A REPORT ON THE GEOARCHAEOLOGICAL FIELD INVESTIGATIONS AT 105-107 TARLING ROAD, LONDON BOROUGH OF NEWHAM (SITE CODE: TAR13)

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INTRODUCTION

This report summarises the findings arising out of the geoarchaeological field investigations undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at 105-107 Tarling Road, London Borough of Newham (site code: TAR13; National Grid Reference: TQ 398 812; Figure 1). The site is in the lower valley of the River Lea, to the east of the river and close to the confluence of the Lea with the River Thames. The western boundary of the site is approximately 400m from the present-day channel of the Lea at a point where the river, known here as Bow Creek, follows a very convoluted meandering course. The mouth of Bow Creek, at its confluence with the Thames, lies *ca*. 500m to the southeast of the site.

The British Geological Survey (1:50,000 Sheet 257 Romford 1996) shows the site underlain by Alluvium, described as comprising mainly sand, silt and clay with some gravel, resting on London Clay bedrock. In fact, the Holocene alluvium of the Lower Thames and its tributaries is almost everywhere underlain by Late Devensian Late Glacial Gravels (in the Thames valley, the Shepperton Gravel of Gibbard, 1985, 1994; in the Lea valley, the Lea Valley Gravel of Gibbard, 1994), and this gravel is widely recorded in boreholes in the vicinity of Canning Town.

The site lies within the area that has been investigated in the Lea Valley Mapping Project (Corcoran *et al.,* 2011; Figure 1). In this project the Lea Valley has been divided into Landscape Zones characterised by their Holocene landscape history based largely on sedimentary evidence derived from borehole records. The Tarling Road site lies within Landscape Zone 1.3, where Corcoran *et al*. (2011) record the Gravel surface at between *ca*. -2.0 and -4.0m OD and describe ‘a single peat bed, likely to be of Neolithic date at its base and Bronze Age at the top… interleaved between alluvial clay units’. It should be recognised however, that although the examination of the borehole evidence by Corcoran *et al.* (2011) appears to have been thoroughly comprehensive (in total over 2000 BGS borehole records were incorporated into the Lea Valley Mapping Project database), the distribution of these boreholes is very uneven (see Corcoran *et al.* 2011 Figure 15) relative to the scale of the

variability that characterises the Holocene alluvial sequence and the surface of the Lea Valley and Shepperton Gravels on which it rests. Indeed, no boreholes were studied from the nearby vicinity of the site and thus the sub-surface stratigraphy is not that well understood here.

Recent geotechnical investigations by K F Geotechnical (2013) indicate that the Gravel surface beneath the site lies at around 3.8m below ground surface (bgs) (*ca*. -2.8m OD). This surface apparently rises to the south-west, recorded at approximately -1.75m OD in Trenches 1, 2 and 4, and -2.03m OD in Trench 3 during previous archaeological excavations at St Luke's Square (Figure 2; Weale, 2008). The K F Geotechnical borehole records indicate that the surface of the Gravel at Tarling Road is overlain by a sequence of generally silty, clayey Alluvium, with silty clayey Peat recorded between 2.30 to 2.70m bgs (*ca*. -1.30 to -1.70m OD) in BH1, and 1.30 to 3.8m bgs (*ca*. -0.30 to -2.8m OD) in BH2. A similar sequence of Alluvium was recorded at St Luke's Square, including Peat deposits approximately 1.4m in thickness, which were dated in Trench 3 between 5660-5490 (middle Neolithic) and 3570-3450 cal BP (middle Bronze Age) (Wicks, 2010).

The different stratigraphic units recorded are significant as they represent different environmental conditions that would have existed in a given location. For example, soil and Peat represent former terrestrial or semi-terrestrial land-surfaces, whilst fine to medium-grained sediments such as sands, silts and clays represent periods of inundation/flooding by estuarine or fluvial waters. Thus by studying the sub-surface stratigraphy across a given area (i.e. the site and its surroundings), it is possible to build an understanding of the former landscapes and environmental changes that took place over space and time. Furthermore, the soils and Peats represent potential areas that might have been utilised or even occupied by prehistoric people. Similarly, high areas of Shepperton Gravel may also represent utilised surfaces as they remained elevated above the floodplain during periods of inundation. Indeed, Corcoran *et al.* (2011) consider the archaeological and palaeoenvironmental potential of Landscape Zone LZ1.3 to be high, with evidence for prehistoric communities exploiting the wetland-dryland interface in this area.

In addition to St Luke's Square, this potential has been demonstrated at the following nearby sites (Figure 1): (1) Victoria Dock Road *ca*. 300m to the south (Barnett *et al*., 2010) which contained a sequence of alluvial and peat deposits dating from the early Neolithic to Middle Bronze Age with palaeoenvironmental evidence (including pollen, charcoal and burnt molluscs) for impact on the prehistoric landscape; (2) the A13 Ironbridge-Canning Town route *ca*. 400m to the north (Stafford, 2013) at which peat and alluvial deposits were recorded

dating from the middle Neolithic to middle Bronze Age; (3) Fords Park Road *ca*. 300m to the northeast (Eastbury *et al*., 2009) at which a sand island was recorded with a large flint assemblage, including local and imported flint, flint waste and burnt flint dating to the Mesolithic and Bronze Age, and (4) the Pitts Head (Batchelor *et al*., 2013) *ca*. 300m to the northeast (Batchelor *et al*., 2013) at which a sequence of peat deposits dating from the middle Neolithic to middle Bronze Age was recorded adjacent to a high gravel surface containing charcoal and palynological evidence for prehistoric impact on the prehistoric landscape.

The main aim of the geoarchaeological investigations at the Tarling Road site was to produce a basic model of the sub-surface stratigraphy of the site by putting down two new geoarchaeological boreholes at the site, and combining these records with existing geotechnical and archaeological data from both on and immediately adjacent to the site. This model will be used to provide a reconstruction of the site's former landscape and its evolution through time, as well as its potential utilisation by prehistoric people. The report will also provide recommendations on the suitability for further geoarchaeological investigations.

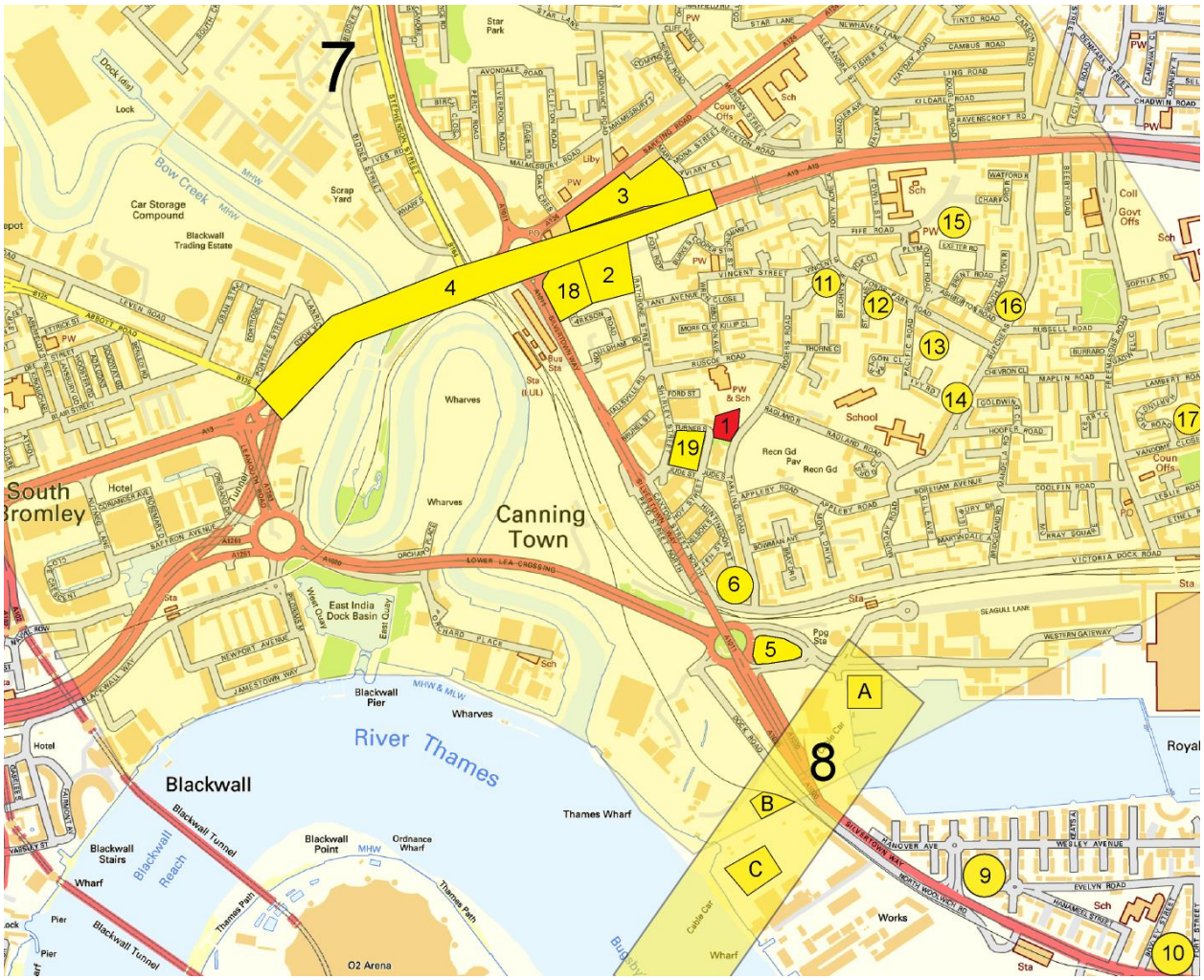

Figure 1: Location of (1) 105-107 Tarling Road, London Borough of Nehwam and other geoarchaeological and archaeological sites nearby: (2) Canning Town Phase 1 (CTR12; Green & Young, 2012); (3) Rathbone Market (RBO10; Young *et al*., 2013); (4) A13 Ironbridge-Canning Town (Stafford, 2012); (5) Tidal Basin Road (Young & Batchelor, 2013); (6) 118 Victoria Dock Road (Barnett *et al*., 2010); (7) area of the Lower Lea Valley Mapping Project (Corcoran *et al*., 2011); (8) the Cable Car route ((A) North Station; (B) North Intermediate Tower; (C) North Tower (Batchelor *et al*., 2012); (9) Silvertown (BWC96; Wilkinson *et al*., 2000); (10) Fort Street (HW-FO94; Wessex Archaeology, 2000); (11) The Pitts Head (PHD12; Batchelor *et al*., 2013); (12) Fords Park Road (FDP07; Eastbury *et al*., 2009); (13) Crediton Road (CDZ07; Eastbury *et al*., 2009); (14) Butchers Road (BUZ07; Eastbury *et al*., 2009); (15) Fife Road (FIH12; Killock, 2012); (16) Butchers Road Garages (BCQ97; Eastbury *et al*., 2009); (17) Vandome Close (VAD07; Eastbury *et al*., 2009) and (18) Canning Town Phase 2 (Young, in prep.); (19) St Luke's Square (LUC07; Weale, 2008; Wicks, 2010) *Contains Ordnance Survey data © Crown copyright and database right [2013]*

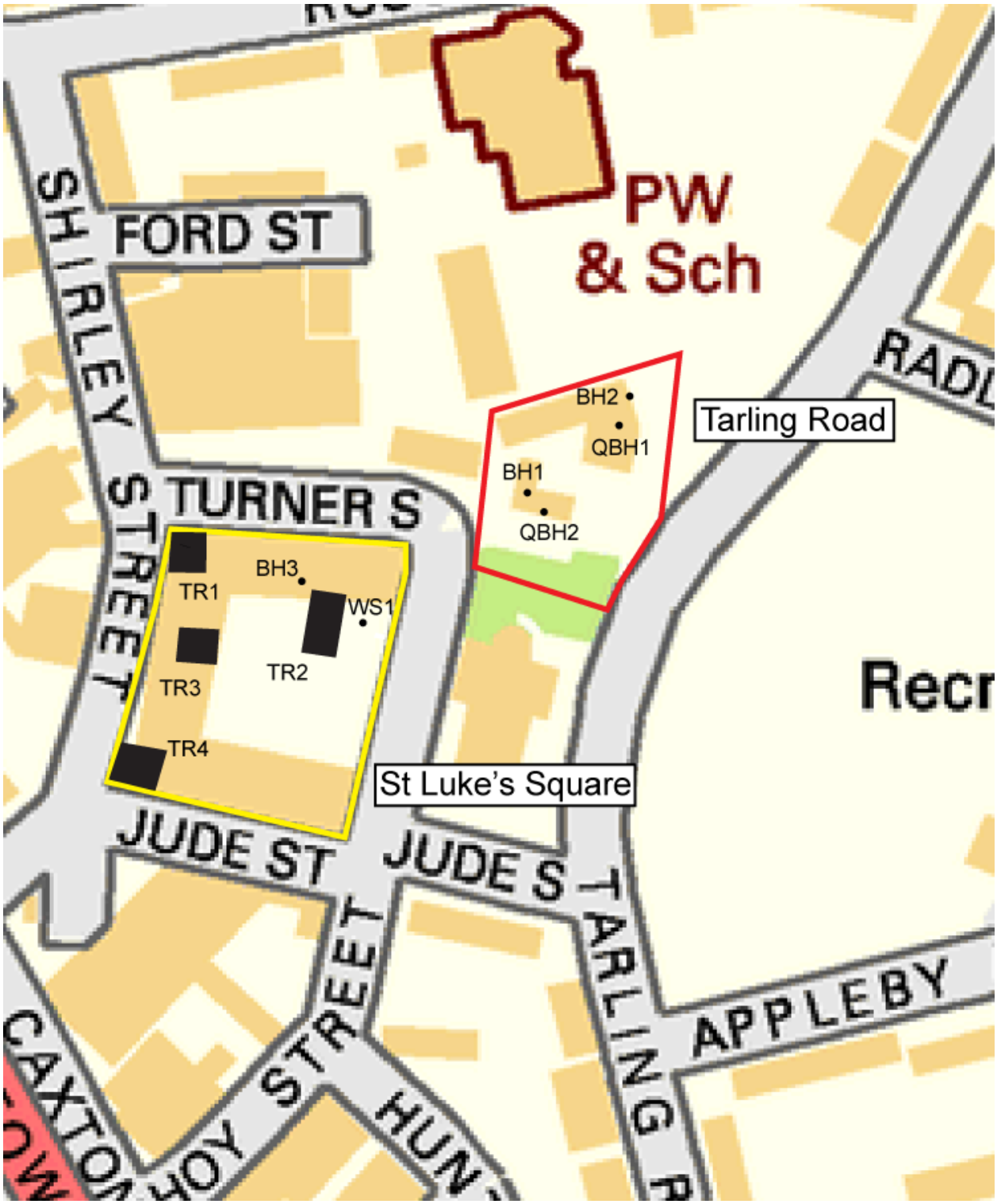

Figure 2: Location of boreholes QBH1 and QBH2 at 105-107 Tarling Road, and previous geotechnical boreholes/archaeological trenches at St Luke's Square (Weale, 2008; Wicks, 2010), London Borough of Newham.

METHODS

Field investigations

Two boreholes (boreholes QBH1 and QBH2) were put down at the site in September 2013 (Figure 2). Borehole core samples were recovered using an Eijkelkamp window sampler and gouge set using an Atlas Copco TT 2-stroke percussion engine. This coring technique is a suitable method for the recovery of continuous, undisturbed core samples and provides sub-samples suitable for not only sedimentary and microfossil assessment and analysis, but also macrofossil analysis. The recovered core samples were wrapped in clear plastic to prevent moisture loss, labelled with the depth (metres from ground surface) and orientation (top and base) and returned to Quaternary Scientific for storage in a purpose built facility at 2^0C. This temperature prevents fungal growth on the core surface, which may lead to anomalous radiocarbon dates, and moisture loss. The spatial attributes of each borehole were recorded using a Leica Differential GPS (Table 1 and Figure 2).

Table 1: Spatial data for the new geoarchaeological boreholes at Tarling Road, London Borough of Newham

Borehole	Easting	Northing	Surface elevation (m OD)
QBH1	539857.1	181216.9	0.79
QBH2	539838.0	181194.8	0.66

Lithostratigraphic descriptions

The lithostratigraphy of boreholes QBH1 and QBH2 was described in the laboratory using standard procedures for recording unconsolidated sediment and organic sediments, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts) (Tröels-Smith, 1955). The procedure involved: (1) cleaning the samples with a spatula or scalpel blade and distilled water to remove surface contaminants; (2) recording the physical properties, most notably colour using a Munsell Soil Colour Chart; (3) recording the composition; gravel (Grana glareosa; Gg), fine sand (Grana arenosa; Ga), silt (Argilla granosa; Ag) and clay (Argilla steatoides); (4) recording the degree of peat humification and (5) recording the unit boundaries e.g. sharp or diffuse. The results are displayed in Tables 2 and 3.

RESULTS AND INTERPRETATION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS

The results of the lithostratigraphic descriptions are displayed in Tables 2 and 3, and in Figure 3.

The lowermost unit recorded is a horizon of sandy gravel (the Lea Valley Gravel) laid down on the valley floor within a high energy braided river system at the end of the Late Glacial period (Marine Isotope Stage 2, Late Devensian, *ca*. 16,000-11,500 cal BP). The borehole records indicate that the Gravel surface lies at -2.86m OD towards the northeast of the site (QBH1), and at -2.29m OD towards the southwest (QBH2; Figure 3). At St Luke's Square immediately to the southwest, the Gravel surface was recorded at approximately -1.75m OD in Trenches 1, 2 and 4, and -2.03m OD in Trench 3 (Figure 2; Weale, 2008). Thus, the results of the geoarchaeological fieldwork confirm that the Gravel surface slopes downwards from southwest to northeast across the Tarling Road and St Luke's Square sites.

The Lea Valley Gravel at Tarling Road is overlain in both boreholes by a unit of variably sandy silt 0.3 in QBH2 and 0.95m thick in QBH1. In QBH2 this unit also contains detrital plant remains. These sediments most likely represent alluvial deposition during the early to mid-Holocene. The alluvial sediments are overlain in both boreholes by a silty and in borehole QBH2 woody Peat horizon, between -1.56 and -1.91m OD (0.35m thickness) in borehole QBH1 and between -1.27 and -1.99m OD in QBH2 (0.72m thickness) (Figure 3). The accumulation of Peat is indicative of a transition from an alluvial to semi-terrestrial environment, most likely supporting the growth of wetland vegetation. In both boreholes the Peat is silty, indicating frequent flooding during the period of accumulation. The Peat is overlain in both boreholes by silty clay containing frequent detrital organic material between -0.72 and -1.30m OD (QBH1) and -0.34 and -1.27m OD (QBH2), indicative of a return to alluvial conditions. In both boreholes the uppermost Unit was Made Ground, 1.51m thick in borehole QBH1 and 1.00m thick in QBH2.

The program of recent geotechnical investigations previously carried out at the site (K F Geotechnical Ltd, 2013) indicate different thicknesses of Peat and Alluvium to those recorded during the georarchaeological boreholes (despite their close proximity). This is likely to be the result of different descriptive terms and differing technical constraints in terms of recorded detail of the geotechnical investigations. Thus, the geoarchaeological borehole descriptions are considered to represent the most accurate record of sedimentary sequence.

The alluvial sequence at Tarling Road is similar to that recorded at St Luke's Square. There are however differences. Detailed description of the St Luke's Square Trench 3 sequence

reveals that Peat immediately overlies the Lea Valley Gravels at -2.03m OD (Wicks, 2010), whilst at Tarling Road, a period of sediment accumulation in an alluvial environment took place prior to Peat formation. In addition, in the St Luke's Square sequence, the Peat measured 1.42m in thickness, forming between -2.03m OD and -0.61m OD, a period spanning 5660-5490 (middle Neolithic) to 3570-3450 cal BP (middle Bronze Age). The Peat recorded within the boreholes at Tarling Road is much thinner, spanning a maximum of 0.72m, between -1.99 and -1.27m OD. On the basis of elevation, it is likely that the date of the Peat at Tarling Road is within the same range as that recorded at St Luke's Square, although a shorter period of accumulation is anticipated (most likely <1000 years).

Table 2: Lithostratigraphic description of borehole QBH1, Tarling Road, London Borough of Newham

Depth (m OD)	Depth (m bgs)	Description
0.79 to -0.72	0.00 to 1.51	Made Ground/disturbed Alluvium; sharp contact in to:
-0.72 to -1.30	1.51 to 2.09	10YR 4/1; Ag2 As2 Dh+ Dl+; dark grey silt and clay with traces of detrital herbaceous material and detrital wood. Diffuse contact in to:
-1.30 to -1.56	2.09 to 2.35	10YR 3/1; As2 Ag1 Dl1 Dh+; very dark grey silty clay with detrital wood and traces of detrital herbaceous material. Sharp contact in to:
-1.56 to -1.91	2.35 to 2.70	10YR 2/1; Sh3 Ag1 Th+; humo. 3/4; black well humified silty peat with traces of herbaceous material. Diffuse contact in to:
-1.91 to -2.86	2.70 to 3.65	Gley1 5/10Y; Ga2 Ag1 As1; greenish grey silty clayey sand. Sharp contact in to:
-2.86 to -3.21	3.65 to 4.00	Gg3 Ga1; sandy gravel. Mainly flint clasts 3-25mm in diameter.

Table 3: Lithostratigraphic description of borehole QBH2, Tarling Road, London Borough of Newham

Depth (m OD)	Depth (m bgs)	Description
0.66 to -0.34	0.00 to 1.00	Made Ground
-0.34 to -0.73	1.00 to 1.39	10YR 4/1; As3 Ag1; dark greyish brown silty clay with occasional ?calcareous nodules. Diffuse contact in to:
-0.73 to -1.27	1.39 to 1.93	10YR 3/1; As2 Ag1 Sh1 Dl+ Dh+; very dark grey organic silty clay with traces of detrital herbaceous material and detrital wood. Sharp contact in to:
-1.27 to -1.34	1.93 to 2.00	10YR 2/1; Sh3 Ag1 Th+; humo. 3/4; black well humified silty peat with traces of herbaceous material.
-1.34 to -1.99	2.00 to 2.65	10YR 2/1; Sh2 Ag1 Tl^{2}1 Th+; humo. 3; black well humified silty wood peat with traces of herbaceous material. Sharp contact in to:
-1.99 to -2.29	2.65 to 2.95	Gley1 4/N; Ag2 Ga1 As1 Dh+; dark grey clayey sandy silt with traces of detrital herbaceous material. Diffuse contact in to:
-2.29 to -2.34	2.95 to 3.00	Gley1 4/N; Gg2 Ga1 Ag1; dark grey silty sandy gravel. Mainly flint clasts 2-30mm in diameter.

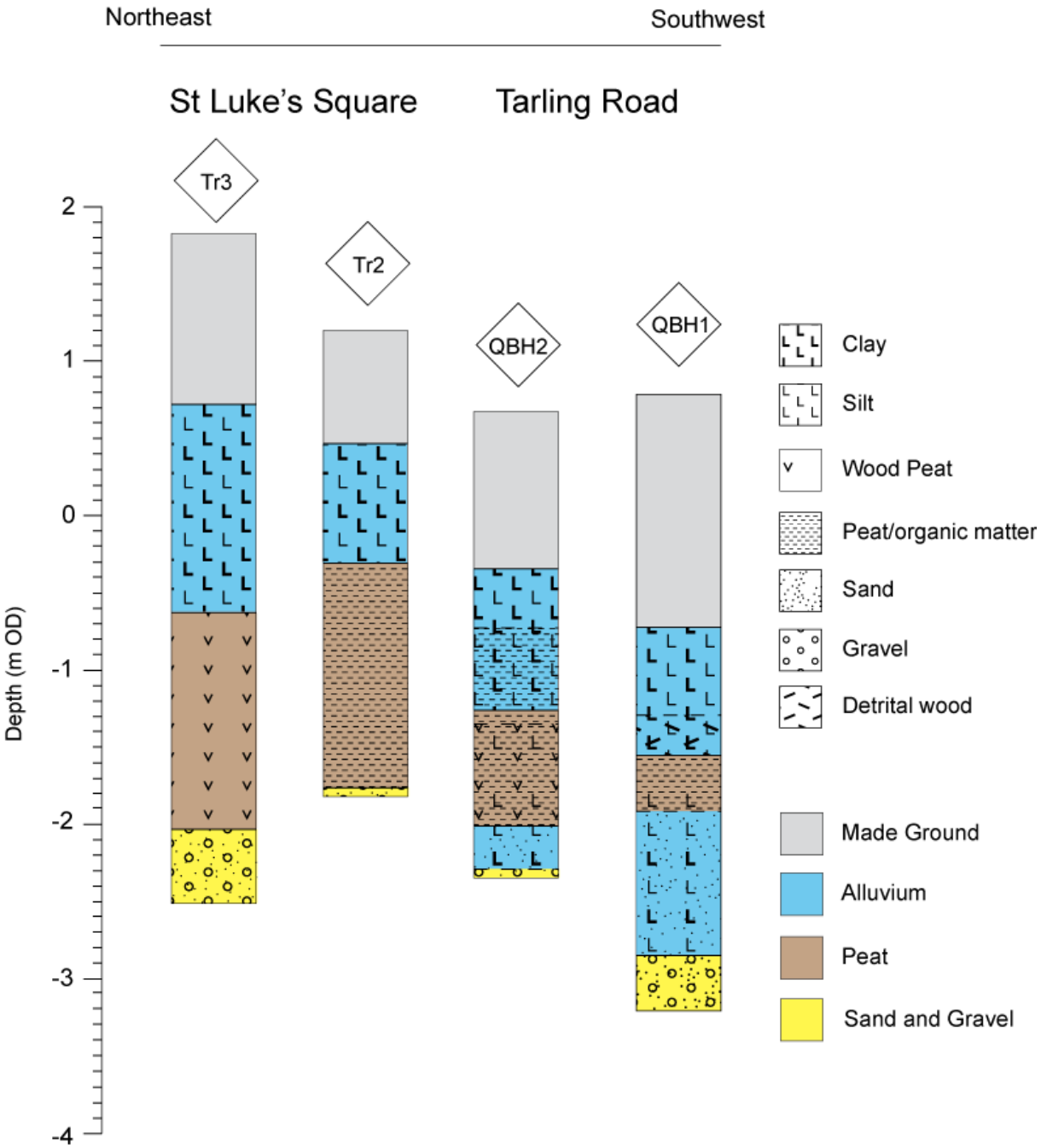

Figure 3: Results of the lithostratigraphic description of boreholes QBH1 to QBH2 at Tarling Road, London Borough of Newham

DISCUSSION

The surface of the Late Devensian Lea Valley Gravel at Tarling Road and St Luke's Square is the platform upon which Holocene Alluvial sediments, including Peat, have accumulated. Elsewhere in the valley of the Middle and Lower Thames, the surface of the Late Devensian Lea Valley/Shepperton Gravel is often uneven (Gibbard, 1985; 1994) with relief features that can be identified as longitudinal gravel bars and palaeochannels with a relief amplitude commonly of 3-4m and in some places up to 6m. The new geoarchaeological boreholes indicate that the Gravel surface lies at -2.86m OD towards the northeast of the site, and slopes upwards to between -2.03 and -1.75m OD beneath the St Luke's Square site (Weale, 2008).

Corcoran *et al.'s* (2011) investigations indicate that the Gravel surface in Landscape Zone 1.3 (within which Tarling Road lies) generally ranges between -2.0 and -4.0m OD. The surface at St Luke's Square is therefore clearly above this range, whilst Tarling Road is located within the upper limits. Whether the downward slope of the Gravel surface beneath the Tarling Road site marks the edge of a much deeper depression is unknown due to a lack of stratigraphic data from the immediate vicinity of the site. It is of note however, that in the area of the Tidal Basin Road site *ca*. 300m to the south, the Lea Valley Gravel surface was recorded at between -2.0 and -4.0m OD, also sloping downwards from west to east (Young & Batchelor, 2013; Figure 1). It might be postulated on the basis of the results from these sites, that a former channel aligned broadly north-south exists within this area.

Further variations in the height of the Lea Valley Gravel surface, potentially indicative of former channels have been identified *ca*. 300m to the north in Landscape Zone 1.1a during geoarchaeological investigation of the Canning Town Regeneration Program (Phases 1 & 2; Green & Young, 2012; Young, in prep), Rathbone Market (Young *et al*., 2013), and the A13 Ironbridge-Canning Town route (Stafford, 2012). It is unclear at this stage how any of these potential channels might relate to one another, and demonstrates the complexity of the sub-surface stratigraphy in this region of the Thames/Lower Lea Valley.

At Tarling Road, the Gravel surface is overlain by Alluvium prior to the formation of Peat; whilst at St Luke's Square, Peat immediately overlies the Gravel surface. This difference is most likely a reflection of the topography of the Lea Valley Gravel, which is higher at St Luke's Square and thus less susceptible to inundation. Whilst higher Gravel surfaces are considered to contain a greater potential for prehistoric archaeology, excavation of the trenches at St Luke's Square revealed no such evidence (Weale, 2008).

The Peat that overlay the Gravel at St Luke's Square accumulated between 5660-5490 (middle Neolithic) to 3570-3450 cal BP (middle Bronze Age) (Wicks, 2010). Radiocarbon dating of the Peat at other nearby sites such as Victoria Dock Road (Barnett *et al*., 2010), the A13 Ironbridge-Canning Town route (Stafford, 2013) and the Pitts Head (Batchelor *et al*., 2013) also indicate accumulation during at least some of the Neolithic and Bronze Age cultural periods (Figure 1). It is therefore highly likely that the Peat from Tarling Road is of the same age range, although the precise chronological relationship between formation here and at St Luke's Square is uncertain.

Nevertheless, the transition to Peat formation is significant, as it represents the development of a semi-terrestrial surface supporting the growth of fen vegetation, and which may have been utilised by prehistoric people. Indeed, many of the sites outlined above contain archaeological and/or palaeoenvironmental evidence for prehistoric impact on the landscape (e.g. *in situ* burning and woodland disturbance) during the period of Peat formation. At St Luke's Square, assessment of the pollen indicated the growth of alder dominated fen woodland on the Peat surface, with an understorey of grasses, sedges and ferns, whilst the dryland was occupied by tree and shrub taxa including oak, lime and hazel (Wicks, 2010). The preservation of pollen was insufficient to enable full analysis, but some very tentative evidence for human activity was noted towards the base of the Peat in the form of ribwort plantain (*Plantago lanceolata*), which might suggest disturbance (Wicks, 2010). In addition, declines in the relative proportions of lime pollen were recorded further up the sequence, potentially indicative of late prehistoric land clearance.

CONCLUSIONS AND RECOMMENDATIONS

The Holocene sediments recorded at the 105-107 Tarling Road site are consistent with the findings of Corcoran *et al*. (2011) for this area, whose Landscape Zone LZ1.3 is characterised by a Gravel surface at between *ca*. -2.0 and -4.0m OD and Holocene Alluvium containing 'a single peat bed, likely to be of Neolithic date at its base and Bronze Age at the top… interleaved between alluvial clay units'. Previous work at the adjacent St Luke's Square site (Wicks, 2010) suggests that the Peat horizon at Tarling Road is likely to date to from the middle Neolithic to middle Bronze Age periods, and may contain evidence for environmental change and human activity associated with archaeological/palaeoenvironmental evidence recorded at other nearby sites. Due to the poor preservation of pollen recorded at the St Luke's Square site, and the absence of other proxies which may provide evidence for environmental change, an assessment of one borehole sequence from the Tarling Road site is recommended. This will also enable the precise chronological relationship of Peat formation at Tarling Road to be compared with other nearby sites.

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

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APPENDIX 1: OASIS

Project details

Project name	THE GEOARCHAEOLOGICAL FIELD INVESTIGATIONS AT 105-107 TARLING ROAD, LONDON BOROUGH OF NEWHAM (SITE CODE: TAR13)
Short description of the project	Two geoarchaeological boreholes were put down at the site. When compared with other nearby records, the results revealed a gravel surface that sloped downwards from south-west to north-east, overlain by Holocene alluvial and peat deposits. Results from an adjacent site suggest the peat is likely to date somewhere between the middle Neolithic and middle Bronze Age.
Project dates	Start: 06-09-2013 End: 20-10-2013
Previous/future work	No / Yes
Any associated project reference codes	TAR13 - Sitecode
Type of project	Environmental assessment
Site status	None
Current Land use	Industry and Commerce 1 - Industrial
Monument type	PEAT Neolithic
Monument type	PEAT Bronze Age
Survey techniques	Archaeology

Project location

Country	England
Site location	GREATER LONDON NEWHAM CANNING TOWN 105-107 Tarling Road
Postcode	E16 1HN
Study area	0 Hectares
Site coordinates	TQ 3984 8120 51 0 51 30 42 N 000 00 55 E Point

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project brief originator	CgMs Consulting
Project design originator	D.S. Young
Project director/manager	D.S. Young

Project supervisor	D.S. Young
Project supervisor	C.R. Batchelor
Type of sponsor/funding body	Landowner

Project archives

Physical Archive Exists?	No
Physical Archive recipient	LAARC
Digital Archive Exists?	No
Digital Archive recipient	LAARC
Paper Archive Exists?	No
Paper Archive recipient	LAARC

Entered by	C.R. Batchelor (c.r.batchelor@reading.ac.uk)
Entered on	20 October 2013