# FORMER NURSES' ACCOMMODATION
# GENERAL LYING-IN HOSPITAL
## No. 79 YORK ROAD
## WATERLOO
## LAMBETH SE1 7NJ
### LONDON BOROUGH OF LAMBETH

AN ARCHAEOLOGICAL EVALUATION AND IMPACT STATEMENT

COMPASS ARCHAEOLOGY

March 2011

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AN ARCHAEOLOGICAL EVALUATION AND IMPACT STATEMENT

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## *Abstract*

*This report provides the results of an archaeological evaluation of an area of proposed redevelopment at the former Nurses' Accommodation (No. 79) for the General Lying-In on York Road, SEI 7NJ, London Borough of Lambeth. This report has been written to supplement a planning application to demolish the Nurses Accommodation and to refurbish the Grade II listed main Hospital building in order to construct an extended joint building for use as a hotel.*

*The site lies within an area of known archaeological importance within the floodplain of the River Thames and close to important archaeological sites that range in date from the late Mesolithic to the later post-medieval periods. However, the archaeological potential of this site is constrained by the fact that the site has been basemented to a general level at the front of the site of +0.78m OD and at the rear of the site to +1.22m OD. This truncation means that there is little potential for archaeological remains to survive dating from the Saxon period or later (although there is obviously a slight possibility that later deposits may be encountered in the upper layers of the deep channels which are known to cross this area). Most significantly archaeological excavations in close proximity to the present study area at the Waterloo sites and at County Hall have revealed important archaeological deposits dating from the prehistoric periods. These prehistoric deposits have been seen to survive in situ at similar depths to the basement slab level and relate to the early settlement of the sand and gravel eyots of the south bank of the Thames.*

*This report aims to clarify the knowledge available concerning the archaeological potential of this site follows an archaeological assessment of the site (May 2008) which drew together the previously uncollated archives of the excavations that have taken place nearby, to determine as much as is possible the likelihood of archaeology extending into this area and surviving to below the depth of the basement slab on this site. The assessment report concluded that based upon the available research material, the excavation archive analysis and deposit survival projections it is possible that deposits relating to the earlier formation processes of the Thames floodplain may survive below the depth of the basement slab.*

*An archaeological evaluation took place between 14th January 2011 and 11th February 2011, but owing to the very thick nature of the concrete basement slab these works were limited to recording the depth of the slab in the five evaluation trench locations. Owing to logistical and Health and Safety considerations works could not take place beneath the concrete slab. This report is therefore an impact assessment of the data received from these works, in order that English Heritage and the Local Planning Authority can determine what further archaeological mitigation is required on this site in accordance with the conditions on the grant of planning consent.*

**Contents** page



**List of figures** page

## 1. INTRODUCTION

**1.1**. In response to recommendations made by English Heritage a programme of archaeological evaluation took place between 14th January and 11th February 2011 at the proposed redevelopment site of the former Nurses' Accommodation, General Lying-In Hospital, 79 York Road, SEI 7NJ, London Borough of Lambeth. The evaluation was designed to follow a methodology set out in a Written Scheme of Investigation (WSI, January 2011) which supplemented a planning application to demolish the Nurses' Accommodation and to refurbish the Grade II listed main hospital building in order to construct an extended joint building for use as a hotel. The WSI followed an archaeological assessment of the site compiled by Compass Archaeology in May 2008, which recommended further archaeological mitigation.

**1.2** Early in the evaluation process it became apparent that it would not be possible to carry out the work to the exact specifications of the WSI. The basement slab was found to be comprised of two separate slabs, the lower one reinforced, this meant that opening the full extent of the evaluation trenches was not possible within the confines of the existing standing building. Health and safety considerations also meant that it would not be possible to enter the trenches because of depth restrictions, the trench edges collapsing beneath the slab and very significant water ingress. In consultation with English Heritage it was decided to record the concrete slab depths across the site and to present the results of this exercise as a detailed impact assessment, which could then be used by English Heritage to determine what further archaeological mitigation might be required in consideration of this planning proposal.

**1.3** The site lies within an area of known archaeological importance within the floodplain of the River Thames and close to important archaeological sites that range in date from the late Mesolithic to the later post-medieval periods. However, the archaeological potential of this site is constrained by the fact that the site has been basemented to a general level at the front of the site of +0.0634m OD and at the rear of the site to +0.582m OD. This truncation means that there is little potential for archaeological remains to survive dating from the Saxon period or later (although there is obviously a slight possibility that later deposits may be encountered in the upper layers of the deep channels which are known to cross this area). Most significantly archaeological excavations in close proximity to the present study area at the Waterloo sites and at County Hall have revealed important archaeological deposits dating from the prehistoric periods. These prehistoric deposits have been seen to survive *in situ* at similar depths to the top of basement slab level and relate to the early settlement of the sand and gravel eyots of the south bank of the Thames.

**1.3** The site is roughly rectangular (with a boundary wall to the north, and the Hospital to the south) and is generally at a level several metres below that of spot heights on York Road (*c* +4.2m OD). The site measures approximately 35m (east to west) by 20m (the longer north to south side fronting on to York Road). The Nurses' Accommodation building has a basement with the lowest level being +0.582m OD; it is five storeys high and is irregular in plan. The Grade II Listed main hospital building site bounds the site to the south, York Road to the west, 75-77 York Road to the north and buildings fronting onto Addington Street to the east. The centre of the site lies at National Grid reference 530825 179775 (Fig 1).

**1.4** The proposal is to demolish the former Nurses' Accommodation building and this method statement forms the initial archaeological mitigation works associated with this phase of the scheme. Any heritage mitigation required for the refurbishment works associated with the Grade II listed hospital buildings is not included in this report.

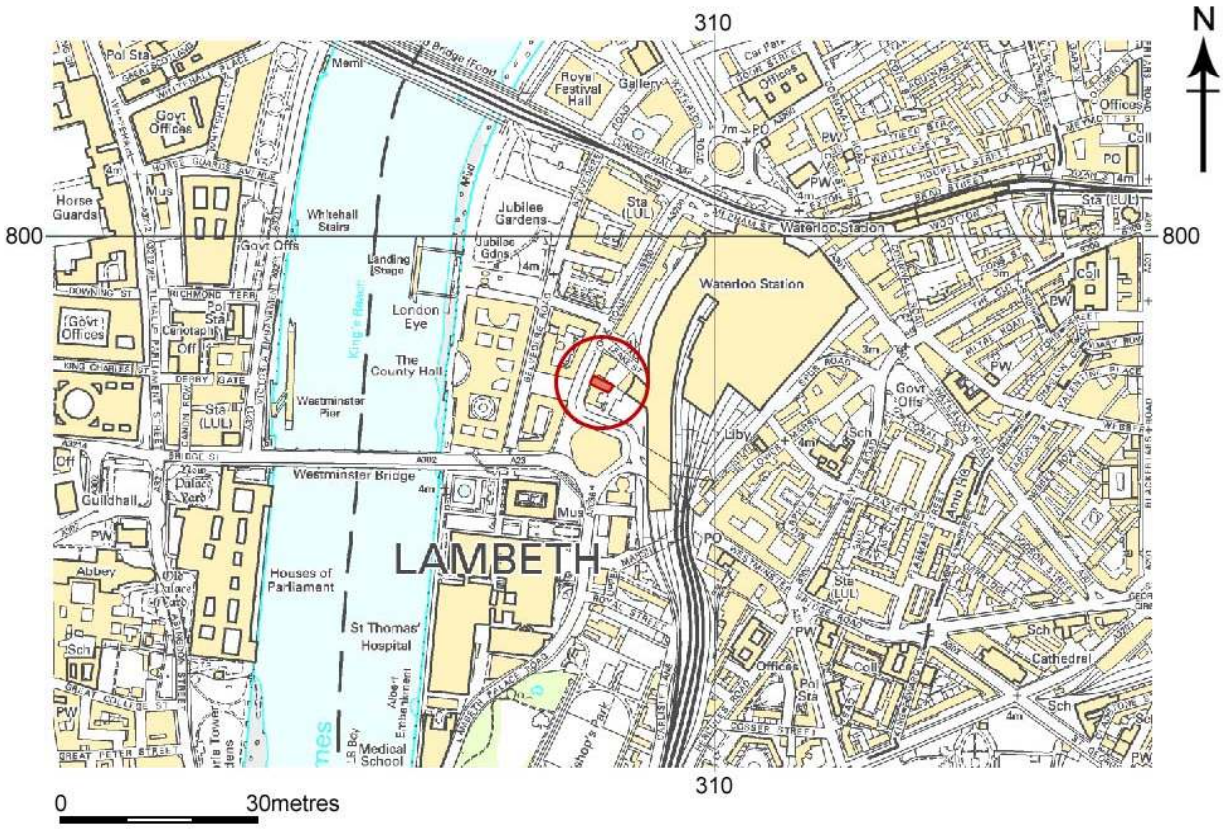


Fig. 1 Site location in relation to the current Ordnance Survey plan.

*Figure 1 reproduced from the relevant Ordnance Survey maps with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright (Compass Archaeology Ltd, licence no. AL 100031317).*

## 2. ACKNOWLEDGEMENTS

Compass Archaeology would like to thank John Sisk & Son for commissioning the evaluation and especially Andrew James and Len Morris for all their assistance on site. We would like to thank Andrew James, Len Morris and Melvin Loughnane of John Sisk for their expert advice and for their perseverance in making every possible effort to carry out the archaeological evaluation works.

We would also like to thank Jane Sidell of English Heritage for her help and advice with this project.

## 3. SUMMARY OF THE ARCHAEOLOGICAL POTENTIAL OF THE SITE

### 3.1 Geology and topography

The Nurses' Accommodation site lies on relatively level ground approximately 20m to the east of the River Thames, at a current ground surface level of *c* +4.2m OD. The geological survey[1] indicates that the site lies on a relatively recent deposit of Alluvium, which overlies the post-diversionary River Terrace Gravels (Kempton Park) in this area.

The site is located on the south bank of the river where the geology is characterised by a complex fluvial sequence relating to the previous courses and floodplains of the River Thames. These deposits range from the gravel terraces of the later Pleistocene, through sands deposited within river channels of the Early to Middle Holocene (in this part of Lambeth from the Mesolithic period), to peats of the Bronze and Iron Ages and estuarine clays of the historic period[2]. The southern side of the tidal river forms the deposition, as opposed to erosion, bank of the river channel in this area of the floodplain.

The evolution of the Thames floodplain in central London, its formation processes and the distribution of human settlement and activity across the landscape is an ongoing research topic in the current archaeological research framework for London. Recent major archaeological projects such as those relating to the Jubilee Line Extension (across the boroughs of Lambeth, Southwark and Westminster), extension works at Waterloo Station and generally PPG16 led projects such as County Hall, have collated a wealth of palaeoenvironmental data. This has contributed to the understanding and partial mapping of the Holocene evolutionary phases of the Thames since the 1990s (i.e. since the last glaciation)[3]. This work has looked at the palaeoecology, geomorphology and topography of the region and has assessed the role of geology, hydrology and changes induced by relative sea level change across the area. The work also discussed changes in the vegetation and environmental data from the study area supported by absolute and relative dating techniques, with particular application of $^{14}C$ (radiocarbon) dating as the most widely applied absolute dating method for Holocene sediments.

This recent and ongoing research also discusses the current position with regard to our understanding of the complex Pleistocene and Holocene development of the Thames, the interpretation of which has been covered in a number of recent texts. This recent work particularly highlights the problems encountered with topographical terrain modelling and why terrain models for North Lambeth are not available and are currently not regarded as an especially reliable tool for archaeologists because of problems with data interpretation[4].

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[1] British Geological Survey 1998: Solid and Drift Sheet 270

[2] Sidell, J. *et al* 2000 p11'The Holocene Evolution of the London Thames: Archaeological Excavations (1991-1998) for the London Underground Limited Jubilee Line Extension Project' *MoLAS Monograph* 5.

[3] Sidell, J. *et al* 2000 'The Holocene Evolution of the London Thames: Archaeological Excavations (1991-1998) for the London Underground Limited Jubilee Line Extension Project' *MoLAS Monograph* 5 and Sidell, J. *et al* 2002 'The prehistory and topography of Southwark and Lambeth' *MoLAS Monograph* 14.

[4] *c.f* Sidell, J. *et al* 2000 pp.12ff; Gibbard 1985; Bridgland 1994; 1995; Bridgland *et al* 1995; Devoy 1979. This very specialised subject is still open to much interpretation and unfortunately there is insufficient comprehensive data for this part of North Lambeth. The models for the inner Thames estuary are far from complete and several

## 3.2 Formation of the Holocene geology in North Lambeth

The mean sea level has been gradually rising since the post-Devensian (last glaciation), additionally with phases of relative sea level fall. A period of a rise in sea level is referred to as a transgression and a fall as a regression. Studies in the Thames estuary have revealed there to be complex phases of transgression and regression through the Holocene period. During regression periods previously uninhabited sites would be settled and deposits such as fibrous, dark brown organic peats would be formed and during transgression periods bands of waterlain silts/clays and sands would be deposited.

These sediments and formations are the result of regression and transgressions of the main Thames stream and the movement of tidal creeks. These deposits lie above eroded Late Eocene gravel transition beds, in turn overlying Tertiary London Clay at significant depths. Topographically the area is low lying sloping down gradually from east to west, though areas of higher ground or eyots exist where the gravels are differentially eroded by previous paths of the river and by tributaries of the estuarine system that create their own cycles of erosion and deposition.

The development of North Lambeth has been determined by this fluctuation in water level and by the progressive build up of waterlain overbank deposits and many of the silt and clay transgression deposits can be very recent, in some cases even medieval and early post-medieval in origin. These factors, along with the system of channels that cross the area, contributed to the formation of the Lambeth Marsh and it is for this reason that the area, and the embankment of the river, has only been intensively developed since the post-medieval period.

The natural gravels of the floodplain have been modified by an earlier southern course of the Thames, which flowed through the North Lambeth area. This and other formation processes have left higher islands (dunes or eyots) across the area and projecting between the braided channels of organic silts, clays and peat formations. The top of the gravel eyots in this area of the floodplain is thought to be above 1m Ordnance Datum, which has rendered them less susceptible to changes in tidal levels. The highest astronomical tide during Roman times is thought to lie at about 1m OD and earlier tides would have been lower. The eyots and areas of drier ground have formed the centres of human settlement and activity since the last glaciation and have been gradually inundated by the rising sea level since the later prehistoric periods. It is possible that an eyot was located to the south of the present junction of Waterloo Bridge Road with York Road and this has been referred to as the North Lambeth Eyot, perhaps also indicated in adjacent placenames such as ‘Upper Ground’. The occupational land surface of the eyot would consist of sands and gravels, with some of the sand components being artefact bearing

In addition to excavations and geoarchaeological survey work, a series of foreshore surveys have also been undertaken recently including important Mesolithic discoveries on the foreshore near County Hall. These have helped to record the alluvial sequence and have provided valuable environmental data, unfortunately the foreshore surveys to

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problems in interpretation have been identified. Sidell, J. *et al* 2000 pp.12ff discusses in detail the nature of the problem and therefore, only an over simplified model of the general state of current knowledge of these matters can be presented in this report.

date have centred on the foreshore in Southwark and analysis of the Lambeth stretch has yet to be undertaken[5]. Some foreshore work in 1997 opposite County Hall and south of Hungerford Bridge (TFC 97) revealed the gravel profile falling towards the river. However, it also noted a sharp fall, which is probably the result of truncation by dredging for the clearance of an entrance to one of the numerous wharves that lined this part of the river in the 18th and 19th centuries.

### 3.3. Archaeological and historical background

The desk top assessment revealed that the site has the potential for archaeological deposits dating from the prehistoric period and the Historic Environment Record (HER) recorded 141 entries for the 450m-search radius around the site (however a number of these entries can be grouped by location and date to simplify discussion). In summary the site has the potential for archaeological deposits in relation to the following periods.

#### 3.3.1 Mesolithic (9500-1500 cal BC)

The earliest evidence for human activity in the North Lambeth area dates to the Mesolithic period. The occurrence of earlier occasional Palaeolithic finds in the archaeological record should be generally regarded as residual 'background noise' rather than as indications of Palaeolithic hunting group movements across the area in interglacial or interstadial periods.

At the London Nautical School, No. 61 Stamford Street site (TQ 3142 8033) in 2004 alluvial silt, clay, peat and sand were recorded in an auger survey. Basal deposits dated to the Mesolithic period, while another later sample produced a Bronze Age date. A further geoarchaeological investigation carried out to test and sample the earlier identified deposits produced a date at the top of the gravels of the late glacial period (Upper Palaeolithic *c* 13,000 years ago). Late glacial dates are very uncommon for this stretch of the Thames floodplain and further testing revealed the organic deposits over the gravels to not be of such antiquity. The organic material must have been either a very small remnant of a glacial deposit or as a redeposited fragment of these earlier sediments[6]. This site indicates some of the problems of absolute dating techniques in a fluvial and changing landscape.

A series of geoarchaeological surveys have taken place in the last few years across the floodplain in Lambeth and Southwark to map the prehistoric and Roman landscape. The sand islands (dunes) of the floodplain such as Bermondsey and Horsleydown Eyot and Thorney Island (on the north bank) are likely to have starting forming in the Early Holocene. A 4th millennium cal BC date has been obtained from a wood sample found in the laminated sands of Thorney Island[7].

The evidence for Mesolithic activity from excavation evidence across the floodplain does indicate that elements of the landscape were utilised and populated by early

[5] Maloney, C and Holroyd, I. London Fieldwork and Publication Round-up 2002 *London Archaeologist* Vol 10 supplement 2 (2003)
[6] Maloney, C and Holroyd, I. London Fieldwork and Publication Round-up 2004 *London Archaeologist* Vol 11 supplement 3 (2005)
[7] Sidell *et al* 2002 p7

hunter-gatherer mobile communities on a transient or seasonal basis. The HER has numerous entries for Mesolithic material in the study area and a cluster of Mesolithic sites can be seen in the immediate vicinity of the study site. Across the floodplain in a wider landscape context three large flintwork scatters have been excavated adjacent to the Old Kent Road, in South Bermondsey since 1990[8]. These sites contained thousands of worked flints and hearth settings, cut features, concentrations of burnt flint and lay on a weathered sand deposit between +0.80m OD and 1.20m OD.

Many Mesolithic artefacts have been recovered from the Thames and from work during the construction of County Hall in the 1900s. These finds include three Mesolithic antler mattocks, Neolithic flint axes, a human mandible, an Early Bronze age copper halberd, a Late Bronze Age alloy sword and two Iron Age copper alloy dagger sheaths have been recorded.

Important excavations were carried out in 2004 at land to the rear of the General Lying-in Hospital at the site of the proposed Westminster Bridge Hotel on Addington Street (ADI 04). These excavations revealed sandy deposits representing Early Holocene land surfaces and contained many Mesolithic and some Neolithic assemblages. The exact height of survival of these deposits could not be ascertained for the assessment as the site is still awaiting publication, but a general depth similar to other sites on Addington Street can be anticipated. Excavation at County Hall, Addington Street Annexe (ADD 95) in 1995 revealed a former river channel, with alluvial clays dating to the 18th century and containing large pieces of waterlogged timber. In an area of raised sand and gravel lying at approximately +0.80m OD flint artefacts and burnt flint debris of Late Mesolithic and Early Neolithic date were recovered from within the sands and from the top of the raised eyot deposit. A possible cut feature was also recorded. Environmental samples taken from these deposits revealed the presence of carbonised cereal grain, suggesting a Neolithic date. The discovery of the north edge of a sand and gravel eyot indicates the potential for early prehistoric deposits to survive to the west of the study site and at a level correlating with the existing basement of the Nurses' Accommodation Building (*cf.* Fig 2). On the nearby County Hall (North and South Blocks) Belvedere Road site (BEE 95) post medieval alluvial deposits were recorded. The upper surface of these deposits lay between +1.70m OD (to the south of the site) and +1.09mOD to the north. Natural gravels were recorded lying at –0.35m OD at the southern end of the site and indicate that again a similar sequence of palaeoenvironmental deposits would extend towards the Nurses' Accommodation site. However, the evaluation works at the Nurses' Accommodation site have now shown that the concrete basement slab surviving at the front of the site in the location of evaluation pits D and E extends to a depth of –1.066m OD and the concrete bases at the rear of this site extend to a depth of –0.668m OD, this indicates that similar deposits are extremely unlikely to survive at the Nurses' Accommodation site as the current survival levels are in the region of two metres lower than the surrounding gravel and sand island stratigraphy (*cf.* Fig 2).

At 126-156 Westminster Bridge Road a series of excavations (LAM 107/79 WBR 88 and WBG 96) revealed a sequence of silty sands over gravel, which contained hundreds of prehistoric struck flints and pottery sherds. The top of these sands ranged in height across the site between +2.87m OD and 2.21m OD and a gravel eyot was

[8] B&Q Depot, Old Kent Road/Bowles Road and Marlborough Grove. Site Codes BAQ 90 and sites OKG 91 and OKR 90 and MAG 93. Sidell *et al* 2002 Gazetteer p56 ff.

recorded at a depth of 1.26m, again the level of survival at the study sites is now shown to be significantly lower. Occupation sites are also indicated at Coronation Buildings, Nos. 30-60 South Lambeth Road (COR 89) where a flint assemblage (48 pieces) was discovered in association with mid to late Iron Age occupation evidence.

At Addington Street, Waterloo Site C (WSC 90), just to the east of the study site, evidence for Mesolithic and Neolithic occupation and settlement was discovered in 1990 in the form of pits, postholes and a ditch terminal of prehistoric date. The flint assemblage (439 pieces) included a small but important collection of eight later Mesolithic microliths and also cores, a burin spall and the butt of a later Neolithic triangular arrowhead. The flints were recovered from within an alluvial sand unit at +0.82m and +0.64m OD, noticeably about the same height of the level of truncation at the study site. Gravels were recorded at +0.34m OD.

At Waterloo Station, No. 29 Addington Street, Waterloo Site B (WSB 90) a further prehistoric horizon revealed struck flints and prehistoric pottery, this horizon overlay sands and gravels at +0.34m OD. The deposit was cut by six pits dating to the Neolithic period, which were sealed by a sand layer containing further flintwork, pottery, burnt flint and two fragments of bone. The flintwork assemblage (282 pieces) of late Mesolithic and Early Neolithic date appears to indicate that flint knapping was taking place on this site.

Many of these archaeological evaluations mentioned above were in connection with the widening of the Waterloo Railway viaduct, to the east of the Nurses' Accommodation site. Here there were extremely important *in situ* Mesolithic and later deposits at *c*.0.7m OD, some 3.5m (or less) below modern ground surface, and preserved under alluvial deposits. However, the evaluation works at the Nurses' Accommodation site have now shown that the concrete basement slab surviving at the front of the site in the location of evaluation pits D and E extends to a recorded depth of –1.066m OD and the concrete bases at the rear of this site in the areas of evaluation pits A and B extend to a depth of –0.668m OD, this indicates that similar deposits are extremely unlikely to survive at the Nurses' Accommodation site as the current survival levels are, at the front of the site, at a depth of 5.266m below current ground surface (–1.066m OD) and, at the rear of the site, at 4.868m below current ground surface (–0.668m OD; *cf*. Fig 2).

General prehistoric flintwork finds have been recovered from a cluster of sites around the study site including Waterloo Station, Upper Marsh, (Waterloo Site E WSE 90); Waterloo Station, Upper Marsh (Waterloo Site F: WSF 90) and additionally at 126-156 Westminster Bridge Road flintwork and burnt flint was recovered in the base of a Roman ditch (WBG 94); a Mesolithic tranchet axe was discovered in Waterloo Road, Waterloo Station.

At Nos. 47-67 Hopton Street (to the east of the study area HNT 94) was a sand eyot with prehistoric settlement activity. This was principally small pits and stakeholes together with traces of ard marks and revealed a flintwork assemblage (*c* 300 pieces) containing elements dating to the Mesolithic through to the Bronze Age. Among the pottery assemblage from this site was a complete Neolithic Beaker type bowl buried in a small pit with a flint core and a blade. At 44-47 Hopton Street (HPT 01) a prehistoric land surface, cut by a substantial north-south channel had also been identified.

As has been shown, there is a definite prehistoric presence in this general area of Lambeth. To the south of the borough finds from the Lambeth Palace Kitchen Gardens in 1986 (L582/86) included a multi-platform core and four scrapers of end, side, end/side and thumbnail form respectively. Also, south of the radius search area a site at Lambeth Palace North Garden, Lambeth Palace Road (L58286) revealed in 1986 two prehistoric features with flint and pottery, two sherds of an Iron Age bead-rim jar, and a flint assemblage (237 pieces). The latter was notable for a number of diagnostic Neolithic/Early Bronze Age pieces[9]. These included two transverse arrowheads, a barbed and tanged arrowhead, two fragments of ground flint axes, a single adze fragment, a blade knife, three scrapers of end and thumbnail type, two single platformed cores and a quartzite hammerstone.

It is significant that there is a cluster of sites around the study site that have produced definite evidence for earlier prehistoric occupation with large flint assemblages[10]. The depth of concrete recorded in the evaluation does indicate however that Mesolithic occupation levels will have been truncated and removed by the construction of the Nurses' Accommodation building.

### 3.3.2 Neolithic (2500-1500 cal BC)

In addition to the sites already mentioned in the earlier section the area also has a rich heritage for finds dating from the Neolithic period. The considerable overlap of cultural aspects between the mobile communities of the Mesolithic and the sedentary farmers of the Neolithic period in lowland Britain makes a separation of terms slightly redundant. However, the changing river regime would have had a much greater impact on the settled communities of the Neolithic as compared to the preceding societies[11]. The HER has numerous entries for the Neolithic period and several Neolithic flint implements have been recovered from the river and foreshore, including a polished axe from near Waterloo Bridge (FCY 06). Settlement evidence dating to the Neolithic has been recovered from Lower Marsh to the east of the site (WBR 88) in the form of a flint (36 pieces) and pottery assemblage. At Nos. 99-101 Waterloo Road (LOO 90) a north-south running ditch of Neolithic to Bronze Age date was sealed by an accumulation of horizontal timbers (possibly part of a trackway) with two flint flakes, roots and branches, flood deposits at -0.85m OD and a peat horizon that survived to +0.8m OD; again at approximately the basement slab level of the study site. At Nos. 4-10 Lower Marsh and Nos. 126-156 Westminster Bridge Road (LIO779) assemblages of residual struck flints (*c* 220 pieces) were found. Neolithic and Bronze Age peat deposits were also mapped for the Jubilee Line Extension Project palaeoenvironmental project at Joan Street (JOA 91) and 206 Union Street (UNS 91)[12].

A further important site in the landscape context of the study site is Phoenix Wharf, No. 4 Jamaica Road, downstream of Tower Bridge, where Neolithic material was discovered with a later burnt mound and a series of ard marks[13].

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[9] Richardson 1986, Bird *et al* 1987. Sidell *et al* 2002 p58
[10] Filer 1991, Bird *et al* 1991-2, Sidell *et al* 2002 p58
[11] After Sidell *et al* 2002 p122
[12] Sidell *et al* 2002 p59
[13] Bowsher, J.M.C. 1990 'A Burnt Mound at Phoenix Wharf south-west London' in Hodder, M.A and Barfield, L.H 1991 'Burnt Mounds and Hot Stone Technology' .*Sandwell Metropolitan Borough Council.*

### 3.3.3 Bronze Age (2000-1500 cal BC)

The study area also has entries on the HER for sites and findspots dating from the Bronze Age period, some of which have been mentioned in the preceding sections. The HER has seven distinct entries for the Bronze Age. Numerous finds have been recovered from the Thames including a Bronze Age copper alloy spearhead, a dagger blade, a copper alloy chisel, three copper alloy socketed axes and three swords. On the foreshore at Vauxhall (VXF 93) part of a prehistoric pile structure was recorded and associated artefacts included a pair of Middle Bronze Age side-looped spearheads and a piece of worked red deer antler. A further timber structure was found, dated to the Iron Age and thought to possibly be a fish trap.

At Waterloo Station, Upper Marsh Street, Site D, (WSD 89) flint waste (40 pieces) and Late Bronze Age pottery was found in a weathered sand layer. A late medieval /Tudor chalk building fronting Upper marsh was also examined. At No. 127 Stamford Street (SMF 95) investigations revealed peat horizons with pollen showing evidence of nearby land clearance and cereal cultivation. At Stamford House, Stamford Street (SFO 03) evaluation mapped the alluvial deposits over the natural sands and gravels and revealed a rise in sea level and inundation of the area in the Middle Bronze Age.

There is evidence from several sites that there was a considerable amount of Bronze Age agriculture taking place on the floodplain in Southwark and Lambeth. Although there is little direct evidence for settlement, important Bronze Age timber structures have been recovered in Southwark from the Bricklayers Arms site, Bermondsey and from Bramcote Grove, Bermondsey.

### 3.3.4 Iron Age (1500 cal BC to AD 43)

There are very few Iron Age finds and sites on the floodplain of the Thames in Central London. The record for discoveries dating to the Iron Age period in the study area is dominated by the discovery from the Thames, at sometime prior to 1868, of the famous Waterloo Helmet. The copper alloy helmet horned helmet is richly decorated and is a national treasure and important piece in the study of Celtic art styles.

Other Iron Age artefacts have been recovered from this stretch of the Thames and settlement evidence has been revealed at No. 245 Blackfriars Road in the form of Iron Age burnt flint and pottery. At the Courage Brewery site in Southwark, traces of circular wooden huts were found in the form of postholes, while a rare (for London) ring ditch has been uncovered adjacent to modern London Bridge at the site of Fennigs Wharf[14].

[14] [14] Sidell *et al* 2002 p65

### 3.3.5 Roman

Many of the HER entries refer to discoveries made when County Hall was being built in the early part of the last century. The building work involved massively deep and extensive excavation of the site, which was largely on the foreshore of the River Thames. The discoveries included the County Hall Ship a small Roman third century keeled sea-going sailing ship (*c* 20m in length), found in 1910 some 6.55m below contemporary ground surface (thus almost certainly well below Ordnance Datum). It was preserved at the base of a channel overlying the sand and gravel deposits. Some sources state the ship was found at a height of –2m OD[15]. This would place it below the level of known truncation of the Nurses' Accommodation site (*cf*. Fig 2) and it is therefore possible that deeply buried deposits within river channels could still survive beneath the Nurses' Accommodation building. The vessel dates to about AD 300 on coin evidence. Though very little of it survives today, it is a very important find - being only the third Roman ship from London (the others being found a second century shallow draft barge from Guys Hospital, Bermondsey in 1958 and a second century sailing barge from Blackfriars in 1962).

There is little definite evidence for established occupation around this area of Lambeth in the Roman period (AD 43 to 410) except along the line of Stane Street, the major Roman road from London to Chichester and the south coast. The course of the road is not entirely known, although it evidently ran in a fairly straight line from London Bridge southwards towards Kennington and thence to Clapham[16].

By the Roman period much of this area of Lambeth would have been marginal and prone to flooding and occupation can only be anticipated on the localised areas of higher ground, such as recorded at Finck Street (FCK 78) where a Roman cesspit was discovered. Sherds of Roman pottery and a possible Roman ditch have been recorded from Nos. 126-156 Westminster Bridge Road (WBG 90) and No. 245 Blackfriars Road, although few features of Roman date were found. The general area of the site remained broadly marshland until the first reference to embanking of the river in 1444.

### 3.3.6 Saxon and later deposits

Owing to the reduction of the site for the basement floor it is unlikely that any Saxon or later deposits will be present on the site. Apart from a few references to Saxon finds from the river and general area very little evidence survives for the utilisation of the study area in the Saxon period. It seems probable that there was little occupation of this low-lying area during the Saxon period. Until the 18th century much of the northern area of Lambeth was marshland and crossed only by a few roads raised against floods.

[15] Minkin, J. 1997 Sewer Division Works, Belvedere Road SE1 An Archaeological Investigation *MoLAS in house developer report.*
[16] Margary 1973,58

## 4 THE PLANNING PROPOSAL

**4.1** The proposed redevelopment involves the demolition of the Nurses' Accommodation building at 79 York Road which combined with the General Lying-In Hospital will create a 234 room hotel of between four and 15 storeys with a basement level and associated service and plant facilities. An archaeological condition is currently attached to the planning permission that requires an implementation of a programme of archaeological work in accordance with a written scheme of investigation (WSI), which has been submitted to and approved in writing by the local planning authority. Compass Archaeology submitted a WSI for the evaluation of five trial pits in the basement of the existing building at 79 York Road prior to demolition, which was approved by English Heritage in January 2011 (*cf*. Figs 2 and 3).

**4.2** These works began on 14th January 2011. It soon became apparent that the basement slab was much thicker than originally estimated and at the rear of the site was actually made up of two distinct slabs: an upper poured concrete slab of *circa* 300mm thick and a lower reinforced poured slab, which appears to be in the region of 1.3m to potentially 1.9m thick in the test pit locations. After nearly four weeks of drilling and cutting the slab in the basement it became apparent that it was not possible to remove the slab in the test pit areas as originally intended. The evaluation works at the Nurses' Accommodation site have now shown that the concrete basement slab surviving at the front of the site in the location of evaluation pits D and E extends to a recorded depth of –0.866m OD and the concrete bases at the rear of this site in the areas of evaluation pits A and B extend to a depth of –0.668m OD. This shows that the basement slabs have truncated the front of the site to a depth of 5.266m below current ground surface (–1.066m OD) and the rear of the site, to a depth of 4.868m below current ground surface (–0.668m OD). The concrete basement slab was found to actually be one continuous slab throughout the building footprint at a general height of +0.634m OD on the top of the slab at the York Road frontage and a height of +0.582m OD (top of slab) at the rear of the building. At the rear of the building a second concrete slab was encountered overlying this slab and the dimensions of this concrete foundation is discussed in Section 6 (*cf*. Fig 2).

**4.3** A single borehole has been sunk at the rear of the site and this encountered water at *c* -0.4m OD below ground level (-3.881m OD to -4.119m OD) and the water level has been constantly monitored and this level is generally stable at *c* 4m below current ground level. There is also a significant amount of trapped water between the upper and lower concrete bases, which pours in as soon as the underside of the upper slab is reached (*cf*. Figs 9 to 27) run. Therefore, it became apparent that the evaluation pits could potentially contain up to two metres of standing water from a rapid water ingress level of *circa* +0.8m OD (the underside of the upper basement slab) and a water table level of –0.4m OD across the site. The general level of the base of the concrete truncation of the site is between –0.666m OD at the front of the site and –0.668m at the rear of the site, which is below the level of the water table. The underside of the basement slab in this area is at generally –0.850m OD. In discussion with English Heritage it was agreed that the evaluation works could not continue as originally proposed owing to the depth of the slabs, and concerns regarding water ingress and the possibility of destabilising the basement.

**4.4** The discovery of the thick basement slabs also necessitated a redesign of the entire basement slab proposal and a provisional sketch of the new foundation design proposal is shown in Fig 4.

**4.5** It is now the intention to demolish the building to basement level and remove the arising demolition debris from site. Once this work is complete the basement slab will be cut locally in the vicinity of the proposed pile caps using large diamond drilling machinery (*cf.* Fig 4). The lower basement slab (top of slab at +0.63m OD to +0.582m OD) will be cut in the vicinity of the pile caps only, the lower basement slab will remain intact across the rest of the building footprint, **although it may be necessary to further reduce this in height by *circa* 300mm and this point will require clarification when the final design is confirmed**. In each of the pile cap areas the slab will be removed and then the piles inserted.

**4.6** The new basement slab will then be cast over the top of the existing slab. The originally proposed secant piling to the existing site boundary will now not go ahead instead pile caps and piles will replace this section of work.

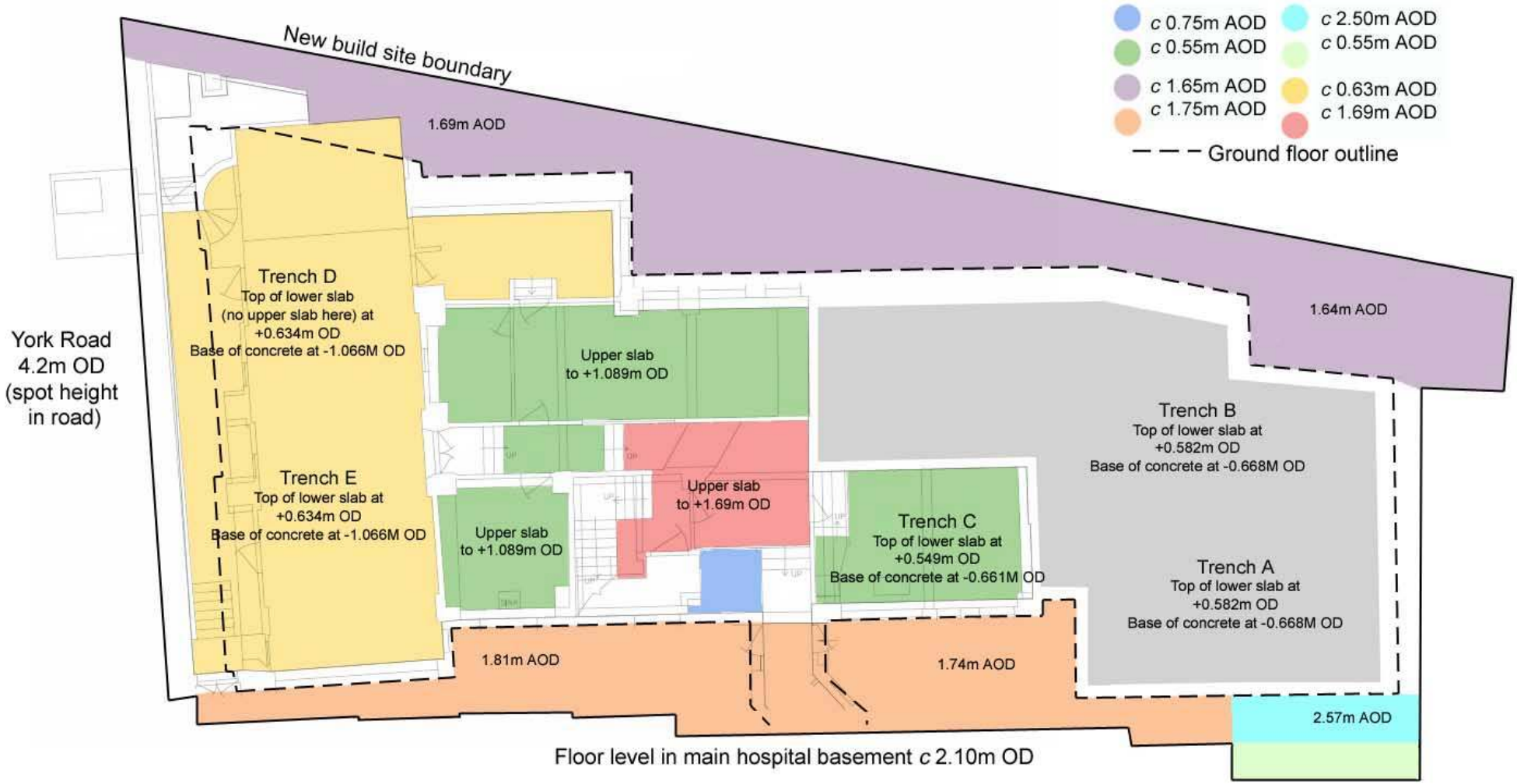


Fig. 2 Plan showing the existing basement outline and approximate levels of the lower basement slab across the site (indicative levels for archaeological purposes only, see the project level survey for design level data). 

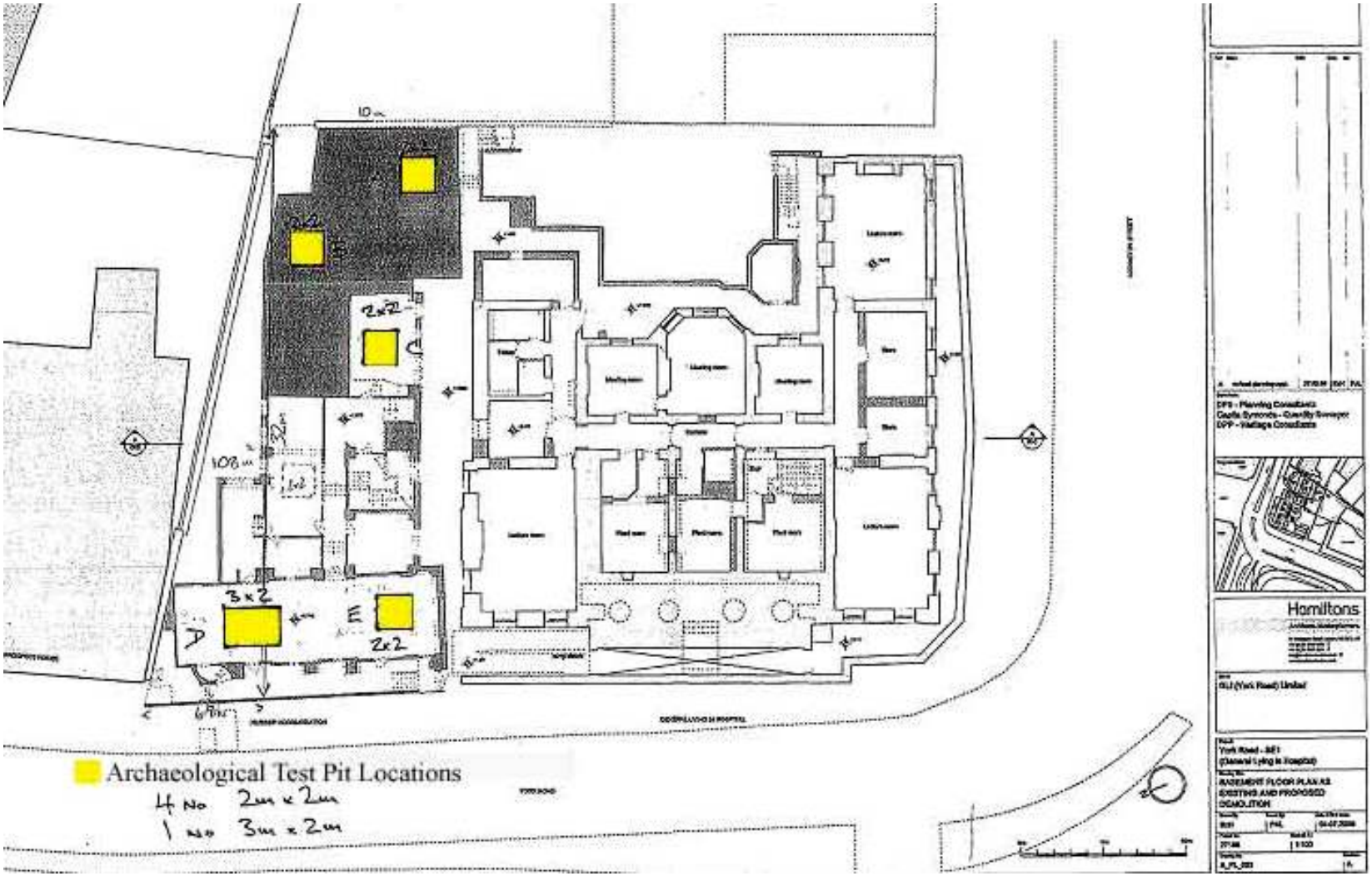


Fig 3 Approximate layout of the proposed archaeological evaluation trenches as shown in the WSI. © John Sisk & Son 2011.

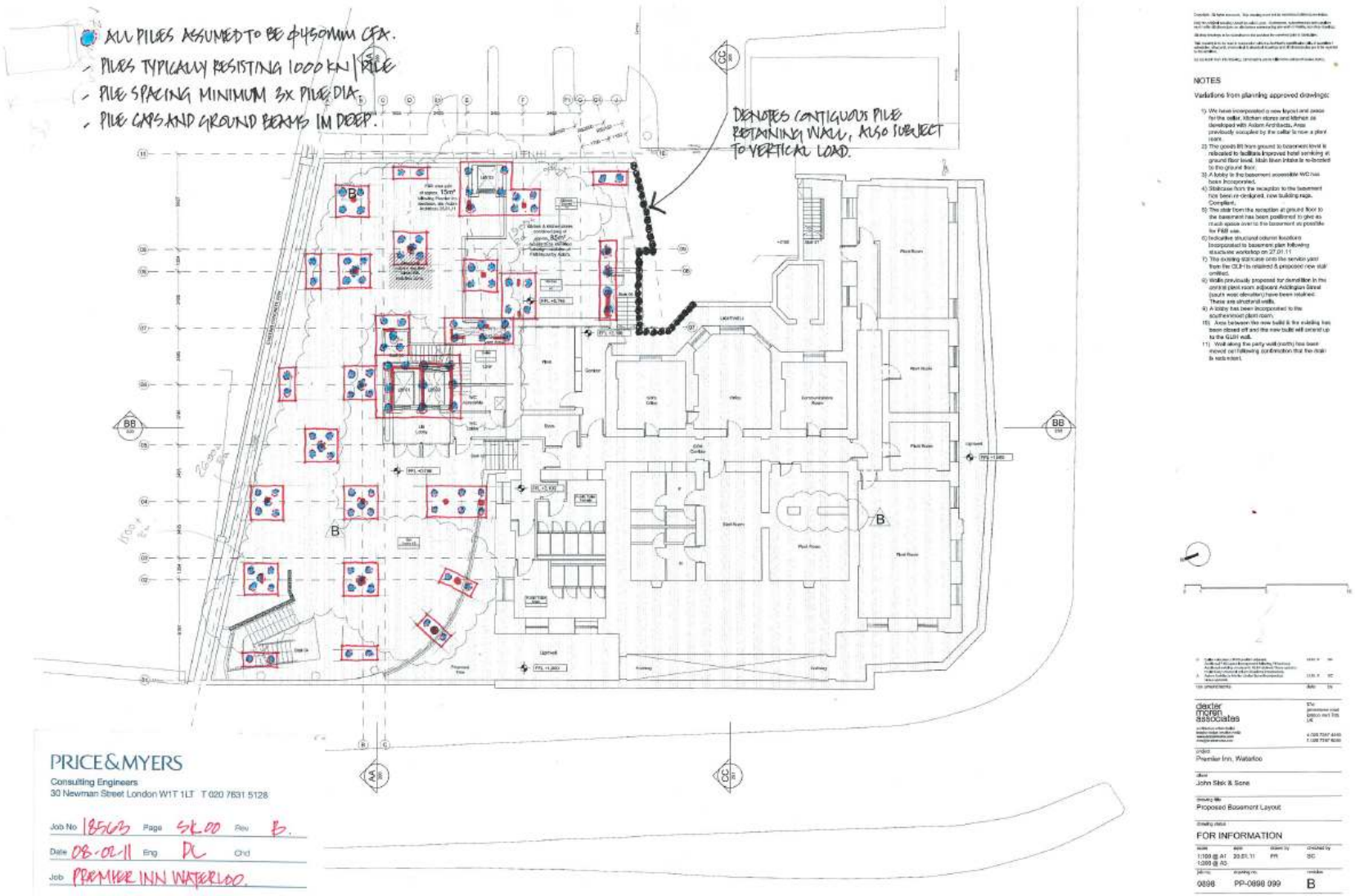


Fig 4 The redesigned proposed pile layout and foundations (provisional sketches following the discovery of the deep basement slabs). Price and Myers drawing PP-0898 099 Rev B (marked SK00 Rev B dated 09-02-2011). © John Sisk & Son 2011.

The location of the proposed pile caps are shown on Fig 4. Melvin Loughnane, the project's Senior Engineer estimates that the pile cap sizes will be as follows:

The two pile caps will be 2100x750x1000 deep
The four pile caps will be 2100x2100x1000 deep
The five pile caps will be 2700x2700x1000 deep

It is proposed to break out the upper 300mm thick high level slab and burst out pockets locally in the 1300mm to 1900mm thick slab in the pile cap locations as shown on Fig 4. The total area of the proposed pile caps is 121m$^2$. The current basement area of the former nurses' accommodation is approximately 400m$^2$.

Therefore, the pile cap area equates to 30.25% of the basement area. The total area of the basement lower slab that will remain *in situ* is 69.75%.

## 4.7 John Sisk & Son Slab Thickness Report and Profiles.

John Sisk & Son have also prepared profiles through the building with the thickness of the slab in various locations shown. These are shown below:


Fig 5: Plan of the site showing location of slab thickness profiles, see Figs 6 to 8 for sections. © John Sisk & Son Ltd. 2011.

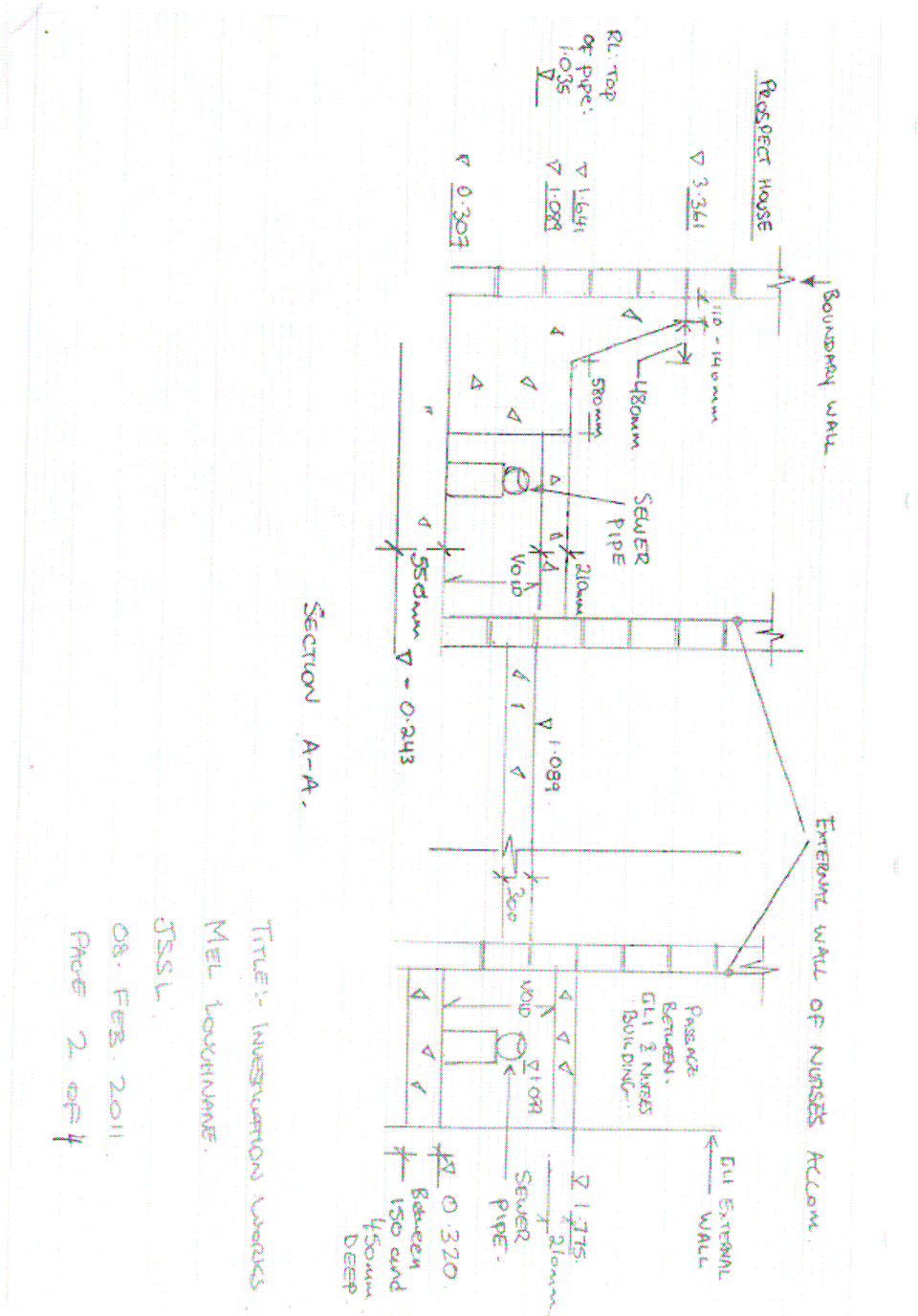


Fig 6 Section A-A. The slab profile north to south across the site. This details the external 210mm thick slab (between Prospect House and the site). This is the roof of the service ducting, which runs between the two buildings. The base slab thickness of this is 550mm. It also shows the internal higher level slab of 300mm thick with a Top of Slab (T.O.S) RL : 1.089. Also included here is the 210mm thick slab between the site and the General Lying-In Hospital building. The base slab thickness here varies between 150mm and 450mm. Added to each of the underside of slab measurements is the c200 to 250mm of loose concrete at the base of the cores. 

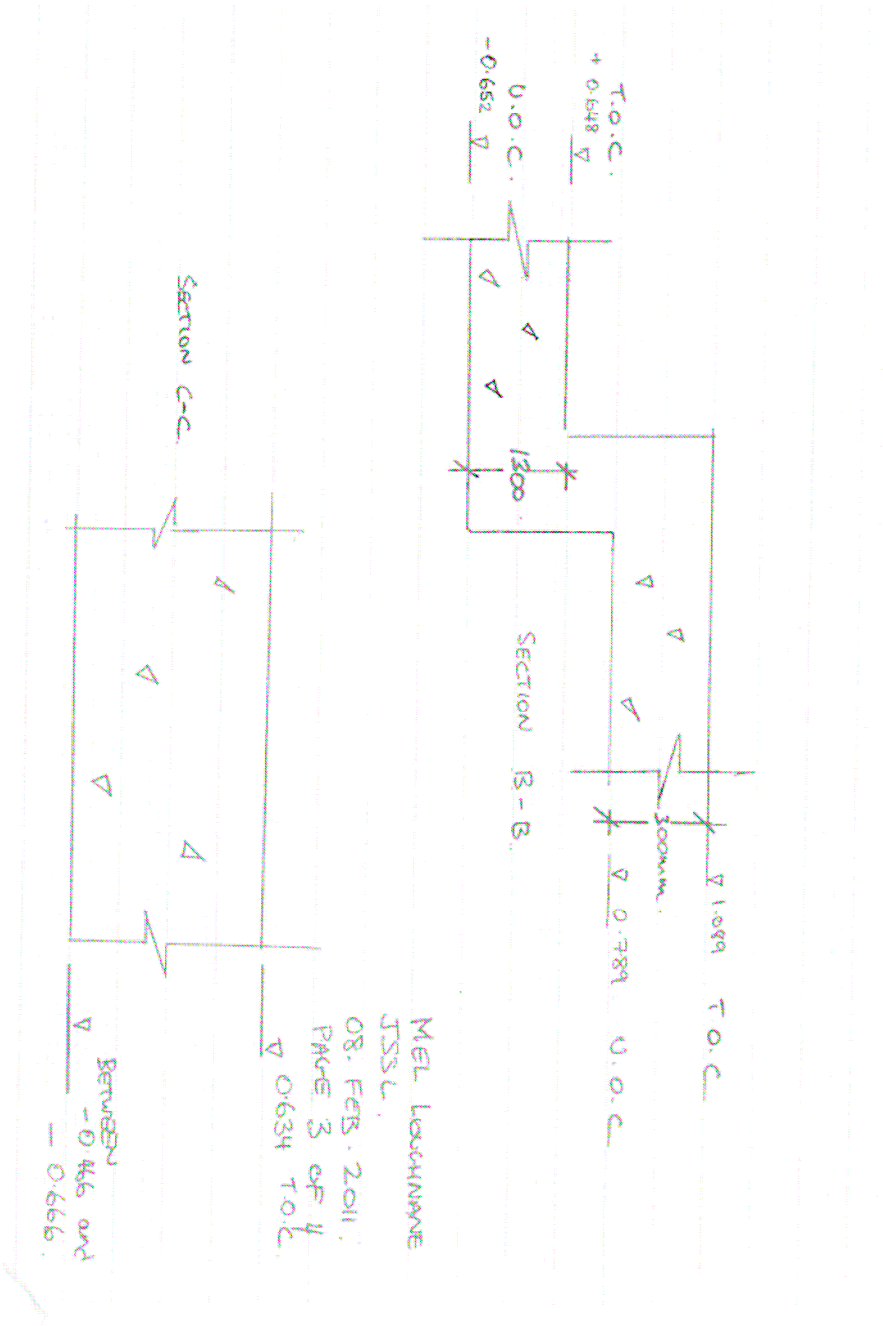


Fig 7 Slab Profiles B-B and C-C (*cf.* Fig 6 for location). Section B-B: This details the lower level slab, T.O.S: +0.648. The slab thickness here is approximately 1300mm deep. This leaves an Underside of Slab (U.O.S): -0.652m OD. It also shows the higher level slab (300mm thick) as section A-A. Section C-C shows the slabs located closer to York Road with a thickness between 1100mm and 1300mm. 

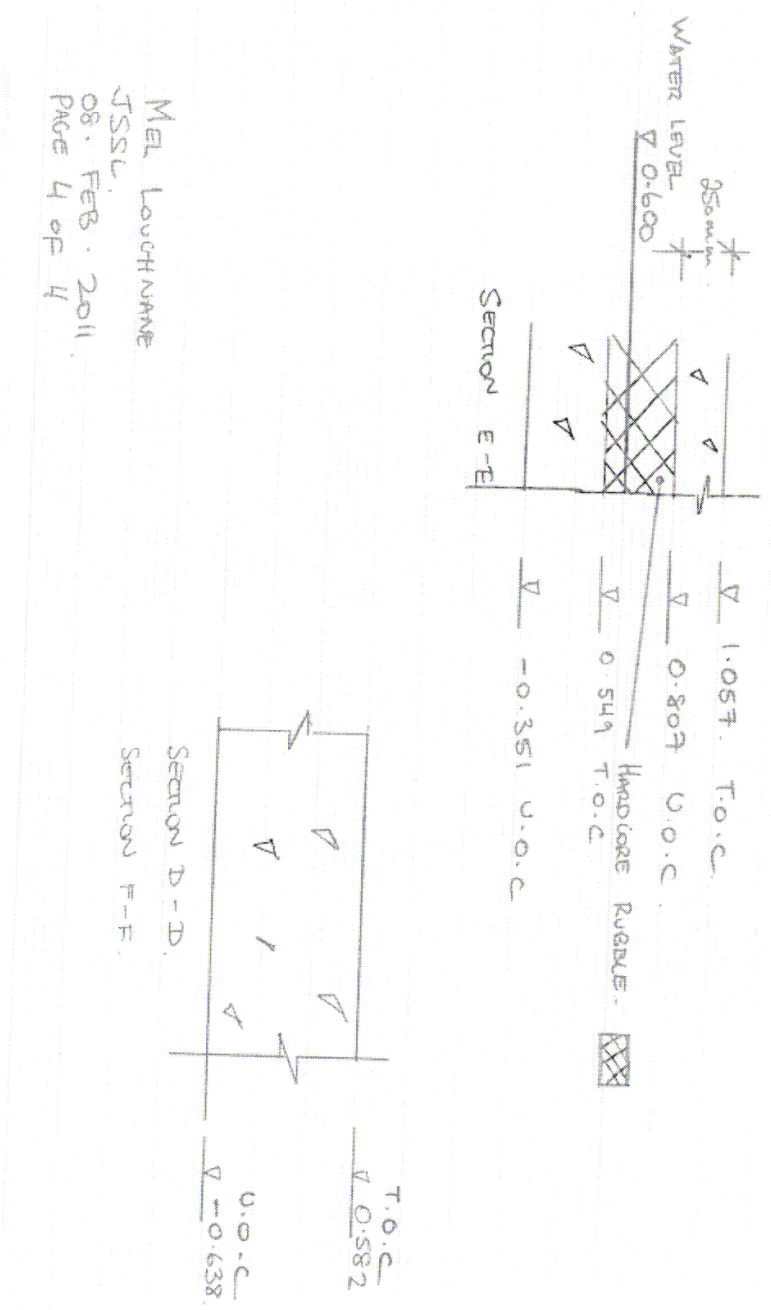


Fig 8 Slab Profiles D-D, E-E and F-F (*cf.* Fig 6 for locations). Section D-D and F-F, these cores were taken in the rooms adjacent to the boundary wall that splits the site and the Crown Plaza County Hall. This shows a slab thickness of 1200mm approximately. Section E-E: slab removal here found a higher level slab of 250mm thick. On further investigation here, a hardcore rubble layer was discovered with a thickness of 260mm. Under this rubble was found a concrete slab thickness of 900mm. There was also encountered water ingress. Water level: 0.600, this appears to be standing water trapped between the two concrete floors. This conflicts with the readings from the site water point with readings between -0.391 and -0.431 (*cf.* Appendix II). 

## 5. Level Surveys

In order to determine the potential levels of survival of archaeological material Compass Archaeology carried out a level survey at the site on 14th May 2008[17]. This survey has now been superseded by a level survey undertaken by John Sisk & Son in response to the basement slab works in January and February 2011. The reduced levels from this survey are shown on Figs 2 and 5 to 8.

In 2008 at the York Street frontage of the building the internal basement floor slab was surveyed at +0.78m OD and varied in height between +1.23m OD to +1.69m OD in the central area and +1.23m OD in the rear southern corner of the site. This has now been resurveyed and the sprung wooden floor removed at the front of the building, this has reduced the top of slab level at the front of the building to 0.634 AOD. The height of the basement floor slab in the Boiler House could not be determined in 2008, as access to the Boiler House was not possible at this time, but has now been surveyed and the top of the lower slab level is 0.582m AOD . The existing exterior courtyard floor level at the northeast corner of the site was at 1.75m OD, but has been resurveyed to 1.64m AOD and the existing courtyard to the south, between the Nurse Accommodation Building and the Lying-in Hospital, was at +1.90m OD, but is now resurveyed to +1.80m . This appeared to be lower than the existing basement floor level inside the Lying-in Hospital, which was surveyed as being at *c* +2.1m OD (Figure 2).

The level survey and evaluation works shows that the site has been reduced (truncated) by generally between two and five metres in depth for the construction of the basement floor level. The reduction in height from the known street level is at a maximum of –5.2m at the York Street frontage and approximately 4.8m at the rear of the site. The basement floor levels inside the Lying-in Hospital appear to be slightly higher at approximately 2m below the current street frontage level in places.

No general soil/geotechnical investigation has been undertaken on site in relation to this application, although one borehole has been sunk on the site and the results of this are shown in Appendix I. There is no evidence from the site inspection to suggest that any other boreholes or testpits have been sunk on this site since the construction of the Nurses' Accommodation.

[17] Levels used in this report are based upon measurements derived from a TBM set up on the pavement outside the main entrance to the Lying-in Hospital, value +4.28m OD. Levels derived from the Compass Archaeology Survey were provided for the sole purpose of this archaeological assessment and should not be used for any other survey in relation to the proposed redevelopment of the site.

# 6 RESULTS OF THE ARCHAEOLOGICAL EVALUATION

It was proposed to sink five evaluation trenches in the basement of the existing building prior to demolition. Two were be located at the site frontage at the west of the site and three to the rear of the site at the east. The purpose of these was to provide information on the level and nature of the present foundations, the extent of horizontal truncation and the nature and depth of surviving archaeological deposits with particular reference to possible prehistoric horizons on the site. However, as noted above it was no possible within the confines of the standing building to open the full area of the evaluation trenches, although it was still possible to provide information on the level and nature of the present foundations, the extent of horizontal truncation and the depth at which potential surviving archaeological remains might be encountered. Specific details of each trench are provided below. The location of the evaluation trenches is shown on Fig 3.

## 5.1 Archaeological Evaluation Trench A

Trench A was located at the rear of the site to provide information about the nature and levels of archaeological survival in the south-east of the site. It was intended to be dug as a trench measuring *c* 2m by 2m, and was anticipated to be up to *c* 1m deep. The trench area actually encountered two distinct slabs of concrete, one above the other. The top of the basement lower slab level in this area of the site was at 0.582m OD, the top of the upper slab lies at 0.832m AOD. It was possible to use a mechanical saw to remove the upper slab in the trench area, but it was not possible to cut the lower slab. As a result a diamond drilled core was excavated to determine the depth of the slab in this location.

Fig 9 General location of Trench A at the rear of the basement on the southern side, prior to the removal of the partition wall on the right of the image.

Fig 10 Trench A after removal of the upper basement slab by mechanical saw and after removal of the core of the lower slab, looking east towards the rear wall of the Nurses' Accommodation building (Scale 1m). The upper slab has been cut through in an area 2m$^2$ , top of basement floor at +0.832m OD

Fig 11 Trench A showing the depth of the upper slab, generally *circa* 250mm to 300mm depth (Scale 20cm).

Fig 12 Trial Pit A detail of the concrete bore, which shows the lower concrete slab to be generally 1000mm deep, with *circa* 200mm of loose poured concrete below this depth. The loose concrete could not be brought to the surface. Adding to this the depth of the upper concrete slab of *c* 300mm, the total depth of the two concrete slabs and the loose poured concrete beneath the lower slab in Trench A was *c* 1.5m. The height of the upper slab i.e. the existing basement floor at this point is +0.832m OD, this gives a reduced level for the underside of the concrete to be–0.668mOD.

## 5.2 Archaeological Evaluation Trench B

Trench B was located at the rear of the site to provide information about the nature and levels of archaeological survival in the north-east part of the site. It was intended to be dug as a trench measuring *c* 2m by 2m, and was anticipated to be up to *c* 1m deep. Basement slab levels in this area of the site are top of upper slab +0.832 and top of lower slab at 0.582m OD.

Fig 13 General location of Trench B in the Boiler Room at the rear of the basement on the northern side.

Fig 14 Diamond drilled bore in the location of Trench B, scale 1m, see Fig 15 for location.

Fig 15 The location of the drilled core through the concrete slabs in the area of Trench B. The borehole can be seen to the left of the 1m scale. The core of concrete measured 1m and beneath this was a further *c* 250mm of loose concrete. Therefore the total depth of the concrete slabs in the location of Trench B is 1.25m and assuming the top of the basement floor to be at *c* +0.582m this gives a reduced level for the base of the concrete in Trench B to be at –0.668m OD.

## 5.3 Archaeological Evaluation Trench C

Trench C was located in the central area of the basement as shown on Fig 3 to provide information about the nature and levels of archaeological survival in the centre of the site. It was dug as a trench measuring *c* 2.04m by 2.10m. The basement slab levels in this area of the site are thought to lie at *c* 1.057m OD. The trench area actually encountered an upper distinct slab of concrete measuring *c* 250mm deep, which overlay a concreted and compacted hardcore rubble layer, which was also on average 260mm deep. It was possible to use a mechanical saw to remove the upper slab in the trench area, but it was not possible to remove the concreted rubble layer in its entirety. Beneath the rubble was a further lower concrete slab. As a result a diamond drilled core was excavated to determine the depth of the lower slab in this location. The lower slab produced a core 700mm long, which with the upper slab (250mm) and rubble layer (260mm) and loose concrete below the core (250mm) gave a total depth of concrete in Trench C of 1.41m (-0.351m OD).

Fig 16 General location of Trench C in the centre of the site, looking west towards the York Road frontage.

Fig 17 General view of Trench C looking southeast towards the rear of the site. The upper concrete slab has been removed and the trench measures 2.04m x 2.10m in plan. The compacted rubble layer can be seen. (Scale:1m).

Fig 18 Trench C detail looking east, showing the rubble layer and water ingress below the upper slab. The light in the distance is illuminating Trench A which shows how much higher this part of the site is to the area of Trenches A and B.

Fig 19 Trial Pit C showing the depth of the upper slab, generally *circa* 250mm to 300mm depth (Scale 20cm).

Fig 20 Trench C after diamond drilling through the rubble and lower slab.

Fig 21 The core from the lower slab in Trench C, part of this core could not be retrieved and the actual core was 700mm in depth, with 250mmm of loose concrete below (Scale:500mm).

## 5.4 Archaeological Evaluation Trench D

Trench D was located at the site frontage near to York Road to provide information about the nature and levels of archaeological survival in the north-west of the site. This and Trench E were sampled as drilled cores through the basement slabs. Basement slab levels in this area of the site lie at *c* +0.634m OD.

Fig 22 The door leading into the room with Trenches D and E at the front of the site, looking west towards the front wall on York Road.

Fig 23 General view looking south, with the core from Trench D in the foreground and the core for Trench E in the distance.

Fig 24 Core for Trench D looking west.

Fig 25 Core for Trench D looking south. The core for this Trench measured 1.3m in length and was reinforced from a depth of 1.24. However, on extraction the base of the core broke (200mm) and fell back into the hole. The actual depth of the concrete slabs in this area of the site, included the loose concrete rubble below, was actually probably about 1.7m. This would still give an underside of concrete level of between –1.066m OD.

Fig 26 The broken end of the core from Trench D (Scale 20 cm)

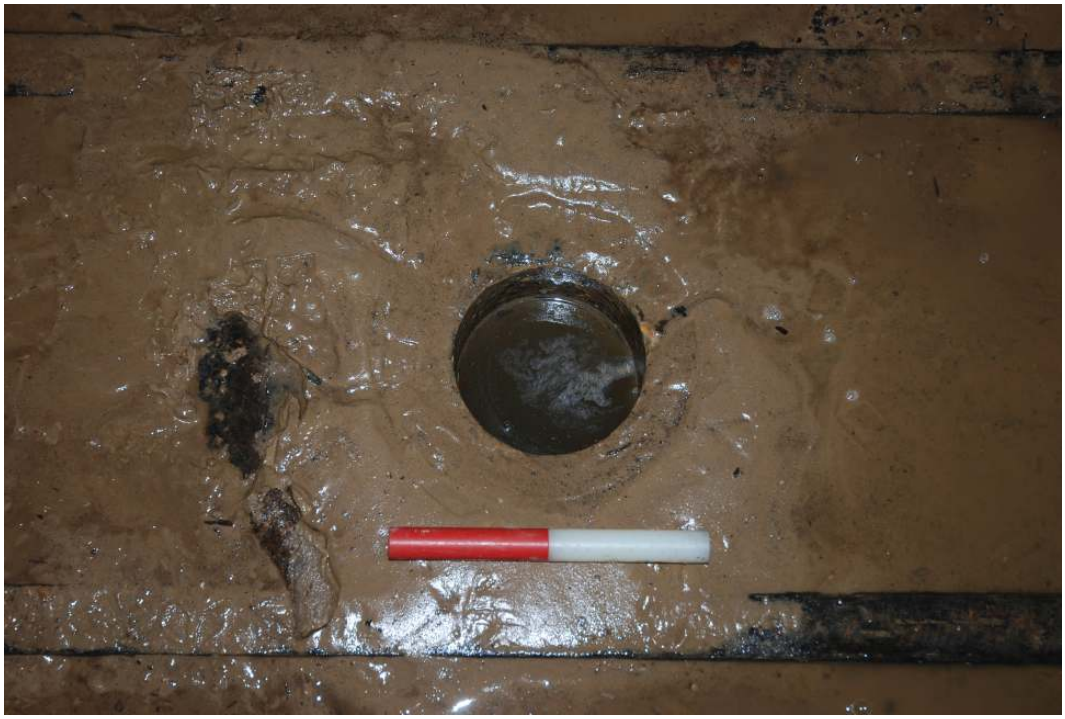

Fig 27 Detail of the core hole for Trench D.

## 5.6 Archaeological Evaluation Trench E

Trench E was located at the site frontage to provide information about the nature and levels of archaeological survival in the south-west of the site. It was dug as a diamond drilled core similar to Trench D. The depth of the core in Trench E is calculated to be in total about 1.7m, *circa* –1.066m OD.

Fig 28 The core in the location of Trench E (Scale 1m).

## 6. Conclusions

These evaluation works began on 14th January 2011 and were not completed until 11th February 2011. The basement slab was much thicker than originally estimated and after nearly four weeks of drilling and cutting the slab in the basement it became apparent that it was not possible to remove the slab in the test pit areas as originally intended and at the rear of the site was actually made up of two distinct slabs: an upper poured concrete slab of *circa* 300mm thick and a lower reinforced poured slab, which appears to be in the region of 1.3m to potentially 1.9m thick in the test pit locations..

The evaluation works at the Nurses' Accommodation site have now shown that the concrete basement slab surviving at the front of the site in the location of evaluation pits D and E extends to a recorded depth of –1.066m OD and the concrete bases at the rear of this site in the areas of evaluation pits A and B extend to a depth of –0.668m OD. This shows that the basement slabs have truncated the front of the site to a depth of 5.266m below current ground surface (–1.066m OD) and the rear of the site, to a depth of 4.868m below current ground surface (–0.668m OD). The concrete basement slab was found to actually be one continuous slab throughout the building footprint at a general height of +0.634m OD on the top of the slab at the York Road frontage and

a height of +0.582m OD (top of slab) at the rear of the building. At the rear of the building a second concrete slab was encountered overlying this slab

## 6.1 Evaluation Methodology, objectives and research questions

Research questions were outlined in the WSI, but as it was not possible to open the trenches beyond the concrete base they could not be fully answered, however, valuable data about the level of truncation of the site has been collected.

It is apparent that the current building has truncated the site to levels below those of the surrounding prehistoric occupation sites on the sand and gravel eyots, however, the close proximity of the nationally important County Hall Ship surviving at a depth of *c* –2m OD is of note and prehistoric sites and findspots are encountered at similar depths on the foreshore in this area of London.

Any further archaeological work will need to take into consideration the logistical and health and safety concerns of the depth of deposits here and the level of the water table[18].

Following this initial evaluation phase it is possible that the Local Planning Authority and their archaeological advisors, English Heritage, may require further phases of archaeological mitigation in their consideration of this proposal. Where an evaluation produces positive results safeguards will be applied; these would normally consist of either design modifications to preserve archaeological remains *in situ* or, where this is not achievable, further archaeological fieldwork in advance of development.

A sympathetic redesign of the foundations by John Sisk & Son in response to this work has increased the percentage preservation of the basement slab and now instead of the slab being removed entirely nearly 70% of the slab will be preserved *in situ*.

The removal of the secant wall on the site boundaries should also help avoid dewatering of the site and any deeply buried archaeological deposits.

[18] Archaeological watching brief works at the GLC Island Block, Addington Street, (CgMs, July 2007) demonstrated that the basement slab of the former GLC Island Block extended to a depth of -1.5m OD into the truncated terrace gravel and no significant archaeological deposits were found to be present. We are grateful to Mark Stevenson of English Heritage for providing this data.

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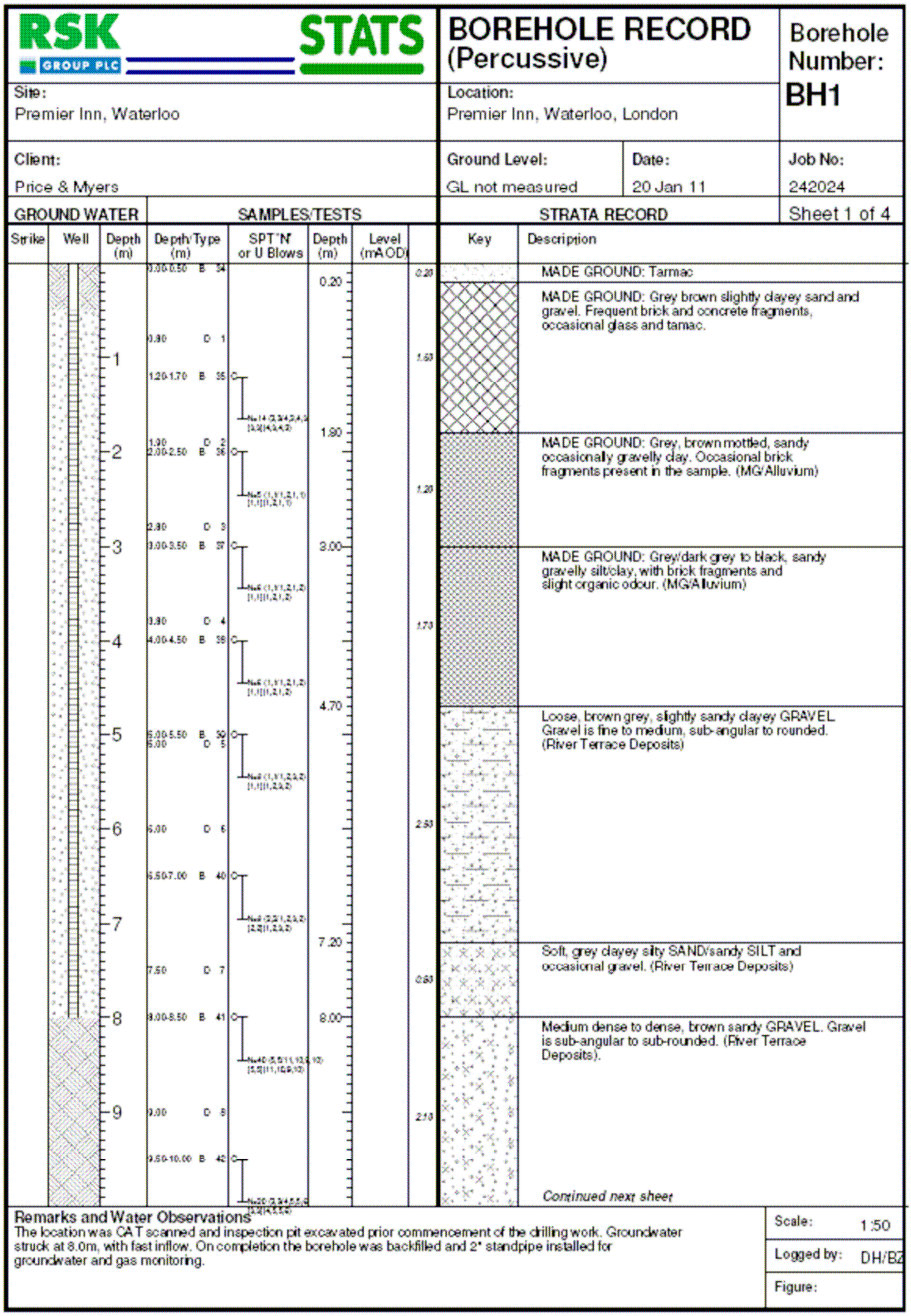
## Appendix I: the Borehole Record



RSK GROUP PLC STATS

**BOREHOLE RECORD (Percussive)**

Borehole Number: **BH1**

Site: Premier Inn, Waterloo

Location: Premier Inn, Waterloo, London

Client: Price & Myers

Ground Level: GL not measured

Date: 20 Jan 11

Job No: 242024

GROUND WATER | SAMPLES/TESTS | STRATA RECORD | Sheet 1 of 4

| Strike | Well | Depth (m) | Depth/Type (m) | SPT 'N' or U Blows | Depth (m) | Level (mAOD) | Key | Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0.20 | 0.20 | | MADE GROUND: Tarmac |
| | | | | | | | | MADE GROUND: Grey brown slightly clayey sand and gravel. Frequent brick and concrete fragments, occasional glass and tarmac. |
| | | | | | 1.90 | 1.50 | | MADE GROUND: Grey, brown mottled, sandy occasionally gravelly clay. Occasional brick fragments present in the sample. (MG/Alluvium) |
| | | | | | 3.00 | 1.20 | | MADE GROUND: Grey/dark grey to black, sandy gravelly silt/clay, with brick fragments and slight organic odour. (MG/Alluvium) |
| | | | | | 4.70 | 1.70 | | Loose, brown grey, slightly sandy clayey GRAVEL. Gravel is fine to medium, sub-angular to rounded. (River Terrace Deposits) |
| | | | | | 7.20 | 2.50 | | Soft, grey clayey silty SAND/sandy SILT and occasional gravel. (River Terrace Deposits) |
| | | | | | 8.00 | 0.80 | | Medium dense to dense, brown sandy GRAVEL. Gravel is sub-angular to sub-rounded. (River Terrace Deposits). |
| | | | | | | 2.10 | | *Continued next sheet* |

**Remarks and Water Observations**

The location was CAT scanned and inspection pit excavated prior commencement of the drilling work. Groundwater struck at 8.0m, with fast inflow. On completion the borehole was backfilled and 2" standpipe installed for groundwater and gas monitoring.

Scale: 1:50

Logged by: DH/BZ

Figure:

RSK GROUP PLC STATS

# BOREHOLE RECORD (Percussive)

Borehole Number: **BH1**

Site: Premier Inn, Waterloo

Location: Premier Inn, Waterloo, London

Client: Price & Myers

Ground Level: GL not measured

Date: 20 Jan 11

Job No: 242024

GROUND WATER | SAMPLES/TESTS | STRATA RECORD | Sheet 2 of 4

| Strike | Well | Depth (m) | Depth/Type (m) | SPT 'N' or U Blows | Depth (m) | Level (mAOD) | Key | Description |
|---|---|---|---|---|---|---|---|---|
| | | 11 | 10.50 D 9 | S | 10.10 | | | Stiff becoming very stiff with depth, thinly laminated closely fissured occasionally sandy CLAY. (London Clay). |
| | | 12 | 12.00 D 10 | | | | | |
| | | | 12.50-12.95 U 44 | | | | | |
| | | 13 | 13.00 D 11 | | | | | |
| | | | 13.50 D 12 | | | | | |
| | | 14 | | S | | | | |
| | | 15 | 15.00 D 13 | | | | | |
| | | | 15.50-15.95 U 45 | | | | | |
| | | 16 | 16.00 D 14 | | | | | |
| | | | 16.50 D 15 | | | | | |
| | | 17 | | S | | | | |
| | | 18 | 18.00 D 16 | | | | | |
| | | | 18.50-19.00 B 43<br>18.50-18.95 U 46 | | | | | |
| | | 19 | | | | | | |
| | | | 19.50 D 17 | | | | | |

*Continued next sheet*

**Remarks and Water Observations**

The location was CAT scanned and inspection pit excavated prior commencement of the drilling work. Groundwater struck at 8.0m, with fast inflow. On completion the borehole was backfilled and 2" standpipe installed for groundwater and gas monitoring.

Scale: 1:50

Logged by: DH/BZ

Figure:

RSK GROUP PLC STATS

# BOREHOLE RECORD (Percussive)

Borehole Number: **BH1**

Site: Premier Inn, Waterloo

Location: Premier Inn, Waterloo, London

Client: Price & Myers

Ground Level: GL not measured

Date: 20 Jan 11

Job No: 242024

Sheet 3 of 4

| GROUND WATER | | SAMPLES/TESTS | | | STRATA RECORD | | | |
|---|---|---|---|---|---|---|---|---|
| Strike | Well | Depth (m) | Depth/Type (m) | SPT 'N' or U Blows | Depth (m) | Level (mAOD) | Key | Description |
| | | 21 | 20.00-20.45 U | 47 | | | | |
| | | | 20.50 D | 18 | | | | |
| | | | 21.00 D | 19 | | | | |
| | | 22 | | | | | | |
| | | | 22.50 D | 20 | | 24.03 | | |
| | | 23 | 23.00-23.45 U | 48 | | | | |
| | | | 23.50 D | 21 | | | | |
| | | 24 | 24.00 D | 22 | | | | |
| | | 25 | | | | | | |
| | | | 25.50 D | 23 | | | | |
| | | 26 | 26.00-26.45 U | 49 | | | | |
| | | | 26.50 D | 24 | | | | |
| | | 27 | 27.00 D | 25 | | | | |
| | | 28 | 28.00 D | 26 | | | | |
| | | 29 | 29.00-29.45 U | 50 | | | | |
| | | | 29.50 D | 27 | | | | |

*Continued next sheet*

**Remarks and Water Observations**

The location was CAT scanned and inspection pit excavated prior commencement of the drilling work. Groundwater struck at 8.0m, with fast inflow. On completion the borehole was backfilled and 2" standpipe installed for groundwater and gas monitoring.

Scale: 1:50

Logged by: DH/BZ

Figure:

RSK GROUP PLC STATS

# BOREHOLE RECORD (Percussive)

Borehole Number: **BH1**

Site: Premier Inn, Waterloo

Location: Premier Inn, Waterloo, London

Client: Price & Myers

Ground Level: GL not measured

Date: 20 Jan 11

Job No: 242024

Sheet 4 of 4

| GROUND WATER | | SAMPLES/TESTS | | | | STRATA RECORD | |
|---|---|---|---|---|---|---|---|
| Strike | Well | Depth (m) | Depth/Type (m) | SPT 'N' or U Blows | Depth (m) | Level (mAOD) | Key | Description |
| | | 30 | 30.00 D 28 | | | | | |
| | | 31 | | S | | | | |
| | | | 31.50 D 29 | | | | | |
| | | 32 | 32.00-32.45 U 51 | | | | | |
| | | | 32.50 D 50 | S | | | | |
| | | 33 | 33.00 D 51 | | | | | |
| | | 34 | 34.00 D 32 | | | | | |
| | | | 34.50-34.95 U 52 | | | | | |
| | | 35 | 35.00 D 33 | | 35.00 | | | End of Borehole at 35.00 m |
| | | 36 | | | | | | |
| | | 37 | | | | | | |
| | | 38 | | | | | | |
| | | 39 | | | | | | |

**Remarks and Water Observations**

The location was CAT scanned and inspection pit excavated prior commencement of the drilling work. Groundwater struck at 8.0m, with fast inflow. On completion the borehole was backfilled and 2" standpipe installed for groundwater and gas monitoring.

Scale: 1:50

Logged by: DH/BZ

Figure:

**Appendix II: Water Table Survey (from Borehole)**

| Date of Survey | Time of Survey | RL to CL of WP | Distance down to WL |
|---|---|---|---|
| Fri 04.02.2011 | 08.00hrs | 4.12 | 4.55 |
| Fri 04.02.2011 | 12.00hrs | 4.12 | 4.54 |
| Fri 04.02.2011 | 17.00hrs | 4.12 | 4.54 |
| Mon 07.02.2011 | 08.30hrs | 4.12 | 4.54 |
| Mon 07.02.2011 | 13.00hrs | 4.12 | 4.54 |
| Mon 07.02.2011 | 17.00hrs | 4.12 | 4.53 |
| Tues 08.02.2011 | 08.30hrs | 4.12 | 4.54 |
| Tues 08.02.2011 | 13.00hrs | 4.12 | 4.54 |
| Tues 08.02.2011 | 17.00hrs | 4.12 | 4.53 |
| Wed 09.02.2011 | 08.30hrs | 4.12 | 4.54 |
| Wed 09.02.2011 | 13.00hrs | 4.12 | 4.54 |
| Wed 09.02.2011 | 17.00hrs | 4.12 | 4.54 |
| Thurs 10.02.2011 | 08.30hrs | 4.12 | 4.54 |
| Thurs 10.02.2011 | 13.00hrs | 4.12 | 4.54 |
| Thurs 10.02.2011 | 17.00hrs | 4.12 | 4.54 |
| Fri 11.02.2011 | 08.30hrs | 4.12 | 4.50 |
| Fri 11.02.2011 | 13.00hrs | 4.12 | 4.50 |
| Fri 11.02.2011 | 17.00hrs | 4.12 | 4.51 |