

WEST HAM BUS GARAGE (THE FORMER PARCEL FORCE DEPOT), WEST OF STEPHENSON STREET, LONDON BOROUGH OF NEWHAM (SITE CODE: WHQ09): ENVIRONMENTAL ARCHAEOLOGICAL ANALYSIS

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1.0 INTRODUCTION

This report summarises the findings arising out of the environmental archaeological analysis undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09; National Grid Reference: TQ 539050 182500; Figures 1 and 2). The results of an archaeological desk-based assessment conducted by Bull and Corcoran (2007), and the Lea Valley Mapping Project by Burton *et al.* (2004), suggested the site has considerable potential for addressing a range of important research questions with respect to the environmental and cultural histories of the Lea Valley. Situated centrally within the modern floodplain of the Lea Valley, and only a short distance upstream from the confluence with the River Thames, Bull and Corcoran (2007) recorded a stratigraphic sequence comprising Holocene alluvium (floodplain deposits) overlying Pleistocene gravels. The thickness of the alluvium and height of the gravel surface deepened towards the south and eastern boundaries of the site. This suggested that the former course of the River Lea may have occupied this vicinity, with the remaining area comprising relatively dry ground (alluvium <1.5m in thickness), which was only subject to intermittent flooding. This alluvial sequence towards the western part of the site probably represents a series of landsurfaces (“accretionary soils” see Bull and Corcoran, 2007, 15), located proximal to the river channel, and its tributary streams, which have progressively accumulated during prehistory and into the historic period. The margins of the former river channel were also identified by the presence of peat, and it is these deposits and possible former channel fills that provide the potential for reconstructing the environmental history of the site and its environs, enabling records to be compiled of human impact on the wetland and adjacent dryland environment e.g. woodland clearance and farming (these comments are also supported by Bull and Corcoran, 2007). Bull and Corcoran also conclude that if the peat deposit is an extensive unit, it may be of a similar age to the Middle Holocene peat recorded extensively within the Lower Thames Valley. At several sites in the Lower Thames Valley, this peat unit has been linked to a period of marine regression, where the

rate of Holocene sea level rise since the end of the last glaciation has slowed, resulting in the transition from estuarine sediment deposition (alluvium) to peat formation within a semi-terrestrial environment.

The results of the archaeological desk-based assessment conducted by Bull and Corcoran (2007) indicated that the central-southern area of the site contained the greatest potential for the recovery of Holocene alluvium (including peat) and thus was targeted for further geoarchaeological and environmental archaeological investigations (Figure 2). The results of the geoarchaeological investigations (Batchelor *et al.*, 2009a) broadly confirms the work of Bull and Corcoran (2007), and Burton *et al.* (2004), with a sequence of up to five major stratigraphic units, deposited in the following order: (1) Pleistocene gravels; (2) calcareous-rich tufa sediments; (3) fine grained mineral-rich alluvium; (4) organic-rich (including peat) deposits, and (5) Made Ground. A subsequent environmental archaeological assessment (Batchelor *et al.*, 2009b) indicated that during the deposition of the alluvium (and in particular the organic-rich horizons), the wetland was dominated by alder, with an understorey of shrubs (including willow, elder and hazel) grasses, sedges and semi-aquatic taxa. On the adjacent dryland, the pollen-stratigraphic assessment indicates the presence of mixed deciduous woodland dominated by oak with lime. No definitive indicators of anthropogenic activity (e.g. cereals) were noted.

The results of the previous investigations have led to the initiation of four environmental archaeological aims that will be addressed within this analysis report: (1) to establish the timing and duration for the deposition of the organic-rich (peat) sediments, (2) to reconstruct the vegetation history of the site, and (3) to assess any evidence for human impact on the natural environment, and attempt to elucidate the timing, duration and nature of these activities, which may have included woodland clearance (e.g. elm and lime) and forest farming from the Neolithic onwards. Environmental archaeological analysis was concentrated on the sediments from borehole <BH3> only, due to the poor preservation and concentration of remains in the other boreholes. The environmental archaeological analysis procedure consisted of:

1. Radiocarbon dating the top and base of the peat from borehole <BH3> to provide a provisional geochronological framework for its deposition.
2. Analysis of the pollen grains and spores (borehole <BH3>) to provide a reconstruction of vegetation succession, and to detect evidence for human activities e.g. woodland clearance and cultivation
3. Integrating the new data with all the assessment results (all boreholes)

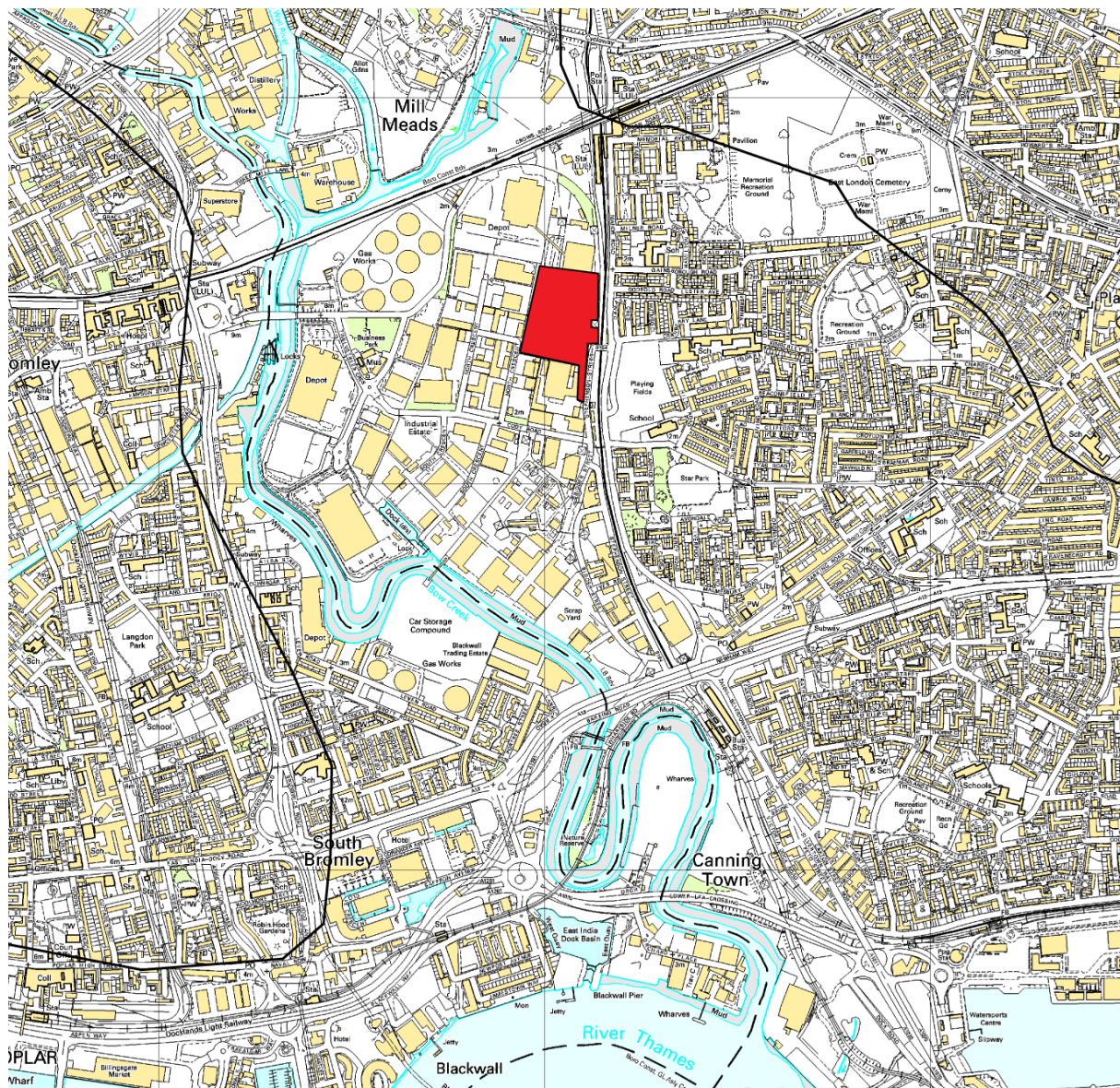


Figure 1: Location of West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09) (reproduced from Ordnance Survey digital map data ©Crown copyright 2009. All rights reserved. License number 0100031673)

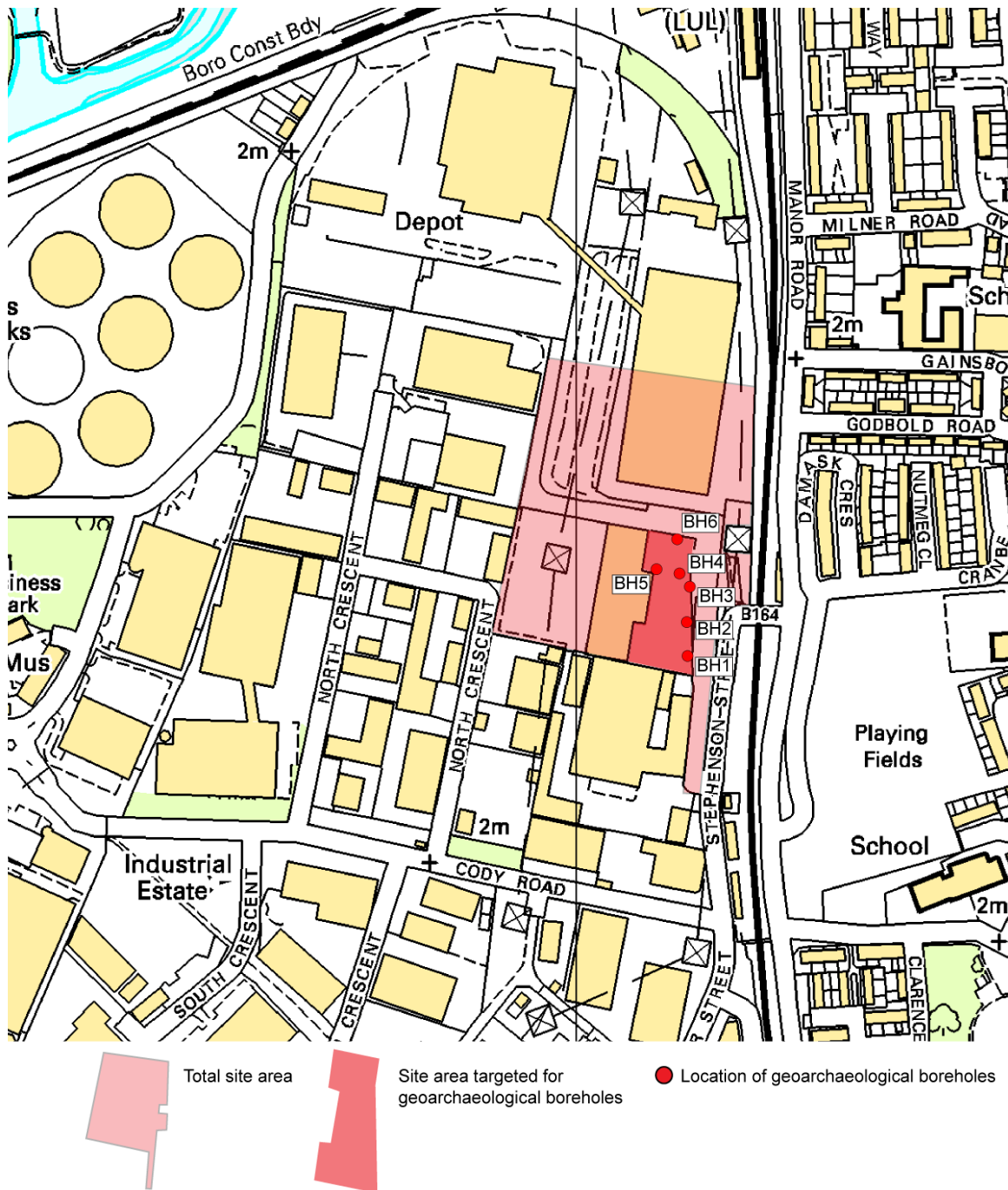


Figure 2: Location of Boreholes BH1 to BH6, Location of West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09) (reproduced from Ordnance Survey digital map data ©Crown copyright 2009. All rights reserved. License number 0100031673)

2.0 METHODS

2.1 *Field Investigations*

Six boreholes (<BH1> to <BH6>) were put down in the south-eastern area of the site (Phase 3 of the construction work; Figure 2). The ground surface (located at approximately 1.5m OD across the site) was initially cleared of all reinforced concrete and contaminated Made Ground by Mansell Construction Services Limited. As soon as natural uncontaminated sediments were recorded in the field by Quaternary Scientific, boreholes were then put down using an Eijkelkamp window sampler and gouge set driven by an Atlas Copco TT 2-stroke percussion engine. Each borehole was put down until coarse grained unconsolidated sediments had been recorded. The spatial attributes of each borehole was recorded from the ground surface by Mansell Construction Services Limited (Table 1 and Figure 2).

Table 1: Location of Boreholes BH1 to BH6, Location of West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Borehole number	Easting	Northing	Depth at surface (m OD)
BH1	539088.853	182320.893	1.38
BH2	539088.278	182347.701	1.55
BH3	539090.695	182375.626	1.39
BH4	539082.465	182386.137	1.33
BH5	539063.815	182389.620	1.38
BH6	539080.647	182413.135	1.47

2.2 *Lithostratigraphic descriptions*

All borehole core samples were retained and described in the laboratory 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 (Tables 2 to 7).

2.3 *Organic matter determinations*

Sixty-four sub-samples were taken from boreholes <BH1>, <BH3> and <BH4> for determination of the organic matter content (Tables 8 to 10; Figure 4). These records were important for two reasons: (1) they identified lithostratigraphic units with a higher organic matter content that may be suitable for radiocarbon dating, and (2) they identified 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°C 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 (2) re-weighing the sub-sample obtain the 'loss-on-ignition' value (see Bengtsson and Enell, 1986).

2.4 Radiocarbon dating

Two sub-samples were extracted from borehole <BH3>; one towards the base of the peat sequence (bulk peat; -1.11m to -1.09m OD) and one from the top of the peat sequence (wood bark; -0.74m to -0.75m OD). These samples were submitted for radiocarbon dating to Beta Analytic INC, Radiocarbon Dating Laboratory, Florida, USA. The results have been calibrated using OxCal v4.0.1 Bronk Ramsey (1995, 2001 and 2007) and IntCal04 atmospheric curve (Reimer *et al.*, 2004). The results are displayed in Table 11.

2.5 Pollen analysis/assessment

Six sub-samples from borehole <BH3> were extracted for pollen analysis. The pollen was extracted as follows: (1) sampling a standard volume of sediment (1ml); (2) deflocculation of the sample in 1% Sodium pyrophosphate; (3) sieving of the sample to remove coarse mineral and organic fractions (>125µ); (4) acetolysis; (5) removal of finer minerogenic fraction using Sodium polytungstate (specific gravity of 2.0g/cm³); (6) 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). Plant nomenclature follows the Flora Europaea as summarised in Stace (1997). The analysis procedure consisted of scanning the prepared slides at 2mm intervals along the whole length of the coverslip and recording the pollen taxa up to a total of 300 pollen grains (excluding aquatic and spore types). The results are displayed in Figure 5.

In addition, the results of the borehole <BH1> pollen assessment are displayed in Table 12. Fifteen sub-samples were extracted for an assessment of the pollen content from borehole <BH1>. The extraction procedure followed the same methodology as above, whilst the assessment procedure consisted of scanning the prepared slides, and recording the concentration and preservation of pollen grains and spores, and the principle taxa on four transects (10% of the slide). Poor pollen concentration and preservation prevented further analysis of these samples (Batchelor *et al.*, 2009b).

2.6 Waterlogged plant macrofossil (seeds and wood) assessment

Ten bulk samples subsampled from boreholes <BH1> and <BH3> were processed and assessed for waterlogged plant macrofossils. Four 10cm sub-samples extracted from borehole <BH1>, and six 10cm sub-samples extracted from borehole <BH3> were processed by wet-sieving using 300 micron and 1mm mesh sizes. Both fractions from each sample were scanned under a stereozoom microscope at x7-45 magnifications and the plant remains were recorded. Preliminary identifications of botanical remains have been made using modern comparative material and reference atlases (Cappers *et al.* 2006, Hather 2000, Schweingruber 1990, Schoch *et al.* 2004). Nomenclature used follows Stace (2005). The quantities of waterlogged seeds and wood were recorded for each sample, with identifications of the main seed and wood taxa (Tables 13 and 14).

3.0 RESULTS AND INTERPRETATION OF THE LITHOSTRATIGRAPHIC ASSESSMENT

The deepest sedimentary units recorded comprised dominantly coarse-grained mineral-rich sediments in boreholes <BH1>, <BH3>, <BH4> and <BH6> (Figure 3). These deposits were not recorded elsewhere; borehole <BH2> had to be abandoned due the presence of contaminated Made Ground, and the base of the sequence was not reached in borehole BH5. There was some variation in the nature of the basal sediments, but they mainly consisted of gravels and sands, with some silt, clay and detrital wood. The upper surface of these deposits varies, between -2.86m in borehole <BH1> and -0.14m OD in borehole <BH6>, indicating a steep topographic rise in the gravel surface from south to north, in this area of the site. These records approximately reflect the findings Bull and Corcoran (2007), and represent the upper and/or reworked surface of the Pleistocene Gravel.

Overlying these coarse-grained sediments in boreholes <BH1>, <BH3>, <BH4>, <BH5>, and almost certainly <BH2>, was a varying thickness of fine-grained alluvial deposits, generally comprising silt and clay. A very thin layer of these deposits was also visually recorded in borehole <BH6> following clearance of the reinforced concrete and Made Ground. However, its absence within the borehole record would suggest that backfilling of the trench, (prior to drilling), removed what little material was originally present.

There is some variability in the nature of the alluvial deposits with three boreholes (<BH1>, <BH3> and <BH4>) containing organic-rich layers (*Substantia humosa*; up to 60% organic; Figures 3 and 4; Tables 8 to 10), which represent a transition towards semi-terrestrial conditions. In borehole <BH1> (Table 2), two of these horizons are recorded between -1.74m OD and -1.43m OD (Units 7 and 8), and -0.94 to -0.58m OD. These units approximately span a single, thicker unit of organic-rich sediments in borehole <BH3> (-1.42 to -0.76m OD; Unit 2; Table 4) which formed directly over the underlying gravel surface. A thinner unit of organic-rich sedimentation is also recorded in borehole <BH4> at approximately the same elevation as the second unit recorded in borehole <BH1>. These results therefore indicate at least one temporary shift towards semi-terrestrial conditions occurred contemporaneously across the site, between boreholes <BH1> and most likely <BH5>. The absence of these deposits towards the north of the site at borehole <BH6> is most likely the result of the rising topography of the underlying Gravel towards higher drier ground. Alternatively these deposits may have been subsequently truncated.

In addition, recorded at the transition between the Shepperton Gravel and alluvial deposits in borehole <BH1> only, were three Units spanning ca. 50cm containing significant quantities of

calcareous material that represents tufa sands. Similar deposits have been recorded in the Lea Valley approximately 2km north-west at the Olympic Park. Here, a sequence of calcareous sandy deposits developing into peaty silts and peats, suggested the infilling of initially active fluvial channels during the Middle Holocene (Green *et al.*, 2009). It is therefore suggested that the sequence (and therefore environmental history) recorded in the transect at West Ham Bus Garage, may have similar characteristics to those recorded at the Olympic Park.

In all boreholes, the fine grained alluvium was overlain by Made Ground that ranged in thickness, up to 2m. This variable thickness was similar to that recorded during previous investigations (Bull and Corcoran, 2007).

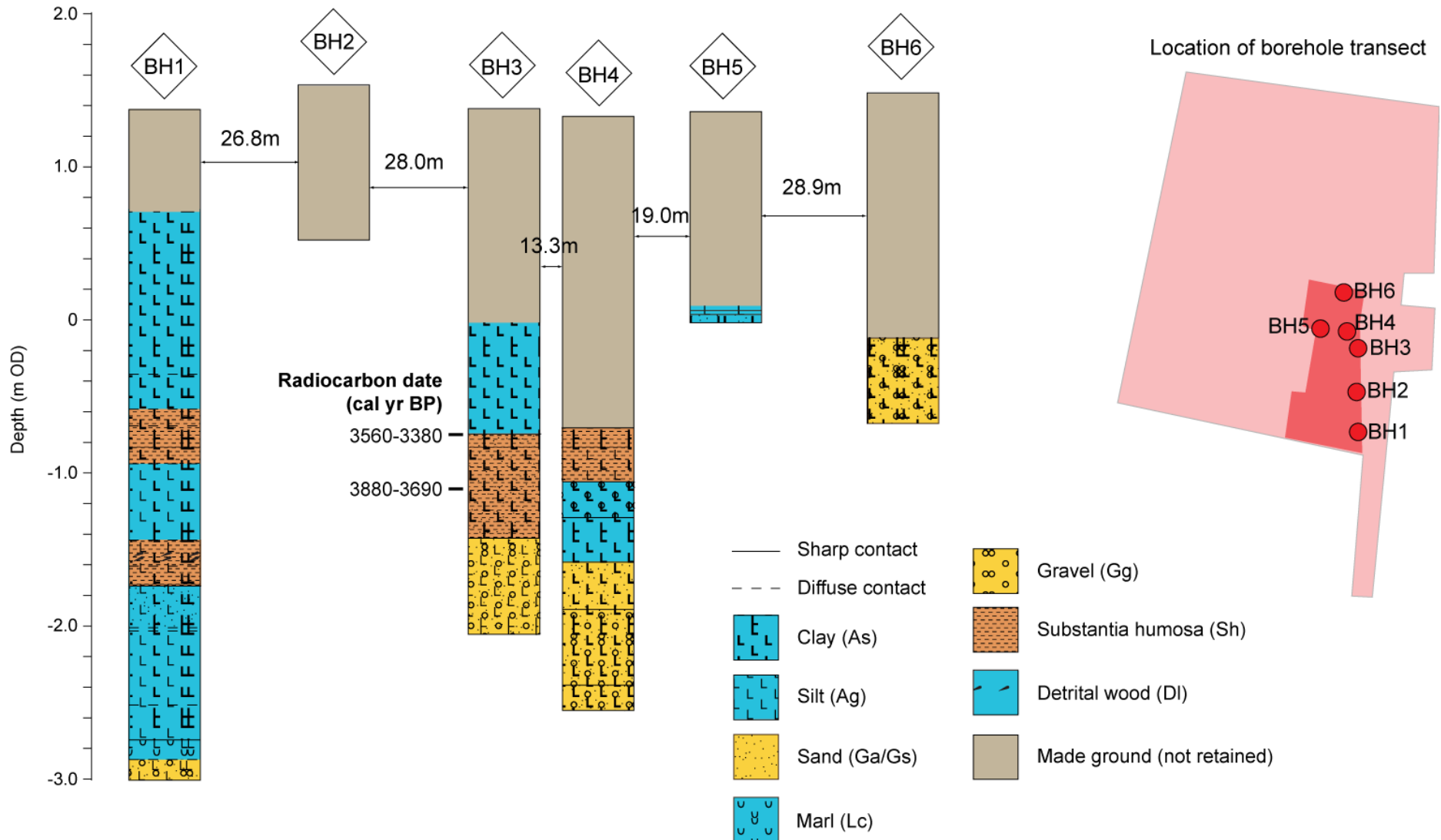


Figure 3: Transect of lithostratigraphic sequences from Boreholes BH1 to BH6, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09). The borehole logs are accurately spaced representing their geographical location

Table 2: Lithostratigraphic descriptions of Borehole <BH1>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Description
1.38 to 0.65	14	Made ground
0.65 to -0.35	13	5Y 3/2 with 10YR 2/1 and 2.5Y 7/2; As4 Gs+; Dark olive gray clay with small patches of black and occasional light gray sand. Diffuse contact into:
-0.35 to -0.58	12	5Y 3/2; As4 Sh+; Dark olive gray clay with organic matter. Diffuse contact into:
-0.58 to -0.69	11	10YR2/1; Sh2 As1 Ag1; Black organic rich silty clay. Diffuse contact into:
-0.69 to -0.94	10	10YR 2/1 to 5Y 3/2; As3 Sh1 DI+; Black to dark olive gray organic-rich clay with detrital wood. Diffuse contact into:
-0.94 to -1.43	9	5Y 3/2; As3 Ag1 Sh+ DI+; Dark olive gray silty clay with organic matter and detrital wood. Diffuse contact into:
-1.43 to -1.61	8	10YR2/1 to 5Y 3/2; As2 Sh1 DI1; Black to dark olive gray organic-rich clay with detrital wood. Diffuse contact into:
-1.61 to -1.74	7	10YR 2/1 to 5Y 3/2 with 2.5Y 6/2; As2 Ag1 Sh1 Gs+ DI+; Black to dark olive gray organic-rich silty clay with traces of light brownish gray sand and detrital wood. Sharp contact into:
-1.74 to -2.01	6	2.5Y 5/2 to 2.5Y 4/3; Ag2 As1 Ga1 Sh+ DI+ Humo 2; Grayish brown to olive brown clayey sandy silt with organic matter and detrital wood. Diffuse contact into:
-2.01 to -2.03	5	10YR 3/2; As3 Ag1; Very dark grayish brown silty clay.
-2.03 to -2.52	4	10YR 3/2; As2 Ag2 Ga+ DI+; Very dark grayish brown silty clay with traces of sand and detrital wood. Diffuse contact into:
-2.52 to -2.75	3	2.5Y 4/3; Ag3 As1 Lc+ Ga+ Sh+ DI+; Olive brown clayey silt with traces of sand, organic matter, tufa and detrital wood. Sharp contact into:
-2.75 to -2.86	2	2.5Y 4/2 to 2.5Y 7/2; Lc2 As1 Ag1 Ga+; Layers of dark grayish brown to light gray silty clayey tufa with sand. Diffuse contact into:
-2.86 to -3.03	1	10YR 2/1 to 10YR 4/1; Gs2 Gg1 Ag1 As+ Sh+ Lc+; Black to dark gray silty gravelly sand with clay, organic material and tufa.

Table 3: Lithostratigraphic descriptions of Borehole <BH2>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Description
1.55 to 0.55	1	Made Ground – borehole abandoned

Table 4: Lithostratigraphic descriptions of Borehole <BH3>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Description
1.39 to 0	4	Made Ground
0 to -0.76	3	2.5Y 4/3 mottled with 10YR 2/1 and 10YR 5/6; As4; Olive brown mottled with black and yellowish brown clay. Diffuse contact into:
-0.76 to -1.42	2	10YR 3/1; Sh2 Ag1 Ga1, DI+; Very dark grey organic-rich silt with occasional sandy horizons, detrital wood and Mollusca inclusions. Sharp contact into:
-1.42 to -2.04	1	10YR 4/1; Gs2 As1 Gg1 DI+; Dark gray clayey sand with gravel and detrital wood inclusions.

Table 5: Lithostratigraphic descriptions of Borehole <BH4>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Description
1.34 to -0.70	7	Made Ground
-0.70 to -1.06	6	2.5Y 4/3 to 2.5Y 2.5/1; Ag2 As1 Sh1; Olive brown to black organic-rich clayey silt. Sharp contact into:
-1.06 to -1.29	5	10YR 4/1; Gs2 Gg1 As1; Dark gray clayey gravelly sand. Sharp contact into:
-1.29 to -1.57	4	10YR 4/1 to 10YR 2/1; Gs2 As2 Sh+; Dark gray to black clayey sand with organic-rich inclusions. Diffuse contact into:
-1.57 to -1.90	3	10YR 4/1; Gs2 As2 Gg+; Dark gray clayey sand with gravel. Sharp contact into:
-1.90 to -2.39	2	10YR 3/1; Gs2 Gg1 As1; Very dark gray, clayey gravelly sand. Sharp contact into:
-2.39 to -2.87	1	10YR 3/1; Gg2 Gs1 As1; Very dark gray clayey sandy gravel.

Table 6: Lithostratigraphic descriptions of Borehole <BH5>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (cm)	Unit number	Description
1.38 to 0.18	6	Made Ground
0.18 to 0.08	5	2.5Y 3/1; As3 Ag1 Gs+ Sh+ Dh+ DI+; Very dark gray silty clay with sand, organic-rich and detrital wood and plant remains. Unknown contact into:
0.08 to 0.13	4	2.5Y 3/1; As3 Ag1 Gs+ Sh+ Dh+; Very dark gray silty clay with sand, organic-rich and detrital plant remains. Unknown contact into:
0.13 to 0.08	3	2.5Y 3/1; As3 Ag1 Sh+ Dh+; Very dark gray silty clay with organic-rich and detrital plant remains. Unknown contact into:
0.08 to 0.03	2	2.5Y 3/1; As3 Ag1 Gs+ Sh+ Dh+ DI+; Very dark gray silty clay with sand, organic-rich, detrital wood and plant remains. Unknown contact into:
0.03 to -0.02	1	2.5Y 3/1; As2 Ag1 Gs1 Gg+ Sh+ Dh+ DI+; Very dark gray silty sandy clay with gravel, organic-rich, detrital wood and plant remains

Table 7: Lithostratigraphic descriptions of Borehole <BH6>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Description
1.47 to -0.14	2	Made Ground
-0.14 to -0.69	1	10YR 3/1; Gs2 Gg1 As1 DI+; Very dark gray clayey gravelly sand with detrital wood and Mollusca inclusions

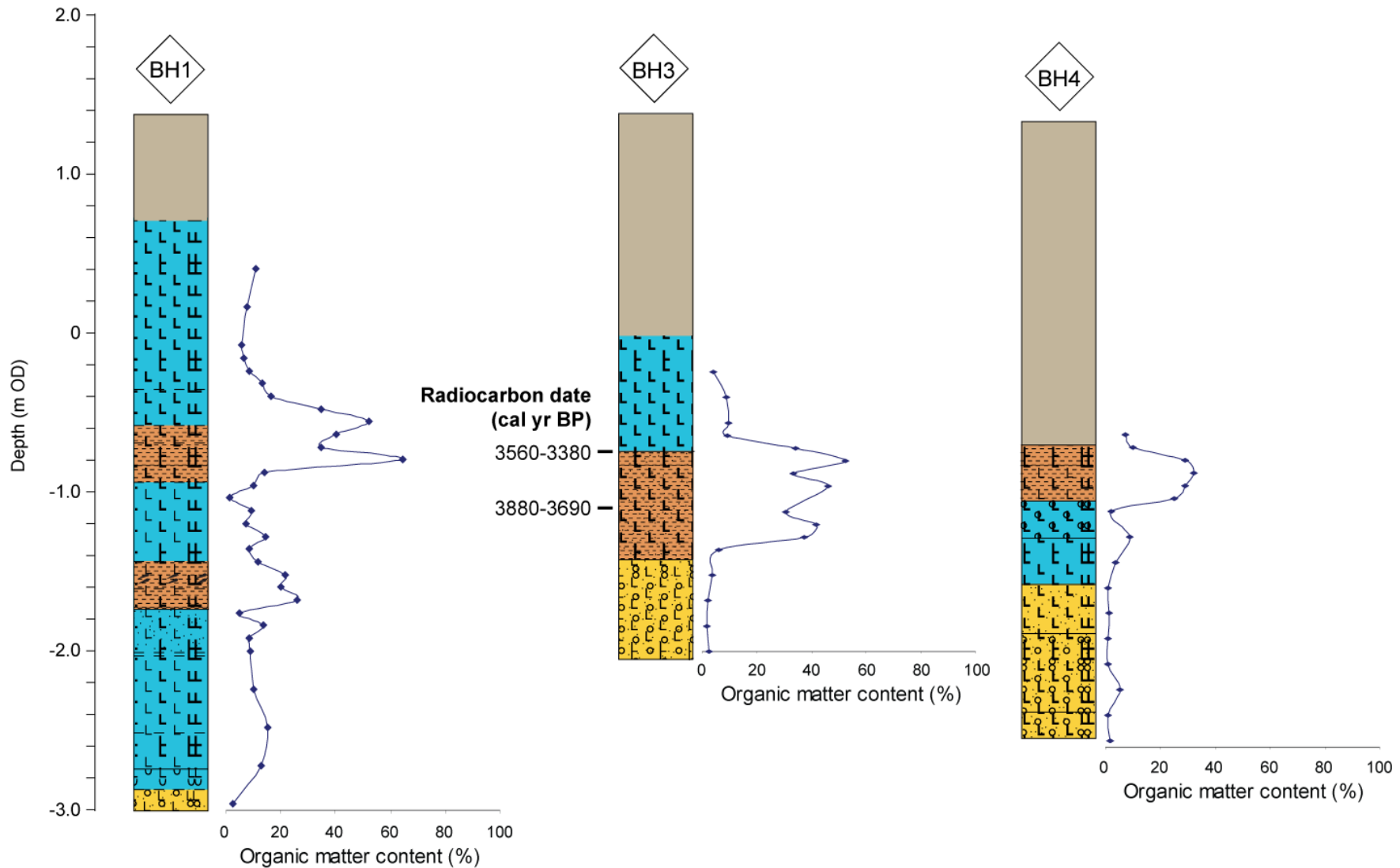


Figure 4: Organic matter content values for Boreholes <BH1>, <BH3> and <BH4>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09). The borehole logs are accurately spaced representing their geographical location

Table 8: Organic matter content determinations of Borehole <BH1>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Organic matter (%)
0.39 to 0.40	13	10.88
0.15 to 0.16	13	7.38
-0.09 to -0.08	13	5.58
-0.17 to -0.16	13	6.37
-0.25 to -0.24	13	8.44
-0.33 to -0.32	13	13.05
-0.41 to -0.40	12	16.53
-0.49 to -0.48	12	34.71
-0.57 to -0.56	12	52.23
-0.65 to -0.64	11	40.20
-0.73 to -0.72	10	34.70
-0.81 to -0.80	10	64.35
-0.89 to -0.88	10	14.03
-0.97 to -0.96	9	9.82
-1.05 to -1.04	9	1.31
-1.13 to -1.12	9	8.98
-1.21 to -1.20	9	7.15
-1.29 to -1.28	9	14.30
-1.37 to -1.36	9	8.56
-1.45 to -1.44	8	11.43
-1.53 to -1.52	8	21.33
-1.61 to -1.60	8	19.98
-1.69 to -1.68	7	25.83
-1.77 to -1.76	5	4.81
-1.85 to -1.84	6	13.50
-1.93 to -1.92	6	8.53
-2.01 to -2.00	6	8.69
-2.25 to -2.24	4	10.02
-2.49 to -2.48	4	15.32
-2.73 to -2.72	2	12.80
-2.97 to -2.96	1	2.19

Table 9: Organic matter content determinations of Borehole <BH3>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Organic matter (%)
-0.09 to -0.08	3	0.00
-0.25 to -0.24	3	4.03
-0.41 to -0.40	3	8.61
-0.57 to -0.56	3	9.40
-0.65 to -0.64	3	9.02
-0.73 to -0.72	3	34.15
-0.81 to -0.80	2	52.53
-0.89 to -0.88	2	33.20
-0.97 to -0.96	2	45.84
-1.13 to -1.12	2	30.65
-1.21 to -1.20	2	41.52
-1.29 to -1.28	2	37.38
-1.37 to -1.36	2	6.01
-1.53 to -1.52	1	3.56
-1.69 to -1.68	1	2.00
-1.85 to -1.84	1	1.66
-2.01 to -2.00	1	2.32

Table 10: Organic matter content determinations of Borehole <BH4>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Organic matter (%)
-0.72 to -0.71	6	9.85
-0.80 to -0.79	6	29.08
-0.88 to -0.87	6	32.18
-0.96 to -0.95	6	28.92
-1.04 to -1.03	6	25.10
-1.12 to -1.11	5	1.81
-1.28 to -1.27	5	8.76
-1.44 to -1.43	4	3.60
-1.60 to -1.59	3	0.76
-1.76 to -1.75	3	1.14
-1.92 to -1.91	2	0.71
-2.08 to -2.07	2	0.92
-2.24 to -2.23	2	5.31
-2.40 to -2.39	1	0.87
-2.56 to -2.55	1	1.52

4.0 RESULTS AND INTERPRETATION OF THE RADIOCARBON DATING

The near base of the peat unit at **-1.11m to -1.09m OD** has been radiocarbon dated to **3880 to 3690 cal yr BP**; wood bark from the top of the peat unit at **-0.74m to -0.75m OD** has been dated to **3560 to 3380 cal BP**. The $\delta^{13}\text{C}$ (‰) values are consistent with that expected for organic sediment, and there is no evidence for mineral or biogenic carbonate contamination. These dates may be equated with the Bronze Age cultural period.

Table 11: Results of the Radiocarbon Dating, Borehole <BH3>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Laboratory code / Method	Material and location	Depth (m OD)	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC (BP) (2-sigma, 95.4% probability)	$\delta^{13}\text{C}$ (‰)
Beta-270093 AMS	Wood bark; top of peat	-0.74 to -0.75	3240 ± 40	1610-1430 cal BC (3560-3380 cal BP)	-26.9
Beta-270094 AMS	Near base of peat	-1.11 to -1.09	3500 ± 40	1930-1740 cal BC (3880-3690 cal BP)	-29.0

5.0 RESULTS AND INTERPRETATION OF THE POLLEN-STRATIGRAPHIC ASSESSMENT/ANALYSIS

5.1 Results and interpretation of the borehole <BH1> pollen assessment

Fifteen sub-samples were extracted from borehole <BH1> for assessment of the pollen content (Table 12). No pollen or microscopic charred particles were preserved in the single sample from the sand and gravel deposits at the base of the sequence (-2.96 to -2.97m OD; unit 1). In the five sub-samples collected from the tufa sand, clay and silt units overlying the gravels (between -2.73m and -1.76m OD; units 3-6), the concentration of pollen was absent or poor, and preservation poor to moderate. Pollen is best preserved in anaerobic and acidic environments, and therefore its limited concentration and variable preservation in these calcareous-rich sediments is unsurprising. Nevertheless, the occurrence of Cyperaceae (sedge family), Poaceae (grass family), *Typha latifolia* (bulrush) and *Sparganium* type (bur-reed) indicate the growth of herbaceous and aquatic plants, most likely in a semi-aquatic environment. Microscopic charred particles were either absent or recorded in very low concentrations in these samples.

Pollen preservation and concentration was also poor or absent in the five samples taken between -1.53m and -0.56m OD, which comprised the two organic-rich, and single mineral-rich horizons (units 8-11). *Alnus* (alder) was the most commonly preserved with *Corylus* type (e.g. hazel) and *Pinus* (pine). Microscopic charred particles were either absent or recorded in very low concentrations in these samples. In the four samples taken from the fine grained mineral-rich sediments at the top of the sequence (units 12-13), pollen concentration and preservation was generally very low to absent, with the exception of the sample taken from -0.32 to -0.33m OD had a very high concentration and moderate preservation. The main taxa included *Alnus* (alder), Poaceae (grass family), Cyperaceae (sedge family) and *Typha latifolia* (bulrush). The assemblage is indicative of wet woodland dominated by alder, with an understorey of grasses, sedges and aquatics. *Corylus* type (e.g. hazel) may have grown on the wetland, but is equally likely to have formed mixed deciduous woodland on the dryland with *Tilia* (lime). Microscopic charred particles were recorded in low to moderate concentrations in these samples.

Table 12: Pollen-stratigraphic assessment of Borehole <BH1>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Concentration	Preservation	Microscopic charcoal	Main taxa	
					Latin name	Common name
0.40 to 0.39	13	1	1	3	cf Poaceae	grass family
0.16 to 0.15	13	0	-	2	-	-
-0.08 to -0.09	13	1	2	2	<i>Corylus</i> type	e.g. hazel
-0.32 to -0.33	13	5	3	2	<i>Alnus</i> <i>Tilia</i> <i>Pinus</i> <i>Corylus</i> type Poaceae Cyperaceae <i>Typha latifolia</i>	alder lime pine e.g. hazel grass family sedge family bulrush
-0.56 to -0.57	11	1-2	3	1	<i>Alnus</i> <i>Pinus</i>	alder pine
-0.80 to -0.81	10	1	2	1	<i>Alnus</i> <i>Corylus</i> type	alder e.g. hazel
-1.04 to -1.05	9	0	-	1	-	-
-1.28 to -1.29	9	1	2	1	<i>Alnus</i>	alder
-1.52 to -1.53	8	1	2	2	<i>Alnus</i> <i>Corylus</i> type	alder e.g. hazel
-1.76 to -1.77	6	0	-	-	-	-
-2.00 to -2.01	5	0	-	-	-	-
-2.24 to -2.25	4	1	2-3	1	Cyperaceae	sedge family
-2.48 to -2.49	4	1	3	-	cf <i>Trifolium</i> type Poaceae	e.g. red clover grass family
-2.72 to -2.73	3	1	4	-	Poaceae <i>Typha latifolia</i> <i>Sparganium</i> type	grass family bulrush bur-reed
-2.96 to -2.97	1	0	-	-	-	-

Key: 0 = 0 estimated grains per slide; 1 = 1 to 75; 2 = 76 to 150; 3 = 151 to 225; 4 = 226-300; 5 = 300+. Estimated number based on assessment of 10% of total number of slide transects (4 of 40 transects)

5.2 Results of the borehole <BH3> pollen-stratigraphical analysis (Figure 5)

Local Pollen Assemblage Zone WHQ-01 (-1.24m to 0.99m OD): *Alnus* – *Quercus* – *Corylus* type

This zone is characterised by high values of arboreal pollen: *Alnus* (50-70%) and *Quercus* (10-20%) dominate with *Pinus*, *Fraxinus*, *Betula*, *Acer*, *Ulmus* and *Tilia* (all <5%). Shrub pollen values are low (<10%) dominated by *Corylus* type with *Hedera*, *Salix* and cf *Lonicera periclymenum* (all <5%). Herbaceous pollen values are also low (<10%) dominated by Poaceae and Cyperaceae (both <5%) with *Ranunculus* type, Caryophyllaceae, *Plantago lanceolata*, *Lysimachia*, *Valeriana officinalis*, *Aster* type and *Avena-Triticum* type (all <2%). Aquatic pollen taxa were present through the zone (<5%) dominated by *Sparganium* type with *Menyanthes trifoliata* and *Potamogeton* type. Spores were also present through the zone dominated by *Dryopteris* type with *Polypodium vulgare* and *Pteridium aquilinum*.

Local Pollen Assemblage Zone WHQ-02 (-0.99m to -0.76m OD): *Alnus* – Poaceae-*Quercus* – *Corylus* type

This zone is characterised by high, but declining values of arboreal pollen: *Alnus* (50-30%) and *Quercus* (10%) dominate with *Pinus*, cf *Taxus*, *Fraxinus*, *Betula*, *Ulmus* and *Tilia* (all <5%). Shrub pollen values are low (<10%) dominated by *Corylus* type with *Hedera* and *Salix* (both <5%). Herbaceous pollen values increase, dominated by Poaceae (up to 20%) and *Chenopodium* type (5%) with Cyperaceae, *Ranunculus* type, *Sinapis* type, Apiaceae, Caryophyllaceae, *Plantago lanceolata*, *Galium* type, *Artemisia*, *Centaurea nigra*, Lactuceae, *Aster* type, *Cereale* type and *Avena-Triticum* type (all <2%). Aquatic pollen taxa increased through the zone (<10%) dominated by *Sparganium* type with *Menyanthes trifoliata* and *Typha latifolia*. Spores also increased through the zone (<15%) dominated by *Pteridium aquilinum* and *Dryopteris* type with *Polypodium vulgare* and Sphagnum.

5.3 Interpretation of the borehole <BH3> pollen-stratigraphical analysis (Figure 5)

Local Pollen Assemblage Zone WHQ-01 (-1.24m to 0.99m OD): *Alnus* – *Quercus* – *Corylus* type

The results of the pollen-stratigraphical analysis indicate that during Local Pollen Assemblage Zone (LPAZ) WHQ-01 *Alnus* (*Alnus glutinosa* - common alder) dominated the wetland environment with an understorey comprising *Corylus* type (e.g. hazel), *Hedera* (ivy) and cf *Lonicera periclymenum* (honeysuckle). The wetland ground flora comprised Poaceae (grass family, e.g. *Phragmites australis*), Cyperaceae (sedge family, e.g. *Schoenoplectus lacustris*), *Ranunculus* type (e.g. *R. acris* – meadow buttercup), Caryophyllaceae (pink family), *Lysimachia* (loosestrife), *Polypodium vulgare* (polypody fern) and *Dryopteris* (Buckler ferns). These taxa indicate the presence of damp woodland, growing within fen carr and/or on the margins of a river or stream with flowing water. The presence of aquatics *Sparganium* type (bur-reed), *Menyanthes trifoliata* (bogbean) and *Potamogeton* type (pondweed) is indicative of particularly damp (semi-aquatic) conditions. *Corylus* type pollen maybe representative of either *Corylus avellana* (hazel) and/or *Myrica gale* (bog myrtle) also growing as understorey shrubs within the wetland environment. *Quercus* (e.g. *Quercus robur* – pendunculate oak), *Fraxinus* (*F. excelsior* – ash), *Acer* (maple) and possibly *Ulmus* (e.g. *U. procera* – english elm) and *Betula* (e.g. *B. pendula* – silver birch) may have also been a component of the wetland woodland with alder. However, these taxa most commonly occur on dryland and they would have formed stands of mixed deciduous – possibly coniferous woodland with *Tilia* (e.g. *T. cordata* – small-leaved lime) and *Pinus* (*P. sylvestris*, pine).

The limited values of dryland woodland taxa, in particular *Ulmus* and *Tilia* indicate the pollen-stratigraphic sequence commences after the well documented elm and lime declines, and the dryland environment was relatively open in nature. The moderate pollen percentage values of hazel support this, together with the growth of light-loving trees, herbs and ferns, such as ash, ribwort plantain (*Plantago lanceolata*) and bracken (*Pteridium aquilinum*) to survive. Indeed, the presence of *Avena-Triticum* (oat/wheat) in addition to this pollen assemblage is a very strong indication of woodland disturbance for cultivation from at least the Early Bronze Age.

Local Pollen Assemblage Zone WHQ-02 (-0.99m to -0.76m OD): *Alnus* – Poaceae-*Quercus* – *Corylus* type

The results of the pollen-stratigraphical analysis indicate that during LPAZ WHQ-02, *Alnus* (*Alnus glutinosa* - common alder) dominated woodland declined on the wetland. The increase in aquatic pollen taxa *Sparganium* type (bur-reed), *Menyanthes trifoliata* (bogbean), *Typha latifolia* (bulrush) and possibly Poaceae (grass family, e.g. *Phragmites australis*) is indicative that this decline of wetland woodland maybe the result of a transition towards wetter conditions. In addition, the increased presence of *Pteridium aquilinum* (bracken), Sphagnum, *Dryopteris* type and *Pinus* (pine) maybe indicative of long distance transport within a waterbody (e.g. consequent of wetter conditions), as these pollen grains tend to be over-represented in such conditions (Campbell, 1999). The occurrence of *Chenopodium* type (goosefoot family) pollen through the zone maybe indicative of its growth in one of two main locations: (1) waste, dry ground and cultivated land (e.g. *Chenopodium album* – fat hen) and (2) salt marshes (e.g. *Suaeda maritima* – annual sea-blite). If the presence of *Chenopodium* type is indicative of *Suaeda maritima* plants, it suggests that the wetter conditions could be consequent of an increase in the rate of relative sea level rise.

On the dryland, the pollen-stratigraphy indicates that the vegetation remained relatively unchanged with a reduced woodland cover comprising *Quercus*, *Tilia* and *Corylus* type (e.g. hazel) and strong evidence for the growth of cereals (including *Avena/Triticum* (oats/wheat) and *Cereale* type (e.g. barley)) and associated weed taxa (including *Centaurea nigra* (black knapweed), *Plantago lanceolata* (ribwort plantain), *Galium* type (bedstraw) and possibly *Chenopodium* type (e.g. *C. album* – fat hen).

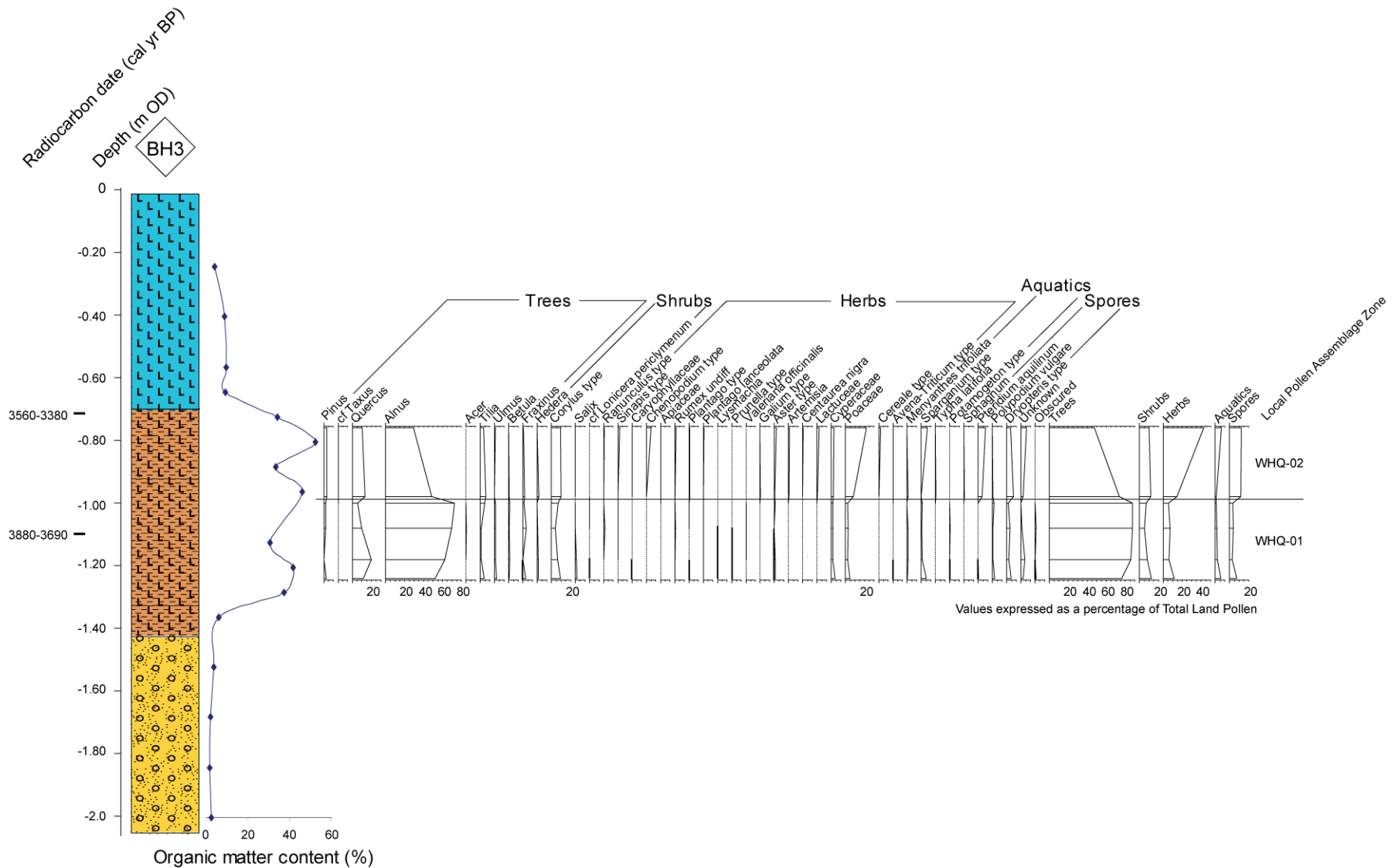


Figure 5: Pollen-stratigraphic diagram of Borehole <BH3>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

RESULTS AND INTERPREATION OF THE WATERLOGGED PLANT MACROFOSSIL (SEEDS AND WOOD) ASSESSMENT

Ten bulk samples subsampled from boreholes <BH1> and <BH3> were processed and assessed for waterlogged plant macrofossils. Four 10cm sub-samples extracted from borehole <BH1> (Table 13), and six 10cm sub-samples extracted from borehole <BH3> (Table 14).

Borehole <BH1>

The results of the waterlogged plant macrofossil assessment indicate that a low quantity of wood and seeds were preserved in the the organic horizons of borehole <BH1>. The waterlogged wood assemblage comprised two pieces of possible alder (cf *Alnus glutinosa*), and a number of unidentifiable fragments. The waterlogged seed assemblage consisted of *Ranunculus* sp (buttercup family) and indeterminate fruit skins.

Borehole <BH3>

The results of the waterlogged plant macrofossil assessment indicate that a low quantity of wood and seeds were preserved in the the organic horizons of borehole <BH3>. The waterlogged wood assemblage comprised two pieces of possible alder (cf *Alnus glutinosa*), two pieces of hazel/alder (*Corylus/Alnus*) and a number of unidentifiable fragments. The waterlogged seed assemblage consisted of *Alnus glutinosa* (seeds and catkins), *Sambucas nigra* (elder) and indeterminate fruit and seed skins.

Table 13: Results of the waterlogged plant macrofossil (seeds and wood) assessment of Borehole <BH1>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Volume (litres)	Fraction (e.g. flot, residue, >300µm)	Waterlogged		Main taxa	
				Wood	Seeds	Latin name	Common name
-0.80 to -0.90	10	<0.1	>1mm	1	1	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	0	0	- <u>Waterlogged seeds</u> <i>Sambucas nigra</i>	Indeterminate <u>Waterlogged seeds</u> elder
-0.90 to -1.00	9/10	<0.1	>1mm	1	0	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	0	1	cf <i>Alnus glutinosa</i> <u>Waterlogged seeds</u>	alder <u>Waterlogged seeds</u> Indeterminate fruit skins
-1.00 to -1.10	9	<0.1	>1mm	1	0	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	1	1	cf <i>Alnus glutinosa</i> <u>Waterlogged seeds</u>	alder <u>Waterlogged seeds</u> Indeterminate fruit skins
-1.10 to -1.20	9	<0.1	>1mm	1	1	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	0	0	- <u>Waterlogged seeds</u> cf <i>Ranunculus</i> sp	Indeterminate <u>Waterlogged seeds</u> buttercup family Monocotyledon stem fragments

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75;
4 = 76 to 100; 5 = 101+

Table 14: Results of the waterlogged plant macrofossil (seeds and wood) assessment of Borehole <BH3>, West Ham Bus Garage (the former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Depth (m OD)	Unit number	Volume (litres)	Fraction (e.g. flot, residue, >300µm)	Waterlogged		Main taxa	
				Wood	Seeds	Latin name	Common name
-0.75 to -0.85	2	<0.1	>1mm	2	1	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	1	1	<i>Corylus/Alnus</i> sp (2) <i>Alnus glutinosa</i> <u>Waterlogged seeds</u> <i>Sambucas nigra</i>	hazel/alder alder <u>Waterlogged seeds</u> elder Indeterminate fruit skins
-0.85 to -0.95	2	<0.1	>1mm	1	2	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	0	0	- <u>Waterlogged seeds</u> <i>Alnus glutinosa</i> (fruits and catkins)	Indeterminate <u>Waterlogged seeds</u> alder Monocotyledon stem fragments
-0.95 to -1.05	2	<0.1	>1mm	1	0	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	1	1	- <u>Waterlogged seeds</u> <i>Alnus glutinosa</i>	Indeterminate <u>Waterlogged seeds</u> alder
-1.05 to -1.15	2	<0.1	>1mm	1	1	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	1	1	- <u>Waterlogged seeds</u> <i>Alnus glutinosa</i>	Indeterminate <u>Waterlogged seeds</u> alder Monocotyledon stem fragments Indeterminate fruit skins
-1.15 to -1.25	2	<0.1	>1mm	1	1	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	0	1	<i>Alnus glutinosa</i> <u>Waterlogged seeds</u> <i>Alnus glutinosa</i>	alder <u>Waterlogged seeds</u> alder Monocotyledon stem fragments
-1.25 to -1.35	2	<0.1	>1mm	1	0	<u>Waterlogged wood</u>	<u>Waterlogged wood</u>
			>300µm	0	1	- <u>Waterlogged seeds</u>	Indeterminate <u>Waterlogged seeds</u> Leaf fragments Monocotyledon stem fragments Indeterminate fruit and seed fragments

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

DISCUSSION AND CONCLUSIONS

Four environmental archaeological aims were proposed for the West Ham Bus Depot site, each of these are addressed below based upon the results of the analysis:

(1) *To establish the timing and duration for the deposition of the organic-rich (peat) sediments*

The results of the radiocarbon dating programme indicate that peat formation commenced at the site sometime before 3880 to 3690 cal yr BP (-1.11m to -1.09m OD) and continued until ca. 3560 to 3380 cal BP (-0.74m to -0.75m OD). This period equates to the Bronze Age cultural period. Elsewhere, within the Lea Valley, approximately 1.5km upstream of the site within PDZ5 and PDZ6 of the Olympic Park (Green *et al.*, 2009), the accumulation of organic-rich sediments (including peat and tufa-sand) were radiocarbon dated to between 5290 to 4970 cal yr BP (PDZ5; Trench 1) and 1900 to 1730 cal yr BP (PDZ 6; Trench 8). These determinations indicate the deposition of organic sediment elsewhere within the Lea Valley occurred at least between the Late Neolithic to Late Iron Age/Early Roman cultural periods. The period of peat formation also occurs within the same time interval as many other sites within the Lower Thames Valley (e.g. Silvertown, Wilkinson *et al.*, 2000; Golfers Driving Range, Batchelor *et al.*, 2009), and at most sites in this region, peat formation and cessation is associated with variations in the rate of relative sea level rise (see Devoy, 1979, 1982; Long, 1995; Haggart, 1995; Sidell and Long, 2000; Long *et al.*, 2000; Wilkinson *et al.*, 2000; Sidell *et al.*, 2000; Sidell, 2003).

(2) *To reconstruct the vegetation history of the site*

Wetland environment

The results of the pollen and waterlogged plant macrofossil (seeds and wood) investigations indicate that during the period of peat formation, the wetland environment was initially colonised by damp woodland dominated by alder (*Alnus*) with an understorey of hazel (*Corylus*), elder (*Sambucas nigra*), ivy, (*Hedera*) and honeysuckle (*Lonicera periclymenum*). Oak (*Quercus*), ash (*Fraxinus*), maple (*Acer*), *Ulmus* (elm) and *Betula* (birch) may also have formed part of the wetland woodland. The wetland ground flora comprised grasses (e.g. *Phragmites australis*), sedges (Cyperaceae), buttercup (*Ranunculus*), pink (Caryophyllaceae), loosestrife (*Lysimachia*), ferns (*Dryopteris* and *Polypodium vulgare*) and aquatics (*Sparganium*, *Menyanthes trifoliata* and *Potamogeton*).

During the later period of peat formation, the alder dominated woodland apparently declined, whilst the growth of aquatic taxa (including *Sparganium*, *Menyanthes trifoliata* and *Typha latifolia*) and grasses (e.g. *Phragmites australis*) increased. This change in vegetation is most

likely representative of a shift towards wetter conditions, possibly caused by an increase in the rate of relative sea level rise.

Dryland environment

The results of the pollen investigations indicate that during the period of peat formation the dryland environment was occupied by stands of mixed deciduous-coniferous woodland comprising oak, maple, elm, birch, lime and pine. The sequence is clearly post the well documented elm and lime declines, and consequently the local dryland environment appears to have been relatively open with the growth of light-loving trees (e.g. ash), herbs (e.g. ribwort plantain – *Plantago lanceolata*), ferns and bracken (*Pteridium aquilinum*). The presence of *Avena-Triticum* (oat/wheat) and *Cereale* type (e.g. barley) at various horizons through the pollen-stratigraphic diagram is a very strong indication of woodland disturbance for cultivation from at least the Early Bronze Age.

(3) *To assess any evidence for human impact on the natural environment, and attempt to elucidate the timing, duration and nature of these activities, which may have included woodland clearance (e.g. elm and lime) and forest farming from the Neolithic onwards*

As discussed above, the pollen-stratigraphic diagram and results of the radiocarbon dating indicate that the organic-rich sequences captured from the site at West Ham Bus Depot are clearly post the well documented elm and lime declines. The pollen-stratigraphy contains unequivocal evidence for a reduced woodland covering, resulting from disturbance, most likely for habitation and farming. In particular the presence of *Avena-Triticum* (oak/wheat) and *Cereale* type (e.g. barley) pollen is indicative of cultivation within the nearby vicinity, and other herbaceous pollen taxa indicate the growth of associated crop weeds.

The amount of human activity on the wetland at this site is unknown: the borehole record does not contain any archaeological evidence, nor are there any indicative plant macrofossils (such as charred seeds, charcoal, or cereal grains). Nevertheless, it is probable that the wetland at the site may have been utilised for e.g. access to the river (for fuel/food/transport) and access to damp grasslands (domesticated animal grazing), as it has elsewhere in the Lower Thames Valley (e.g. Golfers Driving Range; Carew *et al.*, in press; Batchelor, 2009).

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APPENDIX B: OASIS FORM

OASIS ID: quaterna1-62755

Project details

Project name Environmental archaeological assessment, West Ham Bus Depot (site code: WHQ09)

Short description of the project Environmental archaeological assessment was carried out on boreholes collected during a previous borehole survey at the site. The investigations consisted of organic matter determinations, and pollen and waterlogged plant macrofossil (seeds and wood) assessments. The results revealed that preservation and concentration of pollen was poor in borehole but moderate-high in . Waterlogged plant macrofossils were limited in both boreholes assessed. The biostratigraphic assessment results broadly indicate that during the deposition of alluvium, and in particular the organic-rich horizons, the wetland was dominated by alder, with an understorey of shrubs (including willow, elder and hazel) grasses, sedges and semi-aquatic taxa. On the dryland, the pollen-stratigraphic assessment indicates the presence of mixed deciduous woodland dominated by oak with lime. No definitive indicators of anthropogenic activity (e.g. cereals) were recorded within the assessment.

Project dates Start: 15-05-2009 End: 31-07-2009

Previous/future work Yes / Not known

Any associated project reference codes WHQ09 - Sitecode

Type of project Environmental assessment

Site status None

Current Land use Community Service 1 - Community Buildings

Monument type BUS STATION Uncertain

Significant Finds PEAT Uncertain

Significant Finds ALLUVIUM Uncertain

Survey techniques Ecology

Project location

Country England
Site location GREATER LONDON NEWHAM WEST HAM West Ham Bus Garage
Postcode E16
Study area 5.20 Hectares
Site coordinates TQ 39050 82500 51.5237738094 0.00456342060556 51 31 25 N 000 00 16 E Point
Height OD / Depth Min: -2.90m Max: 0.70m

Project creators

Name of Quaternary Scientific (QUEST)
Organisation

Project brief Quaternary Scientific (QUEST)
originator

Project design Dr N.P. Branch
originator

Project C.R. Batchelor
director/manager

Project supervisor C.R. Batchelor

Type of Developer
sponsor/funding
body

Name of Mansell Construction Services Limited
sponsor/funding
body

Project archives

Physical Archive LAARC
recipient

Physical Archive ID WHQ09

Physical Contents 'Environmental'

Digital recipient Archive LAARC

Digital Archive ID WHQ09

Digital Contents 'Environmental','Stratigraphic','Survey'

Digital available Media 'Images raster / digital photography','Images vector','Spreadsheets','Survey','Text'

Paper recipient Archive LAARC

Paper Archive ID WHQ09

Paper Contents 'Environmental','Stratigraphic','Survey'

Paper available Media 'Correspondence','Report'

Project bibliography 1

Publication type Grey literature (unpublished document/manuscript)

Title WEST HAM BUS GARAGE (THE FORMER PARCEL FORCE DEPOT), WEST OF STEPHENSON STREET, LONDON BOROUGH OF NEWHAM (SITE CODE: WHQ09): ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT

Author(s)/Editor(s) Batchelor, C.R.

Author(s)/Editor(s) Branch, N.P.

Author(s)/Editor(s) Allott, L.

Author(s)/Editor(s) Morgan, P.

Author(s)/Editor(s) Young, D.

Other bibliographic details Unpublished Report July 2009; Project Number 007/08

Date 2009

Issuer or publisher Quaternary Scientific (QUEST)

Place of issue or publication Unpublished report

Project bibliography 2

Publication type Grey literature (unpublished document/manuscript)

Title A report on the geoarchaeological borehole investigations: West Ham Bus Garage (The former Parcel Force Depot), West of Stephenson Street, London Borough of Newham (site code: WHQ09)

Author(s)/Editor(s) Batchelor, C.R.

Author(s)/Editor(s) Branch, N.P.

Author(s)/Editor(s) Morgan, P.

Author(s)/Editor(s) Young, D.

Other bibliographic details Quaternary Scientific (QUEST) Unpublished Report April 2009; Project Number 007/08

Date 2009

Issuer or publisher Quaternary Scientific (QUEST)

Place of issue or publication Unpublished report

Project bibliography 3

Publication type Grey literature (unpublished document/manuscript)

Title Parcel Force Depot, West of Stephenson Street, London, E16: Desk-based assessment

Author(s)/Editor(s) Bull, R.

Author(s)/Editor(s) Corcoran, J.
Date 2007
Issuer or publisher MoLAS-PCA Archaeology Limited

Place of issue or Unpublished report
publication

**Project
bibliography 4**

Publication type Grey literature (unpublished document/manuscript)
Title Written Scheme of Investigation for the geoarchaeological investigation of The Parcel Force Depot, West of Stephenson Street, London, E16
Author(s)/Editor(s) Branch, N.P.
Date 2008
Issuer or publisher ArchaeoScape
Place of issue or Unpublished report
publication

Entered by Rob Batchelor (c.r.batchelor@reading.ac.uk)
Entered on 31 July 2009