A REPORT ON THE GEOARCHAEOLOGICAL BOREHOLE INVESTIGATIONS AT BEAR HOUSE, BEAR LANE, SOUTHWARK, LONDON SE1 (SITE CODE: BJH10)

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NON-TECHNICAL SUMMARY

CgMs Consulting Ltd commissioned Quaternary Scientific (QUEST) to carry out a geoarchaeological borehole survey of land at Bear House, Bear Lane, Southwark, London SE1 prior to the proposed development of a new hotel building with basement. The following report aimed to produce a model of the sub-surface stratigraphy of the site and to highlight sediments of potential environmental archaeological significance.

The geoarchaeological investigations have demonstrated that the underlying gravel surface decreases in elevation from north to south, and is overlain by Holocene alluvial sediments including very organic silts and peat. The alluvial sequence is generally thicker in the southern half of the site, both as a result of a lower gravel surface and thinner made ground. The new borehole records have been combined with existing records from Bear Lane to produce a three-dimensional deposit model for the Bear House and Bear Lane sites. This model indicates that the northern edge of the Bankside Channel is located further to the south than previously suggested, and may be within the northern extent of the site itself.

It has been recommended that a palaeoenvironmental assessment of two cores is carried out, and integrated with existing environmental investigations from Bear Lane. Combining the selected boreholes will represent a north-south transect across the projected course of the Bankside Channel, and will help to identify evidence of change or continuity through time, and to establish whether any significant spatial variability exists across the sites.

INTRODUCTION

This report summarises the findings arising out of the geoarchaeological borehole investigations undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at Bear House, Bear Lane, Southwark, London (National Grid Reference: TQ 3185 8023; Figure 1 and Figure 2; site code: BJH10) and following archaeological assessment of the site by Pre-Construct archaeology Ltd (Turner, 2009; site code: BEQ09). Recent geotechnical, archaeological and geoarchaeological investigations carried out by CARD Geotechnics Ltd (Ball, 2007), Pre-Construct Archaeology Ltd (Holden, 2007) and *ArchaeoScape* (Tan *et al.*, 2008), immediately to the south of the site at Bear Lane (site code: BLZ07; Figures 1 and 2) indicate a sequence of Shepperton Gravel, overlain by Alluvium, truncated by Made Ground to the present day surface (*ca.* 3.47m OD). Current records indicate the possible remains of a channel running roughly south-west to north-east across the whole site, with the Bear House and Bear Lane sites positioned towards the centre of the channel (Dunwoodie, 2006; Batchelor, 2010).

Four continuous, cable-percussion U100 core samples were taken at four locations across the Bear House site (Q.<BH1> to Q.<BH4>). The new borehole records were integrated with existing geotechnical and column sample records from Bear Lane to produce a site-wide model of the stratigraphic architecture. The main aim of the geoarchaeological borehole investigations was to produce a basic model of the sub-surface stratigraphy across the site, to clarify the existence and course of the Bankside Channel and to highlight sediments of potential palaeoenvironmental significance.

GEOLOGICAL CONTEXT

The area of investigation is located on the floodplain of the estuarine Thames *ca*. 350m south of the modern waterfront, and *ca.* 150m south of the higher drier ground of the gravel terrace (NGR TQ 3185 8023; Figure 1; *ca*. 3.5m OD). The site is located within the Archaeological Priority Zone of Bankside, Bermondsey, Rotherhithe, as defined in the London Borough of Southwark's Unitary Development Plan (London Borough of Southwark, 1995).

The site itself is projected as being located towards the centre of the Bankside Channel, a large and well documented palaeochannel alongside the River Thames (Dunwoodie, 2006). Investigations immediately to the south of the site record the basal Shepperton Gravel (previously interpreted as the Kempton Park Gravel) at -1.94m OD towards the west and -1.04m OD towards the east (Holden, 2007). The Bankside Channel infilled over time, and recent archaeological investigations at Bear House (Turner *et al*., 2009), indicate that the

truncated surface of alluvium lies at 2.62m OD in Trench 1 in the northwest corner of the site, and 1.65m OD in Trench 4 towards the southeast of the site (Figure 2). This suggests an alluvial sequence at Bear House at least *ca*. 4.50m thick on the northwest of the site, thinning to at least *ca*. 2.70m thick on the southeast of the site. This would correspond with the northwest of the Bear House site being located towards the centre of the Bankside Channel.

Elsewhere, other nearby sites along the course of the Bankside Channel such as St Christopher House (*ca*. 100m northeast of the site; London Archaeologist, 2004) and Great Suffolk Street (*ca*. 80m southwest of the site; London Archaeologist, 2006) indicate the gravel surface was more deeply buried below -3.50m OD (Dunwoodie, 2006). Radiocarbon dating of the earliest deposits found at St Christopher House indicate the channel dated from at least 10,650-10,250 cal yr BP and included both peat and alluvial deposits (London Archaeologist, 2004), whilst historic records indicate it had infilled by the Late 17th Century (Turner, 2009). More locally, recent investigations from Trench 7, Bear Lane (Figures 1 and 2) also demonstrated the accumulation of peat and alluvium from at least 4821 to 4568 to cal yr BP (-0.92 to -0.90m OD; Tan *et al*., 2008). Previous work in the area therefore suggests that there is potential at Bear House to obtain a sequence that may incorporate sediments dating from the Mesolithic through to Post-Medieval cultural periods.

Furthermore, at St Christopher's House, three timber structures dated to 3450-3240 cal yr BP (2 structures) and 2750-2350 cal yr BP (1 structure) were recorded within the channel's sedimentary sequence (London Archaeologist, 2004). Whilst at two sites located on a gravel eyot further the north of the site (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 Bear House 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, with particularly reference to records from Bear Lane immediately to the south.

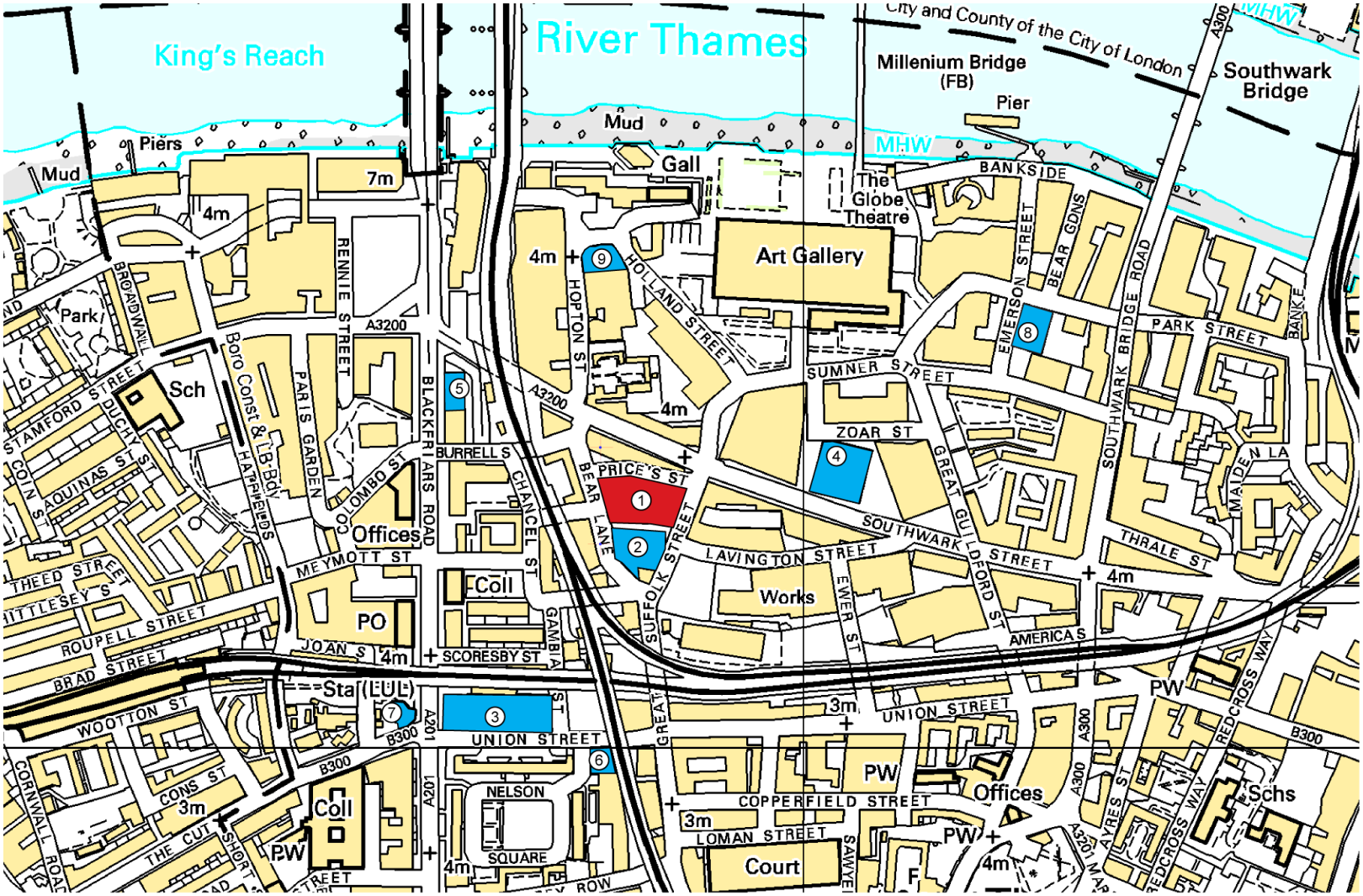

Figure 1: Location of Bear House, Bear Lane, Southwark, London SE1 and nearby studies from which geoarchaeological data is available

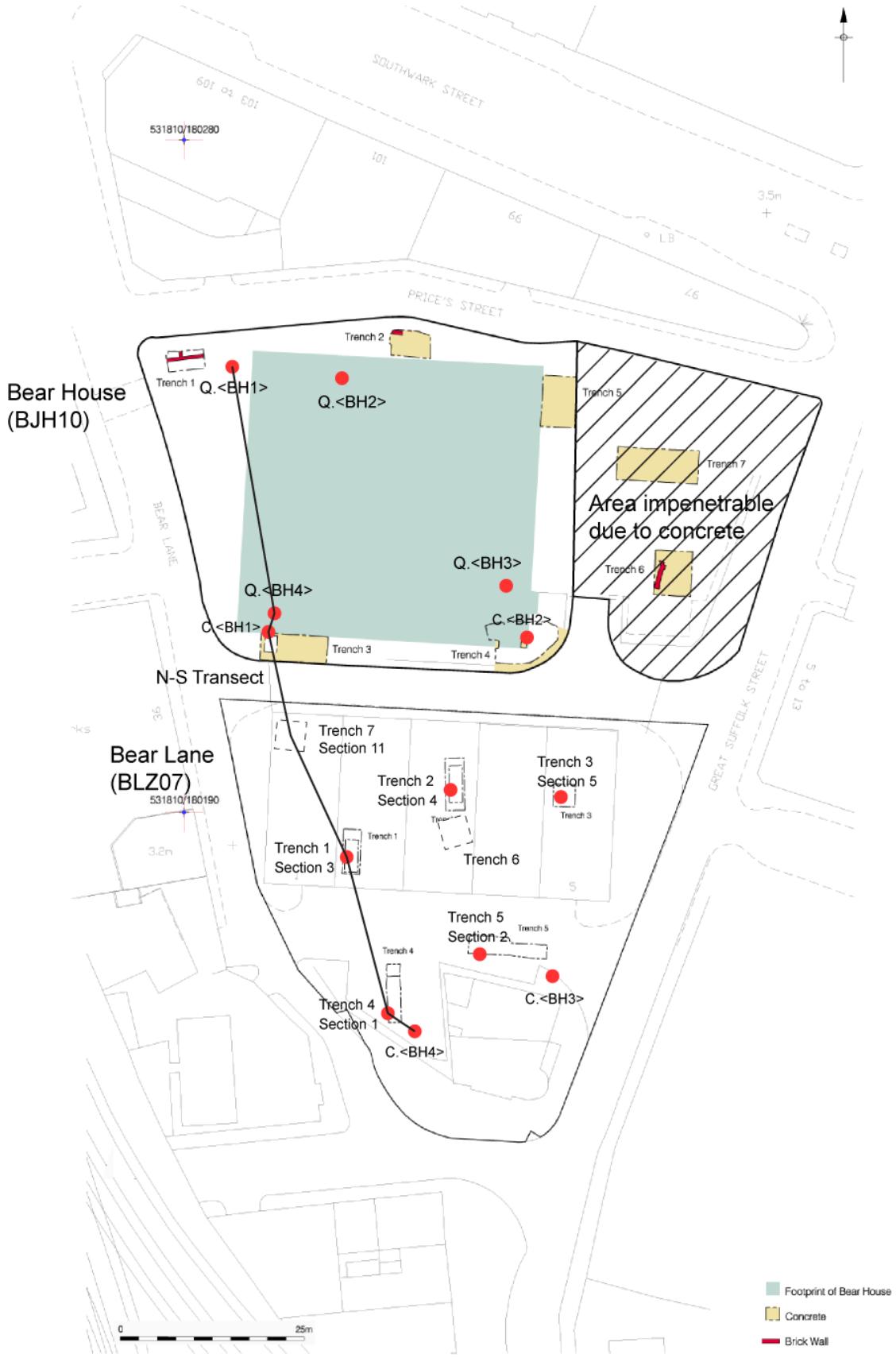

Figure 2: Bear House (this study) borehole locations and Bear Lane (previous study) column sample and borehole locations, Bear House, Bear Lane, Southwark, London SE1

METHODS

Field investigations

Four boreholes (Q.<BH1> to Q.<BH4>) were put down at the site in May 2010 (Figure 2). Boreholes were recovered using cable percussion coring, carried out by Tony Bedford Drilling Services, and monitored by a member of Quaternary Scientific staff. The spatial attributes of each proposed borehole location were recorded in the field. These locations were adjusted following difficulties penetrating the made ground and relocated using GIS software (Table 1 and Figure 2).

Table 1: QUEST borehole details, Bear House, Bear Lane, Southwark, London SE1

Quest borehole number	Easting	Northing	Height at surface (m OD)
Q.<BH1>	531816.551	180249.594	3.90
Q.<BH2>	531831.342	180248.125	3.90
Q.<BH3>	531853.583	180220.325	3.40
Q.<BH4>	531822.216	180216.653	3.30

Lithostratigraphic descriptions

The lithostratigraphy of boreholes Q.<BH1> to Q.<BH4> were 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 samples with a spatula or scalpel blade and distilled water to remove surface contaminants; (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 are displayed in Figure 3 and tables 3 to 6.

Deposit modelling

The deposit model is based on a review of thirteen stratigraphic records incorporating the 4 new Quaternary Scientific geoarchaeological boreholes (Tables 1 and 3 to 6), 4 geotechnical boreholes from Bear Lane (Ball, 2007; Table 2) and 5 descriptive records from archaeological sections (Holden, 2007; Table 2). Sedimentary units from the boreholes were classified into the following five groupings: (1) Shepperton Gravel; (2) Lower Alluvium; (3) Peat/organic horizons; (4) Upper Alluvium, and (5) Made Ground. The classified data for groups 1-5 were then input into a database with the RockWorks 2006 geological utilities software. Models of surface height (using a nearest neighbour routine) were generated for

each of these stratigraphic groups (Figures 4, 5 and 8). Thickness of the Made Ground (Unit 5) and Peat/Very Organic horizons (Unit 3) were also modelled (also using a nearest neighbour routine) (Figures 6 and 7). Because the boreholes are not uniformly distributed over the area of investigation, the reliability of the models generated using RockWorks is variable. In general, more records are available in the southern extent of the modelled area. 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.

It is important to note that two sets of borehole records 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. The cores from the 4 new boreholes (Q.<BH1> to Q.<BH4>) represent the most detailed record of the sediment sequences, and follow the same descriptive techniques.

Table 2: CARD Geotechnics boreholes and Pre-Construct Archaeology archaeological section details, Bear House and Bear Lane, Southwark, London SE1 (CARD Geotechnics, 2007; Holden, 2007)

Borehole/Section number	Trench Number	Easting	Northing	Height at surface (m OD)
C.<BH1>	N/A	531821.438	180214.155	3.47
C.<BH2>	N/A	531856.397	180213.397	3.47
C.<BH3>	N/A	531859.938	180167.999	3.47
C.<BH4>	N/A	531841.223	180160.666	3.47
Archaeological Section 1	4	531832	180184	3.47
Archaeological Section 2	5	531846	180193	3.47
Archaeological Section 3	1	531861	180192	3.46
Archaeological Section 4	2	531837	180163	3.36
Archaeological Section 5	3	531850	180171	3.27

RESULTS OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS AND DEPOSIT MODELLING

The results of the lithostratigraphic descriptions of the new boreholes (Q.<BH1> to Q.<BH4>) are displayed in Figure 3 and Tables 3 to 6. The results of the deposit modelling are displayed in Figures 4 to 6. The present ground level across the area of investigation is between 3.27 and 3.90m OD, rising to 3.90m OD at Borehole Q.<BH1> and falling to 3.27m OD at the location of Archaeological Section 2. All these levels are however, the result of artificial ground-raising represented by between 1.03 and 3.60m of Made Ground across the two sites. In general, the thickness of made ground increases from between 1.00 and 2.00m towards the south (Bear Lane) to between 2.00 and 3.60m at its northern extent (i.e. within Bear House). From the thirteen stratigraphic records, it is possible to recognise the presence of four sediment types in the Holocene alluvial sequence, overlying the Shepperton Gravel:

(Unit 5)	*Made Ground*
(Unit 4)	*Upper (Silty clay) Alluvium*
(Unit 3)	*Peat/Very Organic Horizons*
(Unit 2)	*Lower Alluvium*
(Unit 1)	*Shepperton Gravels*

The base of the Holocene alluvial sequence is the sloping surface of the underlying gravel–the Shepperton Gravel (Unit 1) of Gibbard (1982). The gravel surface lies between -0.60m OD and -1.03m OD towards the north of the Bear House site, and slopes downwards to *ca.* -2.80m OD at the southern extent of the Bear Lane site (Figures 4 and 8). The total thickness of the Holocene alluvial sequence varies between 0.35m and 4.08m, with most of the thicker sequences (>2.5m) surviving in the Bear Lane site (Figure 8).

In five of the eight borehole records across the two sites, the Lower Alluvium is the lowest unit (Unit 2) in the Holocene sequence, resting directly on the surface of the underlying Shepperton Gravel and in some places incorporating scattered pebbles derived from it. Scattered detrital wood remains are also sometimes present in this unit. Like the surface of the Shepperton Gravel, the surface of the Lower Alluvium falls away towards the Bear Lane site (Figure 4). In all but one of the boreholes (Borehole C.<BH1>) the Lower Alluvium or Shepperton Gravel is succeeded upwards by Peat or Very Organic Silt (Unit 3). In those cores that were examined in detail in the laboratory (Boreholes Q.<BH1> to Q.<BH4>), this organic unit was seen in three cases to include a bed of Peat, but in one (Borehole Q.<BH2> to consist entirely of organic-rich mineral sediment.

The Peat/Organic Horizons increase in thickness southwards, ranging from 0.17m (Q.<BH2>) to 0.60m (C.<BH2>) in Bear House to between 0.96m (Section 2) and 1.80m (Section 4) at towards the southern extent of Bear Lane. The base of the organic units ranges from -1.94m OD to –1.04m OD at Bear Lane, rising to between -1.13m OD and -0.42m OD at Bear House. The upper surface is between 0.16m OD and -0.88m OD across the site.

The Upper (silty clay) Alluvium (Unit 4) ranges in thickness from 3.12m to 1.20m within the Bear Lane site, decreasing to between 1.90 and 0.40m at Bear House. This is in part due to a general rise in the surface of the units below towards the Bear House; but also due to truncation by the Made Ground (Unit 5). The base of the Made Ground reaches as low as 0.24m OD at Q.<BH2>, compared to between 2.24 and 1.26m OD at Bear Lane (Figures 7 and 8).

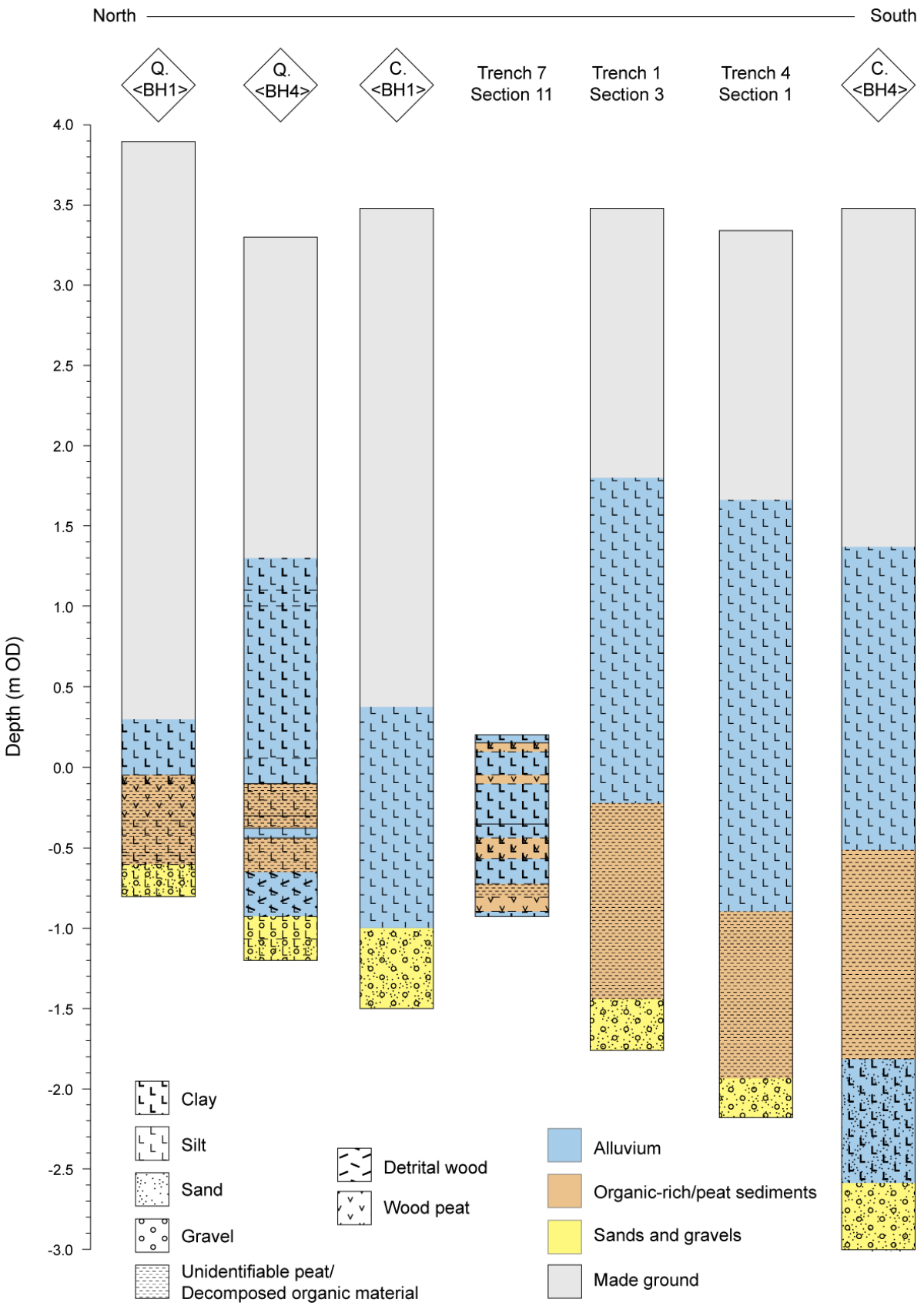

Figure 3: Lithostratigraphic diagram of boreholes Q.<BH1> to Q.<BH4>, Bear House, Bear Lane, Southwark, London SE1

Table 3: Lithostratigraphic description, borehole <BH1>, Bear House, Bear Lane, Southwark, London SE1

Depth (m OD)	Depth (m bgs)	Composition
3.90 to 0.30	0.00 to 3.60	Made ground.
0.30 to -0.05	3.60 to 3.95	Gley 1 3/10Y; Ag2 As2; very dark greenish grey silt and clay. Diffuse contact in to:
-0.05 to -0.10	3.95 to 4.00	10YR 3/2; Ag2 As1 Sh1 Dh+; very dark greyish brown clayey silt with disintegrated organic matter and traces of detrital herbaceous material.
-0.10 to -0.33	4.00 to 4.23	2.5YR 2.5/1; Sh3 Tl[1]1 Ag+; Humo. 3; well humified reddish black woody peat with traces of silt. Diffuse contact in to:
-0.33 to -0.55	4.23 to 4.45	10YR 3/2; Ag2 Sh2 Dh+ Dl+; very dark greyish brown very organic silt with traces of detrital herbaceous material and detrital wood.
-0.55 to -0.60	4.45 to 4.50	Gley 1 4/10Y; Ag2 As1 Sh1 Gg+; dark greenish grey clayey silt with disintegrated organic matter. Occasional gravel clasts 3-4mm. Diffuse contact in to:
-0.60 to -0.80	4.50 to 4.70	Gley 1 3/10Y; Gg2 Ag1 Ga1 Dl+; very dark greenish grey silty sandy gravel with traces of detrital wood. Gravel clasts 4-40mm.

Table 4: Lithostratigraphic description, borehole <BH2>, Bear House, Bear Lane, Southwark, London SE1

Depth (m OD)	Depth (m bgs)	Composition
3.80 to 0.24	0.00 to 3.56	Made ground.
0.24 to 0.15	3.56 to 3.65	2.5Y 3/2; As3 Ag1 Sh+; very dark greyish brown silty clay with traces of disintegrated organic matter.
0.15 to 0.00	3.65 to 3.80	5Y 2.5/2; As3 Sh1 Ag+ Dl+; black clay with disintegrated organic matter and traces of silt and detrital wood. Diffuse contact in to:
0.00 to -0.25	3.80 to 4.05	10YR 3/2; Ag2 Sh1 Dl1 As+; very dark greyish brown organic silt with detrital wood and traces of clay. Diffuse contact in to:
-0.25 to -0.42	4.05 to 4.22	10YR 2/1; Sh2 Ag1 As1 Dl+; Humo. 3/4; well humified black disintegrated organic matter with silt and clay and traces of detrital wood. Diffuse contact in to:
-0.42 to -0.60	4.22 to 4.40	2.5Y 4/2; Ag3 As1 Dl+; dark greyish brown clayey silt with traces of detrital wood. Sharp contact in to:
-0.60 to -0.80	4.40 to 4.60	Gg3 Ga1. Clasts flint, 4-50mm.

Table 5: Lithostratigraphic description, borehole <BH3>, Bear House, Bear Lane, Southwark, London SE1

Depth (m OD)	Depth (m bgs)	Composition
3.40 to 1.40	0.00 to 2.00	Made ground.
1.40 to 1.10	2.00 to 2.30	Gley 1 4/10Y; Ag2 As2 Dl+; dark greenish grey silt and clay with traces of detrital wood.
1.10 to -0.42	2.30 to 3.82	Borehole compromised- no sample retained

-0.42 to -0.50	3.82 to 3.90	2.5YR 2.5/1; Sh3 Ag1 Th^3+; Humo. 3/4; well humified reddish black silty peat with traces of herbaceous material. Diffuse contact in to:
-0.50 to -0.77	3.90 to 4.17	2.5Y 3/2; Ag2 Dl1 Sh1; very dark greyish brown silt with detrital wood and disintegrated organic matter. Sharp contact in to:
-0.77 to -0.85	4.17 to 4.25	Gley 1 4/10Y; Ag3 Gg1; dark greenish grey silt with gravel. Clasts flint 4-50mm. Diffuse contact in to:
-0.85 to -1.10	4.25 to 4.50	Gg4 Ga+ Ag+; gravel with traces of sand and silt. Clasts flint 4-50mm.

Table 6: Lithostratigraphic description, borehole <BH4>, Bear House, Bear Lane, Southwark, London SE1

Depth (m OD)	Depth (m bgs)	Composition
3.30 to 1.30	0.00 to 2.00	Made ground.
1.30 to 1.10	2.00 to 2.20	2.5Y 4/4; As3 Ag1; olive brown mottled orangey brown silty clay with iron nodules. Diffuse contact in to:
1.10 to 1.00	2.20 to 2.30	2.5Y 3/2; As3 Ag1; very dark greyish brown silty clay. Diffuse contact in to:
1.00 to 0.05	2.30 to 3.25	2.5Y 2.5/1; As3 Ag1 Sh+; black silty clay with traces of disintegrated organic matter. Mollusc fragments common. Diffuse contact in to:
0.05 to -0.10	3.25 to 3.40	2.5Y 2.5/1; As3 Ag1 Sh+ Dl+; black silty clay with traces of disintegrated organic matter and detrital wood. Mollusc fragments common. Sharp contact in to:
-0.10 to -0.30	3.40 to 3.60	10YR 2/1; Ag2 Sh2 Dl+ As+; black very organic silt with traces of detrital wood and clay. Sharp contact in to:
-0.30 to -0.38	3.60 to 3.68	2.5YR 2.5/1; Sh3 Ag1 Tl^2+; Humo. 3/4; well humified reddish black silty peat with traces of wood. Sharp contact in to:
-0.38 to -0.43	3.68 to 3.73	5Y 2.5/1; Ag4 Sh+; black silt with traces of disintegrated organic matter. Sharp contact in to:
-0.43 to -0.65	3.73 to 3.95	2.5YR 2.5/1; Sh3 Ag1 Tl^2+ Th^3+; Humo. 3; well humified silty peat with traces of wood and herbaceous material.
-0.65 to -0.92	3.95 to 4.22	5Y 2.5/2; Ag3 Dl1; black silt with detrital wood. Diffuse contact in to:
-0.92 to -1.08	4.22 to 4.38	Gley 1 4/10Y; Ag3 Gg1; dark greenish grey silt with gravel. Clasts flint, 5-40mm. Diffuse contact in to:
-1.08 to -1.20	4.38 to 4.50	5Y 4/2; Gg2 Ga1 Ag1; olive grey silty sandy gravel.

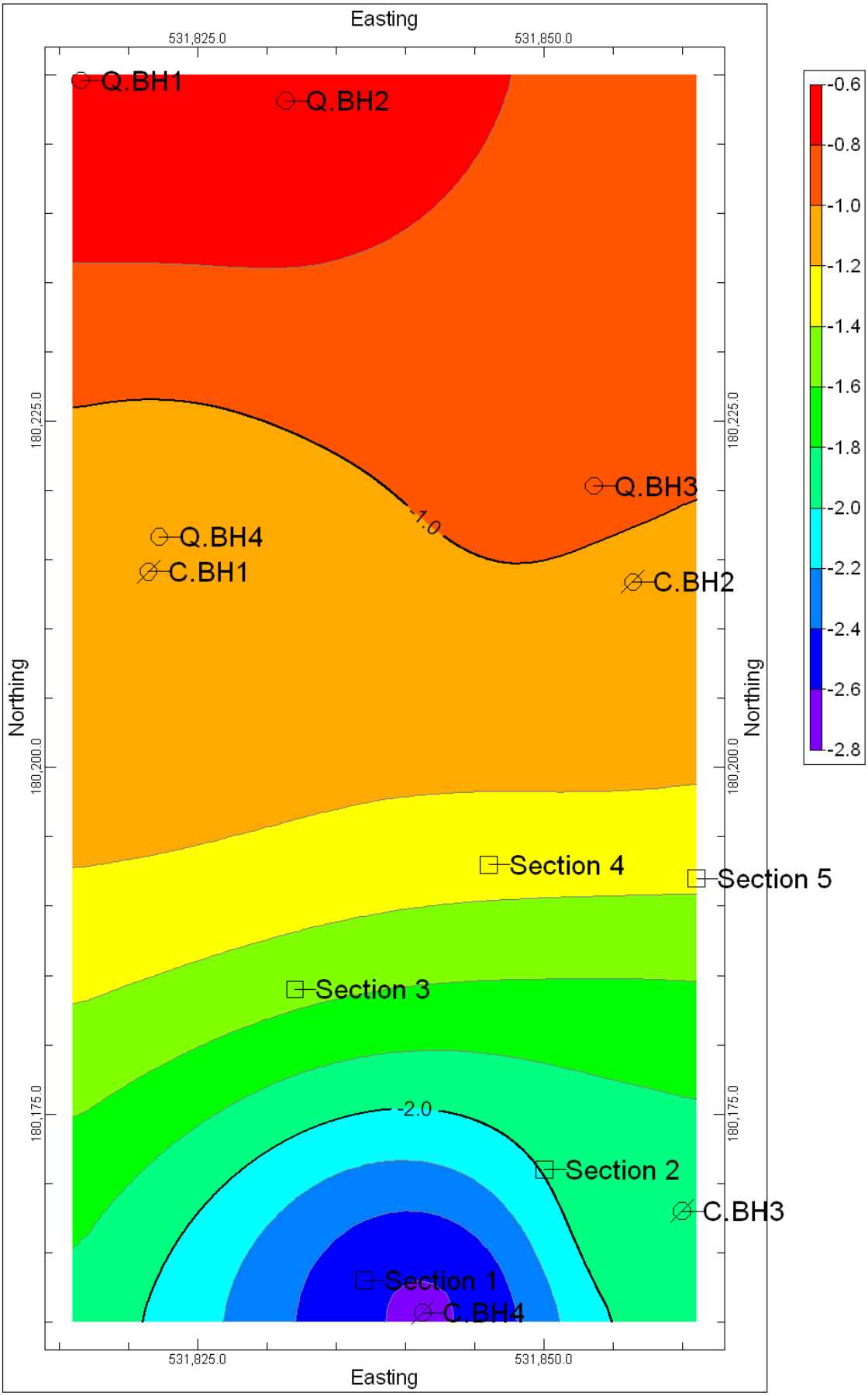

Figure 4: Modelled surface of the Shepperton Gravel (m OD); Unit 1

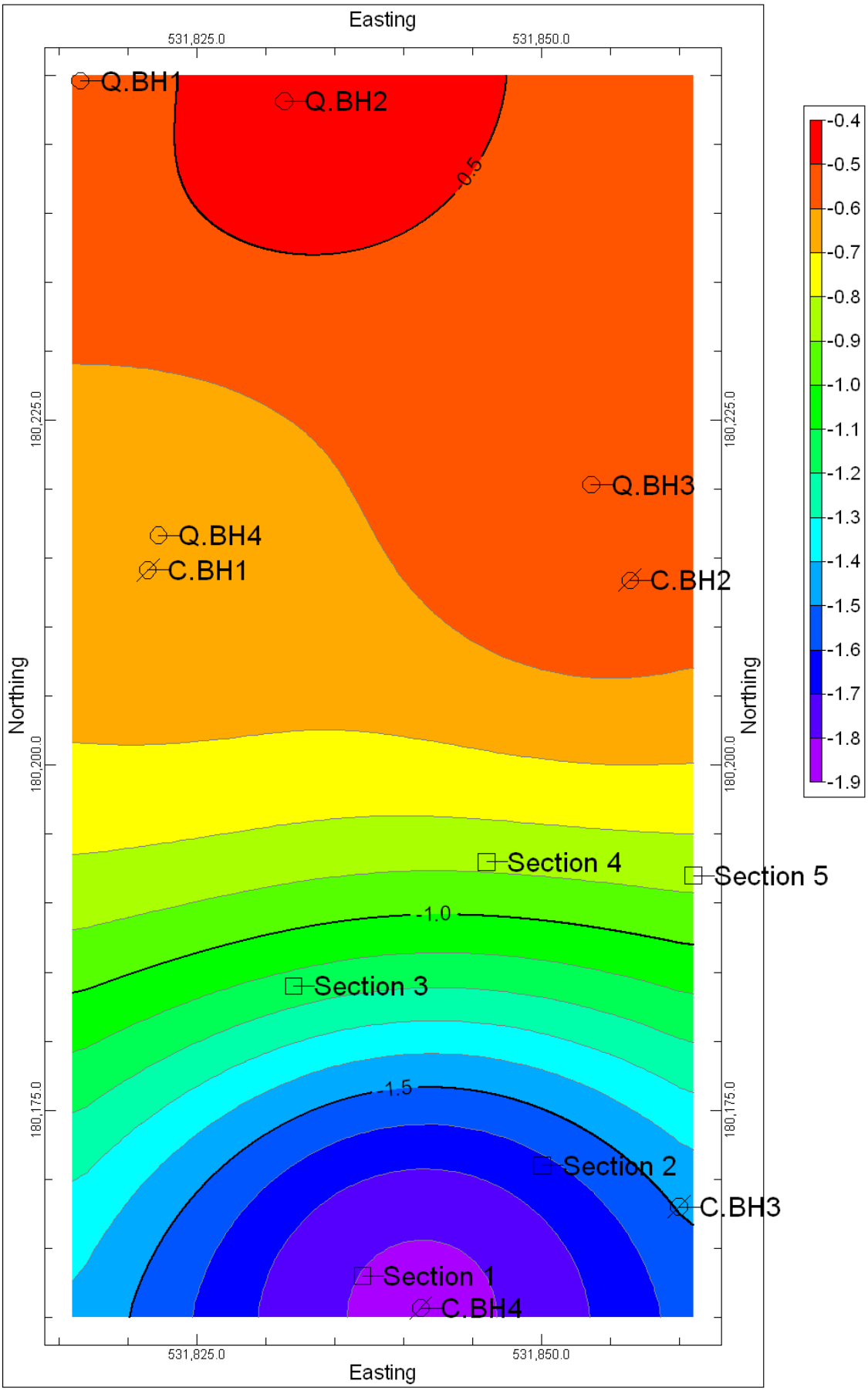

Figure 5: Modelled surface of the Lower Alluvium (m OD); Unit 2

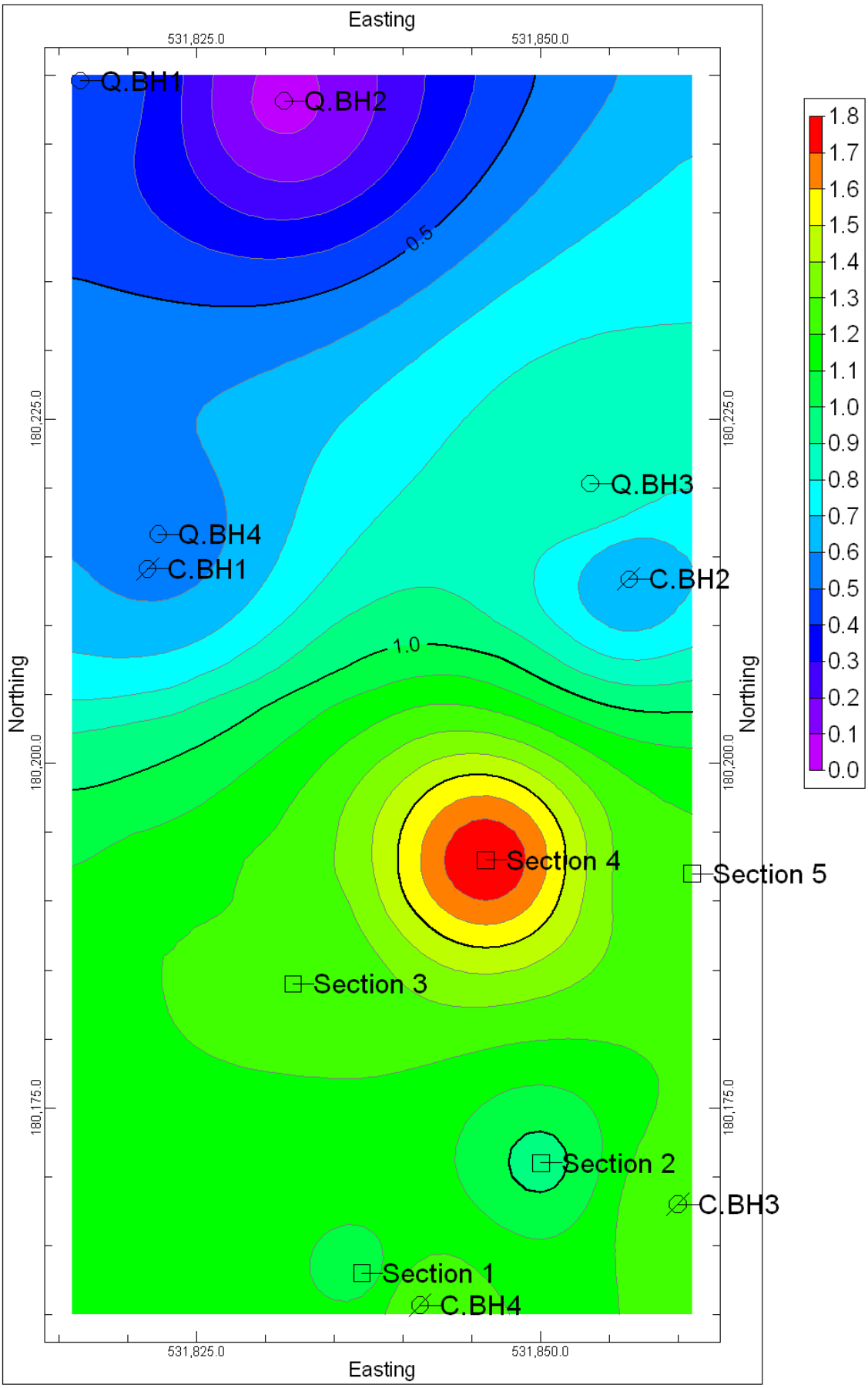

Figure 6: Modelled thickness of the Peat/Very Organic Horizons (m); Unit 3

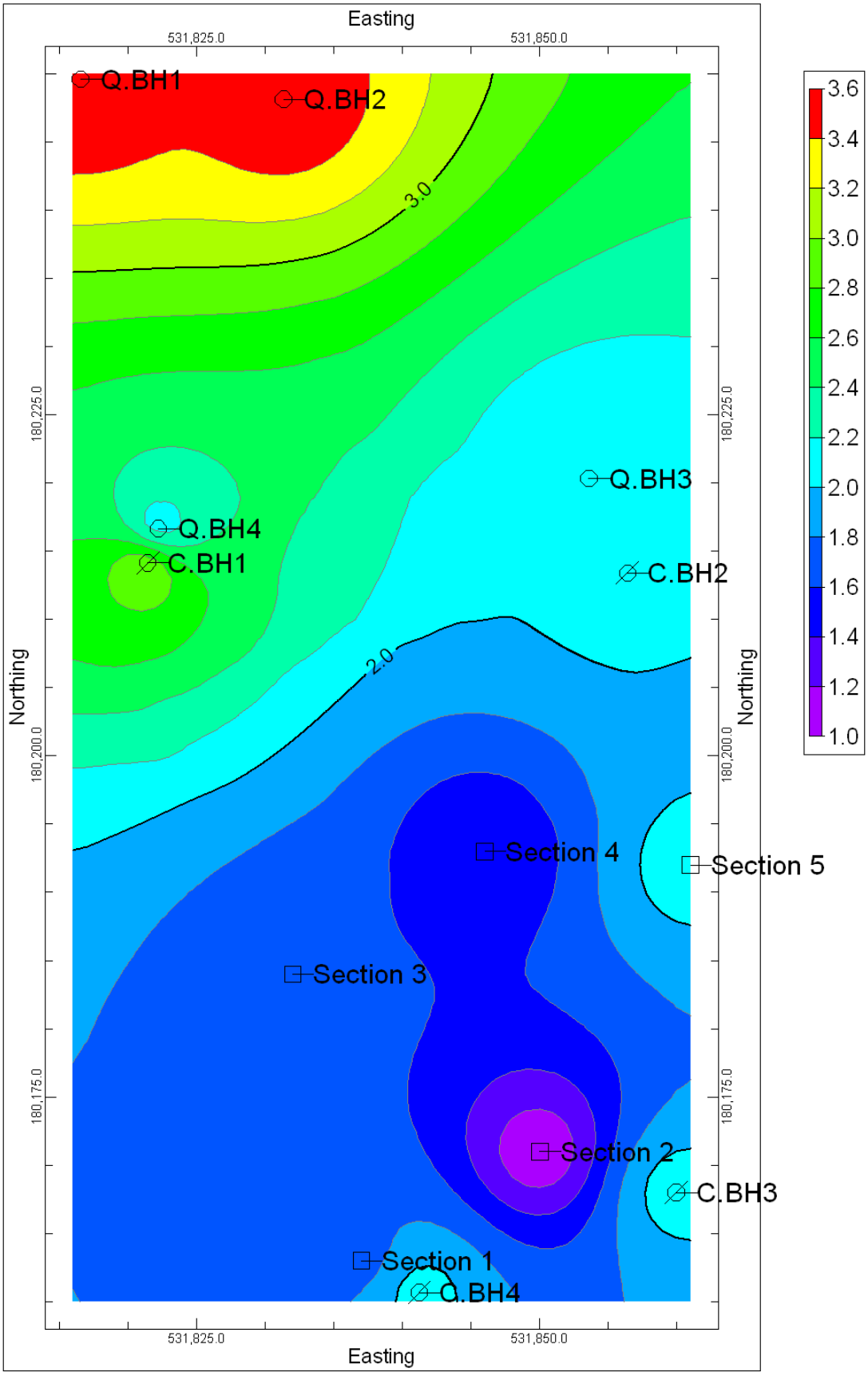

Figure 7: Modelled thickness of the Made Ground (m); Unit 5

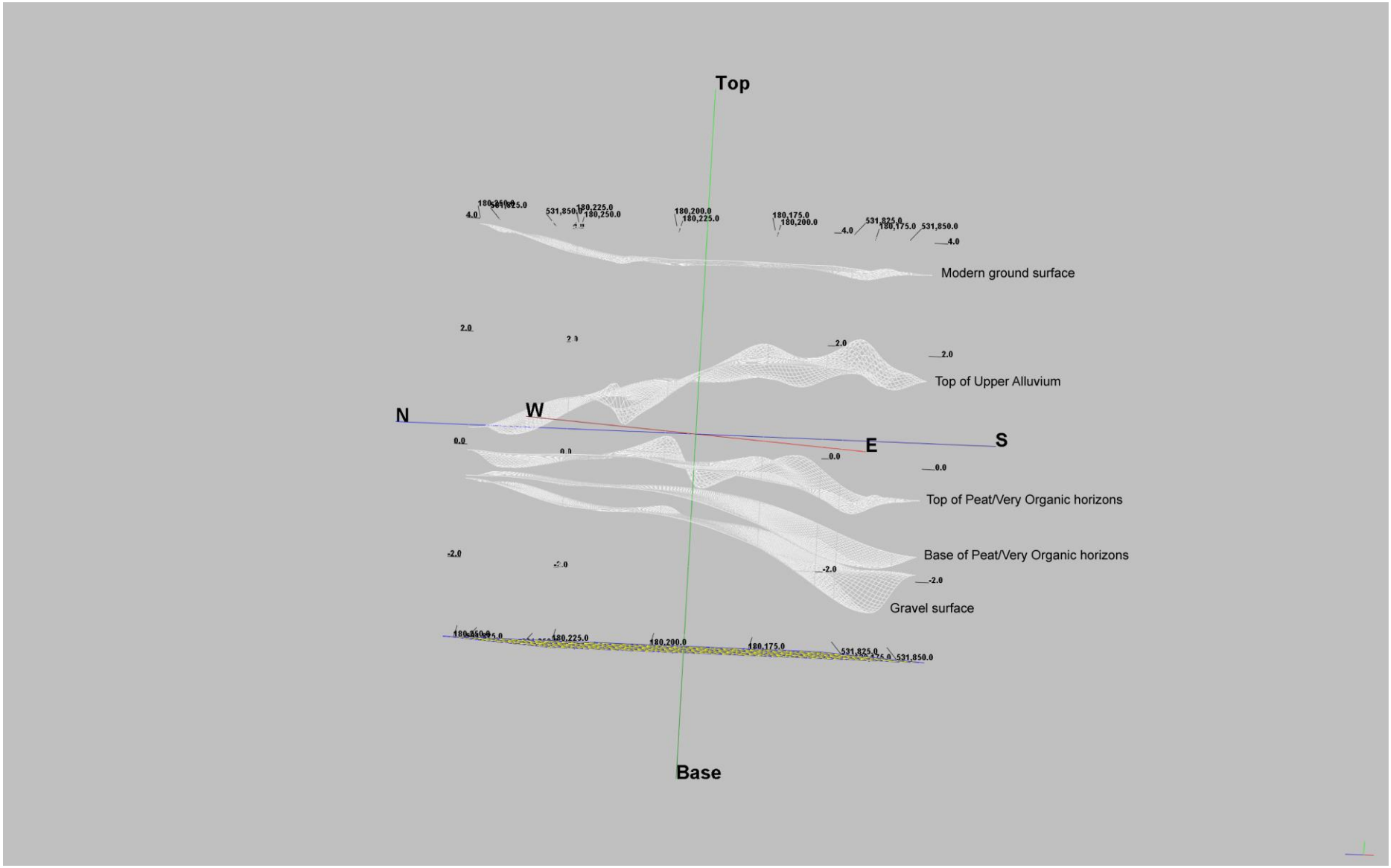

Figure 8: Modelled surface elevations of Units 1 to 5 (m OD)

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

A sequence of Holocene alluvial sediment is present across the whole site, resting on the surface of the Shepperton Gravel. The Gravel surface itself slopes southward, confirming the presence of the Bankside Channel, a large and well documented palaeochannel alongside the River Thames (Dunwoodie, 2006). Previously available records indicated that the Bear House and Bear Lane sites were positioned towards the centre of the channel; Dunwoodie (2006) suggests that the northern edge of the channel was between 20 and 40m north of the Bear House site. Evidence from the addition of four new borehole records (Q.<BH1> to Q.<BH4>) and the development of a three-dimensional deposit model for the Bear House and Bear Lane sites instead indicate that the northern edge of the channel is further south than previously suggested, and may be within the northern extent of the site itself; *ca.* 40m further south than indicated by Dunwoodie (2006).

The Holocene alluvial sequence consists of a truncated upper silty clay, underlain in most of the records by a horizon of organic sediments, including very organic silts and peat. Where the lower alluvium is present, the peat/very organic silts and gravel are separated by silty clay in which detrital plant material is common. The alluvial sequence is generally thicker in the southern half of the site, both as a result of a lower gravel surface and thinner made ground.

Holocene alluvial sequences, similar to the sequence described in this report and at nearby sites, which are sandy and rich in organic remains in their lower part and comprising silts and clays with very sparse organic remains in their upper part are common on the valley floor of the River Thames and its tributaries and more widely in southern and Midland England (e.g. The Staines Alluvial Deposits/ Tilbury Deposits of Gibbard, 1994). The lower part of the sequence is usually of Early and/or Middle Holocene age, the upper part generally post-Neolithic in age and representing sediment derived from widespread soil erosion associated with increasingly intensive prehistoric agricultural land-use (Gibbard, 1994).

An investigation of the local and regional environments of the Holocene alluvial sediments is recommended, to identify evidence of change or continuity through time at Bear House and to establish whether any significant spatial variability exists within the site. An assessment of two cores is recommended from Borehole Q.<BH1> and Q.<BH4>. The results should be combined with the results of recent laboratory-based environmental archaeological investigations from Trench 7, Bear Lane (Figure 2; Tan *et al*., 2008). Combined these stratigraphic sequences will represent a north-south transect across the projected course of the Bankside Channel.

As stated in the written scheme of investigation for this site (Batchelor, 2010), this assessment will consist of (1) organic matter determinations to permit identification of sedimentary units indicating more terrestrial conditions (e.g. peat, soil), and aid the recognition of units having a higher organic matter that may be suitable for radiocarbon dating; (2) pollen assessment, to establish the potential of the cores to provide information on vegetation composition, land-use and diet; (3) diatom assessment, to establish the potential of the cores to provide information on the environmental conditions (e.g. marine, brackish or freshwater) throughout the sequences; (4) waterlogged plant macrofossils (seeds and wood), to establish the potential of the cores to provide information on climate change or vegetation history; (5) insect assessment, to establish the potential of the cores to provide information on regional and local environmental conditions, the local human environment, human and animal diet; and (6) radiocarbon dating, to provide a robust chronology for the palaeoenvironmental assessment.

REFERENCES

Ball, R. (2007) *Bear Lane, Southwark, London: Geotechnical and Geo-environmental interpretative report*. CARD Geotechnics, February 2007.

Batchelor, C.R. (2010) *Written Scheme of Investigation for the Geoarchaeological Investigation of Land at Bear House, Bear Lane, London Borough of Southwark*. Quaternary Scientific Proposal Submitted to CgMs Consulting, March 2010.

Dunwoodie, L. (2006) *Bear House, Bear Lane, London, SE1, London Borough of Southwark: archaeological desk based assessment*. MoLAS unpublished report.

Gibbard, P.L. Coope, G.R., Hall, A.R., Preece, R.C. and Robinson, J.E. (1982) Middle Devensian river deposits beneath the 'Upper Floodplain' terrace of the River Thames at Kempton Park, Sunbury, Surrey. Proceedings of the Geologists' Association 93, 275-290.

Gibbard, P.L. (1994) *Pleistocene History of the Lower Thames Valley*. Cambridge University Press, Cambridge.

Holden, S. (2007) *An Archaeological Evaluation of Land at Bear Lane, London Borough of Southwark*. Pre-Construct Archaeology unpublished report.

London Borough of Southwark (1995) *Unitary Development Plan Deposited Draft.*

Malony, C. (2001) London Fieldwork and Publication Round-up 2001. *London Archaeologist.*

Malony, C. (2004) London Fieldwork and Publication Round-up 2004. *London Archaeologist*.

Malony, C. (2006) London Fieldwork and Publication Round-up 2006. *London Archaeologist*.

Tan, M., Branch, N.P., Batchelor, C.R., Young, D. (2008) *Bear Lane, London Borough of Southwark: environmental archaeological assessment (site code: BLZ07) ArchaeoScape* Unpublished Report.

Thompson, A., Westman, A., Dyson, T. (eds.) (1998). Archaeology in Greater London 1965 - 1990: a guide to records of excavations by the Museum of London. *The Archaeological Gazetteer Series*, **2**. London: Museum of London.

Troels-Smith, J. (1955). Characterisation of unconsolidated sediments. *Danmarks Geologiske Undersøgelse,* Raekke IV (3), 38-73.

Turner, A. (2009) *An archaeological evaluation of land at Bear Lane, London*. Pre-Construct Archaeology unpublished report