ST HUGH'S CHURCH
32 Crosby Row
Southwark
London SE1

London Borough of Southwark

A Geoarchaeological Evaluation Report

August 2010

Museum of London Archaeology

Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED
tel 0207 410 2200 fax 0207 410 2201 email molas@molas.org.uk

MUSEUM OF LONDON ARCHAEOLOGY

St Hugh's Church, 32 Crosby Row London SE1

London Borough of Southwark

A Geoarchaeological evaluation

Site Code: CYB10
National Grid Reference: 532755 179750

Project Manager Derek Seeley
Author Tom Hoyle

Museum of London Archaeology

Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED
tel 020 7410 2200 fax 020 7410 2201
MOLAGeneralEnquiries@museumoflondon.org.uk

Summary

This report presents the results of geoarchaeological monitoring of three boreholes and two window samples which were drilled at St Hugh's Church, Crosby Row, Southwark. It has been prepared by the Museum of London Archaeology (MOL Archaeology) and commissioned by the client, Street Sherwood Ltd.

The data from this phase of work has been used to make a provisional interpretation of the strata encountered and to assess the potential of these deposits to preserve archaeological, geoarchaeological and palaeoenvironmental remains.

The current work has identified where and at what depth deposits of archaeological interest are likely to lie. Late Pleistocene gravels of low archaeological potential were recorded across the study area, overlain by fluvial sediments of probable Late Glacial/Early Holocene provenance. The boreholes and window samples also showed a sequence of peats of possible early Holocene age with potential to preserve timber remains including track ways, wetland archaeology, revetments and sunken vessels. The entire site was capped by alluvial deposits formed during the later part of the Holocene which were in turn overlain by modern ground raising deposits.

The report recommends that any necessary further work should focus on obtaining a chronological framework for the sequence (through radiocarbon dating) to fully assess the significance of the deposit sequence.

Contents

List of figures

List of tables

1 Introduction

1.1 Site background

This *geoarchaeological borehole and window sampling evaluation* on the site of 32 Crosby Row, Southwark, SE1 has been commissioned from Museum of London Archaeology (MOLA) by the client Street Sherwood Ltd. The site code is CYB10.

The site is occupied by St Hugh's church and is bounded by Crosby Row to the west and Porlock Street to the north (Fig 1). The centre of the site lies at National Grid reference 532755 179750. Modern road level near to the site lies at *c* 3.2m OD. The current basement level is at c -3.5m OD

Current modelling of the sub surface stratigraphy has suggested that the site lies at the confluence of the Borough Channel and Guy's Channel. This is likely to have been the case throughout the Prehistoric and Roman periods and possibly into the medieval period. These channels were among a series of watercourses running between the areas of higher ground that made up Southwark, re-entering the Thames to the north and east.

The proposed redevelopment involves the demolition of the existing building to create a new residential development, occupying the same footprint as the existing building. The Archaeology Officer for Southwark Council requires a geoarchaeological evaluation prior to the determination of a planning application. The recent works consisted of three boreholes and two window samples. More extensive evaluation of the site is not possible at this stage, as the building is still occupied.

The results of this exercise will inform continuing construction design and aid in the implementation of an appropriate mitigation strategy for any archaeological and/or palaeoenvironmental remains identified.

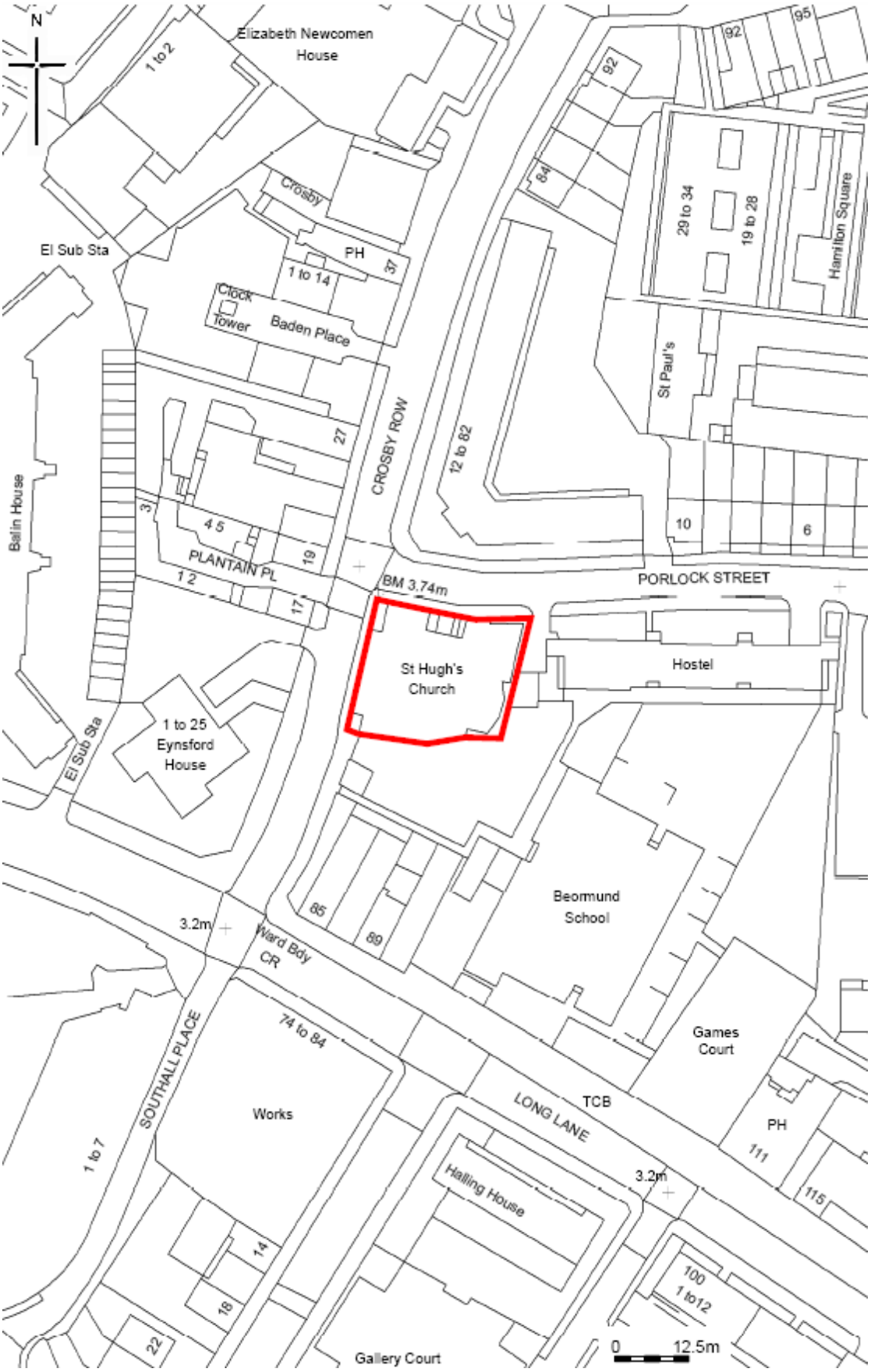

Fig 1 Site location plan

1.2 Planning and legislative framework

The planning and legislative background to the site was set out in the previous *Written Scheme of Investigation* for the site (Seeley 2010). The geoarchaeological borehole evaluation is intended to support the planning application for development of the site. The evaluation was recommended by the local planning authority archaeologist.

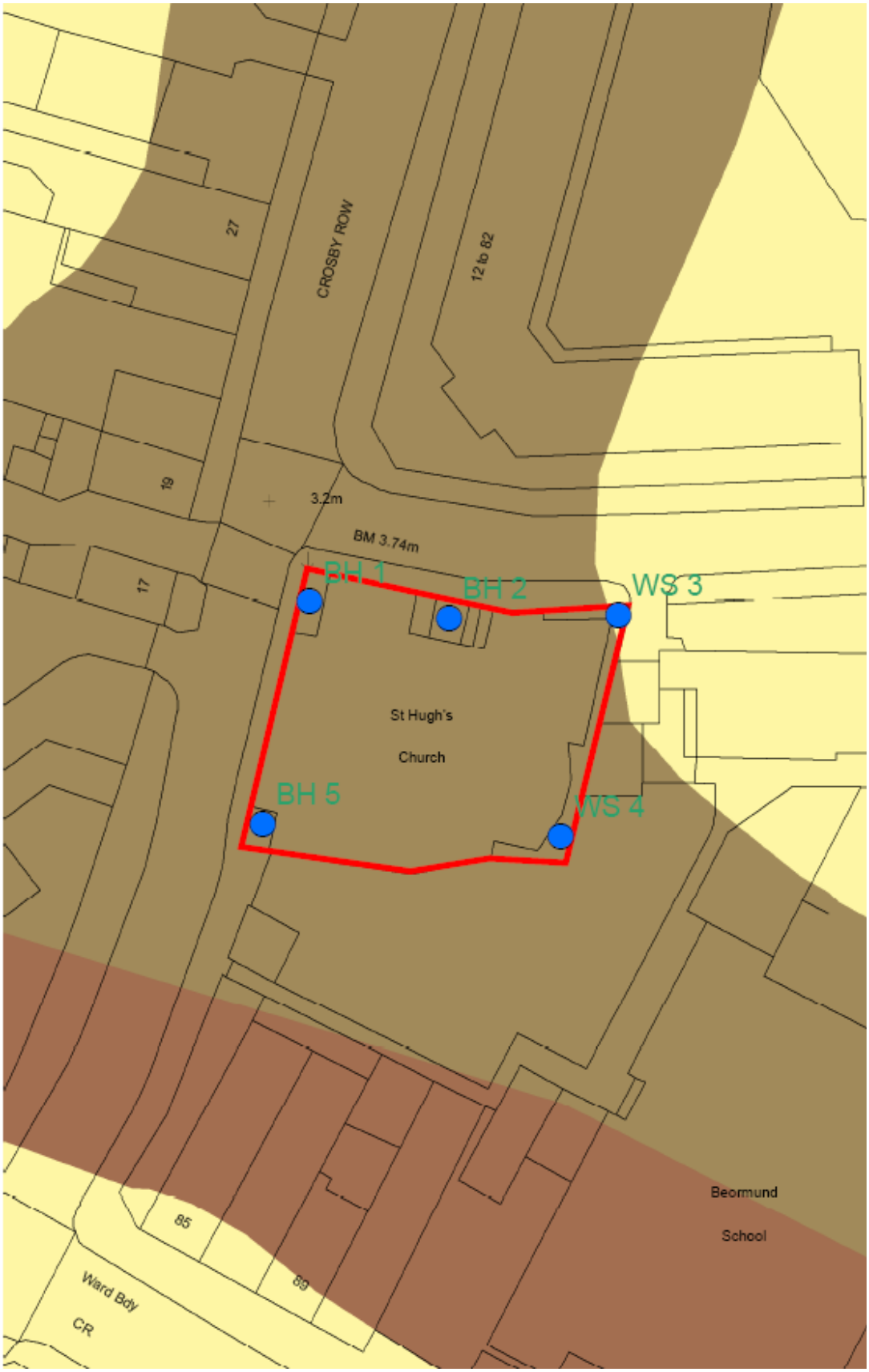

Fig 2 Borehole and Window Sample Locations

1.3 Outline of works

Three boreholes and two window samples were drilled around the footprint of the existing building. The purpose of these is to provide information on the nature and depth of surviving archaeological deposits, specifically, whether the site is within the Roman channel identified on other sites in the vicinity and, if so, what can be determined of the profile of the channel. Given the space constraints of the site, this is an appropriate methodology. It is not possible to carry out any work within the present building at this stage, as it is still occupied.

1.4 Origin and scope of the report

This report was commissioned by Street Sherwood Ltd and produced by the Museum of London Archaeology (MOLA). The borehole monitoring forms a first stage of archaeological evaluation of the site, in order to inform the local authority on an appropriate mitigation strategy.

Field evaluation, and the *Evaluation Report* which comments on the results of that exercise, are defined in the most recent English Heritage guidelines (English Heritage 1998) as intended to provide information about the archaeological resource in order to contribute to the:

- formulation of a strategy for the preservation or management of those remains; and/or
- formulation of an appropriate response or mitigation strategy to planning applications or other proposals which may adversely affect such archaeological remains, or enhance them; and/or
- formulation of a proposal for further archaeological investigations within a programme of research

Geoarchaeological Borehole Evaluations are usually undertaken where traditional archaeological evaluations by trial trenches are impracticable. This might be because of the depth of the archaeological deposits, a high water-table, the nature of the sediments anticipated or the thickness of the ground-slab.

A geoarchaeological borehole survey is unlikely to provide direct evidence for archaeological features or artefacts, it can merely report on the stratigraphy that is likely to contain such remains. It is a form of geoarchaeological evaluation. The objectives of a geoarchaeological evaluation are:

- to report in detail on the nature of a sites' stratigraphy and to determine the environment of deposition and chronology for the deposit sequence

- to assess the potential of any preserved ecological remains for reconstructing the past landscape and understanding environmental change.

- to identify horizons which might:

(a) provide data on past environments and resource availability
(b) represent events which are likely to have had an impact on local human occupation and activities
(c) have been deposited or transformed as a result of human activities
(d) contain indirect evidence of local human activity.

The information gathered from a geoarchaeological evaluation is therefore capable of providing relevant data to assess the archaeological resource as defined in the most recent English Heritage guidelines (English Heritage 1998).

1.5 Aims and Objectives

The aim of the borehole and window sample monitoring is to provide information on the sub surface stratigraphy across the site and assess its archaeological and palaeoenvironmental potential. As the building is still in use, boreholes and window samples provide the best investigation method at present. However the monitoring of such interventions should not be seen as an alternative to observation of the deposits in open trenches.

The results of this exercise will inform continuing construction design and aid in the implementation of an appropriate mitigation strategy for any archaeological remains identified.

1.6 Site background

The site is situated within the floodplain of the River Thames, about 500m south of London Bridge. Present ground surface on the site is at about 3.2m OD. Previous geotechnical boreholes in the area have shown that the bedrock below the site is Tertiary London Clay, with its surface at about –6.0m OD. The London Clay is overlain by about 4m of Pleistocene gravels, which are likely to have been deposited in an arctic climate during the late Devensian (about 15,000 years ago). At this time the Thames flowed in a network of fast flowing, braided channels across a much wider swathe of the floodplain than its present course.

The irregular surface of the Pleistocene gravel formed the early Holocene landsurface. By the early Holocene (about 10,000 years ago) the volume of water flow had declined and the floodplain was likely to have been dry land with pools and marshy areas infilling many of the former braided channels. Sea level at this time was much lower than today.

However there is some evidence (Sidell *et* al 2000) that the sand often found immediately above the Pleistocene gravel accumulated in the early Holocene, perhaps during the Mesolithic and early Neolithic period. On a site at Bowling Green Place, 100m north-west, geotechnical boreholes have indicated that there is likely to be a thickness of about 1-2m of these sandy deposits, outcropping at around -1.0 to -2.0m OD. On a number of sites in Southwark and elsewhere, soil development and evidence for prehistoric (Neolithic and Bronze Age) agriculture have been found in these sands, especially where they formed raised areas or ‘eyots’ several metres higher than adjacent parts of the floodplain (Ridgeway 1999). Rising sea level gradually caused the dry floodplain landsurface to become inundated by flood silts. By the late prehistoric / early Roman period river levels had risen high enough to submerge most of this part of the floodplain so that only land above *c* 1m OD remained as dry ground

During the prehistoric and early historic period the raised areas of sand and gravel eyots would have created a floodplain mosaic of higher, dryland areas with river channels, mudflats, or marshland between them. The precise topography and juxtaposition of environments would have changed as river levels fluctuated and

must have been modified to some extent by human activities. Such activities would have directly influenced drainage and vegetation on the floodplain itself. In addition activity such as deforestation and agriculture within the catchment of the tributary streams flowing into the floodplain must have accelerated soil erosion and caused large quantities of fine grained sediment to be transported by the rivers onto the floodplain. Here, contact with saline water would have led to the flocculation of clay particles causing the build up of thick deposits of river mud.

The accumulation of river mud gradually levelled up the irregular early to mid Holocene floodplain topography. However during the prehistoric, Roman and possibly medieval periods the site is likely to have been situated close to (or possibly within) a broad channel. This channel was probably a swathe of lower lying land separating the higher land to the west of the site in the vicinity of the present day Borough High Street and the higher land of the Bermondsey Eyot to the east. Across this lower lying land flowed a complex of channels including the Guy's Channel, which is thought to have flowed along the line of Long Lane, then down Crosby Row and across the Great Maze Pond towards the Thames.

1.6.1 Prehistoric

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 bur-reed 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.

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.

1.6.2 Roman

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 south-west 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).

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). This vessel may have had an unladen waterline of about 0.14m and laden waterline of 0.4m and it might have carried about 7 tonnes of cargo. These provisional figures could be confirmed by a hydrostatic study of the whole vessel. As the north end of the vessel was pointed, it is likely the southern end will be of a similar design. The absence of blunt ends (as seen in punts) implies the vessel was loaded from the sides. A number of Roman Rhine barges possessed broad sloping ends, to allow the end loading of animals, vehicles etc.

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.

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.

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.

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 – -0.7m 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). There two reasons for this interpretation. First, the presence of three flat, oval headed iron nail which were hammered in the opposite direction to all the other nails, their presence implies the existence of two keel planks (fixed to the underside of the hull either side of the centre line of the vessel to prevent damage to the hull when the vessel was beached and allow the vessel to sit upright while it beached and being loaded or unloaded). It had been speculated that like other examples of this type of vessel the Guy's boat possessed keel planks, but their existence is now confirmed. Secondly, it was noticed in both the

1958 and 1960 discoveries that the points of the clenched iron nails that fixed the hull planks to the frames were hammered over in a herring-bone pattern with their ends all pointing down towards the centre line of the keel. The same pattern of nail tip direction was also recorded on the frames of the Blackfriars I Roman boat. As the nail tips in the newly recorded section of boat are arranged in a herring bone pattern and all point downwards in both directions the position of the centre line of the vessel can be calculated with a high degree of certainty. The internal spacing of the frames varied from 22.5 to 27.0 cm. This frame spacing is much closer than *c* 60cm recorded in the 1958 discovery, which implies that towards the centre of the vessel the frames were significantly closer together.

All the frames were single timbers with a rectangular cross-section about 14cm wide and 6-8cm thick, except the southern-most one, which consisted of two superimposed timbers both 6.5cm thick. As the full width of these two timbers was not exposed the reason for this change of design is not certain, but one possibility is that it might be part of a mast step (a socket for a mast). None of the exposed frames possessed limber holes, which is surprising, because limber holes were seen in two of the frames recovered in 1958.

Short lengths of six keel planks (21mm thick) were exposed. All the planks were tangentially faced, straight grained oak and fitted very closely together carvel-wise (butt joints), which made identifying the joints difficult. Also no caulking material was visible along the joints, although the 1960 work revealed that hazel shavings and pine resin or tar were used. The width of these planks varied from 19.0 to 23.5cm. It is likely that there is a further undefined plank to the west of [38] (otherwise it would be over 30cm wide), but due to the brown staining obscuring the top surface of the wood no joint could not be defined. This substance was not sampled, but it was probably pine tar, which was found on the exterior of the some planking in 1960. The keel planks recorded in 1958 varied in width from *c* 23 to 30 cm. Along the western edge of plank [33] was a thin band of sapwood showing that the in the event of further work these timbers have a high potential for tree ring dating, which would establish a secure construction date for the vessel. There was no sign of any ceiling planks or even any sign of the fixings for securing such timbers. Evidence of ceiling planking was seen in the 1960 investigation, so they might have been expected here too. Perhaps any ceiling planking here had been robbed out in antiquity. The base of the channel at this time was extrapolated as being -1.1m OD.

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.

1.6.3 Medieval and post-medieval

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.

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 24 metres. 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.

2 Geoarchaeological Borehole Evaluation

2.1 Methodology

All geoarchaeological on-site and off-site work, was carried out in accordance with the *Written Scheme of Investigation* (Seeley 2010), and where appropriate the MOLA *Archaeological Site Manual* (MOLA 1994).

2.1.1 On-site

The boreholes (BH) and window samples (WS) were undertaken by a sub-contractor under the supervision of a Senior MOLA Geoarchaeologist. The interventions were drilled as far into the Pleistocene sands and gravels as possible before core retainment and well backfilling prevented further drilling. The location of the geoarchaeological boreholes are shown on Fig 2.

The deposits retrieved through the boreholes and window samples were examined and logged on site. The sediments were described according to standard geoarchaeological practice as outlined by Jones *et al* (1999), and Tucker (1982). This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip.

The depths and nature of the interfaces were recorded and a provisional on-site interpretation made. The borehole and window sample locations and elevations were obtained using the MOLA London GIS. Coordinates were obtained to the six figure ordnance survey grid reference, with levels obtained in metres above ordnance datum.

For each profile, every distinct unit was given a separate number (e.g. for BH1: 4.1, 4.2 etc from the top down) and the depth and nature of the contacts between adjacent distinct units was noted. The interventions were given the prefix MoL (Museum of London) i.e. MoLBH 1 etc.

2.1.2 Off-site

The borehole and window sample logs were entered into a digital (Rockworks 2006) database. Each deposit component (gravel, sand silt etc) was given a colour and a pattern and, as a result, the two major variables of any deposit were stored in the Rockworks database and used to compare and correlate the stratigraphy across the site.

A cross-section (transects: vertical slices through the sub-surface stratigraphy) was drawn through the data points and correlations were made between key deposits. Interpretation of the data is based to a large extent on examining these transects. Individual lithostratigraphic units with related characteristics within a borehole were grouped together and then linked with similar deposits, which may be made up of a number of individual contexts (lithostratigraphic units) in adjacent boreholes.

Linking deposits between boreholes produced a series of site-wide deposits (facies), which are representative of certain environments. Thus a sequence of environments both laterally and through time has been reconstructed for the site. A discussion on the deposit units is given in the Section 3.

2.1.3 Boreholes and windowsample logs

The deposit units recorded within each borehole and windowsample are presented in the tables below. The facies numbers refer to the discussion of the deposits in section 3.

Table 1: Deposits recorded in MoLBH1

Ground level at *c* 3.3m OD

Unit No.	Depth below ground level (m)	Deposit characteristics	Interpretation	Facies No.
1.1	0–0.35	Concrete and brick rubble and paving slab	Modern made ground	**6**
1.2	0.35–0.8	Firm mid bluish **grey clay**	Gleyed alluvium	**5**
1.3	0.8–2	Soft mid grey **silty clay**		
1.4	2–3.15	Soft mid brown **peat**	Alder Carr, sedge fen marshland	**4**
1.5	3.15–4.05	Soft mid grey fine **silty sand**	Holocene fluvial deposits	**3**
1.6	4.05–4.75	Loose mid greyish brown **gravelly sand**	Late Glacial/Early Holocene fluvial deposits	**2**
1.6	4.75–6.5	Loose mid greyish brown **sandy gravel**. Coarsens with depth	Late Pleistocene, Shepperton Gravels	**1**

Table 2: Deposits recorded in MoLBH2

Ground level at *c* 3.3m OD

Unit No.	Depth below ground level (m)	Deposit characteristics	Interpretation	Facies No.
2.1	0–2.75	Concrete. Ash and clinker, redeposited alluvium	Modern made ground	**6**
2.2	2.75–3.20	Soft grey **silty clay**	Gleyed alluvium	**5**
2.3	3.20–3.80	Soft mid brown **peat**	Alder Carr, sedge fen marshland	**4**
2.4	3.80–4.40	Soft mid grey **sandy clay**	Holocene freshwater fluvial deposits	**3**
2.5	4.40–6.50	Soft grey **silty sand**	Late Glacial/Early Holocene fluvial deposits	**2**
2.6	6.50–7.00	Loose mid greyish brown moderately coarse **sandy gravels**	Late Pleistocene, Shepperton Gravels	**1**

Table 3: Deposits recorded in MoLWS3

Ground level at *c* 3.3m OD

Unit No.	Depth below ground level (m)	Deposit characteristics	Interpretation	Facies No.
3.1	0–2.2	Concrete, brick rubble, sand, silt and occasional gravel	Modern made ground	**6**
3.2	2.2–2.75	Very soft grey **clay** with occasional orangey brown mottling throughout	Gleyed alluvium, with evidence of pedogenesis at top of profile	**5**
3.3	2.75–3.3	Very soft grey **clay silt** with black manganese flecking		

Unit No.	Depth below ground level (m)	Deposit characteristics	Interpretation	Facies No.
3.4	3.3–3.7	Soft dark brown **silty clay** with increasing organic content with depth		
3.5	3.7–4.1	Firm mid brown **peat** becoming clayey with depth	Alder Carr, sedge fen marshland	**4**
3.6	4.1–4.4	Moderately soft mid bluish grey **clay** with occasional detrital organics, grades into sandier material with depth	Holocene freshwater fluvial/mudflat deposits	**3**
3.7	4.4–4.5	Soft very light grey slightly calcareous **clay**		
3.8	4.5–6.5	Firm brownish grey medium **sand** coarsens with depth	Late glacial/Early Holocene fluvial deposits	**2**
3.9	6.5–7	Loose mid greyish brown **sandy gravel**	Late Pleistocene Shepperton Gravels	**1**

Table 4: Deposits recorded in MoLWS4

Ground level at *c* 2.75m OD

Unit No.	Depth below ground level (m)	Deposit characteristics	Interpretation	Facies No.
4.1	0–1.6	Concrete, brick rubble, sands and occasional gravel	Modern made ground	**6**
4.2	1.6–2.8	Firm, plastic mid brownish grey **clay silt** with frequent orangey brown mottling	Partially weathered alluvium	**5**
4.3	2.8–3.15	Firm dark brown **peat** with small wood inclusions. Becomes soft and clayey towards base	Alder Carr, sedge fen wetlands	**4**
4.4	3.15–3.75	Very soft mid light bluish grey **clay** with rare wood fragments. Sandy lenses towards base	Holocene freshwater fluvial/mudflat deposits	**3**
4.5	3.75–3.8	Soft off white/very pale grey **clay silt** with very fine sand. Calcareous inclusions		
4.6	3.8–5.6	Firm mid grey medium **sand** with moderate silt lenses. Faintly laminated	Late Galcial/Early Holocene fluvial deposits	**2**
4.7	5.6–6	Moderately coarse mid greyish brown **sandy gravel**	Late Pleistocene Shepperton gravels	**1**

Table 5: Deposits recorded in MoLBH5

Ground level at *c* 3.3m OD

Unit No.	Depth below ground level (m)	Deposit characteristics	Interpretation	Facies No.
5.1	0–2.10	Concrete and brick rubble	Modern made ground	**6**
5.2	2.10–3.10	Soft dark grey **silty clay**	Gleyed alluvium	**5**
5.3	3.10–4	Soft dark brown **peat** with occasional silty clay lenses	Alder Carr, sedge fen marshland	**4**
5.4	4–4.8	Firm mid grey silty sand	Holocene freshwater fluvial deposits	**3**
5.5	4.8–6.5	Loose mid greyish brown fine **silty sand** with occasional gravel	Late Glacial/Early Holocene fluvial deposits	**2**
5.6	6.5–7	Loose mid greyish brown **sandy**	Late Pleistocene	**1**

Unit No.	Depth below ground level (m)	Deposit characteristics	Interpretation	Facies No.
		gravel	Shepperton gravels	

3 Discussion on site stratigraphy

The deposits are discussed in terms of the defined facies units, from the oldest to the most recent. Dates in BP (before present, i.e. before 1950) are quoted in calibrated years. Definitions for the geoarchaeological terms highlighted in bold are given in section 5.

3.1.1 Pleistocene Deposits (facies 1)

The basal deposit observed during the survey consisted of coarse mid greyish brown sands and gravels. The gravels were observed at -2.8 to 3.2m OD. The gravels belong to the Shepperton Gravel formation and date to the Late **Pleistocene**. These sediments were deposited in a cold climate fast flowing braided river environment *c* 18 to 15 000 years ago. During this time (**Last glacial maximum** was *c* 22–18 000 BP) meltwaters of the rapidly warming tundral landscape carved out the present floodplain depositing coarse gravels and sands across the valley bottom.

3.1.2 Late Glacial/Early Holocene fluvial sediments (facies 2)

The gravels are overlain by fine grained sands and silts, the surface of which occurs at -1 to -1.5m OD. These sediments mark a change in fluvial style related to the amelioration of the climate during the Late Pleistocene early **Holocene** transition (c 15 000 to 10 000 BP). As the climate warmed flow power, discharge rates and sediment supply decreased, and thus the gravel bedloaded braided river system of the preceding Devensian Glaciation transformed to a stable anastomising system occupying fewer channel threads. The eyots recorded across this part of Southwark are probably related to this time period, accumulating as large scale bar macroforms during periods of high stage flow.

3.1.3 Holocene fluvial sediments (facies 3)

Above the sands lay bluish grey clays with their surface at –0.3 to –0.75m OD. The very fine grained nature of these sediments suggests deposition within standing water or very sluggishly flowing channel conditions. Given the elevation of these sediments these are likely to represent the freshwater channels environments of the Mesolithic to Neolithic periods. Similar deposits have been recorded recently further towards the north east at St Michaels school (Halsey, *in prep*). Palaeoenvironmental ecofacts (ostracods, diatoms) indicated that the deposits formed within sluggish, shallow freshwater channels.

3.1.4 Alder Carr/sedge fen peats (facies 4)

A peat horizon was recorded within all the interventions with the surface occurring at *c* 0.3m OD. This peat is likely to represent the development of alder carr sedge fen wetland environments forming within channel marginal areas. The peat may have formed across previous channel threads as a result of channel migration, or due to

aggradation across the floodplain and resultant restriction of the channel belt. These peats are likely to be Bronze Age in date.

3.1.5 Overbank flood alluvium (facies 5)

The uppermost alluvial deposit monitored during the survey comprised silty clays often displaying gleyed characteristics. The surface of this unit lay as high as 2.5m OD in BH1 but had been truncated to a depth of 0.6m OD in BH2. These deposits represent overbank flooding and the formation of accretionary floodplain soils. The lower part of the unit is likely to be related to frequent tidal inundation and the formation of estuarine mudflat environments. The upper part displayed evidence of pedogenesis with signs of oxidation, rooting and sub-aerial weathering. This upper part probably accrued through seasonal overbank flooding in semi terrestrial conditions. Given the elevation these deposits are likely to date from the Iron Age to Medieval periods. By the Iron Age/Roman period it is probable that the site existed as a semi terrestrial floodplain.

3.1.6 Modern buried land surface and ground raising (facies 6)

Across the study area, the alluvial deposits were buried by 0.75 to 2.75m of modern ground raising deposits.

4 Archaeological and geoarchaeological potential

The survey demonstrated that the site lies within a channel area, and preserves a deep sequence of alluvial, fluvial and organic deposits related to the evolution of the floodplain and changes in channel morphology. There is potential across the site for geoarchaeological and palaeoenvironmental reconstruction.

The sand and gravel deposits at the base of the sequence generally have little potential for archaeological remains as they would have been deposited within a fast flowing channel, many of them in a harsh arctic climate channel. Such environments also tend to have poor potential for palaeoenvironmental reconstruction.

The fine grained sediments that lie immediately over the sands are likely to preserve ostracods, and diatoms which would provide information on the depth of the water column and the climate at the time of deposition.

Although not evident in the boreholes, the peat deposits may yield evidence of human activity during the early Holocene and later. There is the potential for the preservation of waterlogged wooden remains such timber track ways, wetland archaeology, river revetments, sunken vessels etc. Such structures might provide material for radiocarbon dating and/or dendrochronology dating. The peats also have the potential to preserve a wide range of environmental indicators such as seeds, pollen and plant macro fossils which can be utilised to reconstruct the prehistoric palaeoecology of the surrounding landscape.

Although the upper part of the sequence suggests that the site had developed into a semi-terrestrial floodplain by the Iron Age/Roman period, there is little potential for occupation to be found within these sediments. Such environments were too frequently inundated by floodwaters, or tidal surges to allow any permanent form of occupation to occur. Although infrequent, seasonal usage of the land cannot be discounted.

In general the site preserves a long sedimentary record which can be used to reconstruct changes to the fluvial regime and geomorphology of the Thames floodplain. These deposits will also preserve a range of ecofacts which can be used to reconstruct the environments contemporary with human activity. However, radiocarbon dating is essential to provide a chronological framework to the deposit sequence and ascertain its true potential and significance.

Previous work at St Michaels School has demonstrated that these Southwark channels can preserve organic deposits dating to the Neolithic/Early Bronze Age period with high levels of palaeoenvironmental reconstruction. This is unusual within the floodplain of the middle Thames as the peat and organic deposits are usually found to accumulate after this date in the London area. The deposits recorded on the site display similarities with this sequence, and may therefore have similar levels of potential and significance.

Any further work required should focus on obtaining a chronological framework for the deposit sequence through radiocarbon dating, and assessing the levels of palaeoenvironmental preservation within the deposits sequence.

5 Geoarchaeological glossary

Alluvium: a broad term referring to material deposited in a river channel or floodplain. Alluvial sediments are usually fine-grained and well-sorted although there is no diagnostic particle size as deposition depends on the energy of the water transport (i.e. from sands and gravels deposited by fast flowing water to clays that settle out of suspension during overbank flooding). Alluvium is frequently laminated or exhibits bedding structures, will often oxidise and change colour following exposure and may be rich in environmental remains such as molluscs or pollen. Impeded drainage leads to peat development and can also be considered to be alluvium, while tufa accumulates where calcium carbonate-saturated water issues from springs.

Devensian: the last glacial complex in Britain (MIS4-2) equivalent to the northern European **Weichselian** and the Alpine **Wurmian**.

Holocene: or 'Postglacial' is the most recent epoch (part) of the Quaternary, covering the past 10,000 years, characterised by an interglacial climate. The Holocene in Britain is often referred to as the 'Flandrian'.

Late Glacial: or Devensian Lateglacial, the period following the Last Glacial Maximum lasting until the start of the Holocene. This period is subdivided into a warm interstadial episode (called the **Windermere Interstadial** in Britain), followed by a cold snap (the **Loch Lomond Stadial**) in which local ice re-advance occurred.

Last Glacial Maximum: the peak of the most recent glaciation (Devensian), from between approximately 22,000 to 18,000 years ago. In Britain this is referred to as the Dimlington Stadial.

Pleistocene: referring to the part of the Quaternary pre-dating the climatic amelioration at the start of the Holocene (approximately 2.6 million years ago to 10,000 BP).

Quaternary: the most recent major sub-division (series) of the geological record, extending from around 2.6 million years ago to the present day and characterised by climatic oscillations from full glacial to warm episodes (interglacial), when the climate was as warm as if not warmer than today. The observed pattern is of long glacial stages with cold and warm perturbations (stadials and interstadials) and short interglacials (usually less than 10,000 years). Human evolution has largely taken place within the Quaternary period.

6 Acknowledgements

The author would like to thank Street Sherwood Ltd for commissioning this report.

7 References

ACAO, 1993 Model briefs and specifications for archaeological assessments and field evaluations, Association of County Archaeological Officers

Archaeological Archive Forum, Archaeological Archives: a guide to best practice in creation, compilation transfer and curation (2007)

BADLG, 1986 Code of Practice, British Archaeologists and Developers Liaison Group

Bird, J and Graham, A, 1978 Gazetteer of Roman sites in Southwark, Southwark Excavations 1972-74 II, Joint Pub of London Middlesex Archaeol Soc and Surrey Archaeol Soc, 517-26.

Cowan, C, Seeley, F, Wardle, A, Westman, A, and Wheeler, L, 2009 Roman Southwark settlement and economy: excavations in Southwark 1973-91, MOLA Monograph 42.

Dawson, G, 1979 Excavations at Guy's Hospital 1967, Research Vol No7 of Surrey Archaeol Soc, 27-65.

Department of the Environment, 1990 Planning Policy Guidance 16, Archaeology and Planning

Detsicas, AP, 1960 Some Samian Ware of Form 72, Antiquaries Journal 40, 195-99.

Drummond-Murray, J, Saxby, D, and Watson, B, 1994 Recent Archaeological work in the Bermondsey district of Southwark, London Archaeologist 7, No10, 251-57.

Drummond-Murray, J, Thompson, P, with Cowan, C, 2002 Settlement in Roman Southwark: archaeological excavations (1991-8) for the London Underground Jubilee Line Extension Project, MOLAS Monograph 12.

English Heritage, 1991 Exploring our Past. Strategies for the Archaeology of England, English Heritage

English Heritage, 1991 Management of Archaeological Projects (MAP2)

English Heritage, 1997 Sustaining the historic environment: new perspectives on the future

English Heritage, May 1998 Capital Archaeology. Strategies for sustaining the historic legacy of a world city

Graham, A, 1978, The geology of north Southwark and its topographical development in the post-Pleistocene, Southwark Excavations 1972-74 II, Joint Pub of London Middlesex Archaeol Soc and Surrey Archaeol Soc, 501-17.

Halsey, in prep, Geoarchaeological investigations at St Michaels School, Southwark. London Archaeologist

Institute for Archaeologists (IFA), rev. 2008 By-Laws, Standards and Policy Statements of the Institute for Archaeologists: Standards and guidance

Institute of Field Archaeologists (IFA), supplement 2001, By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists: Standards and guidance – the collection, documentation conservation and research of archaeological materials.

Institute of Field Archaeologists, (IFA), 2008 By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists, (rev. 2008), Standard and guidance: field evaluation.

Jones, A P, Tucker, M E, and Hart, J H, 1999. 'The description and analysis of Quaternary stratigraphic field sections' Technical Guide No.7, Quaternary Research Association, London

London Borough of Southwark, 2007 Unitary Development Plan;

Maitland Muller, MR, 1965 Southwark Archaeological Excavation Committee: Preliminary Report on the Excavations at New Guy's House, Southwark 1965, unpublished typescript dated 7/12/65, in GHY10 site archive.

Marsden, P, 1994 Ships of the Port of London: first to eleventh centuries AD, English Heritage Archaeol Report 3.

Marsden, PRV, 1965 A Boat of the Roman period discovered on the site of New Guy's House, Bermondsey, 1958, Trans London Middlesex Archaeol Soc 21, part 2, 118-31.

MOLA, 2009 Phase 1 Redevlopment, Guy's Hospital , Great Maze Pond, London Borough of Southwark, Archaeological Desk Based Assessment, MOLA un pub report

MOLAS, 2001 1–2 Bowling Green Place, London Borough of Southwark, A Geo-archaeological evaluation report, MOLA un pub report

Museum of London, 2009 General Standards for the preparation of archaeological archives deposited with the Museum of London

Museum of London, 1994 Archaeological Site Manual 3rd edition

Museum of London, 1994 Archaeological Site Manual 3rd edition.

Museum of London, 2002 A research framework for London archaeology 2002.

Museum of London, 2002 A research framework for London archaeology 2002

Standing Conference of Archaeological Unit Managers, 1991 revised 1997 Health and Safety in Field Archaeology, Manual

Taylor-Wilson, R, 2002 Excavations at Hunt's House, Guy's Hospital, London Borough of Southwark, Pre-Construct Archaeol Ltd Monograph 1.

Thompson, A, Westman A, and Dyson, T (eds), 1998 Archaeology in Greater London 1965-90: a guide to records of excavations by the Museum of London, Archaeol Gazetteer Ser Vol 2, London

Tucker, M E, 1982, Sedimentary rocks in the field. John Wiley and Sons, Chichester

Watson, B, 2010 The Roman Boat adjoining New Guy's House: Archaeological evaluation report MOLA un pub report

Watson, B, in prep The Guy's Hospital Roman Boat fifty years on London Archaeologist

Wheeler, REM, 1930 London in Roman Times, London Museum Guide.