder is generally not normally recorded in the British Isles until the early Holocene.

Following the deposition of the Lower Alluvium, a transition towards semi-terrestrial (marshy) conditions is indicated by the presence of peat between *ca*. -1 and -2.5m OD towards the south of the site; this transition occurred during the Late Mesolithic/Early Neolithic, continuing until the Late Bronze Age. Similar dates were recorded for the Holocene peat sequence at Bramcote Green, here recorded at between *ca*. -2.2 and -0.9m OD and of Late Mesolithic through to Late Bronze Age date. During the accumulation of the peat alder carr dominated the floodplain, with mixed deciduous woodland on the surrounding dryland. Although no definitive indicators of human activity are recorded, in the upper part of the sequence values of oak, lime and hazel are reduced, whilst the range of herbaceous taxa increases to include grasses, sedges and disturbed ground taxa, perhaps indicative of woodland clearance in the wider landscape.

The sequence of alluvial deposits at the Ilderton Road site provide an opportunity to examine the environmental history of the Ilderton Road site and its environs in more detail, including during the Lateglacial Interstadial, a period for which very few records exist in the Lower Thames Valley. A programme of environmental archaeological analysis is therefore recommended on the IL-QBH2 sequence from Ilderton Road. Given the proximity of the Early/Middle Bronze Age structures recorded at Bramcote Green, a programme of archaeological evaluation of the site is also recommended. The conjectured alignment of the structures at Bramcote Green is broadly south-southwest/north-northeast and south-southeast/north-northwest, but it should be examined whether any continuation of the archaeological horizons continues within the Holocene peat units at the Ilderton Road site.

2. INTRODUCTION

2.1 Site context

This report summarises the findings arising out of the environmental archaeological assessment undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at 161 Ilderton Road, Southwark (National Grid Reference: centred on 3518 7822; Figures 1 & 2). Quaternary Scientific were commissioned by RPS Planning & Development to undertake the geoarchaeological investigations. The area of investigation at 161 Ilderton Road, Southwark is located on the floodplain of the estuarine Thames, *ca*. 1.5Km to the south of the modern waterfront, and *ca*. 500m north of the higher, drier ground of the gravel terrace. The British Geological Survey (BGS) show the underlying geology here as the Cretaceous Chalk (undifferentiated), overlain by Alluvium, described as 'Clay, Silt, Sand and Peat' (http://mapapps.bgs.ac.uk/geologyofbritain). The site is a linear rectangular plot, covering approximately 0.45 hectares. The site is bounded to the west by Ilderton Road, to the south by Zampa Road and to the east by the Queens Road/South Bermondsey railway line. The site is located within the Archaeological Priority Zone of Bermondsey Lake, as defined by the London Borough of Southwark.

The site itself is projected as lying within an area of lower gravel topography known as Bermondsey Lake (Sidell *et al*., 2002), forming part of the network of Late Devensian/Early Holocene channels and elevated gravel islands that characterises this area. A recent programme of geoarchaeological fieldwork and deposit modelling (Young, 2017) for the site indicated that the sediments at Ilderton Road are similar to those recorded previously within the area of Bermondsey Lake, where organic and calcareous-rich deposits of Late Devensian and Holocene age have previously been recorded (e.g. Thomas & Rackham, 1996). The new deposit model indicated that the Ilderton Road site lies on the margins of the lower Gravel topography that characterises Bermondsey Lake: The Gravel surface falls from *ca*. -1.3m OD towards the north, to *ca*. -3.9m OD towards the south. In the southern area of the site the Gravel is overlain by a sequence of probably Late Devensian/Holocene alluvial sediments, including marl and peat; towards the north however the Made Ground directly overlies the Sand or Gravel, probably truncating the alluvial sequence.

At Bramcote Green, immediately to the west of the present site (Thomas & Rackham, 1996) a sequence of up to 3m of organic-rich alluvial sediments accumulated during the Devensian Late Glacial, followed by a Holocene sequence of clay and peat horizons dated to the Late Mesolithic through to the Late Bronze Age. Within this sequence of clay and peat, two phases of trackway construction were identified, the second of these phases dated to the Middle Bronze Age (Thomas & Rackham, 1996). Here, the underlying gravel topography was recorded at between -1.0 and -5.1m OD, the gravel falling from the western area of the site towards the north (-2.2m OD) and east (-5.1m OD) (Thomas & Rackham, 1996). Similar elevations for the gravel surface have been recorded within the Bankside Channel towards the northeast, where the gravel has been recorded as low as -4.55m OD (see Young, 2015).

2.2 Palaeoenvironmental and archaeological significance

Previous work in this area of Bermondsey Lake (Thomas & Rackham, 1996) indicates that the organic-rich sediments at the Ilderton Road site may date to the Late Devensian and Early to Middle Holocene, with the potential to improve our understanding of the chronology and palaeoenvironmental history of these periods. Furthermore, wooden structures dated to the Bronze Age have been identified in this area, including *ca*. 150m to the west at Bramcote Green (3995-4080 cal BP; Thomas & Rackham, 1996), whilst at the Bricklayer's Arms (Jones, 1991) two Neolithic flint axes, a wooden platform, hearths and horse bones were identified on the margins of the Bermondsey eyot and out in to the adjacent lake basin *ca*. 500m to the west (Sidell *et al*., 2002). The archaeological potential in the area of the elevated Gravel topography towards the north of the site is therefore considered to be relatively high; it should be noted however that in places the Gravel surface may be truncated by the overlying Made Ground, and it is relatively deeply buried at between 2.1 and 4.5m bgl. The archaeological potential of the site is discussed in more detail in RPS (2016).

The sedimentary sequence at Ilderton Road therefore also has good potential to provide evidence of prehistoric and historic human activity on both the wetland and dryland surfaces adjacent to the site, which should be compared with existing evidence for this area of Bermondsey Lake. The geoarchaeological investigations at the site (Young, 2017) have revealed important variations in the height of the gravel surface, and the type, thickness and age of the subsequent Late Devensian/Holocene alluvial deposits within the vicinity of the site. Such variations are significant as they represent different environmental conditions that would have existed in a given location. For example: (1) the varying surface of the Gravel may represent the location of pre-Holocene river terraces, former channels and bars; (2) the presence of peat represents former terrestrial or semi-terrestrial land-surfaces, and (3) the various alluvial units represent periods of changing hydrological conditions. Thus by studying the sub-surface stratigraphy across the site in greater detail, it will be possible to build an understanding of the former landscapes and environmental changes that took place across space and time.

Organic-rich sediments (in particular peat) also have high potential to provide a detailed reconstruction of past environments on both the wetland and dryland. In particular, they provide the potential to increase knowledge and understanding of the interactions between hydrology, human activity, vegetation succession and climate. Significant vegetation changes include the Mesolithic/Neolithic decline of elm woodland, the Neolithic colonisation and decline of yew woodland; the Late Neolithic/Early Bronze Age growth of elm on Peat, and the general decline of wetland and dryland woodland during the Bronze Age. Such investigations are carried out through the assessment/analysis of palaeoecological remains (e.g. pollen, plant macrofossils & insects) and radiocarbon dating.

Finally, areas of high gravel topography, soils and peat represent potential areas that might have been utilised or even occupied by prehistoric people, evidence of which may be preserved in the archaeological (e.g. features and structures) and palaeoenvironmental record (e.g. changes in vegetation composition).

2.3 Aims and objectives

Given the potential of the sediments for reconstructing the environmental history of the site and its environs, and the uncertain nature of the chronology of the sediments, a programme of environmental archaeological assessment was recommended on the sequence from borehole IL-QBH2 (see Young, 2017). The aims of the environmental archaeological assessment were:

1. To clarify the nature, depth, extent and date of the alluvial sequence;
2. To investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity;
3. To investigate whether the sequences contain any evidence for natural and/or anthropogenic changes to the landscape (wetland and dryland), including those related to sea level change;
4. To integrate the new geoarchaeological record with other recent work in the local area for publication in an academic journal.

The environmental archaeological assessment was undertaken in order to address the first three of these aims, making recommendations for any further analysis and/or publication of the results.

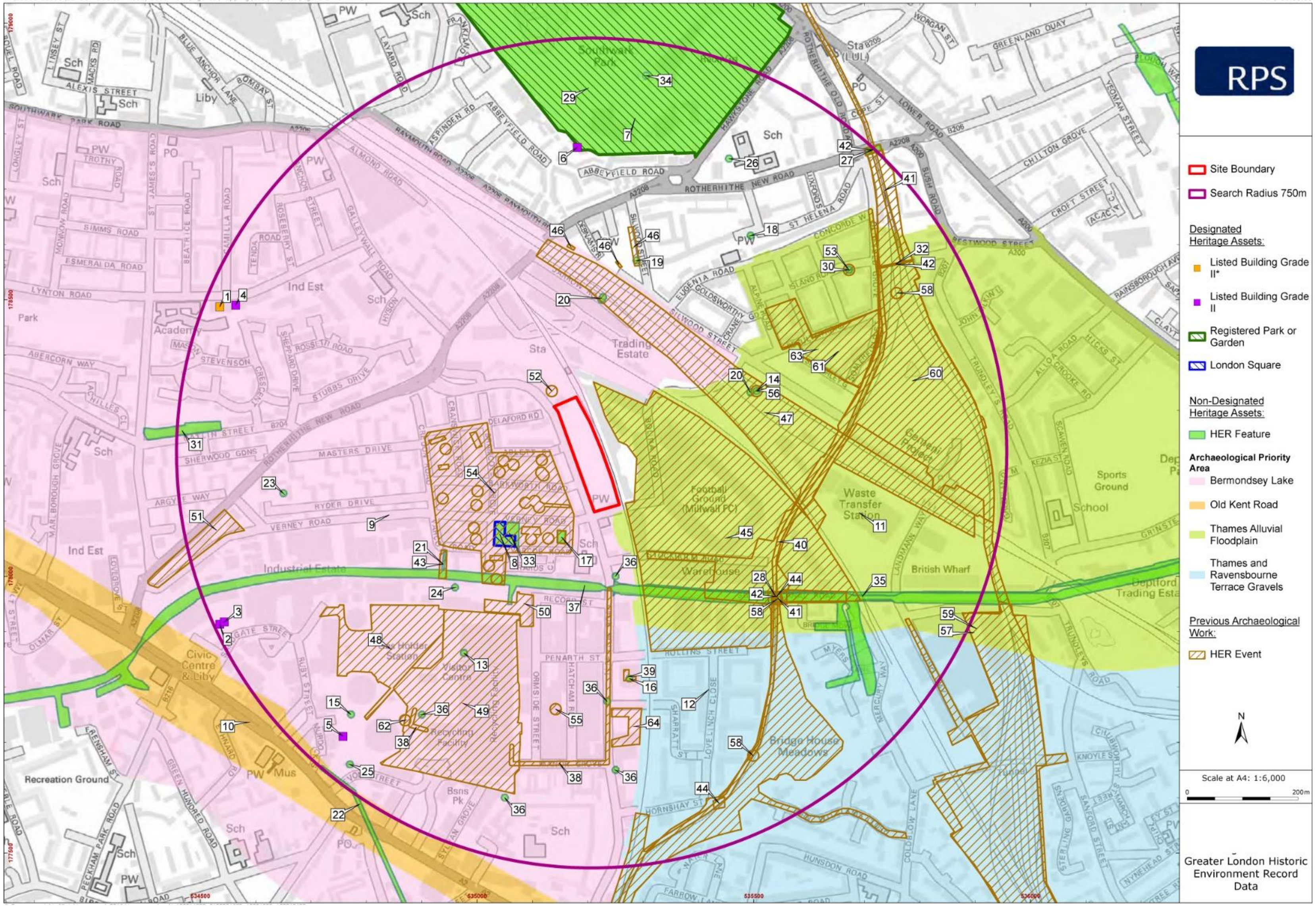

Figure 1: Location of Ilderton Road, Southwark with Greater London Historic Environment data (figure provided by RPS, 2016). Site details shown in Appendix 1.

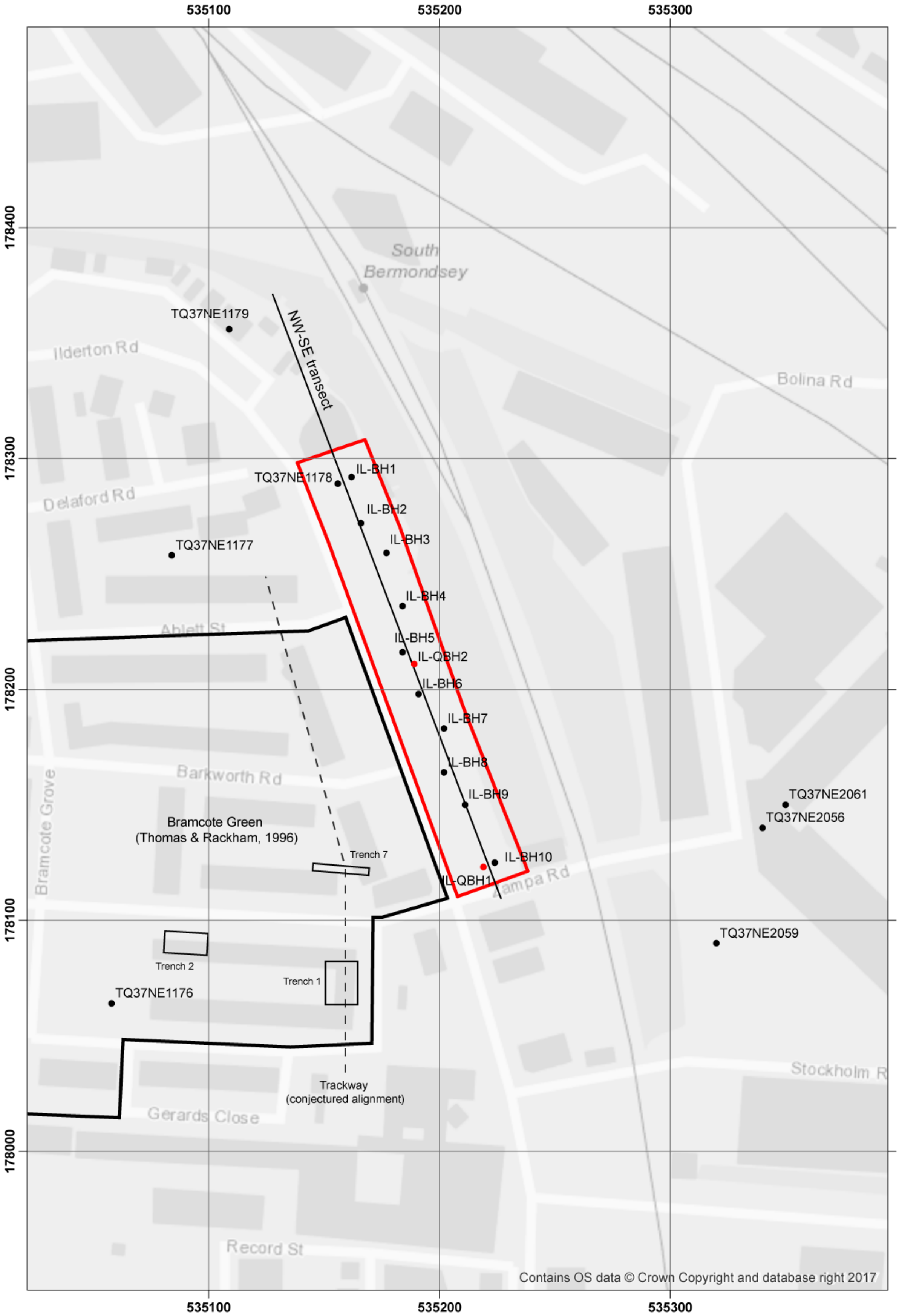

Figure 2: Location of the new geoarchaeological boreholes (IL-QBH1 and IL-QBH2) at 161 Ilderton Road, Southwark, and existing geotechnical/geoarchaeological boreholes at the site and within the wider area (see Table 1). Alignment of the northwest-southeast transect (see Figure 3) also shown. Conjectured alignment of the trackway at Bramcote Green also shown (Thomas & Rackham, 1996).

3. METHODS

3.1 Previous investigations (field investigations and deposit modelling)

The results of the previous field investigations and geoarchaeological deposit modelling were reported in Young (2017). Two geoarchaeological borehole (boreholes IL-QBH1 and IL-QBH2) were put down at the site in October 2017 (Figure 2). The borehole core samples were recovered using an Eijkelkamp window sampler and gouge set using an Atlas Copco TT 2-stroke percussion engine. This coring technique is a suitable method for the recovery of continuous, undisturbed core samples and provides sub-samples suitable for not only sedimentary and microfossil assessment and analysis, but also macrofossil analysis. The borehole locations were obtained using a Leica Differential GPS (see Table 1). The lithostratigraphy of the core samples was described in the laboratory using standard procedures for recording unconsolidated sediment and organic sediments, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts) (Tröels-Smith, 1955). The procedure involved: (1) cleaning the sample using a scalpel; (2) recording the physical properties, most notably colour using a Munsell Soil Colour Chart; (3) recording the composition; gravel (Grana glareosa; Gg), fine sand (Grana arenosa; Ga), silt (Argilla granosa; Ag) and clay (Argilla steatoides); (4) recording the degree of peat humification and (5) recording the unit boundaries e.g. sharp or diffuse. The results of the geoarchaeological description of the boreholes are displayed in Tables 2 and 3.

The deposit model, incorporating the present site and a limited number of available boreholes from the wider area, was based on a review of 19 geotechnical and geoarchaeological records, incorporating the two new geoarchaeological boreholes, ten geotechnical logs provided by RSK (2016) and seven BGS archive boreholes (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) (see Figure 2). Sedimentary units from the boreholes were classified into five groupings: (1) Gravel, (2) Lower Alluvium/Marl Deposits. (3) Peat, (4) Upper Alluvium and (5) Made Ground. The classified data for groups 1-5 were then input into a database with the RockWorks 16 geological utilities software. Models of surface height were generated for the Gravel (Figure 4), Lower Alluvium (Figure 5), Peat (Figure 6) and Upper Alluvium (Figure 8). Thickness of the Peat (Figure 7), combined Holocene alluvial sequence (Figure 9) and Made Ground (Figure 10) were also modelled (also using a nearest neighbour routine). A two-dimensional northwest-southeast transect is shown in Figure 3.

Although the boreholes at the present site are linearly distributed over the area of investigation, the reliability of the models generated using RockWorks is variable. In general, reliability improves from outlying areas where the models are largely supported by scattered archival records towards the core area of boreholes. In addition, because of the 'smoothing' effect of the modelling procedure, the modelled levels of stratigraphic contacts may differ slightly from the levels recorded in borehole logs and section drawings. As a consequence of this the modelling procedure has been manually adjusted so that only those areas for which sufficient stratigraphic data is present will be modelled. In order to achieve this, a maximum distance cut-off filter equivalent to a 50m radius around each record is applied to all deposit models. Finally, it is important to recognise that multiple sets of boreholes are represented, put down at different times and recorded using different descriptive terms and subject to differing technical constraints in terms of recorded detail including the exact levels of the stratigraphic boundaries.

Table 1: Borehole attributes for those records used in the deposit model, 161 Ilderton Road, Southwark

Name	Easting	Northing	Elevation (m OD)
New geoarchaeological borehole			
IL-QBH1	535219.00	178123.00	1.20
IL-QBH2	535189.00	178211.00	1.20
Existing geotechnical boreholes (RSK,2016)			
IL-BH1	535156.00	178289.00	1.49
IL-BH2	535166.00	178272.00	1.38
IL-BH3	535177.00	178259.00	1.01
IL-BH4	535184.00	178236.00	1.49
IL-BH5	535184.00	178216.00	1.18
IL-BH6	535191.00	178198.00	1.32
IL-BH7	535202.00	178183.00	1.23
IL-BH8	535202.00	178164.00	1.22
IL-BH9	535211.00	178150.00	1.14
IL-BH10	535224.00	178125.00	1.19
BGS archive boreholes (http://mapapps.bgs.ac.uk/geologyofbritain/home.html)			
TQ37NE1176	535058.00	178064.00	0.91
TQ37NE2059	535320.00	178090.00	1.10
TQ37NE2056	535340.00	178140.00	0.66
TQ37NE2061	535350.00	178150.00	0.80
TQ37NE1177	535084.00	178258.00	0.91
TQ37NE1178	535162.00	178292.00	0.91
TQ37NE1179	535109.00	178356.00	0.76

3.2 Organic matter and calcium carbonate determinations

A total of 36 subsamples from borehole QBH2 were taken for determination of the organic matter and calcium carbonate ($CaCO_3$) content (Table 4; Figure 11). These records were important as they can identify increases in organic matter possibly associated with more terrestrial conditions, and can quantify the concentrations of calcium carbonate recognised in the lithostratigraphic descriptions. The organic matter content was determined by standard procedures involving: (1) drying the sub-sample at 110^{0}C for 12 hours to remove excess moisture; (2) placing the sub-sample in a muffle furnace at 550°C for 2 hours to remove organic matter (thermal oxidation), and (3) re-weighing the sub-sample obtain the 'loss-on-ignition' value. The samples were then re-weighed after 2 hours at 950°C for determination of the calcium carbonate content (see Bengtsson & Enell, 1986). The samples were then re-weighed after 2 hours at 950°C for determination of the calcium carbonate content (see Bengtsson and Enell, 1986). In order to determine the calcium carbonate concentration, the same sample is reheated to 950°C for two hours; the sample is re-weighed and the difference between the organic matter content and calcium carbonate values determined.

3.3 Radiocarbon dating

Three subsamples of twig wood (<5 growth rings) were extracted from the base and near the top of the peat, and from towards the base of the Lower Alluvium/Marl, in borehole QBH2 for radiocarbon dating. No material suitable for dating was encountered from the uppermost samples from the peat. The samples were submitted for AMS radiocarbon dating to the BETA Analytic Radiocarbon Dating Facility, Miami, Florida. The results have been calibrated using OxCal v4.2 (Bronk Ramsey, 1995; 2001 and 2007) and the IntCal13 atmospheric curve (Reimer *et al.*, 2013). The results are displayed in Figure 11 and in Table 5.

3.4 Pollen assessment

Seventeen subsamples were extracted for an assessment of pollen content. The pollen was extracted as follows: (1) sampling a standard volume of sediment (1ml); (2) adding two tablets of the exotic clubmoss *Lycopodium clavatum* to provide a measure of pollen concentration in each sample; (3) deflocculation of the sample in 1% Sodium pyrophosphate; (4) sieving of the sample to remove coarse mineral and organic fractions (>125μ); (5) acetolysis; (6) removal of finer minerogenic fraction using Sodium polytungstate (specific gravity of 2.0g/cm^3); (7) mounting of the sample in glycerol jelly. Each stage of the procedure was preceded and followed by thorough sample cleaning in filtered distilled water. Quality control is maintained by periodic checking of residues, and assembling sample batches from various depths to test for systematic laboratory effects. Pollen grains and spores were identified using the University of Reading pollen type collection and the following sources of keys and photographs: Moore *et al* (1991); Reille (1992). The assessment procedure consisted of scanning the prepared slides, recording the concentration and preservation of pollen grains and spores, and the principal taxa on four transects (10% of the slide) (Table 6).

3.5 Diatom assessment

A total of six samples from borehole QBH2 were submitted for an assessment of diatom presence. 0.5g of sediment was required for the diatom sample preparation. All samples were first treated with sodium hexametaphosphate and left overnight, to assist in minerogenic deflocculation. Samples were then treated with hydrogen peroxide (30% solution) to remove organic material. Samples were finally sieved using a 10μm mesh to remove fine minerogenic sediments. The residue was transferred to a plastic vial, from which a slide was prepared for subsequent assessment. A minimum of four slide traverses were undertaken across each slide sample. The concentration and preservation of diatoms was recorded for each sample, along with the relative diversity of the assemblage where diatoms were recorded. The results of the assessment are shown in Table 7.

3.6 Macrofossil assessment

A total of ten small bulk samples from borehole QBH2 were extracted and processed for the recovery of macrofossil remains, including waterlogged plant macrofossils, wood, insects and Mollusca (Table 8). The samples were focussed on the organic/calcium carbonate-rich units within the Lower Alluvium/Marl (three samples) and the peat (seven samples). The extraction process involved the following procedures: (1) measuring the sample volume by water displacement, and (2) processing the sample by wet sieving using 125μm (Lower Alluvium/Marl), 300μm (peat) and 1mm mesh sizes. Each sample was scanned under a stereozoom microscope at x7-45 magnifications, and sorted into the different macrofossil classes. The concentration and preservation of remains was estimated for each class of macrofossil (Table 8). Preliminary identifications of the waterlogged seeds (Table 9) have been made using modern comparative material and reference atlases (e.g. NIAB, 2004; Cappers *et al.* 2006). Nomenclature used follows Stace (2005).

4. RESULTS & INTERPRETATION OF THE GEOARCHAEOLOGICAL FIELD INVESTIGATIONS, DEPOSIT MODELLING & RADIOCARBON DATING

The results of the lithostratigraphic description of boreholes IL-QBH1 and IL-QBH2 have been reported previously (Young, 2017) and are shown in Tables 2 and 3, with the results of the deposit modelling displayed in Figures 3 to 10. Figure 3 is a two-dimensional northwest-southeast transect of selected boreholes across the site and wider area; Figures 4 to 10 are surface elevation and thickness models for each of the main stratigraphic units. The results of the deposit modelling indicate that the number and spread of the logs is sufficient to permit modelling with a reasonable level of certainty across the site (Figure 2; see Young, 2017).

The full sequence of sediments recorded in the boreholes comprises:

Made Ground – widely present
Upper Alluvium – widely present
Peat – present in the southern area of the site
Lower Alluvium/Marl deposits – locally present towards the south of the site
Sand – locally present; confined to areas of lower Gravel topography
Gravel (Shepperton Gravel) – widely present

4.1 Shepperton Gravel

The Shepperton Gravel was present in all the boreholes that penetrated to the bottom of the Holocene sequence. It was deposited during the Late Glacial (15,000 to 10,000 years before present) and comprises the sands and gravels of a high-energy braided river system which, while it was active would have been characterised by longitudinal gravel bars and intervening low-water channels in which finer-grained sediments might have been deposited. Such a relief pattern would have been present on the valley floor at the beginning of the Holocene when a lower-energy fluvial regime was being established.

The surface of the Gravel (see Figures 3 and 4) is recorded at Ilderton Road at between -1.31 (IL-BH1) and -3.92m OD (IL-BH5); in general the surface of the Gravel slopes downwards towards the south, although the deepest level is recorded in IL-BH5 towards the centre of the site. A higher level is recorded in IL-BH7 (-2.77m OD), although adjacent boreholes indicate a lower level more consistent with the general trend in the southern area of the site.

Beyond the margins of the site, the Gravel is recorded at similar levels in boreholes TQ37NE1176/1177 towards the west (see Figure 4); slightly deeper levels are recorded towards the southeast in boreholes TQ37NE2056/2061 (-4.24 and -4.20m OD respectively), although borehole TQ37NE2059 shows the surface of the Gravel rising to -2.6m OD just to the south. The topography of the Gravel surface in the area of the site is thus consistent with its presence on the margins of the area identified as Bermondsey Lake (see Sidell *et al*., 2002; Thomas & Rackham, 1996), an area of lower Gravel topography forming part of the network of Late Devensian/Early Holocene channels and elevated gravel islands that characterises this area of Southwark and Lambeth. Within the area of Bermondsey Lake and immediately to the west of the site at Bramcote Green (Thomas & Rackham, 1996) the Gravel surface was recorded at between -1.0 and -5.1m OD, the gravel falling from the western area of the site towards the north (-2.2m OD) and east (-5.1m OD) (Thomas & Rackham, 1996). Similar elevations for the gravel surface have been recorded within the Bankside Channel towards the northeast, where the gravel has been recorded as low as -4.55m OD (see Young, 2015).

4.2 Sand

A unit of sand was identified overlying the Gravel in three boreholes from the present site (IL-BH3, BH4 and BH10). This unit probably forms a remnant of the sandy sediments deposited under fluvial conditions at the site, perhaps during the Early Holocene. It should be noted however that its absence elsewhere in the existing geotechnical borehole logs could be a result of the difficulty identifying sand units within the silty and sandy Lower Alluvium, due to the nature of the coring methods and different methods of description adopted by geotechnical units.

4.3 Lower Alluvium/Marl deposits

The deposits of the Lower Alluvium/Marl rest directly on the Shepperton Gravel or Sand and are only recorded over the lower Gravel topography in the southern area of the site (IL-BH5, BH9, QBH1 and QBH2) (Figure 5). For deposit modelling purposes these units are combined, since they generally lie at similar elevations, and are difficult to differentiate in the geotechnical logs. However, the calcareous-rich (marl) deposits appear to be confined to the lower part of the sequence, between *ca*. -2.95 and -3.7m OD.

The deposits of the Lower Alluvium are predominantly silty, tending to become increasingly coarse (sandy) downward in most sequences. The Lower Alluvium frequently contains detrital wood or plant remains, and in many cases, is described as organic and with occasional Mollusca (generally varying between *ca*. 10 and 30% organic content in borehole IL-QBH2; Table 4). In both of the new geoarchaeological boreholes units of marl-rich (calcareous) sediment are recorded at the base of the sequence, at between -2.80 and -3.42m OD in IL-QBH1 and at 2.95 to -3.11 and -3.35 to -3.52m OD in IL-QBH2. In IL-QBH2 the calcium carbonate content in the Lower Alluvium/Marl generally varies between *ca*. 10 and 50%, with greater concentrations present in the Marl-rich units between -2.95 to -3.11 and -3.27 to -3.52m OD.

Both the Lower Alluvium and marl are indicative of deposition during the Late Devensian/Early Holocene, as the main course of the Thames became confined to a single meandering channel. During this period, the surface of the Shepperton Gravel was progressively buried beneath the sandy and silty flood deposits of the river. The richly-organic nature of the Lower Alluvium suggests that this was a period during which the valley floor was occupied by a network of actively shifting channels, with a drainage pattern on the floodplain that was still largely determined by the relief on the surface of the underlying Shepperton Gravel. The lower calcareous deposits (marl) are indicative of accumulation in a calcareous lake or low-energy stream, generally under still or slack-water conditions; such deposits dated to the Late Devensian period have previously been identified at Bramcote Green immediately to the west (Thomas & Rackham, 1996) in the area identified as Bermondsey Lake. The results of the radiocarbon dating of an organic unit within this sequence of marl/organic sediments (-3.47 to -3.52m OD) indicates that the accumulation of this unit began by *ca*. 13,830 to 14,140 cal BP (11,880 to 12,190 cal BC), placing it within the earlier part of the Greenland (Windermere) Interstadial (GI-1e /GI-1d of the GRIP ice-core record, see Björck *et al*., 1998). At Bramcote Green (Thomas & Rackham, 1996) a radiocarbon date obtained at -3.07 to -3.13m OD, located towards the top of the calcareous (marl) sediments, recorded an age of 12,740-13,035 cal BP (10,790-11,085 cal BC), placing it in the latter part of the Greenland Interstadial (GI-1a); It is therefore possible that the calcareous (marl) sediments recorded at the Bramcote Green and Ilderton Road sites represent a continuous period of accumulation during this Interstadial.

The surface of the Lower Alluvium (Figure 5) is variable, its surface generally following the topography of the underlying Gravel: within the area of the Ilderton Road site it lies at between -1.82 (IL-BH5) and -2.38m OD (IL-QBH2); at Bramcote Green it was recorded at *ca*. -1.9 to 2.2m OD (Thomas & Rackham, 1996). Due to a void core between 3 and 4m below ground level (bgl) in IL-QBH1 the level of the contact between the peat and Lower Alluvium is unclear, although this is present somewhere between -1.80 and -2.80m OD.

4.4 Peat

Recorded in six of the 12 boreholes and limited to the southern area of the site, and generally directly overlying the Lower Alluvium, is a unit of peat described as either herbaceous or woody and in places silty. The surface of this unit is relatively even, generally recorded at about -1m OD (Figure 6) within the area of the site. The Peat is between 1.9 (IL-BH7) and 0.7m thick (IL-BH9) (Figure 7). The results of the loss-on-ignition analysis (see Table 4) indicate that frequent influxes of mineral sediment occurred during the accumulation of the lower part of the peat (-1.80 to -2.38; *ca*. 10-40% organic content). Between -1.08 to -1.80 a more stable peat surface is indicated, with organic content of between *ca*. 60 and 80% (see Figure 11).

Significantly, the peat is indicative of a transition towards semi-terrestrial (marshy) conditions, supporting the growth of either saltmarsh, sedge fen/reed swamp and/or woodland plant communities. Such semi-terrestrial conditions may have represented former land surfaces that might have been utilised by prehistoric people. The results of the radiocarbon dating of the base of this unit (-2.33 to -2.38m OD) indicate that the accumulation began at *ca*. 6015 to 6280 cal BP (4065 to 4330 cal BC), during the Late Mesolithic/Early Neolithic). A radiocarbon date obtained from -1.20 to -1.25m OD, near the top of the peat, indicates that peat cessation probably occurred shortly after 3010 to 3230 cal BP (1060 to 1280 cal BC; Late Bronze Age). At Bramcote Green the peat sequence, recorded at between *ca*. -2.2 and -0.9m OD towards the east of the site, was also of Late Mesolithic through to Late Bronze Age date (*ca*. 6680-7265 cal BP to 2975-3340 cal BP; see Thomas & Rackham, 1996). Within this sequence of clay and peat two phases of trackway construction were identified, the second of these phases dated to the Middle Bronze Age (Thomas & Rackham, 1996).

4.5 Upper Alluvium

The Upper Alluvium was recorded in selected sequences towards the south of the site, generally resting on the Peat (or in one sequence, the Shepperton Gravel). Towards the north this unit is not present (IL-BH1-BH4, BH6), and it appears to have been entirely truncated by the overlying Made Ground, which directly overlies the Sand or Gravel units. The deposits of the Upper Alluvium are described as predominantly silty or clayey and very occasionally organic-rich. The surface of the Alluvium (Figure 8) is relatively even where it is not truncated, generally lying at between -0.8 and -1.2 OD. The sediments of the Alluvium are indicative of deposition within low energy fluvial and/or semi-aquatic conditions during the Holocene. The high mineral content of the sediments may reflect increased sediment loads resulting from intensification of agricultural land use from the later prehistoric period onward, combined with the effects of rising sea level.

The combined Holocene alluvial sequence, incorporating the Lower Alluvium, Sand, Peat and Upper Alluvium, is generally recorded in thicknesses of between *ca*. 2 and 2.5m across the southern area of the site (Figure 9). Greater thicknesses are found where the Gravel topography is lower.

4.6 Made Ground

Between *ca*. 2 and 4.5m of Made Ground caps the sequence across the site, with greater thicknesses generally recorded towards the north where it directly overlies the Sand or Shepperton Gravel (see Figures 3 and 10).

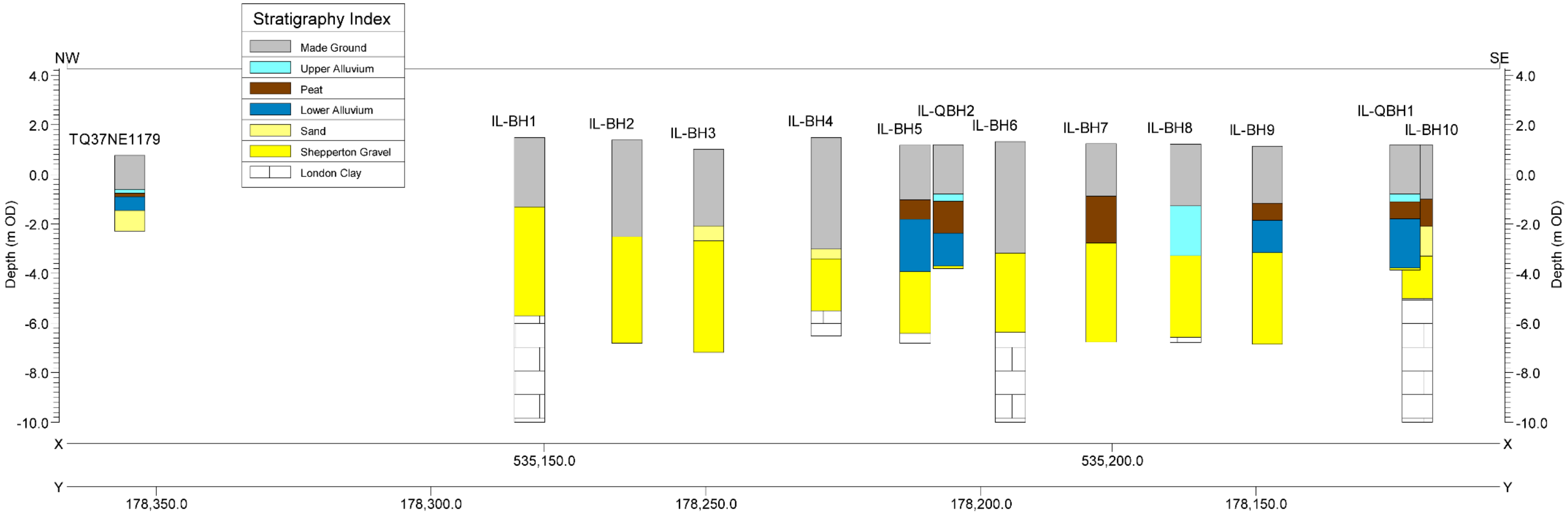

Figure 3: Northwest-southeast transect of selected boreholes across the Ilderton Road site

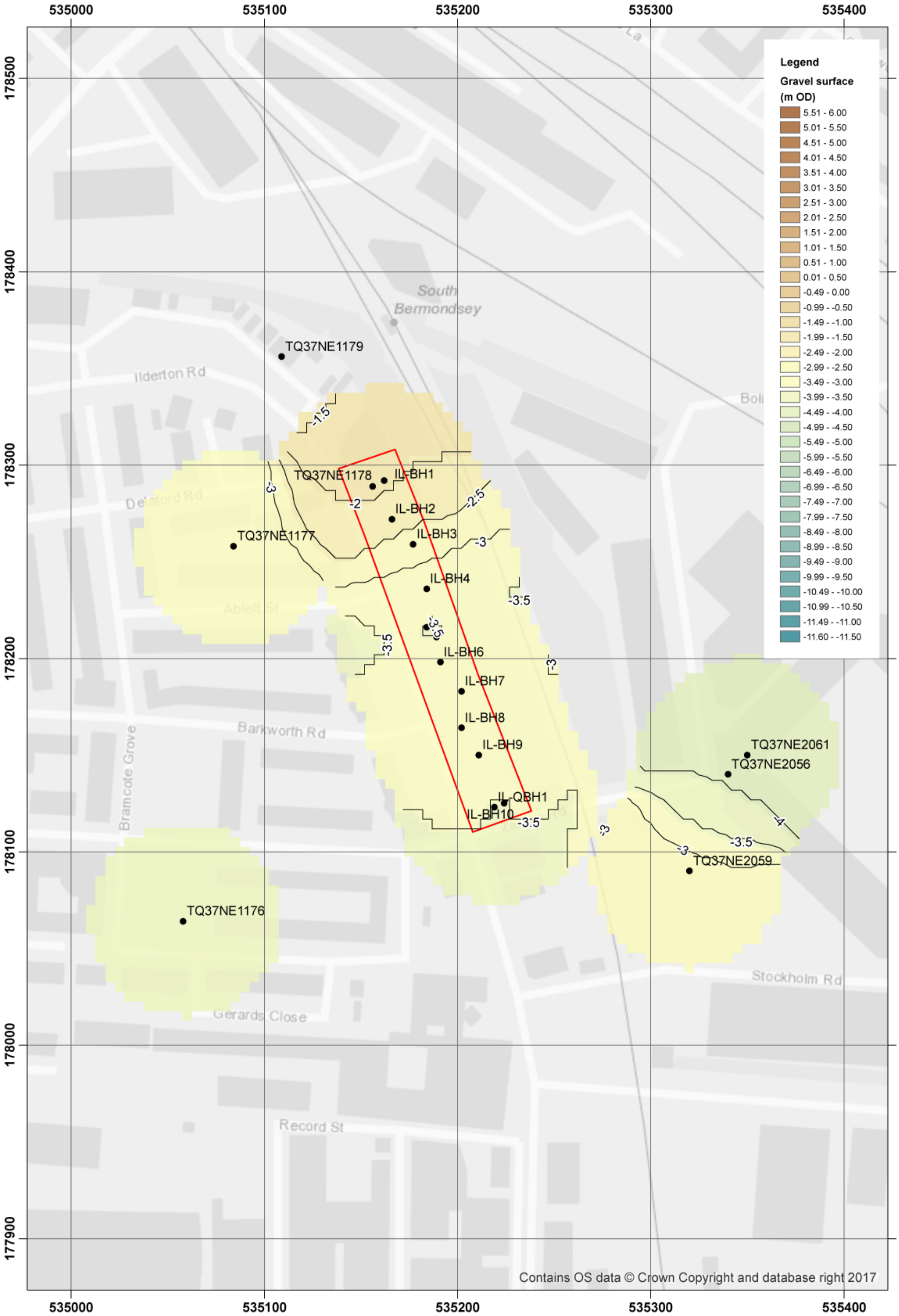

Figure 4: Top of the Shepperton Gravel (m OD) (site outline in red).

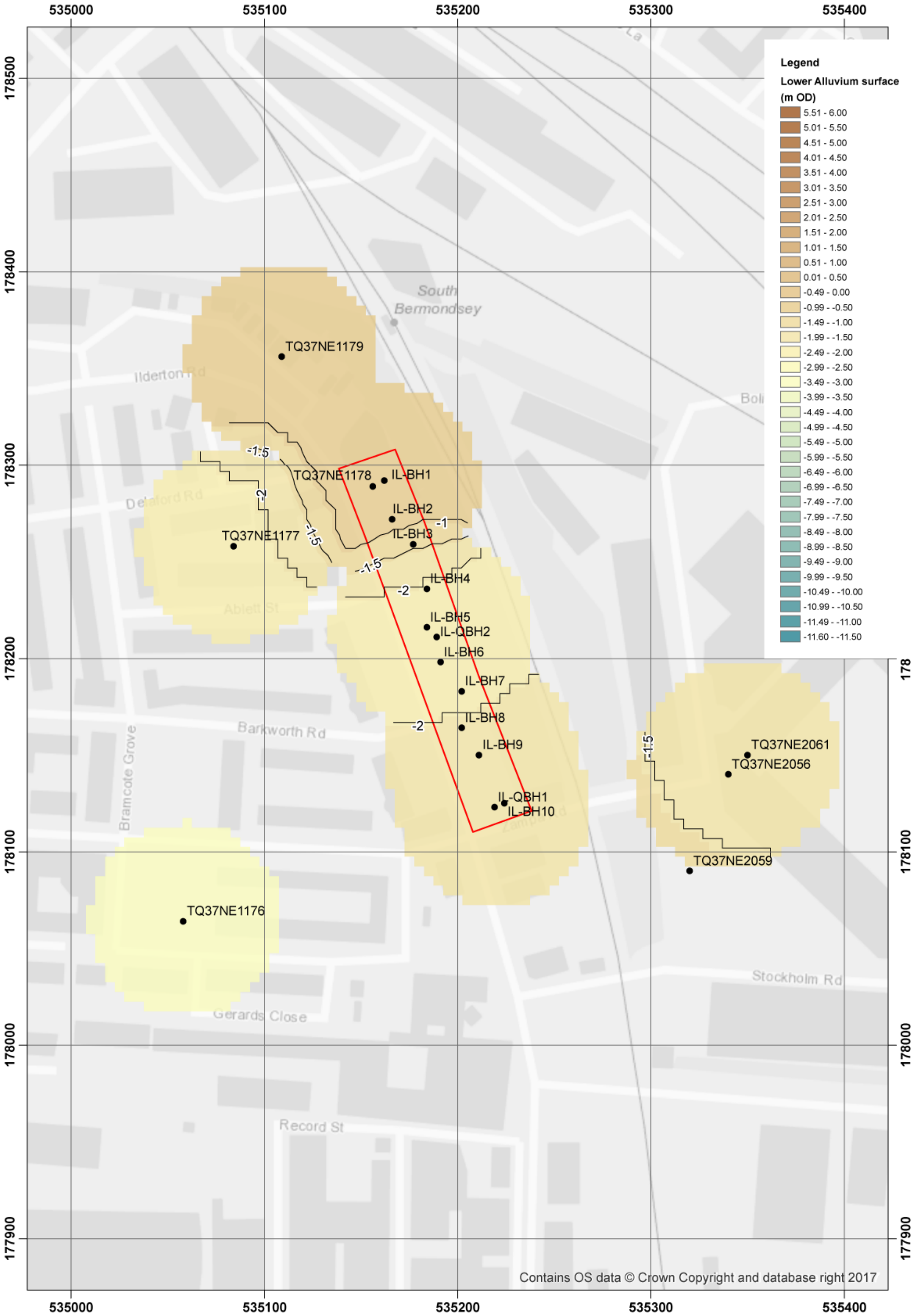

Figure 5: Top of the Lower Alluvium (m OD) (site outline in red).

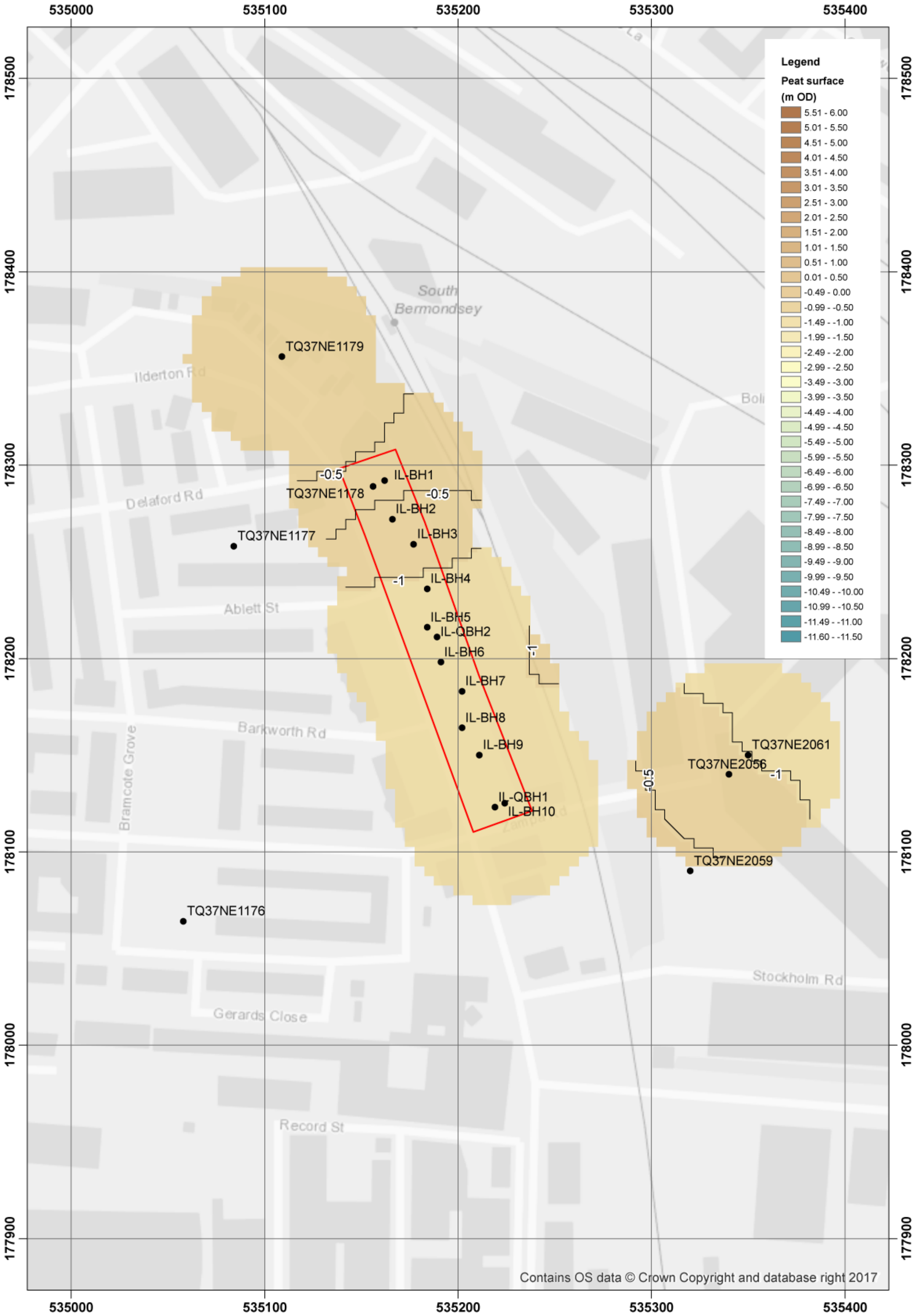

Figure 6: Top of the Peat (m OD) (site outline in red).

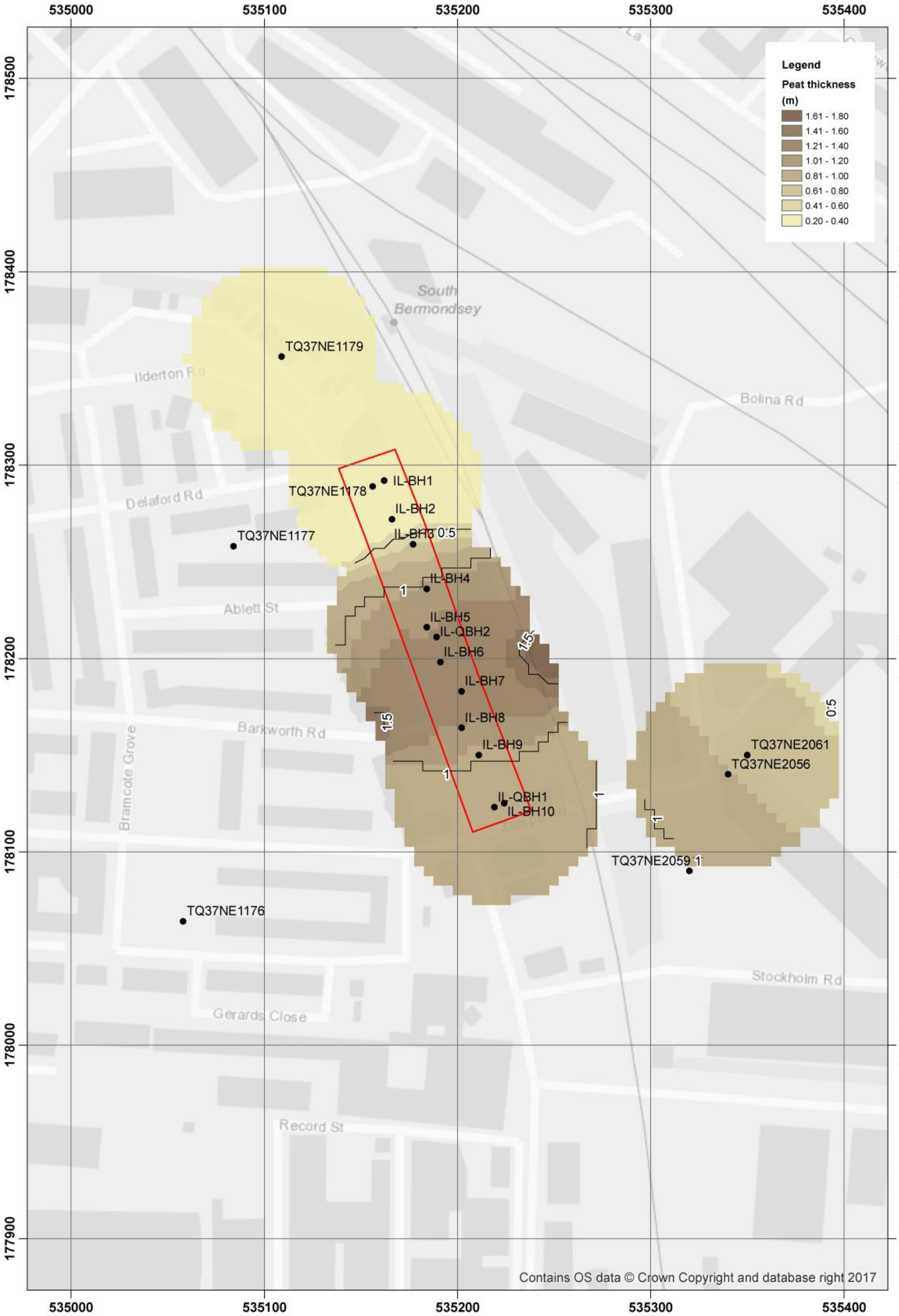

Figure 7: Thickness of the Peat (m) (site outline in red).

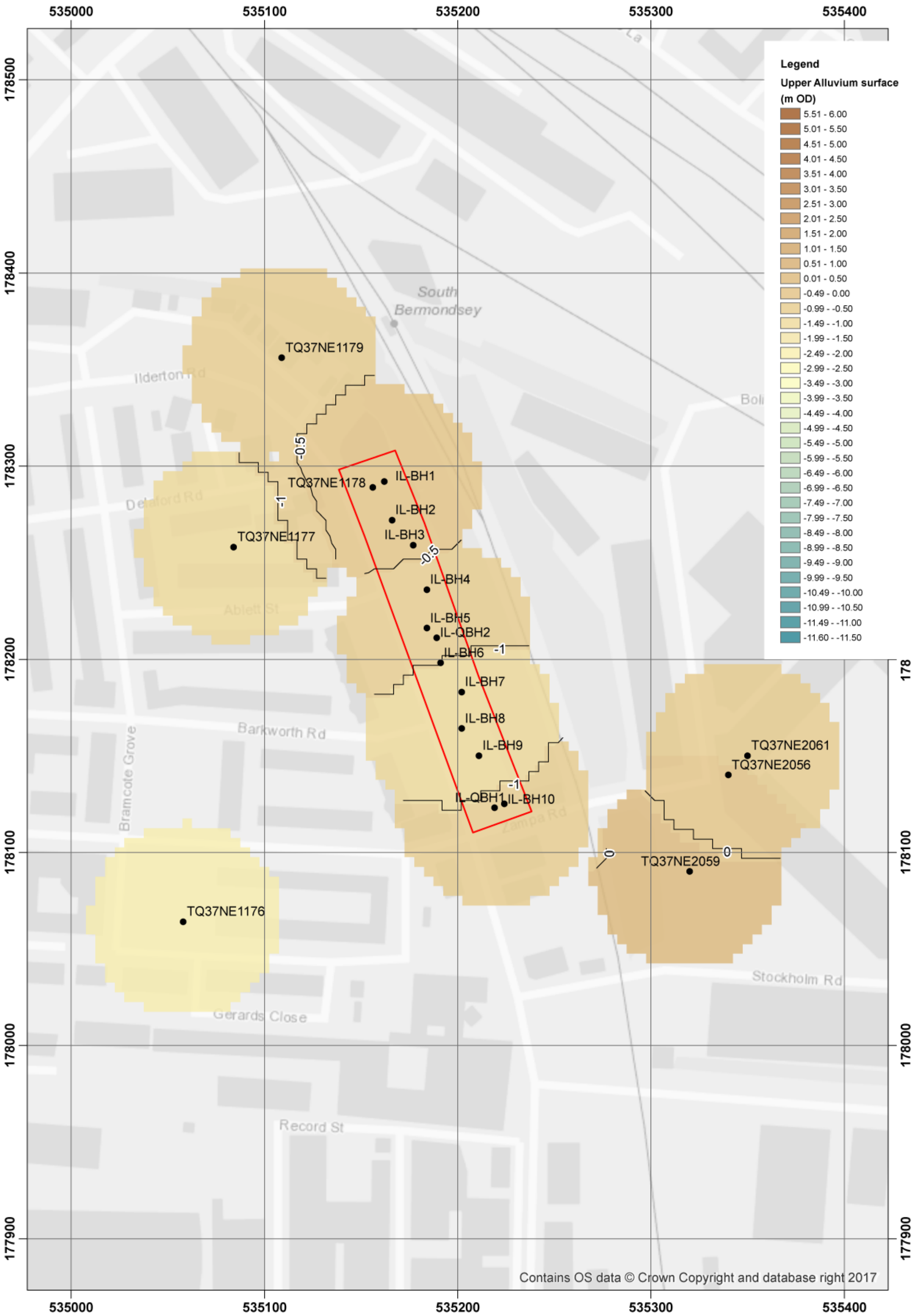

Figure 8: Top of the Upper Alluvium (m) (site outline in red).

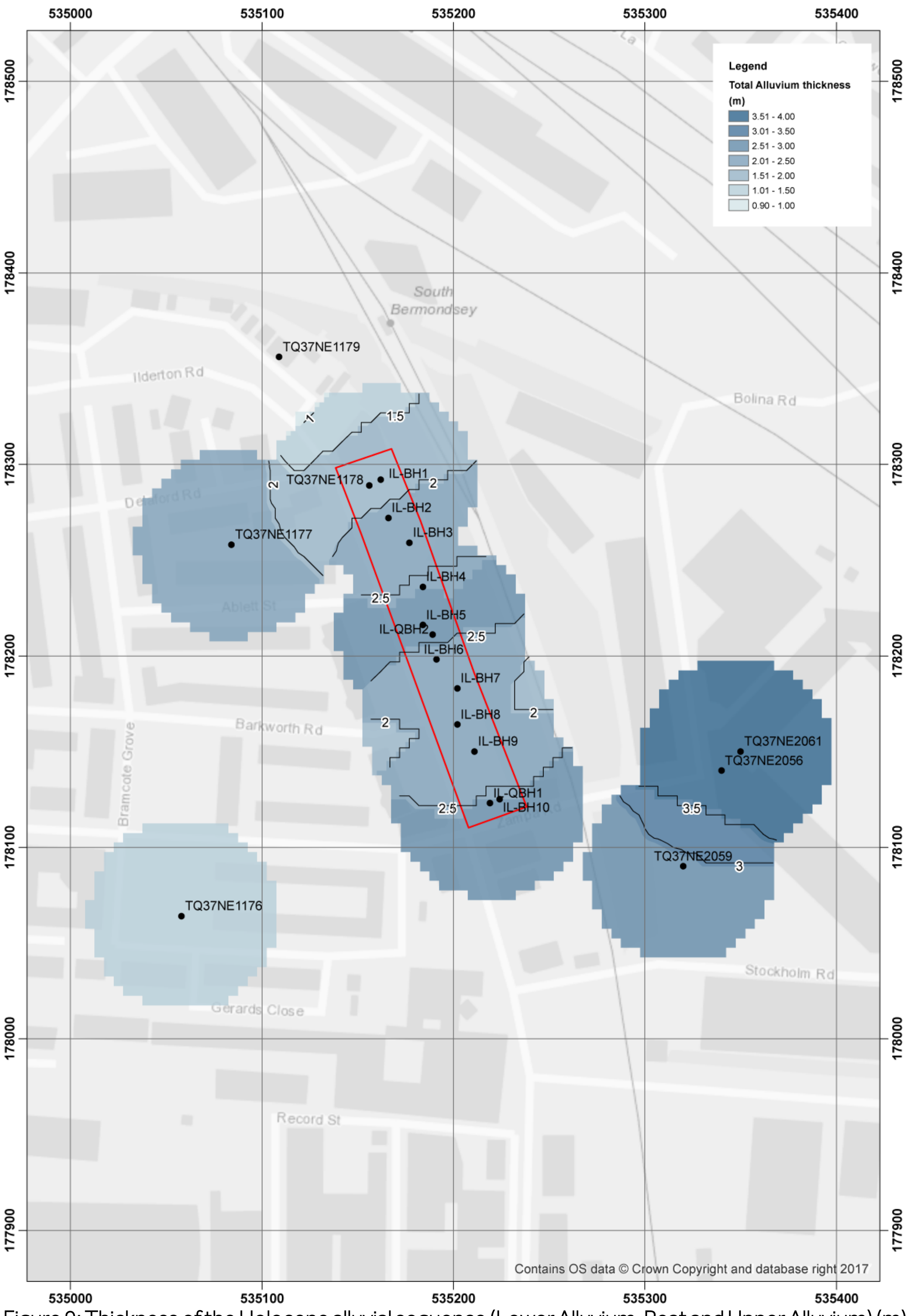

Figure 9: Thickness of the Holocene alluvial sequence (Lower Alluvium, Peat and Upper Alluvium) (m) (site outline in red).

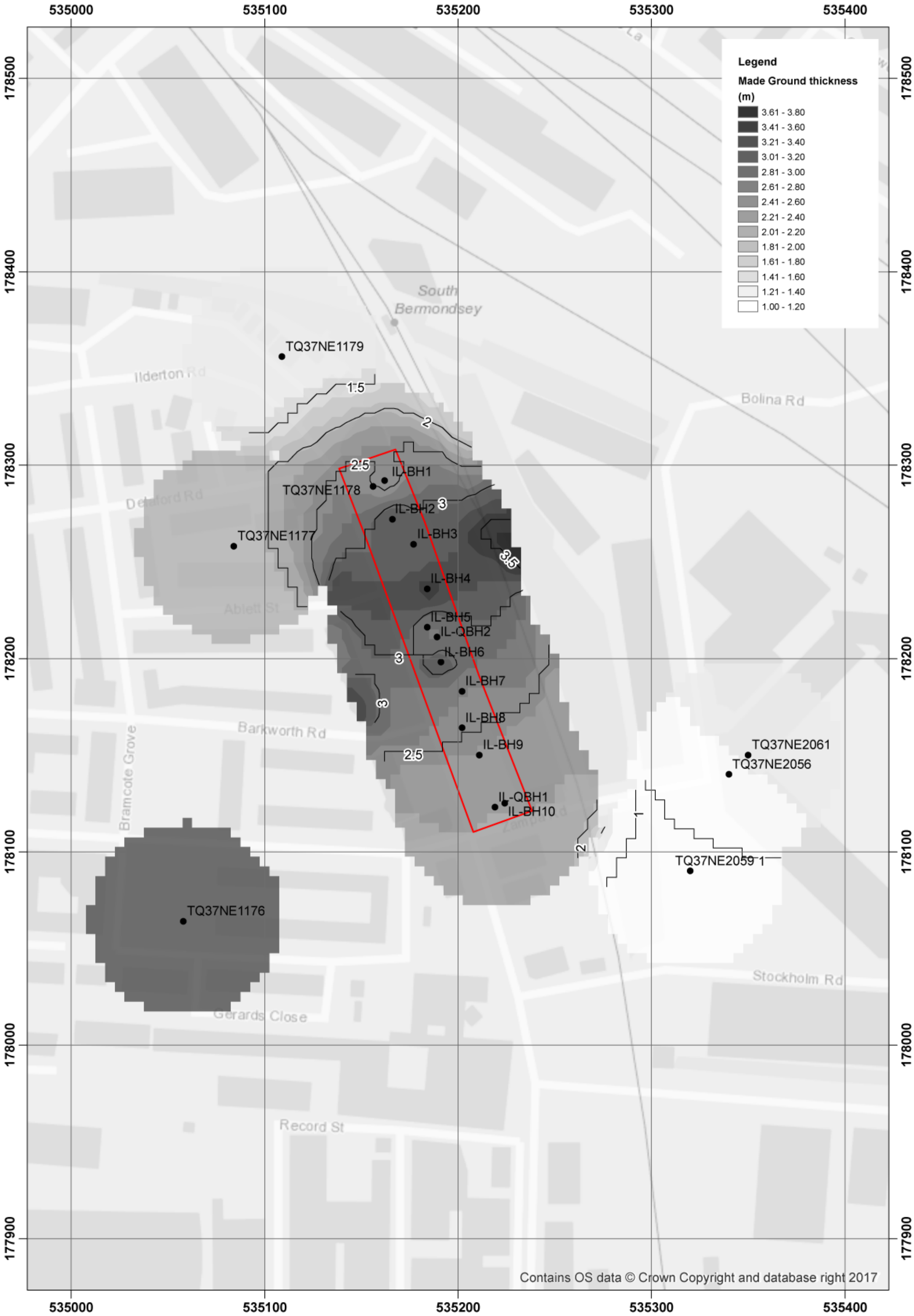

Figure 10: Thickness of Made Ground (m) (site outline in red).

Table 2: Lithostratigraphic description of borehole QBH1, 161 Ilderton Road, Southwark

Depth (m OD)	Depth (m bgl)	Description	Stratigraphic group
1.20 to -0.80	0.00 to 2.00	Made Ground of tarmac over concrete and brick rubble.	MADE GROUND
-0.80 to -0.94	2.00 to 2.14	2.5Y 4/2; As3 Ag1; dark greyish brown silty clay with some orange mottling. Very diffuse contact in to:	UPPER ALLUVIUM
-0.94 to -1.11	2.14 to 2.31	10YR 3/1; Ag3 Sh1; very dark grey organic silt. Diffuse contact in to:	
-1.11 to -1.80	2.31 to 3.00	10YR 2/1; Sh2 Th^{3}1 Ag1; humo. 3; black well humified herbaceous, silty peat.	PEAT
-1.80 to -2.80	3.00 to 4.00	VOID	VOID
-2.80 to -3.42	4.00 to 4.62	10YR 3/1; Lc2 Ag1 As1 Ga+; very dark grey clayey, silty marl with a trace of sand. Frequent Mollusca fragments. Sharp contact in to:	LOWER ALLUVIUM/MARL
-3.42 to -3.53	4.62 to 4.73	10YR 3/1; Ag3 As1 Sh+ Lc+; very dark brown clayey silt with traces of organic matter and calcareous lake mud. Some Mollusca fragments. Sharp contact in to:	
-3.53 to -3.78	4.73 to 4.98	2.5Y 5/2; Ag3 As1 Ga+; greyish brown clayey silt with a trace of sand. Diffuse contact in to:	
-3.78 to -3.80	4.98 to 5.00	Gg2 Ag2; silt and gravel. Clasts are flint, sub-angular to rounded, up to 15mm in diameter.	SHEPPERTON GRAVEL

Table 3: Lithostratigraphic description of borehole QBH2, 161 Ilderton Road, Southwark

Depth (m OD)	Depth (m bgl)	Description	Stratigraphic group
1.20 to -0.80	0.00 to 2.00	Made Ground of tarmac over concrete and brick rubble in matrix of grey silty clay.	MADE GROUND
-0.80 to -1.08	2.00 to 2.28	10YR 4/1; As2 Ag2; dark grey clay and silt. Very diffuse contact in to:	UPPER ALLUVIUM
-1.08 to -1.80	2.28 to 3.00	10YR 2/1; Sh2 Th^{2}1 Ag1 Tl+; humo. 2; black moderately humified silty, herbaceous peat with occasional woody material.	PEAT
-1.80 to -2.38	3.00 to 3.58	10YR 2/2; Sh2 Tl^{2}1 Ag1; humo. 2/3; very dark brown moderately to well humified woody, silty peat. Diffuse contact in to:	
-2.38 to -2.54	3.58 to 3.74	2.5Y 3/2; Ag2 As1 Sh1 Ga+ Dl+; very dark greyish brown organic, clayey silt with a trace of sand and detrital wood. Diffuse contact in to:	LOWER ALLUVIUM/MARL
-2.54 to -2.80	3.74 to 4.00	2.5Y 3/2; Ag3 As1 Ga+; very dark greyish brown clayey silt with a trace of sand. Diffuse contact in to:	
-2.80 to -2.95	4.00 to 4.15	10YR 3/1; Ag3 Sh1 Ga+; very dark grey organic silt with a trace of sand. Diffuse contact in to:	
-2.95 to -3.11	4.15 to 4.31	2.5Y 5/2; Ld3 Ag1 Ga+; greyish brown silty marl with a trace of sand. Frequent Mollusca. Sharp contact in to:	
-3.11 to -3.27	4.31 to 4.47	10YR 3/1; Ag3 Sh1 Ga+; very dark grey organic silt with a trace of sand. Sharp contact in to:	

Depth (m OD)	Depth (m bgl)	Description	Stratigraphic group
-3.27 to -3.35	4.47 to 4.55	2.5Y 5/2; Ld3 Ag1 Ga+; greyish brown silty marl with a trace of sand. Frequent Mollusca. Sharp contact in to:	
-3.35 to -3.52	4.54 to 4.72	2.5Y 3/1; Ld2 Ag1 Sh1; very dark grey silty, organic marl with frequent Mollusca. Some fine (<5mm) to coarse (<20mm) horizontal bedding. Diffuse contact in to:	
-3.52 to -3.70	4.72 to 4.90	Gley1 5/10Y; Ag3 As1; grey clayey silt. Diffuse contact in to:	
-3.70 to -3.80	4.90 to 5.00	Gg2 Ag2; silt and gravel. Clasts are flint, sub-angular to rounded, up to 15mm in diameter.	SHEPPERTON GRAVEL

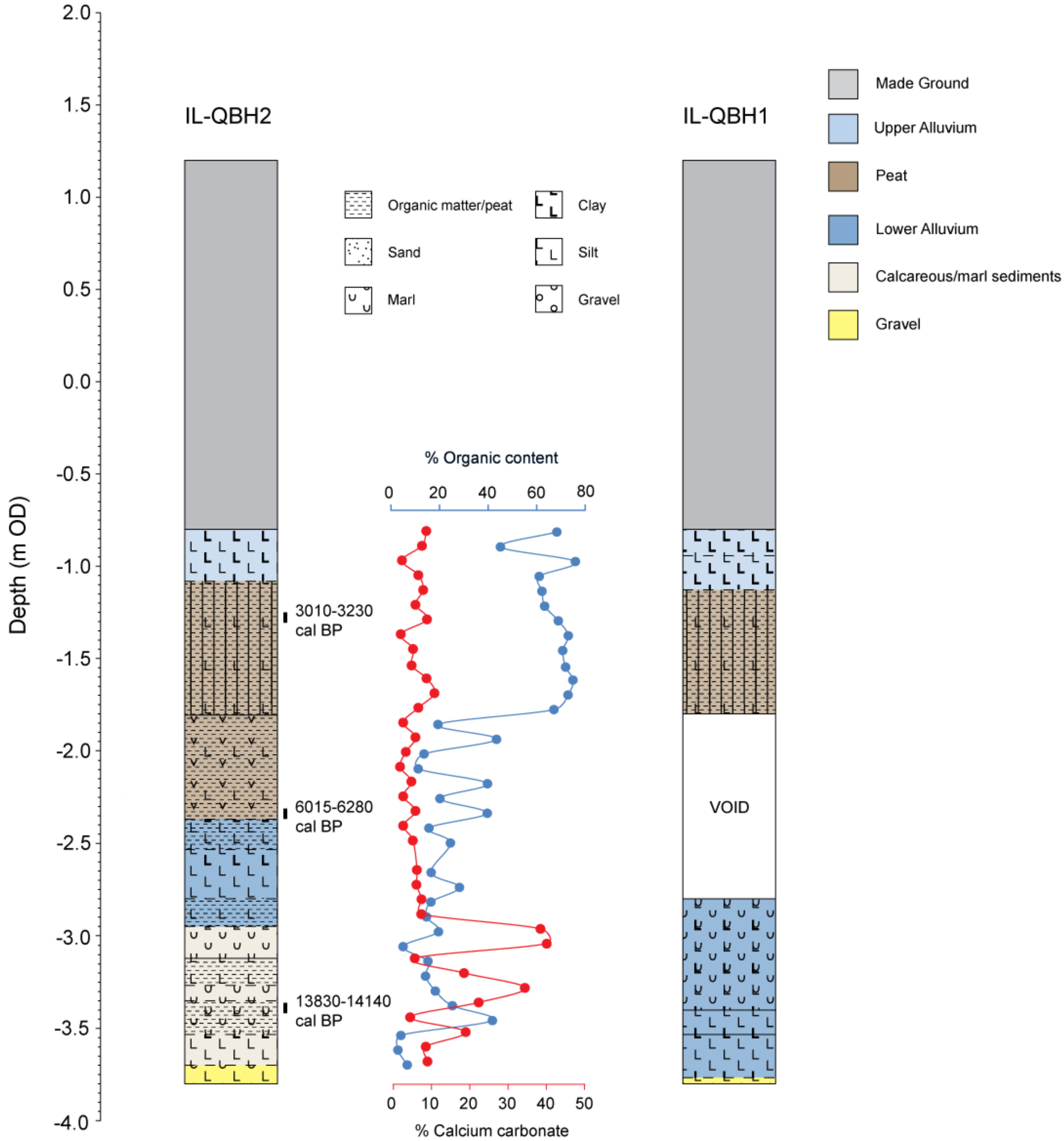

Figure 11: Results of the lithostratigraphic descriptions, organic content/calcium carbonate determinations and radiocarbon dating of boreholes QBH1 and QBH2 at 161 Ilderton Road, Southwark

Table 4: Results of the borehole IL-QBH2 organic matter and calcium carbonate determinations, 161 Ilderton Road, Southwark.

Depth (m OD)		Organic matter content (%)	Calcium carbonate (%)
From	To		
-0.81	-0.82	68.38	8.71
-0.89	-0.90	45.17	7.57
-0.97	-0.98	75.97	2.39
-1.05	-1.06	61.10	6.65
-1.13	-1.14	62.27	7.87
-1.21	-1.22	63.33	5.89
-1.29	-1.30	68.99	8.91
-1.37	-1.38	73.04	2.05
-1.45	-1.46	70.81	5.24
-1.54	-1.55	71.96	4.90
-1.61	-1.62	75.03	8.78
-1.69	-1.70	72.99	10.86
-1.77	-1.78	67.16	6.64
-1.85	-1.86	19.43	2.71
-1.93	-1.94	43.57	5.88
-2.01	-2.02	13.70	3.37
-2.09	-2.10	11.33	1.86
-2.17	-2.18	39.78	4.81
-2.25	-2.26	20.28	2.69
-2.33	-2.34	39.70	5.88
-2.41	-2.42	15.70	2.71
-2.49	-2.50	24.58	5.19
-2.65	-2.66	16.61	6.26
-2.73	-2.74	28.25	6.15
-2.81	-2.82	16.57	7.45
-2.89	-2.90	14.71	7.41
-2.97	-2.98	19.64	38.53
-3.05	-3.06	5.11	40.17
-3.13	-3.14	15.28	5.67
-3.21	-3.22	14.28	18.56
-3.29	-3.30	18.33	34.48
-3.37	-3.38	25.35	22.40
-3.45	-3.46	41.84	4.48
-3.53	-3.54	4.15	19.00
-3.61	-3.62	2.98	8.57
-3.69	-3.70	6.82	9.03

Table 5: Results of the borehole QBH2 radiocarbon dating, 161 Ilderton Road, Southwark.

Laboratory code / Method	Material and location	Depth (m OD)	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC/AD (BP) (2-sigma, 95.4% probability)	δ13C (‰)
BETA 486987 / AMS	Twig wood; top of peat	-1.20 to -1.25	2970 ± 30	1060 to 1280 cal BC (3010 to 3230 cal BP)	-28.0
BETA 486986 / AMS	Twig wood; base of peat	-2.33 to -2.38	5370 ± 30	4065 to 4330 cal BC (6015 to 6280 cal BP)	-26.2
BETA 486985 / AMS	Twig wood; near base of Lower Alluvium/Marl	-3.47 to -3.52	12,130 ± 40	11,880 to 12,190 cal BC (13,830 to 14,140 cal BP)	-27.3

5. RESULTS & INTERPRETATION OF THE POLLEN ASSESSMENT

Samples were prepared for pollen assessment through the Lower Alluvium / Marl and Peat of BH2. The concentration and preservation of remains is high throughout the sequence, with the exception of one sample in which pollen is near absent (-1.86m OD) (Table 6).

The Lower Alluvium/Marl is initially dominated by sedges (Cyperaceae), grasses (Poaceae), bur-reed (*Sparganium* type), meadow-rue (*Thalictrum*) and willow (*Salix*) (-3.46m OD). Subsequently, the deposits birch (*Betula*) and alder (*Alnus*) increase with pine (*Pinus*) and more sporadic oak (*Quercus*), elm (*Ulmus*), lime (*Tilia*) and hazel (*Corylus* type). Willow, grasses, sedges, bur-reed continue to occur, with lesser occurrences including mugwort (*Artemisia*), carrot family (Apiaceae), bulrush (*Typha latifolia*) and water milfoil (*Myriophyllum* type). Microcharcoal is recorded in moderate concentrations.

The results of the assessment indicate a marsh fen-type environment with a lightly wooded landscape including dwarf willow shrubs. Later, open birch woodland with willow occupied the surrounding landscape. This assemblage is consistent with the pioneer plant communities that one might expect to see at this time, and are very similar to those recorded on the neighbouring Bramcote Green site during the Lateglacial Interstadial (Thomas & Rackham, 1996). The exception to this is the high values of alder (and to a lesser extent oak, elm and lime) recorded midway through the Lower Alluvium/Marl deposits at Ilderton Road; this does not occur within the Bramcote Green sequence. If the deposits are of Lateglacial age, this result could be significant, as alder is not ordinarily recorded in the British Isles until the early Holocene.

The Peat is initially dominated by pine and hazel (-2.34m OD). From -2.18 to -2.02m OD, alder dominates with oak, lime and hazel and minimal herbaceous pollen values are recorded. Subsequently from -1.70 to -1.22m OD, alder continues to dominate, but values of oak, lime and hazel are reduced, whilst the range of herbaceous taxa increases to include grasses, sedges, ribwort plantain (*Plantago lanceolata*), fat hen (*Chenopodium* type) and ferns (*Filicales*). Aquatic values are much reduced by comparison to those in the Lower Alluvium / Marl.

Towards the base of the Peat, pine and birch woodland is indicated, prior to the expansion of deciduous woodland; alder carr on the floodplain, and mixed deciduous woodland dominated by oak and lime on the dryland. Sometime after –2.02m OD, a decline in oak, lime and elm is recorded, indicating a reduction in woodland on the dryland. The broad palynological signal is once again very similar to that recorded on the nearby Bramcote Green site (Thomas & Rackham, 1996) between the early and middle Holocene.

Table 6: Results of the pollen assessment from IL-QBH2, 161 Ilderton Road, Southwark.

	Depth (m OD)	-1.22	-1.38	-1.54	-1.70	-1.86	-2.02	-2.18	-2.34	-2.82	-2.90	-3.14	-3.22	-3.38	-3.46
	Stratigraphic unit	PEAT								LOWER ALLUVIUM / MARL					
Latin name	Common name														
Trees															
Alnus	alder	19	23	33	23	1	33	31	1	4		23	13	1	
Quercus	oak	2	7	7	7		18	10	4	1	1	4	1		
Pinus	pine	1	1		1		1	1	21	3	3	7	2		
Ulmus	elm	1					2	1	1				2		
Tilia	lime			2	1		6	5				1	3		
Fraxinus	ash		1	1			2					1	1		
Betula	birch		1		2				1	11	11	4	12	6	
Shrubs															
Calluna vulgaris	heather		1												
Corylus type	e.g. hazel	5	1	4	2		3	5	24	1	3	1	1		1
Hedera	ivy		1												
Salix	willow	3	14							2	2		3	6	10
Herbs															
Cyperaceae	sedge family		5	1	1					4	8	2	10	16	24
Poaceae	grass family	4	1	1	1					8	7	11	13	11	6
Cereale type	e.g. wheat / barley	1													
Asteraceae	daisy family	1	1									2			
Artemisia type	mugwort				1					3	3		1	1	4
Lactuceae	dandelion family	1													
Plantago lanceolata	ribwort plantain	1	1	1											
Rosaceae	rose family														
Chenopodium type	goosefoot family		2	1											1
Caryophyllaceae	pink family									1		1			
Apiaceae	carrot family	3	8	6	1		3	5		2		2	1	1	
Galium type	bedstraw										1				
Ranunculus type	e.g. buttercup											2			
Filipendula type	meadowsweet												1		
Thalictrum	meadow-rue														3
Mentha type	mint														
Aquatics															
Nuphar type	water lily		1												
Myriophyllum type	water milfoil									2		1	4		2
Typha latifolia	common bulrush									3				4	
Sparganium type	bur-reed		6							4	3	2		83	65
Spores															
Pteridium aquilinum	bracken	1	1												
Filicales	ferns	97	14	2	10		3					13	2		

	Depth (m OD)	-1.22	-1.38	-1.54	-1.70	-1.86	-2.02	-2.18	-2.34	-2.82	-2.90	-3.14	-3.22	-3.38	-3.46
	Stratigraphic unit	PEAT								LOWER ALLUVIUM / MARL					
Latin name	Common name														
Polypodium vulgare	polypody						2				2	2			
Unidentifiable								4	2						
Total Land Pollen (grains counted)		41	68	57	40	1	68	58	52	40	39	61	64	42	50
Concentration*		5	5	5	5	1	5	5	5	5	5	5	5	5	5
Preservation**		3-4	4	4	4	2	4	3	4	4	3-4	4	3-4	4	4
Microcharcoal Concentration***		0	0	0	0	4	0	0	2	3	3	3-4	2	0	0
Suitable for further analysis		YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

*Key: *Concentration: 0 = 0 grains; 1 =1-75 grains, 2 = 76-150 grains, 3 =151-225 grains, 4 = 226-300, 5 =300+ grains per slide; **Preservation: 0 = absent; 1 = very poor; 2 = poor; 3 = moderate; 4 = good; 5 = excellent; ***Microcharcoal Concentration: 0 = none, 1= negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant*

6. RESULTS & INTERPRETATION OF THE DIATOM ASSESSMENT

A total of six samples from borehole IL-QBH2 were submitted for an assessment of diatoms. The samples were located at the interface between the Peat and the overlying Upper Alluvium, between the Peat and underlying Lower Alluvium/Marl, and towards the base of the Lower Alluvium/Marl. A summary of the diatom concentration, preservation and assemblage diversity is shown in Table 7.

Diatoms were present in high concentrations in the samples from the base of the Lower Alluvium/Marl (-3.45 to -3.46 and -3.53 to -3.54m OD), and in generally low concentrations in the remainder of the samples. Assemblage diversity was low in the sample from -3.45 to -3.46m OD, but medium in the sample from -3.53 to -3.54m OD.

Table 7: Results of the diatom assessment of samples from IL-QBH2, 161 Ilderton Road, Southwark.

Depth (m OD)	Diatom concentration	Diatom preservation	Assemblage diversity
-1.05 to -1.06	2	3	Low
-1.13 to -1.14	1	2	Low
-2.33 to -2.34	1	3	Low
-2.42 to -2.43	1	2	Low
-3.45 to -3.46	5	3	Low
-3.53 to -3.54	4	4	Medium

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

7. RESULTS & INTERPRETATION OF THE MACROFOSSIL ASSESSMENT

A total of ten small bulk samples from borehole QBH2 were extracted and processed for the recovery of macrofossil remains, including waterlogged plant macrofossils, wood, insects and Mollusca (Table 8). The samples were focussed on the organic/calcium carbonate-rich units within the Lower Alluvium/Marl (three samples) and the peat (seven samples).

Within both the peat and underlying Lower Alluvium/Marl the samples were largely dominated by waterlogged wood, with low to moderate quantities recorded in all but one sample from the peat (-2.28 to -2.33m OD). Waterlogged sedge remains, generally lacking the diagnostic epidermal tissue necessary for identification, were recorded in low concentrations in the majority of samples from the peat, and in one sample from the Lower Alluvium/Marl (-3.47 to -3.52m OD). Mollusca, generally present as small fragments, were recorded in one sample from the Lower Alluvium/Marl (-3.22 to -3.27m OD), whilst insects were recorded in one sample from the peat (-1.55 to -1.65m OD) and one from the Lower Alluvium/Marl (-3.47 to -3.52m OD).

Waterlogged seeds were recorded only in two samples (Table 9): one from the Lower Alluvium/Marl (-3.47 to -3.52m OD), including an assemblage of *Potamogeton* sp. (pondweed), *Carex* sp. (sedge) and *Scirpus* sp. (bulrush), and one from the peat (-1.55 to -1.65m OD), the assemblage here limited to *Sparganium erectum* (bur-reed). The assemblage in both samples is very small, but in the sample from the Lower Alluvium/Marl it is consistent with wet/aquatic conditions, perhaps on the margins of a pond or stream, whilst the presence of bur-reed in the sample from the peat is consistent with a wetland fen or reed swamp.

Table 8: Results of the macrofossil assessment of samples from borehole QBH2, 161 Ilderton Road, Southwark.

				Charred					Waterlogged			Mollusca		Bone			
Depth (m OD)	Unit	Volume processed (ml)	Fraction	Charcoal (>4mm)	Charcoal (2-4mm)	Charcoal (<2mm)	Seeds	Chaff	Wood	Seeds	Sedge remains (e.g. stems/roots)	Whole	Fragments	Large	Small	Fragments	Insects
-1.20 to -1.25		0.05	>300µm	-	-	-	-	-	3	-	-	-	-	-	-	-	-
-1.25 to -1.30		0.05	>300µm	-	-	-	-	-	3	-	1	-	-	-	-	-	-
-1.35 to -1.45		0.10	>300µm	-	-	-	-	-	2	-	1	-	-	-	-	-	-
-1.55 to -1.65	Peat	0.10	>300µm	-	-	-	-	-	2	1	2	-	-	-	-	-	1
-2.15 to -2.25		0.10	>300µm	-	-	-	-	-	1	-	-	-	-	-	-	-	-
-2.28 to -2.33		0.05	>300µm	-	-	-	-	-	-	-	1	-	-	-	-	-	-
-2.33 to -2.38		0.05	>300µm	-	-	-	-	-	2	-	-	-	-	-	-	-	-
-2.90 to -2.95		0.05	>125µm	-	-	-	-	-	1	-	-	-	-	-	-	-	-
-3.22 to -3.27	Lower Alluvium/Marl	0.05	>125µm	-	-	-	-	-	2	-	-	-	2	-	-	-	-
-3.47 to -3.52		0.05	>125µm	-	-	-	-	-	1	1	1	-	-	-	-	-	1

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

Table 9: Results of the seed identifications of samples from borehole QBH2, 161 Ilderton Road, Southwark.

Depth (m OD)	Unit	Seed identification		Quantity
		Latin name	Common name	
-1.20 to -1.25	Peat	-	-	-
-1.25 to -1.30		-	-	-
-1.35 to -1.45		-	-	-
-1.55 to -1.65		*Sparganium erectum*	bur-reed	1
-2.15 to -2.25		-	-	-
-2.28 to -2.33		-	-	-
-2.33 to -2.38		-	-	-
-2.90 to -2.95	Lower Alluvium/Marl	-	-	-
-3.22 to -3.27		-	-	-
-3.47 to -3.52		*Potamogeton* sp. *Carex* sp. *Scirpus* sp.	pondweed sedge bulrush	2 2 1

8. DISCUSSION & CONCLUSIONS

The aims of the environmental archaeological assessment at Ilderton Road were (1) to clarify the nature, depth, extent and date of the alluvial sequence; (2) to investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity; (3) to investigate whether the sequences contain any evidence for natural and/or anthropogenic changes to the landscape (wetland and dryland), including those related to sea level change. In order to achieve this aim, an environmental archaeological assessment was undertaken on borehole IL-QBH2.

The results of the previous geoarchaeological deposit modelling exercise (Young, 2017) indicated that the sediments recorded at the site were similar to those recorded elsewhere in the Lower Thames Valley, and specifically within the area of Bermondsey Lake, where a sequence of organic and calcareous-rich deposits of Late Devensian and Holocene age have previously been recorded (Thomas & Rackham, 1996). The deposit model indicates that the Ilderton Road site lies on the margins of the lower Gravel topography that characterises Bermondsey Lake: The Late Devensian Shepperton Gravel surface falls from *ca*. -1.3m OD towards the north, to *ca*. -3.9m OD towards the south. In the southern area of the site the Gravel is overlain by a sequence of Late Devensian/Holocene alluvial sediments, including marl and peat; towards the north however the Made Ground directly overlies the Sand or Gravel, probably truncating the alluvial sequence.

Previous work in this area of Bermondsey Lake (Thomas & Rackham, 1996) indicated that the organic-rich sediments at the Ilderton Road site may date from both the Late Devensian and Early to Middle Holocene, with the potential to improve our understanding of the chronology and palaeoenvironmental history of these periods. The lower part of the sequence overlying the Gravel at Ilderton Road, between *ca*. -2.95 and -3.7m OD, is characterised by a sequence of intercalated calcareous and organic-rich units of a similar nature to that recorded at Bramcote Green between *ca*. -3 and -3.9m OD (Thomas & Rackham, 1996). The results of the radiocarbon dating of an organic unit towards the base of this sequence at Ilderton Road indicates that the accumulation of this unit began by *ca*. 13,830 to 14,140 cal BP (11,880 to 12,190 cal BC), placing it within the earlier part of the Greenland (Windermere) Interstadial (GI-1e /GI-1d of the GRIP ice-core record, see Björck *et al*., 1998). At Bramcote Green (Thomas & Rackham, 1996) a radiocarbon date obtained towards the top of this unit recorded an age of 12,740-13,035 cal BP (10,790-11,085 cal BC), placing it in the latter part of the Greenland Interstadial (GI-1a); it is therefore possible that the calcareous sediments recorded at the Bramcote Green and Ilderton Road sites represent a continuous period of accumulation during the Lateglacial (Windermere) Interstadial. The results of the palaeobotanical assessment (pollen and seeds) for this part of the sequence at Ilderton Road are indicative of a marsh fen-type environment at this time dominated by sedges, grasses and aquatic taxa, with a lightly wooded landscape including dwarf willow shrubs. Later, open birch woodland with willow occupied the surrounding landscape. These assemblages are representative of the pioneer plant communities that one might expect to see at this time, and are very similar to those recorded at the Bramcote Green site during the Lateglacial (Thomas & Rackham, 1996). One perhaps significant difference between the assemblages at Bramcote Green and Ilderton Road is the high values of alder (and to a lesser extent oak, elm and lime) recorded here within the sequence of calcareous/Marl deposits at -3.14 and -3.22m OD. This result is significant, as the expansion of alder is generally not normally recorded in the British Isles until the early Holocene.

Overlying the calcareous Lateglacial Interstadial deposits at the site is a unit of generally sandy silt, typical of the Lower Alluvium recorded elsewhere in the Lower Thames Valley. These deposits suggest that this was a period during which the valley floor was occupied by a network of actively shifting channels, with a drainage pattern on the floodplain that was still largely determined by the relief on the surface of the underlying Shepperton Gravel, although here it overlies the underlying Lateglacial Interstadial sediments. The results of the assessment are indicative of similar environments on the floodplain during the deposition of the Lower Alluvium, probably dominated by marsh fen-type environments dominated by sedges, grasses and aquatic taxa, with a lightly wooded landscape on the surrounding dryland including open birch woodland with some oak and willow.

Following the deposition of the Lower Alluvium, peat horizons recorded at between *ca*. -1 and -2.5m OD towards the south of the site are indicative of a transition towards semi-terrestrial (marshy) conditions at *ca*. 6015 to 6280 cal BP (Late Mesolithic/Early Neolithic), continuing until the Late Bronze Age (*at least* 3010 to 3230 cal BP). Similar, but slightly earlier, dates were recorded for the Holocene organic sequence at Bramcote Green, here recorded at between *ca*. -2.2 and -0.9m OD and of Late Mesolithic through to Late Bronze Age date (*ca*. 6680-7265 cal BP to 2975-3340 cal BP; see Thomas & Rackham, 1996). The results of the palaeobotanical assessment of the peat here indicates that it is initially dominated by pine and hazel, although above -2.18m OD alder dominates with oak, lime and hazel and minimal herbaceous pollen. Subsequently from -1.70 to -1.22m OD, alder continues to dominate, but values of oak, lime and hazel are reduced, whilst the range of herbaceous taxa increases to include grasses, sedges, ribwort plantain, fat hen and ferns, with few aquatic taxa recorded. Towards the base of the Peat, pine and birch woodland is indicated, prior to the expansion of deciduous woodland; alder carr on the floodplain, and mixed deciduous woodland dominated by oak and lime on the dryland. Sometime after -2.02m OD, a decline in oak, lime and elm is recorded, indicating a reduction in woodland on the dryland. The broad palynological signal is once again very similar to that recorded during the accumulation of the peat at Bramcote Green (Thomas & Rackham, 1996); here, alder carr dominated the floodplain with an understorey of sedges and some aquatic taxa, with mixed deciduous woodland on the dryland with lime, birch and elm. Although no definitive indicators of human activity are recorded, in the upper part of the peat sequence values of oak, lime and hazel are reduced, whilst the range of herbaceous taxa increases to include grasses, sedges and disturbed ground taxa, perhaps indicative of woodland clearance in the wider landscape.

Significantly, within the peat sequence towards the east of the site at Bramcote Green two phases of trackway construction were identified, the second of these phases dated to the Early to Middle Bronze Age (3695-4080 cal BP/1745-2130 cal BC; Thomas & Rackham, 1996). These structures were thought to be aligned broadly south-southwest/north-northeast and south-southeast/north-northwest, perhaps traversing the floodplain that separates the higher terrace deposits to the south and the Bermondsey Eyot to the north (see Thomas & Rackham, 1996). At the Bricklayer's Arms (Jones, 1991) two Neolithic flint axes, a wooden platform, hearths and horse bones were identified on the margins of the Bermondsey eyot, and out in to the adjacent lake basin, *ca*. 500m to the west of the Ilderton Road site (Sidell *et al*., 2002).

9. RECOMMENDATIONS

The sequence of alluvial deposits at the Ilderton Road site provide an opportunity to examine the environmental history of the Ilderton Road site and its environs in more detail, including during the Lateglacial Interstadial, a period for which very few records exist in the Lower Thames Valley; one of the few published accounts includes that of the Bramcote Green site, immediately to the east (Thomas & Rackham, 1996).

A programme of environmental archaeological analysis is therefore recommended on the IL-QBH2 sequence from Ilderton Road. This analysis should incorporate additional radiocarbon dates from the Lateglacial Interstadial deposits recorded towards the base of the sequence, and an additional date from the Holocene peat deposits, in order to provide an improved chronological model for the sequence. Additional pollen and diatom analysis should be undertaken on those samples suitable for analysis, as well as a detailed assessment of the Ostracoda and Mollusca concentration in the sequence of Lateglacial sediments.

Given the proximity of the Early/Middle Bronze Age structures recorded at Bramcote Green, a programme of archaeological evaluation of the site is also recommended. The conjectured alignment of the structures at Bramcote Green is broadly south-southwest/north-northeast and south-southeast/north-northwest, but it should be examined whether any continuation of the archaeological horizons continues within the Holocene peat units at the Ilderton Road site (between *ca*. -1 and -2.5m OD). Should an opportunity arise to collect additional samples of the deeper Lateglacial Interstadial deposits (*ca*. -3 to -3.7m OD) during this exercise, column and bulk samples from this sequence would provide more material for a more thorough investigation of the biological remains (e.g. Mollusca, insects and plant macrofossils) in this part of the sequence.

10. REFERENCES

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11. APPENDIX 1: GLHER DATA

RPS No	ListEntry / MONUID	LegacyUID / PrefRef	Record Type	Name	MonType	Date Range	Period Range	Finds	Summary
1	1385687	471091	LBII*	CHURCH OF ST AUGUSTINE					
2	1378456	470757	LBII	7 AND 8, CANAL GROVE					
3	1378457	470758	LBII	9, CANAL GROVE					
4	1385688	471092	LBII	FORMER VICARAGE TO CHURCH OF ST AUGUSTINE					
5	1385743	471153	LBII	STATUE OF GEORGE LIVESEY IN THE FORECOURT OF THE GAS WORKS OFFICES					
6	1385919	471339	LBII	FORMER CLARE COLLEGE MISSION CHURCH					
7	1000838	1834	RPG II	SOUTHWARK PARK					
8	DLO35341		LSQ	Verney Road/Bramcote Road, [Varcoe Road]					
9	DLO35764	DLO35764	APA	Bermondsey Lake					
10	DLO35767	DLO35767	APA	Old Kent Road					
11	DLO35839	DLO35839	APA	Thames Alluvial Floodplain					The extensive peat and clay deposits across North Southwark and North Lewisham are up to 12m thick a
12	DLO35840	DLO35840	APA	Thames and Ravensbourne Terrace Gravels					The terrace gravels fringing the Thames are commonly associated with evidence of successive prehisto
13	MLO104864	MLO104864	MON	Old Kent Road [Southwark Integrated Waste Management Facility], Southwark, SE15 {Peat}	PEAT?	500000 BC to 42 AD	Prehistoric		A possible deposit of peat was observed during a watching brief carried out by Wessex Archaeology at the Southwark Integrated Waste Management Facility between October and December 2008.
14	MLO74893	093223/00/000	MON	Silwood Street, SE16 {Prehistoric peat layer}	PEAT	500000 BC to 42 AD	Prehistoric		Peat and waterlain deposits, all probably of prehistoric date, were observed during a watching brief undertaken by the Museum of London Archaeology Service, in 2000.
15	MLO103254	MLO103254	FS	Old Kent Road [South Eastern Gas Works], Southwark {Palaeolithic Mammalian Fossils}	FINDSPOT	130000 BC to 115000 BC	Middle Palaeolithic	ANIMAL REMAINS (Middle Palaeolithic)	An assemblage of palaeolithic mammalian fossils were uncovered on the site of the gas works on Old Kent Road.
16	MLO60722	091709/00/00	FS	Sharratt Street, London, SE15 {Prehistoric flint}	FINDSPOT	10000 BC to 2201 BC	Early Mesolithic to Late Neolithic	CORE (Early Mesolithic to Late Neolithic), FLAKE (Mesolithic)	Residual Mesolithic to Neolithic worked flint fragments were found during an evaluation at Sharatt Street by the Museum of London Archaeology Service in 1994.
17	MLO63987	MLO63987	MON	Varcoe Road/Verney Road, Bermondsey {Bronze Age trackway and palaeo-environmental sequence}	TRACKWAY, PEAT	7500 BC to 701 BC	Early Mesolithic to Late Bronze Age		Excavations by the Museum of London Archaeology in 1995 revealed a series of peat and alluvial deposits, with two phases of Bronze Age trackway.
18	MLO76325	MLO76325	MON	Oldfield Grove, [Silwood Estate], SE16 {Peat}	PEAT	10000 BC to 701 BC	Early Mesolithic to Late Bronze Age		
19	MLO77143	MLO77143	FS	Corbett's Lane [Silwood Estate] SE16 {Neolithic core}	FINDSPOT	4000 BC to 2201 BC	Neolithic	CORE (Neolithic)	A single dark brown single platform flint core weighing 92gm was found.
20	MLO104805	MLO104805	MON	Silwood Street, Bermondsey, Lewisham/Southwark, SE16 {Peat Deposit}	PEAT	2200 BC to 701 BC	Bronze Age		Peat deposits were found during a watching brief by the Museum of London Archaeology Service at Silwood Street between April and May 2000.
21	MLO105227	MLO105227	MON	Varcoe Road, Southwark, SE16 {Peat deposit}	PEAT	1600 BC to 701 BC	Middle Bronze Age to Late Bronze Age	SCRAPER (TOOL) (Early Neolithic to Late Bronze Age)	A peat deposit was found during a geoarchaeological excavation by Museum of London Archaeology at Varcoe Road between August and October 2009.
22	MLO19469	MLO19469	MON	New Cross Gate/Lewisham/Beckenham {Roman Road London-Lewes}	ROAD	101 AD to 199 AD	Roman		The London-Lewes Roman Road from Lewisham cuts across Bromley and forms the border with Croydon. It was probably constructed in the early 2nd century.
23	MLO8743	090774/00/00	FS	OLD KENT RD	FINDSPOT, FINDSPOT	43 AD to 409 AD	Roman	FIND UNCLASSIFIED (Roman), LAMP (Roman)	
24	MLO4264	090287/00/00	MON	Ruby Street/Old Kent Road, SE15	MANOR HOUSE	1066 AD to 1539 AD	Medieval		
25	MLO71139	092623/00/00	MON	64-74 QUEENS RD SE15	WELL	1540 AD to 1900 AD	Post Medieval		
26	MLO8709	090707/00/00	MON	ROTHERHITHE NEW RD	WINDMILL, TOWER MILL	1540 AD to 1900 AD	Post Medieval		
27	MLO101129	MLO101129	BLD	Rotherhithe New Road, [Rotherhithe New Road bridge] {19th century road bridge}	ROAD BRIDGE	1868 AD to 2050 AD	19th Century to Modern		Rotherhithe New Road bridge, which carries the road over the East London Railway line, was constructed by 1868.
28	MLO101131	MLO101131	BLD	Surrey Canal Road, [Surrey Canal Road bridge] {19th century railway bridge}	RAILWAY BRIDGE	1868 AD to 2050 AD	19th Century to Modern		The Surrey Canal bridge was constructed to carry the East London Railway line over the Surrey Canal. It was constructed by 1868.
29	MLO59259	213477/00/00	PK	Lower Road, [Southwark Park], Southwark {19th century public park}	PUBLIC PARK	1865 AD to 2050 AD	19th Century to Modern		19th century public park, extended by c.4 ha (King's Stairs Gardens) in the 1980s.
30	MLO77539	MLO77539	MON	SILWOOD ESTATE (PHASE 2), SE1	BUILDING RUBBLE	1801 AD to 1900 AD	19th Century		
31	MLO89367	MLO89367	BLD	Catlin Street [Former Bricklayers Arms Goods Depot], Bermondsey, Southwark {19th century stables and forge}	STABLE, COURTYARD, FORGE, HORSE HOSPITAL	1843 AD to 2050 AD	19th Century to Modern		The stables and forge at Catlin Street are the last surviving structures on the site of the former Bricklayers' Arms Goods Depot owned by Southern Railway.
32	MLO101130	MLO101130	BLD	Trundley's Terrace/Oldfield Grove, [Trundley's Terrace footbridge] {Early 20th century foot bridge}	FOOTBRIDGE	1914 AD to 2050 AD	World War One to Modern		Trundley's Terrace foot bridge crosses the East London Railway line between Oldfield Grove and Trundley's Terrace. It was constructed by 1914 to connect what was then known as Oldfield Road with Lee Terrace, renamed Trundley's Terrace in 1933.
33	MLO101393	MLO101393	PK	Verney Road/Bramcote Road, [Varcoe Road] {19th century recreation ground}	PUBLIC PARK?, RECREATION GROUND	1906 AD to 2050 AD	Modern		Protected square designated under the London Squares Preservation Act of 1931.

RPS No	ListEntry / MONUID	LegacyUID / PrefRef	Record Type	Name	MonType	Date Range	Period Range	Finds	Summary
34	MLO68246	300010/00/00	MON	Southwark Park {Second World War Anti-Aircraft Battery}	ANTI AIRCRAFT BATTERY	1940 AD to 1942 AD	World War Two		
35	MLO72777	MLO72777	MON	Surrey Canal Road {Landfill site}	LANDFILL SITE	1901 AD to 1975 AD	Modern		
36	MLO60721	091708/00/00	MON	Ilderton Road, SE15 {Post-glacial stream}	STREAM				At least one post-glacial stream was found through excavation at Ilderton Road during a watching brief by the Museum of London Archaeology Service in 1994.
37	MLO98360	MLO98360	MON	Old Kent Road [Grand Surrey Canal] Camberwel, Peckham, Southwark					Work in progress
38	ELO10560		EVT	Ilderton Road, London, SE15: Watching Brief					
39	ELO10587		EVT	Sharratt Street, London, SE15: Evaluation					
40	ELO11068		EVT	East London Line project, Southern Phase, London, SE11 and SE16: Archaeological and Geoarchaeological Investigations					
41	ELO11150		EVS	East London Line Extension Project [Central Section And Southern Extension],Southwark, E1-SE8 And SE16: Building Survey					
42	ELO11183		EVS	East London Line Extension Project, London, E1-SE8/SE16: Historic Building Recording					
43	ELO11318		EVT	Varcoe Road, London, SE16: Geoarchaeological Excavation					
44	ELO11516		BL	Surrey Canal Road, Hornshay Street [East London Line Southern Extension], London, SE14 and SE15: Historic Building Recording					
45	ELO11976		BL	Surrey Canal Road (Surrey Canal Triangle). Archaeological Desk Based Assessment					
46	ELO13102		EVT	Debnams Road/Corbett's Lane/Silwood [Sillwood Estate], Rotherhithe, Southwark, SE1: Evaluation					
47	ELO13293		EVT	Silwood Street, Bermondsey, Lewisham/Southwark, SE16: Watching Brief					
48	ELO13381		EVP	Old Kent Road (No. 709), Southwark, SE15 1JZ					
49	ELO13385		EVT	Old Kent Road [Southwark Integrated Waste Management Facility], Southwark, SE15: Watching Brief					
50	ELO15012		EVT	Ormside Street, SE15: watching brief					
51	ELO15288		BL	Rotherhithe New Road (No.387 - 399), Southwark: Evaluation					
52	ELO1925		EVT	ILDERTON RD SE15					
53	ELO2319		EVT	SILWOOD ESTATE (PHASE 2), SE1					
54	ELO2767		EVT	Bramcote Grove, Bermondsey, SE16: Evaluation, Watching Brief, Excavation					
55	ELO3725		EVT	Gas Pipeline					
56	ELO4533		EVT	Thameslink 2000					
57	ELO6083		EVP	Oldfield Road/Old Kent Road/New Cross Road [East London Line Southern Extension], Lewisham: Desk Based Assessment					
58	ELO6951		EVP	East London Line Project, Southern Extension, Lewisham					
59	ELO6980		EVP	East London Line Project, Southern Exentsion, Lewisham, SE14					
60	ELO7950		EVP	Oldfield Grove and Trundleys Road, [East London Line Project - Silwood Triangle], Lewisham: Desk Based Assessment					
61	ELO853		EVT	Silwood Estate (Phase I)					
62	ELO9316		BL	Romney Road, [National Maritime Museum], Greenwich, Watching Brief					
63	ELO9935		EVP	Somerfield Road/Sketchley G/Reculver Road/Crane M [Silwood Estate], Lewisham, SE16, Desk Based Assessment					
64	ELO9945		EVT	Sharratt Street, Lewisham, SE15: Evaluation					

12. APPENDIX 2: OASIS

OASIS ID: quaterna1-302043

Project details

Project name	161 ILDERTON ROAD, LONDON BOROUGH OF SOUTHWARK
Short description of the project	Following the results of the geoarchaeological deposit modelling, a programme of environmental archaeological assessment was undertaken on one borehole sequence from the site. The sequence recorded here is similar to that at Bramcote green immediately to the west. Radiocarbon dating indicates that a sequence of calcareous and organic deposits accumulated during the Lateglacial Interstadial, during which type sedge fen or reed swamp and aquatic conditions were present. This was followed by a sequence of Holocene alluvial sedimentation. The peat deposits at the site date to the Late Mesolithic through to the Early Bronze Age, and are indicative of alder carr on the floodplain with mixed deciduous woodland on the surrounding dryland. Further analysis of the sequence is recommended, as well as archaeological evaluation of the site.
Project dates	Start: 01-09-2017 End: 26-02-2018
Previous/future work	No / Not known
Any associated project reference codes	ILT17 - Sitecode
Type of project	Environmental assessment
Significant Finds	ORGANIC SEDIMENTS Upper Palaeolithic
Significant Finds	PEAT Late Mesolithic
Significant Finds	PEAT Late Bronze Age
Survey techniques	Landscape

Project location

Country	England
Site location	GREATER LONDON SOUTHWARK SOUTHWARK 161 Ilderton Road
Postcode	SE16 3JZ

Site coordinates	TQ 3520 7822 51.486245259586 -0.052544732738 51 29 10 N 000 03 09 W Point

Project creators

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

Project archives

Physical Archive Exists?	No
Digital Archive Exists?	No
Paper Archive recipient	LAARC
Paper Contents	"Environmental","Stratigraphic"
Paper Media available	"Report"

Entered by	Daniel Young (d.s.young@reading.ac.uk)
Entered on	26 February 2018