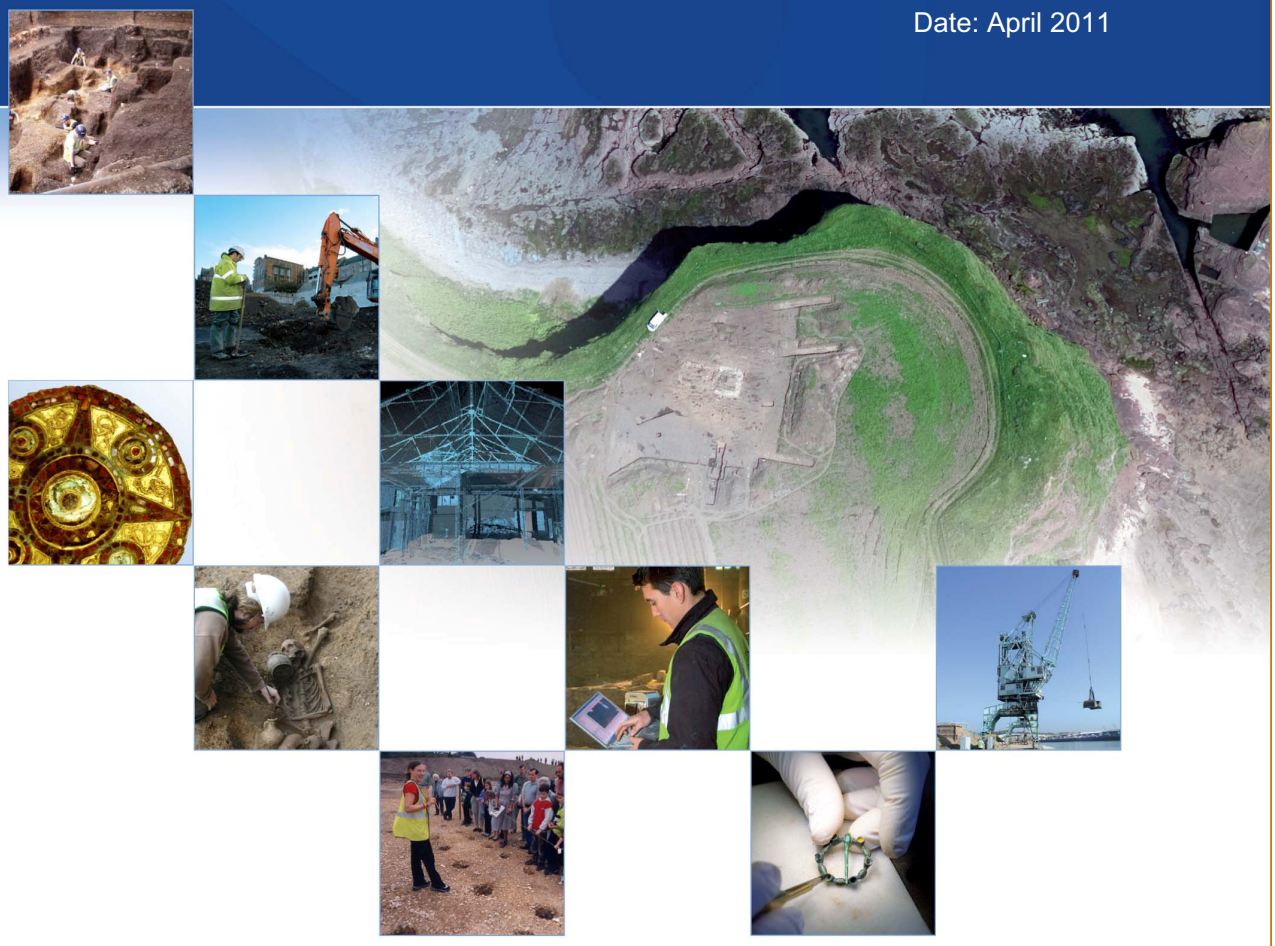
70 Great Suffolk Street, London Borough of Southwark

An Archaeological Evaluation and Geoarchaeological Analysis Report

Planning Application Number: 08-AP-0805
National Grid Reference Number: TQ 3186 7990
AOC Project No: 30742
Site Code: GUF10
Date: April 2011



AOC Archaeology Group

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70 Great Suffolk Street, London Borough of Southwark:

An Archaeological Evaluation and Geoarchaeological Analysis Report

On Behalf of:	**Vision Architecture Ltd** The Studio Kamen House 62-66 Farringdon Road London EC1M 3JB
National Grid Reference (NGR):	**TQ 3186 7990**
AOC Project No:	**30742**
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Date:	**April 2011**

This document has been prepared in accordance with AOC standard operating procedures.

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Non-Technical Summary

A two-trench evaluation was undertaken by AOC Archaeology at 70 Great Suffolk Street, London Borough of Southwark (NGR) TQ 2244 5557. The site was formerly a garage.

Beneath the modern surface was a sequence of post-medieval topsoil overlying deposits that are likely to represent the fill of a channel running roughly north-south. This channel is known from other sites in this area of Southwark, and was thought to be of Bronze Age date or earlier. The top of the sequence was truncated by a basement of 19th century date in Trench 2, and was cut by a pit in Trench 1. To further understand the environmental sequence on site, a borehole was dug that identified deposits associated with either a tributary or channel of the Bankside Channel. An initial assessment was completed which indicated the potential for pollen and diatom remains and the potential for establishing a firm carbon date by the presence of in-situ freshwater mollusca. Further analysis of the pollen and the diatom were completed as well the radiocarbon dating of the mollusca, This indicated a date of 750-410 cal BC for the lower deposits recorded.

1. Introduction

1.1 Site Location

1.1.1 The site is centred on National Grid Reference (NGR) TQ 2244 5557and measures approximately 175m^2 (Figure 1). It is bounded by Great Suffolk Street to the east, Surrey Row to the south, Paradise Row to the north and land under a railway viaduct to the west (Figure 2).

1.1.2 The site is roughly rectangular, and until recently contained a garage for motorcycle repair.

1.2 Planning Background

1.2.1 The local planning authority is the London Borough of Southwark. Archaeological advice to the borough is provided by Dr Chris Constable of Southwark Council.

1.2.2 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.

1.2.3 Planning permission was granted in 2008 for the construction of the demolition of the garage building currently on the site and building of a new six storey residential block over a basement. (Planning Reference 08-AP-0805). Evaluation trenching was required as a condition on the granting of the Planning Application for the site. This follows an assessment of the potential archaeological significance of the site (PCA 2007).

1.2.4 The next stage in the planning process was the production of a Written Scheme of Investigation, detailing the methodology for the evaluation (AOC 2010). This was approved by Dr Chris Constable prior to the start of works and was fully in accordance with the policies and guidelines within Policy Planning Statement (PPS5) Planning for the Historic Environment (DLCG 2010).

1.2.5 The archaeological evaluation conformed 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 2010).

1.3 Geology and Topography

1.3.1 The British Geological Survey mapping (BGS Sheet 270) 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.

1.3.2 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).

1.3.3 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.

1.3.4 No geotechnical investigations have been undertaken on the site although an evaluation undertaken at Southy Point c. 150 m to the north of the site identified a sequence of natural gravel overlain by alluvial clay and peat. It was posited that the alluvium and peat were within a palaeochannel on a north/south alignment (Darton and Taylor 2002).

2. Archaeological And Historical Background

2.1 The following background is drawn from the Desk Based Assessment undertaken for the site in 2007 (PCA 2007).

The Prehistoric Period (c. 500,000 BP – AD 43)

2.2 The site lies within 700m of the south bank of the River Thames and a number of palaeochannels have been identified in the Southwark Area. The nearest is that identified at South Point, the peat from which has been dated to the Bronze Age. The location of 70 the site is believed to have been just above the high tide line associated with this channel (Yule 2005).

2.3 No prehistoric evidence has been recorded within 200m of the site but this would have been a prime location near to riverine resources. Evidence for Prehistoric activity has been recorded in similar locations elsewhere in Southwark including concentrations of Prehistoric activity on Borough High Street (Pickard 2003, Sadarangani 2004).

The Roman Period (c.AD 43 – 410)

2.4 Southwark was a major waterfront and port during the Roman period on the southern approach to the Thames crossing, which lies c. 60m west of the modern London Bridge. Borough High Street follows the line of the principal route through Roman Southwark. The Roman Stane and Watling Streets also converged on the Thames crossing at Southwark.

2.5 Evidence for Roman activity has been identified 400m east of the site and includes a number of Roman burials and cremations such as those found at America Street, Union Street and Lant Street (AOC 2002, Capon 2006, Sayer 2005). There are also records of further finds of Roman urns and a Roman channel deposit containing what may be domestic refuse from the area of Union Street. The investigations at Union Street concluded, however, that the area was on the margins of the Roman settlement at Southwark (Hulka and Meddens 2004). It is therefore posited that Suffolk Street also lies outside of the main occupied area (PCA 2007).

Medieval Period (c.AD 410 – 1540),

2.6 With the collapse of Roman rule, Southwark appears to have become abandoned and no data has been recorded for Early Medieval activity within Southwark. There is however a record in the Burghal Hidage that a fortification was established at *Suthringa geweorche*, which may refer to a fortified bridgehead at Southwark (Tames 2004).

2.7 During the 11th century, Southwark became re-established as the southern suburb of London; the Domesday Book of 1087 recording a Minster Church, dock and a herring fishery as well as 50 houses.

2.8 Throughout the medieval period Southwark became the centre for a large number of industrial activities including milling, fulling, brewing, leatherworking and trades associated with military procurement. The borough also lay on the southern end of the only crossing of the River Thames with London Bridge being built in stone in 1209. The borough was therefore once more the location of the meeting of important road routes into London and was known for the services provided to travellers including inns and brothels. The borough also became known for its large immigrant population.

2.9 No significant evidence for medieval activity has, however been located within 200m of the site and it is conjectured that the site lies outside of the main settled area of the borough

Post-medieval Periods (c.1540 to present)

2.10 The population of Southwark of Southwark rose from c. 10,000 in 1547 to c. 30,000 in 1676, the majority of which may be attributable to an influx of immigrants to the borough (Reilly 1998).

2.11 The earliest maps to show the area of the site are a map of 1627 depicting the Manor of Pans Gardens and the 1662 Morden and Lea Map. Both these maps show the site to have apparently been open ground, although the surrounding area had changed significantly from an area of open fields on the 1627 map to an established Street on the line of Suffolk Street with some housing by 1662.

2.12 During the 18th Century, the development of the area continued apace and it appears that a building had become established on the site by the time of Rocque's depiction of the area in 1746. This building fronted Gravel Lane (The former name for Great Suffolk Street) to the east and Paradise Row to the north. The immediate vicinity of the site appears to have lain in an area associated with the Fulling trade with a Tenter ground and stretches of waterway depicted on Rocque's Map.

2.13 The area continued to become more developed during the later 18th and early 19th centuries although no change is apparent on the site itself until its depiction on the 1st edition Ordnance Survey Map of 1872 when a building is shown on the map, labelled as a public house.

2.14 By 1938, it is apparent that industrial and commercial development is fully taking over the area. The 1872 building is still depicted on the site but appears to be no longer a Public House but has become a residential property. Gravel Street had by then been renamed Great Suffolk Street and the building on the site formally numbered No. 70. The building was demolished during or after World War II, and was first used as a garage as early as 1956 with a sunken petrol tank reportedly within the northwest edge of the site (Case and Goad 1956).

2.15 A number of archaeological investigations have been undertaken along the length of Great Suffolk street. A evaluation at No. 64 Great Suffolk Street recorded rubble associated with the backfilling of the basement of a 20th century building (Maloney and Holroyd 2003) while a evaluation at Nos. 84 – 88 great Suffolk Street recorded no significant archaeology but did note natural sands and gravels overlain by silts of Medieval and Post Medieval date (Maloney and Holroyd, 2003). Finally, an evaluation at 57 – 59 Great Suffolk Street recorded alluvial clay, which were positioned to be part of a tidal mudflat; this channel deposit was cut by a natural channel and a well of probable 18th century date. Over this were layers of recent overburden (Maloney and Holroyd 2004).

3. Strategy

3.1 Aims of the Investigation

3.1.1 The aims of the evaluation 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.

3.1.2 The specific objectives of the evaluation were to determine:

- Determine the presence of any Romano-British activity on site. Does this evidence indicate the presence of settlement at this time?
- Determine the presence of any early medieval/medieval activity on site? Is there any evidence for settlement at this time?
- Assess the potential of the site to inform on the post-medieval development and chronology of London.
- Assess the degree and extent of truncation of earlier deposits by late post-medieval and modern buildings on the site.
- Assess the geoarchaeological potential of the site; A qualified geoarchaeologist will visit the site during the works to advise.
- To provide suitable information concerning the preservation in situ of archaeological deposits so as to inform further mitigation through foundation design or archaeological mitigation.

3.1.3 The final aim is to make public the results of the investigation, subject to any confidentiality restrictions.

3.2 Methodology

3.2.1 A Written Scheme of Investigation (WSI) was prepared by AOC Archaeology (2010). The WSI defined site procedures and detailed how the evaluation, consisting of two trenches; both measuring 5.00m by 2.00m would be undertaken (Figure 2).

3.2.2 Prior to commencing work a unique site code (GUF 10) was provided by the Museum of London, and was used as the site identifier for all records produced.

3.2.3 The excavation of the evaluation trenches was undertaken on the 22nd November 2010. A level for each context was established using a temporary Bench Mark of 3.79mOD. This was established on site, having been transferred from a benchmark on 55 Great Suffolk Street of 4.07mOD. The site was extremely restricted by the presence of live services, and the two trenches could not be excavated concurrently.

3.2.4 In December 2010 QUEST were commissioned to sample the soil sequence on site, by means of drilling a single borehole for the purpose of environmental assessment. An assessment was carried out on the borehole sample, the results of which were included in the AOC evaluation report (AOC 2011). The results indicated the presence of pollen and diatoms which warranted further analysis as well as the remains of *in situ* freshwater mollusca which would be suitable for radiocarbon dating. As such , QUEST were commissioned to carry out an analysis of the remains to sequence the findings into a temporal context, and provide a detailed reconstruction of the vegetation and hydrological

history of the site and its environs. A sample of the fresh water mollusca was obtained and submitted for radiocarbon dating in February 2011.

3.2.5 The site work was conducted by Les Capon, Project Officer, under the overall management of Melissa Melikian, Operations Director. The site was monitored by Chris Constable on behalf of Southwark Council.

4. Results

4.1 Trench 1

Context	Description	Depth	OD height
101	Concrete	0.25m	3.95m
106	Demolition horizon	0.55m	3.25m
107	Buried soil	0.45m	2.70m
112	Subsoil	0.34m	2.25m
113	Naturally-lain silty clay	>0.60m	1.87m

4.1.1 Trench 1 measured 5m by 2.0m at base and was the southern of the two trenches, oriented north-south to avoid four live services towards the east of the site. It was, oriented roughly north-south (Figures 2 and 3). A sequence of naturally lain and developed soils were revealed, with one cut feature and evidence of three building phases present.

4.1.2 The lowest deposit seen was naturally lain bluish yellowish brown silty clay (113), present at 1.87mOD, and having a level horizon. This contained no cultural material. It was sealed by clean brown silty clay with occasional gravel content (112). This was 0.34m deep, and was sealed by dark brown sandy silty clay with some organic content (106), dated to the post-medieval period by fragments of brick and clay tobacco pipe stems (not collected) and by sherds of a polychrome tin-glazed plate. This layer was 0.45m deep and lay at 2.70mOD. The organic character of this deposit suggests that it has its origins in the use of the site as gardens.

4.1.3 The topsoil-like deposit was cut by a square, vertical-sided pit 1.3m across and 1.4m deep [108], in the west side of the trench, and recorded in the section (Figure 3) Within the pit were the decomposed remains of a wooden barrel or similar stave-built item (110), too far decomposed to collect or record in detail. Between the cut and the barrel, grey silty clay had been deposited (109). Within the barrel was a dump of brick rubble and tile with a wet dark brown silty clay soil matrix (111). Smaller finds of pottery, clay tobacco pipe, window glass and a fragment of a shoe indicated an early to mid-19th century date. This barrel-pit may have been a cesspit or a well associated with the properties shown on the 18th century maps.

4.1.4 The rubble fill of the pit and the topsoil horizon was sealed by a 0.55m deep layer of demolition material, dominated by red brick fragments, tile, slate and mortar (106). There were no structural remains within the trench, but the layer probably relates to the demolition of properties that lie beyond the limits of the trench, along the street front as shown on the Horwood Map. The fact that this layer seals the pit-fill suggests that the pit was filled rapidly upon disuse.

4.1.5 The upper layers of the trench were disturbed by 20th century events, but immediately atop the rubble was the base of a brick wall (103), built in English bond with cement-rich mortar. This was seen for a depth of 0.8m. There was no surface associated with this wall present in the trench, so it may have been removed. The wall is most likely part of the Public House shown on the Ordnance Survey Maps since 1876.

4.1.6 Two concrete-bound drains cut through the wall foundation (104 and 105). These were sealed by hardcore (102) and concrete (101), the concrete forming the surface of the site when used by the recent motorbike garage. This lay at 3.95mOD.

Plate 1: Trench 1 looking west

4.2 Trench 2

Context	Description	Depth	OD height
201	Demolition deposit	2.30mm	4.04m
203	Cellar floor	0.35m	1.76m
204	Naturally-lain silty clay	>0.40m	1.45m

4.2.1 Trench 2 measured 5m by 3.00m at surface, and lay to the north of the site, oriented north south. It was relocated from its initial proposed location to avoid the presence of live electric cables to the east. A deep basement of 19th century date had truncated the depositional sequence to 1.45mOD.

4.2.2 The lowest deposit recorded was bluish yellow brown alluvial silty clay, present immediately beneath the cellar at 1.45mOD. This is thought to represent palaeochannel deposits which have been recorded to the north and south of the site in previous excavations in this part of Southwark. This is a former tributary of the Thames called the Bankside Channel.

4.2.3 Cutting into the silty clay was a deep cut [205] with a flat base with a cellar built within the cut; one brick wall of the cellar was present in the western edge of the trench. This was built in English bond of red bricks, bonded with cement mortar (202), and was 0.37m wide, standing 2.3m high. The floor of the cellar was concrete with high gravel content (203), and was 0,35m deep. The cellar floor lay at 1.76mOD. The cellar had been backfilled with brick rubble, occasional slate, pieces of iron pipework and some glass (201), and was roughly compacted. This is probably the cellar of the public house that stood on the site in the 19th and 20th centuries The backfill was sealed by the concrete slab of the motorbike garage (101), which lay at 4.10m OD, slightly higher than at the south of the site.

4.3 Geoarchaeological Borehole (see Appendix C)

4.3.1 After the completion of the evaluation, geoarchaeologists from QUEST returned to site in order to sample the geoarchaeological sequence by means of a borehole. The upper part of the borehole sequence (Unit 4 – between 3.50m and 3.01m OD) consisted of made ground passing down in Unit 3 (3.01m to 2.50m OD) to a mixture of made ground and the underlying alluvial silt (Unit 2 – between 2.36m and 1.01m OD). Unit 2 comprises 1.0m of organic silt with common detrital plant remains throughout and large amounts of broken mollusc shell including one thin bed incorporating complete shells of freshwater gastropods and bivalves. Towards the bottom of the silty alluvium (1.20 to 1.10m OD) a sandy horizon was present. The fine-grained alluvium rests with a sharp contact on sandy gravel at 1.01m OD (Unit 1).

4.3.2 The presence of these channel-fill deposits in an area lying to the south of the supposed southern margin of the Bankside Channel shows either that the Bankside Channel is wider than previously recognised or that a minor channel was present acting either as a backwater to the main channel or as a tributary to it. Since the surface of the Shepperton Gravel at Great Suffolk Street (1.01m OD) is substantially (ca. 2.5m) higher than the level of the floor of the Bankside Channel, it seems more likely that the Great Suffolk Street sedimentary sequence represents infilling of a stream tributary to the Bankside Channel.

4.3.3 Following the identification of articulated freshwater bivalve shells indicative of in-situ deposition towards the base of the sedimentary sequence between 1.30 and 1.40m OD, these were submitted for AMS radiocarbon dating. The resultant determination provided an age of 2400-2700 cal BP (750-410 cal BC; Table 1). The δ13C (‰) values are consistent with that expected, and there is no evidence for mineral or biogenic carbonate contamination. This date indicates that the alluvial sequence dates from the Iron Age cultural period.

Table 1: Results of the radiocarbon dating of Borehole <BH1>, 70 Great Suffolk Street, London Borough of Southwark

Laboratory code / Method	Depth (m OD)	Material	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC/AD (BP) (2-sigma, 95.4% probability)	δ13C (‰)
SUERC-33394 (GU-23503)	1.30 to 1.40	Articulated freshwater bivalve	2450 ± 30	750-410 cal BC (2400-2700 cal BP)	-28.0

5. Finds

5.1 Finds from the pit and topsoil finds have been assessed and are presented in Appendix B. They reveal an 18th century date for the topsoil deposit and a 19th century date for the pit fill. No further work is recommended for the finds.

5.2 A geoarchaeological borehole was drilled on site to obtain a complete sequence through the deposits. This was carried out by QUEST, who collected the samples for processing, assessment and analysis. The results of the analysis can be found in Appendix C.

6. Conclusions and Interpretation

6.1 The archaeological deposits and sequence of soils and buildings on the site confirms historic map evidence and corresponds to other archaeological findings in the area. The archaeological trenches along with the borehole analysis indicate a sequence on site of Kempton Park Gravels overlaid by alluvium, which is in turn overlaid by made ground. The radiocarbon date for the lower section of the sequence indicates hat it dates to the Iron Age. Within the base deposits was a thin but well-marked sandy horizon and common organic remains, including the numerous remains of Mollusca including freshwater species. These features are unlikely to be associated with episodic flooding of the River Thames and suggest rather, the existence of a local channel containing running water. The consistent presence of an estuarine element in the diatom flora suggests that such a channel might represent the upper reaches of a tidal creek maintained by flow of freshwater from nearby high ground to the south, but also subject to regular inflow of tidewater. The pollen results indicate that during the period of alluvial deposition, the wetland environment was dominated by the growth of freshwater plants including grasses, sedges, aquatics and semi-aquatics, most likely alongside the margins of a channel. Wetland trees and shrubs such as alder, willow and possibly birch, ash and hazel were also present, but only occurred as limited stands within this dominantly herbaceous community. On the dryland, the environment was similarly very open in nature, with trees such as oak, lime and hazel limited to isolated stands and/or at distance from the site. The herbaceous community indicates disturbed ground and probable arable farming activities. The results for the geoarchaeological investigations add too and corroborate records from elsewhere, namely that of a greatly reduced woodland cover on the wetland and dryland and increased evidence of human activity from the Late Bronze Age onwards.

6.2 The earliest soil horizon with datable finds was the topsoil deposit in Trench 1. This contained pottery of mixed post-medieval date; and probably represents general use of the site as gardens to the rear of houses fronting onto Great Suffolk Street when known as Gravel Lane. The wood-lined pit may have been a cess pit or well. The finds within indicate an early-mid 19th century date for its closure and filling in. Directly above the fill, the spread of rubble probably represents scattered demolition material from older houses before a new public house was built in the mid 19th century, a public house which appears to have survived until around the time of the Second World War. The presence of the public house had a deep impact on the potential archaeological layers on the site, truncating the northern end to 1.45mOD.

7. Further Work and Publication

7.1 The evaluation revealed no significant archaeological features and cultural artefacts and requires no further fieldwork. Geoarchaeological analysis of the borehole has been carried out and has been summarised in this report as well as added as a full report in Appendix C.

7.2 A short summary of the results of the evaluation will be published with a short summary submitted to the London Archaeological Fieldwork roundup, and grey literature added to the online ADS OASIS project (Appendix D).

8. Archive Deposition

8.1 On completion of the project the developer/landowner will discuss arrangements for the archive to be deposited with the local museum, the London Archaeological Archive and Research Centre. The site archive will comprise all artefacts, environmental samples and written and drawn records. It is to be consolidated after completion of the whole project, with records and finds collated and ordered as a permanent record.

8.2 Following completion of the project the site archive will be prepared in the format agreed with London Archaeological Archive and Research Centre. The excavation archive will be security copied and a copy deposited with the National Archaeological Record (NAR).

8.3 The archive will be prepared in accordance with the guidelines provided by London Archaeological Archive and Research Centre and the Guidelines for the preparation of excavation archives for long-term storage (UKIC 1990). The archive will be security copied and a copy deposited with the National Archaeological Record (NAR) before post-excavation analysis begins or as soon after as can be arranged.

8.4 The site archive will be deposited with the museum, London Archaeological Archive and Research Centre within one year of the completion of report. It will then become publicly accessible.

8.5 An OASIS form has been initiated (Appendix C) and this will be completed and deposited with the Archaeological Data Service (ADS).

9. Bibliography

AOC Archaeology (2010). *70 Great Suffolk Street, London Borough of Southwark: A Written Scheme of Investigation for an Archaeological Evaluation*

AOC Archaeology (2011). *70 Great Suffolk Street, London Borough of Southwark: Results of Archaeological Evaluation*

AOC Archaeology Group Ltd (2005). *Fieldwork Sector On-Site Handbook*.

AOC Archaeology (2002). *Post-Excavation Assessment of an Archaeological Excavation: 2 America Street, London Borough of Southwark. Unpublished*

British Geological Survey, (1979). *Solid and Drift Sheet, North London*.

Capon, L. (2006) *Excavations at 97-101 & 103 Union Street, Southwark*. London Archaeologist. *Spring 2006.*

Case, E Goad (1889 and 1956 Revision). *Insurance Plan of London. Vol. X.* Case E Goad Ltd. London

Darton, L and Taylor, J (2002). *An Archaeological Evaluation at South Point, Blackfriars Road, London Borough of Southwark.* PCA Unpublished Report. London.

Department of the Environment (1990). *Planning Policy Guidance: Archaeology and Planning (PPG16).*

English Heritage (1991). *Management of Archaeological Projects.*

English Heritage (1998a) *Archaeological Guidance Paper 2: Standards and Practices for Written Schemes of Investigation. English Heritage London Region.*

English Heritage (1998b). *Archaeological Guidance Paper 3: Standards and Practices in Archaeological Fieldwork*. (English Heritage London Region).

English Heritage (1998c). *Archaeological Guidance Paper 4: Standards and Practices in Archaeological Reports*. (English Heritage London Region).

English Heritage (2002). *Environmental Archaeology: A guide to the theory and practice of methods, from sampling and recovery to post-excavation*

Hulka, K and Meddens, F. (2004). *Phased Summary and Assessment Document of the Excavation at 33 Union Street, London Borough of Southwark.* PCA Unpublished Report. London.

Institute for Archaeologists (2008). *Standards and Guidance and Guidelines for Finds Work*.

Institute for Archaeologists (2008). *Standard and Guidance for an Archaeological Evaluation*.

Institute for Archaeologists (2008). *Code of Conduct.*

Institute for Archaeologists (2008). *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology.*

Maloney, C and Holroyd, I (2003). *London Fieldwork and Publication Round Up 2002.* London Archaeologist Vol. 10. Supplement 2. London

Maloney, C and Holroyd, I (2004). *London Fieldwork and Publication Round Up 2003.* London Archaeologist Vol. 10. Supplement 3. London

MoLAS (2000). *The Archaeology of Greater London: an assessment of archaeological evidence for human presence in the area now covered by Greater London*. MOLAS: London.

Murphy & Wiltshire (1994). *A guide to sampling archaeological deposits for environmental analysis.* English Heritage. London.

Museum of London (1994). *Archaeological Site Manual (3rd ed).*

Museum of London (2002). *A Research Framework for London Archaeology.*

PCA (2007).*An Archaeological Desk top Assessment of 70 Great Suffolk Street, London Borough of Suffolk.* PCA: Unpublished Report. London.

Pickard, C. (2003). *An Archaeological Desk Top Assessment of a Site in Talbot Yard, London, SE1, London Borough of Southwark.* PCA Unpublished Report. London.

Reilly, L (1998). *Southwark and Illustrated History.* London Borough of Southwark. London.

RESCUE & ICON (2001). *First Aid For Finds*. (3rd ed).

Sandarangani, F (2004). *Archaeological Desk Top Assessment of Land at 2 – 6 Lant Street, London Borough of Southwark, SE1.* PCA Unpublished Report. London.

Sayer, K. (2005). *An Assessment of an Archaeological Excavation at 52 – 56 Lant Street, London Borough of Southwark.* PCA Unpublished Report. London.

Tames, R (2001). *Southwark Past.* Historical Publications Ltd. London.

United Kingdom Institute for Conservation (1983). *Conservation Guidelines No 2.*

United Kingdom Institute for Conservation (1990). *Guidance for Archaeological Conservation Practice.*

Yule, B. (2005), *A Prestigious Roman Building Complex on the Southwark waterfront: Excavations at Winchester Palace, London.* MoLAS Monograph 23. Museum of London Archaeology Service. London.

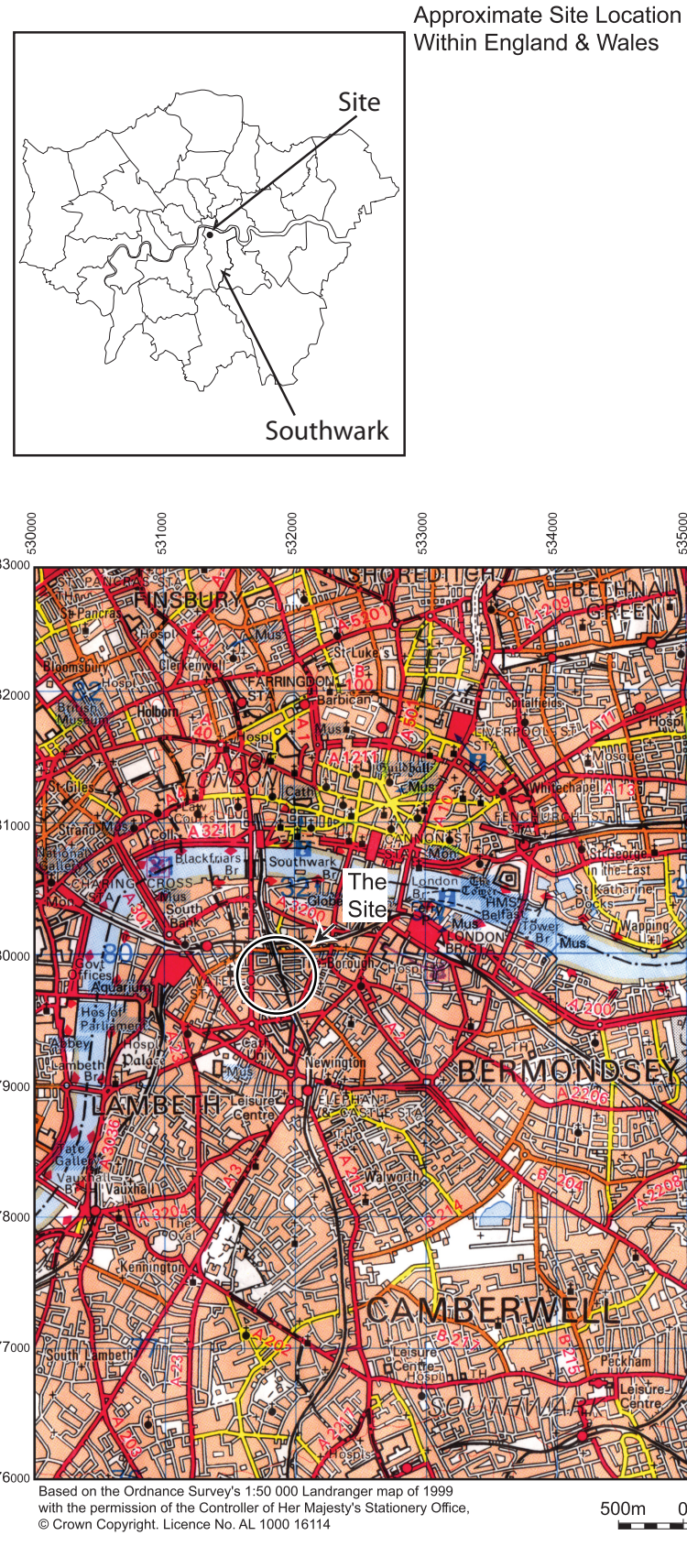


Figure 1: Site Location

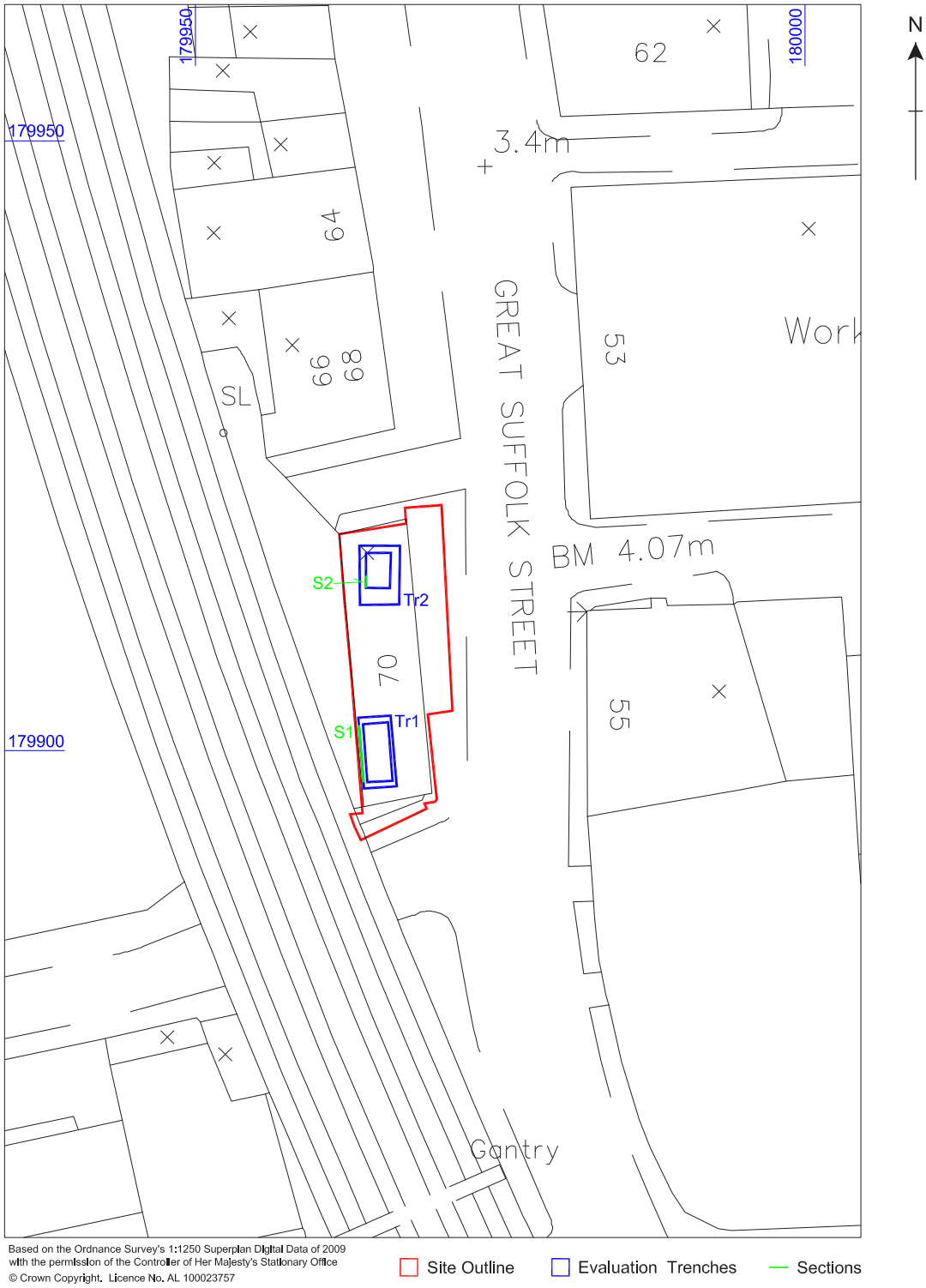


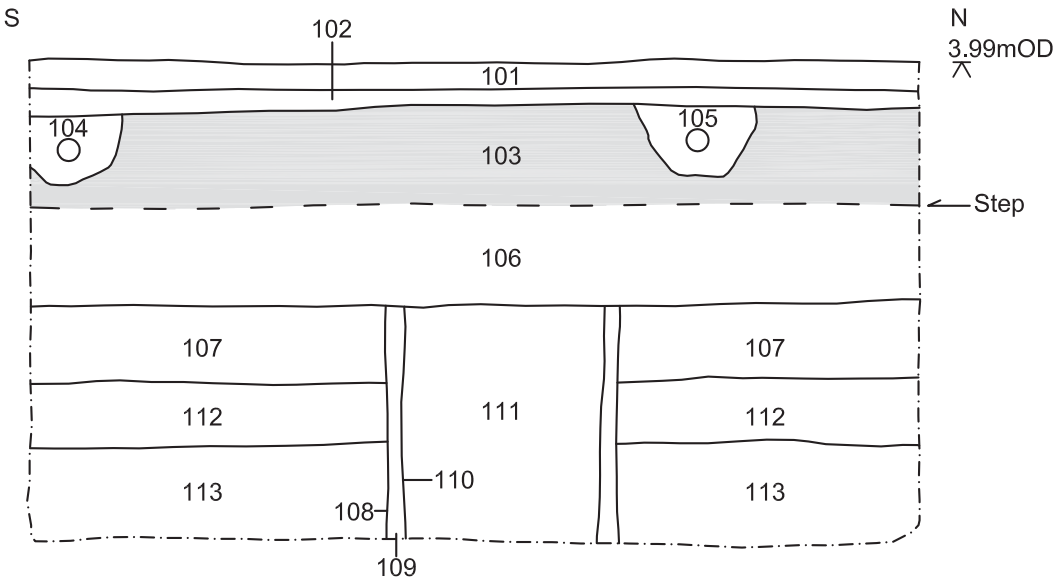
Figure 2: Detailed Trench Location Plan

10m 0 20m

1:500

Trench 1

Section 1



Trench 2

Section 2

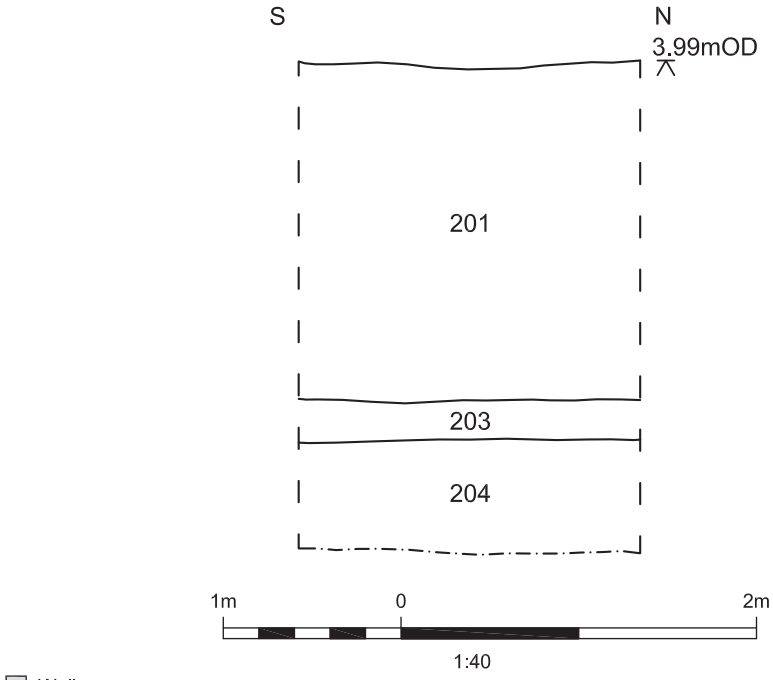


Figure 3: Sections

Appendices

Appendix A - Context Register

Context	Description	Length	Width	Depth
101	Concrete	7.00m	3.00m	0.15m
102	Hardcore	7.00m	3.00m	0.10m
103	Brick foundation	7.00m	0.01m	>0.80m
104	Drain	3.00m	0.50m	0.40m
105	Drain	3.00m	0.50m	0.40m
106	Demolition horizon	5.00m	2.00m	0.55m
107	Buried soil horizon	5.00m	2.00m	0.45m
108	Pit cut	1.30m	1.10m	1.30m
109	Fill of 108	1.30m	1.10m	1.30m
110	Wooden fragments in 108	1.20m	1.00m	1.30m
111	Fill inside 110	1.20m	1.00m	1.30m
112	Subsoil	5.00m	2.00m	0.34m
113	Naturally lain silty clay	5.00m	2.00m	>0.60m
201	Infill of cellar	5.00m	2.37m	2.30m
202	Wall of cellar	5.00m	0.37m	2.30m
203	Cellar floor	5.00m	2.00m	0.35m
204	Naturally lain silty clay	3.00m	2.00m	0.40m
205	Cut for cellar	3.00m	5.00m	2.65m

Appendix B – Finds Assessment

By Paul Fitz, AOC Archaeology Group

Summary and Quantification

A small assemblage of finds was collected from two contexts. Ceramics, predominately pottery, make up the majority of the assemblage. The quantification by context is listed below.

A deposit of topsoil (107), contained 12 sherds of the same polychrome tin glazed plate, one white tin glazed sherd <Orton C-1630 -1800> from a small jar/drug jar, a small English stoneware sherd, a plain white glazed earthenware, and one blue/white European scene transfer-printed plate <1780-1900+>. There is also a residual post-medieval green glazed borderware sherd and a '*famille rose*' style decorated Chinese porcelain cup piece<1720-1800>

A mixture of finds was retrieved from the fill of a well or wood-lined pit (111), the assemblage containing pottery, glass, tobacco pipe and leather. The pottery assemblage comprises seven cream ware plate and bowl pieces <1740-1880+>, five post- medieval red ware pieces all with internal orange-brown glaze<1580-1900>, two pieces of the same dark brown glazed redware bowl<1580-1900>, a mostly whole local London redware crucible(?) pot and a large sherd of an unglazed black basalt ware piece <1770-1900>. The collected glass comprised one punt style base of a small, clear bottle and two window shards. Two pieces of clay tobacco pipe were retrieved; one stem piece and one partial Type 27 bowl with complete initialled spur <1780-1820>. The initials are TB, and could belong to one of three known makers in the early 19th century. A complete pointed leather women's shoe sole in moderate condition was also retrieved.

Discussion/Recommendations

The assemblage as a whole has helped date the two contexts they derive from but have little local or national value for further research.

Both contexts are late eighteenth-nineteenth century in date. The pottery is a mix of domestic and fine wares, the Chinese porcelain and basalt ware being of note.

The leather shoe sole should be discarded as it will not justify conservation costs.

The glass, though having little worth, shall be retained.

The initialled tobacco pipe bowl/spur piece warrants no further investigation.

The finds will be packaged according to the Museum of London LAARC guidelines for deposition with the full archive at a later date.

Appendix C - Geoarchaeological Analysis Report

By C.R. Batchelor[1], C.P. Green[1], D.S. Young[1] & N. Cameron[2]

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INTRODUCTION

This report summarises the findings arising out of the environmental archaeological analysis undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at 70 Great Suffolk Street, London Borough of Southwark (National Grid Reference: TQ 3186 7990; site code: GUF10; Figure 1). The site is on the south side of the Lower Thames in Southwark, lying to the south of the inferred southern margin of the Bankside Channel (Dunwoodie, 2006). The Bankside Channel is a large and well documented palaeochannel aligned broadly NE to SW from Bankside towards Waterloo alongside the River Thames (Dunwoodie, 2006), and close to the north-western banks of a low-lying gravel island (Cowan *et al.* 2009). The site is also located to the west of a tributary channel into the Bankside: the Borough Channel (Dicks, 2010). Recent geoarchaeological field investigations at the site (Green and Young 2011) revealed a sequence of Made Ground between 4.50 and *ca*. 2.50m OD (Units 3 and 4), overlying alluvial organic silt with common detrital plant remains and large amounts of broken mollusc shell (Unit 2) resting sharply on sandy gravel of the Shepperton Gravel at 1.01m OD (Unit 1). The OD height of the Shepperton Gravel indicates the sites prehistoric position on the very edge of the alluvium.

To the north of the present site the general cross sectional form of the Bankside Channel can be made out. At the South Point site on the Blackfriars Road, in the presumed axis of the channel, the surface of the Shepperton Gravel falls to -3.49m OD (Branch *et al* 2002) and at nearby sites in Joan Street and Union Street (Sidell *et al* 2000) this surface is between -2.00m and -3.00m OD. Continuing towards the northern edge of the Bankside Channel at sites such as Bear Lane and Bear House (Tan, 2008; Young *et al* 2010; Batchelor *et al*., 2011a), the gravel surface rises northward from -2.70m to -0.60m OD. Further north again in Blackfriars Road (Batchelor *et al* 2008) the gravel surface rises northward from 0.00m to 2.67m OD. Further east along the channel at Anchor Terrace (Thompson *et al* 1998), the surface of the Shepperton Gravel at -3.64m OD is probably also close to the axis of the Bankside Channel. However, less than 100m to the south of the 65 Southwark Street site the gravel surface is at 0.66m OD in Skinmarket Place (Thompson *et al* 1998) and at 0.8m OD at 97-101 Union Street (Capon 2006).

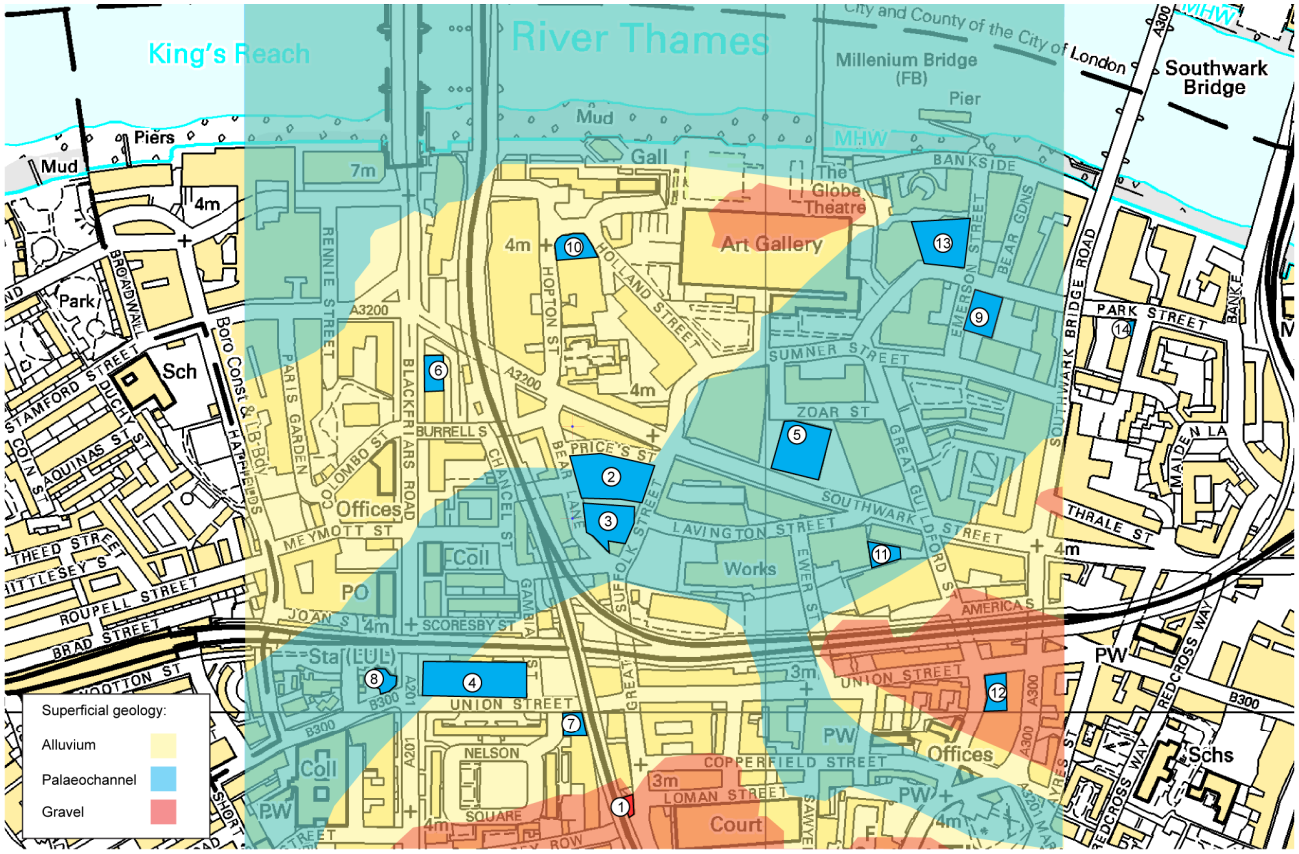
The Holocene sediment sequence within the Bankside Channel includes in most places a peat horizon. In the axis of the channel a thickness of over 3.0m of peat has been recorded (Branch *et al* 2002) but towards the edges of the channel the peat thins to less than 0.5m, e.g. at the northern end of the Bear Lane site (Young *et al* 2010), where 0.45m of peat was recorded. Investigations at Bear

House (Young *et al*., 2010) and Bear Lane (Tan, 2008) indicate that towards the northern edge of the Bankside Channel the peat deposits accumulated from at least 4820-4570 to 3140-2870 cal yr BP (Late Neolithic to Late Bronze Age). At 65 Southwark Street towards the southern edge of the Bankside Channel, peat accumulated between 5610-5480 cal BP and 4290-4090 cal BP (Middle to Late Neolithic; Batchelor *et al*., 2011b). At sites towards the middle of the projected course of the Bankside Channel such as St Christopher House (*ca*. 100m northeast of the site; London Archaeologist, 2004) radiocarbon dating indicate that the channel dated from at least 10,650-10,250 cal yr BP and included both peat and alluvial deposits (London Archaeologist, 2004), whilst historic records indicate it had infilled by the Late 17th Century (Turner, 2009). These results clearly indicate that peat and alluvium accumulated within the Bankside Channel at different rates during different cultural periods. No peat deposits were recorded within the sedimentary sequence from Great Suffolk Street, but the identification of *in situ* freshwater Mollusca demonstrate the potential to date the sequence and place it into a temporal context with the other palaeoenvironmental sequences from the Bankside Channel.

Furthermore, at St Christopher's House, three timber structures dated to 3450-3240 cal yr BP (2 structures) and 2750-2350 cal yr BP (1 structure) were recorded within the channel's sedimentary sequence (London Archaeologist, 2004). Whilst at two sites located on a gravel eyot further the north of the site (44-47 Hopton Street, London Archaeologist, 2001; 245 Blackfriars Road, Thompson *et al*., 1998), various artefacts reflective of occupation dating from the Neolithic cultural period onwards have been recorded. The sedimentary sequence at Great Suffolk Street therefore also has potential to provide evidence of prehistoric and historic human activity on both the wetland and dryland surfaces adjacent to the site.

The aim of this environmental archaeological analysis was therefore to place the sequence from Great Suffolk Street into a temporal context, and provide a detailed reconstruction of the vegetation and hydrological history of the site and its environs. In order to achieve this aim, the environmental archaeological analysis consisted of the following techniques, as stated in the written scheme of investigation for this site:

1. Recording the lithostratigraphy to provide a detailed reconstruction of the sedimentary history
2. Radiocarbon dating an *in situ* articulated freshwater bivalve shells recovered from towards the base of Unit 2 to provide a provisional geochronological framework for the natural stratigraphic sequence
3. Analysis of pollen grains and spores to provide a reconstruction of the vegetation history, and to detect evidence for human activities e.g. woodland clearance and cultivation
4. Detailed assessment of diatom frustules to provide a reconstruction of the hydrological history e.g. water quality and depth



① Great Suffolk Street (GUF10)
② Bear House (BJH10; Batchelor *et al.*, 2011)
③ Bear Lane (BLZ07; Tan *et al.* 2008)
④ South Point (BKA02; Branch *et al.*, 2002)
⑤ St. Christopher's House (SCH03; London Archaeologist, 2004)
⑥ 231-241 Blackfriars Rd (BFX08; Batchelor *et al.*, 2008)
⑦ Jubillee Line, Union St (UNL08; Sidell *et al.*, 2000)
⑧ Joan St (JOA91; Sidell *et al.*, 2000)
⑨ 135 Park St (PKP09; Batchelor and Young, 2009)
⑩ 44-47 Hopton St (HNT94; London Archaeologist, 2001)
⑪ 65 Southwark Street (SOU11; Batchelor *et al.*, 2011)
⑫ 97-101 & 103 Union Street (Capon, 2006)
⑬ Skinmarket Place (Thompson *et al.*, 1998)
⑭ Anchor Terrace (Thompson *et al.*, 1998)

Figure 1: Location of 70 Great Suffolk Street and nearby archaeological sites. The projected course of the Bankside Channel, as indicated by Dunwoodie *et al.* (2006) and adapted after Young *et al.* (2010), is also shown.

METHODS

Field investigations

Duplicate sets of one borehole (<BH1>) were put down at the site in December 2010. The borehole was recovered using an Eijkelkamp window sampler and gouge set driven by an Atlas Copco TT 2-stroke percussion engine. Each borehole was put down until coarse grained unconsolidated sediments had been recorded.

Lithostratigraphic descriptions

Borehole core samples were retained and described in the laboratory using standard procedures for recording unconsolidated sediment and peat, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts). The procedure involved: (1) cleaning the samples with a spatula or scalpel blade and distilled water to remove surface contaminants; (2) recording the physical properties, most notably colour; (3) recording the composition e.g. gravel, fine sand, silt and clay; (4) recording the degree of peat humification, and (5) recording the unit boundaries e.g. sharp or diffuse. The results are displayed in Figure 2 and Table 1.

Radiocarbon dating

One *in-situ* freshwater Mollusca extracted towards the base of the sedimentary sequence was submitted for AMS radiocarbon dating to Scottish Universities Environmental Research Centre (SUERC), East Kilbride. 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 2 and Figure 1.

Pollen analysis

Twelve pollen sub-samples were extracted at regular intervals through the sedimentary sequence as follows: (1) sampling a standard volume of air-dried sediment (4 grams dry weight); (2) addition of four *Lycopodium* tablets to enable calculation of pollen concentrations; (3) deflocculation of the sample in 1% Sodium pyrophosphate; (4) sieving of the sample to remove coarse mineral and organic fractions (>125µm); (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 stained with safranin. Each stage of the procedure was preceded and followed by thorough sample cleaning in filtered distilled water. Quality control is maintained by periodic checking of residues, and assembling sample batches from various depths to test for systematic laboratory effects. Pollen grains and spores were identified using the University of Reading pollen type collection and the following sources of keys and photographs: Moore et al (1991); Reille (1992). Plant nomenclature follows the Flora Europaea as summarised in Stace (1997). The analysis procedure consisted of counting the prepared slides to a minimum of 300 terrestrial land pollen species per level. Pollen percentages are calculated based on terrestrial plants. Aquatic and fern spores are calculated as a percentage of terrestrial pollen plus the sum of the component taxa within the respective category. The results are displayed in Figure 2.

Diatom analysis

Six sub-samples were extracted at regular intervals through the sedimentary sequence for the recovery 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)
3. 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)

Duplicate slides each having two coverslips were made from each sample and fixed in Naphrax for diatom microscopy. The coverslip with the most suitable concentration of the sample preparation was selected for diatom analysis. A large area of this coverslip was scanned for diatoms at magnifications of x400 and x1000 under phase contrast illumination using a Leica microscope.

Diatom floras and taxonomic publications were consulted to assist with diatom identification; these include Hendey (1964), Werff & Huls (1957-1974), Hartley *et al.* (1996) and Krammer & Lange-Bertalot (1986-1991). Diatom species' salinity preferences are discussed using the classification data in Denys (1992), Vos & de Wolf (1988, 1993) and the halobian groups of Hustedt (1953, 1957: 199), these salinity groups are summarised as follows:

1. Polyhalobian: >30 g l^{-1}
2. Mesohalobian: 0.2-30 g l^{-1}
3. Oligohalobian - Halophilous: optimum in slightly brackish water
4. Oligohalobian - Indifferent: optimum in freshwater but tolerant of slightly brackish water
5. Halophobous: exclusively freshwater
6. Unknown: taxa of unknown salinity preference.

The results are displayed in Figure 3.

RESULTS, INTERPRETATION AND DISCUSSION OF THE LITHOSTRATIGRAPHIC DESCRIPTIONS

The results of the lithostratigraphic descriptions are displayed in Table 1 and Figure 2. The upper part of the borehole sequence (Unit 4) appears to be Made Ground passing down in Unit 3 to a mixture of Made Ground and the underlying alluvial silt (Unit 2). Unit 2 comprises 1.0m of organic silt with common detrital plant remains throughout and large amounts of broken mollusc shell including one thin bed incorporating complete shells of freshwater gastropods and bivalves. Towards the bottom of

the silty alluvium (1.20 to 1.10m OD) a sandy horizon is present. The fine-grained alluvium rests with a sharp contact on sandy gravel at 1.01m OD.

This alluvial sequence has evidently been truncated at a level between 3.00 and 2.50m OD, but the surviving undisturbed sediments are typical of Holocene alluvial channel-fill sequences widely preserved elsewhere throughout the valley of the Lower Thames and its main tributaries, with organic rich silts passing down into sandier sediment.

The presence of these channel-fill deposits in an area lying to the south of the supposed southern margin of the Bankside Channel shows either that the Bankside Channel is wider than previously recognised; or that a minor channel was present acting either as a backwater to the main channel or as a tributary to it. Since the surface of the Shepperton Gravel at Great Suffolk Street (1.01m OD) is substantially (*ca.* 2.5m) higher than the level of the floor of the Bankside Channel, it seems more likely that the Great Suffolk Street sedimentary sequence represents infilling of a stream tributary to the Bankside Channel.

Table 1: Lithostratigraphic description of Borehole <BH1>, 70 Great Suffolk Street, London Borough of Southwark

Depth (m OD)	Unit	Description
3.50 to 3.25	4	10YR3/1 very dark grey; very poorly sorted gritty silty clay with clasts of CBM (up to 25mm), clinker and glass; massive; common detrital plant remains; a few pieces of mollusc shell including fragment of oyster; charcoal; no acid reaction; well-marked transition to:
3.25 to 3.01	4	10YR4/1 dark grey and 7.5YR5/6 strong brown; poorly sorted gritty silty clay with clasts of sub-angular flint (up to 25mm); massive; common broken mollusc shell; cluster of charcoal particles; small particles of CBM; no acid reaction; well-marked transition to:
3.01 to 2.50	3	2.5Y4/1 dark grey oxidising to 2.5Y4/3 olive brown with black flecks; poorly sorted silty clay with sand and granules and clasts of well-rounded and sub-angular flint (up to 35mm); massive; scattered detrital plant remains; common broken mollusc shell; no acid reaction.
2.50 to 2.36	-	Coring spoil
2.36 to 2.01	2	2.5Y4/1 dark grey oxidising to 2.5Y4/2 dark greyish brown; well sorted silt; massive; scattered detrital plant remains; common mollusc shell debris; weak acid reaction; very sharp contact with:
2.01 to 1.50	2	2.5Y4/1 dark grey oxidising to 2.5Y4/2 dark greyish brown; very well sorted silt; massive; scattered detrital plant remains; common mollusc shell including complete shells of *Bithynia tentaculata* and articulated valves of an unidentified freshwater bivalve at 2.86m OD; moderate acid reaction.
1.50 to 1.01	2	2.5Y4/1 dark grey to black oxidising to 2.5Y4/2 dark greyish brown; very well sorted silt with sandy bed at 1.30-1.40m OD; massive; common detrital plant remains; common mollusc shell debris; sharp contact with:
1.01 to 0.50	1	2.5Y4/2 dark greyish brown passing down to 2.5Y5/3 light olive brown; poorly sorted sandy gravel with clasts of sub-angular flint (up to 40mm); massive.

RESULTS AND INTERPRETATION OF THE RADIOCARBON DATING

Following the identification of articulated freshwater bivalve shells indicative of *in-situ* deposition towards the base of the sedimentary sequence between 1.30 and 1.40m OD, these were submitted for AMS radiocarbon dating. The resultant determination provided an age of 2400-2700 cal BP (750-410 cal BC; Table 2; Figure 2). The δ13C (‰) values are consistent with that expected, and there is no evidence for mineral or biogenic carbonate contamination. This date indicates that the alluvial sequence dates from the Iron Age cultural period.

Table 2: Results of the radiocarbon dating of Borehole <BH1>, 70 Great Suffolk Street, London Borough of Southwark

Laboratory code / Method	Depth (m OD)	Material	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC/AD (BP) (2-sigma, 95.4% probability)	δ13C (‰)
SUERC-33394 (GU-23503)	1.30 to 1.40	Articulated freshwater bivalve	2450 ± 30	750-410 cal BC (2400-2700 cal BP)	-28.0

RESULTS AND INTERPRETATION OF THE POLLEN STRATIGRAPHIC ANALYSIS

Results of the pollen stratigraphic analysis

The percentage pollen diagram is displayed in Figure 2 and due to the similarity of the assemblage has not been divided into local pollen assemblage zones. The assemblage is characterised by the high values of herbaceous pollen taxa (60-80%), dominated by Poaceae (*ca*. 25%), Lactuceae (increasing from 8% to 25%) and Cyperaceae (increasing from 10% to 15%), with *Sinapis* type and *Chenopodium* type (both *ca*. 5%), *Cereale* type, Asteraceae, *Plantago lanceolata*, *Ranunculus* type, *Centaurea nigra* (all <3%), and sporadic occurrences of *Cirsium* type, *Valeriana dioica*, Caryophyllaceae, *Potentilla* type, *Polygonum aviculare*, *Centaurea cyanus* and cf *Armeria maritima* (all <3%). Tree and shrub pollen values are low, but present throughout. *Alnus*, *Corylus* type, *Quercus* and *Pinus* dominate (all <10% and generally declining through the zone) with *Tilia*, *Ulmus*, *Betula* and *Salix* (all <3%), and sporadic occurrences of *Fraxinus*, *Calluna*, *Ilex*, *Hedera*, Rosaceae and cf *Lonicera periclynum* (all <3%). Aquatic pollen percentages are moderate and present throughout the sequence (up to 10%), dominated by *Sparganium* type with *Myriophyllum* type, *Menyanthes trifoliata*, *Potamogeton* type and *Typha latifolia*. Spore pollen values are moderate, dominated by *Dryopteris* type with *Pteridium aquilinum*, *Polypodium vulgare* and *Sphagnum*. Dinoflagellate cysts were frequently noted, and microscopic charred particles were preserved throughout the entire sequence
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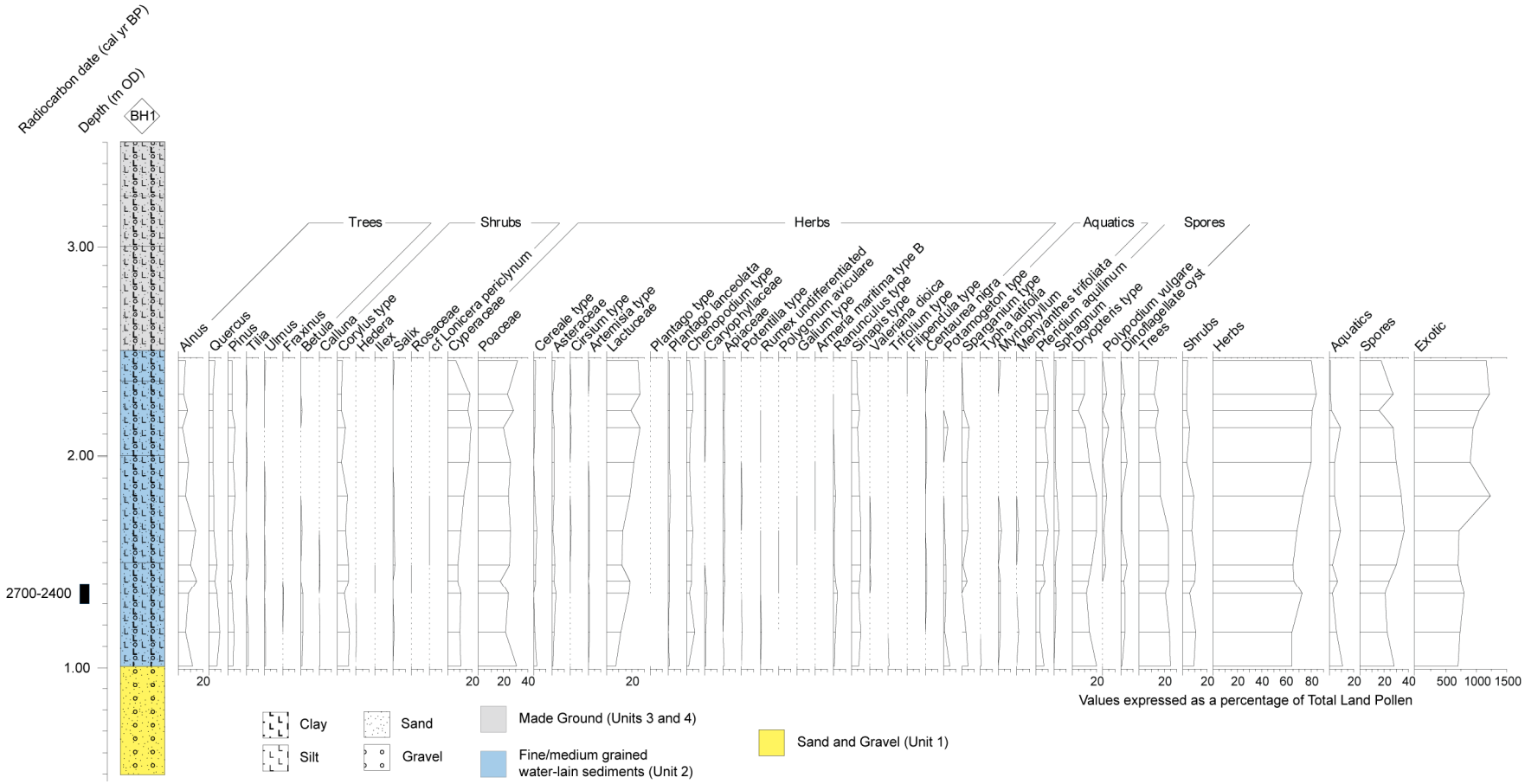


Figure 2: Percentage pollen diagram from borehole <BH1>, 70 Great Suffolk Street, London Borough of Southwark

Interpretation of the pollen stratigraphic analysis

There are a few taphonomic issues to consider prior to undertaking a detailed interpretation of the pollen stratigraphic diagram from Great Suffolk Street, due to the position of the site in on the margins of an alluvial environment next to the dryland during this time. Firstly, the identification of pollen grains (in particular herb taxa) and reconstruction of vegetation communities is frequently limited by: (1) morphological similarities between grains from different species often resulting in only the genus being established, and (2) the difficulty in determining whether the pollen types recorded represent herbs from wetland or dryland environments (e.g. Waller, 1993, 1998; Waller *et al*., 2005). Secondly, at this site, the deposits under scrutiny are fine grained inorganic sediments deposited in a low energy alluvial environment. These sediments may contain pollen from outside the area of interest as a result of these taxa being transported long distances by fluvial or aerial means. Certain pollen types are more likely to be over-represented as a result of morphological attributes that allow them to float over long distances (e.g. *Pinus* and *Pteridium aquilinum*) whilst others are more likely to sink (Hopkins, 1950). Furthermore, reworking of sediments is also possible in these environments, resulting in the liberation of previously deposited pollen grains (Cushing, 1967).

The results of the pollen stratigraphic analysis indicate the dominant growth of herbaceous and aquatic taxa including grasses (Poaceae), sedges (Cyperaceae), dandelions (Lactucaee), e.g. cabbages/charlock (*Sinapis* type), ribwort plantain (*Plantago lanceolata*), e.g. fat hen (*Chenopodium* type), daisies (Asteraceae), buttercups/water crowfoots (*Ranunculus* type), black knapweed (*Centaurea nigra*), thistles (e.g. *Cirsium* type), pinks (Caryophyllaceae), cinquefoils (*Potentilla* type), cornflower (*Centaurea cyanus*), knotgrass (*Polygonum aviculare*), cereals e.g. wheat, barley, rye (*Cereale* type), sea lavender (cf *Armeria maritima* type B), bur-reeds (*Sparganium* type), pondweed (*Potamogeton* type), bulrushes (*Typha latifolia*), bog bean (*Menyanthes trifoliata*) and water-milfoil (*Myriophyllum* type). This assemblage is indicative of herbs growing on both the wetland and dryland environments.

The presence of high grass pollen values could represent (at least in part) the growth of wetland grasses such as common reeds (*Phragmites australis*), which along with sedges, various aquatic and semi aquatic plants (bur-reeds, water milfoil, bulrushes etc), buttercups and/or water crowfoots suggest the growth of floodplain vegetation growing along the margins of a channel. Wetland tree and shrub pollen values are low, but the limited growth of alder, willow, and possibly ash, birch and hazel within this wetland community is indicated by the continual presence of *Alnus*, *Salix*, *Fraxinus*, *Betula* and e.g. *Corylus* type. The herbaceous, aquatic tree and shrub pollen assemblage all strongly suggest a freshwater floodplain environment, with only the occurrence of a single *Armeria maritima* type B pollen grain suggesting a saline influence, and as outlined above, this may be the result of long distance transport. However, it is also important to highlight that the *Chenopodium* type pollen may represent plants from various environments, including that of salt marshes (e.g. *Suaeda maritima* – common seablite), although at this site, it is considered more likely to represent the growth of dryland herbs.

The results of the pollen stratigraphic analysis suggest that the dryland was open, with evidence for disturbance and human activities. The open environment is indicated by the low percentages of tree and shrub pollen, and high values of herbaceous pollen. The presence of arboreal pollen types such as *Quercus*, *Fraxinus*, *Betula*, *Tilia* and *Corylus* type indicate the growth of oak, ash, birch, lime and hazel respectively, but in limited stands and/or at some distance from the site. The occurrence of pollen taxa representative of grasses, cereals, cabbages/charlock, dandelions, fat hen, black knapweed, thistles, cornflower and knotgrass all suggest disturbed land, modified by human activity, and indeed, the assemblage is strongly suggestive of arable farming activities occurring nearby to the site throughout the sequence.

RESULTS AND INTERPRETATION OF THE DIATOM ANALYSIS

Six diatom slides from <BH1> were identified by QUEST as having some potential for diatom analysis. After diatom laboratory preparation there were high concentrations of silt remaining on the slides and although the quality of diatom preservation in this sequence is also very poor, reflected by both silica dissolution and diatom valve breakage, it has been possible to carry out diatom percentage analysis for the sequence. Diatom species and halobian group percentage diagrams are presented for <BH1> in Figure 3.

The diatom assemblages between 1.01m OD and 2.46m OD contain mixed diatom assemblages that are typical assemblages associated with estuarine sedimentary environments. The composition of the assemblages is strongly influenced by taphonomic factors related to both diatom transport and diatom preservation.

The lower four samples between 1.01m OD to 1.98m OD associated with the 2 lower divisions of Unit 2 analysed for diatoms (Table 1) are dominated by oligohalobous indifferent diatom taxa which comprise 35% to almost 60% of the diatom assemblages. In particular *Fragilaria pinnata* forms a high percentage of the total, reaching a maximum of 50% at 1.66m OD. *Fragilaria pinnata* has optimal growth in freshwater, but has a broad salinity tolerance and is an opportunistic species typical of disturbed or rapidly changing habitats.

The mesohalobous species, *Cyclotella striata* is a significant component throughout the whole sequence, and the cumulative percentage of mesohalobous species is from 25% to almost 30% of the total diatoms. *Cyclotella striata*, a planktonic estuarine species, shows that there was a consistent input of tidal water. However, benthic marine brackish taxa such as *Nitzschia navicularis*, *Nitzschia granulata* and *Diploneis didyma* are present but in lower numbers through the sequence. Further, allochthonous marine diatoms such as *Paralia sulcata*, *Cymatosira belgica*, *Rhaphoneis amphiceros*, *Rhaphoneis surirella*, *Podosira stelligera* and *Trachyneis aspera* form only a small component of the total diatom assemblages in the sequence. There also appears to be a slight decline overall in the number of these polyhalobous diatoms from the base to the top of the sequence. At the same time the trace presence of halophobous species (*Cocconeis pediculus*, *Eunotia* sp.) increases at the top of the sequence. Whilst the species composition of the freshwater, oligohalobous indifferent, component changes in the top sub units of the core. In these there is a decline in the percentage of *Fragilaria pinnata*, whilst *Cocconeis placentula* (and to a lesser degree *Cocconeis disculus*) which is an epiphyte associated with more stable habitats than the former species, increases to a maximum of over 20%. Further the mesohalobous to halophilous planktonic species *Actinocyclus normanii* shows a steady increase through the sequence reaching a maximum of almost 30% at the top. Together these shifts in diatom composition (see the summary curve for the combined mesohalobous to halophilous and halophilous to oligohalobous indifferent group) indicate both a more stable aquatic habitat and decreasing salinity. However, the diatom assemblages in the upper part of this sequence confirm that contact with the estuary remains.

In summary, the quality of the diatom assemblages in the <BH1> sequence is poor with a high level of silica dissolution and a large number of broken valves. There is also a high proportion of silt remaining on the cleaned diatom slides. However, the presence of marine and estuarine marine-brackish taxa indicates the tidal nature of the environments.

The mesohalobous taxa comprise a mixture of planktonic estuarine species, a low number of epipelic, mud surface mesohalobous diatoms. In the lower part of the sequence in the freshwater components of the assemblage is of species with wide salinity tolerance.

Through the sequence there is a slight decline in the small component of polyhalobous diatoms, whilst the intermediate, combined mesohalobous to halophilous and halophilous to indifferent salinity group increases from approximately 10% at the base to 30% at the top. There is a decline of the broad tolerance, oligohalobous indifferent species *Fragilaria pinnata* which is replaced by epiphytic freshwater taxa. These changes in the diatom flora suggest increasing stability in the habitat, a decrease in mean salinity, but the presence of estuarine taxa confirm that there was continued contact with the estuary in the later part of the sequence.

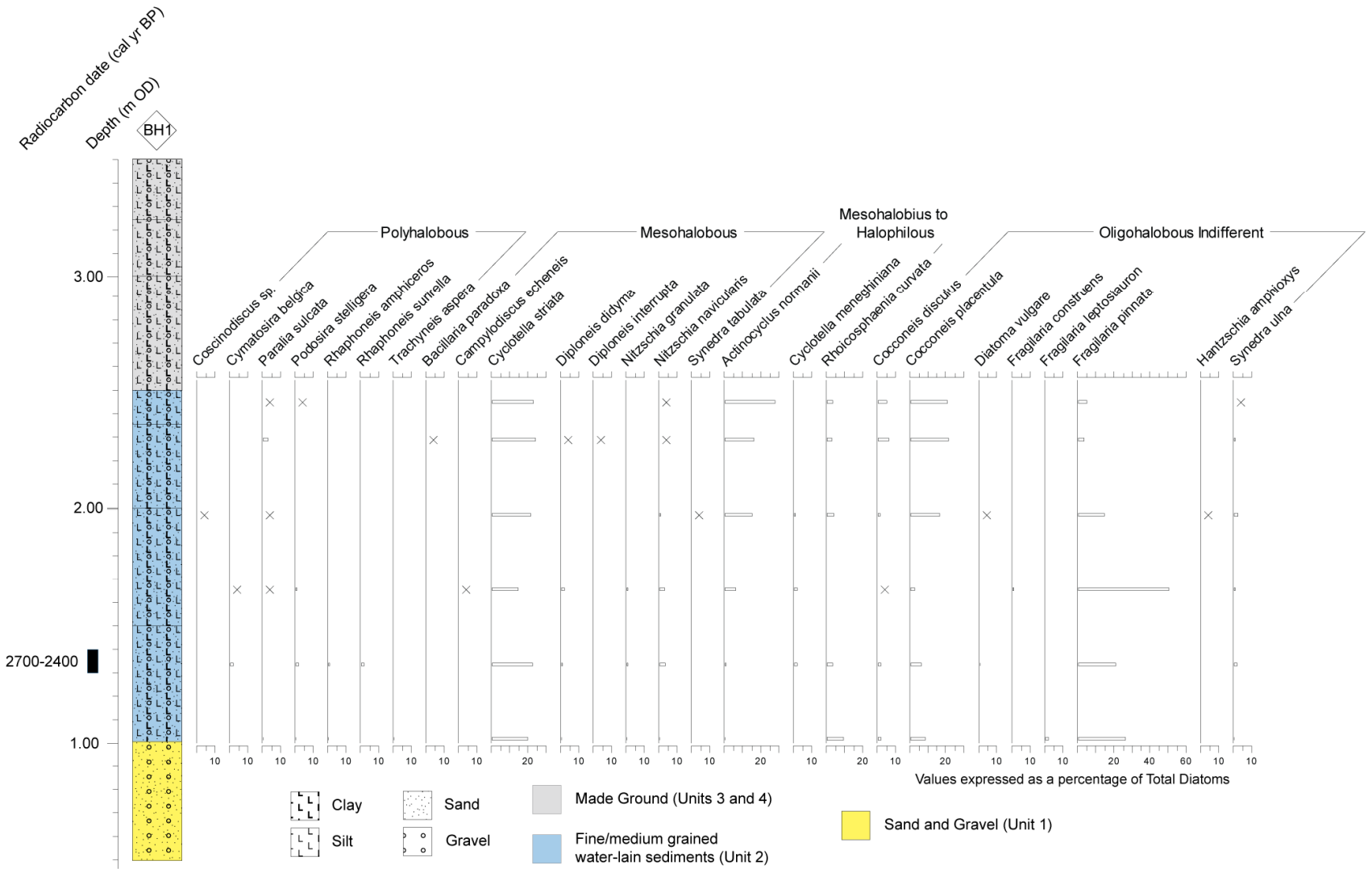


Figure 3a: Percentage diatom diagram from borehole <BH1>, 70 Great Suffolk Street, London Borough of Southwark

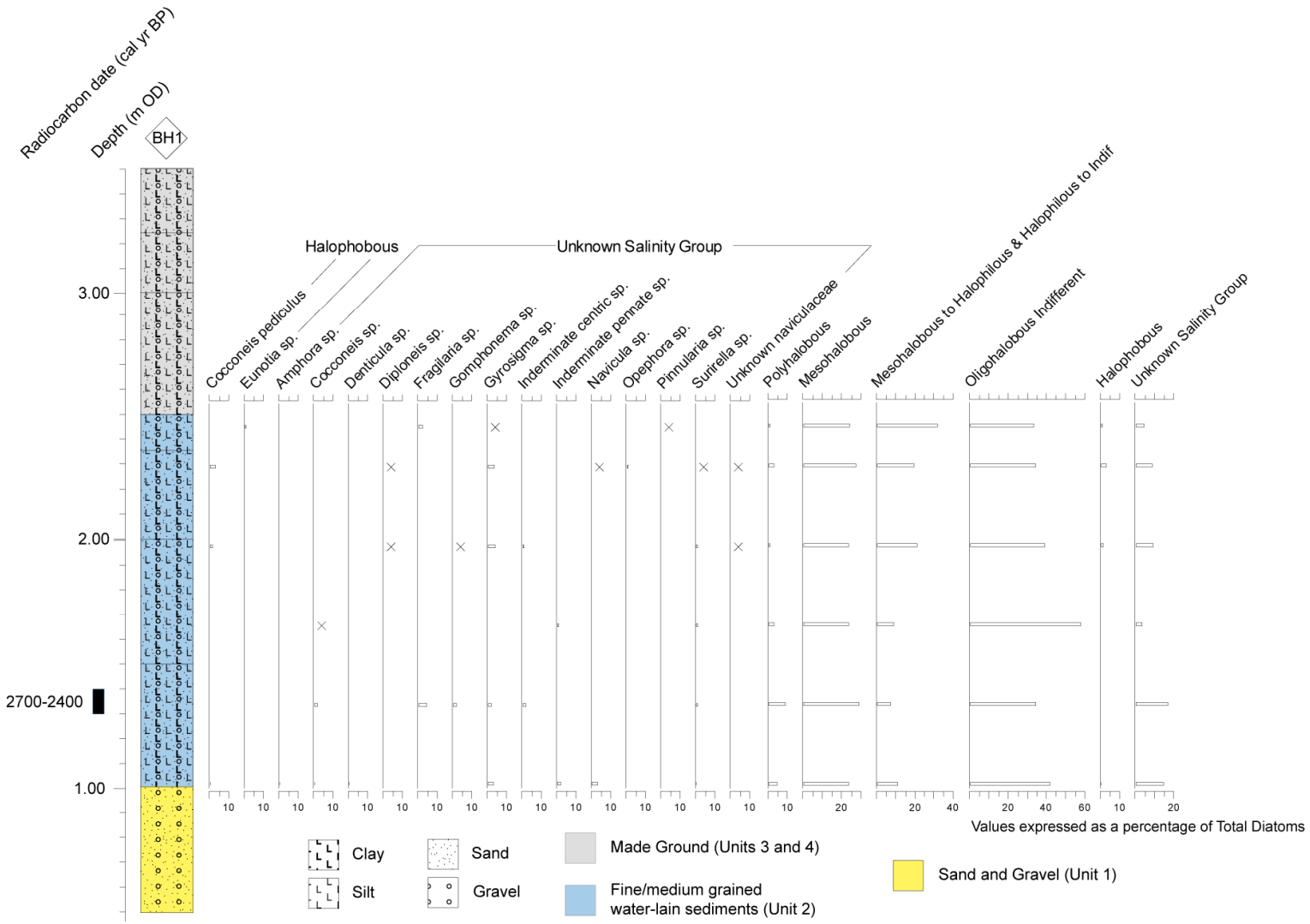


Figure 3b: Percentage diatom diagram from borehole <BH1>, 70 Great Suffolk Street, London Borough of Southwark

DISCUSSION AND CONCLUSIONS

Sedimentary and hydrological history

This sediment sequence, with a date near the base of the sequence in the Iron Age, is evidently later than most of the infill so far recorded in the nearby Bankside Channel from which dates have been obtained ranging from the Mesolithic to the Bronze Age. Across most of the floodplain of the Thames, in common with most other river floodplains in south-east England, deposition in the Iron Age was in the form of largely inorganic silts deposited from still or very slow-moving floodwaters and reflecting an increase in soil erosion associated with intensification of land-use which had been going on since the Neolithic. The Great Suffolk Street sediments in contrast incorporate, towards the base, a thin but well-marked sandy horizon and common organic remains, including the numerous remains of Mollusca including freshwater species. These features are unlikely to be associated with episodic flooding of the main river and suggest rather, the existence of a local channel containing running water. The consistent presence of an estuarine element in the diatom flora suggests that such a channel might represent the upper reaches of a tidal creek maintained by flow of freshwater from nearby high ground to the south, but also subject to regular inflow of tidewater. The evidence of sandy deposition and a flourishing mollusc population occupies only *ca*.10cm towards the base of the sediment sequence and is succeeded by less organic and more silty deposits consistent with the progressive infilling of this minor channel by deposition from estuarine floodwater.

Vegetation history

The results of the pollen analysis suggest that during the period of alluvial deposition, the wetland environment was dominated by the growth of freshwater plants including grasses, sedges, aquatics and semi-aquatics, most likely alongside the margins of a channel. Wetland trees and shrubs such as alder, willow and possibly birch, ash and hazel were also present, but only occurred as limited stands within this dominantly herbaceous community. On the dryland, the environment was similarly very open in nature, with trees such as oak, lime and hazel limited to isolated stands and/or at distance from the site. The herbaceous community indicates disturbed ground and probable arable farming activities.

The pollen stratigraphic record from Great Suffolk Street post-dates other sequences from the Bankside Channel, and thus provides a new record of vegetation history in this area during the Iron Age cultural period. Elsewhere at sites such as 65 Southwark Street (Batchelor *et al*., 2011b) and Bear House/Bear Lane (Batchelor *et al*., 2011a), recent environmental archaeological investigations indicate that infilling areas of the Bankside Channel were dominated by alder carr during the Neolithic (65 Southwark Street) and into the Bronze Age, before declining towards the end of the Bronze Age as a consequence of flooding (e.g. Bear House/Bear Lane). The new record from Bear House/Bear Lane on the northern edge of the Bankside Channel suggests the decline of dryland woodland and indications of human activity in the form of cereal pollen from the Bronze Age onwards. Therefore, whilst the record from Great Suffolk Street is new, it corroborates the records from elsewhere, of greatly reduced woodland cover on the wetland and dryland and increased evidence of human activity from the Late Bronze Age onwards.

REFERENCES

Batchelor, C.R., Branch, N.P., Green, C.P., Young, D., Elias, S., Austin, P. and Cameron, N. (2008) *231-241 Blackfriars Road, London Borough of Southwark: Environmental Archaeological Assessment (Site Code: BFX08).* ArchaeoScape Unpublished Report

Batchelor, C.R. and Young, D.S. (2009) *135 Park Street, London Borough of Southwark (Site Code: PKP09): Environmental Archaeological Assessment*. Quaternary Scientific Unpublished Report

Batchelor, C.R., Cameron, N., Young, D.S., Green, C.P., Allott, L., Austin, P. & S. Elias (2011a) Bear House, Bear Lane, Southwark, London, SE1 (site codes: BJH10 and BLZ07): Environmental archaeological analysis report. *Quaternary Scientific (QUEST) Unpublished Report July 2010; Project Number 028/10.*

Batchelor, C.R., Green, C.P., Young, D.S. & Allott, L. (2011b) 65 Southwark Street, London Borough of Southwark (site code: SOU11): Geoarchaeological assessment report. *Quaternary Scientific (QUEST) Unpublished Report March 2011; Project Number 158/10.*

Battarbee, R.W., Jones, V.J., Flower, R.J., Cameron, N.G., Bennion, H.B., Carvalho, L. & Juggins, S. (2001) *Diatoms.* In (J.P. Smol, H.J.B. Birks & W.M. Last, eds.), *Tracking environmental change using lake sediments volume 3: terrestrial, algal, and siliceous indicators*, 155-202. Dordrecht: Kluwer Academic Publishers.

Branch, N.P., Swindle, G.E. and Williams, A.N. (2002) *Middle Holocene Environmental History of South Point, Blackfriars Road, Southwark, London.* ArchaeoScape Unpublished Report

Bronk Ramsey, C. (1995) Radiocarbon calibration and analysis of stratigraphy: the oxcal program. *Radiocarbon,* **37(2)**, 425-430.

Bronk Ramsey, C. (2001) Development of the radiocarbon program oxcal. *Radiocarbon,* **43(2a)**, 355-363.

Bronk Ramsey, C. (2007) Deposition models for chronological records. *Quaternary Science Reviews,* **27(1-2)**, 42-60.

Capon, L. (2006) Excavations at 97-101 and 103 Union Street, Southwark. *London Archaeologist*, 10, 157-162.

Cowan, C. Seeley, F., Wardle, A., Westman, A. & Wheeler, L. (2009) *Roman Southwark settlement and economy, excavations in Southwark 1973-91*, MoLA Monograph 42..

Cushing, E.J. (1967) Evidence for differential pollen preservation in late Quaternary sediments in Minnesota. *Review of Palaeobotany and Palynology,* **4**, 87-101.

Dunwoodie, L. (2006) *Bear House, Bear Lane, London, SE1, London Borough of Southwark: archaeological desk based assessment*. MoLAS unpublished report.

Green, C.P. & D.S. Young (2011) *70 Great Suffolk Street, London Borough of Southwark (Site Code: GUF10)* Quaternary Scientific (Quest) Unpublished Report January 2011; Project Number 152/10.

Hopkins, J. (1950) Different flotation and depostion of conifer and deciduous pollen. *Ecology,* **31**, 633-641.

Malony, C. (2001) London Fieldwork and Publication Round-up 2001. *London Archaeologist.*

Malony, C. (2004) London Fieldwork and Publication Round-up 2004. *London Archaeologist*.

Moore, P.D., Webb, J.A. & Collinson, M.E. (1991) *Pollen Analysis*. Oxford: Blackwell Scientific.

Reille, M. (1992) *Pollen et spores D'Europe et D'Afrique du Nord*. Laboratoire de Botanique historique et Palynologie, Marsaille.

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Blackwell, P.G., Bronk Ramsey, C., Buck, C.E., Burr, G.S., Edwards, R.L., Friedrich, M., Grootes, P.M., Guilderson, T.P., Hajdas, I., Heaton, T.J., Hogg, A.G., Hughen, K.A., Kaiser, K.F., Kromer, B., McCormac, F.G., Manning, S.W., Reimer, R.W., Richards, D.A., Southon, J.R., Talamo, S., Turney, C.S.M., van der Plicht, J., Weyhenmeyer, C.E.. (2009). IntCal09 and Marine09 radiocarbon age calibration curves, 0–50,000 years cal BP. *Radiocarbon* **51(4)**:1111–50.

Sidell, E.J., Wilkinson, K.N., Scaife, R.G. and Cameron, N. (2000) The Holocene evolution of the London Thames: archaeological (1991-8) in advance of the London Underground Limited Jubilee Line Extension. *MoLAS Monograph Series 5*, London.

Stace, C. (1992) *New Flora of the British Isles*. Cambridge: Cambridge University Press.

Tan, M., Branch, N.P., Batchelor, C.R., Young, D. (2008) *Bear Lane, London Borough of Southwark: environmental archaeological assessment (site code: BLZ07) ArchaeoScape* Unpublished Report.

Thompson, A., Westman, A., Dyson, T. (eds.) (1998). Archaeology in Greater London 1965 - 1990: a guide to records of excavations by the Museum of London. *The Archaeological Gazetteer Series*, **2**. London: Museum of London.

Turner, A. (2009) An *archaeological evaluation of land at Bear Lane, London*. Pre-Construct Archaeology unpublished report

Waller, M.P. (1993) Flandrian vegetational history of south-eastern England. Pollen data from Pannel Bridge, East Sussex. *New Phytologist,* **124**, 345-369.

Waller, M.P. (1998) An investigation in the palynological properties of fen peat through multiple pollen profiles from south-eastern England. *Journal of Archaeological Science* **25**, 631-642.

Waller, M.P., Binney, H.A., Bunting, M.J. & Armitage, R.A. (2005) The interpretation of fen carr pollen diagrams: pollen-vegetation relationships within fen carr. *Review of Palaeobotany and Palynology,* **133**, 179-202.

Young, D.S., Batchelor, C.R. and Green, C.P. (2010) A report on the geoarchaeological borehole investigations at Bear House, Bear Lane, Southwark, London SE1 (site code: BJH10). Quaternary Scientific Unpublished Report May 2010.

Appendix D – OASIS Form

OASIS ID: aocarcha1-81007

Project details

Project name	70 Great Suffolk Street, London Borough of Southwark
Short description of the project	A two trench evaluation reavealed a sequence of alluvial deposits with subsoil and post medieval topsoil above. Later evidence included three phases of buildings, including a public house with a cellar. A single borehole was also used on site which revealed, kempton gravels, alluvium and madeground. Alluvium deposi located at the base of the sequence has been dated carbon dated to the Iron Age.
Project dates	Start: 12-08-2010 End: 22-11-2010
Previous/future work	Yes / Not known
Any associated project reference codes	30742 - Contracting Unit No.
Any associated project reference codes	GUF 10 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Industry and Commerce 1 - Industrial
Monument type	REFUSE PIT Post Medieval
Monument type	CELLAR Post Medieval
Monument type	CHANNEL Early Iron Age

Significant Finds	BOWL Post Medieval
Methods & techniques	'Sample Trenches'
Development type	Urban residential (e.g. flats, houses, etc.)
Prompt	Direction from Local Planning Authority - PPS
Position in the planning process	After full determination (eg. As a condition)

Project location

Country	England
Site location	GREATER LONDON SOUTHWARK SOUTHWARK 70 Great Suffolk Street
Postcode	SE1 0BL
Study area	184.00 Square metres
Site coordinates	TQ 3186 7990 51.5021347708 -0.09999833818260 51 30 07 N 000 05 59 W Point
Height OD / Depth	Min: 1.45m Max: 1.87m

Project creators

Name of Organisation	AOC Archaeology
Project brief originator	Southwark Council
Project director/manager	Alan Ford
Project supervisor	Les Capon

Type of sponsor/funding body	Developer

Project archives

Physical Archive recipient	Museum of London
Physical Archive ID	GUF 10
Physical Contents	'Ceramics'
Physical Archive notes	held at AOC until transfer
Digital Archive recipient	Museum of London
Digital Archive ID	GUF 10
Digital Contents	'Ceramics','Glass'
Digital Media available	'Images raster / digital photography','Images vector'
Digital Archive notes	held at AOC until transfer
Paper Archive recipient	Museum of London
Paper Archive ID	GUF 10
Paper Contents	'Ceramics','Glass','Stratigraphic'
Paper Media available	'Context sheet','Photograph','Plan','Report','Section','Unpublished Text'

Paper Archive notes	held at AOC until transfer

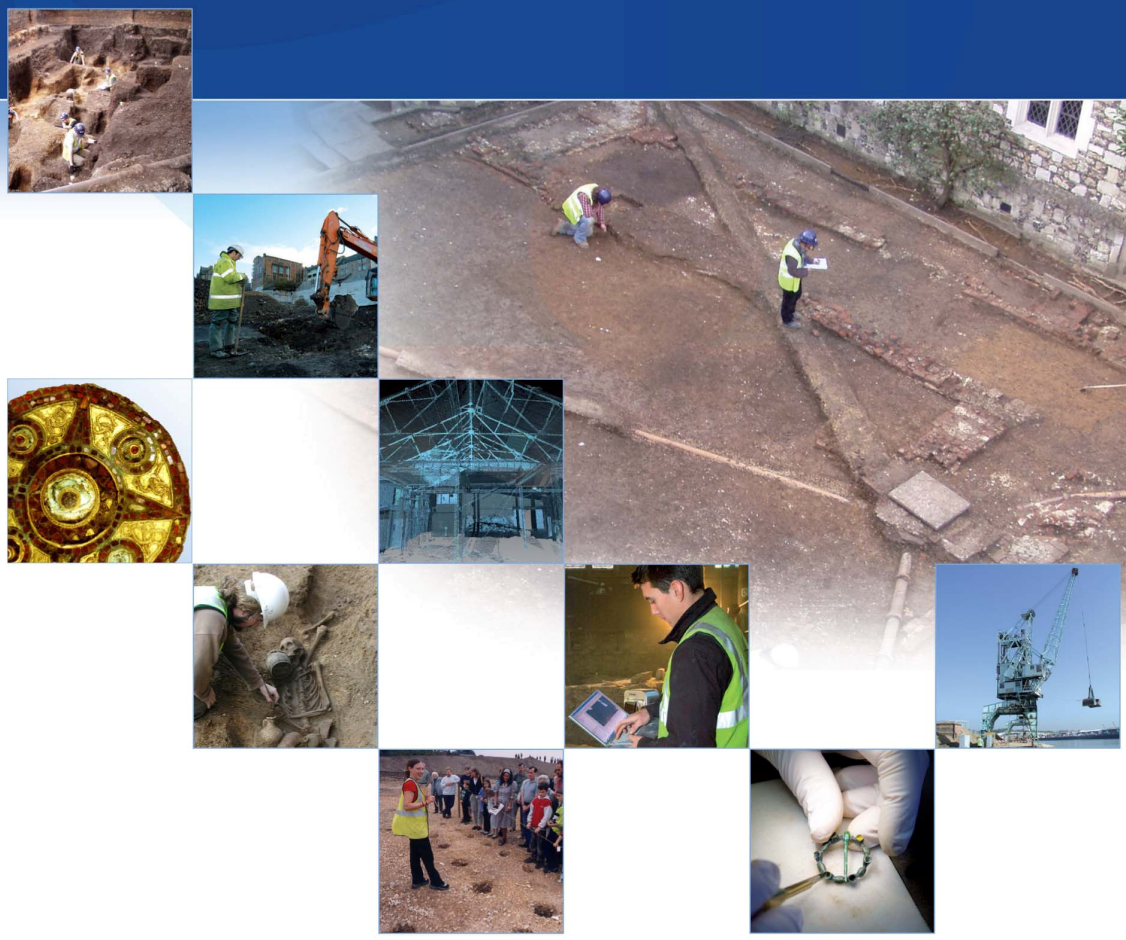
Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	70 GREAT SUFFOLK STREET, LONDON BOROUGH OF SOUTHWARK:
Author(s)/Editor(s)	Edwards, C
Date	2011
Issuer or publisher	AOC Archaeology
Place of issue or publication	London
Description	Report of 50 pages with illustrations, photos and complete geoarchaeological report.

Project bibliography 2

Publication type	Grey literature (unpublished document/manuscript)
Title	70 Great Suffolk Street, London Borough of Southwark: results of Archaeological Evaluation
Author(s)/Editor(s)	Capon, L.
Date	2011
Issuer or publisher	AOC Archaeology
Place of issue or publication	London

Description	26 pages, 3 illustrations A4
Entered by	Catherine Edwards (catherine.edwards@aocarchaeology.com)
Entered on	27 April 2011



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