PHASE 2, RATHBONE MARKET, CANNING TOWN, LONDON BOROUGH OF NEWHAM (SITE CODE: RBO10): GEOARCHAEOLOGICAL FIELDWORK REPORT

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INTRODUCTION

This report summarises the findings arising out of the geoarchaeological borehole investigations undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at Rathbone Market, Canning Town, London Borough of Newham (National Grid Reference: TQ 3961 8162; Site Code: RBO10; 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 only *ca*. 200m 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 about 0.7km to the south 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 is located within Landscape Zone LZ1.1 of the Lea Valley Mapping Project (Corcoran *et al.,* 2011), in which they describe the deposits as 'consistent with in-channel sediments, suggesting that the Zone has always been an area of active channels. Consequently marginal marshland and wetland deposits did not develop across the Zone, and where such environments did take hold, channel activity and river scour are likely to have eroded these deposits'. Further archaeological, geoarchaeological and geotechnical investigations have subsequently been undertaken locally to Rathbone Market in Landscape Zone LZ1.1 (Figure 1), including Canning Town Regeneration Area 7/1C (Green and Young, 2011) and along the Ironbridge-Canning Town section of the A13 (Stafford, 2012). The results from these sites are broadly consistent, but enhance the interpretations of the Lea Valley Mapping Project.

The Rathbone Market site itself is divided into a number of phases of investigation (Figure 2);

this report focusses on the findings arising from the Phase 2 geoarchaeological investigations, but also considers the results from previous archaeological excavations that concentrated on Phase 1 (Frickers and Haslam, 2011). Three archaeological trenches were put down in the western part of the Phase 1 site. Trench 1 recorded the Lea Valley Gravel surface at approximately -0.80m OD and was overlain by a thin (<1m) sequence of alluvium and peat. To the west in Trenches 2 and 3, the Lea Valley Gravel surface was still not reached at -3.81m OD, indicating a deep palaeochannel aligned approximately north-south in this area of the site. The palaeochannel was infilled with a thick sequence of Peat in Trench 2 (>3m) and mineral-rich alluvium in Trench 3. Recent geotechnical investigations indicate that the Lea Valley Gravel surface is also at around -1m OD across the current Phase 2 site, and is overlain by a thin sequence of alluvium and peat. The geotechnical data from Phase 2 is therefore broadly consistent with the presence of a north-south aligned channel beneath the western side of the Phase 1 area, but also provides important enhancement of the findings from the Lea Valley Mapping Project and work on the Ironbridge-Canning Town section of the A13.

Corcoran *et al.* (2011) believe that the potential for significant archaeological evidence surviving in Landscape Zone 1.1 is low due to the environmental conditions that prevailed and subsequent construction. However, a limited number of archaeological interventions have taken place in the Zone, and small pockets of archaeology may exist.

The aim of the geoarchaeological investigations on the Phase 2 part of the Rathbone Market site was to clarify the nature of the sub-surface stratigraphy, and evaluate the potential of the sedimentary sequences for reconstructing the environmental history of the site and its environs. In order to achieve this aim, two new geoarchaeological borehole locations were proposed (<QBH1> and <QBH2>; Figure 2) to: (1) confirm the expected sedimentary sequence in the Phase 2 area of the site (in particular the surface of the Sand and Gravel and the presence of any significant organic horizons); and (2) to investigate the relationship of the sub-surface stratigraphy beneath both the Phase 1 and Phase 2 areas of the site (with particular reference to the possible presence of a north-south aligned palaeochannel, the centre of which is located within the western part of the Phase 1 area).

Figure 1: Location of (1) Rathbone Market, Canning Town and other geoarchaeological and archaeological sites nearby: (2) Canning Town Regeneration Area 7/1C (CTR12; Green & Young, 2012); (3) area of the Lower Lea Valley Mapping Project (Corcoran *et al*., 2011); (4) Preston Road (PPP06; Branch *et al*., 2007); (5) East India Docks (Pepys, 1665); (6) Victoria Deep Water terminal (TUA02; Corcoran, 2002); (7) Millenium Festival Site, Greenwich (BWP97; Bowsher & Corcoran, unknown); (8) A13 Ironbridge-Canning Town (Stafford, 2012); (9) the Cable Car route ((A) North Station; (B) North Intermediate Tower; (C) North Tower; (D) South Tower; (E) South Station) (Batchelor *et al*., 2012); (10) Greenwich Peninsula, Tunnel Approach (Batchelor, in prep.); (11) 118 Victoria Dock Road (Barnett *et al*., 2012); (12) Silvertown (BWC96; Wilkinson *et al*., 2000); (13) Fort Street (HW-FO94; Wessex Archaeology, 2000); (14) Royal Docks Community School (PRG97; Holder, 1998); (15) The Pitts Head (PHD12; Batchelor *et al*., 2013); (16) Fords Park Road (FDP07; Eastbury *et al*., 2009); (17) Crediton Road (CDZ07; Eastbury *et al*., 2009); (18) Butchers Road (BUZ07; Eastbury *et al*., 2009); (19) Fife Road (FIH12; Killock, 2012); (20) Butchers Road Garages (BCQ97; Eastbury *et al*., 2009) (21) Vandome Close (VAD07; Eastbury *et al*., 2009). *Contains Ordnance Survey data © Crown copyright and database right [2012]*

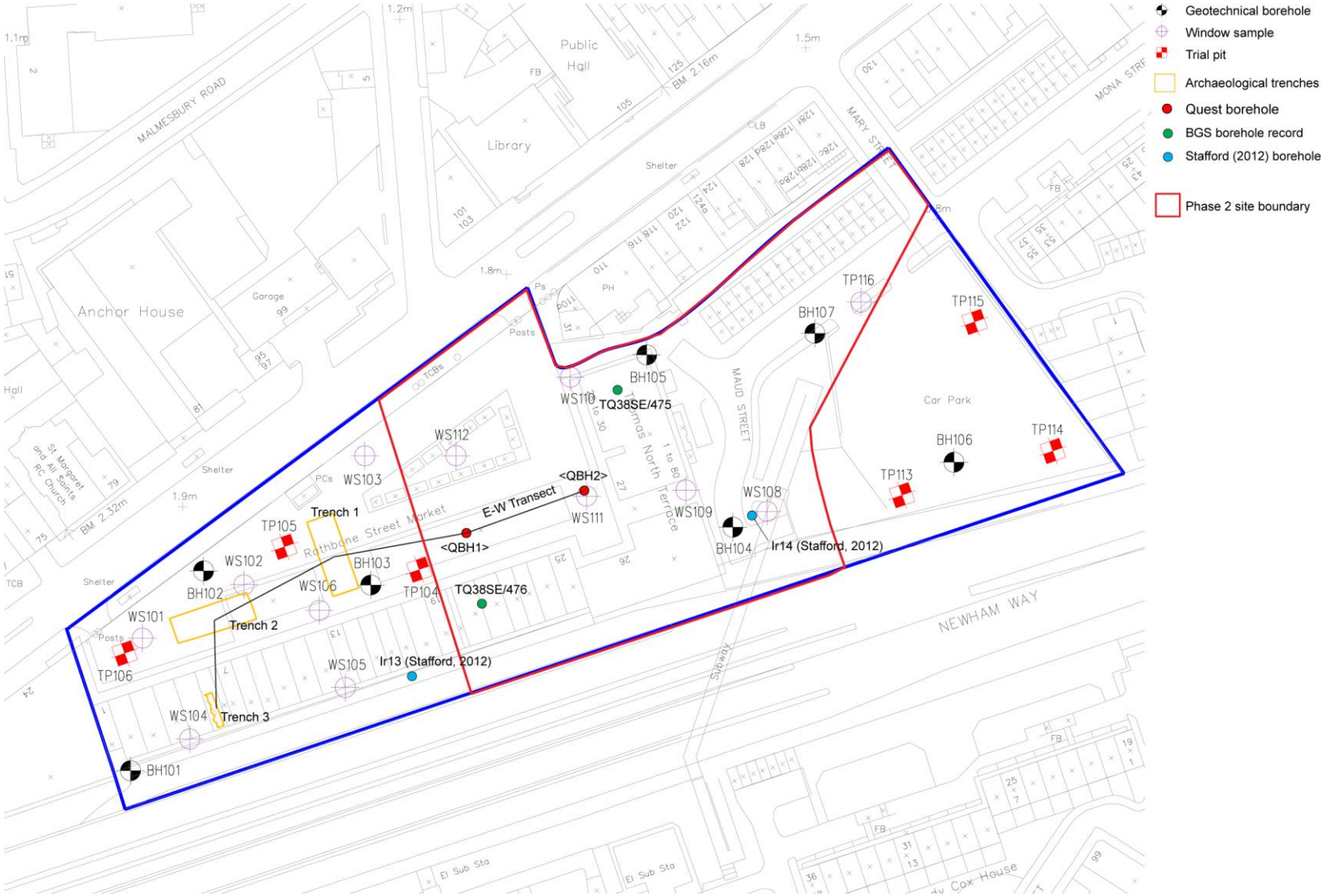

Figure 2: Locations of borehole <QBH1> and <QBH2> and previous archaeological, geoarchaeological and geotechnical investigations at Rathbone Market (Site Code: RBO10). Original figure provided by Ramboll/CgMs Consulting.

METHODS

Field investigations

Two boreholes (boreholes <QBH1> and <QBH2>) were put down at the site in January 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^{o}C. This temperature prevents fungal growth on the core surface, which may lead to anomalous radiocarbon dates, and moisture loss. The spatial attributes of each borehole could not be recorded at the time of the fieldwork, due to a lack of satellite visibility at their locations. The spatial attributes of the boreholes have therefore been estimated based on data from previous work in the Phase 1 area of Rathbone Market (Figure 2). A surface elevation of 1.90m OD has been estimated for both boreholes.

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 1 and 2.

RESULTS AND INTERPRETATION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS

The results of the geoarchaeological borehole investigation (Tables 1 to 2; Figure 3) have enhanced the previous geotechnical and archaeological investigations, and permitted an investigation of the sub-surface stratigraphy in the Phase 2 area of the Rathbone Market site (Figure 3).

The basal unit at the site is a horizon of sand and gravel (the Lea Valley Gravel). These

sediments were deposited during the Late Glacial, within a high energy braided river system. The new geoarchaeological boreholes record the Gravel surface between -1.13 (borehole <QBH1>) and -1.44m OD (<QBH2>). This compares with the recent geotechnical window samples which record the surface between an estimated -0.90 and -1.10m OD, whilst a British Geological Society (BGS) borehole record (TQ38SE/476; Figure 1) located within the site records it at *ca*. -1.66m OD. The combined results therefore indicate that across the Phase 2 and eastern side of Phase 1 the Lea Gravel surface is relatively even, before falling sharply towards the western part of the Phase 1 site and the aforementioned north-south aligned palaeochannel identified by Frickers and Haslam (2011). Towards the eastern side of the Phase 2 site, BGS borehole TQ38SE/475 indicates that the Gravel surface also falls sharply eastwards, to *ca*. -5.32m OD; however, this is inconsistent with the geotechnical records in this part of the site, which record the Gravel surface at an estimated -0.95m (WS110) and -0.80m OD (WS108).

Overlying the Lea Valley Gravel in boreholes <QBH1> and <QBH2> was a unit of variably silty sand, 0.53 and 0.36m thick respectively, containing occasional gravel clasts and detrital herbaceous material. These sediments most likely represent in-channel deposition during the Early to Mid-Holocene and are overlain in both boreholes by Peat, between -0.25 and -0.60m OD in borehole <QBH1> and above -1.08m OD in <QBH2>. The Peat is indicative of a transition towards a semi-terrestrial environment, supporting the growth of wetland vegetation including herbaceous and woodland taxa. In both boreholes the Peat is silty, indicating that periods of inundation of the Peat surface were frequent at this location. In borehole <QBH2> the Peat is truncated by Made Ground at -0.98m OD; however, in borehole <QBH1>, the full thickness of the Peat (0.35m) is observed. These results are reasonably consistent with those from geotechnical window samples WS11A and WS112 which record *ca*. 0.6m of Peat between an estimated -0.3 and -0.9m OD.

Brown, mottled silty clay overlies the Peat in <QBH1> between -0.25 and 1.35m OD, representative of flooding of the wetland environment. In both boreholes the uppermost Unit was Made Ground, 2.88m thick in borehole <QBH2>, and 0.55m thick in borehole <QBH1>, to approximately 1.90m OD.

Table 1: Lithostratigraphic description of borehole QBH1, Rathbone Market, Canning Town, London Borough of Newham (Site Code: RBO10)

Depth (m bgs)	Depth (m OD)	Description
0.00 to 0.55	1.90 to 1.35	Made ground
0.55 to 0.90	1.35 to 1.00	7.5YR 3/3; As3 Ag1; brown silty clay. Sharp contact in to:
0.90 to 1.40	1.00 to 0.50	7.5YR 3/3; As3 Ag1; brown silty clay with iron nodules. Diffuse contact in to:
1.40 to 1.72	0.50 to 0.18	7.5YR 3/3; As3 Ag1; brown silty clay with mottling. Diffuse contact in to:
1.72 to 2.15	0.18 to -0.25	7.5YR 5/1; Ag2 As2; grey silt and clay with occasional iron staining. Diffuse contact in to:
2.15 to 2.50	-0.25 to -0.60	2.5YR 2.5/1; Sh3 Ag1 Th+; humo. 4; well humified reddish black silty peat with traces of detrital herbaceous material. Diffuse contact in to:
2.50 to 3.03	-0.60 to -1.13	7.5YR 4/1; Ga2 Ag2 Gg+; dark grey silt and sand with occasional gravel clasts. Sharp contact in to
3.03 to 4.40	-1.13 to -2.50	10YR5/6; Gg2 Ga2; yellowish brown sand and gravel.

Table 2: Lithostratigraphic description of borehole QBH2, Rathbone Market, Canning Town, London Borough of Newham (Site Code: RBO10)

Depth (m bgs)	Depth (m OD)	Description
0.00 to 1.60	1.90 to 0.30	Made ground
1.60 to 2.88	0.30 to -0.98	Made ground (including redeposited alluvium, sand and gravel)
2.88 to 2.98	-0.98 to -1.08	2.5YR 2.5/1; Sh2 Ag1 Tl1; humo. 3; well humified reddish black silty peat with wood macrofossils. Sharp contact in to:
2.98 to 3.02	-1.08 to -1.12	10YR 6/3; Ga4; pale brown sand. Sharp contact in to:
3.02 to 3.11	-1.12 to -1.21	2.5YR 2.5/1; Ag2 Sh1 Dl1; reddish black organic silt with detrital wood. Diffuse contact in to:
3.11 to 3.34	-1.21 to -1.44	10YR 4/2; Ag2 Ga1 Gg1; dark greyish brown sandy silt with gravel clasts. Sharp contact in to
3.34 to 3.42	-1.44 to -1.52	Gg4; gravel. Sharp contact in to
3.42 to 3.60	-1.52 to -1.70	10YR 4/3; Gg3 Ga1; brown sandy gravel.

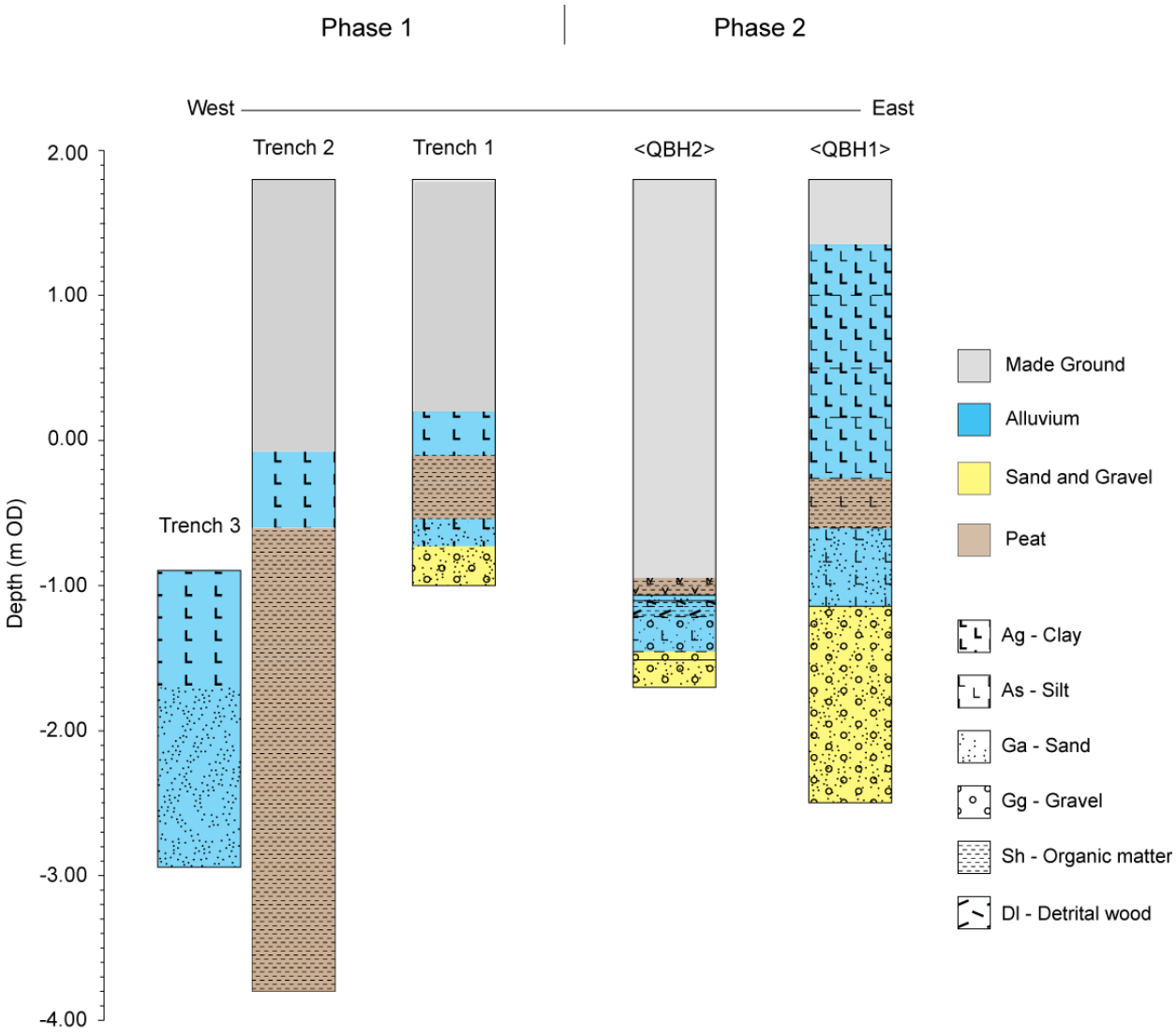

Figure 3: Lithostratigraphic description of boreholes <QBH1> and <QBH2> (Phase 2), incorporating the results of the archaeological excavations at the Phase 1 site (Frickers and Haslam, 2011).

DISCUSSION

The results of the geoarchaeological investigations enhance previous work on the Rathbone Market site, and within the local area (Corcoran *et al*., 2011; Stafford, 2012, Green & Young, 2012). The Late Devensian Lea Valley Gravel forms the platform upon which Holocene alluvial sediments have accumulated. Across Phase 2 and eastern part of Phase 1, this surface is relatively high between -0.75 and -1.66m OD. Towards the western side of Phase 1 a depression in the Lea Valley Gravel is recorded at a depth below -3.81m OD, most likely representative of a former palaeochannel. This interpretation is consistent with that made by Stafford (2012), following investigations along the Ironbridge-Canning Town section of the A13, just to the south of the site; here, the Lea Valley Gravel surface drops sharply from west (*ca*. -1m OD) to east (*ca*. -3.5m OD). Similarly, a transect of boreholes across this general area of Landscape Zone LZ1 suggests a depression in the Lea Valley Gravel in this general area. A single BGS borehole TQ38SE/480 to the southwest of the site suggests the palaeochannel may have been as deep as -5.3m OD.

Further to the south of the Rathbone Market site, geoarchaeological investigation of the Canning Town Regeneration Area 7/1C site (Green and Young, 2011; Figure 1) revealed a Gravel surface that reduced in height from south (*ca*. -0.50m OD) to north (-1.21 to -2.81m OD). Unlike the results from the Rathbone Market/Ironbridge-Canning Town sites, this depression is suggestive of an east-west aligned palaeochannel. However, it is unclear at this stage whether the north-south and east-west channel features were contemporaneous, and if so whether the Rathbone north-south channel was a tributary into the east-west channel identified on the Canning Town Regeneration Area 7/1C site, as opposed to representing part of the same meandering channel.

Within the Phase 1 palaeochannel, a thickness of more than 3.0m of Peat was recorded in Trench 2; however, *ca*. 10m to the south in Trench 3 the sequence was entirely different, comprising sand overlain by clay between -2.92 and -0.90m OD (Figures 2 & 3). It is thus hypothesised here that the palaeochannel was initially abandoned, enabling Peat to accumulate in a semi-terrestrial environment; the thick sequence of Peat suggests that this accumulation may have lasted for a considerable period of time. Within the same palaeochannel to the west, a 1.5m thick horizon was dated to between 5410-5310 and 3470-3160 cal BP; a period of nearly 2000 years spanning the Neolithic and Bronze Age cultural periods. The sedimentary sequence recorded in Trench 3 is hypothesised to represent erosion and redistribution of sediments by a subsequent channel. These hypotheses are broadly consistent with the interpretation made by Corcoran *et al*. (2011) for an active channel environment in Landscape Zone 1. It also correlates with the interpretations made,

for an absence of Peat recorded at the Canning Town Regeneration Area 7/1C site (Green & Young, 2012).

On the eastern part of Phase 1, and the Phase 2 area of the site, the Holocene Alluvium overlying the Lea Valley Gravel is typical of the tripartite sequence found across most of the Lower Thames Valley, where in many places Lower Alluvium is overlain by a Peat bed, representing the development of a more stable terrestrial surface across the floor of the valley; the uppermost unit almost everywhere is a silty alluvium (Upper Alluvium) in which visible organic remains are uncommon. The age of this Peat is uncertain, but due to its elevation is considered likely to either correlate with the upper part of the Peat in the palaeochannel, or represent a subsequent phase of accumulation.

CONCLUSIONS AND RECOMMENDATIONS

In summary therefore, the combined results of the recent investigations at Rathbone Market and surrounding area indicate a complex stratigraphic architecture including a highly variable Lea Valley Gravel topography, and subsequent deposition of Holocene Alluvium and Peat. Corcoran *et al*. (2011) consider the archaeological potential to be limited in this Landscape Zone due to active channels, river scouring and more recently, development. Pockets of palaeoenvironmental and archaeological potential are considered to exist however, and at Rathbone Market, a thick sequence of peat deposits was recorded in Phase 1, Trench 2, that is likely to be contemporaneous with at least the Neolithic and Bronze Age cultural periods (according to recent determinations carried out on a less substantial peat horizon to the southwest; Stafford, 2012). The limited survival of such thick Peat horizons in this general area is demonstrated by its probable erosion in Trench 3. The Rathbone Market site is also clearly located on the margins of a deep palaeochannel with an area of higher ground to the east (Phases 1 and 2).

It is intended that environmental samples will be assessed once all phases of archaeological fieldwork at the site are complete. It is recommended that at this stage the alluvium and peat in borehole <QBH1> should also be considered for potential assessment.

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