

THAMES VIEW ESTATE, RENWICK ROAD, BARKING, ESSEX (SITE CODE: TVE12): GEOARCHAEOLOGICAL FIELDWORK REPORT

C.R. Batchelor & C.P. Green

Quaternary Scientific (QUEST), School of Human and Environmental Sciences, University of Reading, Whiteknights, PO Box 227, Reading, RG6 6AB, UK

INTRODUCTION

This report summarises the findings arising out of the geoarchaeological fieldwork and deposit modelling undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at Thames View Estate, Renwick Road, Barking, Essex (National Grid Reference: centred on TQ 468 831; site code: TVE12; Figure 1). Quaternary Scientific were commissioned by CgMs Consulting to undertake the geoarchaeological investigations. The site at Thames View Estate is located on the floodplain of the Estuarine Thames approximately 1.5km from the modern waterfront to the south, and 250m south of the floodplain edge. The site represents an area of land measuring ca. 400m north to south and a maximum of ca. 170m east to west (generally <100m wide).

The results of previous geotechnical investigations at the site (Figure 2; Ian Farmer Associates Limited, 2011) reveal a pre-Holocene gravel surface (Shepperton Gravel) that appears to lie between -4.28m OD and -3.27m OD. The lowest surface is recorded around boreholes BH9 and BH10 in the north-west corner of the site, whilst the higher areas are recorded around boreholes BH1 to BH3 in the north-eastern area; elsewhere across the site the gravel surface appears to lie between -3.75 and -4.00m OD. The early indications are thus that the amplitude of relief is relatively low when compared to other sites nearby. Furthermore, the highest level at which the gravel surface is recorded is lower than high points recorded nearby. At the large Barking Riverside site to the south of Thames View Estate, the gravel surface was recorded as varying between above -2.50m OD and below -6.00m OD (Batchelor *et al.*, 2011). At this site, two extensive topographic highs of ca. -2.50m OD were recorded centred on TQ 45440 82220 to the south-west of the site and 47000 82400 to the south-east.

Above the gravel surface at Thames View Estate, the geotechnical records indicate a sequence of Holocene Alluvial deposits (including Peat), and Made Ground. The relief of the Holocene Alluvial deposits generally reflects that of the underlying gravel surface and the deposits can generally be divided into three units: the Lower Alluvium, Peat and the Upper Alluvium. Where recorded, the Peat unit is: (1) at approximately the same level OD in all the

boreholes, with an upper surface generally lying around -1.20m OD; and (2) reasonably substantial, ranging between 1m (BH2) to 2.2m (BH10) in thickness. Such horizons might represent a time period of between 1000 and 2000 years (assuming an average rate of 1000 years for every metre of peat accumulation), and most likely accumulated somewhere between the Late Mesolithic and Bronze Age cultural periods. The Peat unit was also identified in many of the test-pits, although the depths of the excavations did not permit the total thickness to be ascertained. In certain borehole locations, the Peat appears to have been less substantial, or absent altogether (e.g. boreholes BH6 and BH7 towards the centre of the site). Capping the alluvial sequence was a variable thickness of Made Ground (1 to 3m), bringing the site to its current elevation of between ca. 1.50 to 3.00m OD.

The Alluvial and Peat sediments at Thames View Estate thus have the potential to provide data contributing to the reconstruction of past environments on both the wetland and dryland, from the Mesolithic to Late Bronze Age cultural periods. In particular, there is the potential to increase knowledge and understanding of the interactions between relative sea level, human activity and vegetation succession in this area of the Lower Thames Valley. 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.

Seven significant research aims were outlined for geoarchaeological investigations at Thames View Estate during the generation of the Written Scheme of Investigation (Batchelor, 2012). The geoarchaeological field investigations aimed to address the first of these research aims: 'To carry out geoarchaeological borehole investigations to clarify the nature of the sub-surface stratigraphy across the site'. The following objectives were proposed in order to achieve this aim:

1. To obtain 6 geoarchaeological boreholes from select locations across the site (Figure 2).
2. To use the stratigraphic data from the new locations, and existing records to produce a new deposit model of the major depositional units across the site.

In the first instance after the completion of these geoarchaeological investigations, the resultant deposit modelling report will be used in order to clarify the need for further intrusive archaeological work.

The six geoarchaeological borehole locations (<QBH1> to <QBH6>) were chosen for the following reasons: <QBH1> was located in order to elucidate the sedimentary sequence and

depth of the Shepperton Gravel in the south-western corner of the site near to test-pit 14 (not recorded in full during the geotechnical investigations); <QBH2> was located in order to confirm the sedimentary sequence in the region of geotechnical borehole BH7 where no substantial horizon of peat previously was recorded; <QBH3> was located in order to confirm the sedimentary sequence the midway between geotechnical boreholes BH4, BH5 and BH7; <QBH4>: was located in order to confirm the higher gravel surface (ca. -3.30m OD), and nature of the overlying Holocene sediments recorded in geotechnical boreholes BH1 to BH3; <QBH5>: was located in order to elucidate the sedimentary sequence and depth of the Shepperton Gravel in the north-western area of the site (an area not investigated during the geotechnical works), and <QBH6> was located adjacent to geotechnical boreholes BH9 and BH10. At the latter, the thickest horizon of peat (2.20m), and lowest gravel surface (-4.28m OD) was recorded.

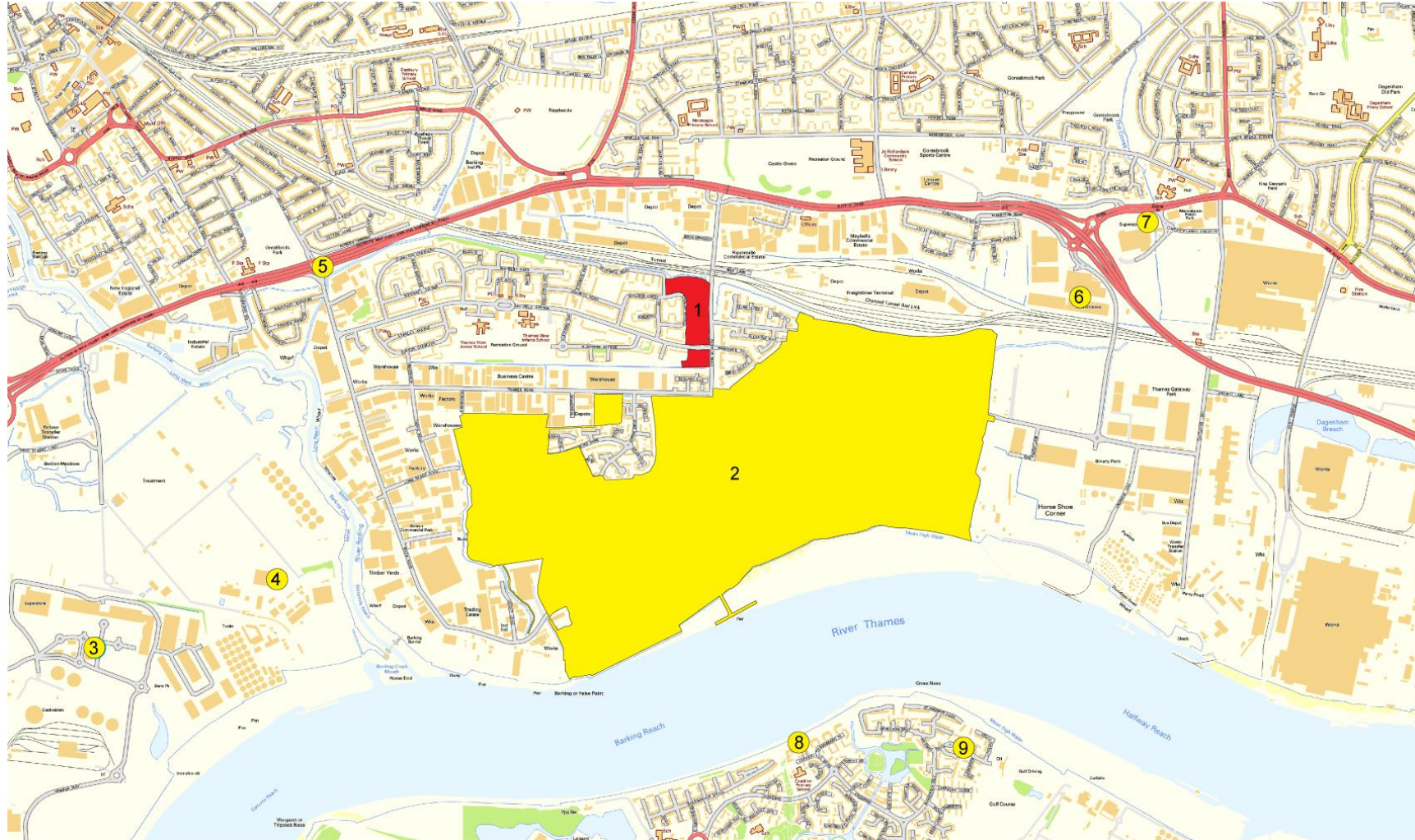


Figure 1: Location of Thames View Estate (1) and other selected local sites: (2) Barking Riverside (RWC10; Batchelor *et al.*, 2010); (3) Gallions Reach Shopping Park (GAJ09; Batchelor, 2009); (4) Beckton Sewage Works (HE-SW94; Divers, 1995); (5) A13 Movers Lane (no site code; Gifford and Partners, 2001); (6) Hays storage (DA-HS93; Divers, 1996); (7) Dagenham Idol (Coles, 1990); (8) Voyager's Quay (CPP96; Sidell, 2003), and (9) Summerton Way (SWY97; Lakin, 1999). Contains Ordnance Survey data © Crown copyright and database right [2012]

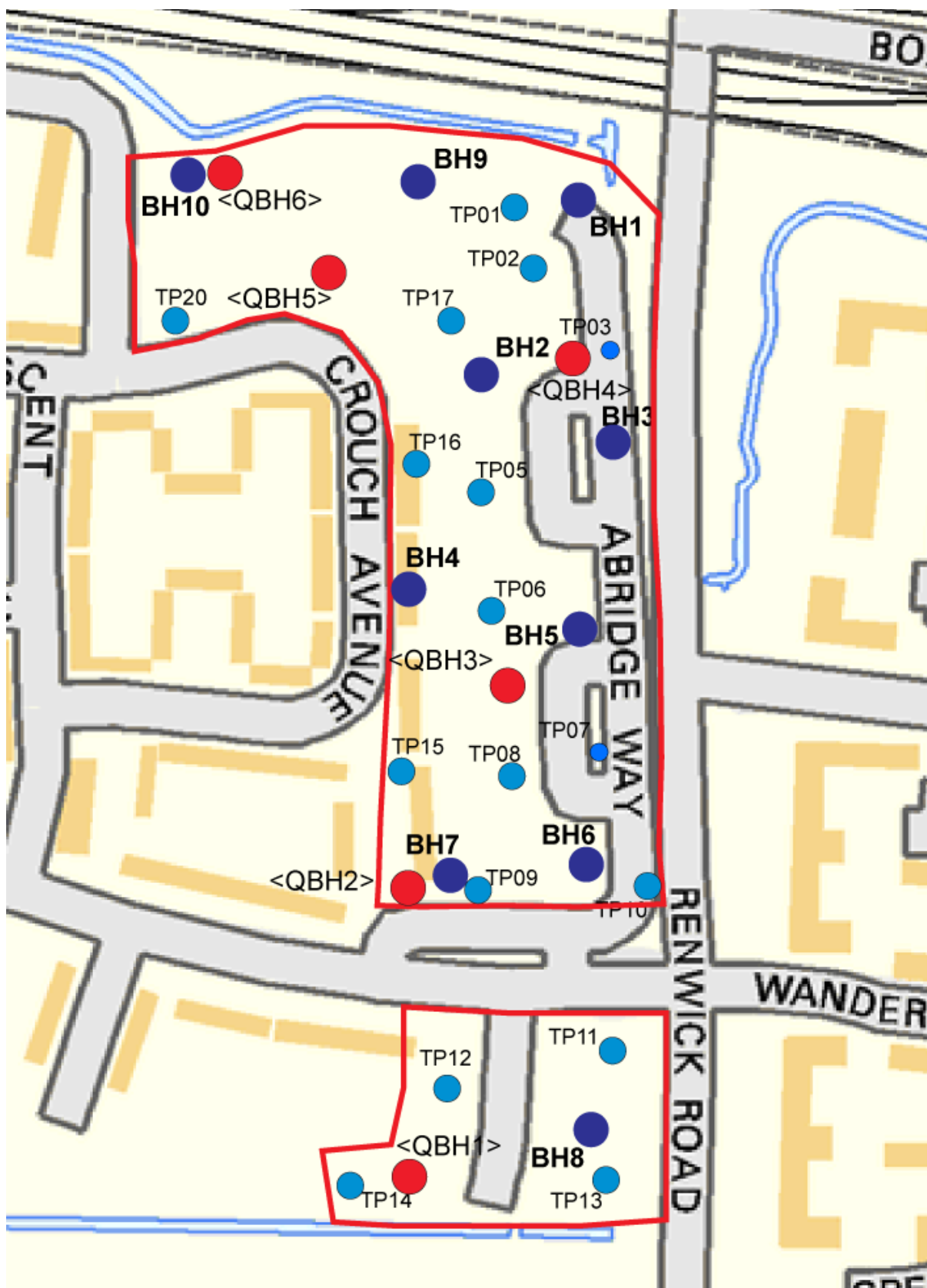


Figure 2: Proposed geoarchaeological borehole locations and existing geotechnical borehole and test-pit locations at Thames View Estate, Renwick Road, Barking, Essex. Contains Ordnance Survey data © Crown copyright and database right [2012]

METHODS

Field investigations

Six boreholes (Boreholes <QBH1> to <QBH6>) were put down at the site in April 2011 (Figure 2). Borehole core samples were recovered using an Eijkelpamp 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 recovered core samples were wrapped in clear plastic to prevent moisture loss, labelled with the depth (metres from ground surface) and orientation (top and base) and returned to Quaternary Scientific for storage in a purpose built facility at 2°C. This temperature prevents fungal growth on the core surface, which may lead to anomalous radiocarbon dates, and moisture loss. The spatial attributes of each borehole were recorded (Table 1 and Figure 2).

Table 1: Borehole attributes, Thames View Estate, Renwick Road, Barking, Essex

Borehole number	Easting	Northing	Elevation (m OD)
<QBH1>	546850.044	182909.746	1.83
<QBH2>	546851.519	182995.257	1.94
<QBH3>	546880.654	183066.729	2.47
<QBH4>	546901.571	183178.654	2.46
<QBH5>	546816.763	183207.698	2.54
<QBH6>	546777.978	183242.743	2.44

Lithostratigraphic descriptions

The lithostratigraphy of boreholes <QBH1> to <QBH6> 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) (Troels-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 2 to 7.

Deposit modelling

The deposit model was based on a review of sixteen borehole records incorporating the six new Quaternary Scientific geoarchaeological boreholes and ten existing geotechnical boreholes (Ian Farmer Associates, 2011; see Table 8 for summary data). In addition, the

records from the fourteen geotechnical test-pits were used where applicable (Ian Farmer Associates, 2011; see Table 8 for summary data).

Sedimentary units from the boreholes were classified into six groupings: (1) London Clay (2) Shepperton Gravel; (3) Lower (Sandy) Alluvium; (4) Peat; (5) Upper Alluvium, and (6) 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 to 8). Thickness of the combined alluvial units was also modelled (also using a nearest neighbour routine) (Figures 9 to 13). A 3-Dimensional topographic model is displayed in Figure 14. 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 commissioned boreholes. 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.

In addition, the reliability of individual models is affected by the quality of the stratigraphic records which in turn are affected by the nature of the sediments and/or their post-depositional disturbance during previous stages of development on the site. In particular, it is important to recognise that two 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. The cores from the six new boreholes (<QBH1> to <QBH6>) represent the most detailed record of the sediment sequences.

RESULTS, INTERPRETATION AND DISCUSSION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS

The combined results of the geoarchaeological borehole investigation (Tables 2 to 7; Figure 3) have enhanced the previous geotechnical investigations (Table 8) and permitted a programme of deposit modelling of the surface elevation and thickness of each major stratigraphic unit (Figures 4 to 14).

The basal London Clay was only recorded during the course of the geotechnical investigations. The surface of this unit is relatively uniform, with all but two boreholes suggesting a surface between -8.00 and -9.00m OD (Figure 4). The two exceptions to this are boreholes BH8 and BH9. Borehole BH8 is located at the southern end of the site, and the London Clay is recorded at -9.34m OD, and BH9 at the northern end of the site where the surface is recorded at -7.34m OD.

Overlying the London Clay is a horizon of sand and gravel (the Shepperton Gravel) approximately 4 to 5.5m in thickness (Figure 9). These sediments were deposited during the Late Glacial within a high energy braided river system. The new geoarchaeological boreholes have confirmed the results of the geotechnical boreholes in suggesting that the surface of this unit is relatively uniform across the site lying between -4.47m OD (<QBH6>) and -3.27m OD (BH3) (an amplitude of only 1.20m; Figure 5). A preliminary review of the geotechnical borehole records prior to the geoarchaeological fieldwork suggested that a slightly higher surface was located around boreholes BH1, BH2 and BH3 (ca. -3.30m OD), and lower surface within the region of Boreholes BH9 and BH10 (ca. -4.20m OD).

Geoarchaeological borehole <QBH4> was put down in-between boreholes BH1, BH2 and BH3 and recorded the Shepperton Gravel at -3.54m OD; a difference of only 0.3m to the geotechnical records. The surface of the Shepperton Gravel was also recorded at a higher elevation in borehole <QBH5> (-3.51m OD). Geoarchaeological borehole <QBH6> was put down adjacent to BH10 to confirm the deeper gravel surface in this area of the site. The Shepperton Gravel surface was encountered in the borehole at -4.47m OD, enhancing the geotechnical record. Unfortunately, the non-retrieval of sample between -2.56m and -3.56m OD (5.00 to 6.00m BGS; Table 7) has resulted in some uncertainty in the -4.47m OD measurement, but if an error is present the margin is considered to be small.

Succeeding the Shepperton Gravel was a 0.4m to 1.50m thick unit of generally silty sands with varying quantities of wood that occasionally penetrated into the upper surface of the

underlying sands and gravels (Figure 10). This unit represents the Lower Alluvium, the sediments of which were deposited during the Early to Mid-Holocene, as the energy of flow decreased and the Thames probably became confined to a single meandering channel. The upper surface of the Lower Alluvium is recorded between -3.34m and -2.38m OD with the deepest areas in the region of boreholes BH5 and BH8 and shallowest over boreholes BH1, BH2 and <QBH3> (Figure 6). In certain areas of the site, the variations in the surface height reflect that of the Shepperton Gravel (e.g. the north-eastern area of the site). However, in the main, no specific (or significant) arrangement in the surface height is noted.

Well-humified wood Peat overlay the Lower Alluvium in all geoarchaeological and geotechnical boreholes. The Peat is indicative of a transition towards a semi-terrestrial environment supporting the growth of wetland woodland. The thickness of the Peat varies between 2.2m in borehole BH10 and 0.86m in <QBH2> and <QBH4> (Figure 11), and the upper surface lies between -2.00m OD (<QBH2>/<QBH4>) and between -0.50m and -1.00m OD in five of the geotechnical test-pits and borehole records (BH9, BH10, TP03, TP07, TP13) and <QBH5>. In the remaining and majority of records, the surface lies between -1.00 and -2.00m OD (Figure 7).

Several of the geoarchaeological boreholes were put down to investigate the nature of the Peat in certain locations. In particular, <QBH2> was put down to elucidate whether any substantial unit of Peat was recorded in this area of the site, as geotechnical borehole BH7 only indicated the presence of lenses. The geoarchaeological record indicated that Peat was present, but it was one of the thinnest units recorded on the site, with an upper surface of -2.00m OD; this also correlates with the TP09 record (Table 8; Figure 3). <QBH5> was located in a new area of the site in order to investigate the sedimentary sequence in this area of the site. The results revealed one of the thickest retained units of Peat (ca. 2.00m), despite being located over one of the highest surfaces of Shepperton Gravel on the site (-2.51m OD). Contrary to this, <QBH4> which is also located over a higher gravel surface, contained one of the thinnest horizons of Peat on the site (0.86m thick). Finally, <QBH6> was located adjacent to BH6 in an attempt to confirm the thickness of Peat in this area of the site. Despite the non-retrieval of the entire sequence, indications are that the Peat was indeed in the region of 2.00m thick in this area of the site. There are therefore clear variations in the thickness of the Peat across the site; these are considered to be the result of a combination of factors including: (1) variations in the topography of the underlying Shepperton Gravel/Lower Alluvium; (2) small variations in the environment of Peat accumulation across the site, and (3) subsequent erosion of the upper surface of the Peat.

The fact that geotechnical sedimentary descriptions are frequently less detailed than geoarchaeological ones should also be noted.

The Upper Alluvium overlies the surface of the Peat, and is representative of inundation of the wetland environment. In many cases, the contact between the Peat and Upper Alluvium is diffuse, suggesting a gradual transition. In those boreholes containing a sharp contact between these units (e.g. <QBH4>) or towards the base of the Upper Alluvium (e.g. <QBH2>), it is most likely that the transition was more abrupt and that some erosion took place during inundation. The surface of the Upper Alluvium generally lies between +1.00m and 0m OD (Figures 8 and 12). In most cases, in those boreholes which continued to accumulate alluvium above 0m OD (e.g. <QBH2>, <QBH3> and <QBH5>), there are indications of soil forming processes. In borehole BH8 however, the surface of the Upper Alluvium was recorded lower at -0.84m OD, and is clearly truncated by the overlying Made Ground, which also caps all the other boreholes to the current surface height of 1.50 to 3.00m OD.

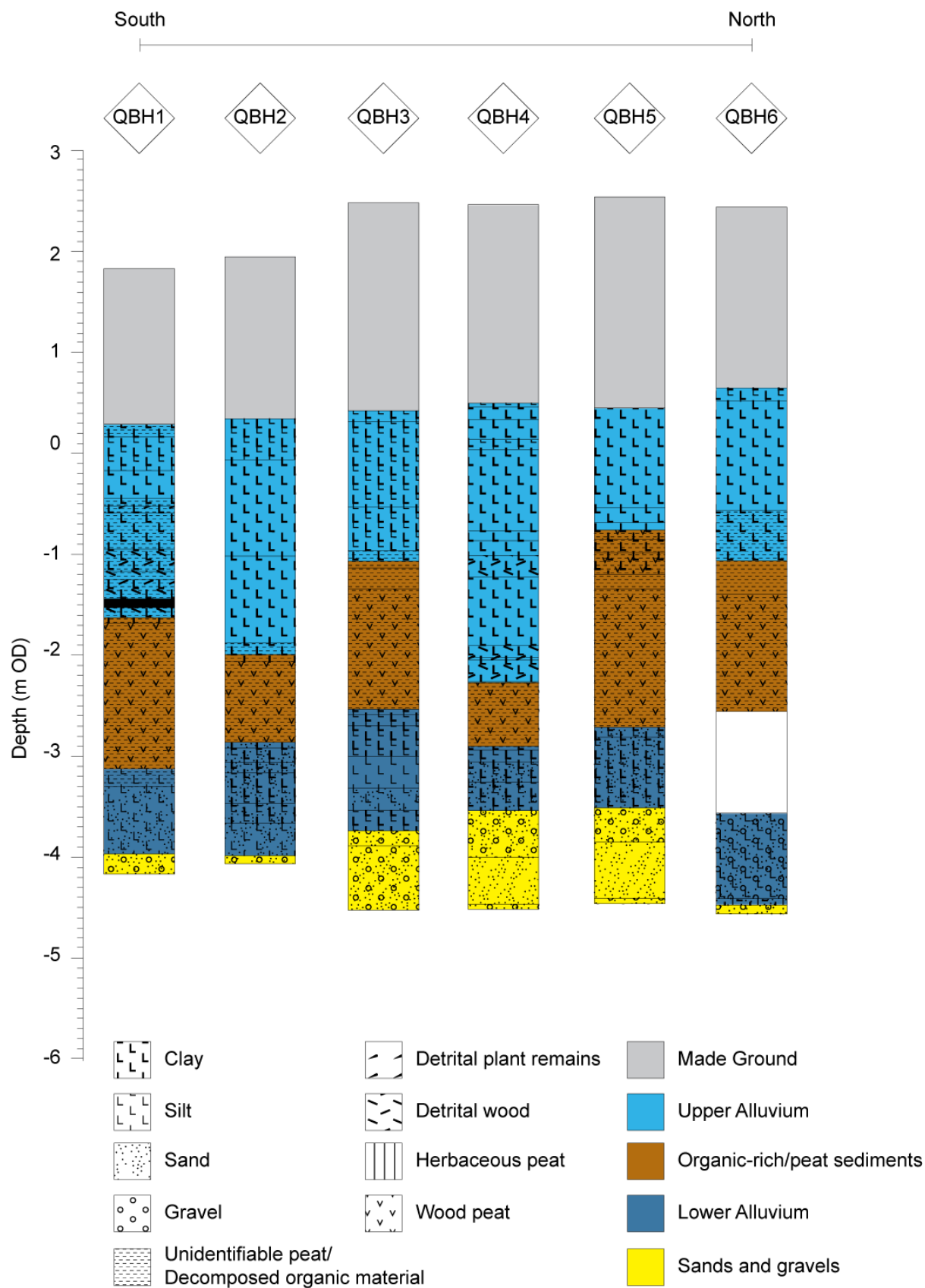


Figure 3: North-south transect of the geoarchaeological boreholes across Thames View Estate, Renwick Road, Barking, Essex (distance between boreholes is not to scale)

Table 2: Lithostratigraphic description of Borehole <QBH1>, Thames View Estate, Renwick Road, Barking, Essex

Depth (m OD)	Depth (BGS)	Unit number	Description
1.83 to 0.29	0 to 1.54	5	Made Ground; sharp contact into:
0.29 to 0.16	1.54 to 1.67	4	7.5YR 4/1; As3, Sh1; Dark grey organic-rich clay; diffuse contact into:
0.16 to -0.17	1.67 to 2.00	4	10YR 6/2; As3, Ag1; Light brownish grey silty clay; diffuse contact into:
-0.17 to -0.45	2.00 to 2.28	4	10YR 5/1 mottled 10YR 7/6; As4; Grey mottled yellow clay; sharp contact into:
-0.45 to -0.52	2.28 to 2.35	4	10YR 5/1; As3, Sh1; Grey organic-rich clay; diffuse contact into:
-0.52 to -0.59	2.35 to 2.42	4	10YR 4/1; As2, Sh1, DI/TI1; Dark grey organic-rich clay with detrital or <i>in situ</i> wood; diffuse contact into:
-0.59 to -0.95	2.42 to 2.78	4	10YR 5/1; As3, Sh1; DI+; Grey organic-rich clay with traces of detrital wood which increases downwards; diffuse contact into:
-0.95 to -1.17	2.78 to 3.00	4	10YR 4/1; As2, Sh1, DI/TI1; Dark grey organic-rich clay and detrital or <i>in situ</i> wood remains; diffuse contact into:
-1.17 to -1.25	3.00 to 3.08	4	10YR 5/1; As1, Ag1, DI/TI1, Sh1; Grey organic-rich silty clay with detrital or <i>in situ</i> wood remains; Diffuse contact into:
-1.25 to -1.44	3.08 to 3.27	4	10YR 5/1 to 10YR 7/1; As3, DI1, Sh1; Grey to light grey organic-rich silty clay with detrital or <i>in situ</i> wood remains
-1.44 to -1.53	3.27 to 3.36	4	Wood macrofossil
-1.53 to -1.62	3.36 to 3.45	4	10YR 5/1; As3, Sh1; DI+; Grey organic-rich clay with traces of detrital wood which increases downwards; diffuse contact into:
-1.62 to -1.68	3.45 to 3.51	3	10YR 3/1; Sh2, As2; Humo 4; Very dark grey well humified clay-rich peat; diffuse contact into:
-1.68 to -3.12	3.51 to 4.95	3	10YR 2/1; Sh3, TI ³ 1, As+; Humo 4; Black very well humified wood peat with clay traces; sharp contact into:
-3.12 to -3.30	4.95 to 5.13	2	10YR 4/1; Ag2, Sh1, As1, Ga+; Dark grey organic-rich clayey silt with traces of sand; diffuse contact into:
-3.30 to -3.97	5.13 to 5.80	2	10YR 4/1 to 5Y 6/2; Ag2, Ga1, As1; Dark grey to light olive grey clayey sandy silt; sharp contact into:
-3.97 to -4.17	5.80 to 6.00	1	10YR 6/2; Ga2, Gg2; Light brownish grey sandy gravel.

Table 3: Lithostratigraphic description of Borehole <QBH2>, Thames View Estate, Renwick Road, Barking, Essex

Depth (m OD)	Depth (BGS)	Unit number	Description
1.94 to 0.34	0 to 1.60	5	Made Ground; sharp contact into:
0.34 to -0.06	1.60 to 2.00	4	10YR 5/3; As3, Ag1; Brown silty clay; diffuse contact into:
-0.06 to -1.01	2.00 to 2.95	4	10YR 7/4; As4, Ag+; Very pale brown clay with traces of silt and brownish yellow concretions; diffuse contact into:
-1.01 to -1.88	2.95 to 3.82	4	10YR 6/1; As4, Ag+, DI+; Grey clay with traces of sily and detrital wood; sharp contact into:
-1.88 to -2.00	3.82 to 3.94	4	10YR 4/1; As3, Sh1, DI+; Dark grey organic-rich clay with traces of detrital wood; diffuse contact into:
-2.00 to -2.06	3.94 to 4.00	3	10YR 4/1; As2, Sh2, DI/TI+; Dark grey clay-rich peat with traces of detrital or <i>in situ</i> wood remains; diffuse contact into:
-2.06 to -2.86	4.00 to 4.80	3	10YR 2/1; Sh2, TI ² , Humo 3; Black well humified wood peat with lenses at 4.47 to 4.49m BGS & 4.69 to 4.72m BGS of Gley 1 8/10Y; As3, Ga1; Light greenish grey sandy silt; sharp boundaries between each sub-unit and into:
-2.86 to -2.91	4.80 to 4.85	2	Gley 1 8/10Y and 10YR 5/1; As3, Ga1, DI+; Light greenish grey and grey sandy silt with traces of detrital wood; sharp contact into:
-2.91 to -3.06	4.85 to 5.00	2	10YR 4/1; Ga2, Ag1, As1; Dark grey clayey silty sand; diffuse contact into:
-3.06 to -3.17	5.00 to 5.11	2	5Y 7/1; Ga3, Ag1; Light grey silty sand; sharp contact into:
-3.17 to -3.47	5.11 to 5.41	2	5Y 6/1; As2, Ag1, Ga1; Grey silty sandy clay; diffuse contact into
-3.47 to -3.67	5.41 to 5.61	2	5Y 6/1; As2, Ag1, Ga1, DI/TI+; Grey silty sandy clay with traces of detrital or <i>in situ</i> (root?) wood; diffuse contact into:
-3.67 to -3.98	5.61 to 5.92	2	5Y 7/2; Ga2, Ag1, As1; Light grey silty clayey sand; sharp contact into:
-3.98 to -4.06	5.92 to 6.00	1	5Y 7/2; Ga2, Gg2; Light grey sandy gravel.

Table 4: Lithostratigraphic description of Borehole <QBH3>, Thames View Estate, Renwick Road, Barking, Essex

Depth (m OD)	Depth (BGS)	Unit number	Description
2.47 to 0.42	0 to 2.05	5	Made Ground; sharp contact into:
0.42 to 0.32	2.05 to 2.15	4	10YR 4/1; As2, Ag1, Ga1, brick+, Gg+; Dark grey silty sandy clay with inclusions of brick and gravel; sharp contact into:
0.32 to -0.53	2.15 to 3.00	4	10YR 5/1 becoming 10YR 6/1; As3, Ag1, chalk+; Grey becoming light grey silty clay with chalk inclusions and brownish yellow concretions; diffuse contact into:
-0.53 to -0.96	3.00 to 3.43	4	10YR 6/1 to 10YR 5/1; As3, Ag1; Light grey to grey silty clay; sharp contact into:
-0.96 to -1.07	3.43 to 3.54	4	10YR 5/2; As3, Sh1, DI+; Greyish brown organic-rich clay with detrital wood inclusions; diffuse contact into:
-1.07 to -1.13	3.54 to 3.60	3	10YR 4/2; As2, Sh2, DI/TI+; Dark greyish brown clay-rich peat with traces of detrital or <i>in situ</i> wood; diffuse contact into:
-1.13 to -1.34	3.60 to 3.81	3	10YR 2/1; Sh4, TI+; Humo 4; Black very well humified unidentifiable peat with traces of wood; diffuse contact into:
-1.34 to -2.53	3.81 to 5.00	3	10YR 3/1 to 10YR 3/2; Sh3, TI ³ 1; Humo 4; Very dark grey to very dark greyish brown very well humified wood peat; sharp contact into:
-2.53 to -2.59	5.00 to 5.06	2	10YR 4/1; Ag2, Sh1, As1, DI/TI+; Dark grey organic-rich clayey silt with traces of detrital or in situ wood remains; diffuse contact into:
-2.59 to -2.70	5.06 to 5.17	2	10YR 5/1; Ag2, As2, Sh+; Grey silty clay with traces of organic material; diffuse contact into:
-2.70 to -3.00	5.17 to 5.47	2	10YR 6/1 to Gley 1 8/10Y; As2, Ag2, DI+; Grey to light greenish grey clayey silt with traces of detrital wood; diffuse contact into:
-3.00 to -3.32	5.47 to 5.79	2	10YR 6/1; As2, Ag2, DI/TI+, Ga+; Grey clayey silt with traces of detrital or in situ (root?) remains; sharp contact into:
-3.32 to -3.53	5.79 to 6.00	2	Gley 1 8/10Y; Ag2, Ga2; Light greenish grey silty sand; diffuse contact into:
-3.53 to -3.74	6.00 to 6.21	2	10YR 6/1; As2, Ag2, DI/TI+, Ga+; Grey clayey silt with traces of detrital or in situ (root?) remains; sharp contact into:
-3.74 to -3.89	6.21 to 6.36	1	10YR 6/1 to 10YR 5/1; Ga2, Ag1, Gg1; Grey silty sand with gravel; sharp contact into:
-3.89 to -4.53	6.36 to 7.00	1	5YR 7/6; Ga2, Gg2; Yellow sandy gravel.

Table 5: Lithostratigraphic description of Borehole <QBH4>, Thames View Estate, Renwick Road, Barking, Essex

Depth (m OD)	Depth (BGS)	Unit number	Description
2.46 to 0.50	0 to 1.96	5	Made Ground; sharp contact into:
0.50 to 0.46	1.96 to 2.00	4	10YR 6/1 and 10YR 7/2; As3, Ag1; Grey to very pale brown silty clay; diffuse contact into:
0.46 to 0.33	2.00 to 2.13	4	10YR 6/1; As4, Ag+; Grey clay with traces of silt; diffuse contact into:
0.33 to 0.14	2.13 to 2.32	4	10YR 5/1; As3, Ag1, Sh+; Grey silty clay with traces of organic-rich remains; diffuse contact into:
0.14 to 0.04	2.32 to 2.42	4	10YR 5/1; As4, Sh+, Ag+; Grey clay with traces of organic-rich remains and silt; diffuse contact into:
0.04 to -0.77	2.42 to 3.23	4	10YR 6/1; As4; Grey clay; diffuse contact into:
-0.77 to -0.86	3.23 to 3.32	4	10YR 5/1; As4, Sh+; Grey clay with traces of organic-rich remains; diffuse contact into:
-0.86 to -1.01	3.32 to 3.47	4	10YR 5/1 to 10YR 4/1; As3, Sh1, DI+; Grey to dark grey organic-rich clay and traces of detrital wood; diffuse contact into:
-1.01 to -1.22	3.47 to 3.68	4	10YR 5/1; As3, DI/TI1, Sh+, Mollusca+; Grey clay with detrital or <i>in situ</i> wood remains and occasional Mollusca; diffuse contact into:
-1.22 to -1.90	3.68 to 4.36	4	10YR 6/1 mottled Gley 1 8/10Y and 10YR 5/1; As4, Ag+, DI+; Grey mottled light greenish grey clay with traces of silt and detrital wood; diffuse contact into:
-1.90 to -1.96	4.36 to 4.42	4	10YR 5/1; As3, DI1; Grey clay with detrital wood; sharp contact into:
-1.96 to -2.02	4.42 to 4.48	4	10YR 2/1 and 10YR 5/1; DI/TI3, As1, Mollusca+; Black and grey clay detrital or <i>in situ</i> wood with clay; sharp contact into:
-2.02 to -2.05	4.48 to 4.51	4	10YR 5/1; As4, Mollusca+, DI+; Grey clay with Mollusca and detrital wood inclusions; sharp contact into:
-2.05 to -2.26	4.51 to 4.72	3	10YR 2/1 and 10YR 5/1; DI/TI3, As1, Mollusca+; Black and grey clay detrital or <i>in situ</i> wood with clay; sharp contact into:
-2.26 to -2.27	4.72 to 4.73	3	10YR 7/1; Ga4; Light grey sand; sharp contact into:
-2.27 to -2.90	4.73 to 5.36	3	10YR 2/1; Sh3, TI ³ 1; Humo 4; Black very well humified wood peat; sharp contact into:
-2.90 to -2.94	5.36 to 5.40	2	10YR 3/1; Ag2, As1, Sh1; Very dark grey organic-rich clayey silt; diffuse contact into:
-2.94 to -3.06	5.40 to 5.52	2	10YR 4/1 to 10YR 5/1; Ag2, As2, Sh+, DI+; diffuse
-3.06 to -3.26	5.52 to 5.72	2	10YR 5/1; Ag2, Ga1, As1, DI+, Sh+; Grey clayey silty sand with traces of detrital wood and organic material; diffuse contact into:
-3.26 to -3.54	5.72 to 6.00	2	Gley 1 8/10Y; Ag2, Ga1, As1, DI+; Light greenish grey clayey silty sand with traces of detrital wood; sharp contact into:
-3.54 to -4.00	6.00 to 6.46	1	10YR 6/2; Ga3, Gg1; Light brownish grey gravelly sand; diffuse contact into:
-4.00 to -4.46	6.46 to 6.92	1	10YR 6/2; Ga4, Gg+; Light brownish grey sand with traces of gravel.

-4.46 to -4.54	6.92 to 7.00	1	10YR 6/2; Ga2, Gg2; Light brownish grey sandy gravel.
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Table 6: Lithostratigraphic description of Borehole <QBH5>, Thames View Estate, Renwick Road, Barking, Essex

Depth (m OD)	Depth (BGS)	Unit number	Description
2.54 to 0.45	0 to 2.09	5	Made Ground; sharp contact into:
0.45 to -0.46	2.09 to 3.00	4	10YR 6/2; As4, Ag+, chalk+; Light brownish grey clay with silt and chalk inclusions and brownish yellow concretions; diffuse contact into:
-0.46 to -0.69	3.00 to 3.23	4	10YR 7/1 to 10YR 6/1; As4, Ag+; Grey to light grey clay with silt inclusions; diffuse contact into:
-0.69 to -0.76	3.23 to 3.30	4	10YR 5/1; As4, Sh+; Grey clay with traces of organic-rich material; diffuse contact into:
-0.76 to -0.85	3.30 to 3.39	3	10YR 3/1; TI ³ 2, Sh1, As1; Humo 4; Very dark grey very well humified wood peat with clay; diffuse contact into:
-0.85 to -0.98	3.39 to 3.52	3	10YR 5/2; Sh2, As2, DI/TI+; Greyish brown clay-rich peat with inclusions of detrital or in situ wood; diffuse contact into:
-0.98 to -1.20	3.52 to 3.74	3	10YR 4/1; Sh2, As1, TI ³ 1; Humo 4; Dark grey very well humified wood peat with clay; diffuse contact into:
-1.20 to -1.34	3.74 to 3.88	3	5YR 4/3; Sh4, TI+; Humo 4; Reddish brown very well humified unidentifiable peat with inclusions of wood; diffuse contact into:
-1.34 to -2.71	3.88 to 5.25	3	5YR 4/3; Sh3, TI ³ 1; Humo 4; Reddish brown very well humified wood peat; sharp contact into:
-2.71 to -2.81	5.25 to 5.35	2	10YR 5/1; Ag2, As1, Ga1, Sh+, DI+; Grey sandy clayey silt with traces of organic-rich remains and detrital wood; diffuse contact into:
-2.81 to -3.51	5.35 to 6.05	2	10YR 5/1 to Gley 1 8/10Y; Ag2, As1, Ga1, DI+; Grey to light greenish grey sandy clayey silty with detrital wood inclusions; sharp contact into:
-3.51 to -3.85	6.05 to 6.39	1	10YR 6/2; Ga2, Gg2; Light brownish grey sandy gravel; diffuse contact into:
-3.85 to -4.41	6.39 to 6.95	1	10YR 6/2; Ga4, Gg+, DI+; Light brownish grey sand with gravel and detrital wood inclusions; diffuse contact into:
-4.41 to -4.46	6.95 to 7.00	1	10YR 6/2; Ga2, Gg2; Light brownish grey sandy gravel.

Table 7: Lithostratigraphic description of Borehole <QBH6>, Thames View Estate, Renwick Road, Barking, Essex

Depth (m OD)	Depth (BGS)	Unit number	Description
2.44 to 0.65	0 to 1.79	5	Made Ground; sharp contact into:
0.65 to 0.51	1.79 to 1.93	4	10YR 5/2; As3, Ag1; Greyish brown silty clay; diffuse contact into:
0.51 to -0.56	1.93 to 3.00	4	10YR 7/2; As4, Ag+; Light grey clay with traces of silt and brownish yellow concretions; sharp contact into:
-0.56 to -1.06	3.00 to 3.50	4	10YR 5/1; As3, Sh1, Tl/Dl+; Grey organic-rich clay with inclusions of detrital or <i>in situ</i> wood remains (increasing downwards); diffuse contact into:
-1.06 to -1.40	3.50 to 3.84	3	10YR 4/1; As2, Sh2, Th+, Tl+; Dark grey clay-rich peat with inclusions of wood and herbaceous peat; diffuse contact into:
-1.40 to -2.56	3.84 to 5.00	3	10YR 2/1; Sh3, Tl ³ 1, As+, Th+; Humo 3; Black well humified wood peat with traces of clay and herbaceous peat
-2.56 to -3.56	5.00 to 6.00		VOID (non-retrieval)
-3.56 to -4.41	6.00 to 6.85	2	2.5Y 7/3; Ga2, Gg1, Ag1; Pale yellow silty sand with gravel; diffuse contact into:
-4.41 to -4.47	6.85 to 6.91	2	2.5Y 7/3; As2, Ga1, Ag1; Pale yellow silty sandy clay; sharp contact into:
-4.47 to -4.56	6.91 to 7.00	1	10YR 6/2; Ga2, Gg2; Light brownish grey sandy gravel.

Table 8: Summary existing geotechnical data from Thames View Estate, Renwick Road, Barking, Essex

Borehole number	Easting	Northing	Surface elevation (m OD)	Top of Upper Alluvium (m OD)	Top of Peat (m OD)	Top of Lower Alluvium (m OD)	Gravel surface (m OD)	London Clay surface (m OD)	Peat thickness (m)
<QBH1>	546850.044	182909.746	1.83	0.29	-1.62	-3.12	-3.97		1.50
<QBH2>	546851.519	182995.257	1.94	0.34	-2.00	-2.86	-3.98		0.86
<QBH3>	546880.654	183066.729	2.47	0.42	-1.07	-2.53	-3.74		1.46
<QBH4>	546901.571	183178.654	2.46	0.50	-2.05	-2.90	-3.54		0.85
<QBH5>	546816.763	183207.698	2.54	0.45	-0.76	-2.71	-3.51		1.95
<QBH6>	546777.978	183242.743	2.44	0.65	-1.06	Not recorded	-4.47		
BH1	546901.8	183233	2.63	0.63	-1.27	-2.27	-3.37	-8.57	1.9
BH2	546868	183173.1	3.12	-0.18	-1.38	-2.38	-3.28	-8.68	1
BH3	546914	183150.3	2.23	-0.27	-1.27	-2.77	-3.27	-8.17	1.5
BH4	546843	183099.8	2.1	0.1	-1.1	-2.8	-3.7	-8.80	1.6
BH5	546902.2	183085.3	2.41	None	-1.39	-3.19	-3.89	-8.59	1.8
BH6	546904.4	183004.2	2.51	0.81	Units described together		-3.39	-8.39	
BH7	546856.9	183000.6	1.98	0.88	Units described together		-3.92	-8.92	
BH8	546905.7	182912.3	2.16	-0.84	-1.34	-3.34	-3.74	-9.34	2
BH9	546846.1	183240	2.57	0.57	-0.93	-2.73	-4.13	-7.93	1.8
BH10	546766.7	183241.9	2.22	0.62	-0.48	-2.68	-4.28	-8.48	2.2
TP01	546879.2	183231.2	2.66	0.56					
TP02	546886.3	183209.5	3.01	0.51					
TP03	546913	183181.8	2.24	-0.16	-0.96				
TP05	546868.1	183132.9	2.76	0.26	-1.14				
TP06	546871.8	183091.8	2.39	0.09	-1.11				
TP07	546909.1	183043.2	2.1	0.4	-0.8				
TP08	546879.2	183034.6	2.49	0.09	-1.21				
TP09	546866.4	182995.8	2.08	0.78	-1.82				
TP10	546926	182997.1	2.31	0.81					
TP11	546913.2	182940.6	2.19	0.89					
TP12	546856.7	182928	2.01	-0.19	-1.79				
TP13	546912.6	182895.6	1.73	0.83	-0.67				
TP14	546821.7	182893.9	1.53	0.23	-1.67				
TP15	546839.7	183036.5	1.82	0.12					
TP16	546845.1	183142.1	2.35	0.35	-1.15				
TP17	546858.1	183192.2	2.56	-0.14	-1.14				
TP20	546762.5	183192	2.54	-0.16	-1.56				

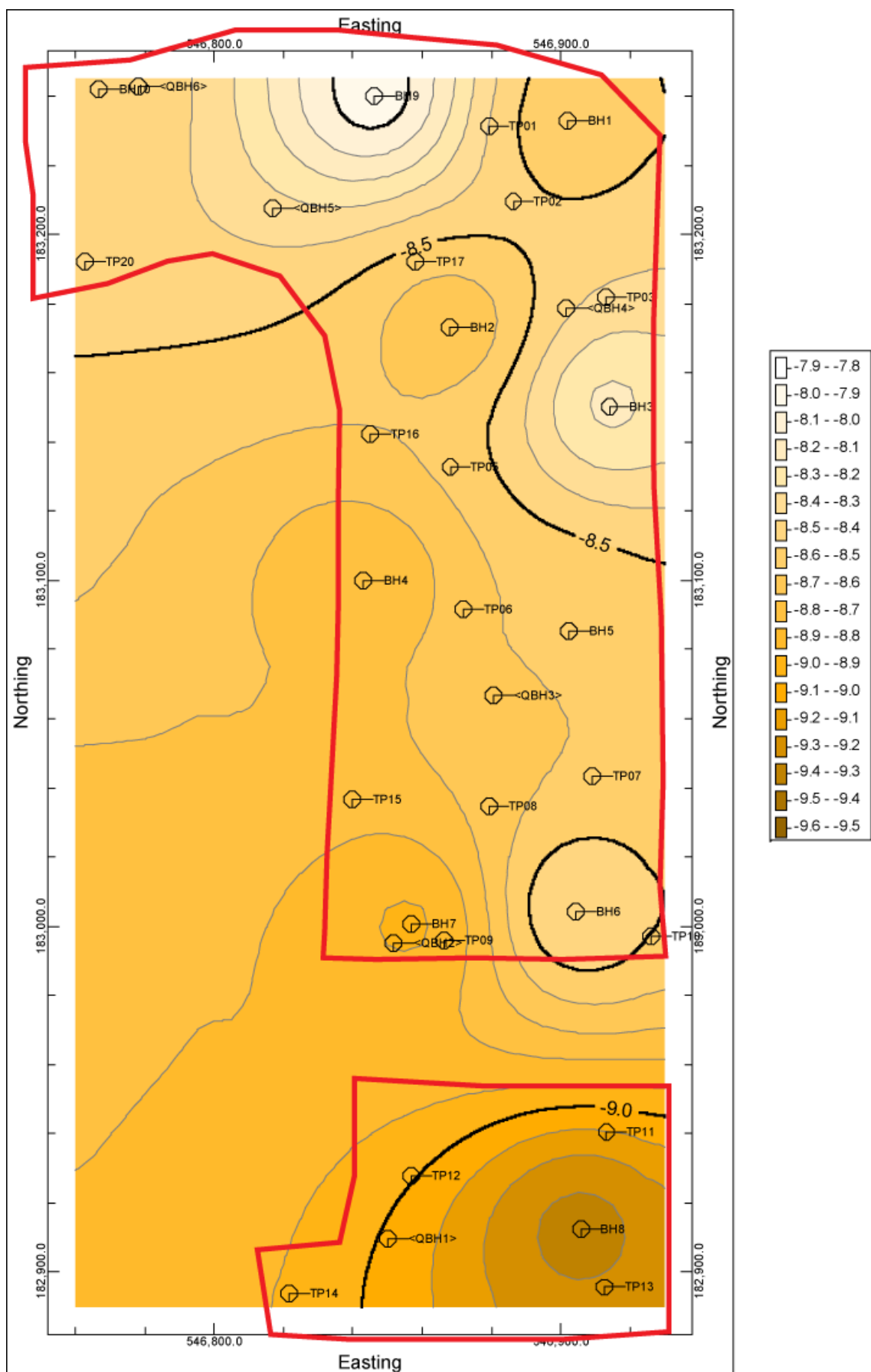


Figure 4: Top of London Clay / Base of Shepperton Gravel (m OD)

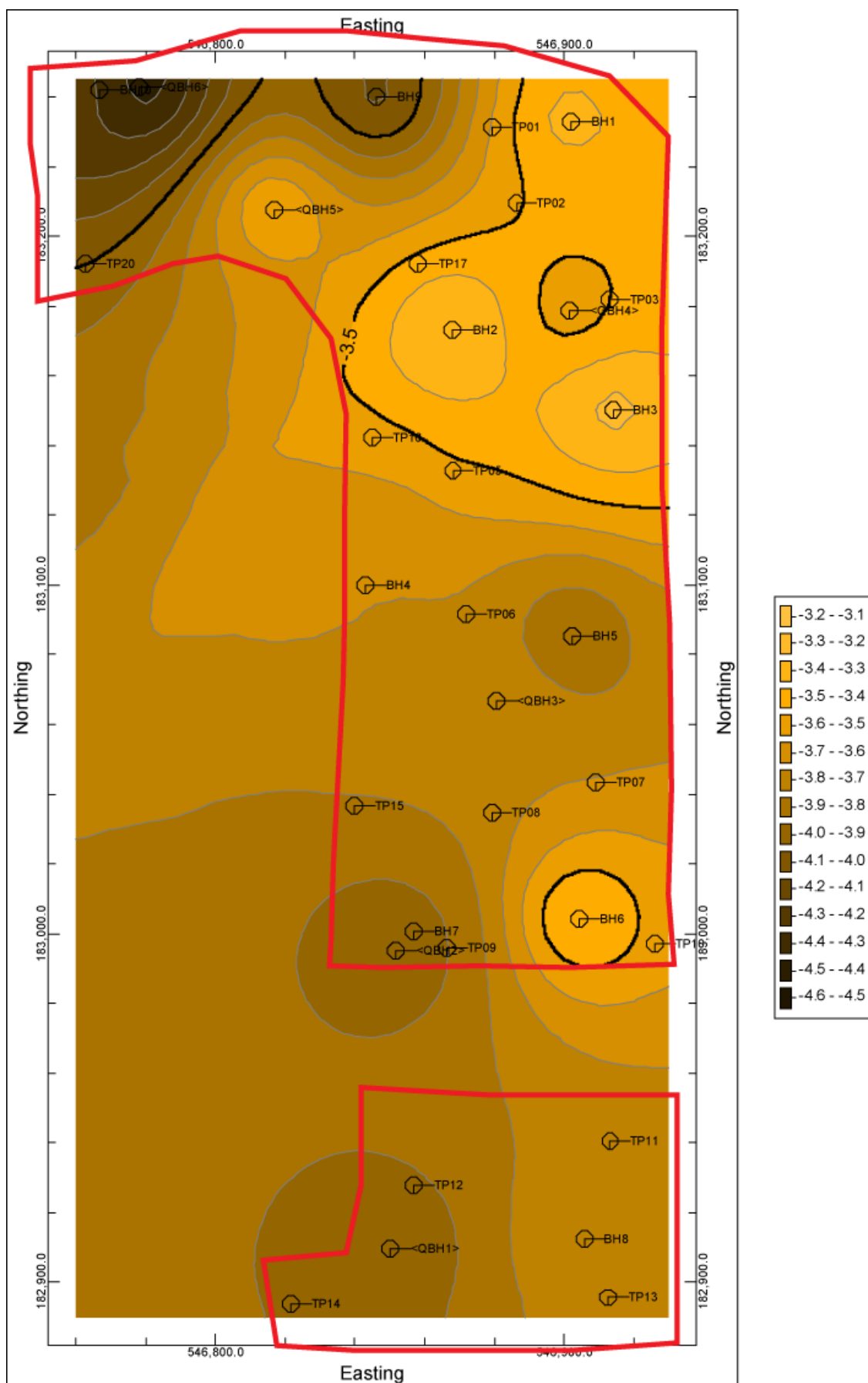


Figure 5: Top of the Shepperton Gravel / Base of the Lower (Sandy) Alluvium (m OD)

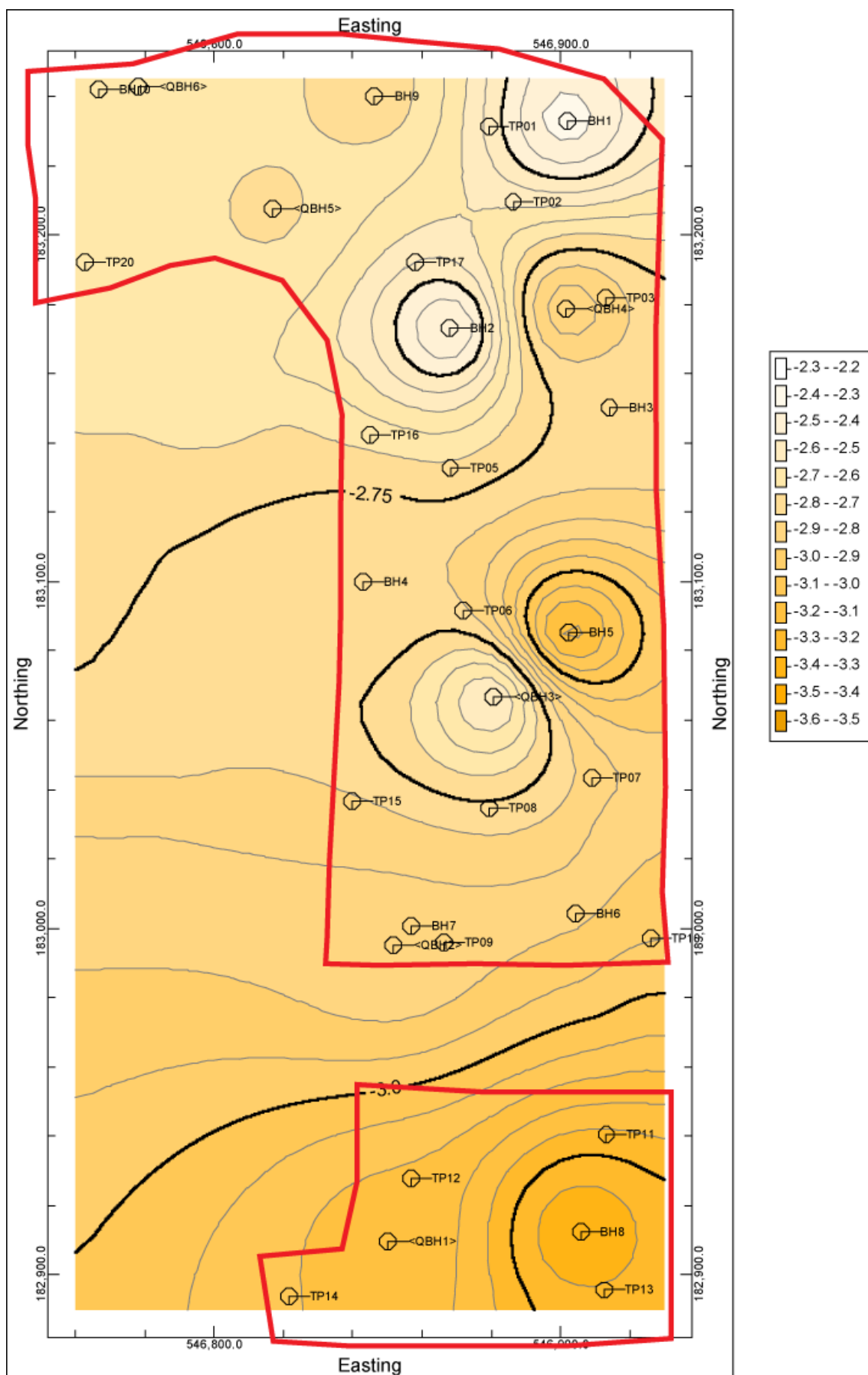


Figure 6: Top of Lower Alluvium / Base of the Peat (m OD)

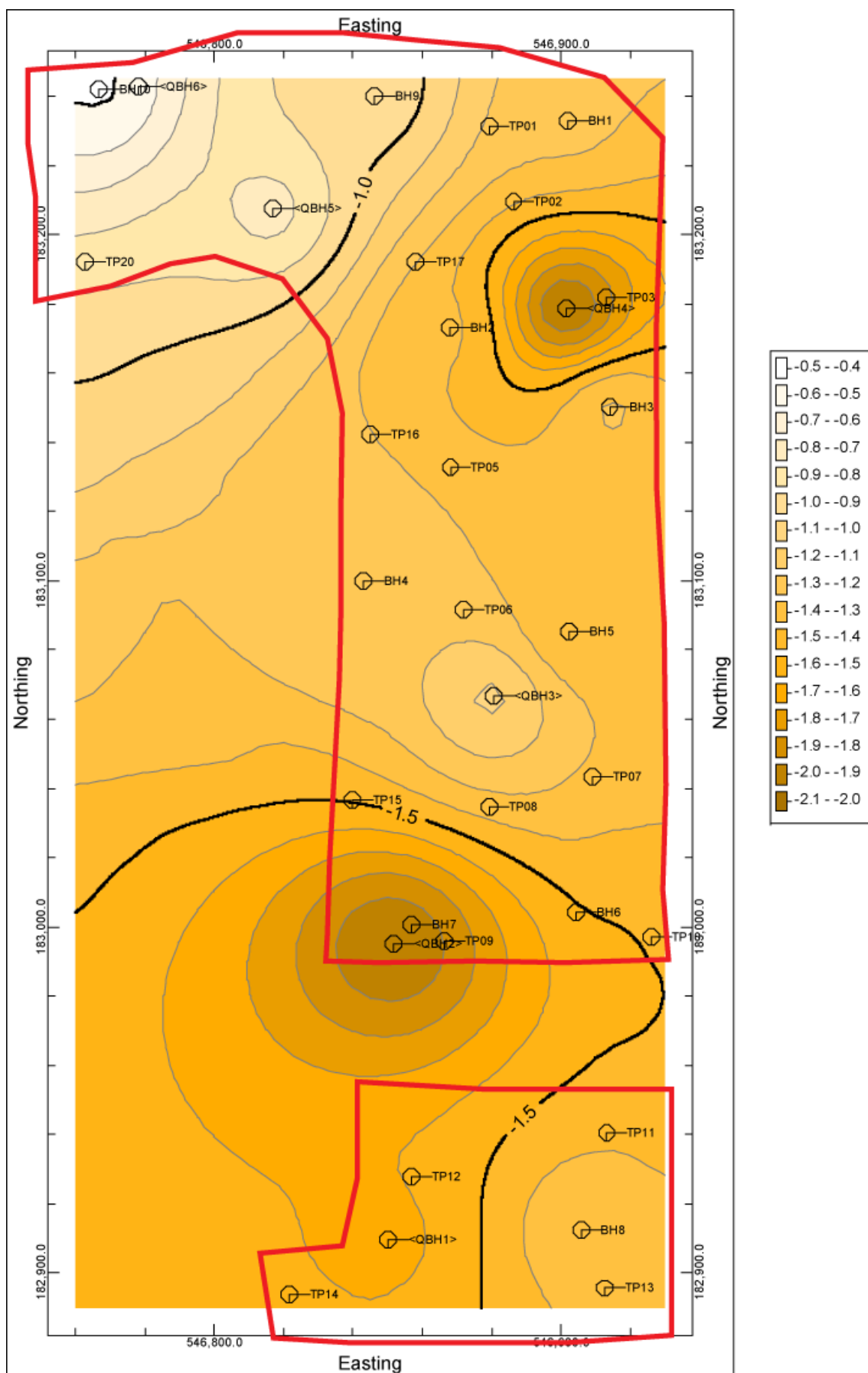


Figure 7: Top of Peat / Base of the Upper Alluvium (m OD)

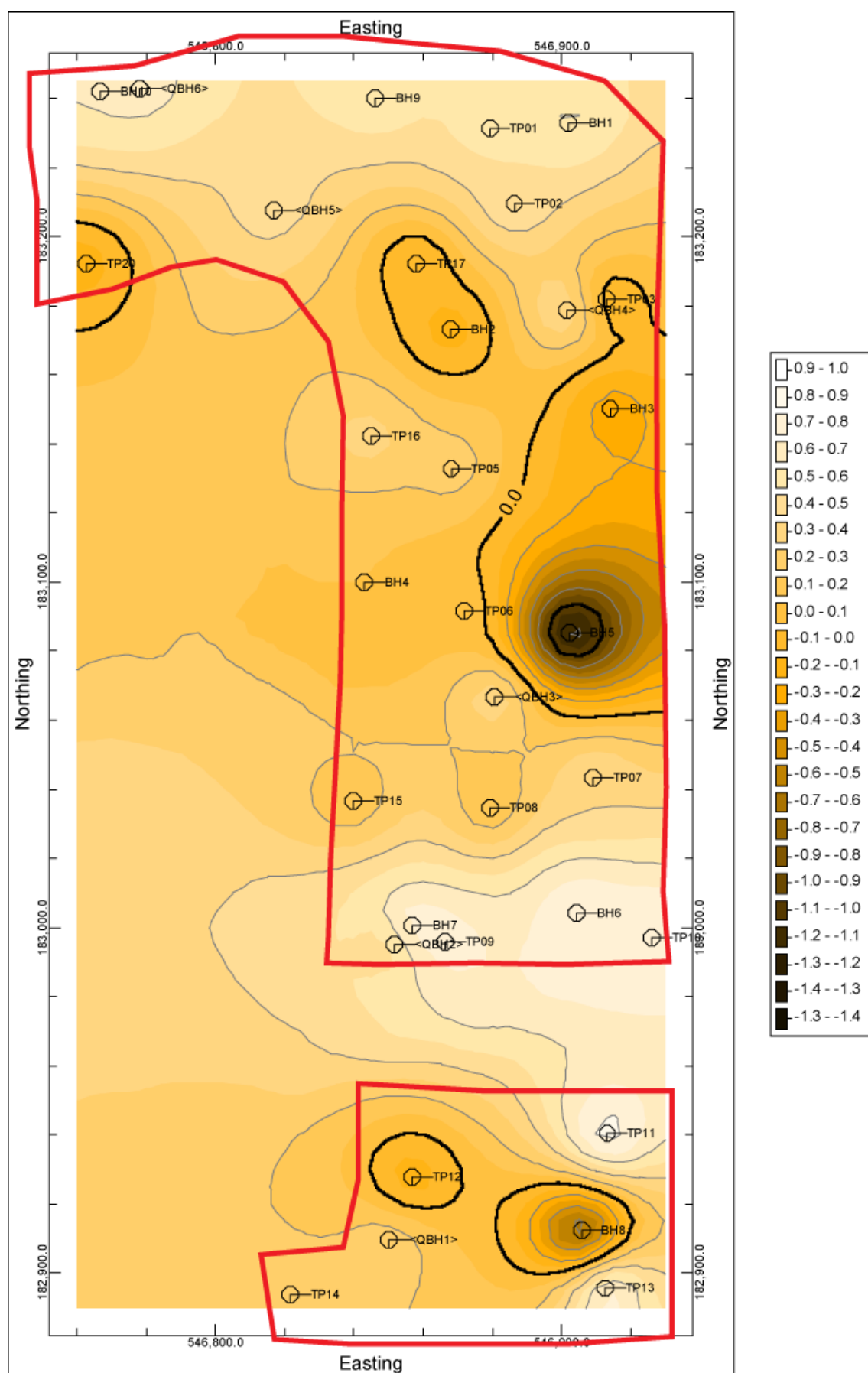


Figure 8: Top of Upper Alluvium / Base of Made Ground (m OD)



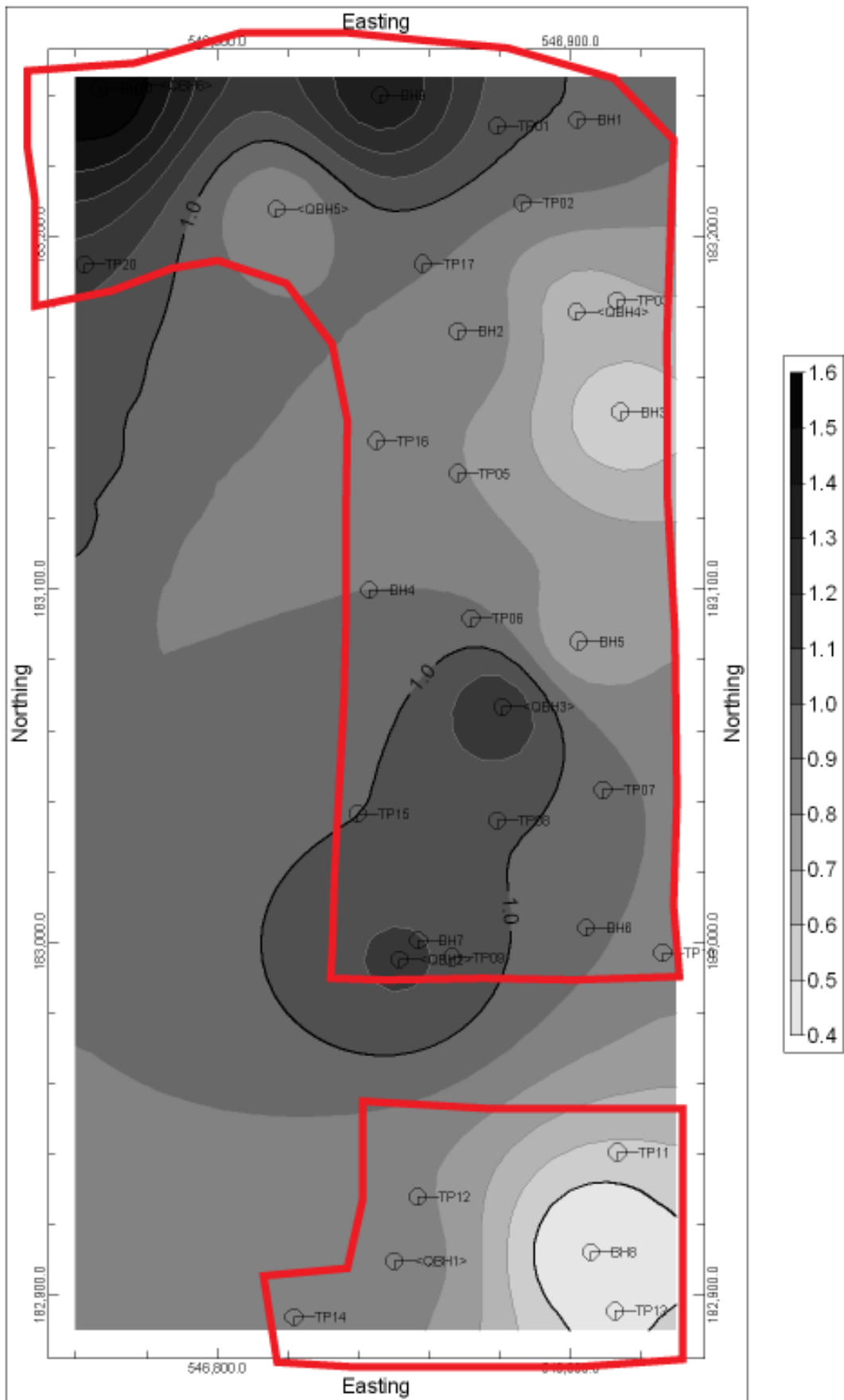


Figure 10: Thickness of the Lower Alluvium (m)

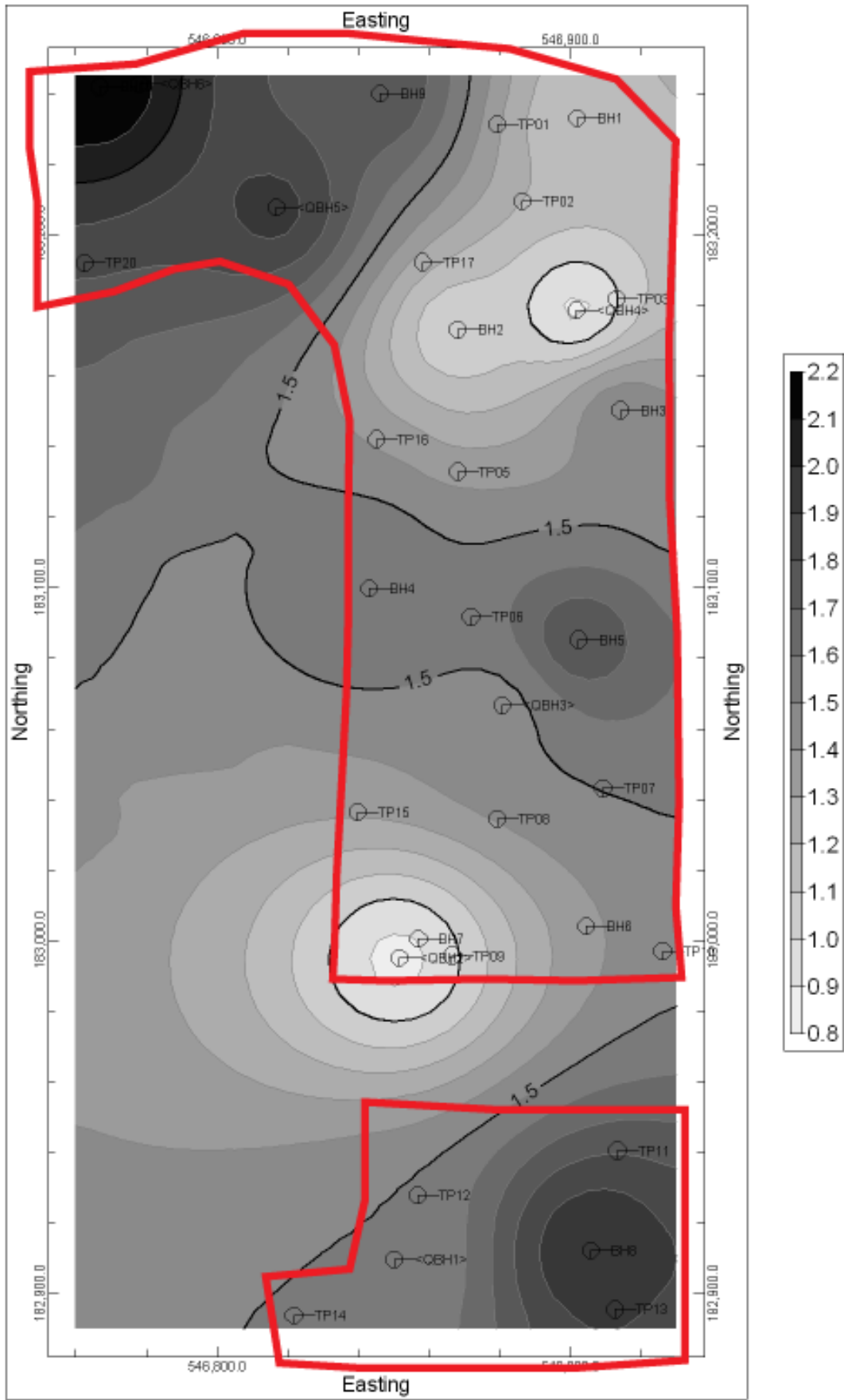


Figure 11: Thickness of the Peat (m)

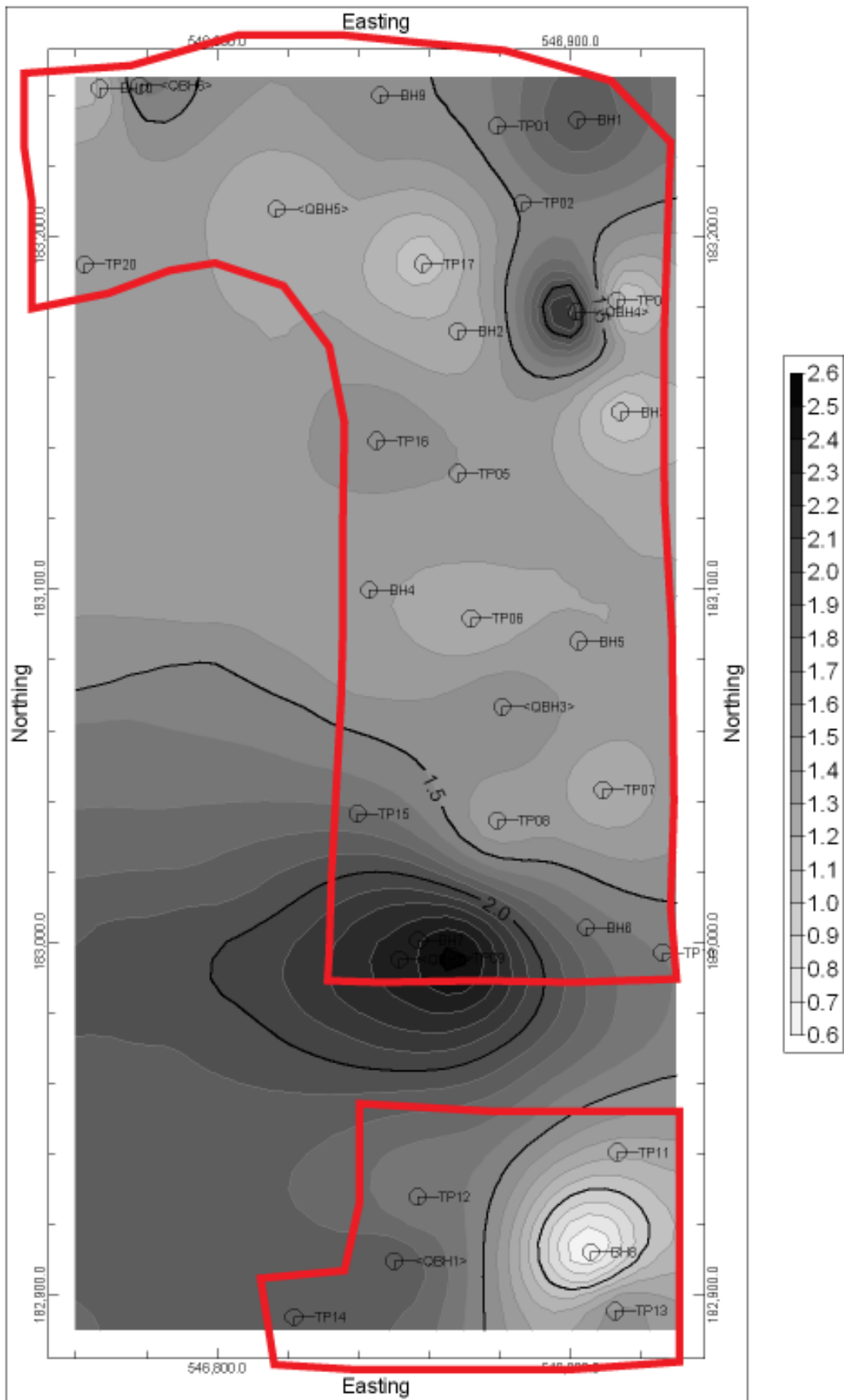


Figure 12: Thickness of the Upper Alluvium (m)

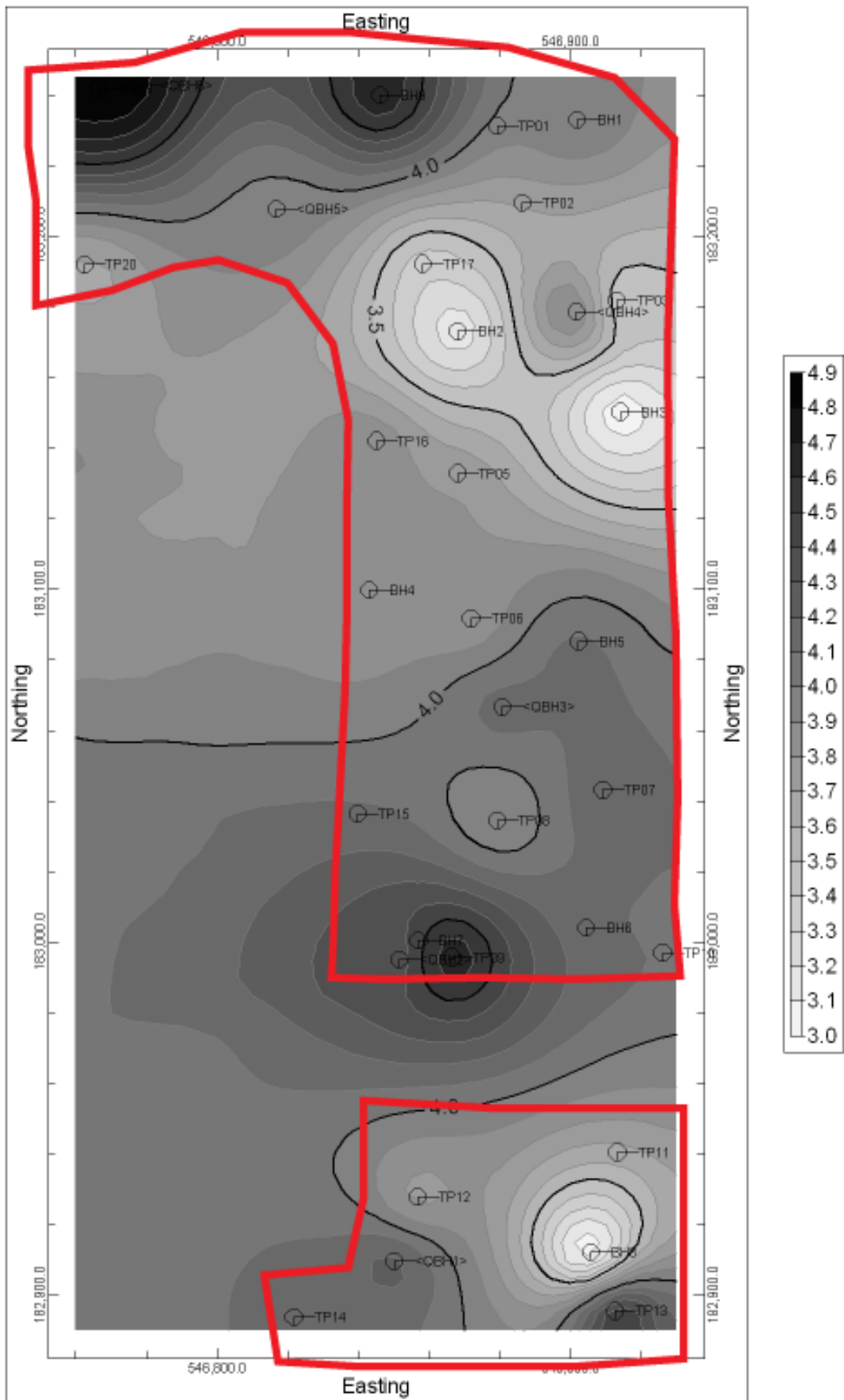


Figure 13: Thickness of Total Alluvium (m)

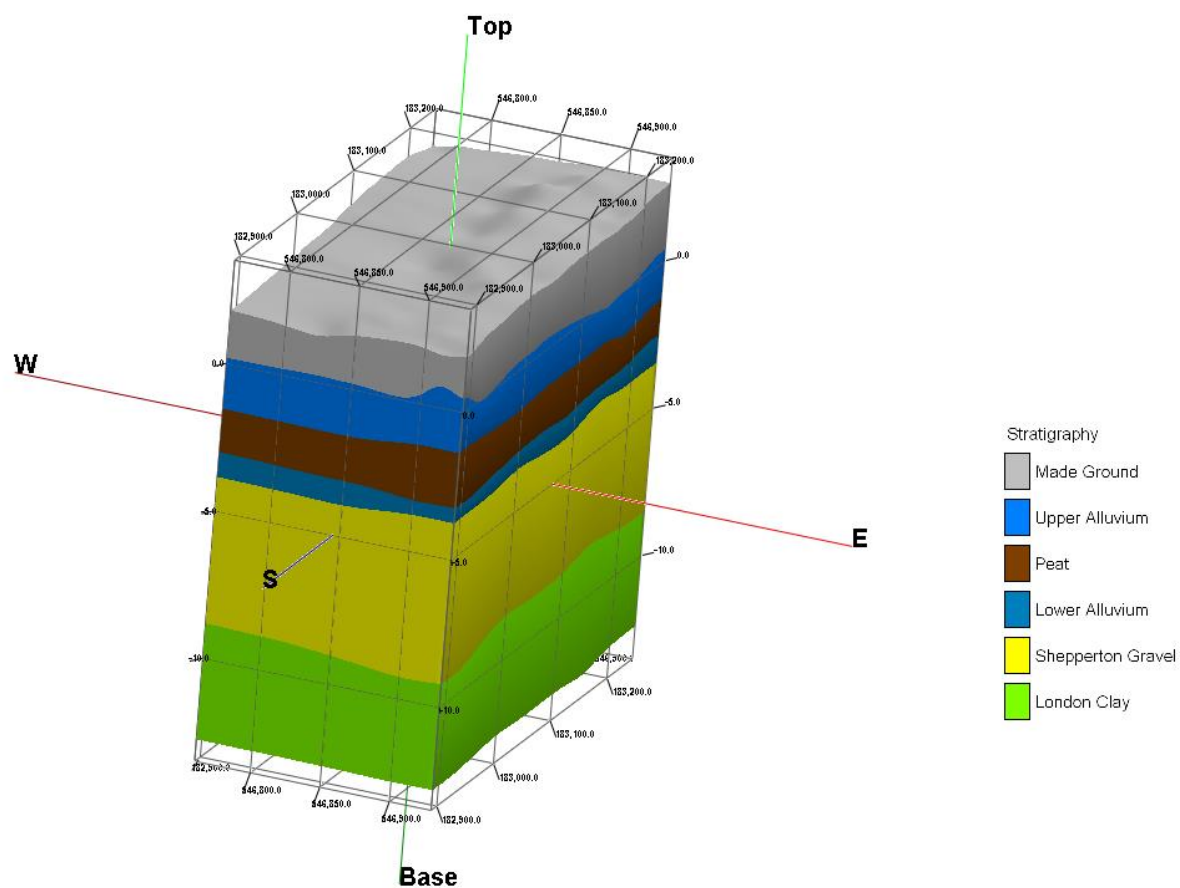


Figure 14: Three-Dimensional topographic model of the sub-surface stratigraphy at Thames View Estate, Renwick Road, Barking, Essex

DISCUSSION AND CONCLUSIONS

The Thames View Estate site is immediately adjacent to the Barking Riverside site which has been the subject of recent geoarchaeological investigation (Batchelor *et al* 2011), and lies between other areas that have been extensively investigated, upstream in Southwark (e.g. Sidell *et al* 2002, Batchelor *et al* 2010) and downstream at various localities between Crossness and Tilbury (e.g. Devoy 1979, Batchelor *et al* 2008a, 2008b). In all these areas a broadly similar sequence of sediments overlies the bedrock. Immediately overlying the bedrock are sands and gravels of Late Devensian late glacial age – the Shepperton Gravel of Gibbard (1985). In the broad view, the surface of the Shepperton Gravel falls in the downstream direction, but in detail the surface is uneven. The principal relief features of the gravel surface are longitudinal bars approximately parallel with the main axis of the valley and separated by channels in which finer grained deposits are sometimes present. The amplitude of the relief on the gravel surface is generally between 2.00m and 4.00m, but where major channels are present may be as much as 6.0m. Upstream from the present site of investigation, in Southwark, the tops of the gravel bars are close to the level of the modern floodplain; downstream, e.g. beneath Rainham Marshes, the gravel surface may be as much as 11.00m below the modern floodplain surface, whilst at Crossness, only ca. 2km downstream the average level of the gravel surface (192 records) was -6.39m OD

At Barking Riverside the surface of the gravel varied between above -2.50m OD and below -6.00m OD (Batchelor *et al.*, 2011). Two extensive topographic highs above -2.50m OD were recorded centred on TQ 45440 82220 to the south-west of the site and 47000 82400 to the south-east. By comparison therefore, the surface of the Shepperton Gravel at Thames View Estate lies between -3.20m and -4.50m OD, thus representing a surface somewhat beneath that of the topographic high points recorded at Barking Riverside.

Overlying the Shepperton Gravel across most of the Lower Thames Valley is a sequence of Holocene alluvial sediments, usually comprising a lower unit of sandy alluvium (Lower Alluvium) which often contains visible organic remains, which may include wood, other plant remains, and Mollusca. In many places the Lower Alluvium is overlain by a Peat bed, representing the development of a more stable terrestrial surface across the floor of the valley. The uppermost unit almost everywhere is a silty alluvium (Upper Alluvium) in which visible organic remains are uncommon. In the tidal reaches of the Thames, the Upper Alluvium represents evidence of the combined effects of rising sea level, leading to regular estuarine flooding, and an increase in sediment supply produced by soil erosion associated with the intensification of land-use from the Neolithic period onward. The overall effect of

Holocene floodplain sedimentation has been to bury progressively the uneven surface of the Shepperton Gravel and to create in the tidal reaches of the Thames a very low relief floodplain close to OD.

The sequence of deposits recorded at Thames View Estate, thus fits the model for the Lower Thames Valley. Furthermore, between 0.86 and 2.20m of Peat have been recorded across the site, and has been retained within the 6 geoarchaeological boreholes. On the basis of other sites within this region, the Peat at Thames View Estate is likely to have accumulated somewhere between 6000 and 3000 cal BP (Neolithic to Bronze Age cultural periods), and ca. 2000 years may be represented in the thickest sequences (e.g. <QBH5>). These units have the potential to provide a detailed reconstruction of the environmental history of the site and its environs on both the semi-terrestrial Peat surface and neighbouring dryland. Work on other sites within the Lower Thames Valley has demonstrated that there are significant interactions between human activity, sea level change and vegetation history that warrant investigation, not only during the interfaces between the Lower Alluvium, Peat and Upper Alluvium, but during the accumulation of the Peat itself.

RECOMMENDATIONS

The results of the geoarchaeological investigation have revealed that the surface of the gravel surface is relatively low across the site when compared with the neighbouring Barking Riverside where potential topographic high points have been identified. It is therefore considered that the potential for recording any *in situ* evidence for human activity on the gravel surface at the site to be low. The potential for recovering archaeological remains within the semi-terrestrial Peat surface is considered to be slightly higher since prehistoric trackways have been recorded in such units in other areas of the Lower Thames Valley, but particularly adjacent to the margins of the dryland (Thames View Estate is ca. 250m to the south of this).

As outlined above, the boreholes retained from Thames View Estate have the potential to provide for reconstructing the past environmental conditions (including evidence for human activity) of the site and its environs, and if no archaeological investigations are carried out on the site, it is recommended that an assessment of these sequences is undertaken to evaluate this potential. Such an investigation is recommended on the sequences from <QBH5> and <QBH1> since they are located at opposite ends of the site. In addition, a smaller assessment of the sequence from borehole <QBH4> is recommended due to the thinner Peat sequence recorded in this particular part of the site. The assessment should

incorporate: (1) rangefinder radiocarbon dating, to provide an age for the onset and cessation of peat formation; (2) organic matter determinations to aid identification of the sedimentary units; (3) assessment of the archaeobotanical remains (pollen, waterlogged wood and seeds) to provide a provisional reconstruction of the vegetation history; (4) assessment of the diatoms to provide an indication of the palaeohydrology (e.g. marine, brackish or freshwater), and (5) assessment of the zooarchaeological remains (insects and Mollusca) to provide information on the general environmental conditions, climatic change and hydrology of the site. The environmental assessment will also highlight any indications of nearby human activity, and provide recommendations for further analysis (if necessary).

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APPENDIX 1: OASIS

Project details

Project name	Thames View Estate, Renwick Road: Geoarchaeological Fieldwork and Deposit Modelling
Short description of the project	Geoarchaeological fieldwork was carried out at the site to investigate the nature of the sub-surface stratigraphy. The results of the fieldwork were integrated with previous geotechnical records from the site to provide a series of topographic maps for the surface of each major stratigraphic unit as follows: London Clay, Shepperton Gravel, Lower Alluvium, Peat, Upper Alluvium and Made Ground. The results revealed a reasonably uniform sequence of Holocene Alluvium overlying a gravel surface that lay between -3.20 and -4.50m OD.
Project dates	Start: 12-04-2012 End: 25-05-2012
Previous/future work	No / Yes
Any associated project reference codes	TVE12 - Sitecode
Type of project	Environmental assessment
Site status	None
Current Land use	Vacant Land 1 - Vacant land previously developed
Significant Finds	PEAT Late Prehistoric
Survey techniques	Archaeology

Project location

Country	England
Site location	GREATER LONDON BARKING AND DAGENHAM BARKING Thames View Estate, Renwick Road
Postcode	IG11
Site coordinates	TQ 46800 83100 51.5271993941 0.116458773697 51 31 37 N 000 06 59 E Point
Height OD / Depth	Min: -0.84m Max: 0.89m

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project brief originator	CgMs Consulting
Project design originator	Dr C.R. Batchelor
Project director/manager	C.R. Batchelor
Project supervisor	C.R. Batchelor

Type of sponsor/funding body	Developer
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Project archives

Physical Archive recipient	LAARC
Physical Contents	'Environmental'
Digital Archive recipient	LAARC
Paper Archive recipient	LAARC
Paper Media available	'Report'

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	WRITTEN SCHEME OF INVESTIGATION FOR THE GEOARCHAEOLOGICAL INVESTIGATION OF LAND AT THAMES VIEW ESTATE, RENWICK ROAD
Author(s)/Editor(s)	Batchelor, C.R.
Date	2012
Issuer or publisher	Quaternary Scientific
Place of issue or publication	University of Reading

Project bibliography 2

Publication type	Grey literature (unpublished document/manuscript)
Title	THAMES VIEW ESTATE, RENWICK ROAD, BARKING, ESSEX (SITE CODE: TVE12): GEOARCHAEOLOGICAL FIELDWORK REPORT
Author(s)/Editor(s)	Batchelor, C.R.
Author(s)/Editor(s)	Green, C.P.
Other bibliographic details	Quaternary Scientific (QUEST) Unpublished Report April 2012; Project Number 069/12
Date	2012
Issuer or publisher	Quaternary Scientific
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