

20 HORN LANE, ROYAL BOROUGH OF GREENWICH

Geoarchaeological Deposit Model Report

NGR: TQ 41252 80085

Site Code: HNA17

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1. NON-TECHNICAL SUMMARY

Geoarchaeological fieldwork and deposit modelling was instigated at the 20 Horn Lane site in order to: (1) map the height and thickness of the deposits; (2) assess their geoarchaeological, archaeological and palaeoenvironmental significance and potential, and (3) prepare recommendations for geoarchaeological assessment. In order to address these aims, two geoarchaeological boreholes were retained from the site. These were described under laboratory-based conditions and integrated with stratigraphic data from existing records to produce a deposit model of the major depositional units across the site.

The results of the deposit modelling indicate that the sediments present beneath the 20 Horn Lane site are similar to those recorded elsewhere in the Lower Thames Valley. A sequence of Shepperton Gravel is overlain by a sequence of Holocene alluvial sediments, buried beneath modern Made Ground. However, the site is projected as lying towards the eastern end of a significant, deep palaeochannel that traverses this area of the Greenwich Peninsula from west to east. The mapped topographic surface and thickness of the deposits are consistent with those recorded at other sites lying within the same deep palaeochannel at its western end.

The potential for archaeological remains beneath the site is considered low on the basis of an underlying Shepperton Gravel surface of at least -3.8m OD (5m bgl). However, even in the absence of the archaeological remains, the sediments have the potential to contain a wealth of further information on the past landscape, through the assessment/analysis of palaeoecological remains. Indeed, on the 20 Horn Lane site, the Shepperton Gravel is overlain by up to 5m of alluvial deposits, 2m of which comprise Peat and/or organic-rich sediment, which elsewhere have been dated to the Neolithic and Bronze Age periods. It is therefore recommended that radiocarbon dating and an assessment of the palaeoecological remains is carried out on one sequence to establish whether the concentration, preservation & diversity, is sufficient to achieve the overall aims of the project, and as a comparison to the results ascertained from other sequences at the western end of the palaeochannel.

2. INTRODUCTION

2.1 Site context

This report summarises the findings arising out of the fieldwork and deposit modelling undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at 20 Horn Lane, Royal Borough of Greenwich (site code: HNA17; NGR: TQ 40273 78692; Figures 1 & 2). Quaternary Scientific were commissioned by CgMs Consulting to undertake the geoarchaeological investigations. The site is located to the southeast of Greenwich Peninsula, ca. 500m to the south of the River Thames and bounded by Bugsby's way to the north, a railway line to the east, Horn Lane to the west and commercial units to the south. Greenwich Peninsula itself is formed and bounded by a meander of the Thames to the west, east and north, and lies opposite the confluence of the River Lea.

The ground across the area originally formed part of the natural floodplain of the Thames, and is underlain by river alluvium (British Geological Survey 1:50,000 sheets 256 North London 1993, 257 Romford 1996, 270 South London 1998, 271 Dartford 1998). This alluvium consists of fine-grained mineral-rich deposits and peat, and is mapped to the south to approximately the position of the A206, where it meets higher drier ground (ca. 300m to the south of the present site). Beneath the alluvium, sand and gravel is present and is assigned by Gibbard (1994) to the Late Devensian Shepperton Gravel. The bedrock beneath this is mapped as the Palaeogene Lambeth Group – Clay, Silt and Sand. Ground level at the site is recorded at ca. 2m OD (Woolgar Hunter, 2016).

During previous geotechnical investigations (Woolgar Hunter, 2016) a total of three cable percussion boreholes (BH01-03), four window sample boreholes (WS01-04) and four test pits (TP01-04) were put down at the site (Figure 2). Although only the cable percussion boreholes recorded the entire Holocene alluvial sequence, these investigations revealed a sequence of Shepperton Gravel, overlain by alluvium (which in most places contained peat), overlain by Made Ground. The surface of the Gravel was recorded in the three cable percussion boreholes at between -4.0 and -5.7m OD, with an indication that the surface of the gravel falls towards the north/northeast. A horizon of sandy/silty alluvium was recorded overlying the Gravel, in turn overlain by peat in all but one borehole sequence (BH02), at levels of between ca. -1 and -4m OD. The peat was overlain by clay-rich alluvium to a level of between -0.7 and 0.75m OD, in turn overlain by Made Ground.

Previous deposit modelling across the wider area suggests that the 20 Horn Lane site is located within a significant depression (>-4m OD) in the Gravel surface that traverses Greenwich Peninsula from west to east. Enderby Wharf (Batchelor *et al.*, 2015) and Alcatel Lucent (Young & Batchelor, 2015) are both within this large channel at its western end; 20 Horn Lane is towards the eastern end. Elsewhere on the peninsula, low gravel surfaces are recorded at various sites, representing localized hollows and/or interconnected palaeochannels. High gravel surfaces (between ca. -1 and -1.7m OD) have also been recorded representing small but important former islands. Peat has also been identified at numerous sites across Greenwich Peninsula, including Enderby Wharf (Batchelor *et al.*, 2015), Alcatel Lucent (Young & Batchelor, 2015) and Bellot Street (Branch *et al.*, 2005). The

horizons recorded vary in date, but generally accumulated within the same general age range of 6700 to 3000 cal BP (late Mesolithic to late Bronze Age).

2.2 Geoarchaeological, palaeoenvironmental and archaeological significance

As above, on the basis of ongoing research that incorporates the area of Greenwich Peninsula, including the results of the investigations at the sites listed above and data from the British Geological Survey online database (www.bgs.ac.uk/opengeoscience), the site is thought to lie within the approximate area of a deep, broadly east-west aligned palaeochannel that may have formed either a tributary or subsidiary channel of the Thames (see Batchelor *et al.*, 2015; Young & Batchelor, 2015). In addition, the peat recorded at the site represents a period of semi-terrestrial conditions that may date from the Neolithic to Bronze Age periods. The palaeoenvironmental potential of the sequences at the site is therefore considered to be high. Significantly, on the basis of the radiocarbon dates from sites elsewhere on the Peninsula, it is possible that the peat at the present site may have been accumulating at the same time as trackway construction occurred on the nearby 72-88 Bellot Street (McLean, 1993; Philp, 1993) and the Garage Site, Bellot Street (Branch *et al.*, 2005) sites (Bronze Age) approximately 1km to the west. The existing records from the nearby area indicate a variable sequence of Holocene alluvial deposits resting, on a highly variable Shepperton Gravel surface.

The different deposits recorded are significant as they represent different environmental conditions that would have existed in a given location. For example: (1) variations in the topography of the River Terrace Gravels could indicate the position of former channels and islands on the floodplain; (2) the presence of soils and peat represent former terrestrial or semi-terrestrial land-surfaces, and (3) the less organic alluvial deposits of sands/silts/clays represent periods of varying hydrological conditions on the floodplain. By studying the sub-surface stratigraphy across the site in greater detail, it will be possible to build a greater understanding of the former landscapes and environmental changes that took place over space and time at this location of Greenwich Peninsula.

Organic-rich sediments (in particular peat) also have high potential to provide a detailed reconstruction of prehistoric environments on both the wetland and dryland. In particular, there is the potential to increase knowledge and understanding of the interactions between hydrological change, human activity, vegetation succession and climate in this area of the Middle Thames Valley. Significant vegetation changes include the early Holocene/early Mesolithic transition from pine-dominated to mixed-deciduous dominated woodland; the late Mesolithic/Neolithic decline of elm woodland, the Neolithic colonisation and decline of yew woodland; the late Neolithic/early decline of wetland and dryland woodland. Such investigations are carried out through the assessment/analysis of palaeoecological remains (e.g. pollen, plant macrofossils & insects) and radiocarbon dating. So called palaeoenvironmental reconstructions have been carried out on the sedimentary sequences from elsewhere in this general area, including at Alcatel Lucent (Young & Batchelor, 2015, and Enderby Wharf (Batchelor *et al.*, 2015).

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 structure) and palaeoenvironmental record (e.g. changes in vegetation composition). As stated above, such evidence was identified in the form of a Bronze Age trackway at the nearby 72-88 Bellot Street (McClean, 1993; Philp, 1993) and Garage Site, Bellot Street (Branch *et al.*, 2005) sites (Bronze Age) approximately 1km to the west.

2.3 Aims and objectives

On the basis of the geoarchaeological, palaeoenvironmental and archaeological potential of the site, Further records are required to enhance our understanding of the sub-surface stratigraphy of the 20 Horn Lane site, and for any further assessment/analysis of the deposits (if necessary).

Five significant research aims relevant to the geoarchaeological investigations at the site are outlined here:

1. To clarify the nature of the sub-surface stratigraphy across the site
2. To clarify the nature, depth, extent and date of any former land surfaces, alluvial and peat deposits;
3. To compare the results of the investigation to the other sites in the area of Greenwich Peninsula;
4. To investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity;
5. To investigate whether the sequences contain any evidence for natural and/or anthropogenic changes to the landscape (wetland and dryland);
6. 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, the following objectives are proposed:

1. To retrieve undisturbed continuous samples from two targeted borehole locations for laboratory-based investigation;
2. To use the stratigraphic data from the new locations, and existing records to produce a deposit model of the major depositional units across the site;
3. To make recommendations for any further geoarchaeological, palaeoenvironmental and archaeological investigation at the mitigation stage.

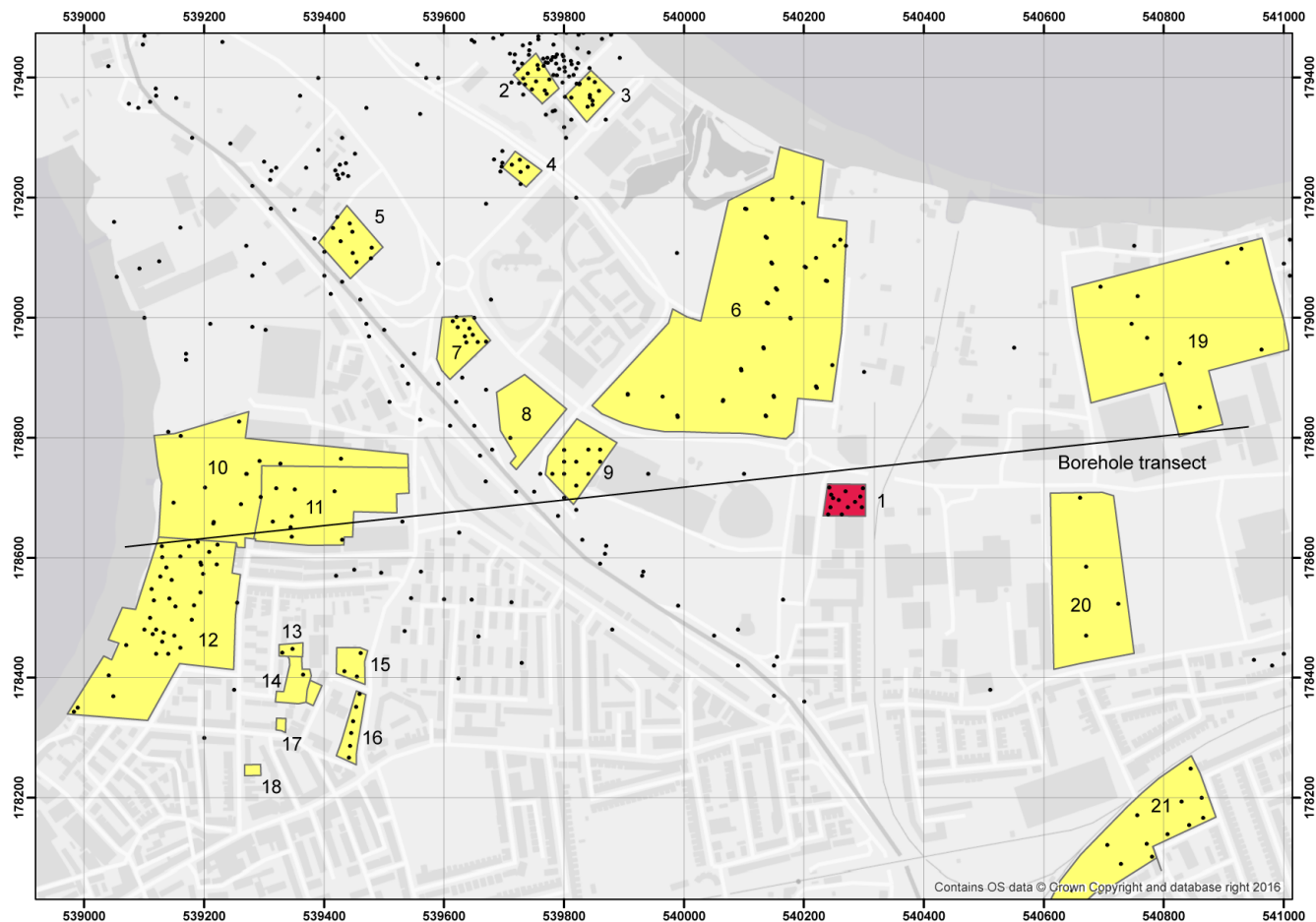


Figure 1: Location of (1) 20 Horn Lane, Royal Borough of Greenwich and selected other geoarchaeological and archaeological sites nearby: (2) Plot MO115 (Young & Batchelor, 2013b); (3) Plot MO117 (JHW13; Young & Batchelor, 2013a); (4) Plot 19.05 (Batchelor & Young 2017); (5) Plot MO401 (Batchelor, 2014); (6) Greenwich Millennium Village (Miller & Halsey, 2011); (7) Land between A102(M) & Bugsby's Way (GPN98); (8) The Leisure Site, Bugsby's Way (BW99); (9) Land between A102(M) & Bugsby's Way (GPN98); (10) Enderby Wharf (Batchelor *et al.*, 2015); (11) Alcatel-Lucent Telegraph Works (Young & Batchelor, 2015); (12) Greenwich Wharf; (13) Bellot Street (GLB05; Branch *et al.*, 2005); (14) 72-88 Bellot Street (BSG93; McLean, 1993; Philp, 1993); (15) & (16) 1-3, 9, 27 Blackwall Lane & 109 Pelton Street (MoLA, 2011); (17) St Josephs Community Centre; (18) 4 Christchurch Way (Hart, 2011); (19) Lombard Wall (Young *et al.*, 2011); (20) Greenwich Industrial Estate (GIE02; Morley, 2003); (21) Victoria Way (MoLA, 1993). *Contains Ordnance Survey data © Crown copyright and database right [2017].*

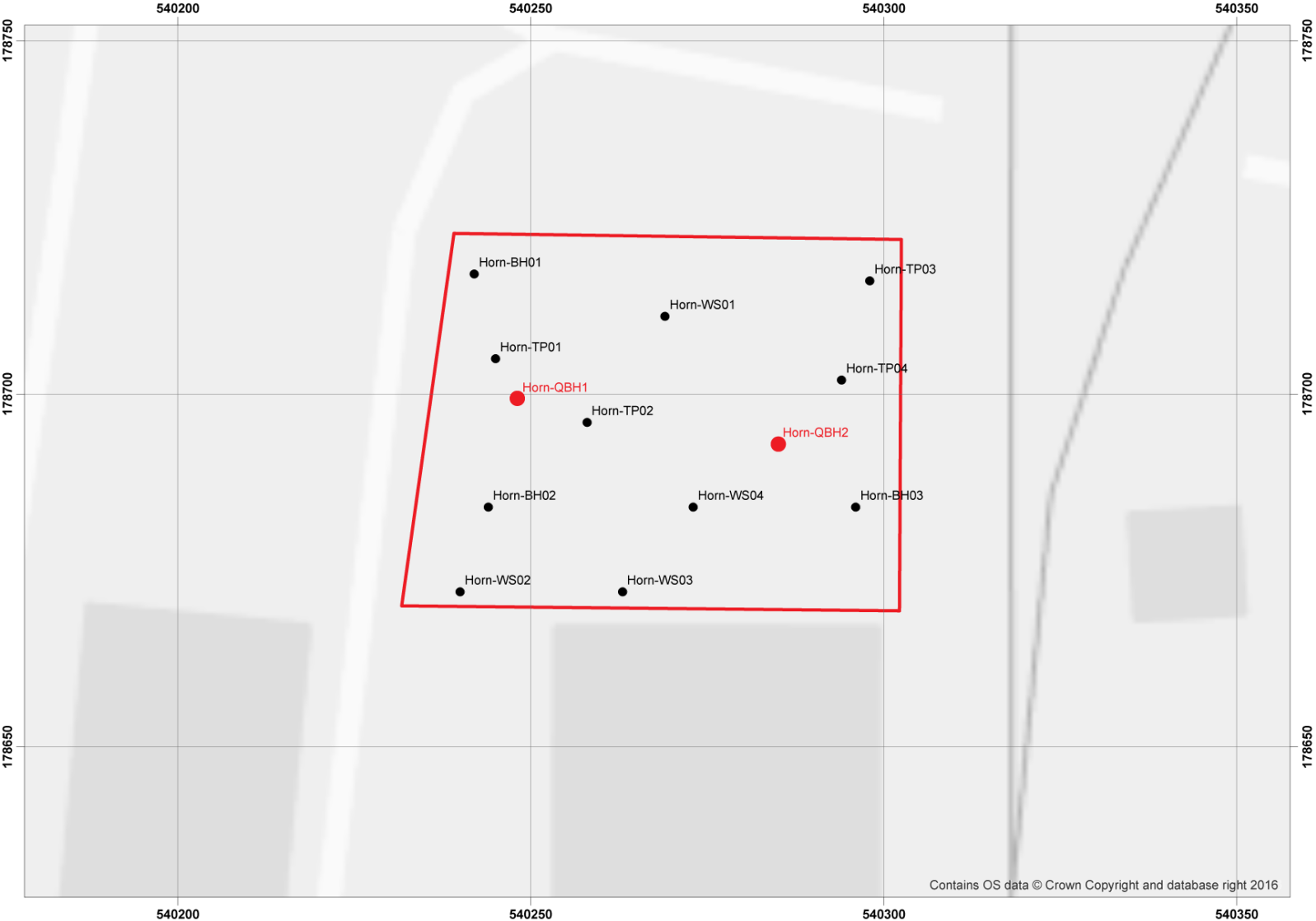


Figure 2: Location of previous geotechnical boreholes/test pits and the proposed new geoarchaeological boreholes (QBH1 and QBH2) at 20 Horn Lane, Royal Borough of Greenwich.

3. METHODS

3.1 Field investigations

Two geoarchaeological boreholes (boreholes Horn-QBH1 & Horn-QBH2) were put down at the site in March 2017 by Quaternary Scientific (Figure 2). The borehole core samples were recovered using an Eijkelkamp window sampler and gouge set using an Atlas Copco TT 2-stroke percussion engine. This coring techniques provide 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. Spatial co-ordinates for each borehole were obtained using a Leica Differential GPS.

3.2 Lithostratigraphic description

Laboratory-based lithostratigraphic descriptions of the new borehole samples was carried out using standard procedures for recording unconsolidated sediment and peat, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts). 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; (3) recording the composition e.g. gravel, fine sand, silt and clay; (4) recording the degree of peat humification, and (5) recording the unit boundaries e.g. sharp or diffuse. The results are displayed in Tables 1 & .

3.3 Deposit modelling

The deposit model for 20 Horn Lane was based on a review of 13 records including the two new geoarchaeological boreholes & eleven geotechnical interventions (Figure 2). Sedimentary units from the boreholes were classified into seven groups: (1) Bedrock, (2) Gravel, (3) Sand, (4) Lower Alluvium, (5) Peat, (6) Upper Alluvium and (7) Made Ground. In addition, 857 geoarchaeological, archaeological and geotechnical records were collated to examine key deposits across the wider area. The classified data for groups 1-7 were then input into a database within the RockWorks 16 geological utilities software, the output from which was displayed using ArcMAP 10. A north-west to south-east borehole transect is displayed in Figure 3. Models of surface height were generated for the Gravel, Lower Alluvium, Peat and Upper Alluvium using an Inverse Distance Weighted algorithm (Figures 3-6 & 9). Thickness of the Peat, total Holocene alluvium (incorporating the Lower Alluvium, Peat and Upper Alluvium) and Made Ground (Figures 7-8, 10-12) were also modelled (also using an Inverse Distance Weighted algorithm). Borehole transects are displayed in Figures 13 (site wide) & 14 (wider area).

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. 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 25m radius around each record is applied to all deposit models from the 20 Horn Lane site; for the models of the wider area (Figures 4, 8 & 11), a 100m radius is used. In addition, 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.

4. RESULTS, INTERPRETATION & DISCUSSION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS AND DEPOSIT MODELLING

The results of the deposit modelling are displayed in Figures 3 to 14. Figures 3 to 12 are surface elevation and thickness models for each of the main stratigraphic units, both for the site and wider area; Figures 13 & 14 are two-dimensional west-east transects across the site & wider area. The results of the deposit modelling indicate that the number and spread of the logs is sufficient to permit modelling with a high level of certainty across the site.

The full sequence of sediments recorded in the boreholes comprises:

Made Ground
Upper Alluvium – widely present
Peat – widely present
Lower Alluvium – widely present
Sand – intermittently present
Gravel – widely present

4.1 Gravel

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 modelling exercise indicates that the surface of the Shepperton Gravel varies between -3.8 and -5.7m OD (Figures 3, 13 & Table 2). This variation is large over a relatively small site. In reality, the surface of the Gravel is probably relatively even, with the disparities recorded between each borehole, the result of difficulties in separating the deposits of the Shepperton Gravel, Sand (see section 4.2) and Lower Alluvium (see section 4.3). Within the new geoarchaeological boreholes, it was recorded around -3.8m; this is considered the most reliable surface level value.

According to the wider modelling exercise (Figures 4 & 14), the site does appear to lie within a large trough in the Shepperton Gravel surface, representative of at least one former palaeochannel

traversing Greenwich Peninsula from west to east. At sites towards its western end such as Alcatel-Lucent (Batchelor *et al.*, 2015) & Enderby Wharf (Batchelor & Young, 2015) the channel reaches depths of around -4m OD. Towards its eastern end at 20 Horn Lane and Greenwich Millennium Village (Miller & Halsey, 2011), the Shepperton Gravel is lower, ranging between -4 and -8m OD. Similarly towards the south-east, a deep depression is evident beneath the Greenwich Industrial Estate site (Morley, 2003), potentially representing a channel draining off the terrace edge towards the present day River Thames. Towards the north of 20 Horn Lane and further onto the main area of Greenwich Peninsula, the Shepperton Gravel surface is recorded in various places down to -4 representing the presence of further smaller, but important channels.

Beyond the confines of the channel to the south, the Gravel surface rises to between -2 and 0m OD as it nears the margin of the floodplain. The Gravel surface also rises to a similar height towards the east beneath the Lombard Wall site (Young *et al.*, 2011). To the north, Gravel surface is patchily recorded above -2m OD, representing small, but important former islands. Wherever the Gravel surface reaches such elevations, it is more likely to represent the former River Terrace of the Kempton Park Gravel, deposited during the middle-late Pleistocene. Such terraces have negligible potential for Palaeolithic remains since the Kempton Park Gravel was deposited during a period when hominid remains have not previously been recorded in the British Isles. They do however, represent areas of greater archaeological potential as they would have been raised above the surrounding floodplain. This is demonstrated by prehistoric trackway remains found within the overlying Peat at Bellot Street (e.g. Branch *et al.*, 2005).

4.2 Sand

A horizon of sand is the lowest unit in the Holocene alluvial sequence, and where present, it rests directly on the surface of the underlying Shepperton Gravel. Where it is identified, it can be interpreted as being deposited under low to moderate energy fluvial conditions, most likely within former channel features.

On the present site, it is recognised in seven sequences: Horn-QBH1, Horn-QBH2, Horn-BH01, Horn-BH02, Horn-WS02, Horn-WS03 & Horn-WS04; and up to 1.5m in thickness (Figures 5 & 13). However, its absence in the other sequences does not necessarily mean it is not present as an individual unit; it is rarely possible to confidently separate Sand from Shepperton Gravel or indeed the silty sandy deposits of the Lower Alluvium (see below), due to the nature of the coring methods and less precise method of description. In the case of the modelling exercise, differentiation between the Sand and Shepperton Gravel is made based upon the presence of Gravel within the sediment. As above, this may therefore partly explain the difference in height of the Shepperton Gravel across the site.

4.2 Lower Alluvium

The Lower Alluvium rests directly on either the Shepperton Gravel or Sand and was recorded in the majority of those records that penetrated sufficiently deeply across the site. The deposits of the Lower Alluvium are described as a 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 remains. 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.

The surface of the Lower Alluvium (Figures 5 & 13) is highly variable across the 20 Horn Lane site, ranging between -4.0 and -1.0m OD. This variation might in part be explained by the aforementioned differences in separating the deposits of the Shepperton Gravel, Sand and Lower Alluvium. These deposits should however be far easier to distinguish from the overlying Peat, and yet the contact is somewhat variable (see Figure 13). The new geoarchaeological boreholes (Horn-QBH1 & Horn-QBH2) are considered to represent the most reliable records, and within these, the surface of the Lower Alluvium is recorded at around -2.3m OD (Tables 1 & 2). In Horn-BH01, it is recorded a little deeper at -2.8m OD, but in Horn-BH03, it is recorded at -4.2m OD. At the other end of the spectrum, the Lower Alluvium is recorded at -0.75 and -0.45m OD in Horn-BH02 & Horn-WS02. The different drilling and descriptive methods would appear to be the most likely reason for the topographic variations recorded. However, spatial variations in the infilling of the channel cannot be ruled out as an alternative explanation for the results recorded.

4.3 Peat

Overlying the Lower Alluvium / Sand in many of the boreholes is a unit of peat, which is present across the site. The peat is indicative of a transition towards semi-terrestrial (marshy) conditions, supporting the growth of sedge fen/reed swamp and/or woodland communities across the floodplain.

The surface of the peat is relatively even, generally lying at between ca. -0.2 and -0.9m OD, and varies between 0.4 and 2.9m in thickness. In new geoarchaeological boreholes Horn-QBH1 & Horn-QBH2, it was 2m in thickness (Figures 6, 8 & 13).

Peat is frequently recorded across much of the wider area in thicknesses of up to 3m (Figures 7 & 14). Greater thicknesses tend to be recorded in areas where the Shepperton Gravel surface is lowest. Thus, thick horizons have been recorded at 20 Horn Lane Alcatel-Lucent (Batchelor *et al.*, 2015) & Enderby Wharf (Batchelor & Young, 2015) for example. At these two latter sites, the Peat has been dated to from the early to late Neolithic period, and middle Neolithic to Bronze Age periods respectively. Even in areas of high gravel topography (e.g. Bellot Street & Lombard Wall), important Peat horizons have been recorded dating, tending to date from the Bronze Age period onwards (Branch *et al.*, 2005; Young *et al.*, 2011). Indeed it is such horizons that are more likely to contain archaeological remains on the basis of previous findings (see above).

4.4 Upper Alluvium

The Upper Alluvium rests on the Peat and was recorded in all records across the site with the exception of a few sequences (e.g. Horn-WS02, Horn-BH01). The sediments of the Upper 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 deposits of the Upper Alluvium are described as predominantly silty or clayey which are very occasionally organic-rich. The surface of the Upper Alluvium is relatively even, generally lying at between 0 and 1m OD (Figures 9 & 13).

The Total Alluvium thickness (incorporating Sand, Lower Alluvium, Peat and Upper Alluvium) is displayed in Figures 10 (20 Horn Lane only) and 11 (wider area). The thickness of the Total Alluvium tends to reflect the model of the Gravel surface, with greater thicknesses recorded in areas of low Gravel topography and vice versa as might be expected.

4.5 Made Ground

Between 0.6 and 2.5m of Made Ground caps the Holocene alluvial sequence across the majority of the site (Figure 12). In certain cases, the Made Ground truncates the Upper Alluvium (e.g. Horn-WS02, Horn-BH01).

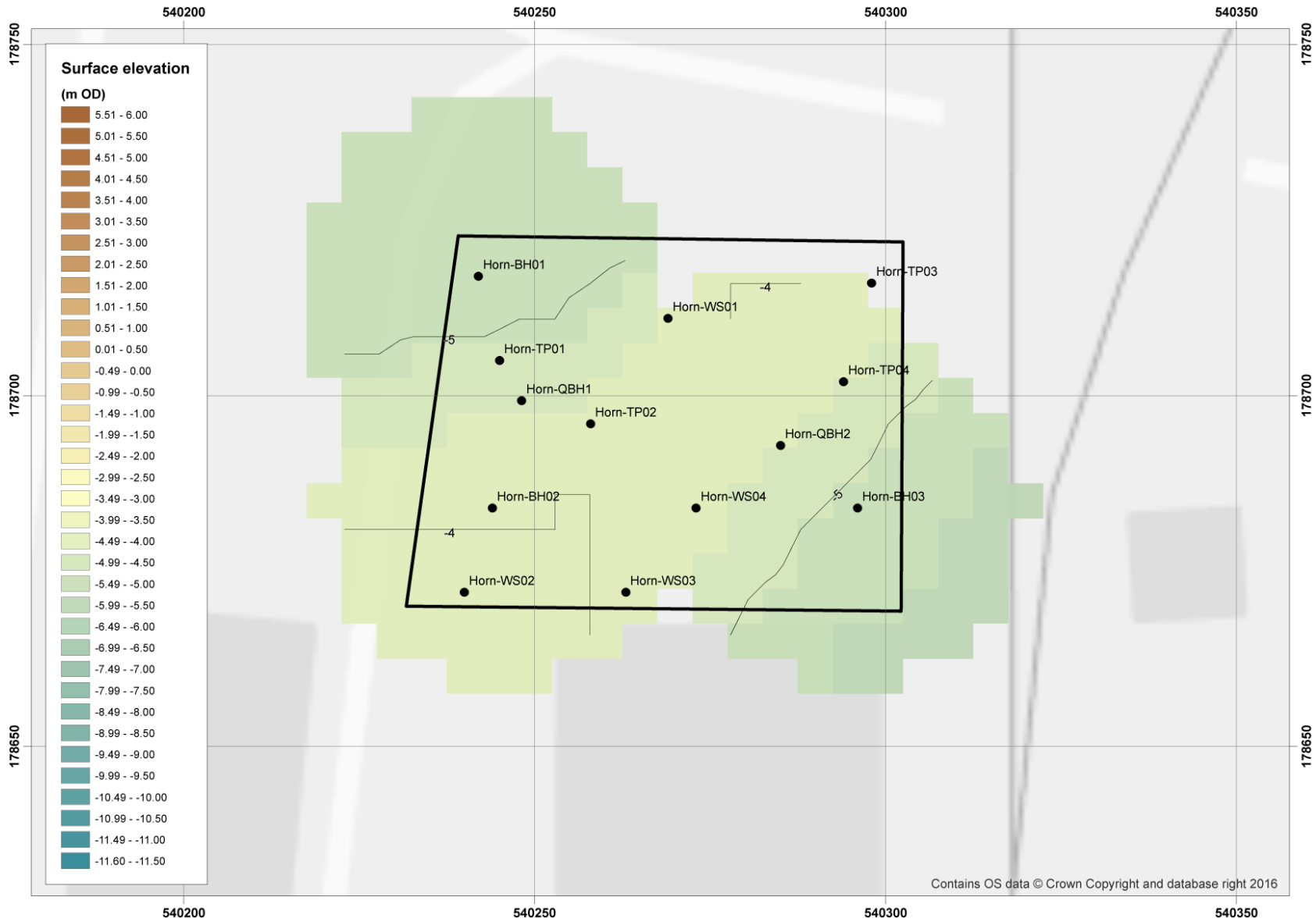


Figure 3: Top of the Gravel (m OD)

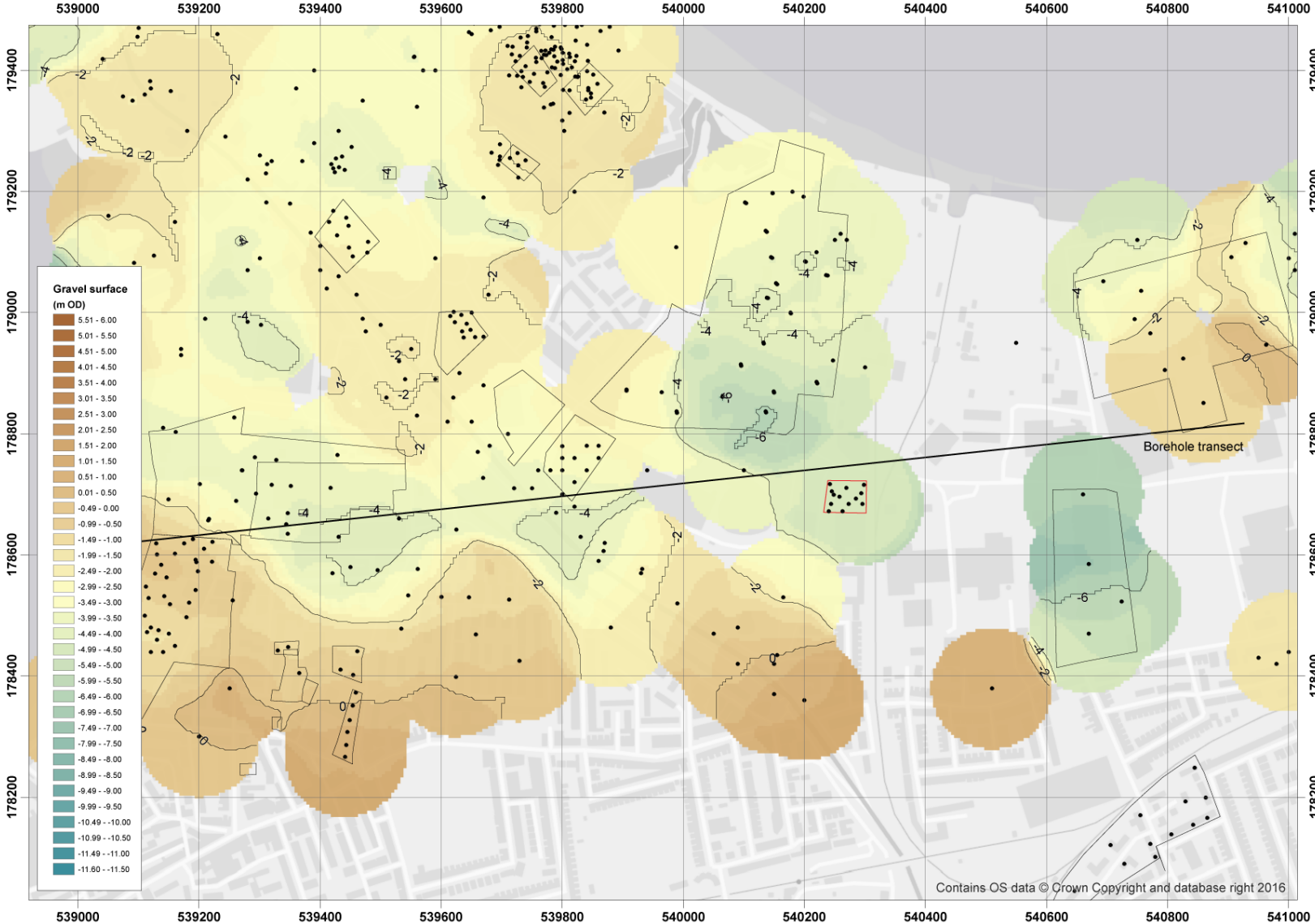


Figure 4: Top of the Gravel (m OD) across the wider area

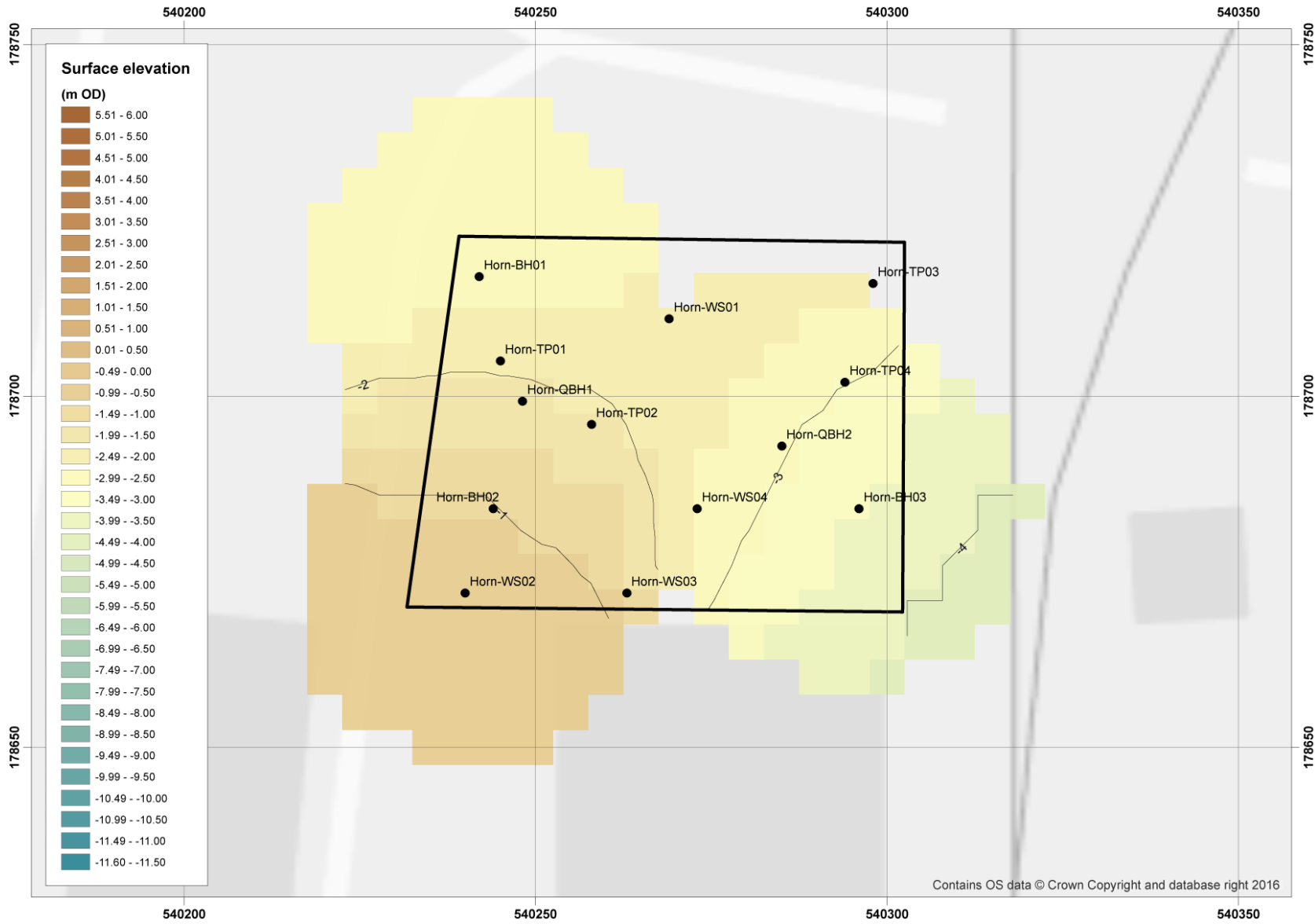


Figure 5: Top of the Lower Alluvium (m OD)

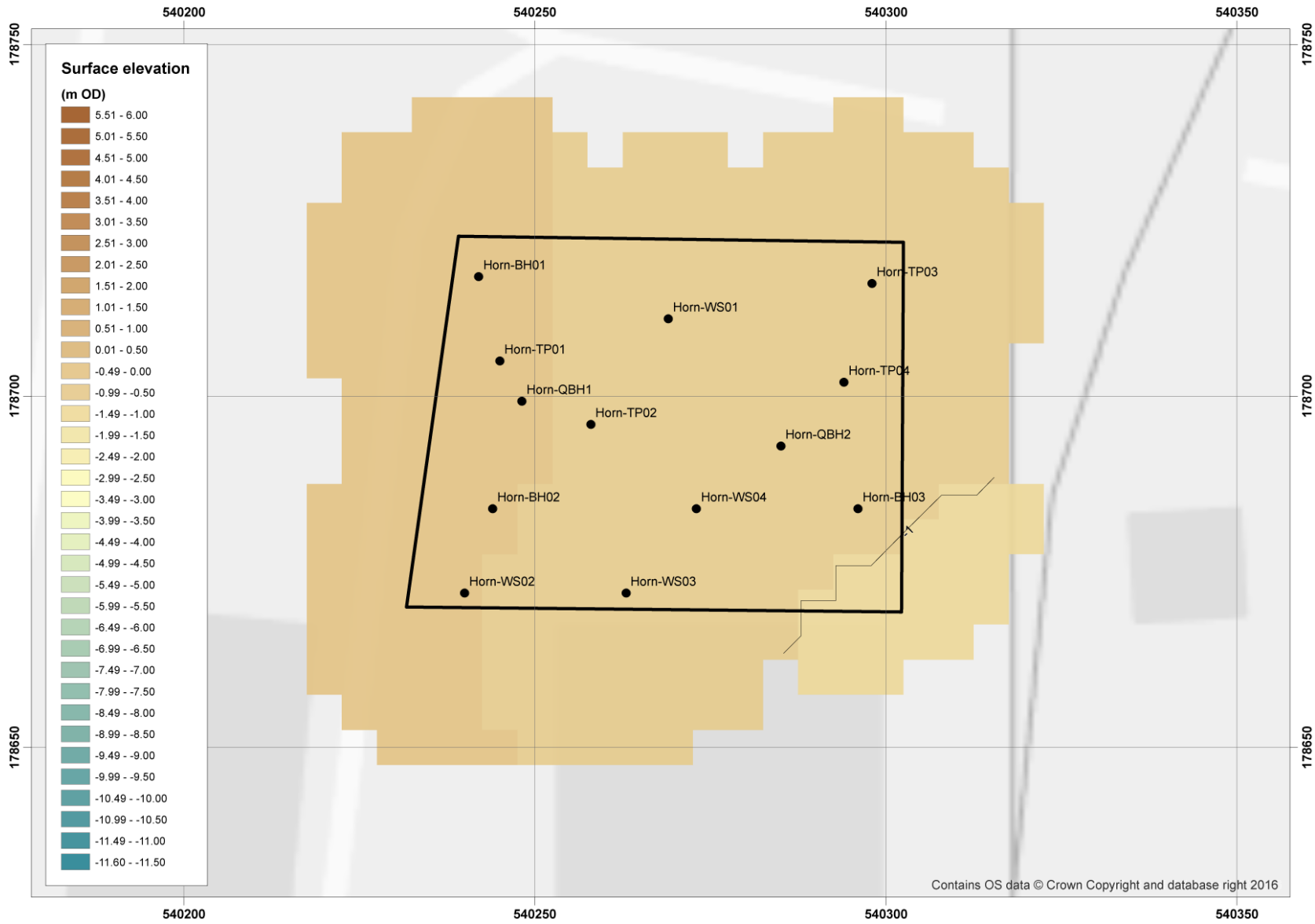


Figure 6 Top of the Peat (m OD)

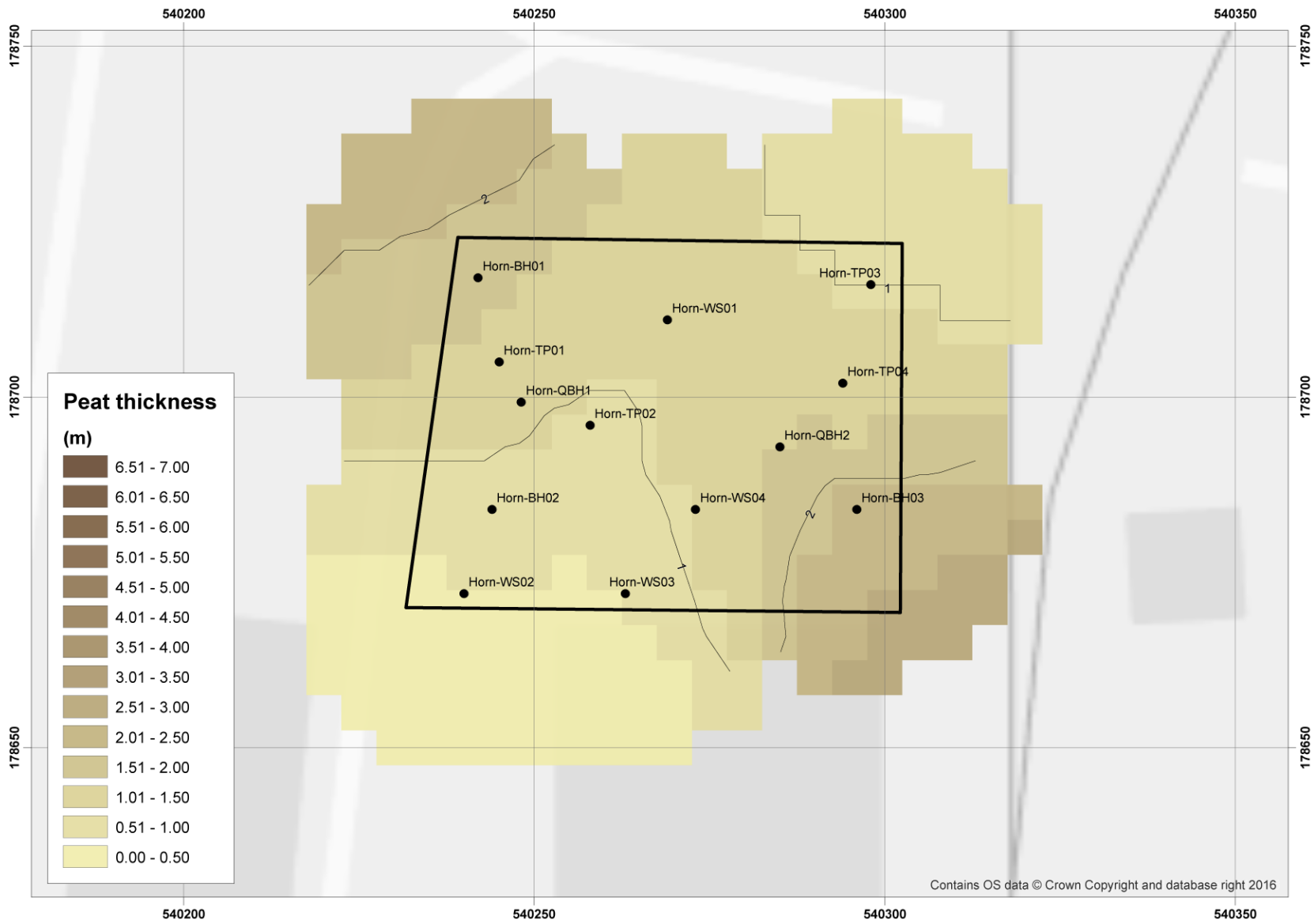


Figure 7: Thickness of the Peat (m)



Figure 8: Thickness of the Peat (m) across the wider area

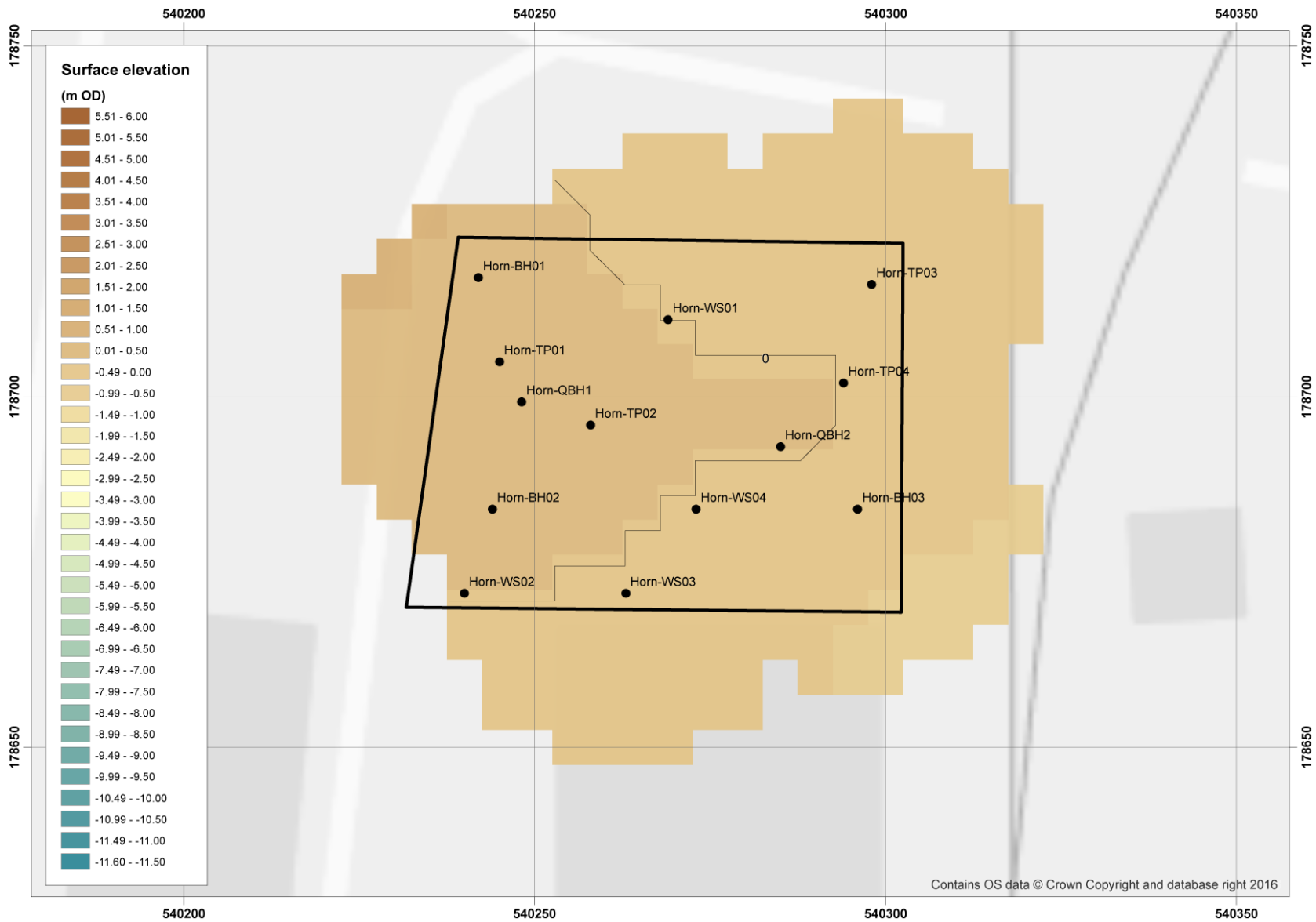


Figure 9: Top of the Upper Alluvium (m)

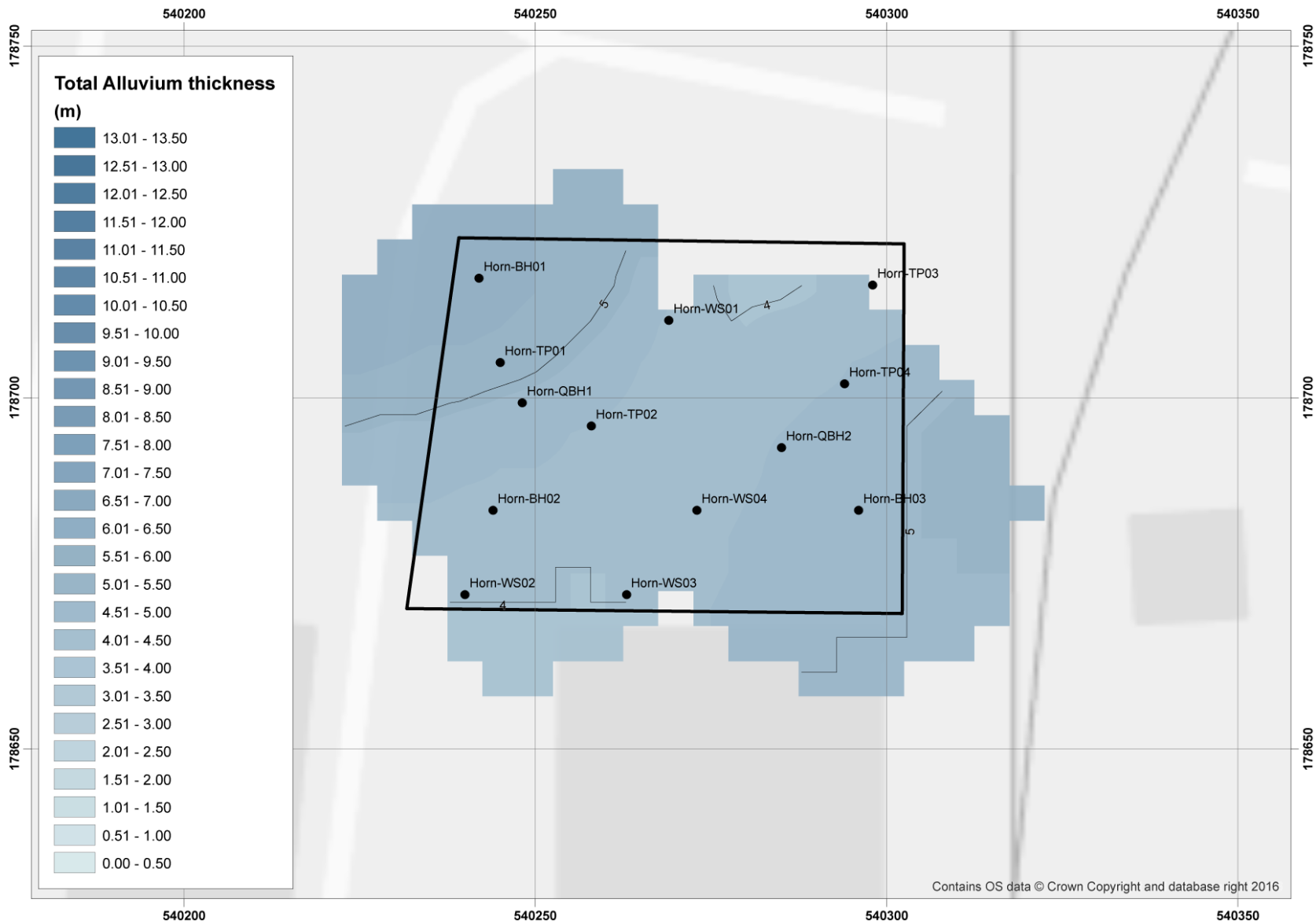


Figure 10: Thickness of the Total Alluvium (Lower Alluvium, Peat and Upper Alluvium) (m)

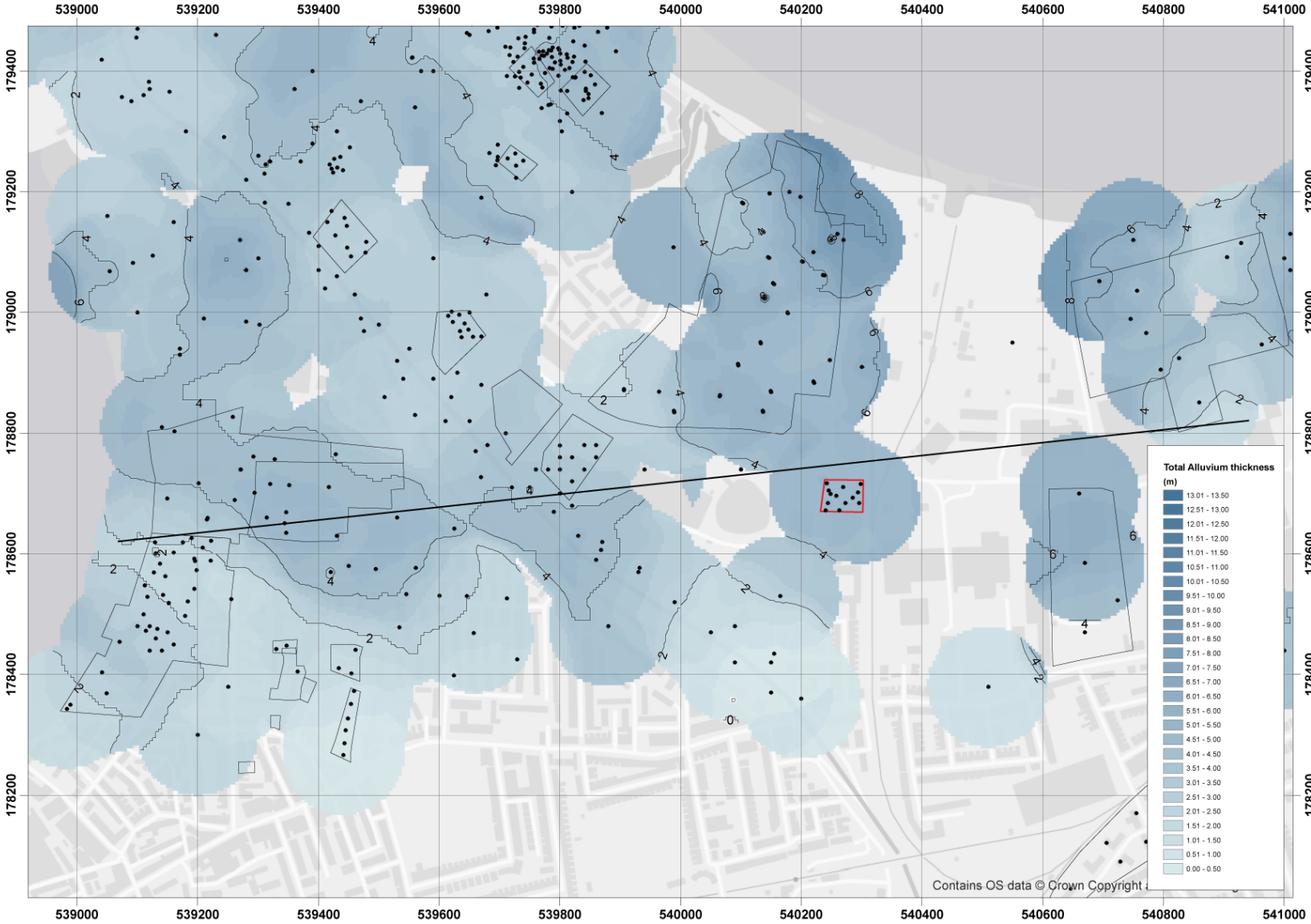


Figure 11: Thickness of the Total Alluvium (Lower Alluvium, Peat and Upper Alluvium) (m) across the wider area

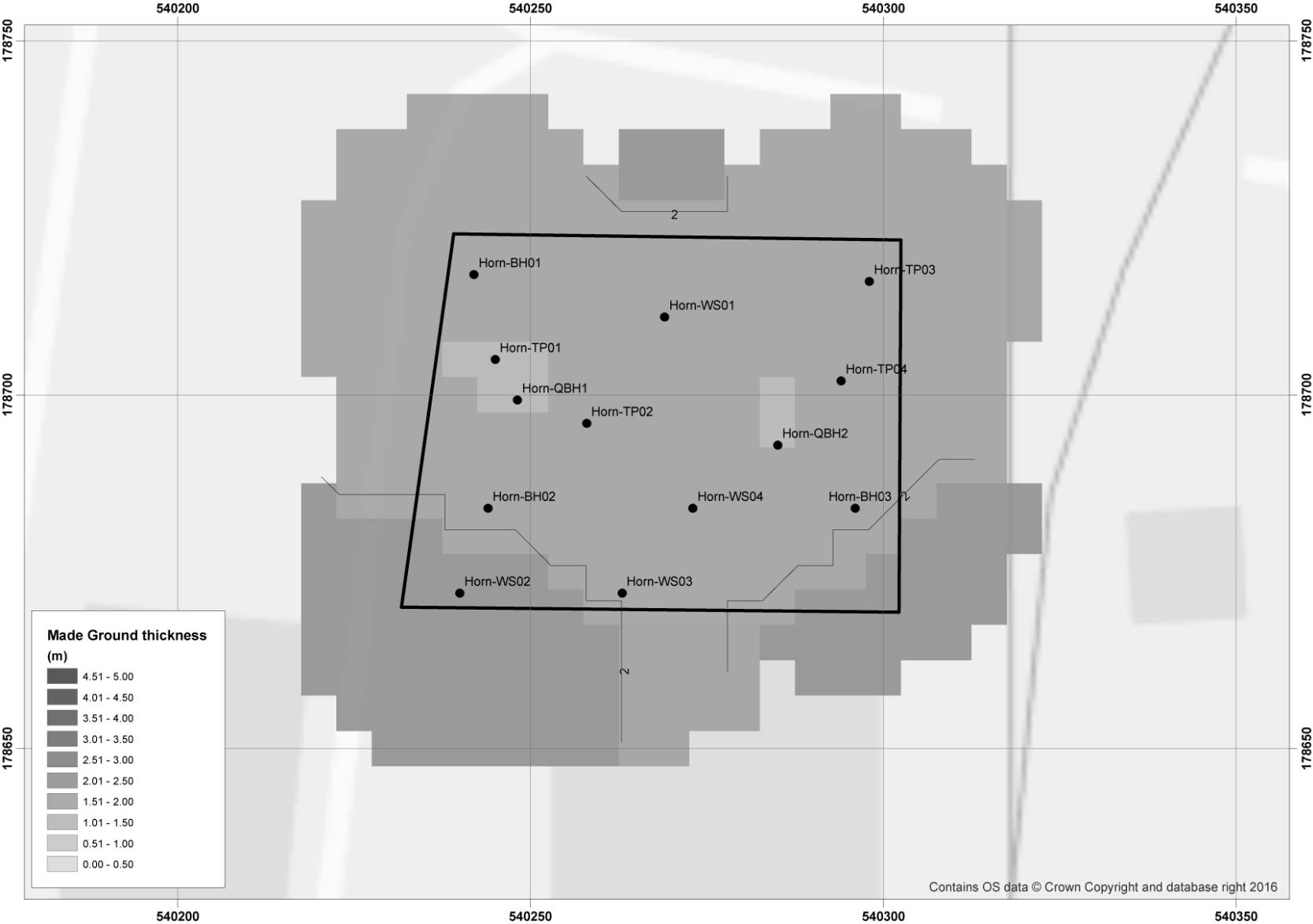


Figure 12: Thickness of Made Ground (m)

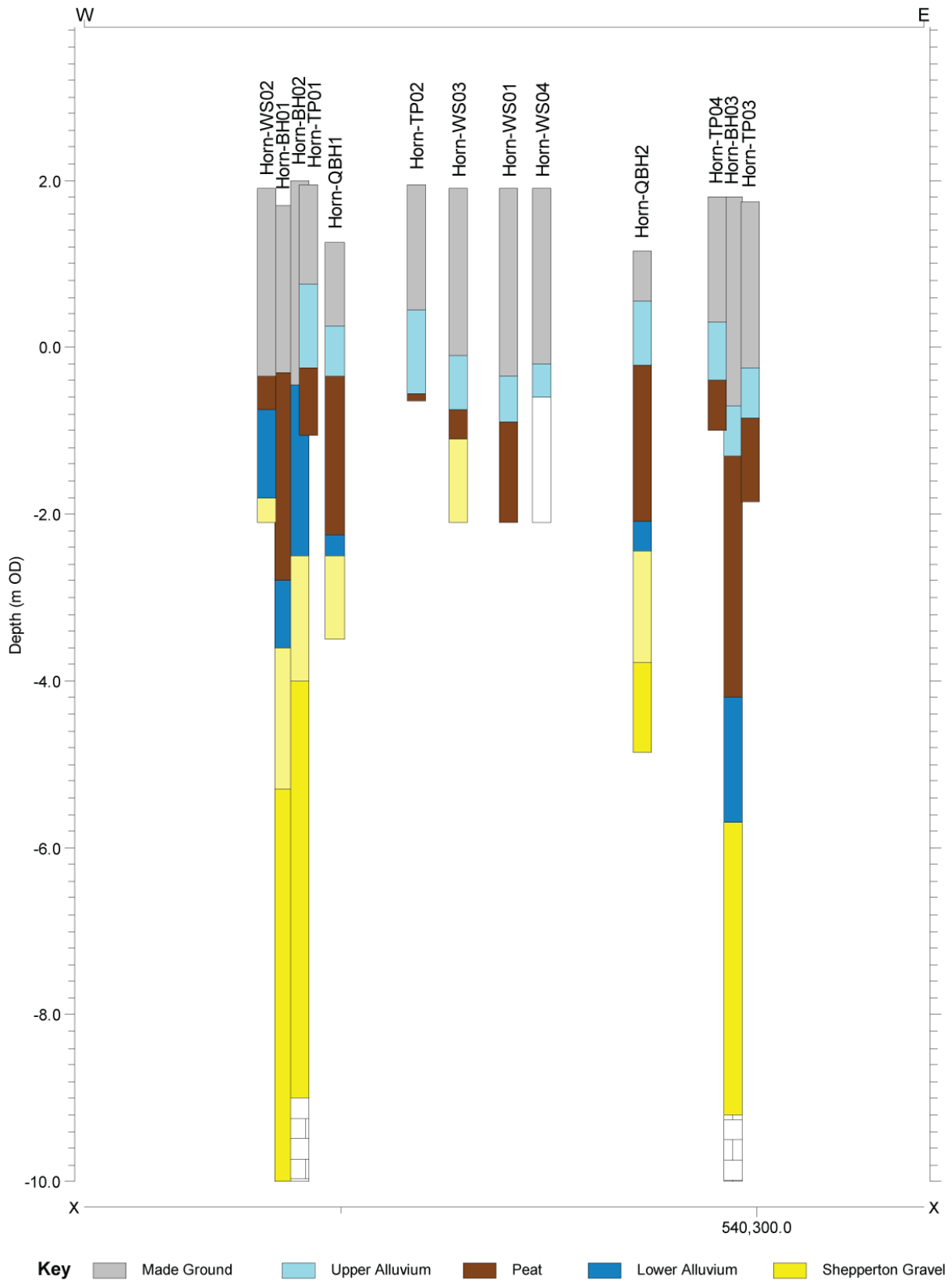


Figure 13: West-east transect of boreholes across the 20 Horn Lane site

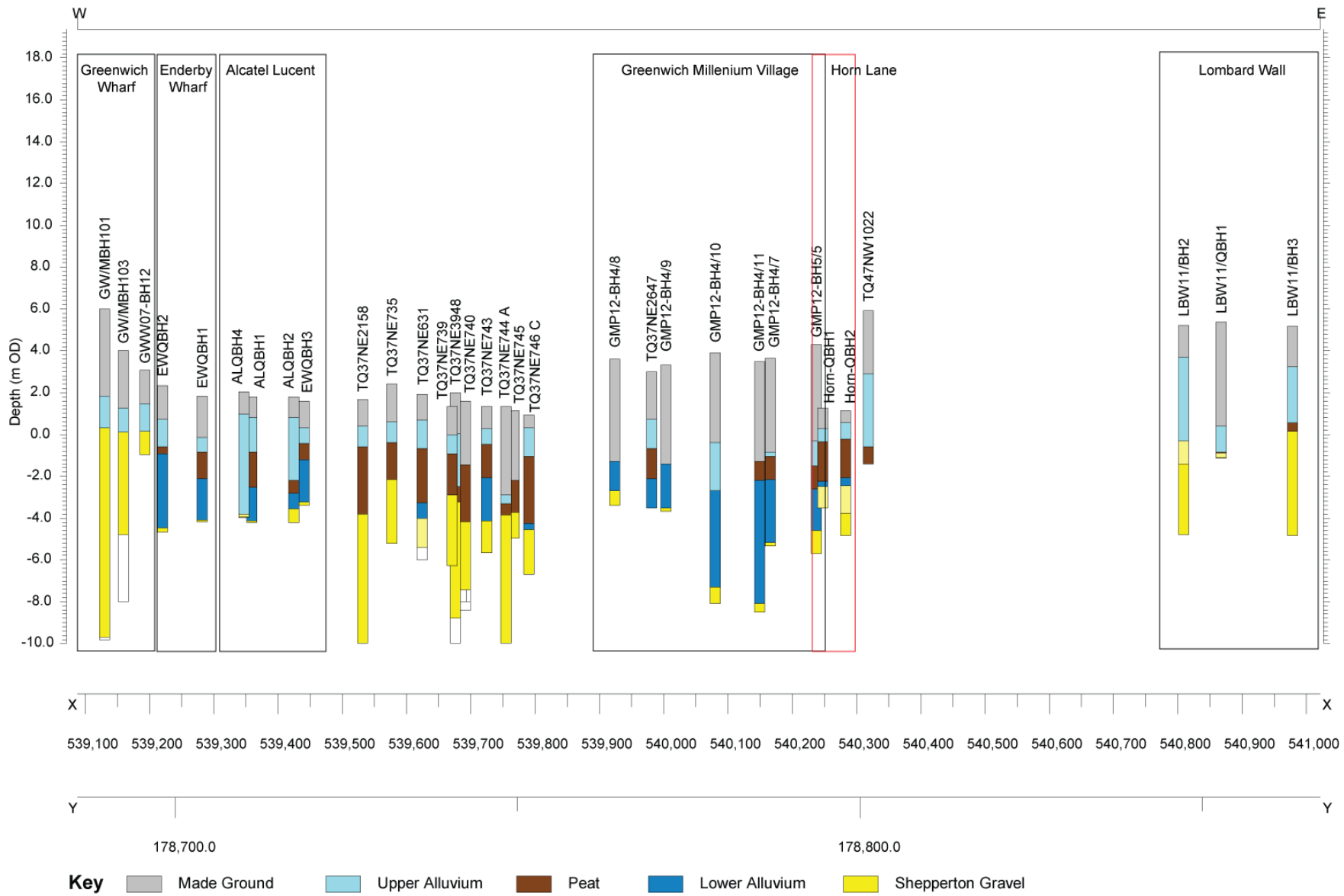


Figure 14: West-east transect of boreholes across the wider area

Table 1: Lithostratigraphic description of borehole HORN-QBH1, The Reach, Thames Reach, London Borough of Greenwich

Depth (m OD)	Depth (m bgl)	Description	Stratigraphic group
1.25 to 0.25	0 to 1.00	Made Ground	MADE GROUND
0.25 to -0.35	1.00 to 1.60	10YR 5/1; As3, Ag1; Grey silty clay; sharp contact into:	UPPER ALLUVIUM
-0.35 to -2.25	1.60 to 3.50	10YR 3/3; Sh3, TI21, Th+; Humo 2-3; Very dark brown moderately humified unidentifiable and wood peat; diffuse contact into:	PEAT
-2.25 to -2.50	3.50 to 3.75	Gley 1 6/10GY; Ga2 Ag2 DI+: greenish grey sandy silty matter with traces of detrital wood. Diffuse contact into:	LOWER ALLUVIUM
-2.50 to -3.50	3.75 to 4.75	Gley 1 6/10GY + 10YR 6/6; Ga4 Gg+: greenish grey brownish yellow sand with trace of gravel.	SAND

Table 2: Lithostratigraphic description of borehole HORN-QBH2, The Reach, Thames Reach, London Borough of Greenwich

Depth (m OD)	Depth (m bgl)	Description	Stratigraphic group
1.15 to 0.55	0 to 1.60	Made Ground	MADE GROUND
0.55 to 0.15	1.60 to 1.00	Gley 2 6/10B; As3 Ag1: clayey silt with some calcareous nodules; unknown contact into:	UPPER ALLUVIUM
0.15 to -0.22	1.00 to 1.37	10YR 5/2; As3 Sh1 TI+ becoming Sh2 TI ² 1 As1 Humo 2-3: greyish brown clay with humified matter and trace of wood becoming dark humified wood peat with clayey matter. Diffuse contact into:	PEAT
-0.22 to -1.78	1.37 to 2.93	10YR 3/3; Sh3 TI ² 1 Humo 3: dark brown well humified unidentifiable and wood peat; diffuse contact into:	PEAT
-1.78 to -1.85	2.93 to 3.00	10YR 4/3; Sh1 As1 Ag1 Ga1 TI+: brown sandy silty clay with humified matter; diffuse contact into:	PEAT
-1.85 to -2.09	3.00 to 3.24	10YR 2/1; Sh3 As1: black sandy humified matter, soft At 3.05 and 3.10m bgl - 10YR 5/1 Ag2 Ga2 DI+: grey sandy silt matter with traces of detrital wood; very sharp contact into:	PEAT
-2.09 to -2.44	3.24 to 3.59	Gley 1 6/10GY; Ga2 Ag2 DI+: greenish grey sandy silty matter with traces of detrital wood. Diffuse contact into:	LOWER ALLUVIUM
-2.44 to -2.85	3.59 to 4.93	Gley 1 6/10GY + 10YR 6/6; Ga4 Gg+: greenish grey brownish yellow sand with trace of gravel, occasional tufa, laminations redeposited at 4.55 and 4.79m bgl.	SAND
>-3.78	4.93 to 5.00	10YR 6/6 Gg3 Ga1: brownish yellow slightly sandy gravel.	SHEPPERTON GRAVEL

5. CONCLUSIONS & RECOMMENDATIONS

Geoarchaeological fieldwork and deposit modelling was instigated at the 20 Horn Lane site in order to: (1) map the height and thickness of the deposits; (2) assess their geoarchaeological, archaeological and palaeoenvironmental significance and potential, and (3) prepare recommendations for geoarchaeological assessment. In order to address these aims, two geoarchaeological boreholes were retained from the site. These were described under laboratory-based conditions and integrated with stratigraphic data from existing records to produce a deposit model of the major depositional units across the site.

The results of the deposit modelling indicate that the sediments present beneath the 20 Horn Lane site are similar to those recorded elsewhere in the Lower Thames Valley. A sequence of Shepperton Gravel is overlain by a sequence of Holocene alluvial sediments, buried beneath modern Made Ground. However, the site is projected as lying towards the eastern end of a significant, deep palaeochannel that traverses this area of the Greenwich Peninsula from west to east. The mapped topographic surface and thickness of the deposits are consistent with those recorded at other sites lying within the same deep palaeochannel at its western end.

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Significant archaeological remains have been found within the floodplain deposits nearby to the site. These include the Bronze Age trackways at Bellot Street (Branch *et al.*, 2005; McLean, 1993; Philp, 1993). However, these remains have been recorded in association with an underlying (Kempton Park) gravel surface of <-2m OD. The potential for archaeological remains beneath the

20 Horn Lane site is therefore considered low on the basis of an underlying Shepperton Gravel surface of at least -3.8m OD (5m bgl).

However as outlined in section 2.2; even in the absence of the archaeological remains, the sediments have the potential to contain a wealth of further information on the past landscape, through the assessment/analysis of palaeoecological remains (e.g. pollen, plant macrofossils and insects) and radiocarbon dating. So called environmental archaeological or palaeoenvironmental investigations can identify the nature and timing of changes in the landscape, and the interaction of different processes (e.g. vegetation change, human activity, climate change, hydrological change) thereby increasing our knowledge and understanding of the site and nearby area. In the case of human activity, palaeoenvironmental evidence can include: (1) decreases in tree and shrub pollen suggestive of woodland clearance; (2) the presence of herbs indicative of disturbed ground, pastoral and/or arable agriculture; (3) charcoal/microcharcoal suggestive of anthropogenic or natural burning, and (4) insect taxa indicative of domesticated animals. Such investigations are routinely carried out where required as part of planning conditions across the Lower Thames Valley and its tributaries, instructed by the LPA Archaeological Advisor.

It is therefore recommended that radiocarbon dating and an assessment of the palaeoecological remains is carried out to establish whether their concentration, preservation & diversity, is sufficient to achieve the overall aims of the project (see section 2.3).

The results of the deposit modelling indicate that the sediments present beneath the 20 Horn Lane site are similar to those recorded elsewhere in the Lower Thames Valley. A sequence of Shepperton Gravel is overlain by a sequence of Holocene alluvial sediments, buried beneath modern Made Ground. However, the site is projected as lying towards the eastern end of a significant, deep palaeochannel that traverses this area of the Greenwich Peninsula from west to east. The mapped topographic surface and thickness of the deposits are consistent with those recorded at other sites lying within the same deep palaeochannel at its western end.

The potential for archaeological remains beneath the site is considered low on the basis of an underlying Shepperton Gravel surface of at least -3.8m OD (5m bgl). However, even in the absence of the archaeological remains, the sediments have the potential to contain a wealth of further information on the past landscape, through the assessment/analysis of palaeoecological remains. Indeed, on the 20 Horn Lane site, the Shepperton Gravel is overlain by up to 5m of alluvial deposits, 2m of which comprise Peat and/or organic-rich sediment, which elsewhere have been dated to the Neolithic and Bronze Age periods. It is therefore recommended that radiocarbon dating and an assessment of the palaeoecological remains is carried out on one sequence to establish whether the concentration, preservation & diversity, is sufficient to achieve the overall aims of the project, and as a comparison to the results ascertained from other sequences at the western end of the palaeochannel.

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7. APPENDIX 1: OASIS

OASIS ID: quaterna1-282026

Project details

Project name	20 Horn Lane, Royal Borough of Greenwich
Short description of the project	Geoarchaeological fieldwork and deposit modelling was instigated at the 20 Horn Lane site in order to: (1) map the height and thickness of the deposits; (2) assess their geoarchaeological, archaeological and palaeoenvironmental significance and potential, and (3) prepare recommendations for geoarchaeological assessment. In order to address these aims, two geoarchaeological boreholes were retained from the site. These were described under laboratory-based conditions and integrated with stratigraphic data from existing records to produce a deposit model of the major depositional units across the site. The results of the deposit modelling indicate that the sediments present beneath the site are similar to those recorded elsewhere in the Lower Thames Valley. A sequence of Shepperton Gravel is overlain by a sequence of Holocene alluvial sediments, buried beneath modern Made Ground. The site is projected as lying towards the eastern end of a significant, deep palaeochannel that traverses this area of the Greenwich Peninsula from west to east. The mapped topographic surface and thickness of the deposits are consistent with those recorded at other sites lying within the same deep palaeochannel at its western end. The potential for archaeological remains beneath the site is considered low. However, even in the absence of the archaeological remains, the sediments have the potential to contain a wealth of further information on the past landscape, through the assessment/analysis of palaeoecological remains. Indeed, on the 20 Horn Lane site, the Shepperton Gravel is overlain by up to 5m of alluvial deposits, 2m of which comprise Peat and/or organic-rich sediment, which elsewhere have been dated to the Neolithic and Bronze Age periods. Further work was therefore recommended
Project dates	Start: 15-02-2017 End: 09-04-2017
Previous/future work	No / Yes
Any project codes associated with reference codes	HNA17 - Sitecode
Type of project	Environmental assessment
Monument type	PALAEOCHANNEL Uncertain
Monument type	PEAT Uncertain
Significant Finds	PEAT Uncertain
Survey techniques	Landscape

Project location

Country	England
Site location	GREATER LONDON GREENWICH GREENWICH 20 Horn Lane, Royal Borough of Greenwich
Study area	5500 Square metres
Site coordinates	TQ 541252 180085 50.940316499067 0.193976200357 50 56 25 N 000 11 38 E Point

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project originator	brief Consultant

Project design D.S. Young
originator
Project director/manager C.R. Batchelor
Project supervisor C.R. Batchelor
Type of Developer
sponsor/funding
body

Project archives

Physical Archive No
Exists?
Physical Archive LAARC
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recipient
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available

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