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ISIS HOUSE, 67-69 SOUTHWARK STREET, LONDON BOROUGH OF SOUTHWARK

Report on the Geoarchaeological Deposit Modelling and Radiocarbon Dating

NGR: TQ 32058 80193

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1. NON-TECHNICAL SUMMARY

Geoarchaeological investigations were carried out at the Isis House site in order to: (1) clarify the nature of the sub-surface stratigraphy, and (2) clarify the nature, depth, extent and date of any alluvium and organic/peat deposits. In order to address these aims, a geoarchaeological borehole was put down, and the stratigraphic data from existing geotechnical and geoarchaeological boreholes from the site and the wider area used to produce a deposit model of the major depositional units. Following the results of the initial deposit modelling exercise, it was recommended that a programme of radiocarbon dating was carried out in order to assess the age of the Peat horizon at the Isis House site in comparison to those already recorded in the area of the Bankside Channel, and to assess the need for subsequent environmental archaeological assessment of the sequence.

The results of the deposit modelling indicate that the Isis House site lies towards the main axis of the Bankside Channel: here, a Gravel surface as low as -5m OD is deeper than has been identified elsewhere within the channel. The sequence of Holocene sedimentation overlying the Gravel is similar to that recorded elsewhere within the Bankside Channel, incorporating a horizon of Sand, the silty/sandy Lower Alluvium, Peat, and the clay-rich Upper Alluvium, overlain by modern Made Ground. Here, the Peat is relatively thin, at between 0.4 and 0.6m thick, perhaps indicative of prolonged fluvial activity at this location either preventing the accumulation of peat, or subsequently eroding its surface. The results of the radiocarbon dating indicate that Peat accumulation occurred at the present site during the late Mesolithic/early Neolithic transition, lying within the age and elevation range of the organic deposits at Surrey House, immediately to the east (Batchelor *et al.*, 2012), from where environmental archaeological analysis of a thick Peat sequence has already been carried out. Given the thin nature of the surviving Peat deposits at Isis House, and their contemporary age with the deposits at Surrey House, no further environmental archaeological assessment is therefore recommended.

2. INTRODUCTION

2.1 Site context

This report summarises the findings arising out of the geoarchaeological deposit modelling undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at Isis House, 67-69 Southwark Street, London Borough of Southwark (National Grid Reference: centred on TQ 32058 80193; Figures 1 & 2). Quaternary Scientific were commissioned by CgMs Consulting to undertake the geoarchaeological investigations. The site is located on the floodplain of the estuarine Thames, *ca.* 400m south of the modern waterfront, and *ca.* 350m north of the higher, drier ground of the gravel terrace. The site is a triangular-shaped plot, covering approximately 164m². The site is bounded to the north by Southwark Street, to the south and east by Lavington Street, and to the west by the Mercure Hotel. The site is located within the Archaeological Priority Zone of Borough, Bermondsey and Rivers, as defined by the London Borough of Southwark.

The site itself is projected as lying within the area of the Bankside Channel, a large and well documented palaeochannel that is aligned broadly NE to SW from Bankside towards Waterloo (see Cowan *et al.*, 2009). Geoarchaeological investigations at 61 Southwark Street (Young, 2015) included topographic deposit models that encompassed the area of the present site. In these models it was possible to make out the relief of the Bankside Channel, where the Gravel surface falls to as low as -4.55m OD in the area of the Surrey House and (on the basis of existing BGS archive borehole data) Isis House sites (Young, 2015). The present site at Isis House thus appears to lie close to the main axis of the Bankside Channel. The Holocene sediment sequence within this Channel includes in most places a peat horizon; in the axis of the channel a thickness of over 3.0m of peat has been recorded (Branch *et al.,* 2002), but towards the edges of the channel the peat thins to less than 0.5m, for example at the northern end of the Bear Lane site to the northwest (Young *et al.,* 2010; 0.45m) and at 61 Southwark Street (Young, 2015) to the southeast.

2.2 Palaeoenvironmental and archaeological significance

The existing borehole records in the area of the site indicate considerable variation in the height of the Gravel surface, and the type, thickness and age of the subsequent Holocene deposits. 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 former channels and bars; (2) the presence of soil and 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 Isis House 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.

The alluvial and 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, and have been undertaken at the nearby sites such as Bear Lane (Tan, 2008), Bear House (Young *et al*., 2010), St Christopher House (London Archaeologist, 2004; Turner, 2009), 65 Southwark Street (Batchelor *et al*., 2011) and Surrey House (Batchelor *et al*., 2012) (see Figure 1).

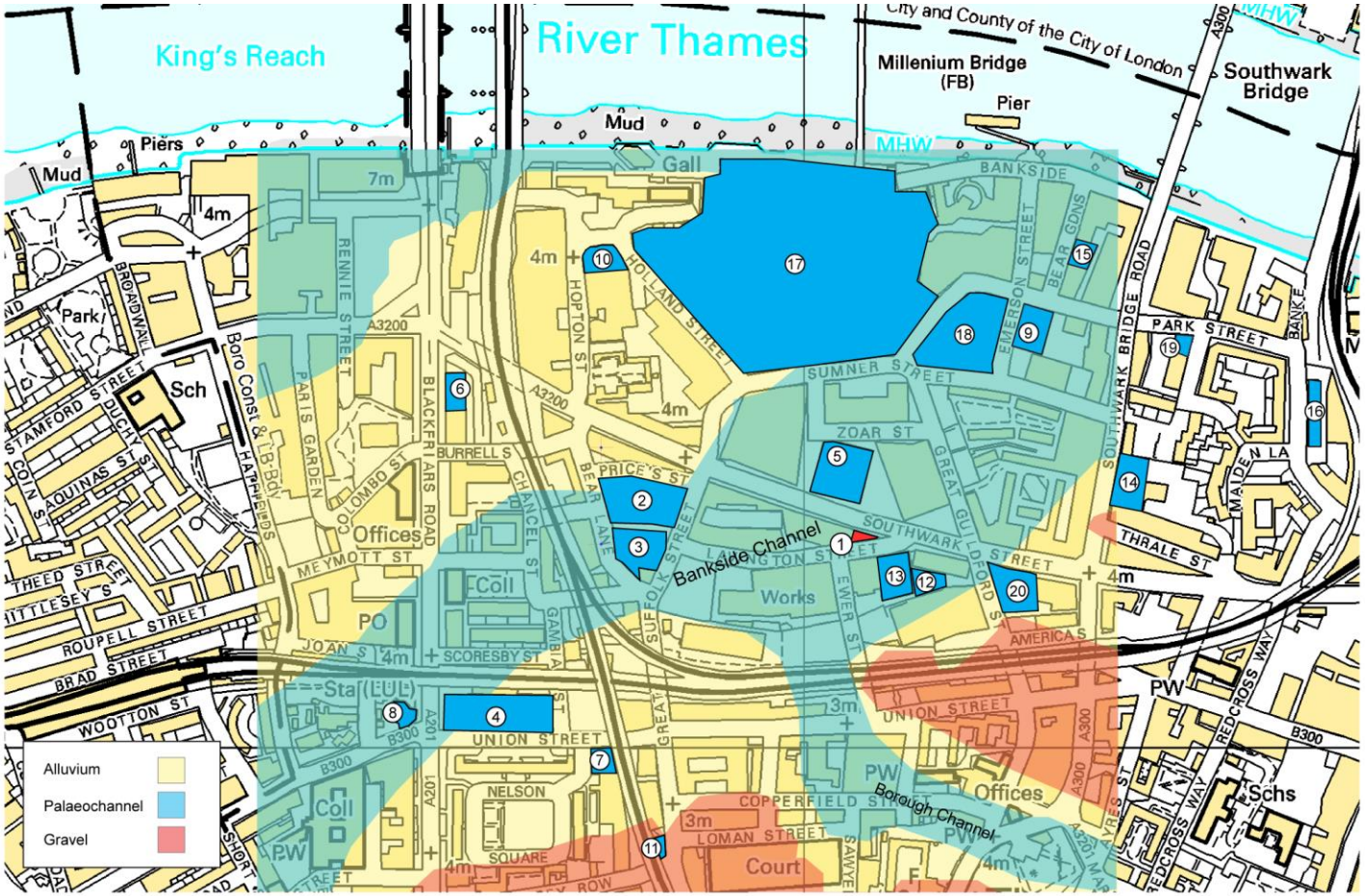
Finally, areas of high gravel topography, soils and peat represent potential areas that might have been utilised or even occupied by prehistoric people, evidence of which may be preserved in the archaeological (e.g. features and structures) and palaeoenvironmental record (e.g. changes in vegetation composition). The previous work in this area of the Bankside Channel suggests that there is the potential to obtain a sequence at the Isis House site that may incorporate sediments dating from the Mesolithic through to Post-Medieval cultural periods. Significantly, at St Christopher's House, three timber structures dated to 3450-3240 cal BP (two structures) and 2750-2350 cal BP (one structure) were recorded within the channel's sedimentary sequence (London Archaeologist, 2004), whilst at two sites located on a gravel eyot further the north (44-47 Hopton Street, London Archaeologist, 2001; 245 Blackfriars Road, Thompson *et al*., 2008), various artefacts reflective of occupation dating from the Neolithic cultural period onwards have been recorded. The sedimentary sequence at Isis House therefore 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 the existing sedimentary and archaeological data.

2.3 Aims and objectives

An additional borehole record is required in order to enhance our understanding of the sub-surface stratigraphy of the Isis House site, and to assess its palaeoenvironmental potential. Five significant research aims relevant to the geoarchaeological investigations were outlined within the WSI for the site (Young, 2016):

1. To clarify the nature of the sub-surface stratigraphy across the site;
2. To clarify the nature, depth, extent and date of any alluvium and organic/peat deposits;
3. To investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity;
4. 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;
5. To integrate the new geoarchaeological record with other recent work in the local area for publication in an academic journal.

In order to address the first two of these aims, one new borehole was put down at the site, followed by a deposit modelling exercise incorporating existing geotechnical and geoarchaeological data from the site and the wider area.



① Isis House, 67-69 Southwark Street
② Bear House (BJH10; Batchelor *et al.*, 2011a)
③ Bear Lane (BLZ07; Batchelor *et al.*, 2011a)
④ South Point (BKA02; Branch *et al.*, 2002)
⑤ St. Christopher's House (SCH03; London Archaeologist, 2004)
⑥ 231-241 Blackfriars Rd (BFX08; Batchelor *et al.*, 2008)
⑦ Jubillee Line, Union St (UNL08; Sidell *et al.*, 2000)
⑧ Joan St (JOA91; Sidell *et al.*, 2000)
⑨ 135 Park Street (PKP09; Batchelor and Young, 2009)
⑩ 44-47 Hopton St (HNT94; London Archaeologist, 2001)
⑪ Great Suffolk Street (GUF10; Batchelor *et al.*, 2011c)
⑫ 65 Southwark Street (SOU11; Batchelor *et al.*, 2011b)
⑬ Surrey House (LVI11; Batchelor *et al.*, 2012)
⑭ Southwark Rose Hotel (SDZ11; Young *et al.*, 2011)
⑮ Empire Warehouse (EWH08; Mackinder, 2008)
⑯ 28 Park Street (PKZ07; Turner, 2007)
⑰ Transforming Tate Modern (TMB09; Daykin, 2009)
⑱ 185 Park Street (PKE14; Batchelor & Young, 2014)
⑲ Anchor Terrace (Thompson *et al.*, 2008)
⑳ 61 Southwark Street (Young, 2015)

Figure 1: Location of Isis House, 67-69 Southwark Street, London Borough of Southwark and other nearby geoarchaeological/archaeological investigations. Superficial geology and the projected course of the Bankside and Borough Channels also shown (adapted from Cowan *et al.*, 2009).

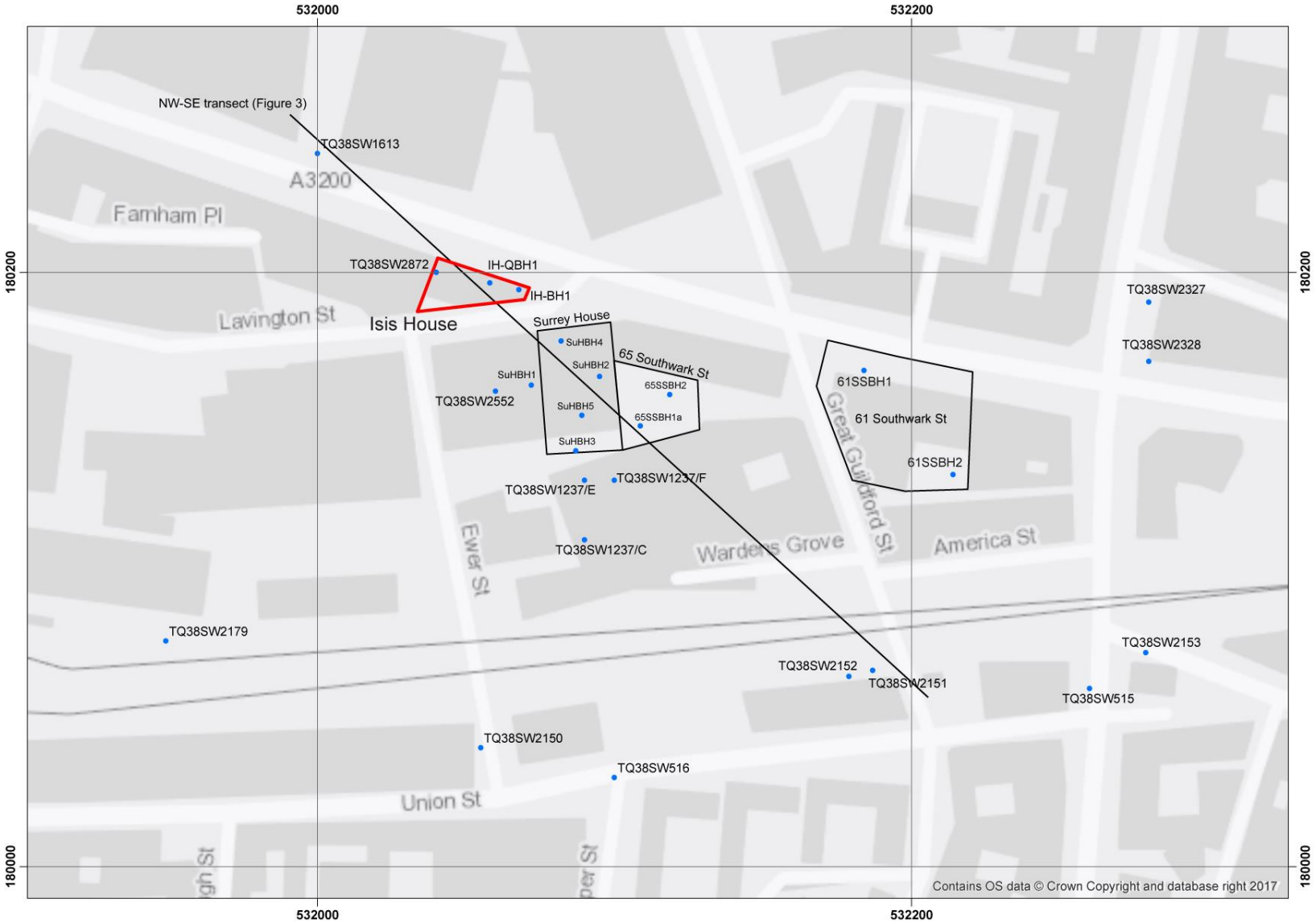


Figure 2: Location of the new geoarchaeological borehole (IH-QBH1) at Isis House, and existing geotechnical/geoarchaeological boreholes at the site and within the wider area (see Table 1). Alignment of the northwest-southeast transect (see Figure 3) also shown.

3. METHODS

3.1 Field investigations

One geoarchaeological borehole (borehole IH-QBH1) was put down at the site in April 2017 (Figure 2). The borehole was put down within a trench excavated prior to the construction of a lift pit, to a depth of 0.0m OD. This level coincided with the contact between the Made Ground and Alluvium at this location (as observed in section). 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).

3.2 Lithostratigraphic descriptions

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 borehole are displayed in Table 2.

3.3 Deposit modelling

The deposit model, incorporating the present site and the wider area, was based on a review of 26 geotechnical and geoarchaeological borehole records, incorporating the new geoarchaeological borehole and one geotechnical borehole from the present site, 15 BGS archive boreholes (http://mapapps.bgs.ac.uk/geologyofbritain/home.html), and nine boreholes from the 61 Southwark Street (Young, 2015), 65 Southwark St (Batchelor *et al.*, 2011) and Surrey House (Batchelor *et al.*, 2012) sites (see Figures 1 and 2). Sedimentary units from the boreholes were classified into six groupings: (1) Gravel, (2) Lower Alluvium. (3) Sand, (4) Peat, (5) Upper Alluvium and (6) Made Ground. The classified data for groups 1-6 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.

Because the boreholes are not uniformly 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, with the exception of the more widely present Gravel, Upper Alluvium and Made Ground, to which a 100m radius is applied. 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.

3.4 Radiocarbon dating

Two subsamples were extracted for radiocarbon dating: one from the top of the peat (3.60 to 3.65m OD) and one from the base of the peat (3.95 to 4.00m OD) in borehole IH-QBH1.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 Table 3 and Figure 3.

Table 1: Borehole attributes for those records used in the deposit model, Isis House, London Borough of Southwark.

Name	Easting	Northing	Elevation (m OD)
New geoarchaeological borehole			
IH-QBH1	532058.06	180196.46	0.00
Existing geotechnical borehole (RSK,2015)			
IH-BH1	532067.81	180194.19	2.11
Existing geoarchaeological boreholes (see Figure 2)			
61SSBH1	532184	180167	3.90
61SSBH2	532214	180132	3.40
65SSBH1a	532108.77	180148.3	2.86
65SSBH2	532118.59	180158.86	2.88
SuHBH4	532082.06	180176.9	1.40
SuHBH5	532089.1	180151.95	2.80
SuHBH1	532072	180162	3.00
SuHBH2	532095	180165	3.08
SuHBH3	532087	180140	3.00
BGS archive boreholes (http://mapapps.bgs.ac.uk/geologyofbritain/home.html)			
TQ38SW2872	532040	180200	2.44
TQ38SW2327	532280	180190	2.08
TQ38SW2328	532280	180170	1.10
TQ38SW2552	532060	180160	3.10
TQ38SW1237/E	532090	180130	4.20
TQ38SW1237/F	532100	180130	4.20
TQ38SW1237/C	532090	180110	4.20
TQ38SW2153	532279	180072	3.88
TQ38SW515	532260	180060	4.20
TQ38SW2152	532179	180064	3.30
TQ38SW2151	532187	180066	3.33
TQ38SW2150	532055	180040	3.08
TQ38SW516	532100	180030	3.22
TQ38SW1613	532000	180240	4.95
TQ38SW2179	531949	180076	2.89

5. RESULTS AND INTERPRETATION OF THE DEPOSIT MODELLING & RADIOCARBON DATING

A summary of the borehole data included in the deposit model is shown in Table 1, 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).

The full sequence of sediments recorded in the boreholes comprises:

Made Ground – widely present
Upper Alluvium – widely present
Peat – widely present
Lower Alluvium – locally present; generally confined to areas of lower Gravel topography
Sand – locally present; confined to areas of lower Gravel topography
Gravel (Shepperton Gravel) – widely present but not reached in all boreholes

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 (Figure 3) is recorded at between -3.89 (IH-BH1) and -5.0m OD (IH-QBH1) within the site. To the southeast it rises from *ca.* -3.5 to -1.5m OD in the area of the Surrey House (Batchelor *et al.*, 2012) and 65 Southwark Street (Batchelor *et al.*, 2011) sites, and further to the south and east, to between *ca.* -1 and 0m OD (e.g. TQ38SW2150, TQ38SW516, TQ38SW2327 and TQ38SW2328). To the northwest of the site it rises to *ca.* -2m OD in borehole TQ38SW1613. The topography of the Gravel surface in the area of the site is thus dominated by the relief of the Bankside Channel; on the basis of this model it would appear that the Isis House site lies towards the main axis of this channel, the Gravel surface lying at lower elevations than those previously recorded towards its main axis (e.g. -4.55m OD at Surrey House and -3.49m OD at South Point, Blackfriars Road (Branch *et al.*, 2002)).

4.2 Sand

A unit of sand was identified overlying the Gravel in one borehole from the Isis House site (IH-QBH1). This unit is indicative of moderate energy fluvial activity, and is only recorded where the Gravel surface is recorded at its lowest, perhaps indicative of higher energy flow at this particular

location – as might be expected, towards the main axis of the Bankside Channel. 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

The Lower Alluvium rests directly on the Shepperton Gravel in selected sequences across the modelled area (with the exception of IH-QBH1, where it rests on the Sand) (Figure 5). In general, the Lower Alluvium is present only where the Gravel surface lies below approximately -3m OD, although there are some exceptions (e.g. TQ38SW1237/E). The deposits of the Lower Alluvium are described as predominantly silty or clayey, tending to become increasingly 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. The surface of the Lower Alluvium (Figure 5) is variable, its surface generally following the topography of the underlying Gravel: in the area of the Isis House site it lies at between -3.69 (IH-BH1) and -4.0m OD (IH-QBH1), rising to between 0 and -1m OD towards the south and east.

The sediments of the Lower Alluvium are indicative of deposition during the Early to Mid-Holocene, when the main course of the Thames was probably 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.

4.3 Peat

Recorded either directly overlying the Shepperton Gravel or the Lower Alluvium in selected sequences is a unit of peat, usually described as woody and in places silty. The surface of this unit was recorded at between -3.09 (IH-BH1) and -3.60m OD (IH-QBH1) within the area of the site; elsewhere it generally lies at between 0 and -3m OD (Figure 6). In the modelled area the Peat is generally thickest (Figure 7) within the lower Gravel topography of the Bankside Channel, although only 0.4 (IH-QBH1) to 0.6m (IH-BH1) is recorded at the Isis House site, compared to up to 3.0m elsewhere. The thin nature of the Peat at the present site may be indicative of prolonged fluvial activity here compared to the neighbouring Surrey House and 65 Southwark Street sites, where *ca.* 1-2m was recorded.

At the present site the results of the radiocarbon dating (Table 3) indicate that Peat accumulation began at around 4685 to 4495 cal BC (6635 to 6445 cal BP; -3.95 to -4.00m OD), with the top of the Peat dated to 4325 to 4055 cal BC (6275 to 6005 cal BP; -3.60 to -3.65m OD). The Peat in borehole IH-QBH1 thus dates to late Mesolithic/early Neolithic transition. 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 communities. Such semi-terrestrial

conditions may have represented former land surfaces that might have been utilised by prehistoric communities.

4.4 Upper Alluvium

The Upper Alluvium generally rests on either the Peat (where present) or the Shepperton Gravel. 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 across the site, generally lying at between 0 and 1m OD; at Isis House it was recorded at between 0 (IH-QBH1 and 0.41m OD (IH-BH1). 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 5m across the site and the wider area (Figure 9). Greater thicknesses are found where the Gravel topography is lower, so within the Isis House site between 4.3 (IH-BH1) and 5.0m (IH-QBH1) is recorded.

4.5 Made Ground

Between *ca*. 2 and 3m of Made Ground generally caps the Holocene alluvial sequence across the wider area, with around 2m present at the Isis House site (Figure 10). 6.6m was recorded in borehole TQ38SW1613 *ca*. 50m to the northwest of the site.

Table 2: Description of Borehole IH-QBH1, Isis House, 67-69 Southwark Street, London Borough of Southwark.

Depth (m bgs)		Depth (m OD)		Description	Stratigraphic interpretation
Top	Base	Top	Base		
0.00	2.72	0.00	-2.72	10YR 3/1; Ag2 As2 Dl+ Dh+; very dark grey silt and clay with traces of detrital wood and herbaceous material. Some fine horizontal bedding. Sharp contact in to:	UPPER ALLUVIUM
2.72	3.12	-2.72	-3.12	10YR 3/1; Ag2 As1 Dl1; very dark grey clayey silt with detrital wood. Diffuse contact in to:	
3.12	3.60	-3.12	-3.60	10YR 3/1; Ag2 As2 Dl+ Dh+; very dark grey silt and clay with traces of detrital wood and herbaceous material. Some fine horizontal bedding. Sharp contact in to:	
3.60	4.00	-3.60	-4.00	10YR 2/1; Sh3 Ag1 Tl+ Th+; humo. 3; black well humified silty peat with traces of wood and herbaceous material. Sharp contact in to:	PEAT
4.00	4.49	-4.00	-4.49	10YR 3/1; Ag3 As1 Dl+; very dark grey clayey silt with a trace of detrital wood. Diffuse contact in to:	LOWER ALLUVIUM
4.49	4.65	-4.49	-4.65	10YR 2/1; As2 Ag2 Sh+ Dl+; black clay and silt with traces of organic matter and detrital wood. Sharp contact in to:	
4.65	5.00	-4.65	-5.00	Gley1 3/10Y; Ga4 Gg+; very dark greenish grey sand with occasional gravel clasts. Sharp contact in to:	SAND
5.00	5.05	-5.00	-5.05	Gley1 3/10Y; Gg3 Ga1; very dark greenish grey sandy gravel. Clasts are flint, well-rounded to sub-angular, up to 30mm in diameter.	SHEPPERTON GRAVEL

Table 3: Results of the radiocarbon dating of samples from borehole IH-QBH1, Isis House, 67-69 Southwark Street, London Borough of 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-469278 / AMS	Twig wood (<5 years old); top of peat	-3.60 to -3.65	5360 ± 30	4325 to 4055 cal BC (6275 to 6005 cal BP)	-29.2
BETA-469279 / AMS	Twig wood (<5 years old); base of peat	-3.95 to -4.00	5730 ± 30	4685 to 4495 cal BC (6635 to 6445 cal BP)	-27.2

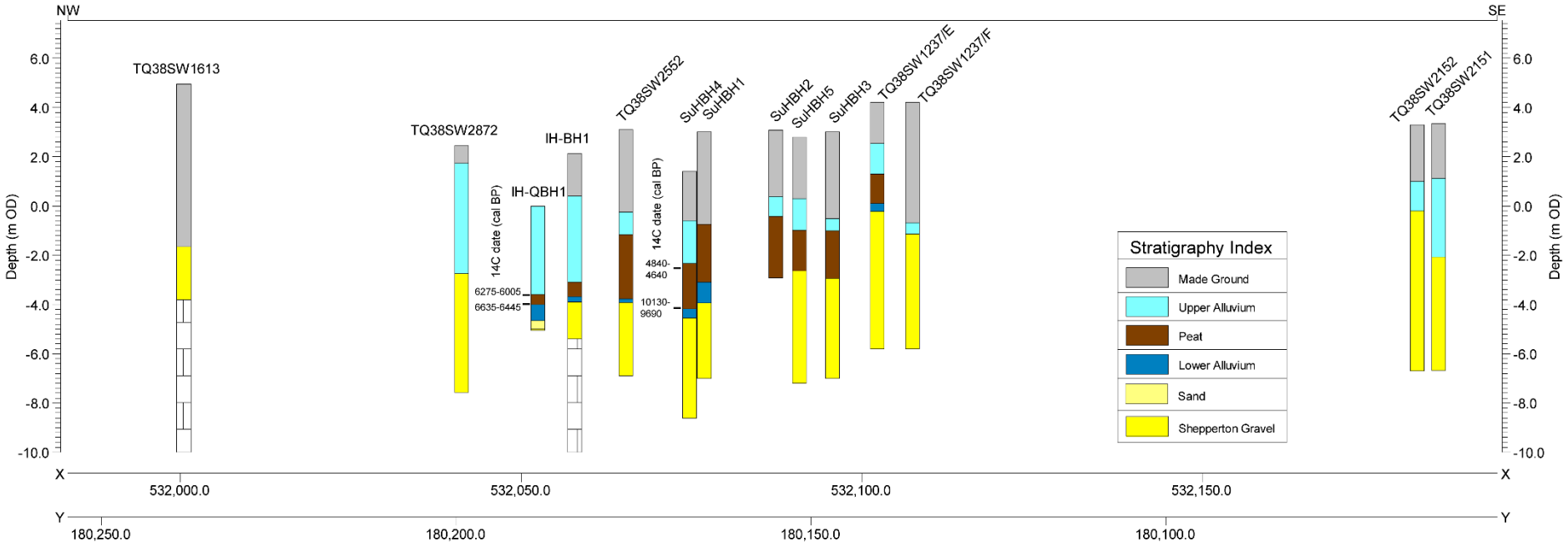


Figure 3: Northwest-southeast transect of selected boreholes across the Isis House site and the wider area. Results of the radiocarbon dating from the present site and Surrey House (Batchelor *et al.*, 2012) also shown.

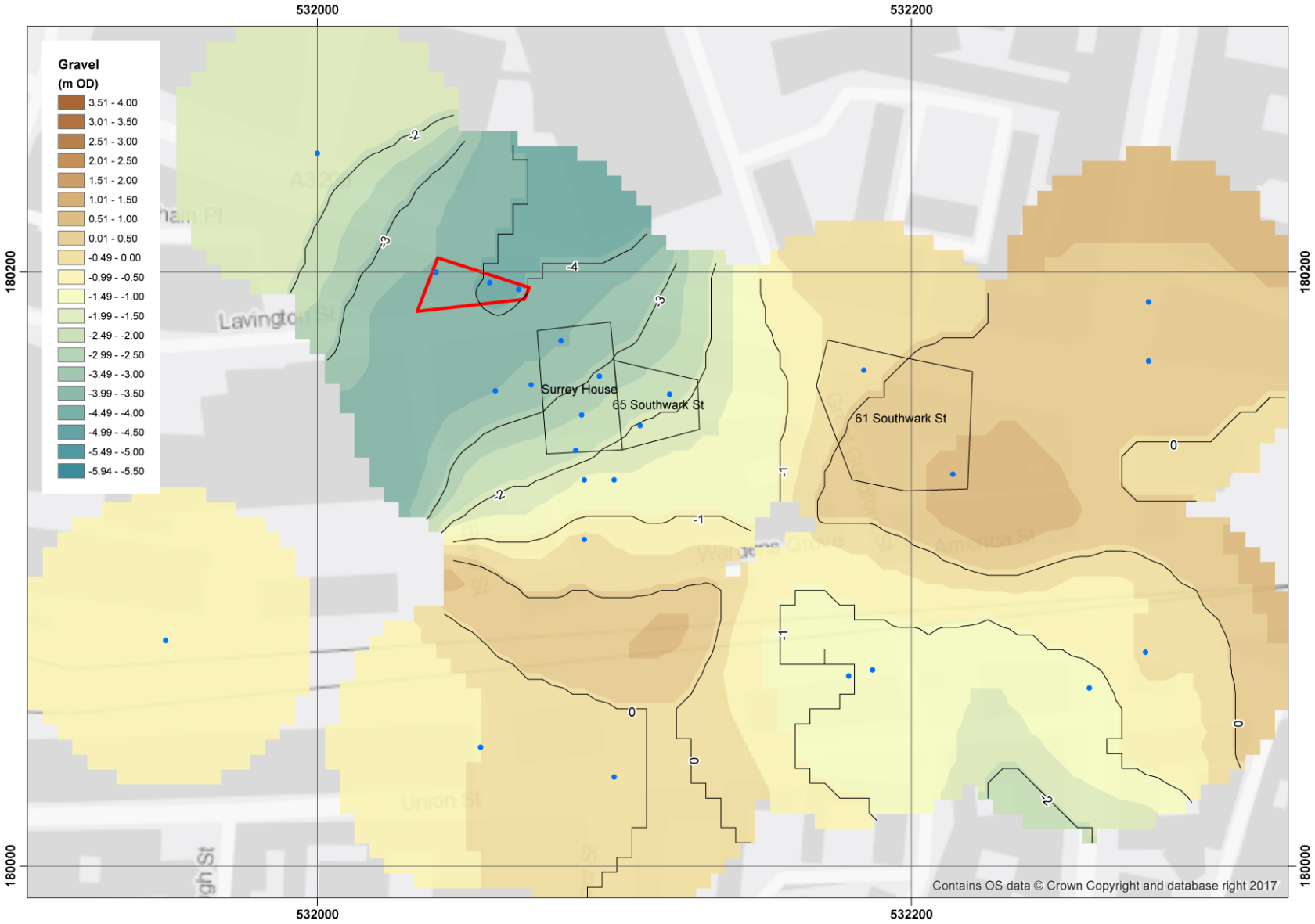


Figure 4: Top of the Shepperton Gravel (m OD) (site outline in red).

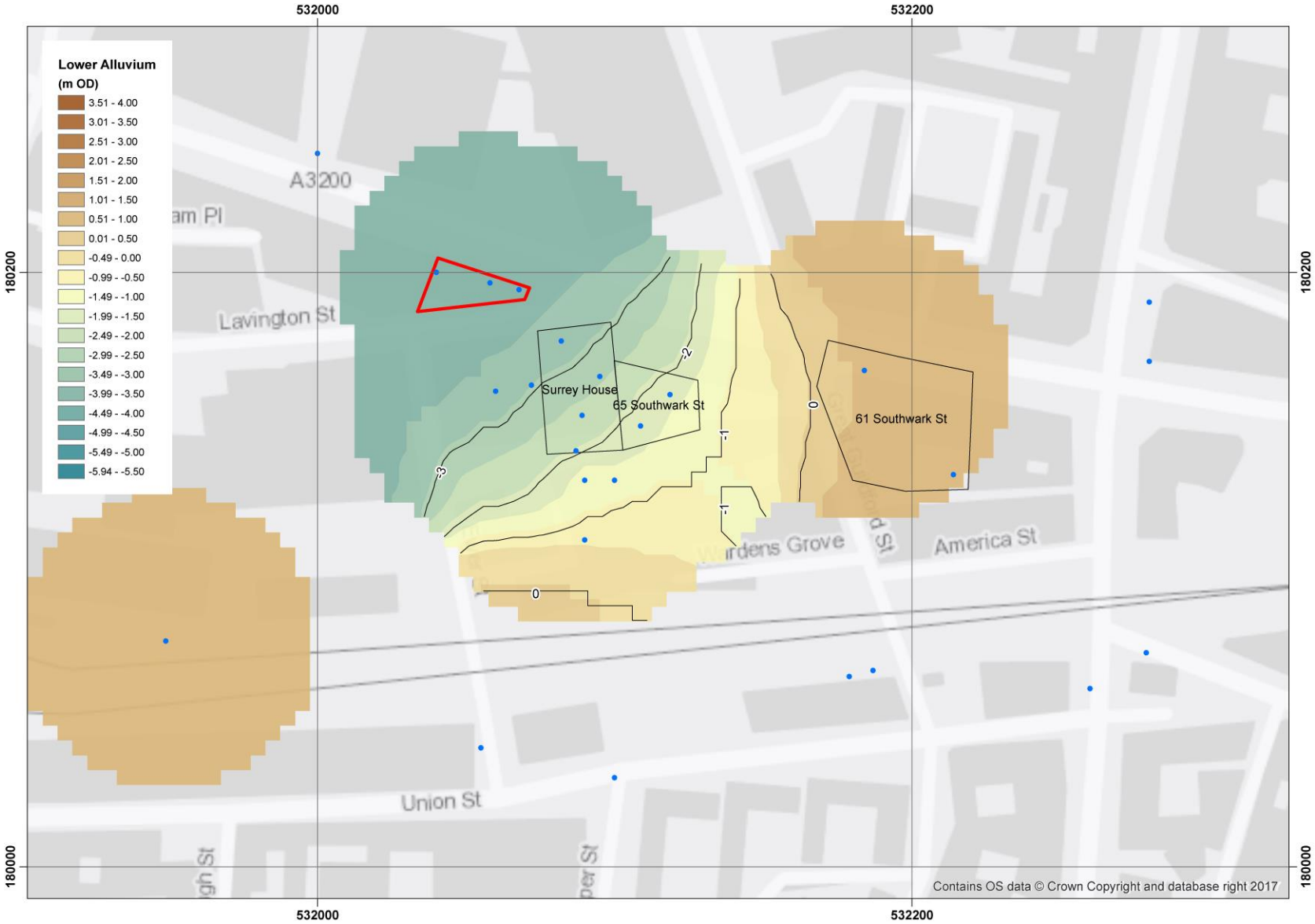


Figure 5: Top of the Lower Alluvium (m OD) (site outline in red).

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).

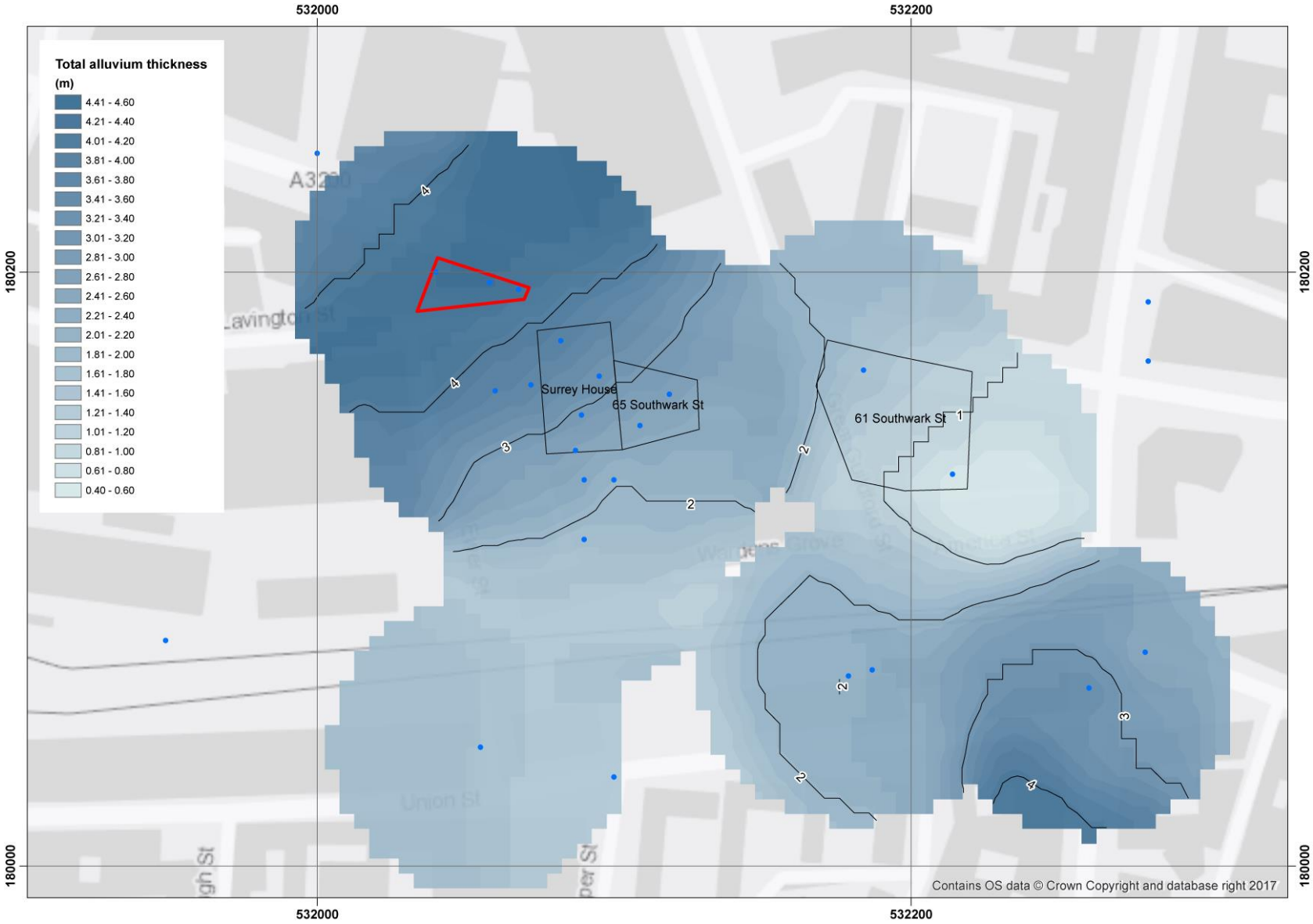


Figure 9: Thickness of the Holocene alluvial sequence (Lower Alluvium, Peat and Upper Alluvium) (m) (site outline in red).

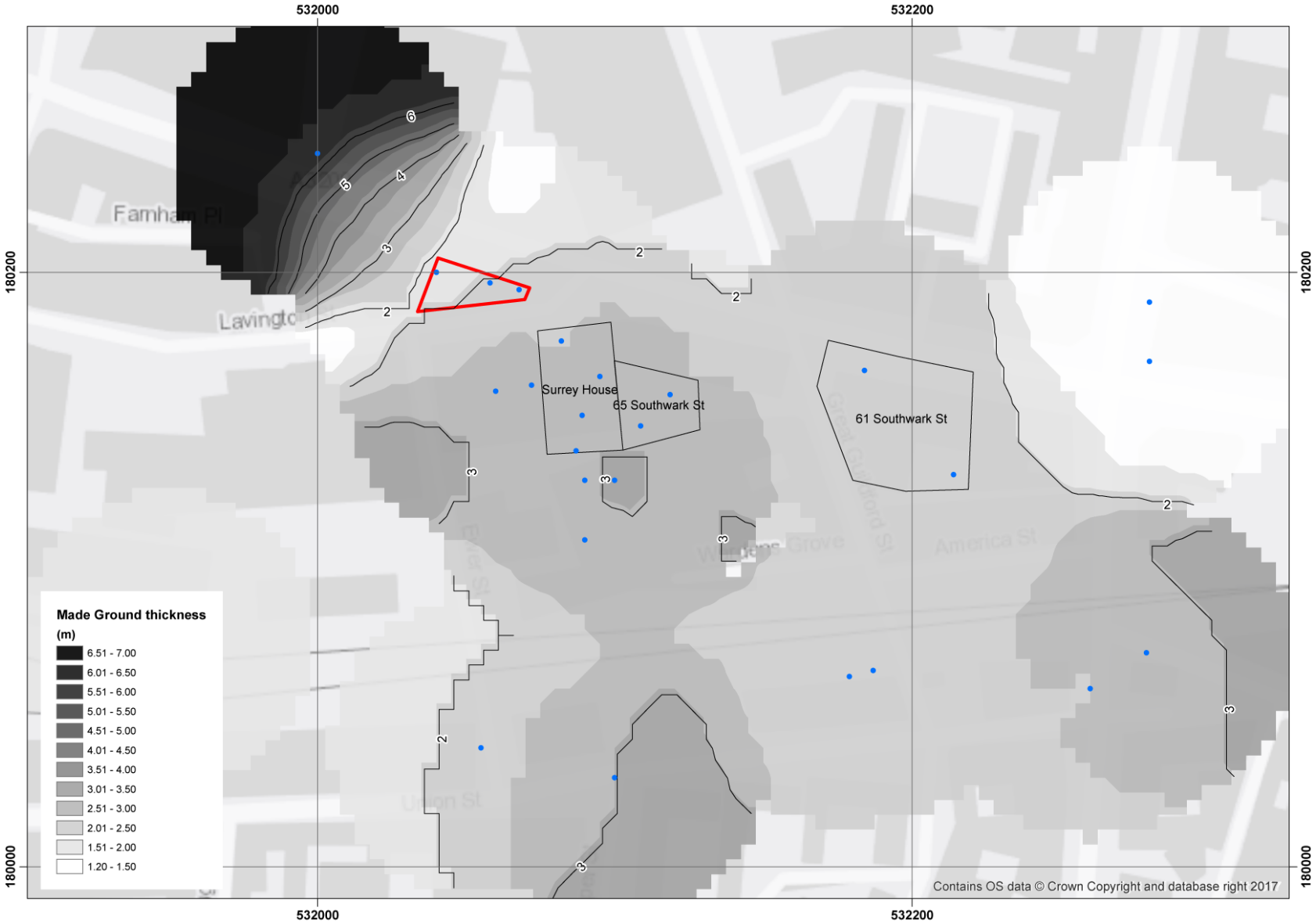


Figure 10: Thickness of Made Ground (m) (site outline in red).

6. DISCUSSION

The aim of the geoarchaeological investigations at the site were: (1) to clarify the nature of the sub-surface stratigraphy, and (2) to clarify the nature, depth, extent and date of any alluvium and organic/peat deposits. In order to address these aims, a geoarchaeological borehole was put down at the site, and the stratigraphic data from existing geotechnical and geoarchaeological boreholes from the site and the wider area used to produce a deposit model of the major depositional units. Following the results of the initial deposit modelling exercise, it was recommended that a programme of radiocarbon dating was carried out in order to assess the age of the Peat horizon at the Isis House site in comparison to those already recorded in the area of the Bankside Channel, and to assess the need for subsequent environmental archaeological assessment of the sequence.

The results of the deposit modelling indicate that the sediments recorded at the site are similar to those recorded elsewhere in the Lower Thames Valley, and specifically within the area of the Bankside Channel, with Late Devensian Shepperton Gravel overlain by a sequence of Holocene alluvial sediments, including peat, and buried beneath modern Made Ground. The results indicate that the Isis House site lies towards the main axis of the Bankside Channel: here, a Gravel surface as low as -5m OD is deeper than has been identified previously within this channel. The Gravel surface appears to fall relatively steeply, falling from 0.9m OD towards the southeast of the 61 Southwark Street site, to -5m OD at Isis House over a distance of *ca*. 160m. Elsewhere, at 65 Southwark Street (Batchelor *et al*., 2011b), less than 50m to the east of Isis House the gravel surface was recorded at -1.60m OD and below -1.99m OD, whilst at Surrey House (Batchelor *et al*., 2012) the Gravel was recorded at between *ca*. -2.6 and -4.5m OD. At the South Point site on Blackfriars Road, towards the presumed axis of the channel, the surface of the Shepperton Gravel falls to -3.49m OD (Branch *et al*., 2002) and at nearby sites in Joan Street and Union Street (Sidell *et al*., 2000) this surface is recorded at between -2.00m and -3.00m OD. However at Great Suffolk Street (Green & Young, 2011), only *ca*. 75m to the south and east of the Union Street site, the gravel surface is at 1.10m OD, and to the north of this locality in sites beside Bear Lane (Young *et al.,* 2010), the gravel surface rises northward from -2.70m to -0.60m OD. Further north again in Blackfriars Road (Batchelor *et al*., 2008) the gravel surface rises northward from 0.00m to 2.67m OD.

The sequence of Holocene sedimentation overlying the Shepperton Gravel is similar to that recorded elsewhere within the Bankside Channel, incorporating a horizon of Sand, the silty/sandy Lower Alluvium, Peat, and the clay-rich Upper Alluvium, overlain by modern Made Ground. At the present site however the Peat is relatively thin, at between 0.4 and 0.6m thick, perhaps indicative of prolonged fluvial activity at this location either preventing the accumulation of peat, or subsequently eroding its surface. It is recorded at relatively low elevations (between *ca*. -3 and -4m OD) compared to other sites in this area; at 65 Southwark Street (Batchelor *et al*., 2011b) it was recorded at elevations between -0.62 and -1.62m OD, whilst at Surrey House (Batchelor *et al*., 2012) it was recorded at between -4 and -1m OD. At 61 Southwark Street (Young, 2015) upslope migration of the Peat surface may have resulted in a significantly higher elevation for this unit,

where it was recorded at between 0.6 and 0.9m OD (although this could also represent a separate, later episode of Peat accumulation).

The results of the radiocarbon dating indicate that Peat accumulation occurred at the present site during the late Mesolithic/early Neolithic transition, at between 4685-4495 cal BC (6635-6445 cal BP) and 4325-4055 cal BC (6275-6005 cal BP). Investigations at Bear House (Young *et al.*, 2010) and Bear Lane (Tan, 2008) indicate that towards the northern edge of the Bankside Channel (*ca.* 150m to the west/northwest) the peat deposits accumulated from at least 4820-4570 to 3140-2870 cal BP (Late Neolithic to Late Bronze Age). At sites towards the middle of the Bankside Channel such as St Christopher House (*ca.* 50m north of the site; London Archaeologist, 2004) radiocarbon dating indicated that the channel dated from at least 10,650-10,250 cal BP and included both peat and alluvial deposits, whilst historic records indicate it had infilled by the Late 17th Century (Turner, 2009). At 65 Southwark Street (Batchelor *et al.*, 2011) peat was identified within the Alluvium in thicknesses of up to 0.84m and present at elevations between -0.62 and -1.46m OD. Subsequent radiocarbon dating demonstrated that the peat accumulated from at least to 5610-5480 to 4290-4090 cal BP (Middle to Late Neolithic). At Surrey House (Batchelor *et al.*, 2012) up to 2m of peat was recorded at elevations between *ca.* -4 and -1m OD, either lying directly on the gravel surface or separated by a thin layer of alluvium. Here, radiocarbon dating demonstrated that peat accumulation began earlier at 7410-7250 cal BP (Mesolithic) and continued until at least 4840-4640 cal BP (Neolithic).

7. CONCLUSIONS AND RECOMMENDATIONS

The Peat horizon recorded at the Isis House site lies within the age and elevation range of the organic deposits at Surrey House, immediately to the east (Batchelor *et al.*, 2012), from where environmental archaeological analysis of a thick Peat sequence has already been carried out. Given the thin nature of the surviving Peat deposits at Isis House, and their contemporary age with the deposits at Surrey House, no further environmental archaeological assessment is therefore recommended.

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9. APPENDIX 1: OASIS

OASIS ID: quaterna1-286292

Project details

Project name	Isis House, 67-69 Southwark Street
Short description of the project	Geoarchaeological investigations were carried out at the Isis House site in order to: (1) clarify the nature of the sub-surface stratigraphy, and (2) clarify the nature, depth, extent and date of any alluvium and organic/peat deposits. Following the results of the initial deposit modelling exercise, it was recommended that a programme of radiocarbon dating was carried out in order to assess the age of the Peat horizon at the Isis House site in comparison to those already recorded in the area of the Bankside Channel, and to assess the need for subsequent environmental archaeological assessment of the sequence. The results of the deposit modelling indicate that the Isis House site lies towards the main axis of the Bankside Channel: here, a Gravel surface as low as -5m OD is deeper than has been identified elsewhere within the channel. The sequence of Holocene sedimentation overlying the Gravel is similar to that recorded elsewhere within the Bankside Channel, incorporating a horizon of Sand, the silty/sandy Lower Alluvium, Peat, and the clay-rich Upper Alluvium, overlain by modern Made Ground. Here, the Peat is relatively thin, at between 0.4 and 0.6m thick, perhaps indicative of prolonged fluvial activity at this location either preventing the accumulation of peat, or subsequently eroding its surface. The results of the radiocarbon dating indicate that Peat accumulation occurred at the present site during the late Mesolithic/early Neolithic transition, lying within the age and elevation range of the organic deposits at Surrey House, immediately to the east (Batchelor et al., 2012), from where environmental archaeological analysis of a thick Peat sequence has already been carried out. Given the

	thin nature of the surviving Peat deposits at Isis House, and their contemporary age with the deposits at Surrey House, no further environmental archaeological assessment is therefore recommended.
Project dates	Start: 01-01-2017 End: 24-07-2017
Previous/future work	No / Not known
Monument type	PEAT Late Mesolithic

Project location

Country	England
Site location	GREATER LONDON SOUTHWARK SOUTHWARK Isis House, 67-69 Southwark Street
Postcode	SE1 0HX
Site coordinates	TQ 32058 80193 51.504721785344 -0.09703727981 51 30 17 N 000 05 49 W Point

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project brief originator	CgMs Consulting
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	24 July 2017