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20 HORN LANE, ROYAL BOROUGH OF GREENWICH

Environmental Archaeological Assessment Report

NGR: TQ 41252 80085

Site Code: HNA17

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CONTENTS

1. NON-TECHNICAL SUMMARY

A programme of environmental archaeological assessment was undertaken of a borehole from the 20 Horn Lane site, following the recommendations of previous geoarchaeological fieldwork and deposit modelling. This work was undertaken in order (1) to establish the age of the peat recorded at the site; (2) to assess the palaeoenvironmental potential of the sequence; (3) to highlight any indications of nearby human activity, and (4) to provide recommendations for further analysis.

The results of the environmental archaeological assessment have revealed a similar sedimentary sequence to that at other sites on Greenwich Peninsula, and more specifically those overlying comparatively low (<-3m OD) Shepperton Gravel topography. The site is located within a large, broadly east-west aligned depression in the Gravel surface, thought to represent a palaeochannel that would have been a significant component of the prehistoric landscape. The alluvial sequence infilling this channel includes a peat horizon of early/middle Neolithic to middle Bronze Age date; these dates for the peat are consistent with those recorded elsewhere on Greenwich Peninsula, including at sites located within this channel *ca.* 1km to the west. The results of the assessment of indicate that the preservation and concentration of biological remains (diatoms, waterlogged plant remains and pollen) is limited, unlike at other sites located within this channel. Although the site has made a significant contribution to our understanding of the sub-surface topography in this area, no evidence for significant changes in vegetation composition or human activity can be defined. On this basis, no further environmental archaeological analysis of the sequence is recommended.

2. INTRODUCTION

2.1 Site context

This report summarises the findings arising out of the environmental archaeological assessment undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at 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 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.

Subsequent geoarchaeological fieldwork and deposit modelling was undertaken at the site (Batchelor & Young, 2017b) 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 environmental archaeological assessment. The results of the deposit modelling indicated that the sediments present beneath the 20 Horn Lane site are similar to those recorded elsewhere in the Lower Thames Valley; as identified in the geotechnical records, a sequence of Shepperton Gravel is overlain by a sequence of Holocene alluvial sediments, buried beneath modern Made Ground. However, the results of the deposit modelling across the wider area indicate that the 20 Horn Lane site is located within a significant depression in the Gravel surface (<-4m OD) that traverses Greenwich Peninsula from west to east. Enderby Wharf

(Batchelor *et al.*, 2015) and Alcatel Lucent (Batchelor *et al.*, 2017) 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 (Batchelor *et al.*, 2017) 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 (Mclean, 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

Previous geoarchaeological investigations at the site (Batchelor & Young, 2017b) indicate the sediments have the potential to contain a wealth of further information on the past landscape, through the assessment/analysis of palaeoecological remains. It was therefore recommended that radiocarbon dating and an assessment of the palaeoecological remains was carried out on one sequence (QBH2) to establish whether the concentration, preservation and diversity of remains 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 within which the site lies. The aims of the assessment were therefore (1) to establish the age of the peat recorded at the site; (2) to assess the palaeoenvironmental potential of the sequence; (3) to highlight any indications of nearby human activity, and (4) to provide recommendations for further analysis (if necessary).

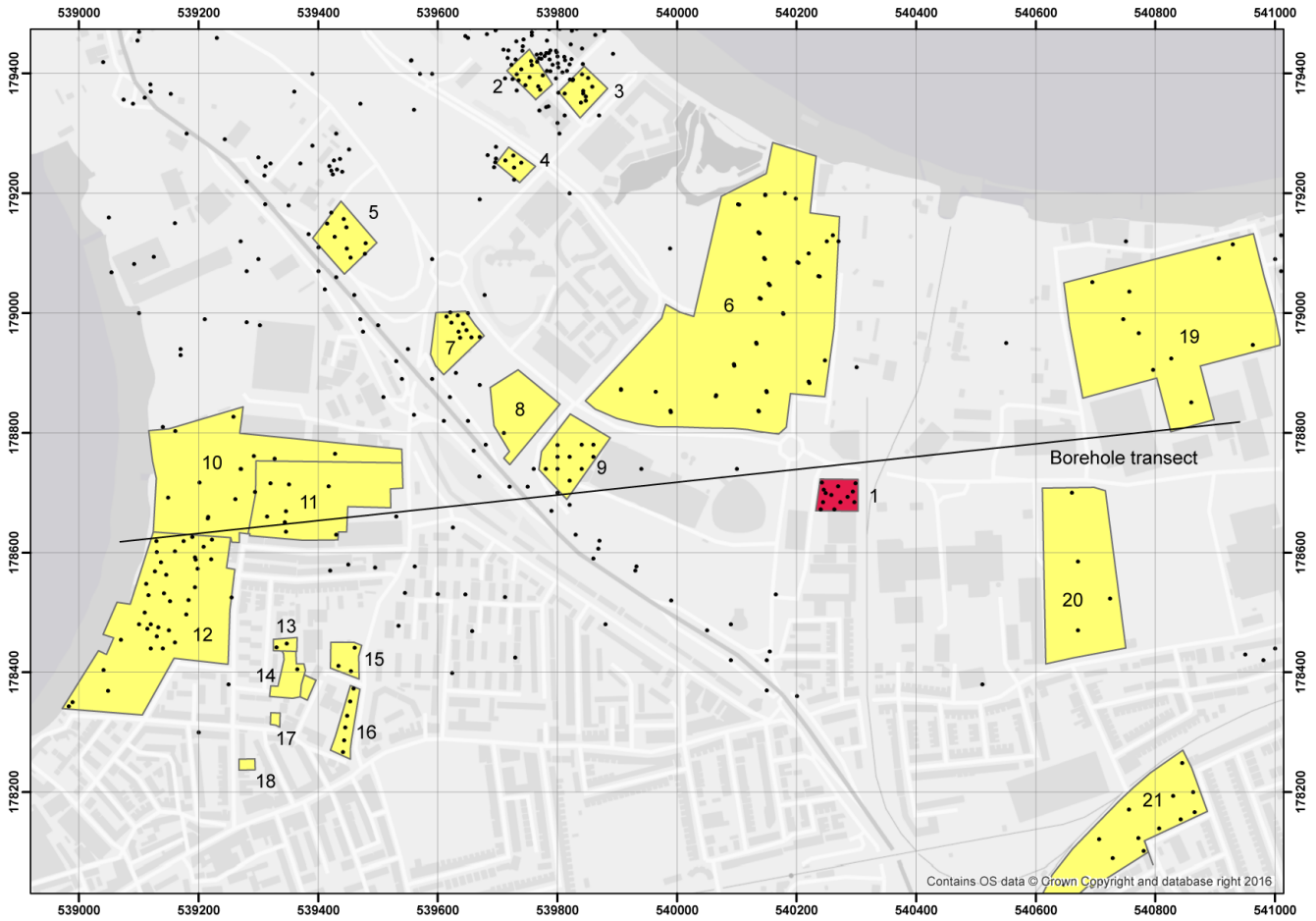

Figure 1: Location of (1) 20 Horn Lane, Royal Borough of Greenwich and selected other geoarchaeological and archaeological sites nearby: (2) Plot MO115 (Young & Batchelor, 2013b); (3) Plot MO117 (JHW13; Young & Batchelor, 2013a); (4) Plot 19.05 (Batchelor & Young 2017); (5) Plot MO401 (Batchelor, 2014); (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 (Batchelor *et al*., 2017); (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].*

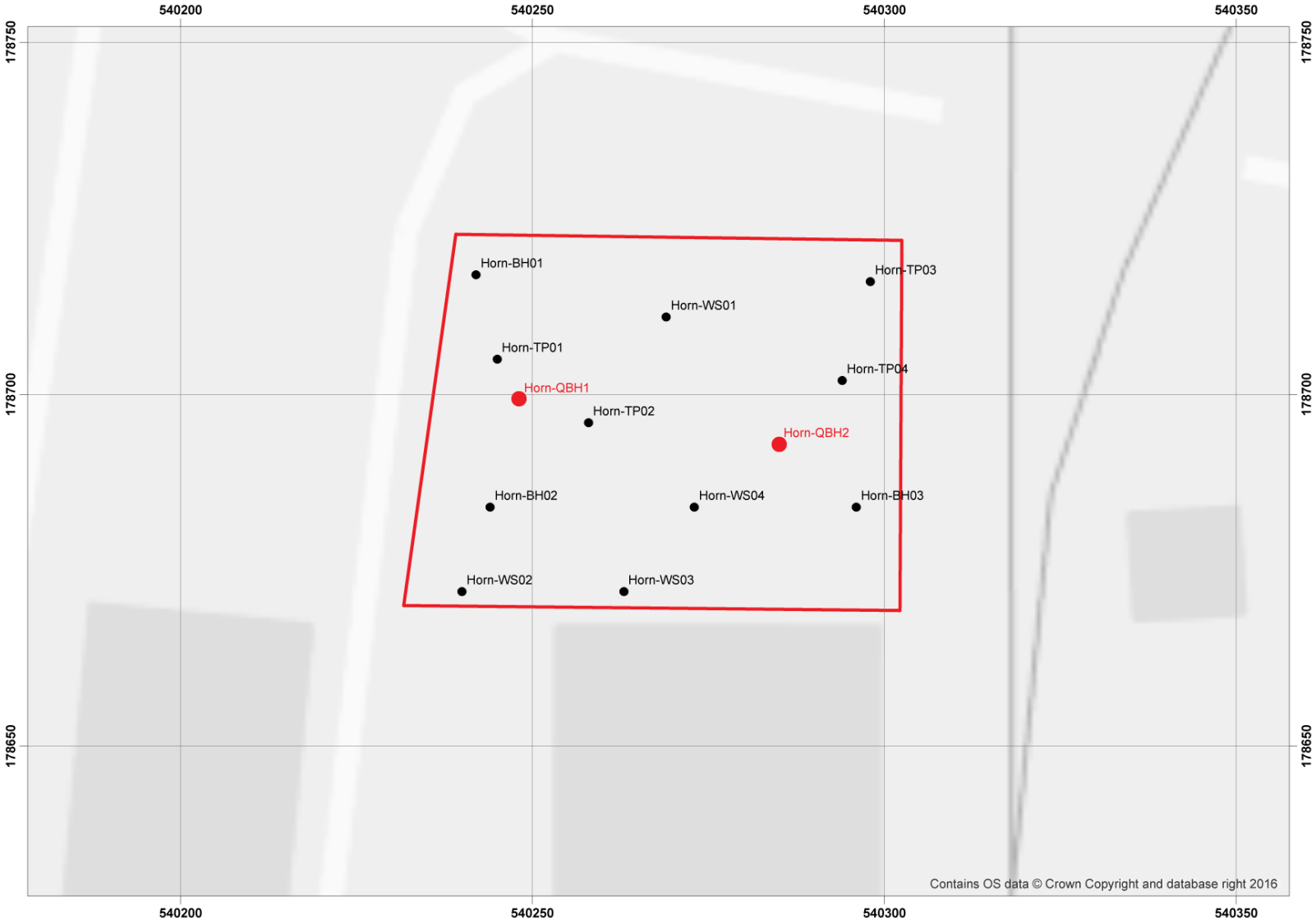

Figure 2: Location of previous geotechnical boreholes/test pits and the proposed new geoarchaeological boreholes (QBH1 and QBH2) at 20 Horn Lane, Royal Borough of Greenwich.

3. METHODS

3.1 Previous investigations (field investigations, lithostratigraphic descriptions & deposit modelling)

Two geoarchaeological boreholes (boreholes QBH1 and 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. 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 & 2 .

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.

3.2 Organic matter determinations

A total of 26 subsamples from borehole QBH2 were taken for determination of the organic matter content (Table 3; Figure 13). These records were important as they can identify increases in organic matter possibly associated with more terrestrial conditions. The organic matter content was determined by standard procedures involving: (1) drying the sub-sample at 110^0C for 12 hours to remove excess moisture; (2) placing the sub-sample in a muffle furnace at 550°C for 2 hours to remove organic matter (thermal oxidation), and (3) re-weighing the sub-sample obtain the 'loss-on-ignition' value. The samples were then re-weighed after 2 hours at 950°C for determination of the calcium carbonate content (see Bengtsson & Enell, 1986).

3.3 Radiocarbon dating

Two subsamples of unidentified twig wood (<2-3 years old) were extracted from the base and top of the peat in borehole QBH2 for radiocarbon dating. The samples were submitted for AMS radiocarbon dating to the BETA Analytic Radiocarbon Dating Facility, Miami, Florida. The results have been calibrated using OxCal v4.2 (Bronk Ramsey, 1995; 2001 and 2007) and the IntCal13 atmospheric curve (Reimer *et al.*, 2013). The results are displayed in Figure 13 and in Table 4.

3.4 Pollen assessment

Twelve subsamples from borehole QBH2 were extracted for an assessment of pollen content. The pollen was extracted as follows: (1) sampling a standard volume of sediment (1ml); (2) adding two tablets of the exotic clubmoss *Lycopodium clavatum* to provide a measure of pollen concentration in each sample; (3) deflocculation of the sample in 1% Sodium pyrophosphate; (4) sieving of the sample to remove coarse mineral and organic fractions (>125µ); (5) acetolysis; (6) removal of finer minerogenic fraction using Sodium polytungstate (specific gravity of 2.0g/cm^3); (7) mounting of the sample in glycerol jelly. Each stage of the procedure was preceded and followed by thorough sample cleaning in filtered distilled water. Quality control is maintained by periodic checking of residues, and assembling sample batches from various depths to test for systematic laboratory effects. Pollen grains and spores were identified using the University of Reading pollen type collection and the following sources of keys and photographs: Moore *et al* (1991); Reille (1992). The assessment procedure consisted of scanning the prepared slides, and recording the concentration and preservation of pollen grains and spores, and the principal taxa on four transects (10% of the slide) (Table 5).

3.5 Diatom assessment

Four samples from QBH2 were sampled for assessment of the diatom content. The samples were focussed on the interface between the Lower Alluvium/Peat and Peat/Upper Alluvium. 0.5g of sediment was required for the diatom sample preparation. Depending on the dominance of either minerogenics of organics within each sample, samples chosen for analysis were first treated with sodium hexametaphosphate and left overnight, to assist in minerogenic deflocculation. Samples were then treated with hydrogen peroxide (30% solution). Samples were finally sieved using a 10µm mesh to remove fine minerogenic sediments. The residue was transferred to a plastic vial, from which a slide was prepared for subsequent assessment. A minimum of four slide traverses were undertaken across each slide sample. The results of the diatom assessment are displayed in Table 6.

3.6 Macrofossil assessment

A total of eight small bulk samples from borehole QBH2 were extracted for the recovery of macrofossil remains including waterlogged plant macrofossils, wood, insects and Mollusca. The extraction process involved the following procedures: (1) removing a sample of either 5 or 10cm in thickness; (2) measuring the sample volume by water displacement, and (3) processing the sample by wet sieving using 300µm and 1mm mesh sizes. Each sample was scanned under a stereozoom microscope at x7-45 magnifications, and sorted into the different macrofossil classes. The concentration and preservation of remains was estimated for each class of macrofossil (Table 7). Preliminary identifications of the waterlogged seeds (Table 8) have been made using modern comparative material and reference atlases (e.g. Cappers *et al.,* 2006; NIAB, 2004). Nomenclature used follows Stace (2005).

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

The results of the lithostratigraphic descriptions and deposit modelling have been reported previously (Batchelor & Young, 2017b) and are displayed in Tables 1 & 2 and 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 a 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 at between -3.8 and -4.78m OD; this is considered the most reliable value for the surface level.

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 previous 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.

4.3 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 by 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.

4.4 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 results of the organic matter determinations (Table 3) indicate that this unit is generally composed of between 55 and 85% organic matter, indicative of frequent influxes of mineral sediment to the surface of the peat, probably during flood events. This is particularly true towards the base of the peat, where between *ca.* 5 and 40% organic matter is recorded. The surface of the peat is relatively even, generally lying at between *ca.* -0.2 and -1.2m OD, and varies between 0.4 and 2.9m in thickness. In new geoarchaeological boreholes QBH1 and 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 Alcatel-Lucent (Batchelor *et al.*, 2017) and Enderby Wharf (Batchelor & Young, 2015) for example. At the present site, the results of the radiocarbon dating of samples from QBH2 (see Table 4) indicate that accumulation began at around 3620 to 3370 cal BC (5570 to 5320 cal BP; early to middle Neolithic), continuing until at least 1610 to 1440 cal BC (3560 to 3390 cal BP; middle Bronze Age). At Alcatel-Lucent (Batchelor *et al.*, 2017) and Enderby Wharf (Batchelor & Young, 2015), the Peat was of a similar age, 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).

4.5 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.

4.6 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).

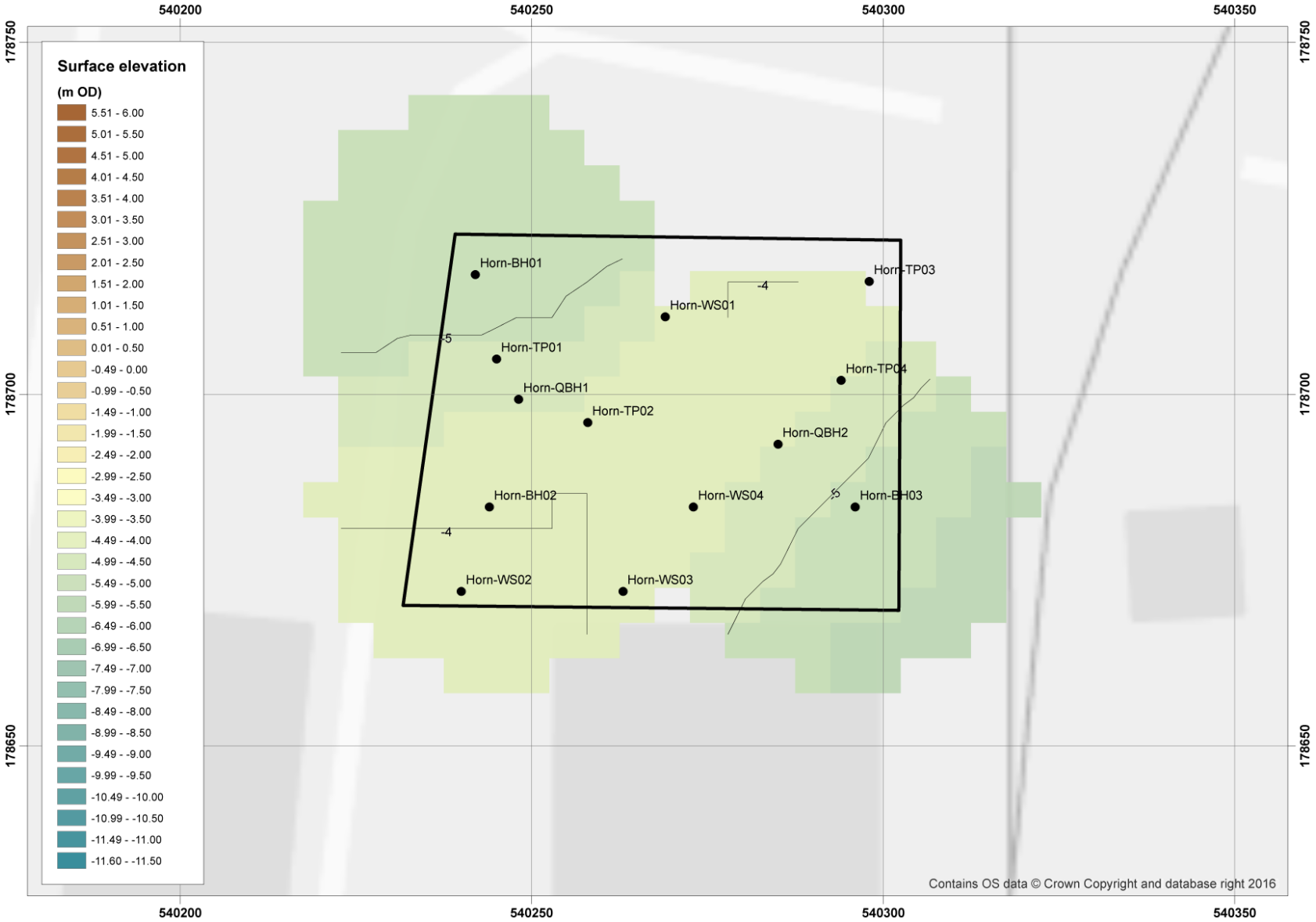

Figure 3: Top of the Gravel (m OD)

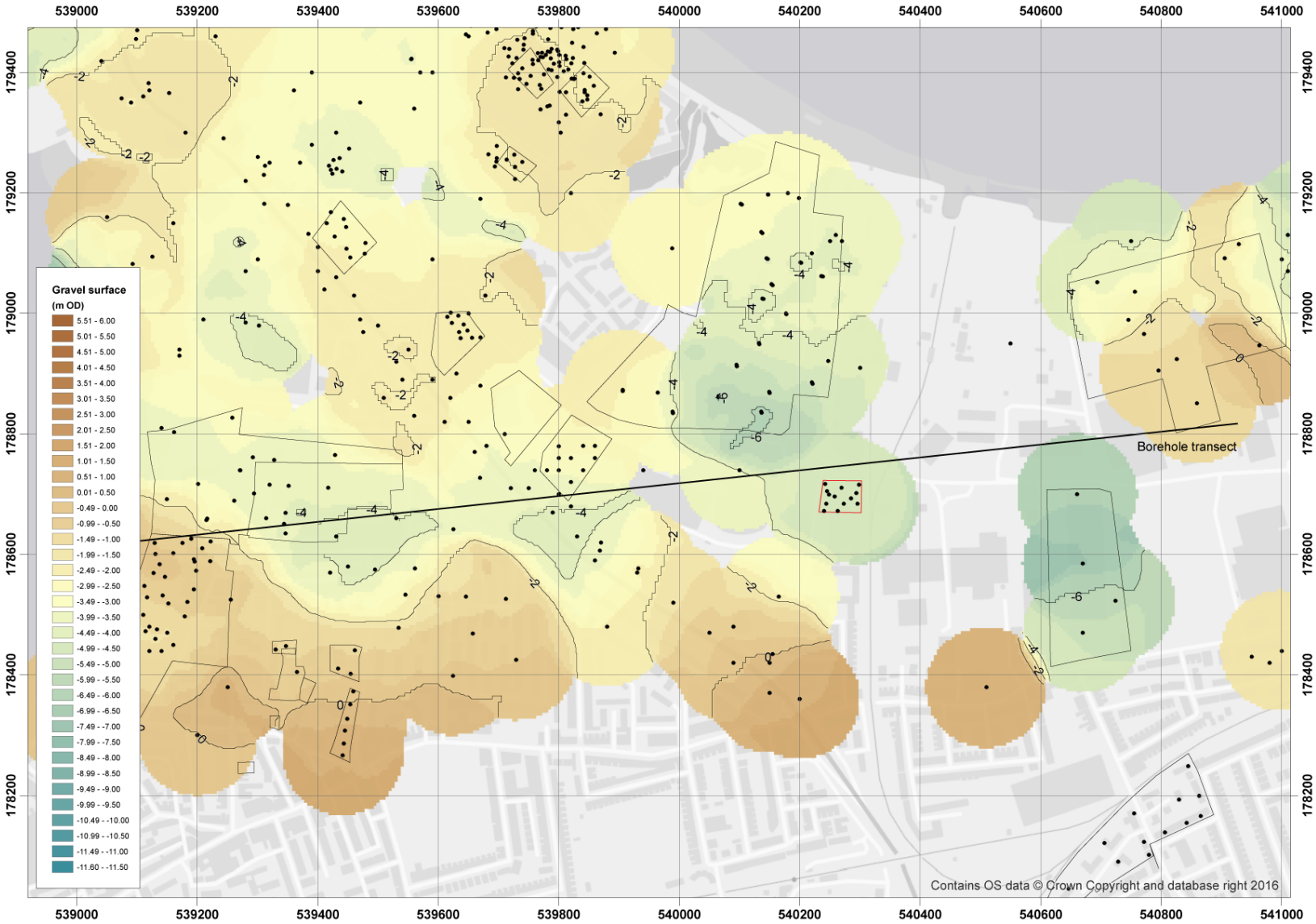

Figure 4: Top of the Gravel (m OD) across the wider area

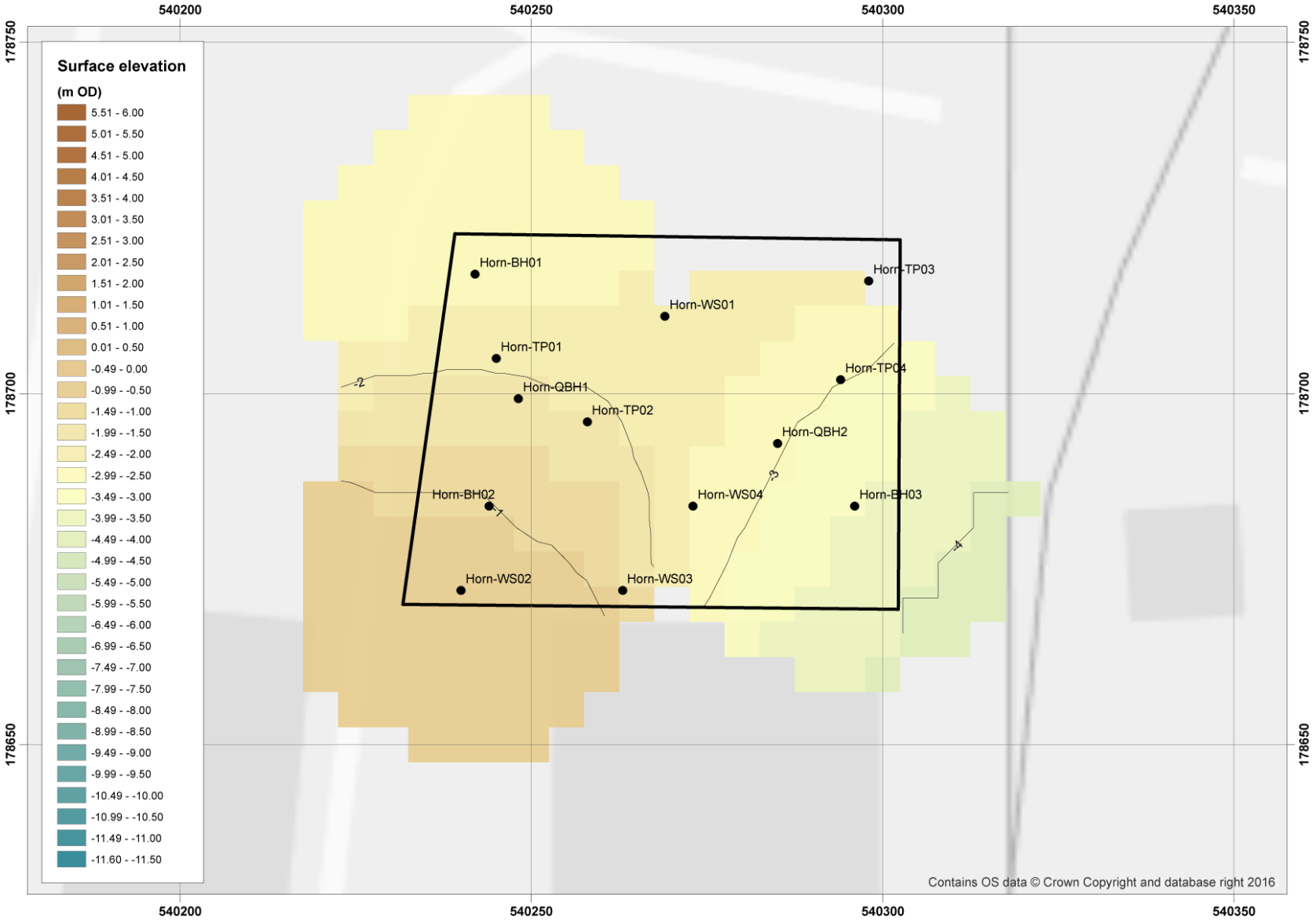

Figure 5: Top of the Lower Alluvium (m OD)

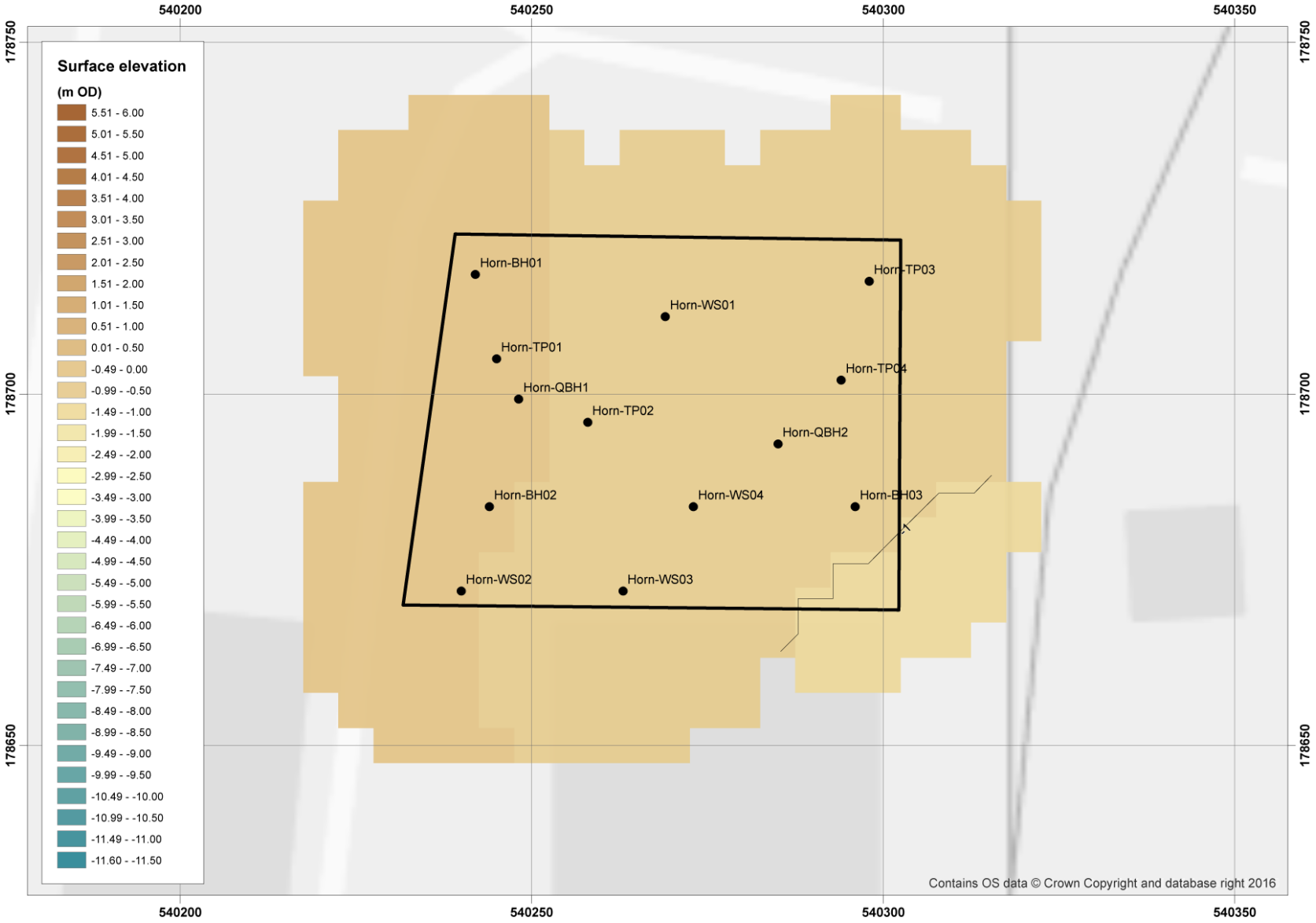

Figure 6 Top of the Peat (m OD)

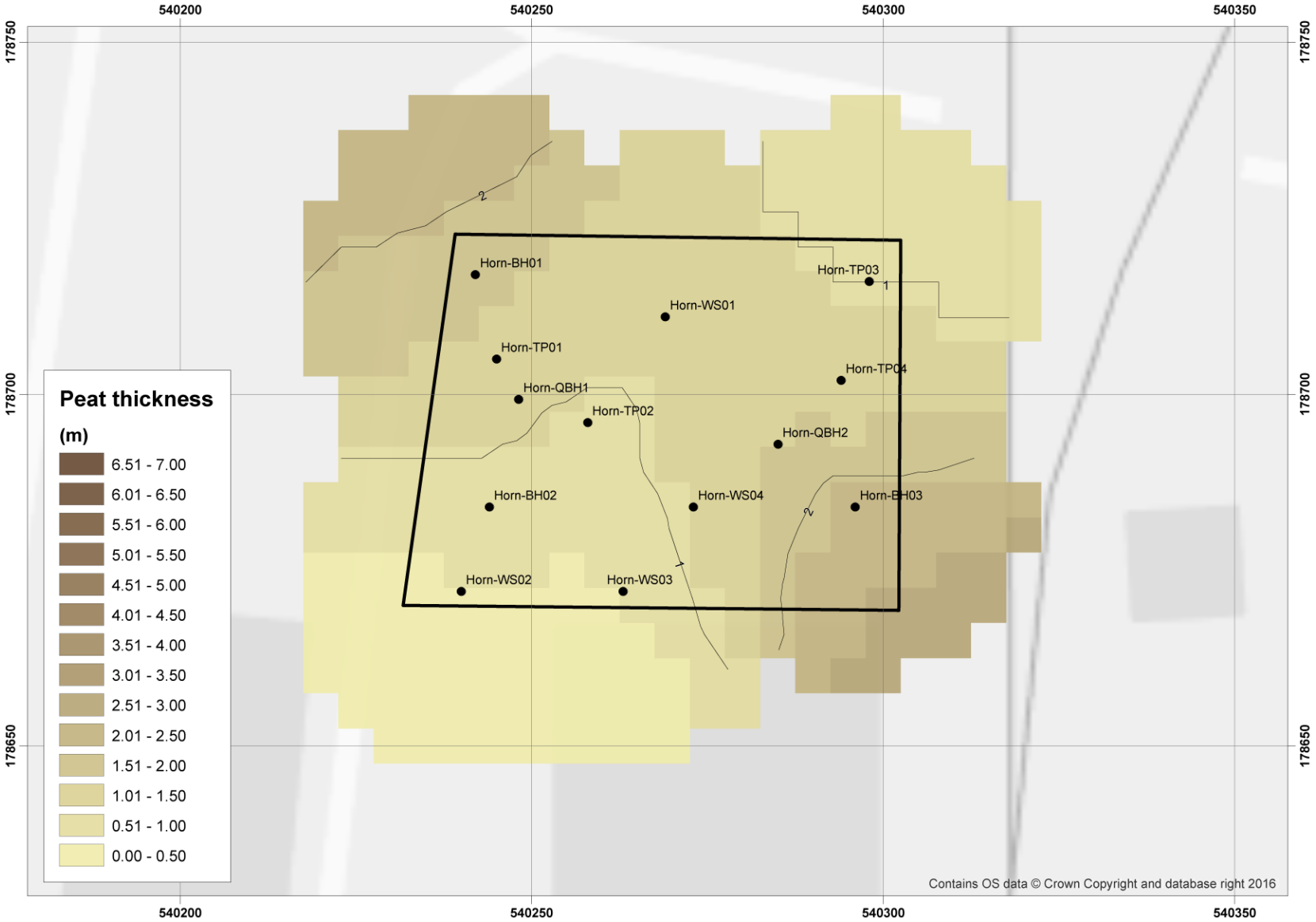

Figure 7: Thickness of the Peat (m)

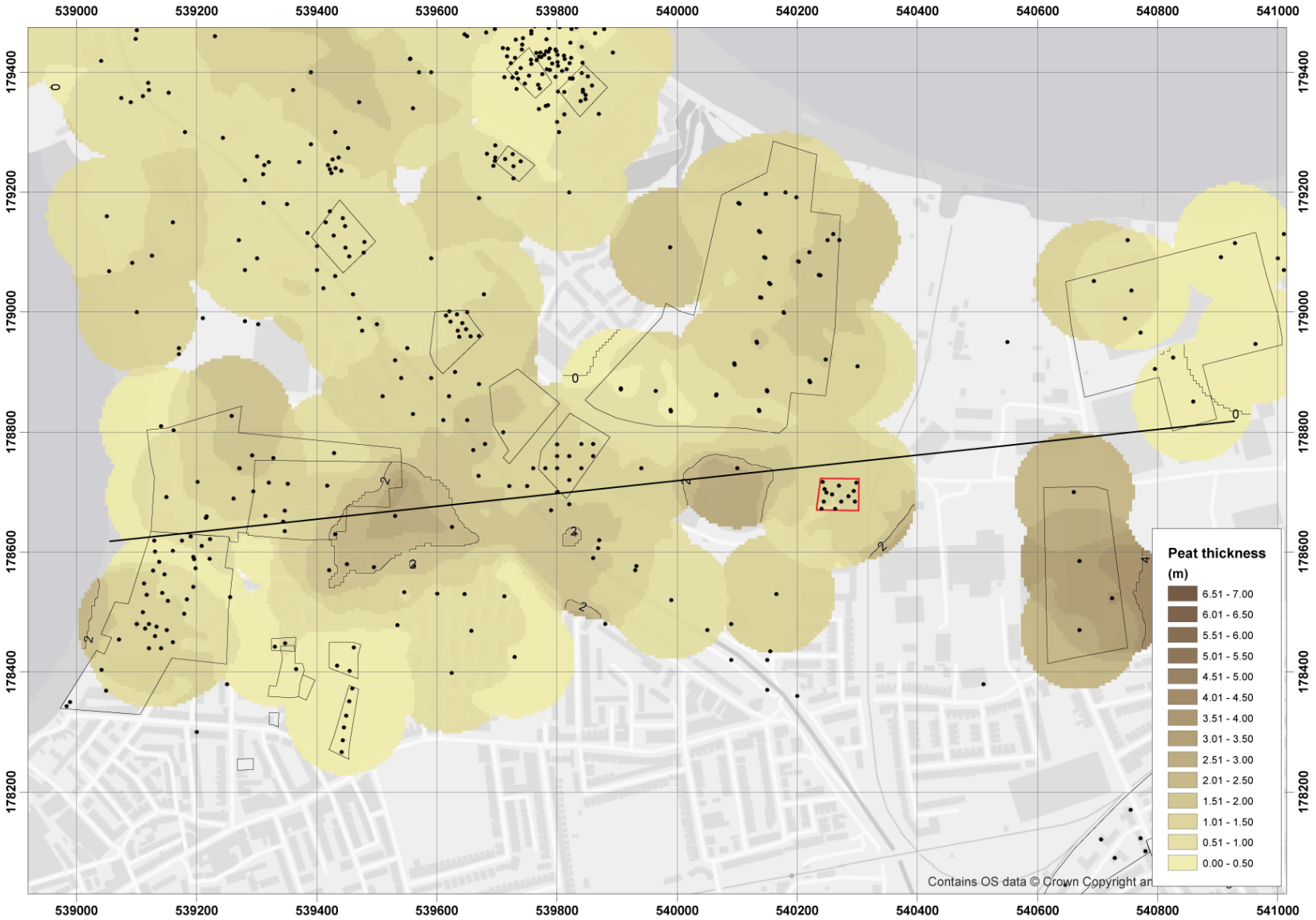

Figure 8: Thickness of the Peat (m) across the wider area

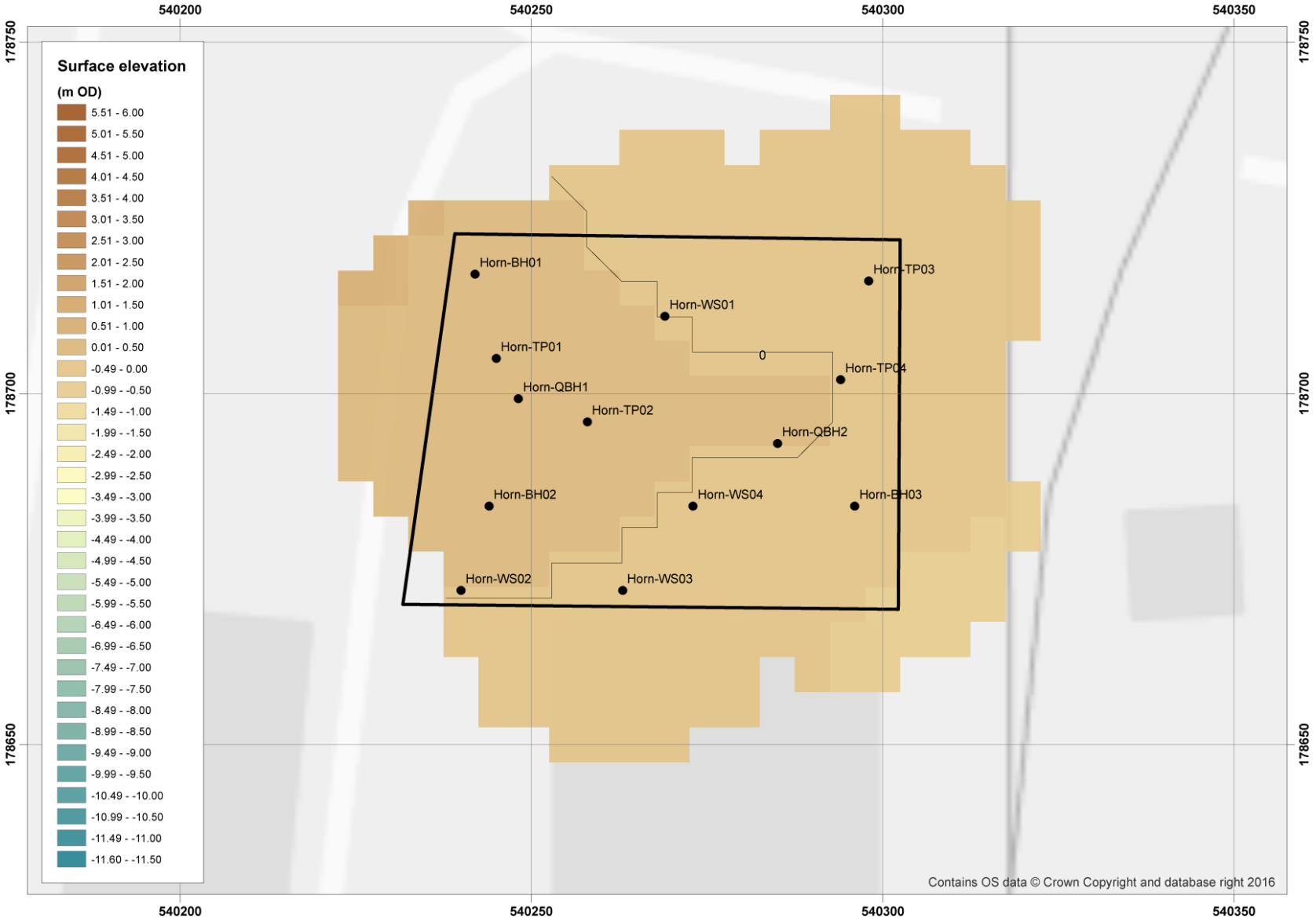

Figure 9: Top of the Upper Alluvium (m)

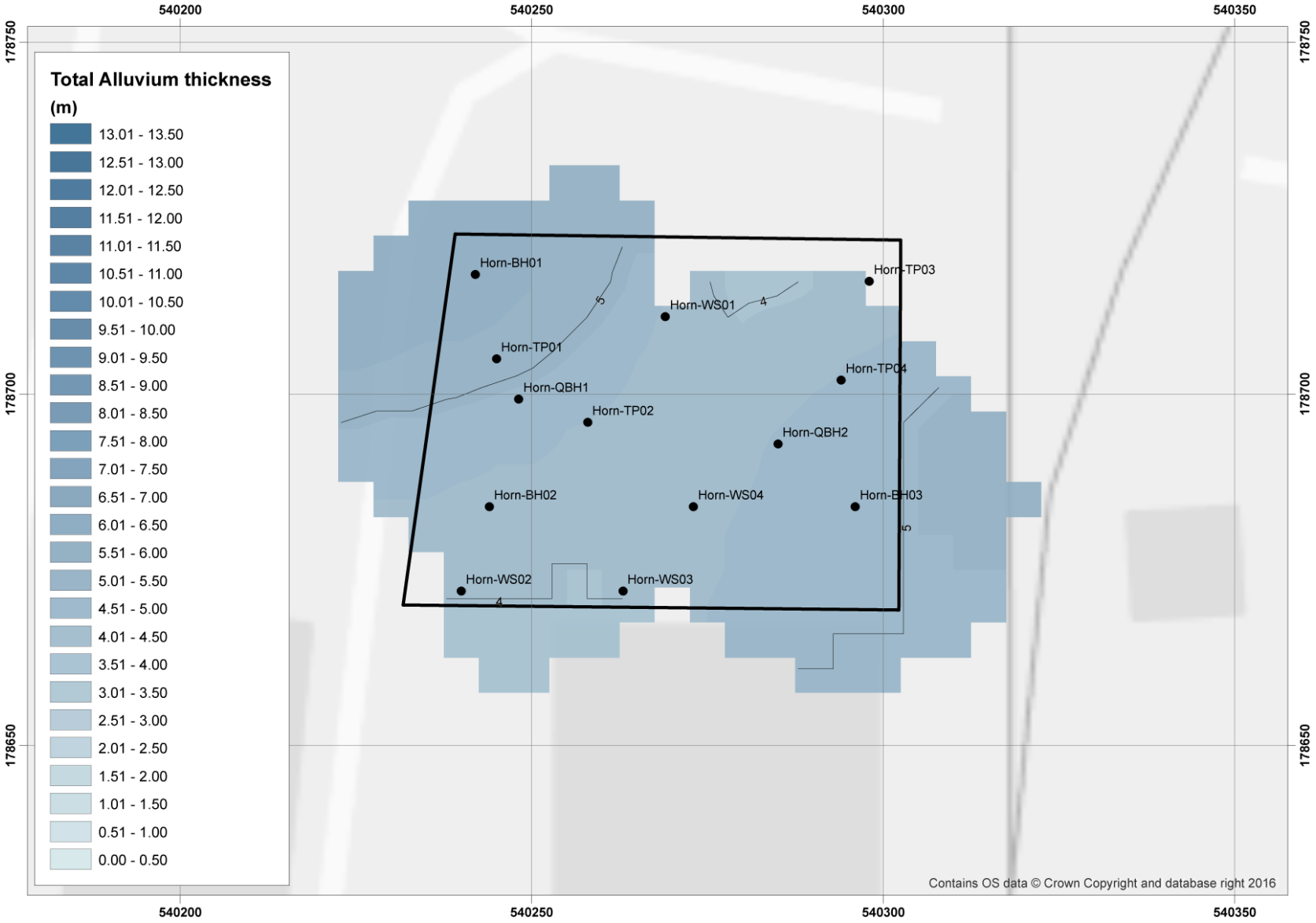

Figure 10: Thickness of the Total Alluvium (Lower Alluvium, Peat and Upper Alluvium) (m)

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

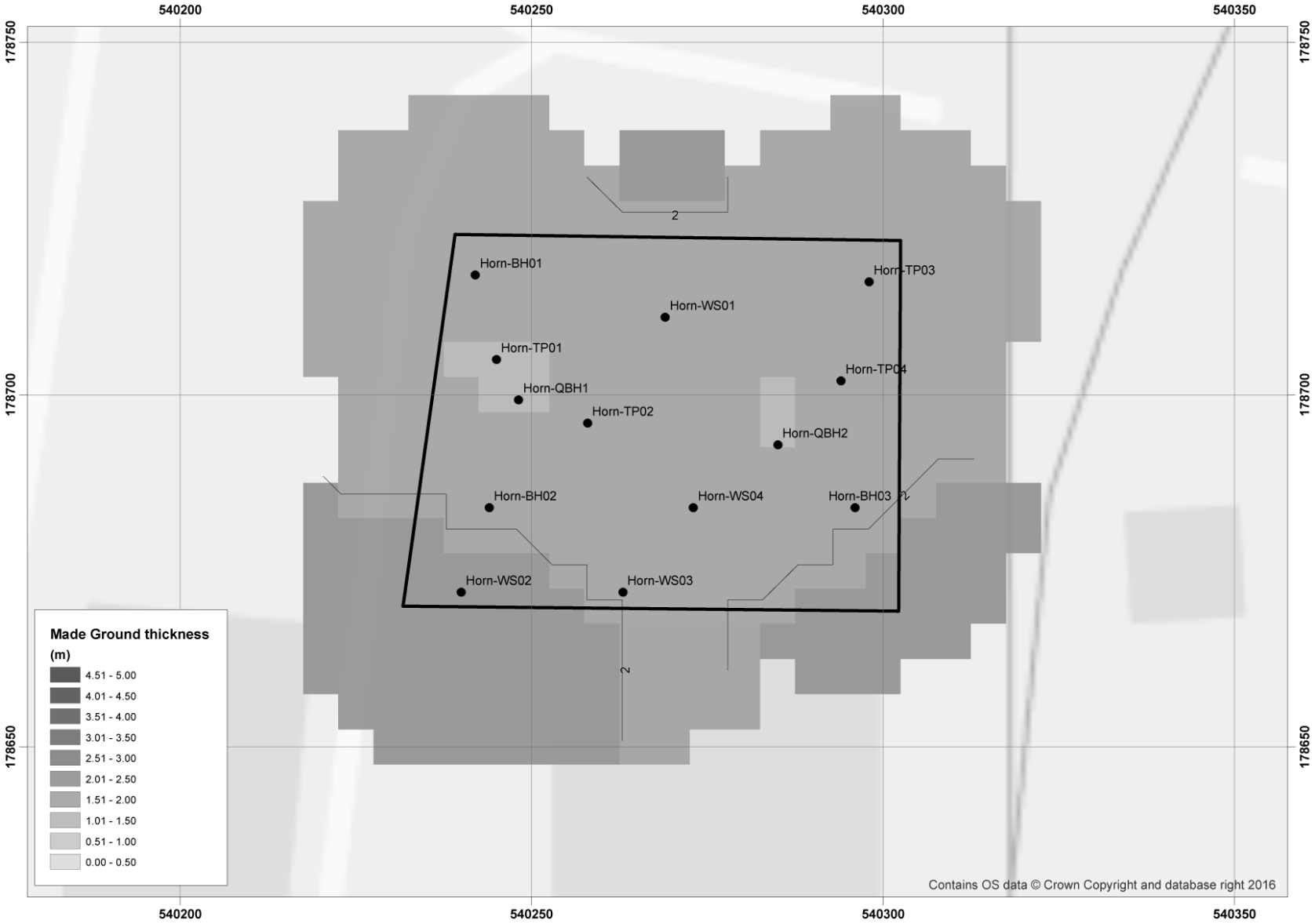

Figure 12: Thickness of Made Ground (m)

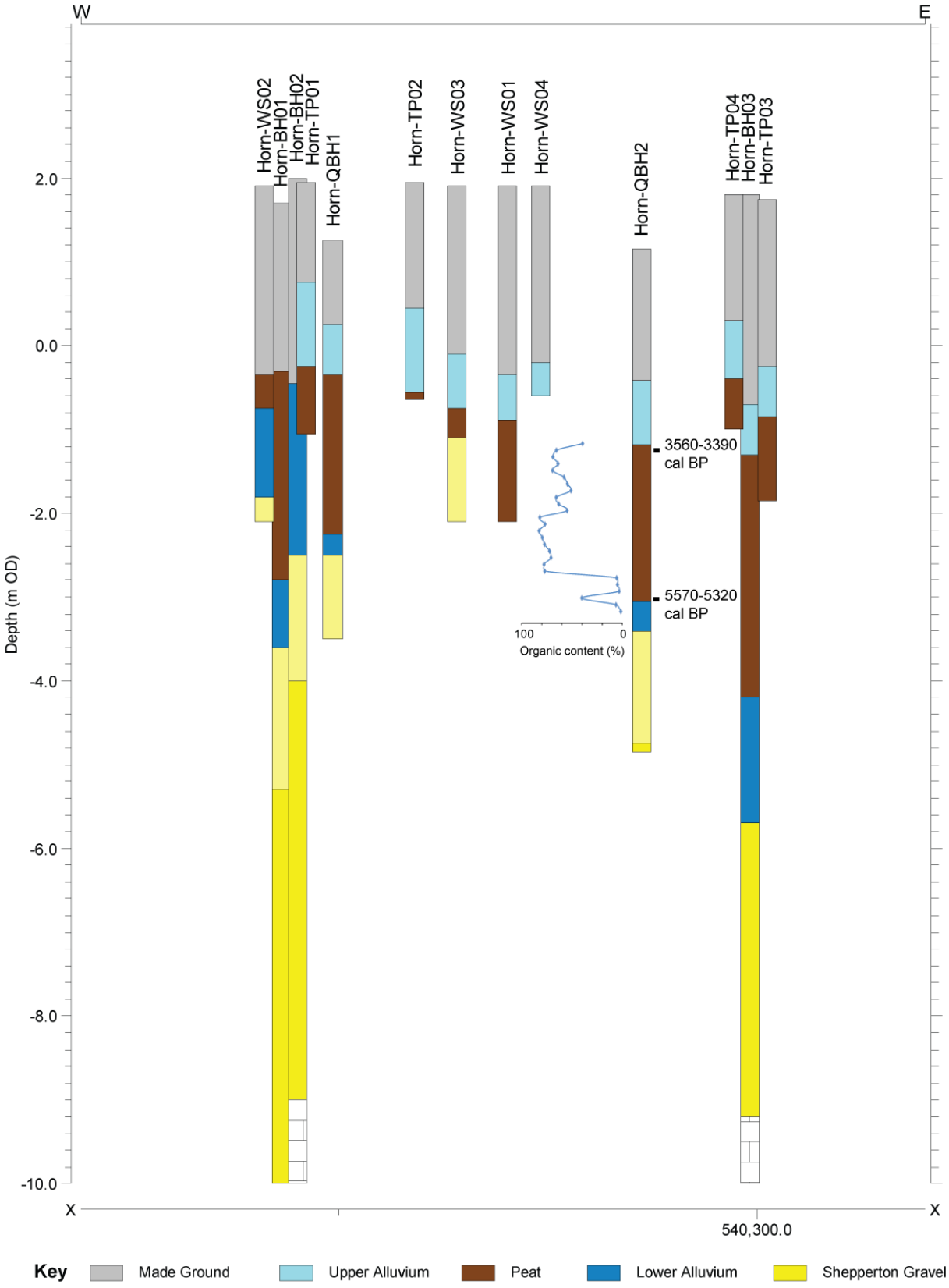

Figure 13: West-east transect of boreholes across the 20 Horn Lane site

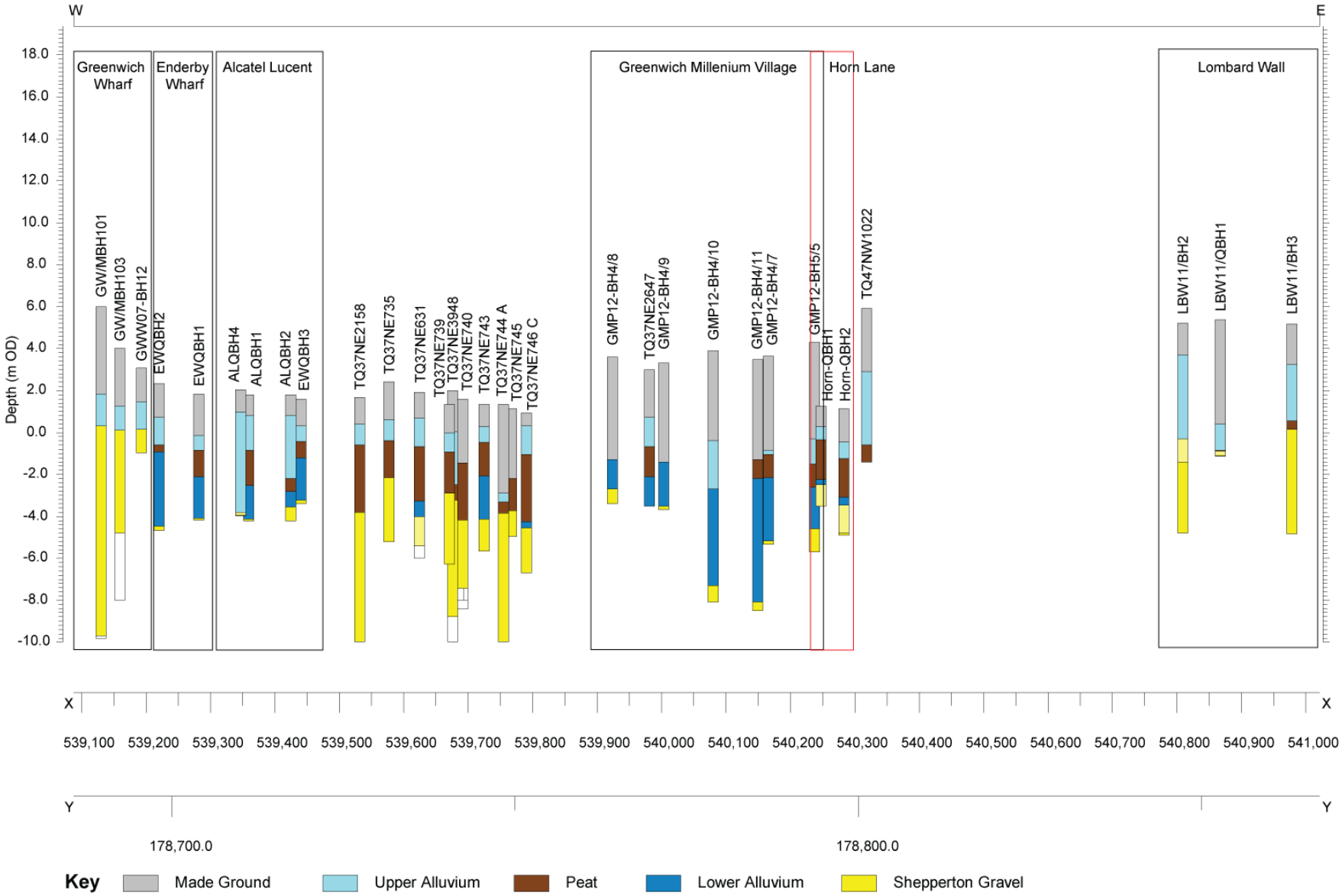

Figure 14: West-east transect of boreholes across the wider area

Table 1: Lithostratigraphic description of borehole QBH1, 20 Horn Lane, Royal 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, Tl21, 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 Dl+: 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 QBH2, 20 Horn Lane, Royal Borough of Greenwich

Depth (m OD)	Depth (m bgl)	Description	Stratigraphic group
1.15 to -0.45	0.00 to 1.60	Made Ground	MADE GROUND
-0.45 to -0.85	1.60 to 2.00	Gley 2 6/10B; As3 Ag1: clayey silt with some calcareous nodules; unknown contact into:	UPPER ALLUVIUM
-0.85 to -1.22	2.00 to 2.37	10YR 5/2; As3 Sh1 Tl+ becoming Sh2 $Tl^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:	
-1.22 to -2.78	2.37 to 3.93	10YR 3/3; Sh3 $Tl^2$1 Humo 3: dark brown well humified unidentifiable and wood peat; diffuse contact into:	PEAT
-2.78 to -2.85	3.93 to 4.00	10YR 4/3; Sh1 As1 Ag1 Ga1 Tl+: brown sandy silty clay with humified matter; diffuse contact into:	
-2.85 to -3.09	4.00 to 4.24	10YR 2/1; Sh3 As1: black sandy humified matter, soft At 3.05 and 3.10m bgl - 10YR 5/1 Ag2 Ga2 Dl+: grey sandy silt matter with traces of detrital wood; very sharp contact into:	
-3.09 to -3.44	4.24 to 4.59	Gley 1 6/10GY; Ga2 Ag2 Dl+: greenish grey sandy silty matter with traces of detrital wood. Diffuse contact into:	LOWER ALLUVIUM
-3.44 to -4.78	4.59 to 5.93	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
-4.78 to -4.85	5.93 to 6.00	10YR 6/6 Gg3 Ga1: brownish yellow slightly sandy gravel.	SHEPPERTON GRAVEL

Table 3: Results of the borehole QBH2 organic matter determinations, 20 Horn Lane, Royal Borough of Greenwich

Depth (m OD)		Organic matter content (%)
From	To	
-1.16	-1.17	39.48
-1.24	-1.25	65.45
-1.32	-1.33	68.93
-1.40	-1.41	63.90
-1.48	-1.49	69.34
-1.56	-1.57	57.96
-1.64	-1.65	54.64
-1.72	-1.73	51.02
-1.80	-1.81	65.57
-1.88	-1.89	63.19
-1.96	-1.97	54.84
-2.04	-2.05	81.91
-2.12	-2.13	76.87
-2.20	-2.21	82.62
-2.28	-2.29	79.47
-2.36	-2.37	77.28
-2.44	-2.45	72.36
-2.52	-2.53	70.90
-2.60	-2.61	77.79
-2.68	-2.69	77.05
-2.76	-2.77	5.60
-2.84	-2.85	4.82
-2.92	-2.93	3.17
-3.00	-3.01	40.29
-3.08	-3.09	6.25
-3.16	-3.17	1.52

Table 4: Results of the borehole QBH2 radiocarbon dating, 20 Horn Lane, Royal Borough of Greenwich

Laboratory code / Method	Material and location	Depth (m OD)	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC/AD (BP) (2-sigma, 95.4% probability)	δ13C (‰)
BETA-471003 AMS	Twig wood; top of peat	-1.22 to -1.27	3240 ± 30	1610 to 1440 cal BC (3560 to 3390 cal BP)	-29.4
BETA-471002 AMS	Twig wood; base of peat	-3.04 to -3.09	4670 ± 30	3620 to 3370 cal BC (5570 to 5320 cal BP)	-27.5

5. RESULTS & INTERPRETATION OF THE POLLEN ASSESSMENT

Twelve subsamples were extracted from borehole QBH2 for an assessment of pollen content (Table 5). The results of the assessment indicate a low concentration and preservation of remains in eight of the twelve samples.

The assemblages contain a mixture of tree, shrub and herbaceous pollen including: *Alnus* (alder), *Quercus* (oak), *Tilia* (lime), *Corylus* type (hazel) and Cyperaceae (sedges), with more sporadic occurrences of *Ulmus* (elm), Poaceae (grasses), Apiaceae (carrots) and *Chenopodium* type (goosefoot family). Spores are dominted by *Filicales* (ferns).

Due to the limited pollen concentration, restriction of the assemblage is somewhat restricted. The peat surface appears to have been occupied by alder with a ground flora of sedges and grasses (most likely including reeds – *Phragmites australis*), representing carr woodland and/or sedge/reed swamp habitats. The dryland contained at least some mixed decidious woodland dominated by oak, lime and elm. However, evidence for changes in vegetation composition can not be defined; in particular a decline in floodplain and dryland woodland which is often seen towards the end of peat formation. There is also no evidence of human activity.

Table 5: Results of the pollen assessment of samples from QBH2, 20 Horn Lane, Royal Borough of Greenwich

	Depth (m OD)	-1.40	-1.56	-1.72	-1.88	-2.04	-2.20	-2.36	-2.52	-2.68	-2.92	-3.00
Latin name	Common name											
Trees												
Alnus	alder	6	6	2	5	5	14		2	6		7
Quercus	oak	1	3	1	3	4	10		1	1		6
Pinus	pine		1	1								
Ulmus	elm											1
Tilia	lime					3	3	1	2	1		1
Shrubs												
Corylus type	e.g. hazel		1			1	3	2		1		3
Herbs												
Cyperaceae	sedge family				1	1	6			1		2
Apiaceae	carrot family						1					
Chenopodium type	goosefoot family				1							
Spores												
Filicales monoletes	ferns		1		7	6	12	5	1	4	4	5
Dryopteris	buckler fern								1			
Polypodium vulgare	polypody						1					1
Total Land Pollen (grains counted)		7	11	10	10	14	37	3	5	10	0	20
Concentration*		2	2	2	2	3	5	1	1	2	0	4
Preservation**		4	4	4	4	4	4	4	4	4	4	4
Microcharcoal Concentration***		0	0	0	0	0	1	0	0	0	3	1
Suitable for further analysis		NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	YES

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

6. RESULTS & INTERPRETATION OF THE DIATOM ASSESSMENT

Four sub-samples from borehole QBH2 were extracted for the assessment of diatoms. The results are displayed in Table 6. The results of the assessment indicate that diatoms are absent in all four samples. A number of factors influence diatom preservation, and it is probable that in the sediments examined here diatom concentrations were always low and that post-depositional destruction of the frustules has occurred due to drying-out, abrasion and possibly unfavourable chemical conditions. Dissolution of the diatom silica, for example, can occur as a response to the ambient dissolved silica concentration, the pH in open water, and the interstitial water in sediments. Using both fossil and modern diatoms, these and other environmental factors have been shown to affect the quality of preservation of assemblages (Flower, 1993; Ryves *et al*., 2001).

Table 6: Results of the diatom assessment of samples from QBH2, 20 Horn Lane, Royal Borough of Greenwich

Depth (m OD)		Diatom concentration	Quality of preservation	Diversity
From	To			
-1.20	-1.21	0	-	-
-1.24	-1.25	0	-	-
-3.08	-3.09	0	-	-
-3.13	-3.14	0	-	-

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

7. RESULTS & INTERPRETATION OF THE MACROFOSSIL ASSESSMENT

A total of eight small bulk samples were extracted and processed for the recovery of macrofossil remains, including waterlogged plant macrofossils, wood, insects and Mollusca (Table 7). The samples were focussed on the peat horizon within borehole QBH2.

The samples were largely dominated by moderate to high quantities of waterlogged wood. Only in two samples (-1.22 to -1.27 and -2.65 to -2.75m OD) were waterlogged seeds recorded, the assemblage in these limited to *Rubus* cf. *fruticosus* (e.g. bramble) and *Alnus glutinosa* (alder) respectively (see Table 8). Largely unidentifiable fragments of insect remains were recorded in the samples from -1.75 to -1.85 and -3.04 to -3.09m OD. Moderate quantities of sedge remains, restricted to stems or roots and lacking the epidermal tissues necessary for identification, were recorded in the sample from -1.27 to -1.32m OD. The seed assemblage in the samples from QBH2 is too small to attempt a full environmental interpretation, but it is consistent with a wetland fen environment.

Table 7: Results of the macrofossil assessment of samples from QBH2, 20 Horn Lane, Royal Borough of Greenwich

				Charred					Waterlogged			Mollusca		Bone			
Depth (m OD)	Unit	Volume processed (ml)	Fraction	Charcoal (>4mm)	Charcoal (2-4mm)	Charcoal (<2mm)	Seeds	Chaff	Wood	Seeds	Sedge remains (e.g. stems/roots)	Whole	Fragments	Large	Small	Fragments	Insects
-1.22 to -1.27	Peat		>300µm	-	-	-	-	-	4	1	-	-	-	-	-	-	-
-1.27 to -1.32			>300µm	-	-	-	-	-	5	-	2	-	-	-	-	-	-
-1.75 to -1.85			>300µm	-	-	-	-	-	3	-	-	-	-	-	-	-	1
-2.05 to -2.15			>300µm	-	-	-	-	-	3	-	-	-	-	-	-	-	-
-2.35 to -2.45			>300µm	-	-	-	-	-	4	-	-	-	-	-	-	-	-
-2.65 to -2.75			>300µm	-	-	-	-	-	4	1	-	-	-	-	-	-	-
-2.99 to -3.04			>300µm	-	-	-	-	-	2	-	-	-	-	-	-	-	-
-3.04 to -3.09			>300µm	-	-	-	-	-	4	-	-	-	-	-	-	-	1

Table 8: Results of the seed identifications from borehole QBH2, 20 Horn Lane, Royal Borough of Greenwich

Depth (m OD)	Unit	Seed identification		Quantity
		Latin name	Common name	
-1.22 to -1.27	Peat	*Rubus* cf. *fruticosus*	e.g. bramble	2
-1.27 to -1.32		-	-	-
-1.75 to -1.85		-	-	-
-2.05 to -2.15		-	-	-
-2.35 to -2.45		-	-	-
-2.65 to -2.75		*Alnus glutinosa*	alder (catkin)	1
-2.99 to -3.04		-	-	-
-3.04 to -3.09		-	-	-

8. DISCUSSION

The aims of the environmental archaeological assessment at the 20 Horn Lane site were (1) to establish the age of the peat recorded at the site; (2) to assess the palaeoenvironmental potential of the sequence; (3) to highlight any indications of nearby human activity, and (4) to provide recommendations for further analysis (if necessary). In order to achieve this aim, an environmental archaeological assessment of one borehole (QBH2) was carried out.

The results of the previous deposit modelling (Batchelor & Young, 2017b) 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 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 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 (e.g. Alcatel-Lucent, Enderby Wharf & Greenwich Industrial Estate; Batchelor *et al*., 2017; Young & Batchelor, 2015). However, the exact surface level of the Gravel on the 20 Horn Lane site is unclear due to difficulties differentiating the Shepperton Gravel, Sand and Lower Alluvium in geotechnical logs. The new boreholes indicate a level of between -3.8 and -4.78m OD, whilst recent geotechnical boreholes indicate surfaces as low as -5.7m OD. To the south the Gravel surface rises to between -2 and 0m OD, where it is thought more likely to reflect the earlier Kempton Park Gravel terrace. On the 20 Horn Lane site, the Shepperton Gravel is overlain by up to 5m of alluvial deposits comprising Sand, Lower Alluvium, Peat and Upper Alluvium. The surface and thickness of each unit (including the Shepperton Gravel) is variable, most likely reflecting the different drilling and descriptive methods used. However, spatial variations in the infilling of the channel cannot be ruled out as an alternative explanation for the results recorded.

The peat recorded within the alluvium at the 20 Horn Lane site is present in thicknesses of between 0.4 and 2.9m, and is generally recorded at elevations between *ca*. -0.2 and -4.0m OD. It has been radiocarbon dated to the early/middle Neolithic (3620 to 3370 cal BC/5570 to 5320 cal BP) through to the middle Bronze Age (1610 to 1440 cal BC/3560 to 3390 cal BP); at the western end of the channel within which the site lies, similar Neolithic and Bronze Age dates have been recorded at the Alcatel-Lucent (Batchelor *et al*., 2017) and Enderby Wharf (Batchelor *et al*., 2015) sites. The period of Peat formation at these sites thus appears to be contemporaneous with a widespread period of accumulation recorded elsewhere across the Lower Thames Valley, between *ca*. 6500-3000 cal BP, largely driven by variations in relative sea level rise (e.g. Devoy, 1979; Sidell, 2003). They are also consistent with those recorded elsewhere on Greenwich Peninsula. At the Victoria Deep Water Terminal site, Peat accumulation was radiocarbon dated to 5280-4660 cal BP (Neolithic; Corcoran, 2002), whilst at the Cable Car South Station in SSBH1C , the base of the peat was recorded around 5580-5310/5890-5610 cal BP and continued until 3380-3210 cal BP (Neolithic through to Bronze Age; Batchelor *et al*., 2015a).

At the Alcatel-Lucent site (Batchelor *et al.*, 2017) *ca*. 1km to the west, woody Peat was recorded in geoarchaeological boreholes at between -0.38 and -2.81m OD and in thicknesses of between 0.61 and 1.67m, similar to the sequence recorded at the Enderby Wharf site, immediately to the west (Batchelor *et al.*, 2015; see Figure 11). At Enderby Wharf a lower, silty peat horizon was recorded within the Lower Alluvium between -2.61 and -2.77m OD. Subsequent radiocarbon dating indicated that peat accumulation commenced here around 5450-5070 cal BP (middle Neolithic). This horizon was considered to be distinct from a thicker complex of generally woody or herbaceous peat and organic sediment, considered to be equivalent to that recorded at the 20 Horn Lane and Alcatel-Lucent sites. Radiocarbon dating of the base of this horizon at Enderby Wharf demonstrated that the accumulation of this horizon began at around 5290-4980 cal BP (middle Neolithic). At Alcatel-Lucent, the results of the radiocarbon dating revealed an age-reversal, which may be due to an erroneous date on one of these samples, or may represent the reworking of older sediment (by fluvial activity) in the case of the upper date (Batchelor *et al.*, 2017). The ages of both the base (4825 to 4570 cal BP) and top (5300 to 4980 cal BP) of the peat at Alcatel-Lucent do however fall within the range of the peat horizons at both Enderby Wharf and 20 Horn Lane, indicative of peat formation during the Neolithic period.

At the present site, the results of the environmental archaeological assessment of borehole QBH2 indicate that the preservation and concentration of biological remains (diatoms, waterlogged plant remains and pollen) is somewhat limited. During the accumulation of the peat, the wetland appears to have been occupied by alder with a ground flora of sedges and grasses, representing carr woodland and/or sedge or reed swamp habitats. The dryland contained at least some mixed decidious woodland, dominated by oak, lime and elm. In the pollen record, evidence for changes in vegetation composition can not be defined, including a decline in floodplain and dryland woodland which is often seen towards the end of peat formation. No evidence of human activity was recorded during the assessment.

In contrast, at the Alcatel-Lucent site (Batchelor *et al.*, 2017) two distinct assemblages where identified within the Peat: the lower assemblage, between -2.74 and -1.86m OD was indicative of a relatively damp and open wetland environment, dominated by sedges and ferns but with alder and willow carr also forming part of the wetland vegetation. On the dryland a mixed deciduous woodland dominated by oak, lime and elm was recorded. Significantly, a decline in lime and elm pollen values towards the base of the sequence was recorded, suggestive of environmental changes taking place towards the wetland-dryland interface (e.g. the loss of dryland habitat or anthropogenic impact). No definitive evidence of human activity was recorded in this part of the sequence, but the occurrence of microcharcoal may be suggestive of either natural or anthropogenic burning in the nearby environment. Between -0.26 and -1.46m OD the assemblage was suggestive of a shift towards sedge fen, reed swamp and salt-marsh communities with an estuarine influence, most likely as a consequence of an increase in relative sea level rise (RSL). On the dryland, the decline of oak is suggestive of a large reduction in mixed deciduous woodland; the increase of a large array of herbaceous taxa including cereal pollen suggests that this decline was a

consequence of woodland clearance for settlement and agricultural purposes, which took place from the Bronze Age onwards.

There are some significant differences between the relatively open environments indicated at the Alcatel-Lucent site, and those from Enderby Wharf (immediately to the east of Alcatel-Lucent), where a much stronger wetland woodland signal was recorded (Batchelor *et al.*, 2015). These differences may reflect localised variations in environment and vegetation at the time the Peat was forming, or given the uncertainties regarding the chronology of the Alcatel-Lucent sequence, may indicated that the Peat is of a different age to that recorded at Enderby Wharf (see Batchelor *et al.*, 2017). At this latter site, the analysis indicated that during the early stages of Peat formation (between 5450-5070 and 5290-4980 cal BP; middle Neolithic) the wetland environment was occupied by alder-carr swamp and sedge fen communities with areas of still or standing water, and potentially a limited tidal influence. Shortly after 5290-4980 to around 3390-3230 cal BP (middle Neolithic to Bronze Age) this vegetation community underwent a transition towards more mature and drier fen carr woodland dominated by alder, but may also have included hazel, ivy, elm, ash and yew. At this time the dryland environment was occupied by mixed deciduous woodland dominated by oak with lime, birch, hazel, elm and ash. Changes in the structure and composition of the dryland woodland are indicated from shortly after 5290-4980 to 3390-3230 cal BP as both lime and elm increased relative to oak. At the very top of the sequence around 3390-3320 cal BP, a reduction in fen woodland cover and an increase in herbaceous and aquatic taxa indicate a transition towards a wetter environment at the site. The timing of this event, in combination with elevated values of *Chenopodium* pollen, suggests this transition was caused by an increased saline influence which may correlate with that recorded in the upper part of the Alcatel-Lucent sequence. As described above, no such significant changes in the environment where identified during the assessment at 20 Horn Lane.

Unlike the upper part of the Alcatel-Lucent sequence, no definitive indicators of human activity were recorded at Enderby Wharf or 20 Horn Lane, including around the time of trackway construction at 72-88 Bellot Street (Philp & Garrod, 1994; 3380 to 3500 cal BP) and the Garage Site, Bellot Street (Branch *et al.*, 2005; (3890-3680 to 3720-3570 cal BP). In addition, the near-contemporaneous Bronze Age decline of the wetland and dryland woodland (as recorded in sequences elsewhere in the Lower Thames Valley, including at Alcatel-Lucent) was not definitively recorded at either site. Most likely this occurred just after the transition from Peat formation to the Upper Alluvium (at 20 Horn Lane, sometime after 3560-3390 cal BP). This transition is considered largely to have been caused by estuarine inundation consequent of an increase in relative sea level rise (RSL); not only would this have caused flooding of the wetland woodland, but would also have caused the expansion of wetland onto areas of former dryland, and/or the saturation of dryland soils, thus leading the decline of dryland woodland. However, Bronze Age clearance taking place on the neighbouring dryland edge is also likely to have increased both sediment supply and water runoff, contributing to flooding on the floodplain.

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 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).

9. CONCLUSION & RECOMMENDATIONS

The results of the environmental archaeological assessment have revealed a similar sedimentary sequence to that at other sites on Greenwich Peninsula, and more specifically those overlying comparatively low (<-4m OD) Shepperton Gravel topography. The site is located within a large, broadly east-west aligned depression in the Gravel surface, thought to represent a palaeochannel that would have been a significant component of the prehistoric landscape. The alluvial sequence infilling this channel includes a peat horizon of early/middle Neolithic to middle Bronze Age date; these dates for the peat are consistent with those recorded elsewhere on Greenwich Peninsula, including at sites located within this channel *ca*. 1km to the west.

The results of the assessment of indicate that the preservation and concentration of biological remains (diatoms, waterlogged plant remains and pollen) is limited, unlike at other sites located within this channel; evidence for significant changes in vegetation composition or human activity cannot be defined. On this basis, no further environmental archaeological analysis of the sequence is recommended.

10. REFERENCES

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11. APPENDIX 1: OASIS

OASIS ID: quaterna1-282026	
Project details	
Project name	20 Horn Lane, Royal Borough of Greenwich
Short description of the project	A programme of environmental archaeological assessment of a borehole from the 20 Horn Lane site was undertaken, following the recommendations of previous geoarchaeological fieldwork and deposit modelling. This work was undertaken in order to (1) establish the age of the peat recorded at the site; (2) assess the palaeoenvironmental potential of the sequence; (3) highlight any indications of nearby human activity, and (4) provide recommendations for further analysis. The results of the environmental archaeological assessment have revealed a similar sedimentary sequence to that at other sites on Greenwich Peninsula, and more specifically those overlying comparatively low (<-3m OD) Shepperton Gravel topography. The site is located within a large, broadly east-west aligned depression in the Gravel surface, thought to represent a palaeochannel that would have been a significant component of the prehistoric landscape. The alluvial sequence infilling this channel includes a peat horizon of early/middle Neolithic to middle Bronze Age date; these dates for the peat are consistent with those recorded elsewhere on the Greenwich Peninsula, including at sites located within this channel ca. 1km to the west. The results of the assessment of indicate that the preservation and concentration of biological remains (diatoms, waterlogged plant remains and pollen) is limited, unlike at other sites located within this channel; evidence for significant changes in vegetation composition or human activity cannot be defined. On this basis, no further environmental archaeological analysis of the sequence is recommended.
Project dates	Start: 15-02-2017 End: 07-09-2017
Previous/future work	No / No
Any associated project reference codes	HNA17 - Sitecode
Type of project	Environmental assessment
Monument type	PALAEOCHANNEL Uncertain
Monument type	PEAT Middle Neolithic
Monument type	PEAT Middle Bronze Age

Significant Finds	PEAT Middle Neolithic
Significant Finds	PEAT Middle Bronze Age
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 brief originator	Consultant
Project design originator	D.S. Young
Project director/manager	C.R. Batchelor
Project supervisor	C.R. Batchelor
Type of sponsor/funding body	Developer
Project archives	
Physical Archive Exists?	No
Physical Archive recipient	LAARC
Digital Archive Exists?	No
Digital Archive	LAARC

recipient	
Paper Archive recipient	LAARC
Paper Media available	"Report"
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
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