Land on the East Side of Crosby Row and the South Side of Porlock Street, London Borough of Southwark: An Environmental Archaeological Assessment Report

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Land on the East Side of Crosby Row and the South Side of Porlock Street, London Borough of Southwark: An Environmental Archaeological Assessment Report

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Contents

		Page
1.	Introduction	1
2.	Planning Background	1
3.	Geology and Topography	2
4.	Archaeological and Historical Background	
5.	Research Aims	6
6.	Methodology	6
7.	Results	7
9.	Conclusions	
10.	Publication and Archive Deposition	
11.	Bibliography	
Ap	pendix A Environemntal Archaeological Assessment Report	
Ap	pendix B - OASIS Form	

List of Illustrations

- Figure 1: Site Location
- Figure 2: Detailed Site / Borehole Location Plan

Non-Technical Summary

This report documents the results of an environmental archaeological assessment at the site located at land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark, in November 2011; the work was undertaken on behalf of Rydon Construction.

The investigation comprised the excavation and assessment of a borehole by percussions drilling, in order to evaluate the potential of the sedimentary sequence from the site for reconstructing the environmental history of the site and its environs.

The investigation successfully recorded the sequence of deposits considered to represent Shepperton Gravel, a sequence of silty sands, overlain by a silty peat. The results of the radiocarbon dating indicate that the peat accumulated during the Late Bronze Age to Early Iron Age cultural periods.

Further analysis of the plant macrofossil remains (seeds and wood) is unlikely to yield any further information than is presented here, and thus further analysis on the bulk samples is not recommended. Pollen concentration was variable through the organic rich horizons and thus a detailed assessment of the pollen is recommended on the five samples with these units.

This forms the primary phase of works on the site which also includes a watching brief to be undertaken during piling.

1. Introduction

- 1.1 This report documents the results of an environmental archaeological assessment at the site located at land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (Figure 1). The investigation comprised the excavation and assessment of a borehole by percussions drilling. This forms the primary phase of works on the site which also includes a watching brief to be undertaken during piling.
- 1.2 The application site is located on the junction of Crosby Row and Porlock Street (Figure 2). The site is bounded by Crosby Row to the west, Porlock to the north and houses, a school and a hostel to the east and south. The site was previously occupied by St Hugh's Church, which has recently been demolished. The site covers an area of c. 572m².

2. Planning Background

- 2.1 The local planning authority is the London Borough of Southwark. Archaeological advice to the borough is provided by Dr Chris Constable of the Southwark Council.
- 2.2 The site is not located within any of the Archaeological Priority Zones designated by the London Borough of Southwark's Unitary Development Plan (2004). There are no Listed Buildings within the site boundary and the site neither contains nor lies within the area of any defined World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens, Registered Battlefields or Areas of Historic Woodland.
- 2.3 The proposed development (Planning Application Ref No: 11AP0140) comprises the demolition of the existing building currently occupying the site and the construction of a new residential development.
- 2.4 Previous, predetermination, archaeological works have occurred on site. In 2010 a geoarchaeological evaluation was completed, which involved the drilling of three boreholes and two window samples (MoLA 2010). The results indicated that the site was located within a channel area.
- 2.5 Following the results of the geoarchaeological evaluation carried out by MoLA, the archaeological officer for Southwark Council required a further mitigation stage in the form of a geoarchaeological survey, a watching brief carried out during piling and historic building recording (HBR). The HBR has been carried out by Sutton Archaeological Services.
- 2.6 The conditions placed upon the planning consent were as follows:

Condition 11

Archaeological Foundation Design – Prior to the commencement of the development, a detailed scheme showing the complete scope, arrangement levels and methods of construction of the foundation design and all ground works shall be submitted to and approved in writing by the Local Planning Authority and the development shall not be carried out otherwise than in accordance with any such approval given.

Condition 12

Archaeological Foundation Design – Prior to the commencement of the development, the applicant shall secure the implementation of a programme of archaeological mitigation works in accordance with a written scheme of investigation, which shall be submitted to and approved in writing by the Local Planning Authority.

Condition 13

Archaeological Reporting – within six months of the completion of archaeological site works, an assessment report detailing the proposals for post-excavation works, publication of the site and preparation of the archive shall be submitted to and approved in writing by the Local Planning Authority and that the works detailed in this assessment report shall not be carried out otherwise than in accordance with any such approval given.

Condition 14

Archaeological Building Recording – Prior to the commencement of the development, the applicant or successors in title shall have secured the implementation of a programme of archaeological building recording in accordance with a written scheme of investigation, which shall be submitted to and approved in writing by the Local planning Authority.

- 2.7 Conditions 11 and 12 are pre-commencement conditions which will be fulfilled following the submission of this document. Condition 13 will be fulfilled once the fieldwork and reporting is complete. Condition 14 is also pre-commencement and will be dealt with by Sutton Archaeological Services.
- 2.8 The investigation followed methodologies set out in a Written Scheme of Investigation (WSI) produced by AOC Archaeology (AOC 2011) and approved by Dr Chris Constable. The WSI conformed to the requirements of Planning Policy Statement 5: Planning for the Historic Environment (PPS 5) (Department for Communities and Local Government 2010). It was designed in accordance with current best archaeological practice and local and national standards and guidelines:
 - English Heritage Management of Archaeological Projects (EH 1991).
 - Institute for Archaeologists Code of Conduct (IfA 2008c).
 - English Heritage Archaeological Guidance Papers 2-4 London Region (EH 1998a-c).
 - Department for Communities and Local Government Planning Policy Statement (PPS) 5: Planning for the Historic Environment (2010).
 - MoL/English Heritage A Research Framework for London Archaeology (2002).
 - English Heritage Environmental Archaeology: A guide to the theory and practice of methods, from sampling to post-excavation (2011).

3. Geology and Topography

- 3.1 The British Geological Survey mapping (BGS Sheet 270, 1979) of this area indicates that the solid geology underlying the site and surrounding area is the London Clay formation. This is an Eocene marine deposit, laid down c. 55 million years ago. This is overlain by a superficial geology of Kempton Park Gravel comprising sand and gravels formed in the Devensian period (c.110,000 25,000 years Before Present (BP). The geological mapping furthermore indicates that the site lies near the boundary where alluvium associated with the River Thames overlies the gravels.
- 3.2 The site is located approximately 700m from the current southern bank of the River Thames, a focus of human activity from prehistory onwards, attested by numerous artefacts discovered from the River and its flood plains (e.g. MoLAS 2000).
- 3.3 Southwark has been identified as lying within a low lying area within the floodplain of the River Thames and has in the past been an area of braided river channels threading between gravel islands and eyots. Since the retreat of the last ice sheet c. 10,000 years ago, the area has been affected by fluctuating sea levels with periods of high sea level (transgression) resulting in flood plain deposition of alluvium over the natural gravels. Conversely, during periods of falling sea level (regression) the area will have seen the development of reed, saltmarsh and woodfen peats within former braided

channels. The area that the site lies in has been identified as being poorly drained and marshy during the historical period.

3.4 Previous geoarchaeological work has occurred within the site boundary. In 2010, as part of predetermination works, three boreholes and two window samples were drilled (MoLA 2010). The results indicated that the site was located within a channel area.

4. Archaeological and Historical Background

The following historical background is taken from the geoarchaeological evaluation report completed for the site by Museum of London Archaeology (MoLA 2010).

4.1 Prehistoric

- 4.1.1 Evidence for prehistoric activity was found at Hunts House, Guys Hospital (HHO97) some 65m north of the present site. Here flint tools, prehistoric pottery and ard marks, scoured by primitive ploughs into the underlying sand were recorded at around 0.25 - 0.55m OD. Neolithic flints were also found at the Marshalsea Prison site, on the southern edge of the Borough High Street eyot, several hundred metres south west of the present site. Prehistoric peat deposits were recorded at Mermaid Court, while at Bowling Green Place evidence was found to indicate that main flow of water appears to have migrated away from the site, perhaps as water levels fell sometime in the prehistoric period but no dating evidence for these events have been obtained. At this time the former sand and silty clay river sediments previously deposited across the site probably became vegetated over and a dryland surface may have existed (as was previously observed at a slightly higher elevation at Hunts House just north of Bowling Green Place). Unfortunately no pollen was preserved in these sediments to enable the environment of the site at this time to be reconstructed. However, peat had began to form by the Iron Age, perhaps as river levels began to rise once more and the site remained as marshy land until at least the early Roman period. Pollen evidence has shown that, at this time, plants like burreed and sedges, growing in very shallow water would have existed across most of the site. However the western part of the site (the part that is closer to the road today) may have been drier and transitional to grassy meadowland, where dandelions and a diverse range of other herb plants were growing. Occasional clumps of ash and alder trees would also have grown nearby and intermittent flood events probably carried pollen from the cultivation that was taking place on the mainland to the south and the eyots that rose either side of the channel, depositing it across the site, (MoLA 2010).
- 4.1.2 Geotechnical logs show the upper surface of the sand at Bowling Green Place, 100m north east is lower than at Hunts House and lies at around -1.0 or -2.0m OD.

4.2 Roman Period

4.2.1 There is extensive evidence for Roman occupation in Southwark. The Romans exploited the Thames gravel islands at Southwark and construct their first bridge across the river, close to the existing London Bridge, c 280m north-west of the site, around AD 50–52 (Drummond-Murray et al 2002, 14). Borough High Street follows the line of the main road leading to the bridge. The road ran in a north-south direction and linked the new capital, Londinium, to Dover. The main focus of the Roman settlement was on the gravel island to the west of the Guy's Channel. During the Roman period the various creeks and channels in Southwark were used to provide sheltered moorings, where vessels could be loaded and unloaded hence the construction of jetties and other structures along these creeks. For instance, nearby along the western side of the Guy's Channel at Hunt's House during c AD 90-110 a wooden jetty was constructed (Taylor-Wilson 2002, 5). While further

south of the site at 171-191 Borough High Street, the shallow western extension of this channel was being actively reclaimed from the mid 1st century onward and by AD 100-120 much of the reclaimed area had been built over (Cowan et al 2009, 69-73). Further north along the western side of the channel in c AD 161 an imposing waterfront was constructed (Cowan et al 2009, 73-75). Examination of the deposits within the centre of the channel during the watching brief carried out by Peter Marsden in 1958 during the construction of New Guy's House revealed a sequence of fluvial silts and peats, the lower portion of these deposits containing pottery dated to c AD 100 and the upper to c AD 200, plus and a slightly worn coin of Marcus Aurelius, dated to AD 180 (Marsden 1965, 126). Finds from the upper deposits included an exceptionally fine Samian ware globular bowl (Déch 72) decorated with barbotine and appliqué relief designs, dated to c AD 200 (Detsicas 1960). In Marsden's second Guys trench, sterile sands were found at 4.3m below ground level (-0.25m OD). During c AD 190-225 a boat (aligned north-south) was abandoned in this stretch of the channel. Part of the eastern side of the hull of this vessel and five parallel ribs or frames were found in March 1958, by workmen during the construction of the lightwell for the basement of the southwest portion of New Guy's House. The boat timbers were recorded on site and later after they were sawn out and taken to the Cuming Museum. A second shaft trench was opened up a nearby in 1960, which located a section either the prow or the stern of the same vessel (it is impossible to tell which). This discovery enabled the centre line of the keel of this vessel to be established, which in turn allowed its dimensions to be tentatively reconstructed (Marsden 1965).

- 4.2.2 The vessel was apparently in use for some time as there was evidence of repairs and wear. It was abandoned in the channel and drift wood and other debris accumulated inside and around the wreck. Pottery dating to c AD 190-225 was recovered from sediments sealing the wreck (Marsden 1965, 126), but the date of the construction of the vessel remains unknown. From these discoveries it was established that the Guy's boat was carvel built (edge to edge hull planking) following the Romano-Celtic tradition of northern Europe. It is estimated that it was at least 16m long and about 4.25m wide and is interpreted as a shallow draught, beamy, flat bottomed river barge or lighter (Marsden 1994, 97-104).
- 4.2.3 In 1965 less than 10m south of the previous shaft trench a Southwark Archaeological Excavation Training dig organised by the Cuming Museum attempted to locate more of the boat by digging a 5m deep shaft trench. This trench was located about 3m south-west of the 2010 evaluation trench and its results can now be reinterpreted and correlated with the present fieldwork, the available spatial data indicates that this trench was located about 1.0m west of the conjectured extent of the boat, (MoLA 2010).
- 4.2.4 It is difficult to interpret the surviving records of this 1965 investigation but it appears that at -0.3m OD, one timber containing two long hooked iron nails (identical to these found on the boat frames in 1958 and 1960) and 'some other fragments of timbers' were discovered. It is not certain if the other timbers were simply driftwood, which had accumulated around the wreck as it fell apart or were more ex-situ boat timbers, which could imply that this trench was situated to the west of the in-situ portion of the vessel, hence it only located scattered ex-situ material. Certainly there is no evidence that these timbers represented any in-situ portion of the boat (which are very distinctive). Possibly this portion of the wreck had been partly dismantled in antiquity or had been disturbed by the construction of the adjoining warehouse stanchion base, from available records it is not possible to tell.
- 4.2.5 It is stated in a short report in Guy's Hospital Gazette (1889, vol 3, new series p11) in an article about the new college building that: 'that the river undoubtedly reached as far as the site of the new college in the past, and in digging down they came upon what were evidently old breakwaters'

probably Roman waterfront revetments along the western margin of the Guy's Channel. The former Guy's Hospital College was situated on the east side of Great Maze Pond (TQ 3283/8001). This short article also mentions the discovery of an 'old barge' 'embedded in the mud'. This vessel was found some years earlier during the construction of an adjacent warehouse. This implies the existence another Roman boat buried within the channel sediments, which means that there may be more undiscovered vessels buried in the channel,(MoLA 2010).

- 4.2.6 To date only three Roman boats (Blackfriars I, the County Hall and the example from Guy's Hospital) are known from Greater London. These vessels are rare discoveries of national and international importance because of their parallels and importance for the comparative study of other wrecks. As more of the Guy's boat remained in-situ its remains have been made a Scheduled Monument (SM No: L0157) in recognition of its importance. Scheduled monument consent was obtained in January 2010 to evaluate the boat when the Guy's and St Thomas' NHS Foundation Trust decided to replace the Newcomen and Bloomfield medical centres which currently occur the site. Due to the number of live services within the roadway it was only deemed practical to dig one three metre square trench within the projected footprint of the boat during February and March 2010. As the evaluation trench was somewhat deeper than anticipated because of the discrepancy between the expected and actual depth of the boat only a one metre square area of the vessel was uncovered. The wooden remains of boat seen during the evaluation were found between -0.8 -- 0.7 m OD. They were well preserved and appeared from visual inspection to be oak (Quercus sp). The remains of the boat consisted of four parallel sets of rectangular frames and their attached hull planking. These frames noticeably sloped from west to east, probably due to their being moulded over time by the pressure of the overlying deposits to follow the profile of the underlying deposits. It appears that part of the midships section along the centre line of the vessel was exposed (there is no evidence that the vessel possessed a keel).
- 4.2.7 During the late Roman period, the build-up of sediments within the Guy's Channel continued and the some peats and dumps of rubbish have been dated to the early 3rd century (Marsden 1965, 126). The northernmost of the 1965 trenches within the channel (Trench 1) revealed organic deposits containing 3rd and 4th century pottery overlying a 1m thick undated build-up of silt. While at Hunt's House on the western edge of channel external surfaces were constructed during the late 4th and early 5th centuries (Taylor-Wilson 2002, 31-34). Evidence from Bowling Green Court suggests that by the later Roman period rising water levels had caused the peat and sedge fen to become inundated with tidal water, as the former channel and subsequent low lying marshy area became a tidal creek. At this time deep water probably existed across the entire site at high tide, with mud possibly exposed in the west of the site at low tide, where occasional lumps of Roman tile and pot were discarded on the muddy foreshore. This environment may have persisted throughout the Roman and medieval period and, as no medieval finds were obtained from these river muds it is possible that water levels rose still higher at this time, or that the area was not inhabited. Pollen was not well preserved in the tidal mud, probably because the samples were taken from the western part of the site where the muds were weathered and regularly exposed. Nevertheless examination of pollen samples were able to show that although meadowland probably continued to exist during the later Roman and medieval periods, it consisted of a more restricted range of herb plants and few, if any, trees and shrubs. This is likely to indicate that clearance and management of the surrounding land was taking place, especially as the herb pollen was dominated by weeds of arable field, waysides and disturbed ground, (MoLA 2010).

4.3 Medieval and Post-Medieval Period

- 4.3.1 In the medieval period the area was largely marshland, although attempts were made to drain the area, as drainage ditches were found at Hunts House, dating to the 14th century. However episodic flooding events appear to be a characteristic of the medieval and post-medieval period, emphasising the fragile or marginal nature of habitation in this low-lying floodplain area at this time. The drainage ditches at Hunts House were infilled with alluvial clay during the medieval period and almost half a metre of clay was deposited across the southern part of the Hunts House site (up to about 1.2m OD) at some time during the 17th century. The ditches were probably remnants of the earlier medieval ditches. These watercourses and the many pools or ponds in the fields, particularly the Maze Pond north of the site are likely to be relicts of the former Guys Channel. Long Lane and several other roads were bounded by drainage ditches where they crossed the low-lying Snows Fields area, (MoLA 2010).
- 4.3.2 The site remained undeveloped and still lay within gardens at the time of Rocque's map of 1746 and the surrounding area appears to have become drier. More buildings had been erected in the area and orchards were growing. By the time of Horwood's map of 1799 the study site was still open space. The current building on the site, St. Hugh's Church (Charterhouse Mission), was built between 1892–8 by the architects Carpenter and Ingelow. It is a substantial building of 3 storeys in height and has a building frontage of 24m. St Hugh's was originally part of Charterhouse-in-Southwark, a mission established in 1885 by old boys of the Surrey-based public school, to provide food, clothes and spiritual support to the slum dwellers of Bermondsey. The interior of the church was re-ordered in the early 1994 with money from the Church Urban Fund.

5. Research Aims

- 5.1 The aims of the environmental archaeological watching brief were defined as being:
 - To establish the presence/absence of archaeological remains within the site.
 - To determine the extent, condition, nature, character, quality and date of any archaeological remains encountered.
 - To record and sample excavate any archaeological remains encountered.
 - To assess the ecofactual and environmental potential of any archaeological features and deposits.
 - To determine the extent of previous truncations of the archaeological deposits.
 - To enable the archaeology advisor to the London Borough of Southwark to make an informed decision on the status of the condition, and any possible requirement for further work in order to satisfy that condition.
 - To make available to interested parties the results of the investigation.
 - 5.2 The aim of this environmental archaeological assessment was to evaluate the potential of the sedimentary sequence for reconstructing the environmental history of the site and its environs.
- 5.3 The final aim is to make public the results of the investigation, subject to any confidentiality restrictions. If the nature of any findings warrant, this will include discussion as to the development of an appropriate outreach strategy.

6. Methodology

6.1 A unique site code (SHC11) was agreed with London Archaeological Archive and Research Centre (LAARC) prior to the commencement of the works.

- 6.2 The fieldwork methodologies were defined in the approved Written Scheme of Investigation (AOC 2011) and are outlined in the Environmental Archaeology Assessment Report (Appendix A). The site work was conducted by Quaternary Science QUEST, 18th November 2011, with survey support from AOC Archaeology.
- 6.3 Following unsuccessful attempts to obtain undisturbed sequences near to the location of previous boreholes MoLBH1 and MoLWS3 (due to truncation), one borehole was put down at the location of MoLBH5 (Figure 2). This amendment to the methodology as outlined in the WSI was verbally approved by Dr Chris Constable (*pers comm.* 23th November 2011).
- 6.4 The borehole was recovered using an Eijkelkamp window sampler and gouge set driven by an Atlas Copco TT 2-stroke percussion engine. The borehole was put down until coarse grained unconsolidated sediments had been recorded. The spatial attributes of the unsuccessful boreholes and borehole <QBH1> were recorded in the field by AOC Archaeology.
- 6.5 The environmental archaeological assessment consisted of the following:
 - Recording the lithostratigraphy of borehole <QBH1> to provide a preliminary reconstruction of the sedimentary history of the site.
 - 2. Carrying out organic matter content determinations to enhance the results of the sedimentary descriptions.
 - 3. Radiocarbon dating of identified plant macrofossils to provide a provisional geochronological framework for the natural stratigraphic sequence.
 - 4. Assessment of the preservation and concentration of pollen grains and spores to provide a preliminary reconstruction of the vegetation history, and to detect evidence for human activities e.g. woodland clearance and cultivation.
 - 5. Rapid assessment of the preservation and concentration of diatom frustules to provide a preliminary reconstruction of the hydrological history e.g. water quality and depth.
 - 6. Assessment of the preservation and concentration of macroscopic plant, insect and Mollusca remains from small bulk samples to provide a preliminary reconstruction of the vegetation history and general environmental context of the site.
- 6.6 The project was managed by Melissa Melikian, Operations Director, AOC Archaeology Group. The works were monitored by Dr Chris Constable, Southwark Borough Council.

7. Results

- 7.1.1 In total the excavation of four boreholes was attempted, however three of these were unsuccessful due to truncation of the archaeological horizons by the basement of the demolished building. The following summarises the results of the assessment of the successful borehole which was excavated in the south-west of the site (referred to as QBH1). The borehole is located within the confluence of the two former tributaries of the River Thames, the Borough Channel and Guy's Channel. The full results of the assessment are detailed within Appendix A.
- 7.1.2 Lithostratigraphic analysis (incorporating sediment descriptions and organic matter content) indicate that the sediment sequence is typical of the infilling of a palaeochannel, followed by the accumulation of fen peat as a semi-terrestrial land surface developed. The sequence is underlain by sand and gravel considered to represent the Shepperton Gravel, and becomes increasingly fine, grading upwards in to sand at -1.49m OD, silty sand at -1.01m OD and silty clayey sand at -0.36m OD. Above this, organic rich silt is overlain by silty peat between 0.13 and -0.25m OD, above which a

truncated silt and clay horizon is recorded. The results of the loss-on-ignition analysis revealed that organic matter values were very low (generally <3%), except within the organic units (*ca.* 30-75%). The results of the radiocarbon dating indicate that the peat in borehole <QBH1> accumulated during the Late Bronze Age to Early Iron Age cultural periods.

7.1.4 The pollen assemblage from Unit 5 was indicative of woodland dominated by alder, lime and hazel with an understorey of ferns and grasses. The combined results of the macrofossil (seeds and wood) and pollen assessments of the peat (Unit 6) are indicative of alder dominated woodland in a wetland environment during the accumulation of the peat, with an understorey of typical shrubs including bramble and elder, typical herbaceous taxa and ferns. A damp, relatively open environment dominated by herbaceous taxa with some woodland growing either on the floodplain surface (alder) or on the surrounding dryland (hazel, oak and pine) is indicated in Unit 7, with unequivocal evidence for human activity recorded by the presence of *Cereale* (e.g. wheat/barley) and *Plantago lanceolata* (ribwort plantain). Diatoms were absent in the four samples from Units 5, 6 and 7.

9. Conclusions

- 9.1 Further analysis of the plant macrofossil remains (seeds and wood) is unlikely to yield any further information than is presented here, and thus further analysis on the bulk samples is not recommended. Pollen concentration was variable through the organic rich horizons (Units 5 and 6), and thus a detailed assessment of the pollen is recommended on the five samples with these units.
- 9.2 Currently further works include an archaeological watching brief during piling. It is noted that archaeological horizons within the footprint of the previous building have been truncated.

10. Publication and Archive Deposition

10.1 Following completion of the final phase of archaeological works the publication and archive requirements will be finalised. Based on the investigation so far it is anticipated that publication will be restricted to a summary of results in the Museum of London Annual Review, and via the Archaeological Data Service (ADS) (Appendix B).

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LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT









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Appendices

Appendix A Environemntal Archaeological Assessment Report

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK (SITE CODE: SHC11): ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT

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INTRODUCTION

This report summarises the findings arising out of the environmental archaeological assessment undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (National Grid Reference: TQ 32740,79767; Site Code: SHC11; Figure 1). The site lies approximately 400m south of the modern River Thames. The British Geological Survey of England and Wales, Sheet 270 (1:50,000) shows the study site is located upon Holocene alluvium overlying Kempton Park Gravel, deposited during the last glacial period. Current modelling of the sub-surface stratigraphy has suggested that the site lies at the confluence of two former tributaries of the River Thames, the Borough Channel and Guy's Channel; previous borehole records from the site (Hoyle, 2010) indicate that the site lies within a channel, at the centre of which a deep sequence of alluvium and organic deposits is preserved. Peat was identified in the boreholes between *ca.* -0.8 and 1.3m OD. The current surface elevation at the site is between 2.75 and 3.3m OD (Hoyle, 2010).

The aim of this environmental archaeological assessment was to evaluate the potential of the sedimentary sequence for reconstructing the environmental history of the site and its environs. In order to achieve this aim, the environmental archaeological assessment consisted of the following techniques:

- 1. Recording the lithostratigraphy of borehole <QBH1> to provide a preliminary reconstruction of the sedimentary history of the site
- 2. Carrying out organic matter content determinations to enhance the results of the sedimentary descriptions
- 3. Radiocarbon dating of identified plant macrofossils to provide a provisional geochronological framework for the natural stratigraphic sequence
- 4. Assessment of the preservation and concentration of pollen grains and spores to provide a preliminary reconstruction of the vegetation history, and to detect evidence for human activities e.g. woodland clearance and cultivation

- 5. Rapid assessment of the preservation and concentration of diatom frustules to provide a preliminary reconstruction of the hydrological history e.g. water quality and depth
- 6. Assessment of the preservation and concentration of macroscopic plant, insect and Mollusca remains from small bulk samples to provide a preliminary reconstruction of the vegetation history and general environmental context of the site.



Figure 1: Location of *land on the east side of Crosby Row and the south side of Porlock Street*, London Borough of Southwark (Site Code: SHC11) (adapted from AOC 2011)

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT



the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (site code: SHC11; adapted from Figure 2: Location of attempted boreholes, <QBH1> and projected confluence of the Borough Channel and Guy's Channel. Land on Hoyle, 2010)

METHODS

Field investigations

Following unsuccessful attempts to obtain undisturbed sequences near to the location of previous boreholes MoLBH1 and MoLWS3 (due to truncation), one borehole was put down at the location of MoLBH5 (Figure 2). The borehole was recovered using an Eijkelkamp window sampler and gouge set driven by an Atlas Copco TT 2-stroke percussion engine. The borehole was put down until coarse grained unconsolidated sediments had been recorded. The spatial attributes of the unsuccessful boreholes and borehole <QBH1> were recorded in the field by AOC Archaeology (Table 1).

Borehole number	Easting	Northing	Elevation (m OD)
<qbh1></qbh1>	532740.122	179743.675	2.642
<bha> (failed)</bha>	532743.974	179761.945	2.560
<bhb> (failed)</bhb>	532766.365	179758.442	2.144
<bhc> (failed)</bhc>	532768.525	179757.451	2.390

Table 1: Borehole attributes,	land on th	e east side	of Crosby	Row	and the	south	side	of
Porlock Street, London Borou	gh of South	wark (site c	ode: SHC1	1)				

Lithostratigraphic descriptions

Borehole core samples were retained and 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) (Troels-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 Table 2, and Figure 3.

Organic matter determinations

Twenty six sub-samples from borehole <QBH1> were taken for determination of the organic matter content (Table 3; Figure 3). These records were important as they can identify increases in organic matter possibly associated with more terrestrial conditions. The organic matter content was determined by standard procedures involving: (1) drying the sub-sample at 110°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 (3) reweighing the sub-sample obtain the 'loss-on-ignition' value (see Bengtsson and Enell, 1986).

Range-finder radiocarbon dating

Fragments of waterlogged wood identified as Alnus glutinosa were extracted from small bulk samples from near the top and base of the Peat in borehole <QBH1> and submitted for AMS 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 4.

Pollen assessment

Eight sub-samples from borehole <QBH1> were extracted for an assessment of pollen content. The pollen was extracted as follows: (1) sampling a standard volume of sediment (1ml); (2) adding two tablets of the exotic clubmoss Lycopodium clavatum to provide a measure of pollen concentration in each sample; (3) deflocculation of the sample in 1% Sodium pyrophosphate; (4) sieving of the sample to remove coarse mineral and organic fractions (>125µ); (5) acetolysis; (6) removal of finer minerogenic fraction using Sodium polytungstate (specific gravity of 2.0g/cm³); (7) mounting of the sample in glycerol jelly. Each stage of the procedure was preceded and followed by thorough sample cleaning in filtered distilled water. Quality control is maintained by periodic checking of residues, and assembling sample batches from various depths to test for systematic laboratory effects. Pollen grains and spores were identified using the University of Reading pollen type collection and the following sources of keys and photographs: Moore et al (1991); Reille (1992). The assessment procedure consisted of scanning the prepared slides, and recording the concentration and preservation of pollen grains and spores, and the principal taxa on four transects (10% of the slide; Table 5). The addition and counting of Lycopodium spores has also permitted the calculation of total land pollen grains/cm³.

Diatom assessment

Four sub-samples from borehole <QBH1> were extracted for the assessment of diatoms. The diatom extraction involved the following procedures (Battarbee *et al.*, 2001):

- 1. Treatment of the sub-sample (0.2g) with Hydrogen peroxide (30%) to remove organic material and Hydrochloric acid (50%) to remove remaining carbonates
- 2. Centrifuging the sub-sample at 1200 for 5 minutes and washing with distilled water (4 washes)
- Removal of clay from the sub-samples in the last wash by adding a few drops of Ammonia (1%)
- 4. Two slides prepared, each of a different concentration of the cleaned solution, were fixed in mounting medium of suitable refractive index for diatoms (Naphrax)

The results are displayed in Table 6.

Macrofossil assessment

A total of five small bulk samples were extracted from borehole <QBH1> for the recovery of macrofossil remains including waterlogged plant macrofossils, waterlogged wood, insects and Mollusca. The extraction process involved the following procedures: (1) removing a

sample up to 10cm in thickness; (2) measuring the sample volume by water displacement, and (3) processing the sample by wet sieving using 300µm and 1mm mesh sizes. Each sample was scanned under a stereozoom microscope at x7-45 magnifications, and sorted into the different macrofossil classes. The concentration and preservation of remains was estimated for each class of macrofossil (Table 7).

Preliminary identifications of the archaeobotanical remains (waterlogged plant macrofossils and wood), 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 taxa (Table 8).

RESULTS, INTERPRETATION AND DISCUSSION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS

The sediment sequence recorded in borehole <QBH1> can be simplified into eight main Units. At the base of the sequence, sand and gravels were noted (Unit 1) at -3.14 to -3.36m OD, and are interpreted as representing the surface of the Shepperton Gravel. Above this, sand (Unit 2) passes in to silty sand (Unit 3) at -1.49m OD, then silty sandy clay at -1.01m OD (Unit 4). This is overlain by organic silt (Unit 5) between -0.25 to -0.36m OD, which passes in to silty peat (Unit 6) between -0.25 and 0.13m OD. This overlain by a truncated clay and silt horizon (Unit 7) at 0.16 to 0.13m OD, above which made ground was present between 0.16 to 2.64m OD. At the location of <QBH1>, a previous geotechnical record (Hoyle, 2010) records peat between -0.7m and 0.2 OD. This represents a thicker peat unit than was recorded in borehole <QBH1>. However, this is likely to be a consequence of the different drilling techniques employed; the cable-percussion technique used during the collection of the previous geotechnical borehole (MoLBH5; Hoyle, 2010) being less accurate. The surface of the Shepperton Gravel is however recorded at a similar depth (-3.2m OD in MoLBH5, -3.14m OD in <QBH1>).

Above the Shepperton Gravel the sediment sequence is characterised by upwards fining through Units 2 to 4, followed by stabilisation of the land surface in Units 5 and 6. This sequence is typical of the infilling of a palaeochannel, followed by the accumulation of fen peat as a terrestrial land surface developed.

RESULTS AND INTERPRETATIONS OF THE ORGANIC MATTER DETERMINATIONS

Quantification of the organic matter content by Loss-on-Ignition allowed further detail to be added to the lithostratigraphic descriptions (Table 3 and Figure 3). The results revealed that organic matter values were consistently low within Units 1 to 4 (generally <3%). As expected, the highest values were recorded within the organic units (Units 5 and 6; *ca*. 30-75%). These results largely confirm the records from the sedimentary descriptions, but indicate that frequent influxes of mineral-rich sediment took place during the period of peat formation. Values declined to <10% in the uppermost unit (Unit 7).

RESULTS AND INTERPRETATION OF THE RADIOCARBON DATING

Fragments of waterlogged wood identified as *Alnus glutinosa* was removed from near the top (0.05 to 0.03m OD) and base (-0.16 to -0.18m OD) of the Peat (Unit 6) for radiocarbon dating (Table 4). The base of the sequence was radiocarbon dated to 1410-1260 cal BC (3360-3210 cal BP), and the top to 770-510 cal BC (2720-2460 cal BP). It is noted that the δ 13C (‰) value for the sample at -0.16 to -0.18m OD is high; however, given the results of the radiocarbon dates are considered accurate. The δ 13C (‰) value for the sample from 0.05 to 0.03m OD is consistent with that expected for peat sediment, and there is no evidence for mineral or biogenic carbonate contamination. The results indicate that the Peat dates from the Late Bronze Age to Early Iron Age cultural periods.

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT



Figure 3: Combined results of the lithostratigraphic, organic matter content analysis and radiocarbon dating from borehole <QBH1>, Land on the east side of Crosby Row

and the south side of Porlock Street, London Borough of Southwark (site code: SHC11)

Table 2: Lithostratigraphic description of Borehole <QBH1>, land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (site code: SHC11)

Depth	Depth	Unit	Description
(m bgs)	(m OD)	number	
0.00 to 2.48	2.64 to 0.16	8	Made ground. Sharp contact in to:
2.48 to 2.51	0.16 to 0.13	7	10YR 4/1; As2 Ag2 Dh+ Sh+; dark grey silt and
			clay with traces of detrital herbaceous material
			and completely decomposed organic matter.
			Sharp contact in to:
2.51 to 2.89	0.13 to -0.25	6	10YR 2/1; Sh3 Ag1 Th+; humo. 3/4; black silty
			peat with traces of herbaceous material. Diffuse
			contact in to:
2.89 to 3.00	-0.25 to -0.36	5	10YR 3/2; Ag2 Sh2 DI+ Ga+; very dark greyish
			brown organic silt with detrital wood and traces
			of sand.
3.00 to 3.65	-0.36 to -1.01	4	Gley 2 4/10G; As2 Ag1 Ga1 DI+ Dh+; dark
			greenish grey silty sandy clay with traces of
			detrital wood and herbaceous material. Diffuse
			contact in to:
3.65 to 4.13	-1.01 to -1.49	3	Gley 2 3/5BG; Ga3 Ag1 DI+; very dark greenish
			grey silty sand with traces of detrital wood.
			Diffuse contact in to:
4.13 to 4.40	-1.49 to -1.76	2	Gley 2 3/5BG; Ga4 Ag+; very dark greenish grey
			sand with traces of silt. Diffuse contact in to:
4.40 to 5.27	-1.76 to -2.63	2	2.5Y 5/4; Ga4 Ag+; light olive brown sand with
			traces of silt. Diffuse contact in to:
5.27 to 5.78	-2.63 to -3.14	2	5Y 5/4; Ga4 Gg+; light olive brown sand with
			traces of gravel. Sharp contact in to:
5.78 to 6.00	-3.14 to -3.36	1	2.5Y 5/4; Ga3 Gg1; light olive brown sand with
			gravel.

Table 3: Results of the organic matter determinations from borehole <QBH1>, Land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (site code: SHC11)

Depth (r	n OD)	Unit	Organic matter
From	То	number	content (%)
0.14	0.13	7	9.62
0.06	0.05	6	75.78
-0.02	-0.03	6	44.41
-0.10	-0.11	6	63.69

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT

-0.18	-0.19	6	35.04
-0.26	-0.27	5	13.81
-0.34	-0.35	5	5.74
-0.50	-0.51	4	2.80
-0.66	-0.67	4	2.50
-0.82	-0.83	4	3.28
-0.98	-0.99	4	2.47
-1.14	-1.15	3	0.92
-1.30	-1.31	3	0.85
-1.46	-1.47	3	0.58
-1.62	-1.63	2	0.77
-1.78	-1.79	2	0.43
-1.94	-1.95	2	0.58
-2.10	-2.11	2	0.59
-2.26	-2.27	2	0.69
-2.42	-2.43	2	0.54
-2.58	-2.59	2	0.29
-2.74	-2.75	2	0.49
-2.90	-2.91	2	0.36
-3.06	-3.07	2	0.40
-3.22	-3.23	1	0.54

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT

Table 4: Results of the radiocarbon dating of borehole <QBH1>, Land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (site code: SHC11)

Laboratory code /	Material and location	Depth	Uncalibrated	Calibrated age BC/AD	õ13C
Method		(m OD)	radiocarbon years	(BP)	(%)
			before present	(2-sigma, 95.4%	
			(yr BP)	probability)	
Beta-311423 AMS	Alnus glutinosa wood; near top of peat	0.05 to 0.03	2490±30 BP	770-510 cal BC	-26.6
				(2720-2460 cal BP)	
Beta-311424 AMS	Alnus glutinosa wood; near base of peat	-0.16 to -0.18	3060±30 BP	1410-1260 cal BC	-31.5
				(3360-3210 cal BP)	

RESULTS AND INTERPRETATION OF THE POLLEN ASSESSMENT

Eight sub-samples from borehole <QBH1> were extracted for an assessment of their pollen content. Sub-samples were not extracted from Units 1, 2 and 3 since they were composed of coarse grained sediment (sand or sand and gravel) and preservation of pollen grains was unlikely. The results of the pollen assessment indicate that pollen concentration and preservation was variable through the sequence. No pollen was found in the two samples from Unit 4 (-0.66 to -0.67 and -0.98 to -0.99m OD).

Pollen concentration in Unit 5 (-0.35 to -0.36m OD) was moderate to high and was dominated by tree and shrub taxa including *Quercus* (oak), *Pinus* (pine), *Alnus* (alder), *Tilia* (lime) and *Corylus* type (e.g. hazel). Ferns were present, including *Dryopteris* type (e.g. buckler fern) and *Polypodium* (polypody). Herbaceous pollen was rare, but included Poaceae (grass family). The assemblage from Unit 5 is indicative of woodland dominated by alder, lime and hazel with an understorey of ferns and limited grasses. Definitive indicators of anthropogenic activity (e.g. cereals) were not recorded in the pollen assessment of this unit, and microcharcoal was absent.

Pollen concentration was highly variable in Unit 6, with low concentrations of pollen in three samples (0.06 to 0.05, -0.10 to -0.11 and -0.18 to -0.19m OD) and very high concentrations in one sample (-0.02 to -0.03m OD). In general the assemblage in Unit 6 is dominated by herbaceous taxa including Poaceae (grass family), Cyperaceae (sedge family), *Chenopodium* type (e.g. fat hen), Lactuceae (dandelion family), *Plantago lanceolata* (ribwort plantain) and Caryophyllaceae (pink family). The fern *Dryopteris* type (e.g. buckler fern) was present in two samples (0.06 to 0.05 and -0.02 to -0.03m OD). Tree taxa were rare, but included *Alnus* (alder) and *Quercus* (oak). The aquatic taxon *Sparganium* (bur-reed) was present in one sample (-0.10 to -0.11m OD). The assemblage in Unit 6 is indicative of a damp, open environment dominated by herbaceous taxa and ferns. Although ribwort plantain was recorded in one sample from Unit 6 (-0.02 to -0.03m OD), definitive indicators of anthropogenic activity (e.g. cereals) were not recorded in the pollen assessment of this unit, and microcharcoal was absent from all but one sample (-0.02 to -0.03m OD), in which microcharcoal values were low.

The pollen concentration in the sample from Unit 7 was very high and dominated by herbaceous taxa including Poaceae (grass family), *Aster* (aster), *Sinapis* (charlock), Cyperaceae (sedge family), Lactuceae (dandelion family), *Plantago lanceolata* (ribwort plantain) and *Cereale* (e.g. wheat/barley). Tree and shrub taxa were present, including *Quercus* (oak), *Pinus* (pine), *Alnus* (alder) and *Corylus* type (e.g. hazel). The fern *Dryopteris* type (e.g. buckler fern) was present, as was the aquatic taxon *Sparganium* (bur-reed). The assemblage in Unit 7 is indicative of a damp, relatively open environment dominated by herbaceous taxa with some woodland growing either on the floodplain surface (alder) or on the surrounding dryland (hazel, oak and pine). Probable evidence for human activity is recorded in Unit 7 by the presence of *Cereale* (e.g. wheat/barley) and *Plantago lanceolata* (ribwort plantain). Microcharcoal values were moderate in this sample.

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICA	ASSESSMENT REPORT
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Table 5: Results of the pollen assessment of borehole <QBH1>, Land on the east side of Crosby Row and the south side of Porlock Street London Borough of Southwark (site code: SHC11)

Denth		Ilnit	Main nollen taxa		Concentration	Concentration	Preservation	Microcharcoal
(m OD	~	number			0 - 5	grains/cm³	0- 5	0 - 5
From	То		Latin name	Common name				
0.14	0.13	7	Quercus	oak	5	80939	4	2
			Pinus	pine				
			Alnus	alder				
			Corylus type	e.g. hazel				
			Aster	aster				
			Sinapis	charlock				
			Poaceae	grass family				
			Cereale	e.g. wheat/barley				
			Cyperaceae	sedge family				
			Lactuceae	dandelion family				
			Plantago lanceolata	ribwort plantain				
			Plantago type	e.g. plantain				
			Sparganium	bur-reed				
			Dryopteris type	e.g. buckler fern				
			Unknown	I				
			Lycopodium	clubmoss spike				
0.06	0.05	9	Dryopteris type	e.g. buckler fern	-	13898	e	0
			Poaceae	grass family				
			Lycopodium	clubmoss spike				
-0.02	-0.03	9	Quercus	oak	5	50961	2/3	-
			Poaceae	grass family				
			Cyperaceae	sedge family				
			Plantago lanceolata	ribwort plantain				
			Dryopteris type	e.g. buckler fern				

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26

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT
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0.10 0.11 6 $Lycopodiumcuturtoss spike196223/400.100.116Lycopodiumcaryophylaceaepink family196223/401.100.116Lycopodiumcaryophylaceaepink family1/2416963/400.180.196Quercus0 adder1/2416963/400.180.196Quercus0 adder1/2416963/400.18Chenopodiumypeypeypeypeypeype0.350.365Quercus0 adder3/430577300.350.365Quercus0 adder3/430577300.350.365Quercus0 adder3/430577300.350.3650.363/430577301.1020.3650.363/430577301.1021.1021.1221.1223.1401.1020.3650.3677301.1020.360.3600001.1020.360.3600001.1020.360.36$									
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-0.18 Caryophyllacaae pink family Caryophyllacaae pink family -0.18 -0.19 6 Quercus oak 1/2 41696 3/4 0 -0.18 -0.19 6 Quercus adder 1/2 41696 3/4 0 -0.13 -0.13 6 Quercus adder 1/2 41696 3/4 0 -0.35 -0.36 5 Quercus sedge family sedge family sedge family 3/4 0 -0.35 -0.36 5 Quercus oak 3/4 30577 3 0 -0.36 0 -0.36 10 oak 3/4 30577 3 0 -0.36 1 1 1/2 1/2 3/4 30577 3 0 -0.36 1 1 1 1/2 1 30577 3 0 1 1 1				Lactuceae	dandelion family				
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Image: constraint of the constr				Alnus	alder				
Cyperaceaesedge family sedge family $ <				Poaceae	grass family				
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-0.35 $Lycopodium$ $Lycopodium$ $Lycopodium$ $Lycopodium$ $Lycopodium$ $Lycopodium$ $Lycopodium$ $Sa577$ 3 3 0 -0.35 5 $Quercus$ adk $3/4$ 30577 3 3 0 -0.35 5 $Quercus$ adk $3/4$ 30577 3 0 $Alnus$ $pine$ $Alnus$ adk adk $3/4$ 30577 3 3 0 $Alnus$ $hinus$ adk $hinus$ adk adk $3/4$ 30577 3 3 0 $Alnus$ $hinus$ adk adk adk adk $3/4$ 30577 3 3 0 $Alnus$ $hinus$ adk adk adk adk adk adk adk adk adk $Alnus$ $hinus$ adk $Alnus$ $hinus$ $hinus$ $hinus$ adk <td< td=""><td></td><td></td><td></td><td>Chenopodium type</td><td>e.g. fat hen</td><td></td><td></td><td></td><td></td></td<>				Chenopodium type	e.g. fat hen				
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Image: Norm of the state of				Poaceae	grass family				
Polypodiumpolypodypolypody $1 > 1 > 1 > 1 > 1 > 1 > 1 > 1 > 1 > 1 $				Dryopteris type	e.g. buckler fern				
L_{r} <				Polypodium	polypody				
-0.66 -0.67 4 <i>Lycopodium</i> clubmoss spike 0 - 0 - 0 -0.98 -0.99 4 <i>Lycopodium</i> clubmoss spike 0 - 0 - 0 Key: Concentration: 0 = 0 grains; 1 = 1-75 grains, 2 = 76-150 grains, 3 = 151-225 grains, 4 = 226-300, 5 = 300+ grains per slide - 0 Freservation: 0 = none, 1 = very poor, 2 = poor, 3 = moderate, 4 = good, 5 = excellent - Charcoal: 0 = none, 1 = negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant				Lycopodium	clubmoss spike				
-0.98 -0.99 4 Lycopodium clubmoss spike 0 - - 0 Key: Concentration: 0 = 0 grains; 1 =1-75 grains, 2 = 76-150 grains, 3 =151-225 grains, 4 = 226-300, 5 =300+ grains per slide Preservation: 0 = none, 1 = very poor, 2 = poor, 3 = moderate, 4 = good, 5 = excellent Charcoal: 0 = none, 1 = negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant	-0.66	-0.67	4	Lycopodium	clubmoss spike	0	1	I	0
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Preservation: 0 = none, 1 = very poor, 2 = poor, 3 = moderate, 4 = good, 5 = excellent Charcoal: 0 = none, 1= negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant	Key: Cor	ncentratic	on: 0 = 0 gra	ains; 1 =1-75 grains, 2 =	: 76-150 grains, 3 =1	51-225 grains, 4 =	226-300, 5 = 300+	grains per slide	
Charcoal: 0 = none, 1= negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant	Preservé	ation: 0 =	none, 1 = v	very poor, $2 = poor$, $3 = 1$	moderate, 4 = good,	5 = excellent			
	Charcoa	l: 0 = nor	ne, 1= negliç	gible, 2 = occasional, 3 :	= moderate, 4 = freq	uent, 5 = abundant	t		

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27

RESULTS AND INTERPRETATION OF THE DIATOM RAPID ASSESSMENT

Four sub-samples were extracted from borehole <QBH1> for the assessment of diatoms (Table 6). Diatoms were not preserved in any of the four samples. A number of factors influence diatom preservation, and it is probable that in the sediments examined here diatom concentrations were always low and that post-depositional destruction of the frustules has occurred due to drying-out, abrasion and possibly unfavourable chemical conditions. Dissolution of the diatom silica, for example, can occur as a response to the ambient dissolved silica concentration, the pH in open water, and the interstitial water in sediments. Using both fossil and modern diatoms, these and other environmental factors have been shown to affect the quality of preservation of assemblages (Flower, 1993; Ryves *et al.*, 2001).

Table 6: Diatom assessment of borehole <QBH1>, Land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (site code: SHC11)

Depth (m OD)	Unit number	Concentration
0.14 to 0.15	7	None
0.06 to 0.05	6	None
-0.18 to -0.19	6	None
-0.26 to -0.27	5	None

RESULTS AND INTERPRETATION OF THE MACROFOSSIL ASSESSMENT

A total of five small bulk samples from borehole <QBH1> were extracted for the recovery of macrofossil remains including waterlogged plant macrofossils, waterlogged wood, insects and Mollusca (Table 7). The samples were focussed on the organic-rich section of the borehole only. The results of an initial assessment indicated that the samples contained no Mollusca, bone, magnetic particles or artefacts. One sample contained a fragment of charcoal 2-4mm in diameter (0.12 to 0.05m OD). All five samples contained variable quantities of waterlogged wood and seeds and were thus submitted for a more detailed assessment.

During the course of the waterlogged wood assessment, up to 10 individual fragments of wood were analysed from the five samples and the majority were identified as *Alnus glutinosa* (alder). All of the fragments examined were well preserved, although all were small in size. Most fragments were derived from twigwood or small roundwood. Bark was present and attached in many instances; it was possible to count seasonal growth rings in several of the fragments. In these fragments the growth rings indicated that most of the wood was aged between 5-8 years at the time of deposition. The identity of the single fragment of wood charcoal could not be determined other than being derived from a hardwood; the conspicuous presence of thick widely spaced spiral (helical) thickenings indicates that the fragment derived from a taxon other than *Alnus glutinosa*. Spiral thickening of this type is a

characteristic of *Prunus* sp., for example. An indeterminate fragment of bark was present in the sample from 0.02 to -0.08m OD.

The concentration of waterlogged seeds was low in the five samples, but included *Rubus* sp. (e.g. bramble) in four samples (0.12 to 0.05, 0.02 to -0.08, -0.08 to -0.18 and -0.18 to -0.28m OD) and *Sambucus nigra/racemosa* (elder) in one sample (-0.08 to -0.18m OD). One unidentified seed was found in the sample from -0.28 to -0.34m OD.

This waterlogged wood and seed assemblage is indicative of the growth of alder dominated woodland in a wetland environment, with an understorey of typical shrubs including bramble and elder.

Table 7: Results of the macrofossil assessment, borehole <QBH1>, Land on the east side of Crosby Row and the south side of Porlock Street, London Borough of Southwark (site code: SHC11)

	[r	I	<u> </u>			1	<u> </u>		<u> </u>
	lnsects		1		1	-		-			1
	Fragments	ı	ı	ı	ı	ı	1	1	ı	ı	ı
a	llemS		1		1						1
Bon	Гагде	ı	1		1						ı
Isca	Fragments	ı	1		1						
Mollu	əlodW	1	1		1						1
rlogged	spəəS	ı	-	-	-	-	-	-	-	-	ı
Wate	booW	ı	~		~		2		2	,	2
	thaff	ı	ı		ı	1	1	1	ı	ı	ı
	spəəS										ı
	Charcoal (<2mm)	ı	1	ı	1	1	1	.	1	1	1
ed	4mm) Charcoal (2-	1	.		1					1	1
Charr	Charcoal (>4mm)	1	,		,						1
	Fraction	>300µm	>1mm	>300µm	>1mm	>300µm	>1mm	>300µm	>1mm	>300µm	>1mm
	brocessed (I) Volume	0.1	1	0.05	1	0.1	1	0.05	1	0.05	1
	Unit number	9		9		9		6/5		5	
	htqeb əlqms2) (DO m)	0.12 to 0.05		0.02 to -0.08		-0.08 to -0.18		-0.18 to -0.28		-0.28 to -0.34	

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LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT

Table 8: Results of the plant macrofossil (seeds) assessment of borehole <QBH1>, Land on the east side of Crosby Row and the . ; 0 . (. . 2 .

South Side of F	Orlock Street, London Bord	wunne to ugue	ark (site co					
Depth	Waterlogged seeds			Waterlogged wood			Charcoal	
(m OD)	Latin name	Common	Number	Latin name	Common	Number	Identification	Number
		name			name			
0.12 to 0.05	Rubus sp.	e.g. bramble	2	1	I	1	Indeterminate	1
							hardwood	
							charcoal. Not	
							Betulaceae	
0.02 to -0.08	Rubus sp.	e.g. bramble	-	Alnus glutinosa twicwood/small	alder	ო	ı	1
				roundwood.				
				Indeterminate cf.	A/A			
				Dark				
-0.08 to -0.18	Rubus sp.	e.g. bramble	L	Alnus glutinosa	alder	5	I	I
	Sambucus nigralracemosa	elder	~	twigwood/small				
				roundwood				
-0.18 to -0.28	Rubus sp.	e.g. bramble	Ţ	Alnus glutinosa	alder	10	I	I
				twigwood/small				
				roundwood; most				
				6-7 growth rings				
-0.28 to -0.34	Unidentified	1	~	Alnus glutinosa	alder	7	1	I
				twigwood/small				
				roundwood; 5-8				
				growth rings				

DISCUSSION AND CONCLUSIONS

The aim of the environmental archaeological assessment was to evaluate the potential of the sedimentary sequence from land on the east side of Crosby Row and the south side of Porlock Street for reconstructing the environmental history of the site and its environs.

Lithostratigraphic analysis (incorporating sediment descriptions and organic matter content) indicate that the sediment sequence is typical of the infilling of a palaeochannel, followed by the accumulation of fen peat as a semi-terrestrial land surface developed. The sequence is underlain by sand and gravel considered to represent the Shepperton Gravel, and becomes increasingly fine, grading upwards in to sand at -1.49m OD, silty sand at -1.01m OD and silty clayey sand at -0.36m OD. Above this, organic rich silt is overlain by silty peat between 0.13 and -0.25m OD, above which a truncated silt and clay horizon is recorded. The results of the loss-on-ignition analysis revealed that organic matter values were very low (generally <3%), except within the organic units (*ca.* 30-75%). The results of the radiocarbon dating indicate that the Peat in borehole <QBH1> accumulated during the Late Bronze Age to Early Iron Age cultural periods.

The pollen assemblage from Unit 5 was indicative of woodland dominated by alder, lime and hazel with an understorey of ferns and grasses. The combined results of the macrofossil (seeds and wood) and pollen assessments of the Peat (Unit 6) are indicative of alder dominated woodland in a wetland environment during the accumulation of the Peat, with an understorey of typical shrubs including bramble and elder, typical herbaceous taxa and ferns. A damp, relatively open environment dominated by herbaceous taxa with some woodland growing either on the floodplain surface (alder) or on the surrounding dryland (hazel, oak and pine) is indicated in Unit 7, with unequivocal evidence for human activity recorded by the presence of *Cereale* (e.g. wheat/barley) and *Plantago lanceolata* (ribwort plantain). Diatoms were absent in the four samples from Units 5, 6 and 7.

RECOMMENDATIONS

Further analysis of the plant macrofossil remains (seeds and wood) is unlikely to yield any further information than is presented here, and thus further analysis on the bulk samples is not recommended. Pollen concentration was variable through the organic rich horizons (Units 5 and 6), and thus a detailed assessment of the pollen is recommended on the five samples with these Units.

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Appendix B - OASIS Form

OASIS ID: aocarcha1-108996

Project details	
Project name	LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET
Short description of the project	The excavation of a geoarchaeological borehole was completed on the 18th November. A watching brief to be completed.
Project dates	Start: 18-11-2011 End: 31-01-2012
Previous/future work	Yes / Yes
Any associated project reference codes	30999 - Contracting Unit No.
Any associated project reference codes	SHC11 - Sitecode
Type of project	Recording project
Site status	None
Current Land use	Other 2 - In use as a building
Investigation type	'Watching Brief'
Prompt	Direction from Local Planning Authority - PPS
Project location	
Country	England
Site location	GREATER LONDON SOUTHWARK SOUTHWARK LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET

LAND ON THE EAST SIDE OF CROSBY ROW AND THE SOUTH SIDE OF PORLOCK STREET, LONDON BOROUGH OF SOUTHWARK: AN ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT REPORT

Postcode	SE1
Study area	572.00 Square metres
Site coordinates	TQ 32755 79750 51.5005766761 -0.08716623010410 51 30 02 N 000 05 13 W Point
Lat/Long Datum (other)	2.642
Project creators	
Name of Organisation	AOC Archaeology
Project brief originator	Southwark Council
Project design originator	AOC Archaeology
Project director/manager	Melissa Melikian
Project supervisor	Helen MacQuarrie
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Rydon Construction
Entered by	catherine edwards (catherine.edwards@aocarchaeology.com)

Entered on 4 January 2012



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