THAMESLINK PROGRAMME–LONDON BRIDGE STATION
London SE1

London Borough of Southwark

Historic environment assessment
Geoarchaeological assessment
Report on the monitoring of geotechnical work

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MUSEUM OF LONDON ARCHAEOLOGY

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Note: site outlines may appear differently on some figures owing to distortions in historic maps. North is approximate on early maps.

Executive summary

Network Rail has commissioned Museum of London Archaeology to carry out a historic environment assessment of buried heritage assets (i.e. archaeological remains only), field evaluation in the form of monitoring of geotechnical work, and a geoarchaeological assessment, all undertaken in advance of proposed development at London Bridge Station.

The geoarchaeological assessment identified two landscape zones (LZs). LZ1 forms the north-western half of the site and is dominated by the main channel activity of the Thames from the early Holocene onward, with moderate potential for palaeoenvironmental remains and perhaps Mesolithic material. LZ2 forms the south-eastern half of the site which is dominated by the deepest part of the channel just to the north of the intersection of Weston and St Thomas Streets There was evidence for a quieter, backwater or channel margin area, a highly favourable environment for the preservation of environmental remains in particular, and at these levels it is quite likely that early to mid Holocene or Mesolithic palaeoenvironmental evidence will exist.

The historic environment assessment indentified buried heritage assets which may be affected by the proposals including:

- ***Palaeoenvironmental remains**, with potential for evidence of past environments, of low to medium significance*
- *truncated remains of **post-medieval walls and cellars**, and evidence of **earlier phases of London Bridge Station**, of low to medium significance;*
- *truncated **later medieval structural remains and cut features**, of low to medium significance;*

Evaluation in the form of monitoring of geotechnical work identified alluvial horizons, mud flats, intertidal zones and remains of Guy 's Channel, a tributary of the Thames, as well as timber structures at 4.3m below ground level. The latter are likely to be associated with the colonisation and exploitation of the foreshore during the late medieval period. Excavations also revealed a variety of post-medieval masonry structures (17th–19th-century in date; these included domestic structures such as garden walls (TP025, 40,658, 530), and brick lined cess/rubbish pits as well as larger structural walls and floors from buildings that may have been for industrial use (TP658, 106, 661 & 665). In particular TP674 revealed phases of masonry building(s) dating from the 17th–18th-century respecting the north-south historical alignment of Bermondsey Street.

The site may additionally contain previously unrecorded, localised and truncated buried remains of the prehistoric, Roman and early medieval periods, of low to high significance.

Details of the proposed development are not yet known. Construction of new foundations, or other works below current ground/slab level, may truncate or remove buried heritage assets, reducing their significance to negligible or none.

1 Introduction

1.1 Origin and scope of the report

1.1.1 Network Rail has commissioned Museum of London Archaeology (MOLA) to carry out a historic environment assessment of buried heritage assets (i.e. archaeological remains only), field evaluation in the form of monitoring of geotechnical work and a geoarchaeological assessment, all undertaken in advance of proposed development at London Bridge Station (National Grid Reference 533025 180105: Fig 1). The development proposals are not yet fully defined, therefore impacts/effects are not considered at this stage.

1.1.2 The client brief specified the nature of this report (Network Rail, 2009a, pp52–3). In summary:

> *The archaeological supplier shall prepare a written report (the Report) integrating the finds of the desk-based assessment and fieldwork. The report shall include, but not be limited to:*
>
> - *A non-technical summary;*
> - *Data sources;*
> - *Presentation of results;*
> - *Assessment of significance;*
> - *Proposals and justification for any further archaeological works or other mitigation…*

1.1.3 Furthermore, the client brief also specified:

- *Assessment of effects*

This latter would follow on from the current report when the nature of the proposed scheme is determined.

1.1.4 Following on from this, this report has three main elements:

- the geoarchaeological assessment (section 3)
- the historic environment assessment (section 4)
- the report on the monitoring of geotechnical work (section 12, the appendix)

1.2 The geoarchaeological assessment

1.2.1 The geoarchaeological deposit model (the geoarchaeological assessment) provides information about the archaeological resource by constructing a deposit model from existing geotechnical data relating to the site. See section 3.

1.2.2 The results are used to assess the potential of the deposits preserved on the site for the survival of archaeology and archaeo-environmental evidence. The information provided is intended to enable an appropriate mitigation strategy to be recommended by the Local Planning Authority.

1.2.3 A geoarchaeological assessment or deposit model can be particularly useful when dealing with prehistoric floodplain archaeology (Howard and Macklin 1999), as in such areas archaeological deposits and ancient landsurfaces are likely to be deeply buried below historic alluvium. The alluvium generally precludes the discovery of stray finds, which, when the archaeology lies close to the surface can give an indication of the existence and nature of the buried archaeological resource, even when none has been formally excavated. However, geoarchaeological assessment of the sub-surface stratigraphy can produce a model that can be used to help predict where archaeological remains are likely to be found.

1.2.4 A geoarchaeological assessment is also of value when only a low level of cultural

remains is likely to be preserved in the alluvium on the site, but there is likely to be good potential for the reconstruction of the prehistoric and historic landscape inhabited by people in the past from soils, sediments and their ecological inclusions. In these cases the assessment can help predict where palaeoenvironmental deposits with potential for the reconstruction of the past landscape and providing indirect evidence of human activity are likely to exist. Such topographical data, providing information about past environments is increasingly required by English Heritage, in order to better understand the distribution of archaeological sites and the activities of people in the past (English Heritage 2002, 17; 2004).

1.3 The historic environment assessment

1.3.1 This desk-based study (the historic environment assessment: HEA) forms an initial stage of investigation of the area of proposed development (hereafter referred to as the 'site') and may be required in relation to the planning process in order that the local planning authority (LPA) can formulate an appropriate response in the light of the impact upon any known or likely heritage assets. These are parts of the historic environment which are considered to be significant because of their historic, archaeological, architectural or artistic interest. These might comprise below and above ground archaeological remains, buildings, monuments or heritage landscape within or immediately around the site (DCLG 2010, 1, 13). This report deals solely with the below-ground archaeological implications of the development and does not cover possible built heritage issues, except where buried parts of historic fabric are likely to be affected. A number of the buildings and structures currently within the site may be of significance as heritage assets, and an assessment of that significance might be required by the local authority. See section 4.

1.3.2 The HEA has been undertaken in accordance with the standards specified by the Institute for Archaeologists (IfA 2001), English Heritage (2006, 2007, 2008) and the Greater London Archaeological Advisory Service (EH 1998, 1999). Under the 'Copyright, Designs and Patents Act' 1988 MOLA retains the copyright to this document.

1.3.3 Note: within the limitations imposed by dealing with historical material and maps, the information in this document is, to the best knowledge of the authors and MOLA, correct at the time of writing. Further archaeological investigation, more information about the nature of the present buildings, and/or more detailed proposals for redevelopment may require changes to all or parts of the document.

Designated heritage assets

1.3.4 The site does not contain any nationally designated (protected) scheduled monuments, or registered parks and gardens. It includes a Grade II listed building, the Brighton side trainshed (platforms 9–16), constructed in 1864–7. It does not lie within a conservation area, although the Borough High Street, Tooley Street and Bermondsey Street conservation areas are immediately adjacent.

1.3.5 The site lies within an Archaeological Priority Zone (APZ) as defined by the London Borough of Southwark, covering the historic settlement areas of Southwark, the Borough and the Thames riverside.

1.4 Report on the monitoring of geotechnical work

1.4.1 Field evaluation, in this case in the form of monitoring of geotechnical work, and the ensuing evaluation report which comments on the results of that exercise, are defined in the most recent English Heritage guidelines (English Heritage, 1998) as intended to provide information about the archaeological resource in order to contribute to the:

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

1.4.2 See section 12, the appendix, for detail.

1.5 Aims and objectives

1.5.1 The aim of the assessments/evaluation overall is to:

- identify the presence of any known or potential heritage assets that may be affected by the proposals;
- describe the significance of such assets, as required by national planning policy (see section 9 for planning framework and section 10 for methodology used to determine significance);
- assess the likely impacts upon the significance of the assets arising from the proposals; and
- provide recommendations to further assessment where necessary of the historic assets affected, and/or mitigation aimed at reducing or removing completely any adverse impacts upon heritage assets and/or their setting.

2 Methodology and sources consulted

2.1 The geoarchaeological assessment

2.1.1 In order to understand the context of the deposits existing on the site, information has been examined from:

- British Geological Survey maps and other sources describing the characteristics of the bedrock, soils and substrate in the area;
- Past archaeological and palaeoenvironmental work undertaken in the area;

2.1.2 Borehole and trial pit data was supplied from the following Site Investigation and Archaeological reports:

- Norwest Holst Report on a structural investigation at street level for Thameslink programme N231 London Bridge Station redevelopment including two geoarchaeological boreholes

2.1.3 The logs were examined and only those that extended down to the level of the Pleistocene gravels and/or early Holocene deposits were selected for inclusion in the deposit model.

2.1.4 The borehole logs were entered into a digital (Rockworks 2006) database. Each deposit component (gravel, sand silt etc) was given a colour and a pattern and, as a result, the two major variables of any deposit were stored in the RW2006 database and used to construct the deposit model. Transects drawn through the borehole profiles form a major means of illustrating the buried stratigraphy in this report, and three transects (Fig 4, Fig 5, Fig 6) were selected to illustrate the stratigraphic sequence and distribution of deposits across the site.

2.1.5 The levels of gravel in the borehole logs were also entered into a digital (Surfer32) database. Surfer32 is a piece of software that creates contour plans and digital terrain models (surfaces) from 3D co-ordinate files (Fig 3). Using a selection of borehole logs across the site, a pre-Holocene surface was constructed which plots the 2D and 3D surface topography of the Pleistocene gravels. This gives an approximation of the topography of the site as it existed at the beginning of the Holocene period (i.e. the early Mesolithic, *c* 10,000 years ago). The development of the Holocene floodplain is likely to have been influenced by the gravel topography inherited from the Pleistocene period.

2.2 The historic environment assessment

2.2.1 For the purposes of this report the documentary and cartographic sources, including results from any previous archaeological investigations in the site and a study area around it were examined in order to determine the likely nature, extent, preservation and significance of any buried heritage assets that may be present within the site or its immediate vicinity.

2.2.2 In order to set the site into its full archaeological and historical context, information was collected on the known historic environment features within a study area comprising a *c* 70m buffer around the site boundary, as held by the primary repositories of such information within Greater London. These comprise the Greater London Historic Environment Record (HER) and the London Archaeological Archive and Research Centre (LAARC). The HER is managed by English Heritage and includes information from past investigations, local knowledge, find spots, and documentary and cartographic sources. LAARC includes a public archive of past investigations and is managed by the Museum of London.

2.2.3 In addition, the following sources were consulted:

- MOLA – Geographical Information System, the deposit survival archive, published historic maps and archaeological publications
- National Monuments Record (NMR) – information on statutory designations including scheduled monuments and listed buildings
- The London Society Library – published histories and journals
- Southwark Local History Library – historic maps and published histories
- British National Copyright Library – Ordnance Survey maps
- British Geological Survey (BGS) – geology map
- Internet - web-published material including the LPA local plan, and information on conservation areas and locally listed buildings.

2.2.4 Fig 2 shows the location of known historic environment features within the study area. These have been allocated a unique historic environment assessment reference number (**HEA 1, 2**, etc), which is listed in a gazetteer at the back of this report and is referred to in the text. Distances to features outside the site are given from the nearest site boundary. Where there are a considerable number of listed buildings in the study area, only those within the vicinity of the site are included.

2.2.5 Section 10 sets out the criteria used to determine the significance of heritage assets. This is based on four values set out in *Conservation Principles* (EH 2008), and comprise evidential, historical, aesthetic and communal value. The statements of significance have been considered under two broad headings: 'above ground assets' and 'buried assets'. The former are visible and tangible and thus significance is more evident. This is not usually the case for buried assets, and the report assesses the likely presence of such assets within (and beyond) the site, factors which may have compromised asset survival (ie present and previous land use), as well as possible significance.

2.2.6 Section 11 contains a glossary of technical terms. A full bibliography and list of sources consulted may be found in section 13. This section includes a list of existing site survey data obtained as part of the assessment.

2.3 Monitoring of geotechnical work

2.3.1 See Appendix 1 for details.

3 Geoarchaeological assessment

3.1 Background

3.1.1 The site is London Bridge Station (NGR 533025 180105: Fig 1). It is bounded by Tooley Street to the north-east, Bermondsey Street to the east (a small part of the site extends east of Bermondsey Street), St Thomas Street to the south-west and Joiner Street to the west. The site boundary excludes 32 London Bridge Street (London Bridge Tower/The Shard). Most of the site falls within the historic parish of St Olave, Southwark, with a small part on the south-western side in parish of St Thomas. It lay within the county of Surrey prior to being absorbed into the administration of the Greater London Borough of Southwark.

3.1.2 The site lies at the confluence of three ancient water channels (palaeochannels) between the Southwark 'mainland' of Thames River gravels to the south, and the low-lying sand and gravel islands ('eyots') at the southern edge of the Thames (Fig 3) Where such areas were high enough to remain dry they tended to form a focus for human activity and occupation from the prehistoric period onwards. Sea and river levels generally rose in the late-prehistoric and early Roman periods. Episodes of higher water levels and flooding (marine transgressions), represented by clays, sands and silts deposited during periods of inundation, would be interspersed with peat and organic silts formed during lowered sea and river levels (marine regressions), allowing the development of fen and marsh.

3.1.3 The alluvial sediments may be correlated to dated sequences elsewhere in the Thames estuary which have been used to identify fluctuations in sea level during the prehistoric and Roman periods (Devoy 1979; Tyers 1988). Significant evidence for prehistoric and Roman activity has been found within the alluvium, which is recognised as having considerable archaeological potential. Alluvial deposits can provide an indication of past environmental and topographical conditions, representing the sequence of drier landscapes, when plants grew, and wetland when peat formed prior to inundation with estuarine muds and clays. Archaeological remains could be located beneath (early prehistoric), throughout (later prehistoric onwards) and on top of the alluvium. Where the areas of higher gravel islands ('eyots') remained dry enough for human occupation or settlement, there is also potential beneath the alluvium for features cut into the top of the gravel.

3.1.4 Human activity in Britain has taken place during the period of geological time known as the Quaternary, which spans the last 2 million years and is characterised by the climatic oscillations known as 'the Ice Ages'.

3.1.5 The Quaternary is subdivided into the:

- Pleistocene: 2 million -10,000 BP (years before the present)
- Holocene: 10,000 BP - present

3.1.6 Although hominins are known to have existed in other parts of the world from the beginning of the Quaternary, if not earlier, the earliest evidence for human activity yet found in Britain has been dated to the latter part of the Quaternary, about 650,000 years ago.

3.1.7 British Geological Survey mapping of the area indicates the site lies within the alluvial floodplain of the Thames approximately 30m to the east of a relatively high outcrop of Kempton Park Gravel river terrace which forms the bridgehead to London Bridge and overlaps a similar outcrop of gravels and sands known as the Horseleydown eyot in the east (BGS Sheet 256). This ties in with extensive archaeological and geoarchaeological investigations which have revealed the underlying geology of Southwark consists essentially of alluvial silts overlying a number of similar small largely sand islands or 'eyots' separated by a complex network of channels (Sidell *et al*, 2000). These eyots would have been formed

during the latter stages of the Pleistocene when the Thames was essentially a high-energy braided river system. In this environment the irregular topography of high and low gravel areas which form the legacy of today's topography in Southwark were sculpted through rapid channel migration.

3.1.8 As the climate ameliorated at the end of the Pleistocene the river energy decreased and sand instead of gravel was deposited within the channels and draped over the higher ground. As the Holocene progressed the river channels stabilised and some incised the underlying gravels. As a consequence, areas of high sand covered gravels (the eyots) were left elevated and exposed, forming a dry land surface suitable for occupation. Indeed, archaeological evidence suggests these eyots were utilised from the Mesolithic onward with seasonal occupation giving way to agricultural activity over time (Ridgeway, 2003). Typically the eyots in Southwark lie at around 1-2m OD with the Horselydown Eyot, reaching an elevation of around 1.11m OD (Hall 2000).

3.1.9 In contrast, the lower ground on which the site is located and the complex network of channels that traversed the southern part of the Thames floodplain and separated the eyots would have remained river marginal or water-filled for much of the early to mid-Holocene. Within these lower lying channels fluvially deposited sands and silts would have accumulated throughout the Holocene with peats and organic clays developing along the channel margins. The peats have, at other locations, been dated to the Bronze Age which has led to associations with Devoys Tilbury IV regression event although there is currently some debate over this correlation (Halsey, 2010).

3.1.10 By the Roman period the maximum mean tidal head measurements, as taken from the study of Roman bankside revetments, indicate that only land over 1m OD would lie above the tidal range (Sidell et al 2000). It is thought that the consequent 'ponding back' of the river through the upstream migration of the tidal head was the cause of the increase in the wetland areas around the margins of the high ground. By the medieval and post medieval periods, the channels developed into tidal creeks where estuarine silts and clays were deposited in a salt marsh / mudflat environment with overbank flooding sealing much of the higher ground in alluvial deposits (Halsey, 2010).

3.2 Geoarchaeological deposit model

3.2.1 The deposits that are of geoarchaeological interest on the site and in the region of the site are discussed in this section in stratigraphic order, from the oldest to the most recent. The stratigraphic sequence is illustrated in the cross-sections drawn across the site, two from west to east and one from the north-west to south-east (see Fig 4, Fig 5, Fig 6).

Late Pleistocene/Early Holocene sandy gravels (facies 1).

3.2.2 Present in almost every borehole, the sandy gravels at the base of the sequence were deposited by meltwater carrying large quantities of coarse sediment in the Late Pleistocene (at the end of the Ice Age). These gravels are known as the 'Shepperton Gravels', which underlie the present floodplain. The gravels are thought to have been deposited around 18,000–15,000 years ago in a braided river environment, following the downcutting by the Thames to its present floodplain, at the end of the last cold stage (the 'Devensian'), which left the Kempton Gravel as a river terrace, above the modern floodplain. The slightly undulating nature of the gravels reflect the nature of deposition and erosion of the braidplain environment at the time when varying rates of flow constantly led to a shifting and remodelling of the gravel surface across a wide area. In Southwark the network of channels feeding into the Thames such as the Guy's Channel (of which this channel is probably part) also played a part in the gravel topography, eroding and incising the

terrace gravels creating highs and lows in the topography of the study area.

3.2.3 As a result, the gravel surface formed the topography at the start of the Holocene about 10,000 years ago (Fig 3). The transects and the Surfer plot indicate the gravels slope down relatively steeply from a high point to the southwest of the site to a trough which stretches through the site from the central southern area (around the intersection of Weston and St Thomas Streets) to the northwest corner of the site (around the intersection of Joiner and Tooley Streets). The gravels then rise gently to the northeast. The lowest gravels, in the central southern area of the site, lie at approximately -3.2m OD (TP138) and the highest gravels, which lie to the south west beneath Guys Hospital – and are probably remnant Kempton Park Terrace – rise to +0.35m OD (GHSC77BH4). Notably the gravel trough is seen to rise northwards toward the Thames to approximately -2.6m OD (TP530) in the northwest corner of the site.

Early Holocene sand deposits (facies 2).

3.2.4 In two boreholes to the north of the site (TP530 & R1) sand deposits directly overly the gravels at -2.5m OD and -2m OD respectively. These deposits give an indication of how the landscape may have been evolving as the water levels rose rapidly during the early Holocene or Mesolithic period. The sandy deposits in TP530 lie directly over the gravels where the gravel surface is at its lowest in the north. This would suggest that at the start of the Holocene this lower lying area was influenced by fluvial activity and the thickness of the deposit suggests that eventually the channel became well established with constant flow depositing thick units of sand. Interestingly the sands in R1 are slightly higher and organic. This tends to indicate this area was at the margins of this Mesolithic channel where soils or vegetation might have developed across an area which may have been a point bar of the channel or something similar. If facies 2 is early Holocene in date Mesolithic remains might be expected within or at the surface of the sand in the area of R1 as Mesolithic flints have been found within and at the surface of sands occasionally along the Thames, for example in the Erith Marsh area (Sidell *et al* 1997).

Early to Mid Holocene sandy clay and silt deposits (facies 3).

3.2.5 The deposition of the sandy clays which can be found in nearly all boreholes overlying the sandy gravels or sands of facies 1 and 2 probably occurred as a result of changes in the river regime, as the climate warmed up and river flow slackened further during the early to mid Holocene. As a result for example, the sands in TP530 and R1 'fine-up' to become sandy clays or silts. The characteristics of these sediments differ laterally, as this facies represents a range of different depositional environments such as channel margins. This can be seen again in R1 where the clays are organic in nature, continuing the channel margin theme seen in the sands of facies 2 in this borehole. Indeed this pattern seems to continue throughout and along the lower areas of gravel with initial deposition of sandy clays in the deeper locations (TP530; TP42A & TP138) and more organic clays along the margins (TP106 & TP157).

3.2.6 It is important to highlight the point that sandy clays can be seen to be developing at the same levels (or even slightly lower) as the sands of facies 2 for example in TP138 where sandy clays begin to accumulate at around -3.1m OD directly over gravels. This is the first indication of the differing fluvial conditions in the early Holocene across the site - particularly from north to south - as different braided channels of the ancient ice-melt river become utilised differentially. Essentially, as mentioned above, by this time the river flow had slackened and the river had probably developed into a series of anastomosing streams/rivers through the braidplain possibly with a more dominant central channel thread and smaller channels on the peripheries possibly being utilised to a lesser extent (Sidell et al

2000). It seems to the north of the site a more dominant channel flowed depositing the sands and then the sandy clays and to the south smaller less energised channels flowed carrying finer sediments. It should also be remembered that until the Roman period, with the arrival of the tidal head at London Bridge, the river would have been freshwater.

Early to Mid Holocene wetland deposits (facies 3a)

3.2.7 A very thin band of peat seen in TP138 at approximately -2.7m OD makes up what is probably a remnant of an early to mid Holocene wetland deposit which subsequently became eroded out. This is comparable altitudinally to those dated at St. Christopher's House, Southwark, where wetland deposits (with trees) have been dated at similar levels between 8500 and 5500BC (Corcoran in prep). It could be that the peat (described in borehole records) is in fact a soil or at least a proto-pedogenic horizon. The evidence elsewhere for soil formation in the Mesolithic suggests that much of the valley floor was relatively dry land, with freshwater streams and lakes or pools of standing water (Sidell et al 2000). However, although the floodplain environment was probably attractive for exploitation by hunter-gatherer groups, Mesolithic remains are not frequently recovered from this stretch of the Thames floodplain, although they are frequently encountered in the tributary valleys of the Middle and Lower Thames, such as the Colne, Lea, Darent and Cray.

Mid to Late Holocene wetland deposits (facies 4)

3.2.8 The mid to late Holocene deposits tend to lie across the site from about -1m OD to +0.5m OD. The deposits are largely silty clays, organic clays and peats. At c. -0.8m OD an approximately 1m band of peat lies sandwiched between sandy clays in a number of boreholes and testpits in the south of the site such as R8, CP5 and in the vicinity of the site at GHSC77BH1. At these levels these are probably Bronze Age peats which in the vicinity have been more accurately described as a series of interdigitated organic and minerogenic deposits representing strandlines or episodic fluctuating vegetated / edge of channel environment (Corcoran *pers comm.*; Halsey, 2010). At St. Michaels school, Bermondsey pollen from these deposits indicate Alder dominating with oak and Hazel on the higher ground with ostracods indicating a continuing freshwater environment (Halsey, 2010). At St. Christopher's House, Southwark Street, Bronze Age platforms dated between 1500 and 1800 BC were found. Clearly this is an horizon with high archaeological potential.

Late Holocene / Historic deposits (facies 5)

3.2.9 The late Holocene / historic deposits tend to lie across the site from about +0.5m OD. The deposits are largely slightly sandy clays, peat and silty clays. From *c* +0.5m OD the sandy clays tend to dominate the profiles of all the boreholes and probably represent the influx of sediments relating to the Roman period tidal conditions. Some borehole records indicate these clays are thick with decomposed rootlets and reeds indicating a typical tidal mud flat / salt marsh environment. Just to the south of the site where the pre-Holocene surface rises steeply under Guys Hospital peat layers probably relating to the historic, perhaps medieval period lie at around +2.5m OD. Notably over these peats silty clays develop which are not found elsewhere across the site (probably due to truncation by made ground) which tend to represent the final phase of sedimentation in the Thames floodplain area. Typically the silty clay represents the gradual transition during the historic period from lower to upper saltmarsh and subsequently to reclaimed land, which may have been seasonally flooded. During the historic period many tidal creeks, natural channels and man-made drainage ditches were cut through the earlier alluvial deposits and are usually found to be infilled with silts (Halsey, 2010; Heard 1996).

Modern made ground deposits (facies 6)

3.2.10 The thickness of modern made ground (facies 6) varies across the area although generally about 4m thick across the site.

3.3 Landscape Zones

3.3.1 In order to understand variations in the stratigraphic sequence across the site and, as a consequence, their potential for archaeological and palaeo-environmental remains, the area has been divided into two Landscape Zones. The distribution of these Landscape Zone (LZs) is illustrated in Fig 7.

3.3.2 A starting point from which to understand the evolution of the site throughout the Holocene is the plot of the Early Holocene surface (Fig 7). This surface plot highlights the major geomorphological features and provides a template of the topography of the site from the beginning of the Mesolithic period, a template which would have influenced the depositional processes of the succeeding environments.

3.3.3 In general, the topography of the gravels slopes relatively steeply from a high point in the southwest of the site to a low channel area which stretches diagonally through the site from the southeast corner to the northwest corner. The gravels then continue to rise gently to the northeast. The lowest gravels, in the central southern area of the site, lie at approximately -3.2m OD and the highest gravels, which lie to the southwest rise to +0.35m OD.

Landscape Zone 1

3.3.4 LZ1 forms the north western half of the site (Fig 7). This area seems to be dominated by the main channel activity of the Thames from the early Holocene onward. The deposits here are typified by fluvial sands overlain by sandy clays which typify a more open channel environment where fluvial energy is higher (relative to the rest of the site). Very little evidence for marginal channel deposits exists in LZ1 with the exception of the vicinity of R1 beneath the intersections of Tooley, Stainer and Weston Streets. Here the organic fluvial sands fined up into organic clay sands, indicative of a point bar environment with moderate potential certainly for palaeoenvironmental remains if not perhaps Mesolithic material. Mesolithic activity is also to be expected on higher areas of gravel particularly adjacent to channels such as in the vicinity of CP2 in the extreme north west corner of the site. Here the gravel lies at approximately -1.1m OD some 1.5m higher than the channel 20m away to the east. Certainly by the Roman period, when the tidal head reaches London Bridge and the upper sandy clays are deposited, there seems little archaeological potential remaining in LZ1 although objects used in waterways such as boats, fish traps and the like could remain a possibility at these levels.

Landscape Zone 2

3.3.5 LZ2 forms the south eastern half of the site which is dominated by the deepest part of the channel just to the north of the intersection of Weston and St Thomas Streets (Fig 7). As opposed to LZ1 there is no evidence of a higher fluvial energy channel but there is evidence for a quieter, backwater or channel margin area. Even at depth (at approximately -2.7m OD) peats were found to exist in TP138. The acidic nature of peat deposits makes them highly favourable environments for the preservation of environmental remains in particular and at these levels it is quite likely that early to mid Holocene or Mesolithic palaeoenvironmental evidence will exist. Furthermore, plant macrofossil material often found in peats such as seeds or identifiable fragments of wood, could be radiocarbon dated to establish a chronostratigraphic framework for the sediments in LZ2. Peats reappear further up the profile around Ordnance datum in a number of boreholes in LZ2 which probably relate to the late prehistoric (Bronze Age and later). Again, typically representing a marginal wetland

deposit, peats or organic clays at this level have high potential for palaeo-environmental remains and dating information as well as the potential for artefacts such as trackways across the peat (as seen at St Christopher's House, for example). Furthermore, the Pleistocene gravels form a significant high area (offsite) to the south west. This would have provided an ideal location from which to access the wetland resources around the channel which makes this area particularly attractive to early hunter-gatherers and of high potential archaeologically.

4 Historic environment assessment

4.1 Overview of past investigations

4.1.1 Although five previous archaeological investigations have been undertaken within the site (Fig 2), these have generally been localised watching briefs covering a very small proportion of the site, and - with the exception of geotechnical works - have not extended to any great depth. The results indicate that the foundations of the 19th and 20th-century railway structures within the site have truncated and fragmented archaeological remains, but between these truncations, relatively good survival has been recorded.

4.1.2 A watching brief was undertaken by MoLAS (now MOLA) in 1995 during excavation of the 4-way escalator lower machine chamber and associated sewer diversion, in the northern part of the site (**HEA 1b**) Excavation was undertaken to a depth of 3.40m. No features earlier than *c* 1800 were present. At 0.7m OD, patches of silty clay (probably alluvial) survived, truncated by the brick foundations of railway arches, and associated 19th-century rubble dumps, and by modern concrete bases and piles.

4.1.3 In 1999, MoLAS undertaken a watching brief (**HEA 1f**) on 20 geotechnical pits in the northern part of the site, in an area bounded by Joiner Street, Stainer Street, and Tooley Street. Undated waterlaid deposits, probably associated with the Guy's Channel, were recorded at *c* 1.1m OD. One test pit had a possible medieval levelling (or flooding) layer at *c* 1.8m OD. A cluster of four timber piles at *c* 1.0m OD were undated but possibly 15th or 16th-century. An overlying dumped layer contained 17th and 18th-century finds; several 17th or 18th-century brick floors were recorded at *c* 1.4–2.6m OD, and remains of small brick walls at *c* 1.0m OD; all the deposits were cut through by the construction of the railway viaduct in 1836 and 1864.

4.1.4 A MoLAS evaluation and excavation in 1994–5 in advance of engineering works for an escalator machine chamber in the Main Ticket Hall, in the northern part of the site (**HEA 1g**). Regularly-spaced concrete piles had removed any remains within their footprint to *c* 2.0m OD. Alluvial sands and silts were cut by a Roman ditch at *c* 0m OD, which was in turn cut by a natural channel, silted up to +0.6m OD. These were sealed by medieval flood deposits at 0.3–0.9m OD, beneath brick walls and 16th-century pits, foundations resting on timber piles, and post-medieval ground consolidation to *c* 1.7m OD comprising dumped layers. A 17th or 18th-century stone-lined pit and brick building foundations were also recorded.

4.1.5 In the south-eastern corner of the site, at the corner of St Thomas Street and Bermondsey Street, MOLA undertaken a watching brief in 2008 (**HEA 1h**) on three test pits, ground reduction and a lift pit trench which were being excavated in relation to works for the Thameslink Programme. Alluvial clay was recorded at *c* 1.4–2.0m OD, truncated by concrete foundations which were overlain by silty deposits containing large numbers of bricks dating from the 16th to 18th centuries, suggesting the railway construction had truncated a number of brick buildings. In one place the alluvium was overlain by a 16th-century brick cellar floor at *c* 1.4m OD; its associated foundation walls were truncated at *c* 2.0m OD.

4.1.6 An archaeological test pit (**HEA 1i**) was excavated by MOLA in the adjacent arch to the west of (**HEA 1h**) in 2007. Overlying the natural were a series of prehistoric alluvial deposits. Truncating the alluvium was a 16th-century pit containing numerous horn cores, sealed by possible cultivation soils, beneath a 400mm thick deposit of lime mortar with occasional brick fragments. Truncating the above deposits were the foundations of the present railway arch; its base was recorded at *c* 0.52m OD.

4.1.7 The results of these investigations, along with other known sites and finds within the

study area, are discussed by period, below. The date ranges given are approximate.

4.1.8 During July to December 2010, MOLA monitored 49 geotechnical trial pits and two archaeological boreholes within the site (Figs 16 and 17). The results are presented in detail in Appendix 1.

4.2 Natural topography

4.2.1 Previous archaeological investigations within and around the site have recorded evidence of the natural topography. In the north-western part of the site (**HEA 1b** and **1f**), truncated alluvial clays and undated waterlaid deposits have been found. An archaeological watching brief (**HEA 1f**) on geotechnical test pits took in an area between Joiner Street and Stainer Street, crossing both the northern end of the Guy's Channel, and the southern tip of an eyot to the north-east. Waterlain clays in the channel were recorded at *c* 1m OD, but the deposits were heavily disturbed by post-medieval activity.

4.2.2 In the extreme northern corner of the site (**HEA 1g**), alluvial sand and silts were recorded at +0.2–0.5m OD. Areas of peat, indicating stagnant water (**HEA 1b** and **1g**), suggest changes in the course of the channel over time. Just outside the western edge of the site, evidence of the sand island has been recorded, with sand at +0.3–0.5m OD (**HEA 2**), and +0.1–0.6m OD (**HEA 7**), and, *c* 30m north-west of the site, at 0.31–0.7m OD (**HEA 8**) (Drummond-Murray *et al* 2002, 11). At Tooley Street, *c* 70m north-west of the site (**HEA 15**), the top of natural clay was at *c* +1.37m OD over gravel at *c* +0.91m OD.

4.2.3 To the south-west of the site there is evidence for a low-lying marginal area (Drummond-Murray *et al* 2002, 12). An evaluation *c* 20m south-west of the site (**HEA 5**) recorded natural sands and gravels at levels between –0.51.m OD and –1.02m OD, respectively 4.58m and 5.00m below the adjacent ground surface level. At the corner of St Thomas Street and Joiner Street, excavation *c* 50m south-west of the site (**HEA 3**) recorded clay layers at +0.3m OD, representing marsh deposits. To the south-west of the site, at Guy's Hospital, St Thomas Street (**HEA 23**), excavations found evidence of a natural braided watercourse. Close to this, at Weston Street, *c* 70m south-west of the site (**HEA 25**), clays at +3.50m OD covered natural gravel; in places a horizon of 'peat' was at *c* +0.40m OD.

4.2.4 In the south-eastern corner of the site (**HEA 1h**), truncated natural alluvial clay was recorded at a depth of 1.4m OD and 2m OD. This is likely to be at the western edge of the 'Horsleydown eyot' which lies under modern Tooley Street (Heard 1996, 79). Immediately to the west (**HEA 1i**) the top of natural orange sand was recorded at *c* –0.90m OD. Overlying the natural were a series of prehistoric deposits which included a 120mm thick light blue silty clay which was in turn overlain by a 300mm thick slightly organic dark blue silty clay. Above this was a 200mm thick dark brown organic clay which was overlain by a 700mm thick grey clay. Above the earlier layer was a 1.30m thick layer of grey alluvial clay containing small shell fragments. The top was recorded at *c* 1.90m OD. The higher ground of the eyot was represented at Holyrood Street, *c* 20m north-east of the site (**HEA 32**), by natural clay at 2.57m OD; here and at nearby Magdalen Street (**HEA 33** and **35**), natural water channels were observed.

4.2.5 In the north-eastern part of the site was another large channel flowing north into the Thames. Immediately north-east of the site, at Shipwright Yard, off Tooley Street (**HEA 29**), an archaeological watching brief recorded river clay between +2m and +1.30m OD.

4.2.6 In places, the Gravels were overlain by a fine-grained silt known as brickearth (within London the outcrop is also named the Langley Silt complex). This is believed to have accumulated by a mixture of processes (e.g. wind, slope and freeze-thaw) mostly since the Last Glacial Maximum around 17,000 before present (BP), and would have been just below the soil of the ancient landsurface. Untruncated

brickearth can be a significant indicator of ancient ground levels, with the potential for associated archaeological remains. However, brickearth formed an important source of building material in London in all periods, and much has been removed by quarrying and modern development. Just outside the south-western edge of the site, below the service ramp of the former London Bridge Hotel from Joiner Street to London Bridge Station, excavation revealed natural brickearth beneath a peaty layer (**HEA 5**).

4.2.7 The geoarchaeologcal assessment underpinned the above by suggesting that the north-western half of the site was dominated by the main channel activity of the Thames from the early Holocene onward (LZ1). The deposits here are typified by fluvial sands overlain by sandy clays which indicate a more open channel environment where fluvial energy is higher (relative to the rest of the site). Very little evidence for marginal channel deposits exists in LZ1 with the exception of the vicinity of R1 beneath the intersections of Tooley, Stainer and Weston Streets. Here the organic fluvial sands fined up into organic clay sands, indicative of a point bar environment with moderate potential certainly for palaeoenvironmental remains if not perhaps Mesolithic material. See section 3.

4.2.8 Furthermore, the monitoring of the geotechnical work revealed alluvial horizons, mud flats, intertidal zones and remains of Guy ‘s Channel, a tributary of the Thames

4.3 Chronological summary

Prehistoric (700,000 BC–AD 43)

4.3.1 The Lower (700,000–250,000 BC) and Middle (250,000–40,000 BC) Palaeolithic saw alternating warm and cold phases and intermittent, perhaps seasonal, occupation. During the Upper Palaeolithic (40,000–10,000 BC), after the last glacial maximum, and in particular after around 13,000 BC, with further climate-warming the environment changed from treeless steppe-tundra to birch and pine woodland. It is probably at this time that England first saw continuous occupation. Erosion has removed much of the Palaeolithic land surfaces and finds are typically residual. There are no known finds dated to this period within the study area.

4.3.2 The Mesolithic hunter-gather communities of the postglacial period (10,000–4000 BC) inhabited a still largely wooded environment. The river valleys would have been particularly favoured in providing a predictable source of water and food (from hunting and fishing), as well as a means of transport and communication. Evidence of activity is characterised by flint tools rather than structural remains. There are no known finds dated to this period within the study area.

4.3.3 The Neolithic (4000–2000 BC), Bronze Age (2000–600 BC) and Iron Age (600 BC–AD 43) are traditionally seen as the time of technological change, settled communities and the construction of communal monuments. Farming was established and forest cleared for cultivation. An expanding population put pressure on available resources and necessitated the utilisation of previously marginal land.

4.3.4 Although too wet for settlement, the tidal, marshy environment over much of the site would have been attractive for hunting and fishing, and would have provided other resources such as reeds. From the fringes of the site, timber tracks or platforms may have been constructed to provide access to the marsh and river. Prehistoric features of undetermined date were recorded during archaeological excavations in Joiner Street, immediately outside the western edge of the site (**HEA 2**). They cut the natural sand, and contained a few pieces of worked flint. The features were sealed by deposits associated with flooding or generally rising water levels. Alluvial and peaty layers indicating a floodplain or marshland were also found immediately outside the south-western edge of the site (**HEA 5**); burnt flint suggested activity in the prehistoric period.

4.3.5 As well as a navigable means of travel, the water channels are likely to have

attracted votive offerings, as seen at similar locations at the confluence between the Thames and its tributaries (Steele *et a*l 1999, 17). Peat-filled and waterlogged channels could be potential findspots for ritually deposited artefacts, as well as preserved boats or the remains of landing-places. The chance discovery of an Iron Age socketed spearhead was made in 1867 on the site of Chamberlains Wharf (now London Bridge Hospital), *c* 75m north of the site (**HEA 17**).

4.3.6 The higher gravel and sand to the west of the site is likely to have been high and dry enough for occupation during the prehistoric period. A pit containing part of a Bronze Age loom weight was found during archaeological excavations *c* 90m west of the site (**HEA 57**), and excavations *c* 80m west of the site (**HEA 22a**) revealed sands apparently disturbed by root action and containing pottery sherds of possible Iron Age date. The sands were overlain by silts of probable pre-Roman-date, likely to represent flooding. Residual prehistoric flints were also found mixed with later material during and archaeological excavation *c* 50m west of the site (**HEA 51**). Excavation *c* 60m north-east of the site (**HEA 46**), on a sand island to the east of the Guy's Channel, recorded several prehistoric pits, sealed by waterlaid clays.

Roman (AD 43–410)

4.3.7 The site was within the hinterland of Roman *Londinium*, established in *c* AD 50 on the north bank of the Thames in the area of the modern City, *c* 800m north of the site. Urban settlement also spread south from what was possibly the only permanent Thames crossing, in the vicinity of modern London Bridge, *c* 190m north-west of the site. A major road running from the bridge along a ridge of dry ground connected *Londinium* with the Channel ports and the agricultural and industrial resources of the Weald and South Downs (Margary 1967, 55, 59, 64). Fig 2 shows its likely route, based on the limited excavation evidence, aligned with modern Borough High Street, *c* 155m north-west of the site. The area of urban occupation expanded in the late-1st and early-2nd centuries AD, with consolidation and ground-raising of the marginal land on the edges of the eyots to prevent flooding, and the construction of timber revetments: the water channels were used for navigation (Drummond-Murray *et al* 2002, 6–7, 22). In the buried Guy's Channel, beneath the grounds of Guy's Hospital *c* 185m south-west of the site, a Roman boat was found preserved in the silts; its remains are protected as a nationally designated scheduled monument.

4.3.8 In the northern corner of the site (**HEA 1g**), part of a ditch of the 1st or 2nd century AD was found during an archaeological excavation. It was truncated by stream or channel fills dated to the 2nd or 3rd century onwards, indicating rising water levels in this marginal marshy area. The only other record of Roman remains within the site is the approximate findspot in 1864, during construction work on the South-Eastern railway line, of a biconical Roman vessel of smooth grey ware, with a pedestal foot (**HEA 1e**).

4.3.9 Although located *c* 45m outside the site, excavations for the redevelopment of Guy's Hospital (**HEA 23**), may be representative of archaeological potential in areas within the site where subsequent truncation has been limited. Evidence was found of a natural braided water course (Guy's Channel) with a 32m-length of 2nd-century AD oak waterfront, with a unique front-braced design along the western edge of the channel. An early 2nd-century AD pagan inhumation was less than 2m west of the timber waterfront. The timber floor and lower plank wall of a 3m-square tank of unknown function was also found; an oak beam drain linked the tank to the watercourse. Evidence of land drainage throughout the Roman period was recorded. At Tooley Street, *c* 30m north-east of the site (**HEA 44**), an alluvial sequence was also found, probably at the edge of the Guy's Channel. It contained Roman artefacts and timber stakes which probably indicate the management of the channel and its usage and abandonment.

4.3.10 Other archaeological investigations within the study area have provided much evidence of Roman activity and expansion, particularly to the west of the site, characterised by ground consolidation, and buildings for domestic or light-industrial occupation. In the 3rd and 4th centuries, the settlement of Southwark contracted, and in some areas, burials have been recorded cutting through what were previously occupation zones, although a number of higher-status buildings continued in use (Drummond-Murray *et al* 2002, 146).

4.3.11 Immediately to the west of the site (**HEA 2**), Roman activity was limited to a linear feature, possibly a drain, dated to the 3rd century, and sealed by flood deposits. Excavations just outside the south-eastern edge of the site (**HEA 3** and **5**) recorded marsh deposits, cut by ditches of the 2nd-century AD, and overlain by 2nd–3rd century river silts. Finds included a Roman bronze relief of Cupid, Roman pottery, building materials including wall plaster, gold swarf, glass/enamel frit and bronze-working slag. Some of these may have accumulated in alluvial deposits from original locations elsewhere. Other Roman finds were from *in situ* contexts. The building materials included combed box flue tiles indicative of a hypocaust heating system, and plain red tesserae may have come from the same structure. Some of the building material indicated a date range from the 1st century to the 3rd century AD. Overall the range of artefacts indicated Roman building activity in the immediate vicinity for a considerable period. Investigations *c* 35m south-west of the site (**HEA 21**) recorded alluvial clays and silts within a small channel from which pottery and tile, dated AD 120–400, were recovered. Deposits next to the channel contained further fragments of Roman pottery, 10 coins (3rd–4th century AD), bottle glass and lead.

4.3.12 Archaeological excavations *c* 20m west of the site (**HEA 7**) recorded evidence of ground-consolidation comprising Roman dumped layers, cut by features including pits, postholes, a north-south ditch in the central part of the site and two inhumations with an additional two possible grave cuts, the latter considered to be of early Roman date. Five east-west later-Roman ditches cut into an extensive dumped deposit and may represent a single phase of drainage activity. To the west, a chalk foundation 'raft' for a wall, and the corner of a large 2nd-century masonry building were recorded; it appeared to have been robbed-out in the late 3rd or 4th century, the robber trenches containing much roof tile and tesserae. No internal features survived. Archaeological investigations *c* 30m north-west of the site (**HEA 8**), much Roman demolition material and domestic debris sealed the natural gravels. These deposits contained pieces of painted wall plaster, roof and flue tiles, pottery and fragments of clay wall. A section of clay and timber wall foundation was found *in situ*. The dumps were cut by two pits which may be later Roman. To the east, natural sands were cut by Roman quarry pits dated to the period, and succeeded by a ditch or channel. Above the dumps were the remains of a *c* 1st-century clay building, succeeded by a masonry building, dated to the 2nd century, and consisting of a chalk wall with associated floor makeup beneath a polychrome floor mosaic.

4.3.13 A similar pattern has been found to the east of the site, on the edge of the Horsleydown eyot. Evidence of later-Roman activity was found *c* 20m north-east of the site (**HEA 35**), where a pit and a probable fluvial deposit containing Roman material was recorded, suggesting some activity in the area from the 2nd to 4th century. Roman activity on the eyot to the north of the site is represented by evidence from excavations *c* 60m north-west of the site (**HEA 46**), where a large circular pit was found, possibly a gravel quarry, of 2nd-century date. To the north of this were a number of partially robbed ragstone foundations of 2nd and 3rd-century date; the structure had gone out of use by the 4th century. At the south end of this site was the edge of a channel aligned east-west which contained Roman material in its waterlaid clays.

4.3.14 The topographical and archaeological evidence suggests that during the Roam period, much of the site would have been waterlogged, marshy or under water. Its

fringes may, however, have been used as landing places, or for hunting or fishing, or revetted and consolidated for building.

Early medieval (AD 410–1066)

4.3.15 Following the withdrawal of the Roman army from England, the established road on the course of modern Borough High Street *c* 155m north-west of the site would still have been used as a dry route through the area, but possibly with little maintenance. London Bridge itself probably fell into disrepair, and this, combined with a rise in the level of the Thames, brought a decline in Southwark's population. There is no evidence for settlement in the early part of this period (Carlin 1996, 6–8).

4.3.16 In the 7th to 9th centuries the trading port of *Lundenwic* flourished on the north bank of the Thames to the west of the old Roman city, *c* 2.8km to the north-west of the site (Cowie and Blackmore 2008, xv). The old city was apparently abandoned until the late 9th century, when Danish invasions prompted its reoccupation as a fortified *burh.* A corresponding fortification was established on the south side of the river in Southwark, probably on the site of the Roman settlement, *c* 150m to the north-west of the site. This protected the river crossing on the site of London Bridge (Clarke 1989, 18).

4.3.17 The *burh* would have formed the nucleus of medieval settlement of the area (Thomas 2002, 22, 68). The extent of settlement at this time is not clear, but until the low-lying areas were drained and protected by river walls (earthen banks) it would have been restricted to the higher ground, away from the site (Watson 2009, 149). Excavation in 1977 *c* 85m to the west of the site (**HEA 22a**) revealed several gullies, containing 10th to 12th-century pottery, and a halfpenny of Alfred (AD 871–899).

4.3.18 Christianity had been widely adopted from the 7th century, and in the 10th century a Minster (religious centre) was established in Southwark, presumably the predecessor of St Mary Overie (now Southwark Cathedral) *c* 220m north-west of the site. By the end of the century a mint was in operation, although its location is unknown (Carlin 1996, 13). London Bridge may have been rebuilt around the end of the 10th century (Thomas 2002, 15). It is likely that, away from these centres of activity, Southwark remained sparsely populated marshland or pasture.

4.3.19 In the northern corner of the site (**HEA 1g**), extensive waterlaid deposits of medieval date were found to overlie the Roman features, and were associated with isolated timbers. Evidence of silt layers associated with post-Roman flooding was also found outside the western edge of the site (**HEA 2**).

4.3.20 An archaeological watching brief along Tooley Street, *c* 20m north-east of the site (**HEA 10**) on the southern edge of the gravel island, recorded creeks and mudflats 11th-century finds. Excavations at Joiner Street, *c* 45m south-west of the site (**HEA 21**) recorded the remains of an early-medieval revetment within the fill of a small channel. Evidence of 11th-century flooding comprising a thick layer of alluvial material was found close to St Thomas Street, *c* 65m west of the site (**HEA 61**).

4.3.21 The archaeological evidence in and around the site suggests that most if not all of the site would have been wet, marginal land, unsuitable for occupation during the early medieval period.

Later medieval (AD 1066–1485)

4.3.22 In 1066 Southwark experienced the brunt of the Norman invasion when all the buildings on the south bank of the Thames were burned by William the Conqueror's knights. Domesday Book (1086) suggests that at that time the area of the bridgehead was an unmanorialised settlement without a direct lord, which evolved informally and spread south along the High Street (now Borough High Street).

Documentary sources suggest a thriving commercial suburb with a dock, trading shore and fishery. The generally low-lying topography tended to concentrate development along the old Roman routes across the higher ground (Carlin 1996, 15, 19). Flooding continued to occur into this period, represented by waterlain deposits of medieval date found, *c* 60m to the west of the site (**HEA 30**) and *c* 75m south-west of the site (**HEA 45**).

4.3.23 By this time, the Saxon minster system had largely been replaced by local parochial organisation, with formal areas of land centred on settlements served by a parish church. The parish church of St Olave, close to the Thames *c* 50m to the north of the site (**HEA 52**), was in existence by 1096, and in the late-11th century was granted to Lewes Priory (Carlin 1996, 86). The church was rebuilt in the 18th century and demolished in 1928, but some truncated medieval foundations were found to survive just below the modern ground surface during archaeological excavations in 1985. Late medieval road gravels representing the predecessor of Tooley Street have been recorded *c* 15m north-east of the site (**HEA 10**).

4.3.24 The Augustinian priory of St Mary Overie was founded in 1106 *c* 220m north-west of the site. Borough High Street, lined with shops and houses, formed the eastern edge of its precinct. In the early 12th century, the Archbishop of Canterbury acquired a manor (estate) on the east side of Borough High Street: the site probably lay within this manor.

4.3.25 The Hospital of St Thomas the Martyr was founded in 1170 within the precinct of St Mary Overie: both it and the priory church were largely destroyed by fire in 1212. The Hospital was resited on the east side of the High Street (on the west side of modern Joiner Street, between St Thomas Street and London Bridge Street), *c* 90m to the west of the site. In the mid-13th century, it lay within a precinct (**HEA 22a**) of 9-acres (*c* 3.6ha) (Carlin 1996, 22, 86, 108; Thomas 2002, 57, 106). Excavation in 1977 *c* 85m to the west of the site (**HEA 22a**) revealed the substantial walls of a stone cellar or undercroft were revealed, likely to be part of the medieval Hospital. A dumped deposit containing 13th and 14th-century pottery and building material, found during excavations *c* 90m west of the site (**HEA 37**), may also have been associated with the Hospital (Knight 2002, 7).

4.3.26 In the early 12th century, Merton Priory obtained land on the north side of Tooley Street (previously known as St Olave's Street), where a townhouse was established for the Prior; over the next century, other religious foundations in the south of England established a series of great houses was along Tooley Street. Each probably consisted of a cluster of buildings within a gated, walled, enclosure. By the 1240s, the priory of Christ Church Canterbury had a house to the south of Tooley Street, likely to have been in the northern part of the site (**HEA 1c**). By the 1270s the Prior was selling produce from his garden, and renting out shops along the street frontage. In 1310 he built a new block of 14 shops; in the 1350s the mansion house may have been let to tenants. By 1421–2, parts of the estate were also being let as tenter grounds, where fullers would stretch and dry cloth (Carlin 1996, 25–26, 46, 54, 132).

4.3.27 Excavations in the northern corner of the site (**HEA 1g**) demonstrated that problems with high tides and flooding continued, as waterlaid deposits of medieval date, associated with isolated timbers, were recorded. A possible 13th or 14th-century pit and gully were found, along with medieval foundations of chalk and ragstone on a horizontal oak beam supported by a line of elm piles dated to the 14th to 18th century.

4.3.28 Possible remains of a comparable house, that of the Prior of Lewes documented in the late-13th century, were discovered during construction of the railway in 1832, in the vicinity of modern Railway Approach and Duke Street Hill, *c* 45m north-west of the site (**HEA 18**). A vaulted stone undercroft measuring 8m by 6.5m was recorded in recorded in a series of drawings. It was demolished, but a coursed chalk

foundation recorded during archaeological excavations in 1992–4 (**HEA 8**) may have been its remains, or those of another medieval house to the west which were also found in the 19th century (Dawson 2010, 233; Knight 2002, 16–17).

4.3.29 There is evidence of attempts to secure and reclaim the southern foreshore upstream of London Bridge using timber revetments in the later 11th century (Thomas 2002, 22, Watson *et al* 2001, 15), and in the 12th and 13th centuries, high tides and floods prompted land reclamation and the construction of ditches and embankments (Knight 2002, 5). Medieval dumped deposits have been recorded just outside the south-eastern edge of the site (**HEA 5**), *c* 20m west of the site (**HEA 7**), and *c* 75m west of the site (**HEA 37**). An east-west aligned channel found during archaeological excavations on the north side of Tooley Street, *c* 50m north-east of the site (**HEA 46**), was completely filled with clay by the medieval period. No contemporary ground surface survived, but truncated medieval features including two ditches and several pits. One was square in plan, wattle-lined and dated probably to the 13th century. Medieval ground consolidation in the form of dumped layers was recorded *c* 75m west of the site, (**HEA 37**); they contained pottery spanning the 13th to 15th centuries, including a complete jug of the 13th or 14th century. Pits and a cellar or cesspit, constructed from chalk, ragstone and flint, were also found.

4.3.30 By the early 14th century the riverfront was embanked along this stretch of the Thames, and became important as a landing-place for boats below the dangerous arches of old London Bridge (VCH *Surrey* iv, 17–24). The GLHER records the former location on Tooley Street of a landing place known as Elgin's Water Gate (**HEA 40**), just outside the north-eastern edge of the site. Archaeological excavations in 1975 (**HEA 10**) found a ragstone wall on timber piles set in clay, possibly the south wall of Elgin's Gate.

4.3.31 The GLHER records the location within the site of a 14th century manor, the Maze (**HEA 1a**). The property was bounded to the south by Weston Street, Weston Place, Melior Street, Great Maze Pond and Maze Pond (VCH *Surrey* iv, 142). Around 1450 the manor was acquired by Roger Copley, and remained in this family until the 17th century. In 1555 it was described as comprising a mansion house, 17 small tenements and an alley (Carlin 1996, 64). According to John Stow's 1598 *Survey of London*, it comprised the gardens of the Abbot of Battle's house (Stow 1598, 379–80). The GLHER records the location of its gatehouse (**HEA 13**) on Tooley Street, just outside the north-eastern edge of the site.

4.3.32 Artefacts indicative of high-status buildings have been found in and around the site. Glazed floor tiles dated to the 14th century were found during archaeological excavations in the northern corner of the site (**HEA 1g**), and immediately to the west and north-west of the site (**HEA 8** and **2**). Several fragments of decorated medieval floor tile and stove tile were found *c* 50m west of the site (**HEA 51**), along with a barrel-lined well. A number of fragments of medieval window glass was found *c* 50m to the west of the site (**HEA 53**) (Knight 2002, 5–6). large pits intruded into the Roman levels and these were dated to the medieval period and appeared to contain organic debris and was interpreted as a cess pit. Medieval walls and a chalk lined well were also present. Medieval surfaces and fragments of structural remains, including evidence of timber-piled foundations, were found in two investigations *c* 75m south-west of the site (**HEA 41** and **45**).

4.3.33 The archaeological and documentary evidence suggests that by the end of the medieval period the site may have included one or more high-status buildings, with outbuildings and gardens. Tenement buildings are likely to have occupied the main street frontages within the site; these were generally of several storeys and occupied by a number of tenants, and probably used as a shops or workshops in addition to living accommodation.

Post-medieval (AD 1485–present)

4.3.34 By the end of the 15th century the character of the area as a location for grand houses and gardens was being lost to more intensive development.

4.3.35 A number of the inns for which Southwark became noted may have originated as large private houses. The inns catered for pilgrims and other travellers, and those who found themselves locked out of the City gates at night. The house of the prior of Christ Church, in the northern part of the site (**HEA 1c**), which was already let to tenants, was converted into a public inn, the Fleur de Lis or Flower de Luce, in 1555 (Carlin 1996, 62).

4.3.36 In the northern part of the site (**HEA 1f**), a cluster of four timber piles, seen at *c* 1.0m OD during a watching brief, were undated but possibly 15th or 16th-century. In the north corner of the site (**HEA 1g**), post-medieval ground consolidation continued over earlier flood deposits, cut by brick walls and 16th-century pits; two sections of ragstone and chalk foundations rested on timber piles of possible 15th or 16th-century date. In the south-eastern corner of the site, (**HEA 1h**), alluvial deposits were overlain by silts containing large numbers of bricks dating from the 16th, 17th and 18th centuries, suggesting that a number of brick buildings had probably existed on the site prior to the construction of the railway. Recovered from the top of the clay or a pit (not seen) were a number of sheep metapodials (knuckle bones), possibly from industrial waste, and a 17th-century decorated tin-glazed earthenware wall tile. In one place the alluvium was overlain by a 16th-century brick cellar floor. Immediately to the west of this (**HEA 1i**) was a 16th-century pit containing numerous horn cores, sealed by possible cultivation soils. Waste materials such as horn cores and sheep's knuckle bones were used to make hard-wearing surfaces, and linings for pits.

4.3.37 Following on from the above, the monitoring of the geotechnical work revealed timber structures at 4.3m below ground level. The latter are likely to be associated with the colonisation and exploitation of the foreshore during the late medieval period. See appendix, section 12

4.3.38 Ground consolidation continued into the post-medieval period, generally using dumps of waste material, and has been widely recorded in the study area, often cut by pits, soakaways and cess pits (**HEA 7**, **28**, **34**, **35**, and **36**). Evidence of timber posts used for revetting the water channels close to the site has been recorded *c* 20m south-west, *c* 75m north-east and *c* 20m and 65m north-east of the site (**HEA 24**, **32, 33,** and **43**). Evidence of 15th or 16th-century buildings was recorded during excavations *c* 85m west of the site (**HEA 53**), possibly associated with the Swan Inn.

4.3.39 The north-eastern side of the site is included in Agas's map of 1562 (Fig 8). Tooley Street is shown lined with buildings, some with courtyards and gardens to the rear, including the gardens of the manor of the Maze. Braun and Hogenberg's map of 1572 (not reproduced) is very similar.

4.3.40 St Thomas's Hospital *c* 85m to the west of the site (**HEA 22a**) was closed in 1540 at the Dissolution of the Monasteries. In 1551 the buildings were granted by Edward VI to the Lord Mayor and citizens of London, and the hospital reopened. It was largely rebuilt at the end of the 17th century (Weinreb and Hibbert 1995, 789–90). It is likely that, originally, those patients who died were buried in the parish cemeteries of St Mary Overie and St Margaret, but the Hospital later established its own cemetery, possibly in order to benefit from the burial fees. The location of its earlier burial grounds is uncertain, and a number of skeletons found during two archaeological excavations, on the western edge of the site (**HEA 2**) and also a short distance to the south, *c* 45m outside the south-western edge of the site **(HEA 21)** (Knight 2002, 9). The later burial ground of St Thomas's Hospital (**HEA 22b**), lay *c* 90m south-west of the site.

4.3.41 Overcrowding was a serious problem in both the Hospital's cemetery and those of

the parishes. In 1586, St Olave's leased a piece of additional land to use for burials, *c* 90m north-west of the site (**HEA 50**). This became known as the Flemish Churchyard, from the large numbers of immigrants buried there. Skeletal remains were found during archaeological excavations in 1995, including a charnel pit containing bones disturbed during the construction of London Bridge Station in the 1850s (Knight 2002, 11).

4.3.42 By the end of the 16th century, according to Stow, the Maze manor (**HEA 1a**) had been built over with many small tenements (Stow 1598, 369). In 1650 the manor was surveyed; all the houses were in a poor state of repair, two of them had lately been burnt, and some tenants were too poor to pay arrears of rent (VCH *Surrey* iv, 142).

4.3.43 Foreign craftsmen had settled in the area from the 14th century onwards, outside the control of the City Guilds. Southwark was one of the first locations of Delftware (tin-glazed) pottery manufacture in England: features apparently associated with the Pickle Herring delftware kiln established by Christian Wilhelm in 1618 were found during excavations *c* 75m north-east of the site (**HEA 43**).

4.3.44 Faithorne and Newcourt's map of 1658 shows the site almost entirely filled with tall narrow tenement buildings, small alleys and courtyards (Fig 9). Morgan's map of 1682 has more detail of the layout, and names most of the streets and alleys (Fig 10). Much of the basic street layout shown around the site still survives today and, within the site, The Maze, running north-east to the Maze Gate (**HEA 13**) is approximately on the line of modern Weston Street. A number of drainage ditches are shown running north-east to south-west across the site. The areas of the former natural water channels may have remained waterlogged until relatively late, and required significant consolidation in order to build on them; excavation in Weston Street, *c* 75m south-west of the site (**HEA 27**) recorded alluvial deposits of 17th or 18th-century date. Above these were deposits of 17th to 18th-century made-ground, cut by a 19th-century cellar and wall. Within the northern part of the site, (**HEA 1f** and **1g**), investigations have recorded a dumped layer containing 17th and 18th-century finds, evidence of several 17th or 18th-century brick floors, foundations and a stone-lined pit.

4.3.45 The monitoring of the geotechnical work also revealed a variety of post-medieval masonry structures (17th–19th century in date; these included domestic structures such as garden walls (TP025, 40,658, 530), and brick lined cess/rubbish pits as well as larger structural walls and floors from buildings that may have been for industrial use (TP658, 106, 661 & 665). In particular TP674 revealed phases of masonry building(s) dating from 17th-18th century respecting the North-South historical alignment of Bermondsey street.

4.3.46 Rocque's map of 1746 shows little change within the site; a few areas in the south-eastern part of the site are still open gardens at this date (Fig 11). Horwood's map of 1799, updated by Faden in 1813 distinguishes between different types of buildings and marks individual plots (Fig 12). Terraced houses line most of the streets and alleys, some with rear yards or gardens. Dean Street (now Stainer Street) had been built across the site by this date. Greenwood's map of 1827 is small-scale and shows no changes within the site (Fig 13).

4.3.47 In 1832, the construction of a railway was proposed, between Tooley Street and Greenwich, *c* 5.6km to the east of the site, the line running on a viaduct of 878 arches. The first section of the London and Greenwich Railway (LGR) opened in February 1836, from Deptford to Bermondsey, and in December was extended to a temporary terminus at London Bridge, in the northern part of the site, with three tracks and two open platforms at viaduct level; a 'roof' consisting of tarred canvas, was provided in 1840. There were offices in a three-storey block on the south side of the viaduct. The railway company had acquired more land than it initially needed, and was soon joined at London Bridge by the London and Croydon Railway (LCR),

which opened a terminus in 1839, immediately to the north of the LGR station, with roofed platforms, a booking office in Joiner Street, and a small goods yard between the train shed and Tooley Street. The LCR premises also accommodated the London and Brighton Railway (LBR) (Jackson 1969, 144–146). Foot passengers used a staircase up from the street-level booking office to reach the platforms on the viaduct, and carriages and carts were drawn by steam engine up a ramp from Canterbury Square, off Dean Street (now Stainer Street) (Thomas 1972, 150–152).

4.3.48 The LGR subsequently built additional tracks on the south side of the viaduct, and agreed to exchange stations with the LCR. By 1839, the stations and facilities were felt to be inadequate. In 1844, a new 'joint' station was opened, accommodating the LGR, LBR, LCR and the South Eastern Railway (SER). Occupying most of the northern part of the site, its north-western façade, along Joiner Street, had foundations reported to have been excavated to 18' (*c* 5.5m) below ground to support the weight of the viaducts. An approach road from Borough High Street was 80' (*c* 24.4m) wide, skirting the grounds of St Thomas's Hospital. To the south-west of the station, facing Joiner Street and extending across the south-western boundary of the site, was a triangular office block (Jackson 1969, 146–7; Thomas 1972, 152–161).

4.3.49 The joint station appears to have incorporated parts of the earlier LCR station, which were now to be occupied by the LGR, and a party wall was built on its south side (Thomas 1972, 161).

4.3.50 The development of the railway station complex, its history, layout and arrangement were described and assessed by Alan Baxter, and their report should be consulted (Network Rail 2009b). See Fig 14 for the configuration in 1875.

Current site

4.3.51 The layout and arrangement of the current site have been described and assessed by Alan Baxter, and their report should be consulted (Network Rail 2009b).

5 Statement of significance: buried heritage assets

5.1 Factors affecting archaeological survival

Natural geology

5.1.1 The underlying geology of the site is gravels overlain by alluvium. Appendix 1, the report on monitoring of the 2010 geotechnical work within the site, notes that natural fine alluvium within the tidal area of the former Guy's Channel was recorded at *c* 1.2–1.3m OD, continuing to below *c* –3m OD. The consistency in OD heights of the top of these deposits suggests that they are untruncated.

5.1.2 Beneath the alluvium, the lowest gravels, in the central southern area of the site, lie at *c* –3.2m OD, rising to *c* –0.8m OD at the south-western edge of the site.

5.1.3 Current street level is at *c* 4.5m OD at the northern tip of the site, falling to *c* 4.0m OD at the north-eastern end of the site. Street level on St Thomas Street, to the south of the site, is lower, at *c* 4.2m OD to the south-west, and *c* 3.3m OD to the south-east at the junction with Bermondsey Street.

Past impacts

5.1.4 Large areas of the site have been built on since the 17th century, and the construction of successive phases of the railway station will have caused widespread truncation to earlier buried heritage assets, including any previous remains of the station(s) itself. The construction of much of the station on a viaduct means that truncation is varied and localised, with potential for survival of earlier remains between the pier footings.

5.1.5 Previous archaeological investigations within the site have indicated that the foundations of the 19th and 20th-century railway structures within the site have truncated and fragmented archaeological remains, but between these truncations, there is potential for relatively good survival. The monitoring of the 2010 geotechnical work within the site confirmed that the greatest truncation on the site relates to the existing viaduct: in places the most recent truncation dates from 1836 (the earliest phase of station construction, and itself of archaeological and historic interest). As the station expanded southwards, subsequent phases were gradually incorporated, up until the early 20th century.

5.1.6 Archaeological survival is likely to be extremely limited within the footprint of the viaduct foundations and their associated construction cuts, which generally extend no more then 1m from the standing masonry. The foundations have on average truncated earlier archaeological deposits to *c* –0.3m OD. The concrete pier foundations which usually protrude around 0.2–3m from the lowest corbel are almost universally trench built, therefore the archaeological impact at this depth (average of 2m bgl) is limited, therefore there is considerable potential for the preservation of deeply stratified archaeological sequences between the viaduct footings. The average depth of archaeological deposits where they do survive is likely to be around 3m OD to 3.5m OD.

Likely depth/thickness of archaeological remains

5.1.7 The monitoring of the 2010 geotechnical work within the site observed that the viaduct footings are reasonably consistent in depth and width. Generally there are between 4–6 brick offsets starting around 1m below ground level, built directly on to a pebble concrete pier (of surprisingly poor construction). This pier is universally trench built, extending on average 0.6–0.9m from the standing wall at a depth of between 1.4–2m beneath ground level. Where exposed, it had caused truncation to an average depth of 6–6.5m beneath ground level. The construction cuts associated

with these foundations were generally observed at around 1.5m from the standing wall at ground level, merging with the trench-built foundation pier.

5.1.8 Localised truncation from existing services was also observed, but in some instances there was undisturbed horizontal stratigraphy as shallow as 0.8m beneath ground level. From this it is possible to surmise that in the areas between the Viaduct footings there is undisturbed stratigraphy from at least 2m below ground level, though possibly surviving higher in localised areas.

5.1.9 Early prehistoric remains could be located beneath the alluvial deposits in the site, and cut into the underlying gravel, with remains of the later prehistoric onwards distributed progressively higher up throughout and on top of the alluvium.

5.2 Geoarchaeological and palaeo-environmental potential and significance

5.2.1 *The site has a high potential to contain palaeoenvironmental remains*. The significance of such remains is predicted as **low to medium**, based on their likely archaeological and historic interest for evidence of past environments and human activity.

5.2.2 The geoarchaeological evaluation of the sub-surface stratigraphy has produced a model that can be used to help predict where archaeological remains might be found and where palaeo-environmental deposits with potential for the reconstruction of the past landscape and human activity are likely to exist.

5.2.3 Although the model is considered a useful means of gaining a preliminary idea of the likely buried stratigraphy on the site and the archaeological and palaeo-environmental potential, by no means should it be taken as the full or correct interpretation of the past environments that formerly existed here. The deposit model is intended only to act as a working tool to assist in identifying areas of archaeological interest and does not constitute a definitive statement of the environments and human activity that existed on the site in the past.

5.2.4 The gravel deposits (Facies1) across the site date to the Late Devensian glacial period and were deposited within a cold climate braided river system from 18,000–15,000 years ago. During this time Britain was uninhabited and therefore these deposits are of low archaeological potential. However, Palaeolithic material, such as hand axes may be found within these gravel deposits reworked from the older terraces. Such material should be considered *ex-situ*.

5.2.5 Throughout the early part of the Holocene the gravel highs (particularly to the south west of the site) are likely to have remained as a relatively dry area of land. In both landscape zones there are areas where the Pleistocene gravels form high points around the channels. This would have provided ideal locations from which to access the wetland resources for early hunter-gatherers.

5.2.6 The overlying early to mid Holocene sand deposits (Facies 2), are only found in the deepest areas in the north of the site (LZ1). The sands represent the deposits of the main channel thread of the Thames. Where the sands incorporate organic material there is moderate potential for Mesolithic period ecofact recovery in particular.

5.2.7 The fine grained sandy clay units of facies 3 and 3a represent a continuation of the gradual reduction in flow velocity and discharge rates as the glacial meltwaters subsided, and the climate continued to ameliorate in the early to mid Holocene. In this case the fine grained sediments would occur as in-channel freshwater sediments within an anastomosing river. Where they occur away from the main channel thread (LZ2) they tend to incorporate peats and organics indicative of marginal channel areas. These early to mid Holocene facies (3a) have good potential for ecofactual remains. Alternatively, where the sandy clays overly higher areas of ground in LZ1 and LZ2 they probably accumulated as overbank flooding and the banking up of sediment along the channel edges. These sediments may

represent the formation of early Holocene dryland soils over the Pleistocene gravels or at least seal areas where early Holocene soils might have developed in which possible flint scatters and mounds of burnt flint may be encountered particularly along the edges of the channel area.

5.2.8 With the impact of relative sea level rise a wetland sequence gradually developed across the site with a transition from marginal wetlands to the development of wet alder carr woodland, and finally reed swamp and mudflat environments (Facies 4 & 5). Such waterlogged deposits are likely to have high levels of preservation for plant macro remains, pollen, insects, diatoms, molluscs and ostracods. These environmental proxy indicators can be utilised to reconstruct changes in climate, past river hydrology, vegetational development and anthropogenic impacts on the landscape in both a local and wider regional area. These deposits occur to varying extents across the entire site but particularly in LZ2.

5.2.9 The geoarchaeologcal assessment suggested that in north-western half of the site was (LZ1) there was moderate potential for palaeoenvironmental remains if not perhaps Mesolithic material. Mesolithic activity is also to be expected on higher areas of gravel particularly adjacent to channels such as in the vicinity of CP2 in the extreme north west corner of the site. Here the gravel lies at approximately -1.1m OD some 1.5m higher than the channel 20m away to the east. Certainly by the Roman period, when the tidal head reaches London Bridge and the upper sandy clays are deposited, there seems little archaeological potential remaining in LZ1 although objects used in waterways such as boats, fish traps and the like could remain a possibility at these levels. See section 3.

5.2.10 In the south-eastern half of the site (LZ2), dominated by the deepest part of the channel just to the north of the intersection of Weston and St Thomas Streets, the geoarchaeologcal assessment suggested evidence for a quieter, backwater or channel margin area. Even at depth (at approximately -2.7m OD) peats were found to exist in TP138. The acidic nature of peat deposits makes them highly favourable environments for the preservation of environmental remains in particular and at these levels it is quite likely that early to mid Holocene or Mesolithic palaeoenvironmental evidence will exist. Furthermore, plant macrofossil material often found in peats such as seeds or identifiable fragments of wood, could be radiocarbon dated to establish a chronostratigraphic framework for the sediments in LZ2. Peats reappear further up the profile around Ordnance datum in a number of boreholes in LZ2 which probably relate to the late prehistoric (Bronze Age and later). Again, typically representing a marginal wetland deposit, peats or organic clays at this level have high potential for palaeo-environmental remains and dating information as well as the potential for artefacts such as trackways across the peat (as seen at St Christopher's House, for example). Furthermore, the Pleistocene gravels form a significant high area (offsite) to the south west. This would have provided an ideal location from which to access the wetland resources around the channel which makes this area particularly attractive to early hunter-gatherers and of high potential archaeologically. See section 3.

5.2.11 The relatively thick late prehistoric peat and organic deposits (Facies 4) provide the best potential for reconstructing past environmental conditions. Environmentally, peats provide pollen for plotting changes in the vegetation through time (and the anthropogenic implications) and carbon for dating to create a chronostratigraphic framework for the alluvial sequence as a whole. The highest level of palaeo-environmental potential is situated in areas of high ground alongside the channels (LZ2 in particular) where these organic deposits survive to a thickness of approximately 1m. Within this zone these organic deposits probably began to accumulate during the Bronze Age period, and may provide a complete sequence of organic deposits up until the early historic. Such sequences can provide good chronological resolution ideal for identifying subtle changes in the palaeo-environmental record. Archaeologically, the high acidity of the peat provides

excellent preservational conditions for organic materials such as timber trackways and wooden structures. In the nearby St Christopher's House site, a brushwood trackways and a timber platform used to access the rich resources of the wetlands, lying between -0.5 and -2m OD and dated to around 1500–1280 BC was found within the peat (Corcoran in prep.).

5.2.12 The brackish salt marsh / mud flat clay deposits (facies 5) provide a less conducive environment for both artefact and ecofact survival than that of facies 4. However, these finegrained minerogenic deposits may preserve diatoms, molluscs, ostracods and foraminifera. These proxy indicators are important for understanding the evolution of the Thames from a freshwater river system to a tidal one, and the associated processes of tidal head migration and relative sea level rise. In places where these deposits are slightly organic, pollen and plant macro fossils may survive. Although the channel areas are unlikely to contain *in-situ* occupational remains, there is the potential of these zones to contain structures and archaeological remains associated with channel side activities. Structures such as revetments, fish traps, boats, jetties and wharfs may be encountered within these zones. Furthermore, the upper part of the alluvial clays (around 3m OD) although seen in the vicinity of the site and not in borehole records of the site itself due to probable truncation by made ground, may represent a transition to drier conditions by the medieval period with the installation of flood defences, and drainage channels to reclaim parts of the land. If found these upper part of the alluvial sequence may represent water or grass meadow environments, only seasonally inundated by floodwaters in which occupational remains of a Medieval date onwards may occur.

5.2.13 Overall, the value of such sites within floodplain areas is largely dependant on the high levels of organic preservation and the range of ecofacts that these deposits preserve. Although sequences with high levels of palaeo-environmental preservation may not be associated with archaeological material, the importance of these deposits is the opportunity they provide to understand the contemporary landscape within which prehistoric and later occupation took place. This can address research questions regarding the resources available to past populations, the impact of anthropogenic activities on the landscape (i.e. land clearance for agriculture, land reclamation through drainage), and a wider landscape archaeological approach in determining settlement patterns and possible anthropogenic or environmental causes for changes occurring to those patterns. Such data is also of value to Quaternary scientists and palaeo-environmentalists, and can be used to understand climate change, vegetational development, sea level rise, and the evolution of river geomorphology.

5.3 Archaeological potential and significance

5.3.1 The nature of possible archaeological survival in the area of the proposed development is summarised here, taking into account the levels of natural geology and the level and nature of later disturbance and truncation discussed above.

5.3.2 The monitoring of geotechnical trial pits has shown that there is good potential for the survival of ancient ground surfaces (horizontal archaeological stratification) on the site beyond the areas of the existing viaduct foundations. There is also potential for the survival of early post-medieval masonry and timber structures as well as other cut features such as pits, wells and drainage features.

5.3.3 *The site has a moderate to high potential to contain archaeological remains dated to the prehistoric period.* The geoarchaeologcal assessment suggested that in north-western half of the site (LZ1) there was potential for Mesolithic material. Mesolithic activity is also to be expected on higher areas of gravel particularly adjacent to channels such as in the extreme north west corner of the site. Here the gravel lies at approximately –1.1m OD, some 1.5m higher than the channel 20m away to the

east. In the south-eastern half of the site (LZ2), dominated by the deepest part of the channel just to the north of the intersection of Weston and St Thomas Streets, the geoarchaeologcal assessment suggested evidence for a quieter, backwater or channel margin area. Even at depth (at approximately –2.7m OD) peats were found to exist. Peats reappear further up the profile around 0m OD in a number of boreholes in LZ2 which probably relate to the late prehistoric (Bronze Age and later). Again, typically representing a marginal wetland deposit, peats or organic clays at this level have potential for artefacts such as timber trackways across the peat. Peat-filled and waterlogged channels could also be potential findspots for ritually deposited artefacts. Furthermore, the Pleistocene gravels form a significant high area (offsite) to the south west. This would have provided an ideal location from which to access the wetland resources around the channel which makes this area particularly attractive to early hunter-gatherers and of high potential archaeologically. See section 3. Isolated prehistoric finds would be heritage assets of **low** significance; well-preserved remains of **medium to high** significance, based on their likely archaeological and historic interest for evidence of the environment, land use, associated activity or occupation. Given the degree of truncation which has taken place on the site, extensive and well-preserved remains, potentially of **very high** significance, are considered unlikely.

5.3.4 *The site has a moderate potential to contain archaeological remains dated to the Roman period.* By the Roman period, when the tidal head reached London Bridge, there seems little archaeological potential for evidence of occupation, particularly in LZ1. A possible Roman ditch has previously been recorded in the northern part of the site. There may be remains of preserved timber wharves or landing stages, or objects used in waterways such as boats and fish traps. Isolated Roman finds would be heritage assets of **low** significance; well-preserved remains of **medium to high** significance, based on their likely archaeological and historic interest for evidence of the environment, land use and associated activity. Given the degree of truncation which has taken place on the site, extensive and well-preserved remains, potentially of **very high** significance, are considered unlikely.

5.3.5 *The site has a low potential to contain archaeological remains dated to the early medieval period.* It was probably open marshy and marginal land during the period. Plant remains from waterlogged deposits may provide evidence of environment, and there could be remains of features such as drainage ditches. Such remains, if found, would be heritage assets of **low** significance, with a likely archaeological and historic interest for evidence of past environments and human activity.

5.3.6 *The site has a moderate potential to contain archaeological remains dated to the later medieval period*. Documentary sources place the town house of the Prior of Christchurch, Canterbury (**HEA 1c**) roughly equidistant between Joiner and Stainer streets, slightly to the south of Tooley street. Whilst this area was well covered by trial pits, little evidence for medieval structures survived, apart from chalk blocks that had been incorporated in the viaduct concrete footings, which may have been reused following levelling/demolition of nearby structures. It is possible that the town house only survives to the north of the Shunt Theatre complex, in the southern part of the London Dungeon, where no trial pits were located. Previous investigations within the site have recorded localised later medieval structural walls and timbers, and cut features. Such remains, if found, would be heritage assets of **low to medium** significance, depending on their extent and state of preservation, with a likely archaeological and historic interest for evidence of past human activity.

5.3.7 *The site has a high potential to contain archaeological remains dated to the post-medieval period.* The monitoring of geotechnical work in the site observed 17th–19th century masonry structures in 17 trial pits, occurring at varying depths and in differing states of preservation. Structures generally appeared to be more frequent and more robust the further east they were located, possibly reflecting the more densely-packed domestic buildings identified in cartographic sources on the western

edge of Bermondsey Street. Such remains are considered to be heritage assets of **low** significance, derived from their archaeological and historic interest: significance may be higher if particular documented buildings can be identified, or if any unique or specialist features are found to be present. Buried remains of the successive phases of London Bridge Station are considered to be heritage assets **low to medium** significance, with archaeological and historic interest for evidence of its development and construction.

The buried heritage landscape

5.3.8 Archaeological excavations in the close vicinity of the site have demonstrated the presence of prehistoric, Roman and medieval remains nearby, and produced widespread evidence of Southwark's early environment, and subsequent development close to the strategic bridgehead. The wider survival of such buried heritage assets is likely to be extremely varied, but where present, they may potentially be of medium or high significance, providing an important context and setting for the buried heritage assets within the site, with each making a positive contribution to the significance of the other.

6 Conclusion

6.1.1 Table 1 summarises the known or likely assets within the site, their significance, and the impact of the proposed scheme on asset significance.

Table 1: Impact upon heritage assets (prior to mitigation)

Asset	Asset Significance	Impact of proposed scheme
Palaeoenvironmental remains	low to medium	Details are not yet known. Construction of new foundations, or other works below current ground/slab level, may truncate the asset, but are unlikely to remove it completely. **Significance of asset possibly reduced to low or negligible**
Localised Roman features such as ditches	low to medium	Details are not yet known. Construction of new foundations, or other works below current ground/slab level, may truncate or remove the asset. **Significance of asset possibly reduced to negligible or none**
Localised and truncated later medieval structural remains and cut features	low to medium	Details are not yet known. Construction of new foundations, or other works below current ground/slab level, may truncate or remove the asset. **Significance of asset possibly reduced to negligible or none**
Truncated post-medieval remains of walls and cellars, and evidence of earlier phases of London bridge Station	low to medium	Details are not yet known. Construction of new foundations, or other works below current ground/slab level, may truncate or remove the asset. **Significance of asset possibly reduced to negligible or none**
Possible, previously unrecorded, localised and truncated buried remains of the prehistoric, Roman and early medieval periods	low to high	Details are not yet known. Construction of new foundations, or other works below current ground/slab level, may truncate or remove the asset. **Significance of asset possibly reduced to negligible or none**

7 Recommendations

7.1 Further work

7.1.1 Deposits of archaeological interest are likely to extend to a maximum of 7m below ground level (bgl). The deposits of greater archaeological and past environmental potential lie between the Pleistocene gravel and the base of made ground, the surface of these deposits varies across the site, but they are generally encountered at between 2 to 4m below modern ground level. The main areas of potential within the alluvium have been identified as:

- Possible early Holocene soils and sediments in both LZs on the higher areas of gravel especially in proximity to the channel area and higher ground to the south western corner of the site. Mesolithic materials could still exist at this location although weathering and exposure may affect archaeological survival.
- Relatively deep early Holocene channel in both LZs dominating the site; possibility of good sequence of environmentally productive sediments including peats especially along the margins of the channel in LZ2 where the potential is good for prehistoric artefact and ecofact remains.

7.1.2 It is recommended that an assessment of the impact of the proposed development is made when the layout and construction details are fully known. Such an assessment should utilise the information contained in this report regarding the archaeological potential of the site, which will enable an appropriate mitigation strategy to be recommended by the local planning authority.

7.2 Non-archaeological site constraints

7.2.1 It is anticipated that live services will be present on the site, the locations of which have not been identified by this archaeological report. Other than this, no other non-archaeological constraints to any archaeological fieldwork have been identified within the site.

7.2.2 Note: the purpose of this section is to highlight to decision makers any relevant non-archaeological constraints identified during the study, that might affect future archaeological field investigation on the site (should this be recommended). The information has been assembled using only those sources as identified in section 2, in order to assist forward planning for the project designs, working schemes of investigation and risk assessments that would be needed prior to any such field work. MOLA has used its best endeavours to ensure that the sources used are appropriate for this task but has not independently verified any details. Under the Health & Safety at Work Act 1974 and subsequent regulations, all organisations are required to protect their employees as far as is reasonably practicable by addressing health and safety risks. The contents of this section are intended only to support organisations operating on this site in fulfilling this obligation and do not comprise a comprehensive risk assessment.

8 Gazetteer of known historic environment assets

8.1.1 The table below represents a gazetteer of known historic environment sites and finds within the study area around the site. The gazetteer should be read in conjunction with Fig 2.

Abbreviations
AOC - AOC Archaeology Ltd
ASE – Archaeology South-East
CA – Compass Archaeology Ltd
DGLA - Department of Greater London Archaeology
GLHER – Greater London Historic Environment Record
LARFIA - London Archaeology Research Facility, Institute of Archaeology
MoLAS – Museum of London Archaeology Service (now MOLA)
PCA – Pre-Construct Archaeology Ltd
SAEC - Southwark Archaeological Excavation Committee
SLAEC - Southwark Lambeth Archaeological Excavation Committee
WA – Wessex Archaeology

HEA No.	Description	Site code/ GLHER No.
1a	**The Maze** Site of a 14th century manor, recorded in the GLHER. The manor of the Maze was originally owned by the abbots of Battle, later Sir William Bucestre. According to Stow, the walks & gardens of the abbot of Battle's Inn were called the Maze, bounded by Weston Street, Weston Place, Melior Street, Great Maze Pond and Maze Pond.	090432
1b	**Joiner Street London Bridge Station, Area 6 (Bonded Bottlers), Railway Approach, SE1** MoLAS watching brief in 1995 during excavation of the 4-way escalator lower machine chamber and associated sewer diversion. Alluvial clays were truncated by foundations and pier bases for the railway arches and by modern concrete bases and piles. No features earlier than *c* 1800 were present. Excavation was undertaken to a depth of 3.40m. At 0.7m OD, patches of silty clay (probably alluvial) survived, truncated by the brick foundations of railway arches, and associated 19th-century rubble dumps.	LBG95
1c	**House owned by Christ Church, Canterbury** By the 1240s, the priory of Christ Church Canterbury had a property to the south of Tooley Street. In the 1270s the Prior was documented as selling produce from his garden, and renting out shops along the street frontage (Carlin 1996, 25–26). Site of the Fleur de Lis or Flower de Luce medieval inn, recorded in the GLHER.	090448
1d	**London Bridge Station, Platforms 9–16 (Brighton Side)** Listed building Grade II Trainshed. 1864–7. By CH Driver (architect) and FD Banister (engineer). For the London Brighton and South Coast Railway. English bond yellow brick with stone and polychromatic brick dressings; hipped flanking taller semicircular corrugated iron roofs. Plan: open plan with wide central 'nave' and narrower aisles. Exterior: 2-storey wall to south (facing St Thomas's Street) with bays framed by Tuscan pilasters rising to classical cornice. Ground floor has semicircular arches, mostly blind and in triplets; a skewed entrance arch with polychromatic brick voussoirs. First floor has triplets of graduated semicircular blind arches with polychromatic brick voussoirs, set on pilasters with bold stone plinths and Romanesque-style capitals. Interior: inner walls divided into 12 bays by pilasters rising to classical stone cornice, most bays having 4 semicircular blind arches with polychromatic brick voussoirs and red-brick bands and friezes. 12-bay roof with wrought-iron trusses: central semicircular roof of crescent-truss design with vertical struts, flanked by 2 side roofs of triangular trusses carried on lattice girders; late 20th-century trusses to 3 bays to south west. Principal ribs and lattice girders carried by 2 parallel lines of reeded cast-iron columns with bulbous palm-leaf bases and decorative wrought-iron foliate spandrels to joints. Open to east (country) side. The crescent-truss roof is the only surviving design of its type among the London termini.	471220

HEA No.	Description	Site code/ GLHER No.
1e	**London Bridge Station** The approximate findspot in 1864, during construction work on the South-Eastern railway line, of a biconical Roman vessel of smooth grey ware, with pedestal foot. Recorded in the GLHER.	090577 MLO11517
1f	**London Bridge Station (Arches), bounded by Joiner Street, Stainer Street, Tooley Street, SE1** MoLAS watching brief in 1999 on 20 geotechnical pits in the northern part of the site. Undated waterlaid deposits, probably associated with the Guy's Channel, and a cluster of four undated timber piles were recorded. Overlying dumped layer contained 17th and 18th-century finds. Several 18th-century brick floors were recorded; all the deposits were cut through by the construction of the railway viaduct in 1836 and 1864.	JNE99
1g	**London Bridge Street, Area 7 Main Ticket Hall (3-Way Escalator), Joiner Street (corner), Tooley Street, SE1** MoLAS evaluation, excavation in 1994–5. Alluvial sands and silts were cut by a possible natural channel and a ditch of Roman date. Peat deposits, perhaps associated with silt that formed in the natural channel, were recorded. More extensive waterlaid deposits also occurred above both channel and ditch, the latest of which (0.3–0.9m OD) were medieval in date and were associated with isolated timbers. These deposits were succeeded by a chalk, tile and ragstone wall on a line of elm piles with a horizontal oak beam across them; they are dated to the 14th to 18th century. This wall may have been associated with a brick wall in the east of the site and was possibly an earlier phase of a chalk and ragstone wall foundation in the west of the site. This latter could have been associated with a possible 13th-14th-century pit and a gully or it could have been late medieval in date. Post-medieval structural remains were constructed on a further sequence of waterlaid and dumped deposits and included 16th and 17th-century brick and stone-lined pits, two 17th or 18th-century brick wall foundations and the corner of another brick building. The site was bisected by a 19th-century railway arch foundation.	LBH94 091985 091986 MLO63926
1h	**London Bridge Station: Phase 1a, Arch 77, St Thomas Street, Bermondsey Street, SE1** MOLA watching brief in 2008. The work consisted of monitoring three test pits and a lift pit trench which were being excavated in relation to works for the Thameslink Programme. Two phases of post-medieval cellars were found which had been demolished and backfilled during the 19th century. The latest cellar phase dated to the 16th/17th century. Pottery sherds, a glass bottle, bone and clay tobacco pipes were found within the rubble of the backfill. Four fragments of building material, varying in date from the mid 15th century to the early 20th century, were also discovered. Natural alluvial clay was found at a depth of 1.4m OD and 2m OD.	LBS08 ELO10168
1i	**London Bridge Station, corner of St Thomas Street, Bermondsey Street, SE1** Archaeological test pit excavated in 2007, adjacent to HEA 1h. The earliest deposit encountered was natural orange sand at *c* –0.90m OD. Overlying this was a series of prehistoric deposits which included a 120mm thick light blue silty clay, overlain by a 300mm thick slightly organic dark blue silty clay, a 200mm thick dark brown organic clay, and a 700mm thick grey clay. Above was a 1.30m thick layer of grey alluvial clay containing small shell fragments. The top was recorded at *c* 1.90m OD. Truncating the alluvium was a 16th century pit containing numerous horn cores, sealed by a 700mm thick dark brown clay/silt which produced 18th century brick and pottery which was overlain by a 400mm thick deposit of lime mortar with occasional brick fragments. This was overlain by a dark brown silt. Truncating the above deposits were the foundation of the present railway arch, the base of which was an 80mm thick blinding of chalk and stone extending 1.60m to the west of the present footing. The top was recorded at *c* 0.60m OD. This was overlain by a lean-mix concrete with occasional brick fragments, extending 600mm to the west of the present foundation and measuring 1.20m in height with the top at *c* 1.80m OD. On top of this was the yellow stock wall which comprised a step footing to 800mm below the slab when it continues vertical to meet with the current vaulted roof.	
2	**London Bridge (Area 4, East Escape Shaft), Joiner Street, SE1** MoLAS excavation in 1995. The site lies close to the edge of the natural sand island on which early settlement was located. The sand was cut by a few indeterminate prehistoric features that produced a handful of flints. They were sealed by a flood horizon or a general raising of the water level. Roman activity was limited to a linear feature, possibly a drain, which is dated to the 3rd century; it may have been sealed by another flood. The sequence was completed by one post-medieval skeleton, which could have been associated with St Thomas's Hospital, and a 17th-century cut feature.	LBD95 092232–7

HEA No.	Description	Site code/ GLHER No.
3	**Corner of St Thomas Street and Joiner Street, SE1** Excavation by SEAC in 1963. Clay layers up to +0.3m OD represented marsh deposits, cut by ditches of 2nd-century AD, and overlain by 2nd–3rd century river silts. Finds included a Roman bronze relief of Cupid, wall plaster, gold swarf, glass/enamel frit and bronze working slag. In 1964, a barrel well or pit was recorded.	090227 090316 090544/01 090422 MLO11437
4	**Guy's Hospital** Excavation by SLAEC in 1967 revealed several phases of building on the same alignment though only one wall was excavated. 3 rows of post-holes (possibly 2 re-builds); rebuilt in stone with tile roof and finally rebuilt in brick. Partially robbed in the 18th century. Large quantities of domestic rubbish in ditch and other layers. A cellar with concrete floor and padstone of warehouse built in 1875 was recorded. Abraided Roman potsherds were found in later contexts.	091022–30 MLO13590
5	**London Bridge Tower (The Shard), 32 London Bridge Street, SE1** MoLAS evaluation in 2007–8. Prehistoric burnt flint, fragments of Roman pottery, roof tile, flue tile and tessarae were recovered from a sequence of alluvial deposits above natural gravels. These were covered by medieval dumps and 19th-c deposits. In one trench, a flagstone floor was recorded: this may have been associated with the 19th-century Terminus Hotel which stood nearby. Modern made-ground and concrete sealed the sequence. Under the service ramp of the former London Bridge Hotel from Joiner Street to London Bridge Station natural brickearth was recorded beneath a peaty layer, probably indicating that the area was originally a floodplain or marsh. This was sealed by a sequence of dumped layers, with the earliest containing a substantial quantity of Roman building material of 1st-3rd-century date, including fragments of box-flue tiles, suggesting that a Roman building (possibly a bath-house or a building of some status) was located nearby. A cut feature, either a boundary ditch or channel, of probable medieval date, was sealed by further phases of dumping, possibly during the middle to late medieval period. These layers were cut by cellars of 18th-c date and by the remains of mid-19th-century buildings relating to the original London Bridge Station ticket office and waiting rooms. Modern made-ground and concrete completed the sequence.	LWE07
6	**Joiner Street, SE1** MoLAS watching brief in 1993. 2m of modern disturbance down to a concrete raft was noted in engineers' test pits.	JNS93
7	**London Bridge Station; London Bridge City (Area 5), MEPC Car Park, Railway Approach, SE1** MoLAS excavation in 1995. Natural sand and gravel sloped down to the south-east of the site. Several residual prehistoric artefacts were recovered. Above the gravels probable Roman dumps were cut by Roman features, including pits, postholes, a north-south ditch in the central part of the site and two inhumations with an additional two possible grave cuts, the latter considered to be of early Roman date. Five east-west later Roman ditches cut into an extensive dumped deposit and may represent a single phase of drainage activity. Along the west limit of the site a chalk foundation 'raft' for an east wall and the north-east corner of a large 2nd-century masonry building were recorded. It appears to have been robbed in the late 3rd or 4th century, the robber trenches containing much roof tile and tesserae. No internal features survived. Roman activity was followed by a sequence of medieval and post-medieval dumps or waterlaid deposits within which was an east-west medieval drainage or boundary ditch and three barrel-lined pits. Post-medieval remains included two brick-lined pits, a soakaway and a cesspit. The backfills of both pits contained large quantities of domestic debris, including pottery and more than six complete glass vessels.	LBE95 092403– 092413

HEA No.	Description	Site code/ GLHER No.
8	**Mayor Sworder's Arches, Joiner Street, SE1** MoLAS evaluation, excavation, watching brief in 1992–4, for London Underground Ltd (Jubilee Line). In the W, natural gravels were sealed by much Roman demolition material and domestic debris, including painted wall plaster, roof and flue tiles, pottery and fragments of clay wall. A fragment of clay and timber wall foundation was found in situ. The dumps were cut by two pits which may be later Roman. Towards the east, natural sands were also cut by Roman quarry pits dated to the period, and succeeded by a ditch or channel. Above the dumps were the remains of a *c* 1st-century clay building, succeeded by a masonry building, dated to the 2nd century, and consisting of a chalk wall with associated floor makeup beneath a polychrome floor mosaic. The building was robbed and levelling took place in the medieval period; top of 'dark earth' was recorded at *c* 1.4–2.0m OD, partially truncated by the construction of a building, evidenced by the remains of a chalk wall. A medieval chalk wall was also recorded above the Roman channel. Two chalk and ragstone wall foundations of a large medieval building cut into the waterlain deposits; above were fragments of post-medieval brick walls and floors, sealed by a 3m thickness of rubble dumps probably relating to the construction of the railway viaduct in the 1830s.	MSA92 091572/01 091573–6 091567–9 091570–2
9	**Joiner Street, SE1: bridge over north end, London Bridge Station** Listed building Grade II Bridge. 6 composite cast- and wrought-iron trusses built to James Warren's 1848 patent. Reconstructed after collapse of newly-built original in 1850. Constructed to carry extension to London Bridge Station forecourt. Converted to pedestrian use in 1890. Span varying from approx 15m to approx 21m, depth approx 1.6m. Spaced at approx 4.2m centres, beneath flat-soffit, solid deck of original cast-iron plates. Comprised of individual panels of cast-iron in form of 60 degree triangles, bolted together at top corner to form chord. Downward pointing apexes pinned to bottom chord of wrought-iron flat chain, each approx 152mm x 3mm (6in x 5/8in). A rare survival of a structure assembled from cast- and wrought-iron components forming a Warren truss. Illustrative of structural thinking in the 1840s, in which the two forms of iron were used compositely. The tendency of cast-iron to fracture led to a preference for wrought-iron in such situations.	471033 800008 MLO64059
10a **10b**	**Tooley Street, SE1: District Heating Scheme** SAEC watching brief in 1975. The site was at the edge of the early Roman settlement; to the east were quarry pits dug into natural clay. A broad channel contained river clays, and creeks and mudflats were also recorded with 11th-century finds. Late medieval road gravels possibly represented the predecessor of Tooley Street. A ragstone wall on timber piles set in clay was possibly the south wall of Elgin's Gate (HEA 40).	DHS75 091055–7 090417 MLO14271 MLO13618
11	**Shipwrights Arms Public House, 88 Tooley Street** Listed building Grade II Public house. Mid to late-19th century, with ground-floor of late-19th century or early-20th century. Stucco and brick in English bond. Roof parapeted. Unusual plan follows curved corner site, with 3-window range to Bermondsey Street, rebated corner range with full-height segmental bay, and 5-window range to return. Exterior: 3 storeys over basement. Round-arched entrance at corner, flanked by colonnettes in rebated jambs; garland to arch. To either side, as well as to party walls a rusticated pier of Ionic order, topped by pedimented and garlanded bracket; thin Ionic colonnettes define glazed ground-floor bays; plain entablature band sign fascia. The most striking feature of the building, apart from its unusual plan, is the crouching Caryatid with outstretched arms beneath the corner segmental bay. Giant pilasters flanking corner range repeated on party wall and return. All upper-floor windows are flat-arched, those to the 1st-floor with eared and shouldered architraves, entablature with fretted frieze, topped by alternating segmental and triangular pediments; corner windows on both floors are tripartite as are centre windows on main elevation and 2nd bay of return. Springing band to 1st floor. Keyed lintels and projecting sills on brackets to 2nd floor. Plain entablature band stepping out over giant pilasters; projecting cornice. Secondary entrances at left party wall and on return.	471389
12	**Battle Bridge (site of)** Site Of Battle Bridge, recorded in the GLHER. The bridge carried Tooley Street over a channel running into the Thames, and was named after the Abbot Of Battle's property nearby.	090441
13	**Tooley Street, SE1** The site of the gatehouse of the manor of the Maze (HEA 1a), recorded in the GLHER.	090432/01 MLO14964

HEA No.	Description	Site code/ GLHER No.
14	**Bermondsey Street, SE1** Site of the Bermondsey Stone Cross, recorded in the GLHER. The GLHER records the nearby findspot of a medieval pipeclay figurine of St. Barbara in Tooley Street.	090605 090547 090546 MLO23127
15	**Tooley Street, SE1** SLAS/SAEC excavation in 1967. The top of clay was recorded at *c* +1.37m OD over gravel at *c* +0.91m OD.	MLO15689 091080
16	**Tooley Street, SE1** Site of the Crown, a medieval tavern, recorded in the GLHER	MLO23340 090748
17	**Chamberlains Wharf (London Bridge Hospital)** The findspot in 1867 of an iron spearhead with socket, long quadrilateral stem ending in a narrow leaf-shaped blade. A watching brief by DGLA in 1983–4 recorded a square timber-lined well dated by dendrochronology to AD 231 or later, containing pottery and leather; and a natural channel flowing across the site from south to north, containing medieval pottery in its upper fills. An 18th- or 19th-century brick-lined cesspit was also recorded.	CHWH83 090800 090677 MLO23172 MLO7824
18	**Railway Approach / Duke Street Hill, SE1** Site of the town house of the priors of St Pancras, Lewes, Sussex recorded in the GLHER. The site was acquired by them in 1278 and was located in modern Tooley Street. The site of the house is now occupied by part of the yard of London Bridge station, but before the building of the railway it was approached by Carter Lane, a narrow turning out of Tooley Street immediately opposite to St. Olave's Church. There is mention in 1373 of the ancient door of his inn and of stables and shops to be built as appurtenant to it, and in 1448 of the great gate of the hostel of the prior and convent; and Stow speaks of 'one great house built of stone, with arched gates,' the lodging of the prior when he came to London. On the south side of the courtyard of the Walnut Tree Inn there was until 1831 a vaulted room below the ground level, which certainly had been part of the prior's hostel. Its roughly groined roof was supported on a circular central column from which sprang four bands resting against the walls on plain square responds. Evidently the work dated from about the year 1130. One pier of the gatehouse of the inn stood across Carter Lane until 1831. The building is recorded in a series of drawings by Mr C. E. Gwilt. Crypt and foundations were found in the 19th century. Site of the Prior of Lewes's medieval house, The site of a medieval house or inn called the Gatehouse, the first prison proper of Southwark, is also recorded in the GLHER at this location..	090440 090744 091651–2 090434–5 MLO4404 MLO5816
19	**44–46 Tooley Street, SE1** DGLA watching brief in 1986 recorded a post-medieval brick-lined drain built over a medieval stone-built drain, both aligned east-west. Other undated evidence, including gravel metalling, was also recorded from an exposed section.	44TS86 MLO67314 091923–4 092319/00/00
20	**St Thomas Street, SE1** Approximate findspot of Roman coins of coins of Titus and Allectus found in 1882, recorded in the GLHER.	090770
21	**London Bridge Site (Area 3, East Vent Shaft), Joiner Street, SE1** MoLAS excavation in 1995. Alluvial clays and silts were recorded within a small channel from which pottery and tile, dated AD 120–400, were recovered. Deposits next to the channel contained further fragments of Roman pottery, 10 coins (3rd–4th c), bottle glass and lead. The remains of an early medieval revetment were also found within the channel fills. Two grave pits containing the remains of 12 burials were probably part of the 17th-century cemetery used by St Thomas's Hospital.	LBC95 092295–8

HEA No.	Description	Site code/ GLHER No.
22a	**St Thomas Street, Southwark: site of medieval and later St Thomas's Hospital** Founded 12th century (probably within the precincts of the priory of St Mary Overie) moved to Borough High Street/St Thomas Street in the 13th century. The hospital was originally dedicated to St Thomas the Martyr, and served the poor and needy sick of the parish. It closed in 1540 when Henry VIII dissolved the monasteries and decannonised Thomas Becket. It reopened in 1551 as St Thomas the Apostle and was granted to the citizens and Lord Mayor of London by Edward VI as one of the three royal hospitals. It was independent by the end of the 16th century and was administered by governors who were the representatives of the City of London. The whole hospital was largely rebuilt 1693–1709 when most of the medieval buildings were 'ruinous'. in 1859 the site was acquired by the Charing Cross Railway Company for London Bridge Station and a new site for the hospital found on the south bank just west of Westminster Bridge, where it still stands. Part of the 19th century operating theatre survives inside the old church tower on St Thomas Street. **11–19 St Thomas Street, SE1** SLAEC excavation in 1977 revealed sands apparently disturbed by root action and containing sherds of possible Iron Age date. 1 residual ? struck flint was found during excavation. The sands were overlain by silts of probable pre-Roman-Roman date, and the area was probably waterlogged before being levelled with rubble for a later Roman building, of which a ragstone footing and mortar floor survived. Above this were pits, further silt and a possible agricultural soil layer. One of several gullies contained pottery of Pingsdorf type and a halfpenny of Alfred. The substantial stone walls of a stone cellar or undercroft were revealed, probably of later medieval date and almost certainly part of St Thomas's Hospital: at one end were external buttresses and a finely built relieving arch, apparently intended to carry a considerable weight, perhaps the base of a tower. The medieval structure was superseded by a substantial brick building, probably part of the 16th-century rebuilding of the hospital. Subsequent building at the hospital resulted in the progressive levelling of the site.	MLO16651 11STS77 090999 091001–2 MLO13574
22b	**Site of St Thomas's Hospital burial ground** The extent of the burial ground is marked on Rocque's map. The land was leased to Guys Hospital in the 19th century for buildings, a tennis court and garden (Basil Holmes, 1899).	091210 MLO20133
23	**Guy's Hospital Redevelopment (Area D), St Thomas Street, SE1** DGLA excavation in 1989 and 1990 found evidence of a natural braided water course with 32m length of 2nd-century AD oak waterfront, with unique front braced design (previously only found in medieval contexts) along the western edge of the channel. An early 2nd-century AD pagan inhumation was less than 2m west of the timber waterfront. The timber floor and lower plank wall of a 3m square tank of unknown function, was associated with the waterfront. An oak beam drain linked the tank to a watercourse. Evidence of land drain-age throughout the Roman period was also found on the site. The remains of a small building, more than 4.6m square, was dated to the 17th century, its floor constructed from large blocks of chalk, with four rectangular sill-beams surviving at the base of each wall. The lower plank of each wall was still intact, though they remained undisturbed only in the south and east walls.	GHL89 GHD90 191259 091255–7 091255/01 MLO22238–9
24	**Guy's Hospital (Squash Court), St Thomas Street, SE1** SLAEC watching brief in 1977 revealed an 18th-19th-century revetment.	GHSC77 091938
25	**Sparrick's Row, Weston Street, SE1** SLAEC watching brief in 1973 recorded evidence of natural topography only. Natural gravel was covered by clays up to +3.50m OD. In places a horizon of 'peat' was at *c* +0.40m OD.	SRWS73 090406
26	**St Thomas's Street** Approximate findspot in 1937 of Roman jar necks and potsherds, recorded in the GLHER.	090227 MLO11427
27	**Land at 52 Weston Street, SE1** ASE evaluation in 2007. Marginal swampy ground was suggested by alluvial deposits of 17th-18th-c date. Above these were deposits of 17th to 18th-century made-ground which had been cut by the insertion of a cellar and structural wall of a 19th-century building.	WNU07
28	**60–68 St Thomas Street, SE1** SLAEC watching brief in 1982 recorded thick waterlaid deposits within the top of which was a dump of animal bone, and two sherds of Guy's type ware perhaps indicating a Tudor date.	60STS82 091920–2

HEA No.	Description	Site code/ GLHER No.
29	**Shipwright Yard, Tooley Street (off), SE1** SLAEC watching brief on a small section in 1975 recorded only late dumped material and topographical evidence. River clay was observed between +2m and +1.30m OD.	SYTS75 090408 MLO4383
30	**20–26 London Bridge Street, SE1** SLAEC watching brief in 1975. Gravel and natural clays were recorded up to +0.60m OD, overlain by a succession of waterlaid clays up to +3m OD. The identification as site code 20LBS75 is not absolutely certain from information available (GLHER, July 1995). MoLAS watching brief in 1995. Roman cut features (unspecified) dating to the 2nd century AD were recorded.	LBJ95 20LBS75 092299 092300–01 20LBS75 090403
31	**17–24 Magdalen Street, SE1** AOC evaluation and watching brief in 2004–5. Alluvial clays overlying gravel were revealed. Significant modern disturbance in the form of made-ground and building foundations was observed within the area of investigation. A piece of shaped timber was uncovered in one of the trenches; it is likely to have been debris washed into the sequence when the clays were laid down. There was significant modern disturbance in the form of made-ground and modern building foundations observed.	MGN04
32	**7 Holyrood Street, SE1** MOLA evaluation in 2008. One trench was excavated and two geotechnical boreholes were observed. Natural clay at a depth of 2.57m OD was cut by a natural or artificial channel used as a drainage ditch, sealed by modern makeup layers. Several wooden stakes found in the channel suggest an associated revetment or platform. Backfill in the channel, dated to the late-16th century, was overlaid by a gravel deposit, possibly a path, above which was a brick drain. A spread of broken roof tile, recorded at the southern end of the drain along with a row of four large postholes and three small stake holes, is dated to after the late-15th century. These were all covered by a deposit dated to late 15th–17th centuries and which contained copper alloy waste, suggesting metal working in the vicinity. Makeup above this was cut by a construction cut containing the remains of a brick wall, probably part of the foundations of a building or property wall constructed of reused bricks of probable 15th–16th-century date. This was cut by a deep pit filled with organic burnt material, possibly waste material from an industrial activity. Overlying dumped deposits were found to contain a piece of crucible of probable 15th–16th-century date which, along with the copper alloy waste, suggests that metalworking was taking place on or near the site. This was sealed by modern made-ground.	HYO08 ELO10225
33	**12–26 Magdalen Street, SE1** MoLAS evaluation and excavation in 1996. A natural channel over 4m wide was recorded which, from the early-16th century, was repeatedly revetted and constricted. Four phases of revetting were identified and comprised oak and elm reused ships' planking nailed to posts which had been driven into the underlying clays and silts. Different styles of build could be related to the tenement boundaries along Magdalen Street. As the channel was constricted, timber-lined cesspits, a timber privy and a sluice were constructed next to it. Carpentry techniques and marks were clearly visible. In the early-17th century the channel, little more than a sewer at this time, was backfilled with domestic rubbish, including delftware vessels and wasters, jugs, bellarmines and other pottery.	MGS96
34	**122–126 Tooley Street, SE1** CA watching brief in 2001 recorded made-ground containing 17th–19th century material overlying alluvium.	TYR01
35	**2–10 Magdalen Street, 7–25 Bermondsey Street, SE1** MoLAS evaluation and excavation in 1998. A probable fluvial deposit containing Roman material and a pit was recorded, suggesting some activity in the area from the 2nd to 4th century. In the north of the site a channel was located, probably one of many natural channels which formed in the low-lying, flood susceptible ground. In the 16th–17th century it was revetted with timber and eventually silted up. The site then seems to have been levelled up, possibly in association with 16th–17th-century wall foundations. Brick and timber structures, including sumps, were located in another trench and appear to have been contemporary. Later features were relatively modern.	MDN98 MDG98 092773–6
36	**108–110 Tooley Street, SE1** MoLAS evaluation in 1992. Geological strata were not reached in either of two trial holes. A layer of silt at the bottom of one may have been a waterlain deposit relating to the River Thames; it was overlain by an undated dump. In the second, the lowest deposit contained many 16th century finds. Both were overlain by modern material.	TOO92 092150–1

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37	**10–18 London Bridge Street , SE1** MoLAS watching brief, excavation in 1998. Above the natural sand evidence of Roman activity was found, represented by a possible drain, two postholes, and a pit, dated to the 2nd century. It was succeeded by medieval dumping, pits and a cellar or cesspit, constructed from chalk, ragstone and flint. Two grave slabs dated to 13th–mid-14th century had been re-used in its construction; one had an inscription on either side of its bevelled edges. Both slabs are believed to come from the early medieval St Thomas' Chapel, part of St Thomas' Hospital, which lay on the north side of the site. The medieval dumping contained pottery spanning the 13th–15th century, including a complete jug of the 13th or late 14th century. Also found within the medieval dumps was a residual fragment of Roman stamped Caerleon ware mortarium, dated to *c* AD 110–170/180, and bearing the letters DB, the first of its kind found in London.	LNB97
38	**Battle Bridge Lane, SE1** The findspot of Roman inscribed stonework in 1842, recorded in the GLHER.	090923
39	**The Counting House 51–67 Tooley Street** Listed building grade II Warehouse and offices, now offices, shops and flats. 1887, restored and interior rebuilt in the 20th century. By Henry Stock of Snooke and Stock. Yellow brick with brick cornice and parapet with pediment over central bay. 20th century parapeted attic extension. Exterior: 6 storeys (former ground- and 1st-floor levels now combined as one tall storey to street containing walkway); 15 bays. Central slightly projecting bay with brick quoins; end bays also project and have quoins and rusticated brickwork forming voussoirs to round 5th-floor windows. Central doorway, 2 floors high in projecting rusticated section with voussoirs and stone key. Arcaded walkway behind leads through to Counter Street. Giant round-headed arches to ground- and 1st-floor openings, now all open. 2nd-5th floor windows in colossal round-arched recesses resting on slightly projecting 1st floor, those to 2nd–4th floors segmental-headed, those to 5th floor round-headed; all windows with gauged-brick arches. Narrower windows to end bays; canted angles to similarly treated 4-bay returns. Counter Street elevation has wider pedimented central bay, and recessed, partly stuccoed central 5 bay section. The southern block of Hay's Wharf complex, formerly linked to buildings north of Counter Street by 4-storey bridges; this block was a later addition to the Hay's Wharf complex. By the end of the 19th century the proprietors controlled most of the river frontage between London and Tower Bridges and much of the land behind. Interior: not inspected. Part of same complex as Hay's Galleria and has group value with 47 & 49 Tooley Street.	471388
40	**Tooley Street, SE1** The site of Eglins (or Elgin's) medieval water gate, recorded in the GLHER).	091058 MLO13620
41	**21–27 St Thomas Street, SE1** DGLA excavation in 1988 of a site at the east limit of Roman and medieval settlement in north Southwark revealed linear Roman ditches and gullies beneath a sequence of Roman dumping and silting. Several lengths of late medieval chalk and flint foundations were located, the best preserved of them in association with a surface of crushed chalk and tile. A continuation of the wall-line was represented by a series of post-holes representing piling for the foundations.	STS88 091137–8

HEA No.	Description	Site code/ GLHER No.
42	**47–49 Tooley Street, SE1** Listed building grade II Warehouse, now offices. 1860s, restored and interior rebuilt late in the 20th century. By W Snooke and H Stock. Yellow brick with stucco and artificial stone dressings, in 20th century roof extensions above cornice. EXTERIOR: 4 storeys (ground floor including recent mezzanine level) and attic, 3 bays. Altered ground floor has tall, segmental-headed openings with keystones now filled in at top to form mezzanine level, open below as walkway. Stucco banded rustication to this level. Slightly recessed rounded corner angles. Upper 3 floors articulated by colossal round-arched recesses with architraves and keystones supporting cornice and resting on blocking course above cornice to ground floor; moulded string at spring. 1st- and 2nd-floor segmental-headed windows in inner, segmental-arched recess. 3rd floor round-headed windows in round-arched recesses have moulded sills inside recesses continuing as plain band outside. Similarly treated 5-bay returns. HISTORICAL NOTE: the last remaining warehouse building of former Cotton's Wharf. Cotton's was almost entirely destroyed in the fire of Tooley Street (1861) and was immediately rebuilt. It was converted into a coldstore in the 1880s by the proprietors of adjacent Hay's Wharf. Late C20 buildings have replaced the other buildings on the site. Has group value with the adjacent Hay's Wharf buildings to the east.	471389
43	**London Bridge City (IIA); (Hay's Wharf), Vine Lane, Tooley Street, SE1** DGLA excavation in 1988 revealed a watercourse, presumed to be part of the moat of the 15th-century house of Sir John Fastolf, together with its post-medieval revetting and reclamation levels. To the west, next to Vine Lane, were found features apparently associated with the Pickle Herring delftware kiln established by Christian Wilhelm in 1618.	VIN88
44	**29–33 Tooley Street, SE1** MoLAS evaluation in 1999. An alluvial sequence was found associated with a water channel known as the Guy's Channel. It contained Roman artefacts and timber stakes which probably indicate the management of the channel and its usage and abandonment. Construction of the existing basement had truncated all later deposits.	TEY99
45	**Temporary Grouting Shaft Area, Adjacent to 15 St Thomas Street Southwark, London, SE1** An excavation and watching brief in 1996 by MoLAS. Glacial river gravels were recorded at –0.9m OD covered by sand and silt to 0.5m OD. The site was located on the foreshore of the eyot on which modern north Southwark stands. The original eyot was no more than 1.80m OD and was surrounded by marsh and more recently by the tidal river environment. Aquatic erosion and deposition were observed from the prehistoric to the medieval periods, with human activity during the earlier periods likely to have been eroded away. A series of pits and ditches dating to the Roman period were cut into the alluvial sand, and a thick layer of undifferentiated dumping and a vertical well-like structure were recorded. A wide selection of pottery as well as glass, tesserae and other building material were recovered from the pits, and pottery and ceramic building material was recorded in the dumping layers. The majority of features date to the third century, with some possibly dating to the fourth century. These include ditches, pits, post or stake holes, as well as a structure consisting of four vertical wooden posts driven through previous deposits. Traces of what appeared to be wattle ran around the outside of the posts. It may have been some form of fish trap, or possibly part of a revetment. A well is also possible. Dumping layers dated primarily to the mid to late fourth century. A thick layer of alluvial material ascribed to the 11th century flooding common to many of the sites in Southwark was also found. medieval activity appears to have been spasmodic and major occupation development only appears to have started during the 14th and 15th centuries, when some structure remains were recorded along with several surfaces. A possible 17th century wall survived under the concrete shaft blocks but was inaccessible. Several fragmentary but undatable surface remnants were also recorded at the same level but later 19th-20th century intrusions had removed further stratigraphy.	TOM95

HEA No.	Description	Site code/ GLHER No.
46	**Cotton's Wharf, Tooley Street, SE1** DGLA excavation in 1983 revealed several prehistoric pits sealed by waterlaid clays. The earliest Roman feature was a large circular pit, possibly a gravel quarry, of 2nd-century date. At the north end of the site a number of partially robbed ragstone foundations of 2nd- and 3rd-century date were recorded; the structure had gone out of use by the 4th century. At the south end of the site was located the north edge of a channel aligned east-west which contained Roman material in its waterlaid clays and sands and was completely filled with clay by the medieval period. No medieval ground surface survived, but the period was represented by truncated features including two ditches and several pits. One of the latter was square in plan, wattle lined and dated probably to the 13th century. The remains of a 17th-century circular brick-lined structure were examined in the north-west corner of the site. A watching brief following the previous year's excavation enabled the west and south limits of the 'island' to be roughly recorded. Some 75,000sq m in area, the island extended from Cottons Yard to Battlebridge Lane, north of Tooley Street, the high ground being protected to the west by a post and plank revetment. Lines of stakes interlaced with wattles were erected beyond and perpendicular to this west edge, and may have functioned as groynes to prevent river erosion. A hoard of 44 bronze coins, the latest dating to AD 378–83, was discovered close to the Roman structure excavated in 1983.	CW83 CWO84 MLO26390 090893
47	**London Bridge Walk, SE1** Site of The Cage, medieval prison, recorded in the GLHER A house called 'The Cage' was probably the town prison and/or originally a cage owned by Earl Warren in the 14th century. The Cage is documented as a ‘capital messuage’ (manor house) by 1544.	090439 MLO7602
48	**Tooley Street, SE1** The approximate findspot of Roman pottery vessels, mortaria fragments & coins found in or before 1833, recorded in the GLHER	090582 MLO7734
49	**New London Bridge House, 25 London Bridge Street, SE1** MOLA watching brief in 2008: modern building destruction deposits were noted.	LBN08
50	**Station Approach, SE1** Site of the medieval Flemish Burial Ground, recorded in the GLHER Excavations by MoLAS in 1995–6 prior to the construction of the escalator shaft/ticket hall revealed evidence for an early Roman clay and timber building and quarrying for gravel, overlain by a substantial Roman masonry building which contained a sunken 'room' with associated drain. This building was succeeded by further clay and timber buildings of which two phases have been identified dating to the middle Roman period. No post Roman activity was recorded due to horizontal truncation by the construction of the railway viaduct and London Bridge Station. However the bases of some graves from a post medieval cemetery were located at around 1.80m OD. Natural deposits were recorded between 0.70–0.90m OD.	LBI95 092401–2 090444

HEA No.	Description	Site code/ GLHER No.
51	**New London Bridge House, 25 London Bridge Street, SE1** DGLA excavation in 1991 in advance of the building of an external lift shaft. Natural sands were exposed at 0.50m OD. The earliest finds were a number of secondary redeposited flint waste flakes. Fluvial silt and clay deposits dating to the Roman period were encountered, laid down during floods of the area. The site was on the edge of a north-south water channel, which probably became uncovered at low tide. One of these layers, possibly a foreshore, was composed of tile, brick, stone and pottery, dating to the 1st to 2nd centuries AD. A wall foundation was recorded, constructed of mortar missed with fragments of chalk, flint and large fragments of tegula (roof tile). The majority of the wall lay beyond the area of excavation. Several fragments of decorated medieval floor tile and stove tile were found. No structural evidence was recorded. A barrel-lined well was recorded during the excavation, the upper part of which was partially cut by later Tudor rubbish pits. Two of the pits were excavated, and they were found to contain a fill of ash and potters herds. Fragments of an elaborate German stone-ware jug from Raeren near Cologne depicting the muses and dated to 1579 was recovered from this context, along with other imports. A further pit containing a small post medieval lead disc was also discovered. These pits were cut through by a complex series of body trenches containing the remains of 227 individuals. The excavators considered that these were paupers graves, and documentary evidence suggested that they had originated in the nearby St Thomas' Hospital. The bodies were buried in groups; at least fifteen separate groups were recognised. Some of the burial groups cut through pervious groups, leading to a great deal of disturbance to the bodies. There was a wide variety of ages, including new born babies, infants and children. The presence of metal pins on or near the bodies indicates that the majority were originally wrapped in shrouds, although a small number of nails may indicate the occasional presence of a coffin. Preliminary work on the bodies indicated that a large number had suffered from the congenital form of syphilis. Each layer of bodies indicates that they were often packed in tightly, and only a thin layer of soil added before the next layer. The fill within the body trench contained large amounts of disarticulated bones indicating that graves may have been unmarked or little regard paid to earlier burials. A number of the grave trenches appeared to contain bodies that had been buried on top of each other without a separating layer of soil, indicating that large numbers had been buried at once. This may be a direct result of the plague. At least 3m of grave stratigraphy was excavated on this site, and the funerary activity had severely truncated the Roman deposits. During the 19th century the area was covered with up to 6m of rubble in order to raise the ground for the construction of London Bridge Station. A Victorian wall foundation was also recorded.	NLB91 091472–7
52	**St Olaf House, Tooley Street, SE1** Site of St Olaves parish church. The remains of the 18th-century hexagonal stone and brick built tower of the church and some truncated medieval foundations survived to modern street level in DGLA excavations in 1985. The chance discovery of Roman pottery fragments, urn and lamp was recorded in 1923	SOH84, 85 090228 090428 090697 MLO7837 MLO4214
53	**London Bridge City: London Bridge Station Area 2, Vent Shaft London Bridge Street Southwark, London, SE1** Excavation by MoLAS in 1995. Natural sands were overlain by dumps of the Roman period, some of which were characteristic of foreshore deposition. A shallow pit dug through the gravels contained a fragment of a Bronze Age loom weight which suggested the pit dated to the prehistoric period. During the Roman period the site was overlain by silty foreshore deposits and dumps, and in the eastern end of the site a timber lined pit or well was recorded. A number of large pits intruded into the Roman levels and these were dated to the medieval period and appeared to contain organic debris and was interpreted as a cess pit. Medieval walls and a chalk lined well were also present. The eastern most walls seem to have been rebuilt in the Tudor period. It is probable that these remains were associated with the Swan Inn. Above these was a sequence of demolition debris as well as later surfaces. A 17th century drain was the latest feature uncovered.	LBA95 LBB95 092393–9 092389 092390–

9 Planning framework

9.1 Statutory protection

Planning (Listed Buildings and Conservation Areas) Act 1990

9.1.1 The Act sets out the legal requirements for the control of development and alterations which affect buildings, including those which are listed or in conservation areas. Buildings which are listed or which lie within a conservation area are protected by law. Grade I are buildings of exceptional interest. Grade II* are particularly significant buildings of more than special interest. Grade II are buildings of special interest, which warrant every effort being made to preserve them.

9.2 National planning policy

9.2.1 The Government issued Planning Policy Statement 5 (PPS5) in March 2010 (DCLG 2010). PPS5 integrates planning strategy on 'heritage assets' - bringing together all aspects of the historic environment, below and above ground, including historic buildings and structures, landscapes, archaeological sites, and wrecks. The significance of heritage assets needs to be considered in the planning process, whether designated on not, and the settings of assets taken into account. PPS5 requires using an integrated approach to establishing the overall significance of the heritage asset using evidential, historical, aesthetic and communal values, to ensure that planning decisions are based on the nature, extent and level of significance. Key paragraphs from PPS5 are set out below:

> **Policy HE6.1:** 'Local planning authorities should require an applicant to provide a description of the significance of the heritage assets affected and the contribution of their setting to that significance… Where an application site includes, or is considered to have the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where desk-based research is insufficient to properly assess the interest, a field evaluation.'
>
> **Policy HE6.3:** 'Local planning authorities should not validate applications where the extent of the impact of the proposal on the significance of any heritage assets affected cannot adequately be understood from the application and supporting documents.'
>
> **Policy HE7.7** 'Where loss of significance is justified on the merits of new development, local planning authorities should not permit the new development without taking all reasonable steps to ensure the new development will proceed after the loss has occurred by imposing appropriate planning conditions or securing obligations by agreement.'
>
> **Policy HE9.1** 'There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be… Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of designated heritage assets of the highest significance…should be wholly exceptional.'
>
> **Policy HE9.6** 'There are many heritage assets with archaeological interest that are not currently designated as scheduled monuments, but which are demonstrably of equivalent significance…The absence of designation for such heritage assets does not indicate lower significance.'
>
> **Policy HE12.3** 'Where the loss of the whole or a material part of a heritage asset's significance is justified, local planning authorities should require the developer to record and advance understanding of the significance of the heritage asset before it is lost, using planning conditions or obligations as appropriate. The extent of the requirement should be proportionate to the nature and level of the asset's

> significance. Developers should publish this evidence…Local planning authorities should…ensure such work is undertaken in a timely manner and that the completion of the exercise is properly secured.'

9.3 Regional policy

The London Plan

9.3.1 The overarching strategies and policies for the whole of the Greater London area are contained within the London Plan of the Greater London Authority (GLA Feb 2008). This includes an archaeological statement:

> **Policy 4B.15 Archaeology**
>
> The Mayor, in partnership with English Heritage, the Museum of London and boroughs, will support the identification, protection, interpretation and presentation of London's archaeological resources. Boroughs in consultation with English Heritage and other relevant statutory organisations should include appropriate policies in their DPDs [Development Plan Documents] for protecting scheduled ancient monuments and archaeological assets within their area.

Draft Replacement London Plan, 2009

9.3.1 A draft replacement plan (GLA 2009) is currently undergoing consultation. Policy 7.8 relates to Heritage Assets and Archaeology:

> Strategic
>
> A. London's historic environment, including natural landscapes, conservation areas, heritage assets, World Heritage Sites, Scheduled Ancient Monuments and memorials should be identified, preserved and restored.
>
> B. Development should incorporate measures that identify, record, interpret, protect and, where appropriate, present, the site's archaeology.
>
> Planning decisions
>
> C. Development should preserve, refurbish and incorporate heritage assets, where appropriate.
>
> D. New development in the setting of heritage assets, and conservation areas should be sympathetic to their form, scale, materials and architectural detail.
>
> E. New development should make provision for the protection of archaeological resources and significant memorials. Where the artefact or memorial cannot be moved from the site without damaging its cultural value, the assets should where possible be made available to the public on-site.
>
> LDF preparation
>
> F. Boroughs should, in LDF policies, seek to maintain and increase the contribution of built heritage to London's environmental quality and economy while allowing for London to accommodate change and regeneration.
>
> G. Boroughs, in consultation with English Heritage, Natural England and other relevant statutory organisations, should include appropriate policies in their LDFs for identifying and protecting heritage assets scheduled ancient monuments, archaeological assets, memorials and natural landscape character within their area.

9.4 Local planning policy

9.4.1 The Southwark Unitary Development Plan (UDP) was adopted in July 2007 and, along with the London Plan, it makes up the current Development Plan for Southwark (Southwark Council, 2007). Following the Planning and Compulsory Purchase Act 2004, the planning policies in the UDP are currently being reviewed and will be replaced with a new system of Local Development Frameworks (LDFs) over the coming years. As a result the current UDP is now a part of the Local Development Framework (LDF) and some policies were 'saved'.

9.4.2 The relevant policy in relation to archaeology is set out below:

> **Policy 3.19** Planning applications affecting sites within Archaeological Priority Zones (APZs), as identified in Appendix 8, shall be accompanied by an archaeological assessment and evaluation of the site, including the impact of the proposed development. There is a presumption in favour of preservation in situ, to protect and safeguard archaeological remains of national importance, including scheduled monuments and their settings. The in situ preservation of archaeological remains of local importance will also be sought, unless the importance of the development outweighs the local value of the remains. If planning permission is granted to develop any site where there are archaeological remains or there is good reason to believe that such remains exist, conditions will be attached to secure the excavation and recording or preservation in whole or in part, if justified, before development begins.
>
> Reasons
>
> Southwark has an immensely important archaeological resource. Increasing evidence of those peoples living in Southwark before the Roman and medieval period is being found in the north of the borough and along the Old Kent Road. The suburb of the Roman provincial capital (Londinium) was located around the southern bridgehead of the only river crossing over the Thames at the time and remains of Roman buildings, industry, roads and cemeteries have been discovered over the last 30 years. The importance of the area during the medieval period is equally well attested both archaeologically and historically. Elsewhere in Southwark, the routes of Roman roads (along the Old Kent Road and Kennington Road) and the historic village cores of Peckham, Camberwell, Walworth and Dulwich also have the potential for the survival of archaeological remains.

9.4.3 Additionally, the council has introduced Supplementary Planning Documents (SPDs) and Supplementary Guidance Documents (SPGs) which are used to provide more information and guidance on the policies in the UDP. The Southwark SPG relating to Archaeology was adopted in 1997:

> **OBJECTIVE E.5**
>
> to assist in the preservation, protection, investigation, display and recording of the archaeological heritage Sites of Archaeological Importance
>
> **POLICY E.5.1**:
>
> The Council will seek to conserve and protect the borough's archaeological heritage and to enhance the knowledge of its historical development. The policy will apply to sites of potential archaeological Importance, where ancient remains are threatened by development.
>
> (i) The Council will expect the applicant to provide Information to enable an assessment of the Impact of a proposed development on the potential archaeology of the site. This would usually be desk based Information and would be expected prior to the determination of a planning application.
>
> (ii) Where there are likely to be Important remains on a site, which may merit preservation In situ, then results of an archaeological field evaluation will, If feasible, be required prior to the determination of a planning application.
>
> (iii) Where the evaluation reveals important remains their protection and preservation will be the primary objective. This can be achieved by redesigning the proposed development and by foundation modification.
>
> (iv) Where important archaeological remains cannot be preserved, or where remains do not merit preservation, then the Council will use planning conditions to ensure excavation and recording of the remains prior to redevelopment, i.e. preservation by record.
>
> (v) Archaeological Investigations are to be undertaken by a recognised archaeological field unit to a written specification. These will need to be approved by the Council prior to commencement of any work.

9.4.4 The council's Core Strategy was approved by government in February 2011. Strategic Policy 12 – Design and conservation, states that development is expected to:

conserve or enhance the significance of Southwark's heritage assets, their settings and wider historic environment, including conservation areas, archaeological priority zones and sites, listed and locally listed buildings, registered parks and gardens, world heritage sites and scheduled monuments (Southwark Council, 2011).

10 Determining significance

10.1.1 'Significance' lies in the value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic or historic (DCLG 2010, 14). Archaeological interest includes 'an interest in carrying out an expert investigation at some point in the future into the evidence a heritage asset may hold of past human activity' (*ibid*, 13) and may apply to standing buildings or structures as well as buried remains.

10.1.2 Known and potential heritage assets within the site and its vicinity have been identified from national and local designations, HER data and expert opinion. The determination of the significance of these assets is based on statutory designation and/or professional judgement against four values (EH 2008):

- *Evidential value*: the potential of the physical remains to yield evidence of past human activity. This might take into account date; rarity; state of preservation; diversity/complexity; contribution to published priorities; supporting documentation; collective value and comparative potential.
- *Aesthetic value*: this derives from the ways in which people draw sensory and intellectual stimulation from the heritage asset, taking into account what other people have said or written;
- *Historical value*: the ways in which past people, events and aspects of life can be connected through heritage asset to the present, such a connection often being illustrative or associative;
- *Communal value*: this derives from the meanings of a heritage asset for the people who know about it, or for whom it figures in their collective experience or memory; communal values are closely bound up with historical, particularly associative, and aesthetic values, along with and educational, social or economic values.

10.1.3 Table 2 gives examples of the significance of designated and non-designated heritage assets.

Table 2: Significance of heritage assets

Heritage asset description	Significance
World heritage sites Scheduled monuments Grade I and II* listed buildings English Heritage Grade I and II* registered parks and gardens Protected Wrecks Heritage assets of national importance	Very high (International/ national)
English Heritage Grade II registered parks and gardens Conservation areas Designated historic battlefields Grade II listed buildings Burial grounds Protected heritage landscapes (e.g. ancient woodland or historic hedgerows) Heritage assets of regional or county importance	High (Regional/ county)
Heritage assets with a district value or interest for education or cultural appreciation Locally listed buildings	Medium (District)
Heritage assets with a local (i.e. parish) value or interest for education or cultural appreciation	Low (Local)
Historic environment resource with no significant value or interest	Negligible
Heritage assets that have a clear potential, but for which current knowledge is insufficient to allow significance to be determined	Uncertain

10.1.4 Unless the nature and exact extent of buried archaeological remains within any given area has been determined through prior investigation, the significance of

heritage assets which comprise below ground archaeological remains is often uncertain.

10.1.5 Built heritage and above ground archaeological remains (e.g. earthworks and landscapes) are visible and tangible and, where appropriate, significance is considered in more detail. 'Built heritage' refers to those aspects of the buildings visible on the site that possess noteworthy architectural or historic interest. These aspects of the buildings have been identified and their interest has been rated very broadly, using the published criteria for statutory listing of buildings for their special architectural or historic interest, in English Heritage 'conservation principles' (EH 2008) and applicable guidance published by English Heritage on selecting buildings for listing (or designation as heritage assets) (2007) and on investigating and recording buildings archaeologically (2006). Criteria for listing includes:

- 'architectural interest:… of importance to the nation for… their architectural design, decoration and craftsmanship; …important examples of particular building types and techniques… and significant plan forms;
- 'historic interest: … illustrate important aspects of the nation's social, economic, cultural or military history;
- 'close historical association with nationally important people or events;
- 'group value, especially where buildings comprise an important architectural or historic unity or a fine example of planning…'

10.1.6 Evidential and aesthetic values correspond most closely to architectural interest, in terms of the published criteria for listing, while historical and communal values correspond to historic interest. These values emphasise national importance as being necessary for statutory listing, but are also useful in considering the particular architectural or historic interest of any building or structure.

11 Glossary

Alluvium	Sediment laid down by a river. Can range from sands and gravels deposited by fast flowing water and clays that settle out of suspension during overbank flooding. Other deposits found on a valley floor are usually included in the term alluvium (e.g. peat).
Archaeological Priority Area/Zone	Areas of archaeological priority, significance, potential or other title, often designated by the local authority.
Brickearth	A fine-grained silt believed to have accumulated by a mixture of processes (e.g. wind, slope and freeze-thaw) mostly since the Last Glacial Maximum around 17,000BP.
B.P.	Before Present, conventionally taken to be 1950
Bronze Age	2,000–600 BC
Building recording	Recording of historic buildings (by a competent archaeological organisation) is undertaken *'to document buildings, or parts of buildings, which may be lost as a result of demolition, alteration or neglect',* amongst other reasons. Four levels of recording are defined by Royal Commission on the Historical Monuments of England (RCHME) and English Heritage. Level 1 (basic visual record); Level 2 (descriptive record), Level 3 (analytical record), and Level 4 (comprehensive analytical record)
Built heritage	Upstanding structure of historic interest.
Colluvium	A natural deposit accumulated through the action of rainwash or gravity at the base of a slope.
Conservation area	An area of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance. Designation by the local authority often includes controls over the demolition of buildings; strengthened controls over minor development; and special provision for the protection of trees.
Cropmarks	Marks visible from the air in growing crops, caused by moisture variation due to subsurface features of possible archaeological origin (i.e. ditches or buried walls).
Cut-and-cover [trench]	Method of construction in which a trench is excavated down from existing ground level and which is subsequently covered over and/or backfilled.
Cut feature	Archaeological feature such as a pit, ditch or well, which has been cut into the then-existing ground surface.
Devensian	The most recent cold stage (glacial) of the Pleistocene. Spanning the period from *c* 70,000 years ago until the start of the Holocene (10,000 years ago). Climate fluctuated within the Devensian, as it did in other glacials and interglacials. It is associated with the demise of the Neanderthals and the expansion of modern humans.
Early medieval	AD 410 – 1066. Also referred to as the Saxon period.
Evaluation (archaeological)	A limited programme of non–intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area.
Excavation (archaeological)	A programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological remains, retrieves artefacts, ecofacts and other remains within a specified area. The records made and objects gathered are studied and the results published in detail appropriate to the project design.
Findspot	Chance find/antiquarian discovery of artefact. The artefact has no known context, is either residual or indicates an area of archaeological activity.
Geotechnical	Ground investigation, typically in the form of boreholes and/or trial/test pits, undertaken for engineering purposes to determine the nature of the subsurface deposits.
Head	Weathered/soliflucted periglacial deposit (i.e. moved downslope through natural processes).
Heritage asset	A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage assets are the valued components of the historic environment. They include designated heritage assets and assets identified by the local planning authority (including local listing).
Historic environment assessment	A written document whose purpose is to determine, as far as is reasonably possible from existing records, the nature of the historic environment resource/heritage assets within a specified area.
Historic Environment Record (HER)	Archaeological and built heritage database held and maintained by the County authority. Previously known as the Sites and Monuments Record

Holocene	The most recent epoch (part) of the Quaternary, covering the past 10,000 years during which time a warm interglacial climate has existed. Also referred to as the 'Postglacial' and (in Britain) as the 'Flandrian'.
Iron Age	600 BC – AD 43
Later medieval	AD 1066 – 1500
Last Glacial Maximum	Characterised by the expansion of the last ice sheet to affect the British Isles (around 18,000 years ago), which at its maximum extent covered over two-thirds of the present land area of the country.
Locally listed building	A structure of local architectural and/or historical interest. These are structures that are not included in the Secretary of State's Listing but are considered by the local authority to have architectural and/or historical merit
Listed building	A structure of architectural and/or historical interest. These are included on the Secretary of State's list, which affords statutory protection. These are subdivided into Grades I, II* and II (in descending importance).
Made Ground	Artificial deposit. An archaeologist would differentiate between modern made ground, containing identifiably modern inclusion such as concrete (but not brick or tile), and undated made ground, which may potentially contain deposits of archaeological interest.
Mesolithic	12,000 – 4,000 BC
National Monuments Record (NMR)	National database of archaeological sites, finds and events as maintained by English Heritage in Swindon. Generally not as comprehensive as the country SMR/HER.
Neolithic	4,000 – 2,000 BC
Ordnance Datum (OD)	A vertical datum used by Ordnance Survey as the basis for deriving altitudes on maps.
Palaeo-environmental	Related to past environments, i.e. during the prehistoric and later periods. Such remains can be of archaeological interest, and often consist of organic remains such as pollen and plant macro fossils which can be used to reconstruct the past environment.
Palaeolithic	700,000–12,000 BC
Palaeochannel	A former/ancient watercourse
Peat	A build up of organic material in waterlogged areas, producing marshes, fens, mires, blanket and raised bogs. Accumulation is due to inhibited decay in anaerobic conditions.
Pleistocene	Geological period pre-dating the Holocene.
Post-medieval	AD 1500 – present
Preservation by record	Archaeological mitigation strategy where archaeological remains are fully excavated and recorded archaeologically and the results published. For remains of lesser significance, preservation by record might comprise an archaeological watching brief.
Preservation in situ	Archaeological mitigation strategy where nationally important (whether Scheduled or not) archaeological remains are preserved *in situ* for future generations, typically through modifications to design proposals to avoid damage or destruction of such remains.
Registered Historic Parks and Gardens	A site may lie within or contain a registered historic park or garden. The register of these in England is compiled and maintained by English Heritage.
Residual	When used to describe archaeological artefacts, this means not *in situ,* i.e. Found outside the context in which it was originally deposited.
Roman	AD 43 – 410
Scheduled Monument	An ancient monument or archaeological deposits designated by the Secretary of State as a 'Scheduled Ancient Monument' and protected under the Ancient Monuments Act.
Site	The area of proposed development
Site codes	Unique identifying codes allocated to archaeological fieldwork sites, e.g. evaluation, excavation, or watching brief sites.
Study area	Defined area surrounding the proposed development in which archaeological data is collected and analysed in order to set the site into its archaeological and historical context.
Solifluction, Soliflucted	Creeping of soil down a slope during periods of freeze and thaw in periglacial environments. Such material can seal and protect earlier landsurfaces and archaeological deposits which might otherwise not survive later erosion.
Stratigraphy	A term used to define a sequence of visually distinct horizontal layers (strata), one above another, which form the material remains of past cultures.
Truncate	Partially or wholly remove. In archaeological terms remains may have been truncated by previous construction activity.

Watching brief (archaeological)	An archaeological watching brief is '*a formal programme of observation and investigation conducted during any operation undertaken for non–archaeological reasons.*'

1:50,000 series map sheet 256 (1994)

12 Appendix 1: Report on monitoring of geotechnical work

Sam Pfizenmaier

12.1 Introduction

Site background

The monitoring of geotechnical work and geoarchaeological borehole investigation took place at London Bridge Station, hereafter called 'the site'. The site is located in the London Borough of Southwark, SE1. It is bounded to the north by Tooley Street, the west by Joiner Street, the south by St Thomas Street and the east by Holyroad and Shand Streets. The OS National Grid Ref. for centre of site is 533025 180105.

The fieldwork was carried out predominantly within the London Bridge Station viaduct complex. Some trial pits were also located immediately to the south of Tooley street in Tuli a Chinese restaurant (ground/slab level 4.36m OD), Paintball (ground/slab level 4.41m OD) and 84 Tooley Street (basement slab level 1.37m OD) Fourteen trial pits were located in the Shunt Theatre (ground/slab level between 5.04-3.50m OD and eleven in the Debut night club between Stainer and Weston Streets (ground/slab level at 5.01m-4.11m OD. The remainder were located between Bermondsey Street and Stainer Street in a variety of small and medium-sized tenanted arches, where ground level lay at *c* 4.40m OD. The site code is LBZ 10.

A *historic environment assessment*, which covers the whole area of the site, forms the main part of this document. The *assessment* should be referred to for information on the natural geology, archaeological and historical background of the site, and the initial interpretation of its archaeological potential.

Aims and objectives

The following aims were established in the *Written Scheme of Investigation for Archaeological Works at Borough Viaduct and London Bridge Station (Network Rail 2009)*:

- establish, as far as reasonably practicable, the presence, location extent, character, date and condition of any archaeological/cultural assets or palaeoenvironmental deposits;
- assess the significance of assets and deposits and the need for further archaeological works;
- reduce the risk of unforeseen archaeological remains being encountered during construction; and
- provide datums for the surface of London Clay and Pleistocene deposits to assist with modelling the palaeotopography of the study area;
- establish the vertical and horizontal extent of the main soil formations;
- establish the extent and degree of modern truncation and disturbance of archaeologically significant deposits;
- determine the environments of deposition (facies modelling) of the main soil formations;
- establish the date of the main soil formations through the recovery of artefacts or by radiocarbon or other dating;
- establish the vertical and horizontal sequence of deposits accumulation;
- examine changes to the environment through all periods of time represented in the archaeological record;

- provide data to allow more confident predictions of archaeological potential to be made; and
- establish the need and scope of any further archaeological works or other mitigation.

12.2 Methodology

All archaeological excavation and recording during the monitoring exercise was carried out in accordance with the preceding *Written Scheme of Investigation* (Document ref. N232-01000-NRT-REV-GO-000004 v1, Network Rail, 2009a), and the *Archaeological Site Manual* (MoLAS, 1994).

A total of 49 trial pits were excavated along the London bridge Station viaduct, between the boundaries of Tooley Street, St Thomas Street, Joiner Street and Bermondsey Street. The work was undertaken by specialist ground investigation contractors (Norwest Holst). It should be noted that further trial pits not excavated at street level and with no impact on deposits of potential archaeological interest were not included in the monitoring exercise.

The slab/ground was broken out and cleared and monitored by MOLA. Further modern material within the trial pits was excavated initially by machine and then excavation by the contractors continued manually; all excavation was monitored by a MOLA Senior Archaeologist. The trial pits were shored at 1.2m intervals. In some instances (where feasible and safe to do so), selective deepening of the trial pits by means of small slots was undertaken by the monitoring archaeologist in order to better understand the nature of the surviving stratigraphy. Trial pits in the London Dungeon and Gas Room in the north-west of the site were excavated during night shifts: where possible, these were recorded by the MOLA Senior Archaeologist following excavation.

The final locations of the geotechnical trial pits and boreholes were recorded by MOLA by offsetting from adjacent standing walls and plotted on to a Basement Survey (Alan Baxter Drg. No. N231-ALB-DRG-SU-000098 Rev P01, dated June 2010). This information was then plotted onto the OS grid (Fig 16, Fig 17).

A written and drawn record of all archaeological deposits encountered was made in accordance with the principles set out in the MOLA site recording manual (MOLAS, 1994). The heights of observations and/or archaeological remains were recorded relative to the ground levels indicated on the Alan Baxter survey drawing noted above.

Where relevant, sections were drawn at a scale of 1:20; numbered contexts were allocated were appropriate.

The site has produced: 49 trial pit plans; 180 context records and 14 section drawings at 1:20. In addition 10 boxes of finds were recovered from the site.

The site finds and records can be found under the site code LBZ10 in the MoL archive.

12.3 Results of the monitoring of geotechnical pits

In total, 49 geotechnical trial pits were excavated and two archaeological boreholes were drilled (CP2ARCH and CP3ARCH). The trial pits have been numbered according to the system employed on the Proposed Trial Pit and Borehole location plan (Alan Baxter Drg. No. N231-ALB-DRG-SU-000098 Rev P01, dated June 2010). Where necessary additional trial pits have been indicated by the addition of alphabetic identifier. There follows a brief description of the archaeological deposits as recorded. For all geotechnical trial pit and archaeological borehole locations see Fig 16 and Fig 17.

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Trial Pit SC01 (Fig 16)	
Location	Shunt Theatre
Dimensions	1.8m by 0.9m
Modern ground level/top of slab	4.07m OD
Base of modern fill/slab	3.91m OD
Depth of archaeological deposits seen	1.54m
Level of base of deposits observed	2.51m OD
Natural observed	N/A

Three courses of wall were visible in section running along the middle of the trench at a depth of 3.43m OD. The wall was generally of poor construction and is most likely to represent a garden wall, probably of early 19th-century origin. Two corroded metal pipes running parallel with the south-east limit of excavation were recorded at 3.90 and 3.3m OD. The remainder of the trial pit was filled with 19th-century rubble backfill from the viaduct construction of 1836.

Trial Pit 008 (Fig 16)	
Location	London Dungeon
Dimensions	2.2m by 2.2m
Modern ground level/top of slab	3.44m OD
Base of modern fill/slab	3.24m OD
Depth of archaeological deposits seen	1.45m
Level of base of deposits observed	1.99m OD
Natural observed	N/A

No deposits of archaeological significance were recorded. The entire trial pit was filled with friable silty sand; this was construction backfill from 1839.

Trial Pit 009 (Fig 16, not monitored)	
Location	Shunt Theatre
Dimensions	2.2m x 2.1m
Modern ground level/top of slab	3.44m OD
Base of modern fill/slab	N/A
Depth of archaeological deposits seen	1.2m OD
Level of base of deposits observed	2.24m OD
Natural observed	N/A

Trial pit 009 was excavated during the night shift due to its proximity to London Bridge underground station and was therefore not monitored. The contractors' (Vinci) records maintain that due to the close confines of the boiler room and inability to remove/store spoil, excavation was halted at a depth of 1.2mg below ground level. No deposits of archaeological significance were encountered.

Trial Pit 010 (Fig 16)	
Location	Shunt Theatre
Dimensions	1.5m by 1.52m
Modern ground level/top of slab	4.62m OD
Base of modern fill/slab	0.35m OD
Depth of archaeological deposits seen	0.35m

Level of base of deposits observed	4.27 OD
Natural observed	N/A

Excavation of Trial Pit 010 was hindered by proximity of live underground cables. It was subsequently relocated and re-numbered as Trial Pit 010a.

Trial Pit 010a (Fig 16)	
Location	Shunt Theatre
Dimensions	2.4m by 2.45m
Modern ground level/top of slab	4.62m OD
Base of modern fill/slab	4.42m OD
Depth of archaeological deposits seen	2.90m
Level of base of deposits observed	1.72m OD
Natural observed	N/A

A small sondage (approx 0.8m x 0.4m) was excavated next to the western pier foundation footing (constructed 1836) to determine its depth, but this was not found. A horizon of predominantly silty sand with rubble inclusions was observed., which appeared to be late 18th-/ early 19th-century in date. Directly above, was a N–S aligned drain with thin walls (0.25m thick), at least 0.75m high [78], constructed between 1700–1900. The remnant of an arched roof survived in the northern corner of the trench, along with a surviving portion of standing wall. This continued beyond the northern limit of excavation for a further 1.3m, eventually being truncated by the 1836 viaduct footing. A separate wall, parallel to this but without the arched roof was recorded in the south-west of the trench. These were of similar construction and most likely represent the same structure. Both were truncated to the east and west by the two phases of viaduct construction.

A sliver of stratigraphy roughly 0.8m in width remained in the centre of the trial pit. The initial phase of 1836 construction truncated everything to the west to a depth of 2.14m OD. The foundation pier (for the viaduct) extended 0.75m into the trench (including wall footings). A crack was visible running through the lower brick footings and into the concrete foundation; it was partly filled with spoil, and was therefore not believed to be recent. Extending to a similar depth in the east of the trial pit (maximum 1.25m) was the 1845 foundation footing. It is likely that the earlier phase of footing was exposed whilst this was constructed, as both are built to the same depth. A friable light brown sandy silt, with frequent rubble inclusions (construction backfill) filled the trial pit down to this level. An inverted arch spanning the internal width of the 1845 phase of viaduct was recorded in the south-eastern section of the trial pit.

Trial Pit 015 (Fig 16)	
Location	Shunt Theatre
Dimensions	1.72m by 1.65m
Modern ground level/top of slab	4.67m OD
Base of modern fill/slab	4.52m OD
Depth of archaeological deposits seen	3.74m
Level of base of deposits observed	0.93 OD
Natural observed	Alluvium at 0.93m OD

The lowest visible horizon was a very wet dark greyish-blue silty clay alluvium [7] approximately 1m thick, which contained pottery dated to 1700–1846. This probably represents a tidal mudflat as it was located immediately to the west of the westernmost tributary of Guy's Channel. Ground water had filled a sondage excavated to 0.93m OD. During initial excavations, significant chalk boulders and smaller fragments had been observed within or near the N–S viaduct concrete foundation pad. Subsequent recording confirmed these had been incorporated within the concrete foundation matrix. It is unlikely that chalk would have been imported as building material; therefore it may have been

exposed during clearance for the viaduct construction and re-used as a convenient and cheap building material. The size of fragments may suggest it was originally uncovered in the form of a (medieval?) structure in the vicinity. Deposit [7] was sealed by an irregular narrow band of pale green sterile sand [6]; this in turn was covered by a thin horizon of finds-rich garden soil [5], which contained clay pipes and pottery consistent with an early 19th-century date. The concrete viaduct footing was visible at *c* 2.45m OD, extending 0.45m from the viaduct wall and vertically truncating all subsequent contexts. A rubble backfill [3] containing broken brick, ceramic building material (CBM) including tile, and mortar fragments associated with the viaduct construction of 1836 covered this up to slab level.

Trial Pit 015a (Fig 16)	
Location	Shunt Theatre
Dimensions	2.22m by 2.02m
Modern ground level/top of slab	4.21m OD
Base of modern fill/slab	3.99m OD
Depth of archaeological deposits seen	3.6m
Level of base of deposits observed	0.61 OD
Natural observed	Alluvium at 0.61m OD

The deepest recorded deposit at 0.61m OD was a fairly organic mid blue redeposited alluvial clay [106]; this contained occasional charcoal, pot & bi-valve shells as well as moderate CBM fragments. The deposit was *c* 1.40–1.50m thick and probably represents an upper deposit within Guy's channel. This was sealed by a 0.65m thick grey-black sandy silt dump [105], containing moderate inclusions of slag, clinker and pea-gravel. This may represent debris from industrial activity. It was sealed by the same viaduct construction make up [104] (dated 1820–1900) and backfill [103] recorded elsewhere on site.

Trial Pit 025 (Fig 16, Fig 18*)*	
Location	Shunt Theatre
Dimensions	1.62m by 1.52m
Modern ground level/top of slab	3.5m OD
Base of modern fill/slab	3.32m OD
Depth of archaeological deposits seen	2.28m
Level of base of deposits observed	1.2m OD
Natural observed	N/A

The lowest recorded feature at *c* 1.2m OD was a wall [75], aligned approximately NW–SE and formed of regular courses in an English bond. The bricks are dated to 1550–1700 and were bonded by a reddish brown sandy mortar. Constructed immediately on top of this was, and sharing the same alignment was a chalk wall [74] of fairly irregular courses and block sizes; again the mortar was sandy and quite loose. This phase of construction was approximately 0.5m in height and was capped by a large lump of indurated mortar associated with a subsequent phase of wall construction. A horizon of garden soil [76] with pottery dated 1701–1711 appeared to have built up against this construction. A layer of roof tiles (probably for levelling) was laid on top of the chalk wall and a later phase of brick wall [73] had been laid immediately on top; the brick dimensions suggest a late 18th-century date. These three phases of wall were sealed by a series of dumps [72] and [71], the earliest with pottery inclusions (probably residual) dated 1580–1600. All of these were truncated by the viaduct construction pier to a depth of 2.1m OD. This construction extended 0.9m from the viaduct wall and appears to undercut at around 1.3m OD. The lowest phase of brick wall appeared to continue westwards underneath this footing. These structures share the same alignment as Tooley Street to the north, and are consistent with documentary sources detailing the relatively high density of domestic dwellings in this area during the post-

medieval period. The most likely interpretation is that they represent the maintenance over time of a property boundary or garden wall.

Trial Pit 035 (Fig 16)	
Location	Shunt Theatre
Dimensions	2m by 2.16m
Modern ground level/top of slab	5.44m OD
Base of modern fill/slab	5.26m OD
Depth of archaeological deposits seen	2.45m
Level of base of deposits observed	2.99m OD
Natural observed	N/A

The lowest horizon, observed at 2.99m OD, was a loose, sandy pebble layer [55] of 0.55m minimum thickness, containing frequent large brick fragments. It appeared to post-date the viaduct foundation pad. This was sealed by 0.8m of friable loose light brown clay silt [54] containing an assortment of building debris and probably residual pottery dated 1550–1700; this in turn was covered by a 0.75m thick mixed silty rubble deposit [53]. All of these layers abutted the viaduct footings which were of relatively poor construction. In places the foundation pads (although heavily saturated) disintegrated with minimal encouragement.

Trial Pit 037 (Fig 16)	
Location	Shunt Theatre
Dimensions	2.2m by 2.69m
Modern ground level/top of slab	4.52m OD
Base of modern fill/slab	4.27m OD
Depth of archaeological deposits seen	2.4m
Level of base of deposits observed	2.12 OD
Natural observed	N/A

The lowest deposit observed at *c* 2.12m OD was a mid grey sandy silt dump [66], with frequent demolition material and a selection of 19th-century pottery. This was sealed by a concrete footing, the purpose of which was unclear, as it was built on to the original 1836 footing, but was evidently a later build. An E–W culvert at 3.37m OD was built on top of this, respecting the 1836 viaduct construction. This culvert was truncated at its western edge by the 1839-45 Viaduct expansion. Rubble backfill (from the viaduct construction) consisting of brick, mortar and CBM fragments filled the remainder of the trial pit up to slab level.

Trial Pit 039 (Fig 16)	
Location	Shunt Theatre
Dimensions	1.65m by 1.93m
Modern ground level/top of slab	4.66m OD
Base of modern fill/slab	4.44m OD
Depth of archaeological deposits seen	3.6m
Level of base of deposits observed	2.18 OD
Natural observed	N/A

The foundation pier was visible across the entire trial pit at a depth of between 2.48m –2.51m OD. This was constructed of a poorly bonded pebble concrete, similar to that recorded elsewhere on site. It was overlain by mid grey-brown friable sandy silt [79], containing residual pottery dated 1825–1830. This was a make up layer, and filled the remainder of the trial pit.

Trial Pit 040 (Fig 16)	
Location	Shunt Theatre
Dimensions	2.35m by 2.01m
Modern ground level/top of slab	4.91m OD
Base of modern fill/slab	4.79m OD
Depth of archaeological deposits seen	3.9m
Level of base of deposits observed	1.01 OD
Natural observed	N/A

The lowest visible horizon (observed within a sondage measuring 0.7mx 0.4m) was a dark blue alluvium [9] at 1.01m OD. Truncating this at 2.51m OD was a post-medieval brick structure [8] (aligned NW–SE) of which only three courses survived. This structure was perpendicular to Stainer Street (immediately to the east) and probably represents the remains of a terraced dwelling or shop. To the north of this structure a brown clay silt deposit [5] was recorded at 2.41m OD; this is possibly garden soil or the fill of a rubbish pit. The viaduct footing extended *c* 0.5m from the wall base at 2.40m OD. Archaeological deposits had been horizontally truncated at this level. A coarse, silty rubble deposit associated with the viaduct construction filled the trial pit up to slab level.

Trial Pit 042 (Fig 16)	
Location	Shunt Theatre
Dimensions	3.58m by 2.21m
Modern ground level/top of slab	4.27m OD
Base of modern fill/slab	4.09m OD
Depth of archaeological deposits seen	4.9m
Level of base of deposits observed	–0.43 OD
Natural observed	Alluvium at 1.27m OD

The lowest recorded deposit, excavated in sondage to –0.43m OD, was a waterlogged mid blue grey alluvial clay [47]. This is likely to represent an intertidal mudflat or channel deposit associated with the Guy's channel. Overlying this to a depth of 1.27m OD was a dark blue grey silty clay [12] containing pottery dating from 1630–1700; this deposit was slightly lighter in colour, containing ceramic building material and tile, implying that demolition activity had occurred nearby prior to deposition of the layer. A series of post-medieval dumps [11], [10] lay above this, with pottery dates ranging from 1720–1800. These layers were all vertically truncated by the viaduct footing which extended irregularly from the wall base. A supporting arch wall (1.32 m high by 0.44m thick) at 2.87m OD abutted the viaduct immediately below slab level and was firmly cemented to it. This structure was evidently backfilled immediately after construction as although robust, it was unfinished. This probably represents a secondary stage of viaduct construction contemporary with the original build, rather then later remedial work and probably spans the gap between the viaduct arch (W67). A single, redeposited human tibia was retrieved from the construction backfill which filled the trial pit up to slab level.

Trial Pit 103 (Fig 16)	
Location	On Your Bike
Dimensions	1.7m by 1.72m
Modern ground level/top of slab	4.10m OD
Base of modern fill/slab	3.9m OD
Depth of archaeological deposits seen	2.9m
Level of base of deposits observed	1.2m OD
Natural observed	N/A

No archaeological deposits of significance were recorded. The entire trial pit was backfilled with friable silty sand, containing residual 18th-/19th-century pottery; this was construction backfill from the 1839–45 viaduct construction. A NE–SW drain/footing was partially uncovered running from the SW section to the centre of the trial pit. It then appeared to be truncated by the 1839–45 viaduct construction at around 0.8m from the viaduct wall at a depth of 1.5m OD. This is probably related to the primary phase of construction (1836). No corbel footings were uncovered.

Trial Pit 106 (Fig 16)	
Location	Debut night club
Dimensions	1.7m by 2.18m
Modern ground level/top of slab	4.33m OD
Base of modern fill/slab	4.05m OD
Depth of archaeological deposits seen	6.3m
Level of base of deposits observed	-1.97 OD
Natural observed	Alluvium at 0.13m OD

A greenish yellow silty sand horizon was observed at –1.97m OD. This was sealed at 0.13m OD by a dark grey blue alluvium [46]. This was occasionally highly organic, with inclusions of very small gastropods and charcoal which was saturated with ground water. These are intertidal deposits from Guy's Channel. A greyish brown clay silt [45] sealed this, visible at *c* 1.33m OD. Again this was saturated and contained moderate CBM as well as oyster shells and occasional animal bones. At a depth of 2.03m OD a firm, mid grey coarse clay silt [30] with frequent oyster shells was observed. This is likely to be garden soil predating the E–W 1845 viaduct construction. It was sealed by a thin layer of dark, coarse sandy silt [164] with frequent roof tiles, which probably represents a make-up dump associated with the 1845 viaduct. This deposit had been truncated by the E–W 1845 Viaduct footing on its northern edge and by a concrete floor (0.1m thick) associated with an internal factory partition wall on its eastern edge. This wall abutted the 1845 construction and was subsequently demolished to make way for the expansion of the Railway station southwards in 1853. This is represented by a N–S wall respecting the eastern side of Stainer Street.

Trial Pit 109 (Fig 16)	
Location	Debut night club
Dimensions	1.7m by 2.4m
Modern ground level/top of slab	4.25m OD
Base of modern fill/slab	3.92m OD
Depth of archaeological deposits seen	4m
Level of base of deposits observed	0.25m OD
Natural observed	N/A

The lowest recorded deposit (at 0.25m OD) was a firm mid greyish-blue clay [18] approximately 2.1m thick. This contained moderate bi-valve shells as well as occasional charcoal and CBM. This is probably represents a tidal deposit from Guy's Channel, although CBM inclusions imply that it may be redeposited. Sealing it was a thin (0.03m) band of loose, light whitish-grey clay silt [17]. This in turn was sealed by 0.23m of sticky clay [16]. These deposits were truncated by a 0.86m deep cut for the viaduct foundation and judging from inclusions of 19th-century London stock brick only just predate the overlying construction (*c* 1861). A narrow sondage excavated to accommodate shoring uncovered a Victorian drain at depth of 2.65m OD, aligned roughly E–W along the south of the trial pit: this was left *in situ*. It was sealed by a rubble dump, probably levelling for the viaduct. At 4m OD there was a poorly constructed masonry structure perpendicular to the viaduct wall, of which four courses

survived. This structure was superficially bonded into the N–S viaduct wall and probably represents the mid 19th-century floor level.

Trial Pit 111a (Fig 16)	
Location	Debut night club
Dimensions	1.8m by 1.5m
Modern ground level/top of slab	4.38m OD
Base of modern fill/slab	4.26m OD
Depth of archaeological deposits seen	1.84m
Level of base of deposits observed	2.54m OD
Natural observed	N/A

No archaeological deposits of significance were recorded. The entire sequence represents late 19th-century dumps and levelling deposits relating to the 1893 viaduct construction. It is worth noting that the E–W internal Viaduct partition wall (2.54m OD) has a very poor quality footing of 0.34 thickness.

Trial Pit 112 (Fig 17Fig 16)	
Location	Junction of Weston and Tooley Streets
Dimensions	1.55m by 1.62m
Modern ground level/top of slab	4.08m OD
Base of modern fill/slab	3.73m OD
Depth of archaeological deposits seen	2.15m
Level of base of deposits observed	1.73 OD
Natural observed	N/A

This inspection pit was not shored. A heavily truncated brick wall of probable 18th-century date was recorded at *c*1.73m OD. The Viaduct footing appeared to be built immediately on top of this.

Trial Pit 117 (Fig 17, Fig 19*)*	
Location	Paintball
Dimensions	1.6m by 2.m
Modern ground level/top of slab	4.41m OD
Base of modern fill/slab	4.15m OD
Depth of archaeological deposits seen	1.5m
Level of base of deposits observed	2.91 OD
Natural observed	N/A

The lowest visible deposit (recorded in sondage) at approx 2.19m OD was a silty garden soil horizon [123]. This was sealed by a mortar layer at 1.99m OD [122]; this crumbly creamy-coloured mortar appeared to be intentionally deposited rather then demolition debris. However there was no associated masonry structure within the area of the pit. This layer was sealed by [121], a 0.2m thick garden soil type horizon. A brick floor [120] dated 1550–1700 at 3.33m OD consisting of reused red half bricks with a 20mm thick mortar bed had been laid immediately on top of this horizon. This may be the remains of a cellar. The floor was sealed by a further garden soil layer [119], which had a diffuse border with an overlying sandy/clay silt deposit [118]. A Victorian brick drain (0.38m wide) with a slate capping ran parallel to the viaduct wall at a depth of 3.19m OD, vertically truncating all deposits. The remains in this trial pit seem to indicate various episodes of structural activity and then apparent 'neglect' represented by the build up of a series of garden soil horizons.

Trial Pit 120 (Fig 17)	
Location	Tuli Restaurant
Dimensions	1.6m by 2.m
Modern ground level/top of slab	4.36m OD
Base of modern fill/slab	4.16m OD
Depth of archaeological deposits seen	2.41m
Level of base of deposits observed	1.95m OD
Natural observed	N/A

The lowest recorded deposit (visible in a sondage measuring 1.92m x1.2m) was a mixed silty sand dump [154] between 2.25m OD and 1.95m OD. This contained patches of light reddish-brown silt, as well as moderate inclusions of animal bone, CBM, charcoal and pottery dated 1630–1680. This probably represents a rubbish dump. At 2.56m OD a mid grey clay silt [153] deposit, containing occasional charcoal, oyster shell and chalk lumps was visible, again in sondage. This was sealed by a compact floor horizon [152], consisting of brick and CBM fragments in a mortar matrix. This may represent demolition debris compacted over time into what initially appears to be a floor. At 3.11m OD a 0.35m thick brownish-black garden soil horizon [151] containing animal bone, bricks and pot (dated 1701–1711) extended across the trial pit. Sealing this layer was a grey/green silty levelling deposit recorded below the slab.

*Trial Pit 122 (*Fig 17)	
Location	Paintball
Dimensions	4.08m by 1.12m
Modern ground level/top of slab	4.38m OD
Base of modern fill/slab	4.18m OD
Depth of archaeological deposits seen	2.7m
Level of base of deposits observed	1.68 OD
Natural observed	N/A

No access was gained to this inspection pit. The deepest recorded deposit was a firm dark brownish-grey sandy clay [149)] containing occasional bi-valve shells, CBM and half bricks, between 2.38m OD and 1.68m OD. This was sealed by gravel and rubble construction backfill [148)] up to 4.18mOD.

Trial Pit 129 (Fig 16)	
Location	Tunnel 47
Dimensions	1.8m by 3.6m
Modern ground level/top of slab	4.25m OD
Base of modern fill/slab	3.75m OD
Depth of archaeological deposits seen	4.55m
Level of base of deposits observed	-0.25m OD
Natural observed	Alluvium at 1.2m OD

The lowest visible deposit at –0.25m OD was a dark blue sterile alluvial clay [52] with no visible inclusions; it was at least 1.45m thick. This probably represents a zone of once fast-moving channel flow and was exposed in a series of stepped sondages in the south-western area of the trial pit. The north–south viaduct foundation base was exposed at 0.45m OD along with a section of timber shoring associated with its construction. This was sealed by a thin band of silty clay [51] only visible in section; this contained moderate amounts of charcoal and CBM and appears to have been deposited after the backfilling of the channel. A layer of demolition debris [50], consisting of pulverized brick and CBM fragments sealed this

deposit; this gradually merged into a mid blue grey clay silt [49] at approximately 1.75m OD. Pottery retrieved from this deposit dates from 1780–1900. At a depth of 2.41m OD the pebble concrete footing was visible. A friable silty sand dump [48] sealing this relates to the viaduct construction of 1861.

Trial Pit 138 (Fig 17)	
Location	Furniture Store, off St. Thomas Street.
Dimensions	2.42m by 2.30m
Modern ground level/top of slab	4.46m OD
Base of modern fill/slab	4.15m OD
Depth of archaeological deposits seen	4.2m
Level of base of deposits observed	0.26m OD
Natural observed	N/A

The deepest archaeological deposit observed was a mid grey coarse sandy silt [169] at 1.36m OD. This was limited to a small island of stratigraphy (0.80m x 0.70m) in the north-east of the trial pit. The context was only partially excavated with a view to defining its nature; the finds retrieved included pottery and clay tobacco pipes dating from 1720–1800. This is likely to represent a dump or make-up deposit for [168], a roughly north–south aligned wall, built directly on top of it and surviving at a maximum height of 1.84m OD. The wall was of fairly poor construction, formed from re-used unfrogged red bricks and London stock. Approximately 0.45m of standing masonry survived, formed of 18th century unfrogged red bricks laid on bed. Truncating these deposits was a one metre plus thick E–W aligned arched brick sewer, the top of which was level with the base of the wall, and was accidentally partially excavated by the contractors. This sewer was seen to continue for some distance beyond the eastern limit of excavation, and was partially filled with sterile water. It appeared to have been blocked during the construction of the 1867 viaduct as it ran westward to the concrete footing, which appeared to have been poured over it. The remainder or the trial pit consisted of 18th-/19th-century backfill up to slab level.

Trial Pit 146 (Fig 17)	
Location	Union car park
Dimensions	2.15m by 2.12m
Modern ground level/top of slab	4.26m OD
Base of modern fill/slab	4.16m OD
Depth of archaeological deposits seen	1.7m
Level of base of deposits observed	2.56m OD
Natural observed	N/A

A dark blue silty clay [95] recorded at 2.56m OD, containing charcoal, wood fragments, weathered chalk, CBM fragments and oyster shell appeared to be late post-medieval in date and is likely to be a dumped deposit. This was truncated by an E–W footing 0.99–1.2m thick running across the trial pit. Construction backfill filled the trench up to slab level. Two rusted iron pipes aligned N–S at 3.66m OD continued into a circular recess in the northern wall. These were left *in situ.*

Trial Pit 148 (Fig 17)	
Location	Bermondsey street
Dimensions	1.98m by 2m
Modern ground level/top of slab	4.26m OD
Base of modern fill/slab	4.17m OD
Depth of archaeological deposits seen	2.75m

Level of base of deposits observed	1.51 OD
Natural observed	N/A

This pit was relocated from its original position to the other side of arch (from E901- E902). It was excavated to 1.51m OD in sondage, approximately 0.3m from the concrete footing. A coarse mid-grey sandy silt [86] at least 0.25m thick was observed, containing inclusions consistent with a gradually deposited dump layer. At 1.84m OD this was sealed by a post-medieval brick floor [85] dated 1550–1700, on a 30mm thick green sand bedding layer. The floor was constructed from reused whole and half bricks, was fairly irregular in construction and showed evidence of *in-situ* wear. This is probably a cellar floor remnant. It was sealed by a 0.5m thick grey-black mixed silty clay dump [84], dated 1700–1730 and probably represents the demolition and subsequent abandonment of the building associated with the brick floor. This was sealed by a silty dump [83] dated 1680–1800 containing CBM and mortar inclusions. At 3.51m OD a 80mm thick horizon of compacted oyster shells, CBM and slag [82] was recorded predominately in the eastern facing section. This, as well as a mid brown clay silt [81] is probably residue deposited soon after the area was levelled prior to the 1851 phase of viaduct construction.

Trial Pit 157 (Fig 17)	
Location	Union car park
Dimensions	2.98m by 2.49m
Modern ground level/top of slab	4.46m OD
Base of modern fill/slab	4.24m OD
Depth of archaeological deposits seen	2.4m
Level of base of deposits observed	2.06 OD
Natural observed	N/A

A blue-grey clay [93] was observed at 2.06m OD, typical of the clays found elsewhere on the site. It was sealed by a fairly coarse clay silt [92] from 2.66m–2.36m OD, containing moderate charcoal, slag, mortar fragments, angular pebbles and pottery dated 1630–1650. Constructed directly on top of this was a robust east-west wall [91], which was 0.59m thick. The lowest 0.2m was constructed from randomly coursed whole bricks bonded in grey silty mortar. This footing supported about 0.2m of surviving standing masonry, formed of regular coursing, but no consistent bond. The upper masonry had a compacted beige sandy lime mortar, with frequent chalk inclusions. This appears to represent two separate phases of construction, apparently of late 18th-/ early 19th-century date. The width of the masonry (0.59m) suggests that this may have been a structural wall supporting more then one storey. Construction backfill [90] dated 1770–1840 filled the remainder of the trial pit.

Trial Pit 158 (Fig 17)	
Location	Basement of 84 Tooley street
Dimensions	2.30m by 1.6m
Modern ground level/top of slab	*c* 1.37m OD
Base of modern fill/slab	1.22m OD
Depth of archaeological deposits seen	2.28m
Level of base of deposits observed	-1.06 OD
Natural observed	N/A

The location of this trial pit was outside the original scope of works and no accurate OD height was obtained for the . The ground level on Tooley Street was 4.37m OD. It was estimated that the basement was approximately three metres deep. Hence slab level is assumed to be *c* 1.37m OD. This pit was relocated *c* 5m to the south of its original position. The deepest deposit observed was a dark grey-blue humic alluvial clay [89] that was very

dense and saturated, containing weathered chalk fragments and shell. This had a diffuse horizon with an overlying clay [88], recorded between 1.35m bgl to 1.8m bgl. This was similar, but slightly paler and contained occasional small rounded mortar fragments. These are interpreted as intertidal mudflat deposits formed on the edge of an alluvial channel/creek running from the Thames from the north-east. This is consistent with recorded river channels and tributaries in the area of Roman Southwark. Immediately beneath the concrete slab from 0.16–1.35m bgl was a light reddish-brown clay [87]. This was very dense, displaying evidence of extensive root action. It contained occasional wood, charcoal, oyster shells, chalk and rounded pebbles. It may represent an area of the channel that was at some point exposed allowing for plant growth, i.e. a semi-terrestrial habitat/zone.

Trial Pit 528 (Fig 17)	
Location	London Dungeon
Dimensions	1.5m by 1.7m
Modern ground level/top of slab	3.54m OD
Base of modern fill/slab	3.34m OD
Depth of archaeological deposits seen	1.9m
Level of base of deposits observed	1.64m OD
Natural observed	N/A

No archaeological deposits were observed in this trial pit. Construction backfill from *c*1839-45 (friable silty sand) filled the entire trial pit to slab level.

Trial Pit 529 (Fig 17)	
Location	London Dungeon
Dimensions	1.7m by 1.7m
Modern ground level/top of slab	3.54m OD
Base of modern fill/slab	4.39m OD
Depth of archaeological deposits seen	1.55m
Level of base of deposits observed	1.99m OD
Natural observed	N/A

This trial pit was machine and hand excavated to 1.99m OD. At this depth only construction backfill was visible. A window sample was taken by the contractors through the pebble concrete footing at a depth of 2.34m OD. The lowest recorded deposit at –2.14m OD was a mid brown fine rounded sand. At –1.29m OD a black highly organic spongy alluvial peat deposit was observed and above it at –0.64m OD was a blackish brown sandy alluvial deposit. This was sealed by 0.3m of soft dark brown slightly sandy clay, with occasional flint inclusions. The viaduct footing truncated to this depth. The trial pit is located near the western edge of the western tributary leading south from the Thames to Guy's Channel. Alluvial deposits support an interpretation that the course of the channel may have varied slightly over time (hence the peat deposit).

Trial Pit 530 (Fig 17)	
Location	Shunt theatre
Dimensions	2.51m by 2.51m
Modern ground level/top of slab	3.52m OD
Base of modern fill/slab	3.40m OD
Depth of archaeological deposits seen	3.5m
Level of base of deposits observed	0.02m OD
Natural observed	Alluvium at 0.32m OD

A dense grey blue alluvial clay [102], containing moderate charcoal, oyster shell, mortar, brick fragments, occasional tile, metal and pot was observed at 0.02m OD. This was sealed by an organic alluvial deposit [101] containing occasional chalk, mortar and oyster shell. These appear to be waterlain deposits, and are located within the vicinity of Guy's Channel. Finds imply that there was significant human activity in the area during deposition (building construction/demolition). A firm grey brown clay silt [70] with pottery dated 1550–1600 overlay these deposits. A roughly NE–SW aligned brick wall [69] of which 1.21m of standing masonry survived (dated 1450–1600), was built directly on top and appeared to be truncated by a later, more robust NW–SE wall [68] visible at 3.2.m OD. These walls follow the 17th-/18th- century masonry alignments of buildings in the area and probably represent structural walls from domestic premises. A brick structure [14] of which 10 courses survived, and an associated floor was observed at approximately 2.22m OD; this was dated 1500–1666. The top course was formed of bricks laid on edge and due to the lack of visible mortar probably represents the actual limit in height of the structure. With this in mind it is most likely to be a brick-lined rubbish pit. A series of thin silty dumps [13] sealed the brick floor and were in turn truncated by the 1836 viaduct construction cut.

Trial Pit 530a (Fig 17)	
Location	Shunt theatre
Dimensions	2.13m by 2.26m
Modern ground level/top of slab	3.96m OD
Base of modern fill/slab	3.77m OD
Depth of archaeological deposits seen	2.5m
Level of base of deposits observed	1.46m OD
Natural observed	N/A

A dark brownish-blue silty clay [109] was recorded at 1.66m OD, containing moderate amounts of oyster shell, small-medium sub-angular pebbles, occasional chalk, small CBM fragments, animal bone, charcoal and tile. This was probably originally an intertidal mudflat deposit, perhaps redeposited with later inclusions mixed in. The deposit contained pottery dated 1480–1600. Construction backfill from 1836 filled the trial pit up to slab level.

Trial Pit 531 (Fig 16)	
Location	Shunt theatre
Dimensions	2.28m by 1.95m
Modern ground level/top of slab	4.23m OD
Base of modern fill/slab	3.99m OD
Depth of archaeological deposits seen	2.m?
Level of base of deposits observed	2.23 OD
Natural observed	N/A

A grey-blue silty clay [165] horizon was exposed at approximately 2.13m OD and was truncated by an E–W post-medieval wall [56] at 2.39m OD. A later cobbled surface [2] which may be a remnant of the 'Bowling Ally' referred to in *Rocque's* map of 1746 respected this wall, which in turn was truncated by a N–S aligned culvert. Construction rubble backfill [1] from 1836 filled the trial pit up to slab level.

Trial Pit 532 (Fig 16)	
Location	Shunt theatre
Dimensions	2.95m by 1.95m
Modern ground level/top of slab	4.34m OD
Base of modern fill/slab	4.22m OD

Depth of archaeological deposits seen	3.2m
Level of base of deposits observed	1.14 OD
Natural observed	N/A

The deepest visible deposit was a waterlogged, slightly organic dark blue alluvium [67] 0.3m thick, with inclusions of metropolitan/ delft ware dated from 1580–1600. This was covered by 0.3m of grey blue clay silt [65]. At approximately 2.34m OD a mid blue grey sandy silt [64] was visible, containing occasional organic material; this produced pottery dated to 1740–1800 and is probably a levelling layer. A substantial N–S wall [63] (dated 1700–1900), visible from 3.97–2.91m OD truncated this horizon. A box drain [62] capped with large flagstones and dated between 1600–1900, cut through this wall at 3.09m OD, curving from the south-western corner of the trial pit to the south-east,. These structures are probably the remains of domestic buildings demolished to make way for the viaduct prior to 1836. Construction backfill [61] filled the trial pit to slab level. An E–W aligned culvert truncated these upper deposits at 3.03m OD. This was aligned with manholes visible to the north-west.

Trial Pit 655 (Fig 16)	
Location	Debut night club
Dimensions	1.58m by 2.95m
Modern ground level/top of slab	4.25m OD
Base of modern fill/slab	4.10m OD
Depth of archaeological deposits seen	3.7m
Level of base of deposits observed	0.55 OD
Natural observed	N/A

This trial pit was relocated from its original position to the area between arches E39 and E39A. A series of soft sandy-silt deposits [39], [40], [41] and [42], becoming more clayey with depth were recorded at a maximum depth of 0.55m OD. These may represent a zone of higher ground (eyot) within the alluvial channel system, although the evidence is not conclusive. A box drain and associated brickwork [19] (dated 1700–1900) were visible at 3.43m OD. These appeared contemporary with the E–W (1893) viaduct construction. However, closer inspection revealed that an earlier structure (probably a factory building, given the presence of the box drain) had been incorporated within the footing for the 1893 construction. The visible remnant measured 1.4m E–W and 0.5m N–S. This appeared to be a robust structure, with at least 1.2m of standing masonry.

Trial Pit 656 (Fig 16)	
Location	Debut night club
Dimensions	1.3m by 1.4m
Modern ground level/top of slab	4.37m OD
Base of modern fill/slab	4.08m OD
Depth of archaeological deposits seen	N/A
Level of base of deposits observed	3.35 OD
Natural observed	N/A

No archaeological deposits were observed within this trial pit. Construction backfill filled trial pit to slab level.

Trial Pit 657 (Fig 16)	
Location	Debut night club
Dimensions	1.6m by 1.28m

Modern ground level/top of slab	4.59m OD
Base of modern fill/slab	4.33m OD
Depth of archaeological deposits seen	N/A
Level of base of deposits observed	4.16 OD
Natural observed	N/A

No archaeological deposits were observed within this trial pit. Viaduct construction backfill filled trial pit to slab level.

Trial Pit 658 (Fig 16, Fig 20*)*	
Location	Debut night club
Dimensions	2.2m by 2.1m
Modern ground level/top of slab	5.01m OD
Base of modern fill/slab	4.77m OD
Depth of archaeological deposits seen	4.2m
Level of base of deposits observed	0.90 OD
Natural observed	N/A

The lowest observed deposit at *c* 0.9m OD was a fine light grey clay [38], with inclusions of occasional bi-valve shells; it probably represents an intertidal zone/mudflat. The deposit was sealed by a 0.26m thick coarse mid grey clay silt [37], containing medium rounded (*c* 20mm) pebbles and very fine charcoal; this was a make-up/ levelling layer for a heavily slumped brick floor [36] on a clay-sand bedding. The bricks date from 1500–1666 and probably represent the remains of a cellar floor. A firm mid blackish-brown levelling layer [35] sealed the floor and this was in turn sealed by a later brick floor [34] of irregular construction, showing evidence of considerable wear; it appeared to be of 18th-century date. A thin layer of crushed coal fragments/ dust [33] covered the floor and may point to use as a coal cellar. A narrow wall [32], dated 1666–1700 and probably an internal partition, was built directly on top of this. A later masonry structure [20] visible in section at 3.51m OD appeared to be the remains of a cellar wall and floor, dating from 1666–1900. Sealing this structure was a demolition levelling dump of clay silt [21] and near-complete roof tiles, deposited prior to the Viaduct construction in 1853. The remainder of the trial pit comprised construction backfill up to slab level.

Trial Pit 659 (Fig 16)	
Location	Debut night club
Dimensions	2.2m by 1.4m
Modern ground level/top of slab	4.25m OD
Base of modern fill/slab	3.97m OD
Depth of archaeological deposits seen	4.90m
Level of base of deposits observed	-0.65 OD
Natural observed	Alluvium at 1.2m OD

The earliest deposit recorded was a firm dark blackish-blue alluvium [44] at *c* 1.2m OD, representing an area of tidal mudflats. A driven timber pile [43], visible at 0.9m OD appeared to post-date a dark blackish-blue clay silt deposit [24], containing pottery dated to 1630–1680.This was sealed by a dark brownish-grey silty clay [23] approximately 1m thick, representing a levelling deposit; pottery retrieved from the excavated spoil dates from 1630–1680. This in turn was sealed by 1.4m of grey sandy silt [22] with moderate inclusions of charcoal, tile, mortar, brick fragments and irregular bands of pulverized [red] brick and mortar. This is likely to be demolition debris deposited prior to the 1853 viaduct construction.

Trial Pit 660 (Fig 16)	
Location	Debut night club
Dimensions	1.3m by 1.1m
Modern ground level/top of slab	4.25m OD
Base of modern fill/slab	3.74 OD
Depth of archaeological deposits seen	N/A
Level of base of deposits observed	2.25 OD
Natural observed	N/A

No archaeological deposits were observed in this trial pit. Construction backfill was present over the entire area of the trial pit up to slab level

Trial Pit 661 (Fig 16)	
Location	Debut night club
Dimensions	1.86m by 1.86m
Modern ground level/top of slab	4.11m OD
Base of modern fill/slab	3.94m OD
Depth of archaeological deposits seen	4.05m
Level of base of deposits observed	0.06 OD
Natural observed	Alluvium at 1.21m OD

The earliest deposit was a dark greyish-blue alluvium [29] at 0.06m OD containing very occasional shell, charcoal, animal bone and glass. This is interpreted as an upper deposit from the Guy's channel. It was sealed by 0.4m of mid blue-brown coarse silty clay [28] containing pottery dating from 1580–1900. A timber pile was observed at 0.77m OD. This appeared similar in size and depth to the timber recorded in TP659, again probably a remnant of the original viaduct construction shoring. The E-W viaduct footing truncated this deposit at 1.61m OD. At 1.81m OD a clay silt deposit [27] was observed; it contained tin-glazed earthenware pottery dating from 1670–1730and may represent a rubbish dump. This in turn was truncated to the south by a robust E–W brick wall [26] at 1.81m OD, which was 0.49m thick and constructed from red unfrogged brick. The building fabric was dated to 1500–1666. This probably represents the original 17th-century alignment of industrial buildings in this area. An E–W wall of later construction was visible at 3.09m OD in the northernmost section of trial pit. This also truncated the clay silt rubbish dump. A N–S aligned drain contemporary with the viaduct construction of 1853 was visible at 3.48m OD in the east of the trial pit.

Trial Pit 662 (Fig 17)	
Location	Paintball
Dimensions	2.70m by 3.08m
Modern ground level/top of slab	4.83m OD
Base of modern fill/slab	4.61m OD
Depth of archaeological deposits seen	2.3m
Level of base of deposits observed	2.53 OD
Natural observed	N/A

A saturated mid brown-grey clay [117] dump deposit containing moderate oyster shell and pottery dated 1580–1700 was recorded at 2.53m OD. A stoneware drain encased in Victorian brickwork ran N–S diagonally across the trial pit, preventing further excavation. Construction backfill [116] was present over the remainder of the trial pit to slab level.

Trial Pit 662a (Fig 17, Fig 21, Fig 22)

Location	Paintball
Dimensions	2.88m by 2.64m
Modern ground level/top of slab	4.44m OD
Base of modern fill/slab	4.14m OD
Depth of archaeological deposits seen	5.23m
Level of base of deposits observed	–0.79 OD
Natural observed	Alluvium at –0.44m OD

The lowest visible horizons were waterlain deposits from Guy's channel, consisting of a mid greyish-green fine silty sand [147)] at –0.79m OD and at –0.44m OD a fairly dense sterile greenish-blue silt with occasional inclusions of decayed wood [146]. At a depth of 0.10m OD there were the remains of an E–W aligned timber base-plate [144] with a 0.3m long mortise slot observed on its exposed side. The timber measured at least 1.76m (continuing beyond the western LOE) x 0.23m x 0.16m. A driven timber pile [145] which may have been associated with it was visible at the same level, slightly to the south. Sealing this was a 1m thick dark blue alluvial clay [143] containing large animal bones and oyster shells. A later revetment sharing the same E–W alignment was recorded in the centre of the trial pit at a depth of 1.14–1.24m OD. This consisted of driven tapered piles [139], [140] and [141] measuring on average 0.67m in length and 0.17m in width, and a horizontal plank [138]. Chalk was used as consolidation/packing [142] behind this later timber structure. It is likely that these represent two phases of timber revetment or jetty, the earliest being potentially medieval in date.

The later timber structure was sealed by mixed layers of clay and silt [137] containing charcoal fragments, CBM, mortar and animal bone; these in turn were sealed by a thin band of loose clinker /sandy silt. A series of intercutting post-medieval brick structures was observed between 1.84m OD and 3.14m OD. The earliest of these was a N–S wall [134], 0.25m thick and 1.76m in length. It was dated 1500–1600 and was truncated at its northernmost edge by a curved brick structure (comprising two separate walls of similar construction). The northernmost wall [132] (dated 1600–1900) continued beyond the limit of excavation and was truncated by the viaduct pier footing; it was mirrored by another curving wall to the south [133], dated 1500–1666, truncating the earlier wall [134] and becoming wider as well as straightening beyond the southern LOE. The function of the structure is not clear. A separate brick structure [136], possibly a floor, formed from what appeared to be reused bricks (dated 1450–1666) was visible in the western section at approximately 2.39m OD. These structures were sealed by a dump of demolition debris [131] consisting of large blocks of ashlar sandstone, rag and granite (one granite block measured 410mm x390mm x280mm) and fragments of mortar, tile and brick. This is likely to be the remains of the superstructure/standing buildings associated with [132] and [133]. Finds from this deposit (clay pipes and tin glazed earthenware) appear to be 18th-century in date. A light brown clay silt [130] sealed this dump at 3.13m OD, overlain by a narrow band of 'garden soil' [129] at 3.63m OD. Construction backfill [128] filled the trial pit to slab level.

Trial Pit 663 (Fig 17, Fig 23*)*	
Location	Paintball
Dimensions	2.30m by 1.50m
Modern ground level/top of slab	4.83m OD
Base of modern fill/slab	4.68m OD
Depth of archaeological deposits seen	2.6m
Level of base of deposits observed	2.23 OD
Natural observed	N/A

A mid grey blue clay [115] was observed at 2.23m OD in a sondage within this trial pit. It was sealed by a mid grey brown silty clay [114] dated 1600–1650, which was cut by a floor remnant at 2.53m OD. This consisted of reused early post-medieval bricks [113] laid on edge (dated 1550–1666). An E–W brick wall [112] (dated 1500–1666) was built directly on top, of which 0.8m of standing masonry survived. Demolition debris [111] was dumped against the northern side of the wall, and consisted of silty clay with frequent roof tiles packed tightly on edge. This probably represents the remains of the standing building represented by the wall. A cobbled surface [110] recorded at 4.13m OD represents street level prior to the 1836 viaduct construction.

Trial Pit 664 (Fig 17)	
Location	Paintball
Dimensions	2.06m by 2.01m
Modern ground level/top of slab	4.50m OD
Base of modern fill/slab	4.22m OD
Depth of archaeological deposits seen	2.2m
Level of base of deposits observed	2.30m OD
Natural observed	N/A

At 2.3m OD, grey-brown soft clay silt [127] was recorded in sondage; the deposit was truncated by a series of masonry structures. The earliest was a robust wall [126], aligned roughly NE–SW, measuring at least 0.85m high, 0.7m thick and 2.01m in length. It was dated 1580–1700 had been truncated horizontally at 3.49m OD and vertically by the viaduct construction to the west, and by a near contemporary masonry structure [125] dated 1580–1700 to the east. These structures would have been part of a large brick building continuing beyond the limits of the trial pit to the north and south. Construction materials suggest an 18th-century date, and may be footings for one of the many factories known to have existed in the area at that date. A stoneware drain running NW–SE at 3.43m OD was probably contemporary with the viaduct construction of 1836.The remainder of the trial pit was taken up by 19th-century construction backfill [124].

Trial Pit 665 (Fig 16)	
Location	Tunnel 47
Dimensions	2.10m by 1.9m
Modern ground level/top of slab	4.32m OD
Base of modern fill/slab	4.17m OD
Depth of archaeological deposits seen	4.6m
Level of base of deposits observed	1.42m OD
Natural observed	N/A

Waterlain clays [60] were recorded between –0.28m OD and 1.37m OD. These represent fills from Guy's channel. Pottery from the uppermost alluvial deposit was dated 1480–1600. Three timber piles were driven into this layer and may be the remnant of an earlier revetment. Only one [59] was fully exposed and recorded; it was also broken in half during machining. Three mortise slots of similar dimensions were recorded along one face. The boxed heart timber would have originally measured at least 1.9m. A structural east–west brick wall [58] in excess of 2m high was built directly on top of the alluvial deposit. Its original purpose is unclear, but it may represent a load-bearing wall of one of the factories located on the site prior to demolition. Masonry dated from 1500–1666. Construction backfill [57] filled the remainder of the trial pit to 3.12m OD.

Trial Pit 667 (Fig 17)

Location	Bermondsey Street
Dimensions	2.84m by 2.68m
Modern ground level/top of slab	4.20m OD
Base of modern fill/slab	4.05m OD
Depth of archaeological deposits seen	6.2m
Level of base of deposits observed	-2.00m OD
Natural observed	–0.75m OD

A series of natural deposits was recorded between –2.00 and –0.75m OD, the earliest being a yellowish brown silty sand [180], which became progressively sandier with depth. Sealing this was a thin deposit (0.1m) of clay silt [179], above which was a very dark grey alluvial clay [178] at –0.75m OD. These appear to represent tidal mudflats pre-dating human occupation of the surrounding area (ie pre- Roman). These were overlain at 1.2m OD by redeposited alluvial material [176] and [177], which contained medieval pottery, dated 1340–1450. An18th-/19th century brick drain/wall [174] and a mortar deposit [175] probably associated with the construction of a drain [171], which had been entirely removed by machine prior to recording, were located at 2.10m OD and 2.40m OD respectively. These masonry structures share the same alignment to Bermondsey street, and are probably the remnants of dwellings fronting on to the eastern side of the street. The viaduct construction horizontally truncated all deposits to a depth of 2.12m OD. Construction backfill was present over the remainder of the trial pit up to slab level.

Trial Pit 669 (Fig 17)	
Location	Topnotch gym
Dimensions	2.2m by 2.2m
Modern ground level/top of slab	4.38m OD
Base of modern fill/slab	4.18m OD
Depth of archaeological deposits seen	2.2m
Level of base of deposits observed	2.18m OD
Natural observed	N/A

The lowest recorded deposit was a blue (possibly fluvial) clay [163] at 2.18m OD, measuring 1.7m N-S by 0.9m E-W. Driven/cut into this layer was an E–W aligned timber structure [162] that was partially exposed, consisting of two driven boxed heart timbers (max 0.4m long by 80mm thick) and one 30mm wide plank running between them. This had been extensively damaged by machining as well as the concrete foundation pier that truncated it at *c* 2.58m OD. This structure was possibly a revetment or fence. A distinctly different blue coarse silt deposit [161] was dumped against the southern side of the plank contained clay pipes and pottery dated 1630-–1700. An assemblage of earthenware pot and clay pipes gives an approximate date of the mid 18th-century. Visible in the eastern section was a robust (probably E-W aligned) wall [160], at least 0.5m thick with a pebble footing. This is probably the remnants of an earlier viaduct construction (?1850) destroyed and levelled during the expansion south of the existing viaduct structure.

Trial Pit 672 (Fig 17)	
Location	Union car park
Dimensions	3.28m by 2.34m
Modern ground level/top of slab	4.19m OD
Base of modern fill/slab	3.99m OD
Depth of archaeological deposits seen	2.71m
Level of base of deposits observed	1.48m OD
Natural observed	N/A

A 0.4m thick deposit of coarse, sterile mid grey waterlogged clay-silt [100], with frequent angular small pebbles was recorded at 1.48m OD. It was sealed by a thin (50–65mm) dump of loose grey brown clinker [99], probably industrial residue from one of the factories located in the area during the 18th-/19th-centuries. A mottled mid brown silty clay [98] overlay this; it contained a variety of dumped material (tile, CBM, animal bone and pottery dated 1650–1800). A similar but slightly sandier dump [97] sealed it, containing frequent brick and CBM fragments. This may represent a levelling horizon for the construction of the pre-1853 viaduct. Rubble deposit [96] filled the trial pit to slab level.

Trial Pit 674 (Fig 17, Fig 23)	
Location	Rooneys gym
Dimensions	2.0m by 2.20m
Modern ground level/top of slab	4.30m OD
Base of modern fill/slab	4.15m OD
Depth of archaeological deposits seen	2.50m
Level of base of deposits observed	1.8m OD
Natural observed	N/A

A firm light blue clay [159] was observed in a sondage within the trial pit at 1.8 m OD; it contained building debris, oyster shell, charcoal and pot dated 1480–1600. This appeared to be redeposited alluvial clay, or possibly residue from a flooding event. It was sealed by a 0.5m thick layer of firm mid brown clay silt [158], again with occasional inclusions of demolition material, possibly residue from an earlier structure. Pottery inclusions from this deposit are dated 1480–1600. Two separate masonry structures were cut into this deposit. The earliest, a roughly N–S aligned wall [156] at 3.40 OD, was one bricks length wide, 1.3m high (truncated) and dated from 1500–1600. A second structure [157] comprised two walls (dated 1450–1550), the return of which was 0.15m beyond the southern LOE. A secondary partition wall, was incorporated into one of them. Both of these structures share a similar alignment to Bermondsey Street (NW–SE), with the earlier wall about 0.5m closer. Given their proximity to Bermondsey Street, this could indicate that the street was widened, and a larger structure built, but still fronting onto it. The structural remains were sealed by a mixed dump deposit [155], with moderate inclusions of building material and pottery and clay pipes date to 1720–1780.

12.4 Assessment of the monitoring

GLAAS guidelines (1998) require an assessment of the success of any evaluation 'in order to illustrate what level of confidence can be placed on the information which will provide the basis of the mitigation strategy'.

The geotechnical trial pits were designed to provide information on the nature and condition of the foundations of the standing building and to give an insight into the archaeological potential of the site. It had been anticipated that the survival of horizontally stratified deposits would be limited at the site.

In the case of this site, 49 trial pits were excavated, distributed across most areas of the site, with the exception of the north-west corner (the area of the London Dungeon) where no pits were located. The majority of trial pits measured 2m by 2m, and were excavated to an average depth of 2.5m below ground level (bgl). Five were excavated to greater depth, between 4.5–5.5m bgl, and these were generally wider to facilitate spoil removal. Archaeological deposits were generally encountered at around 1–1.2m bgl. The shallower trial pits (ie the majority) did not extend through the entire archaeological sequence and therefore only gave a window onto the uppermost deposits. Deeper trial pits (TP 662a in particular) which were excavated to natural alluvial layers, provide a more complete

indication of the stratigraphic sequence that might be anticipated to survive within the area of the site.

It is noted that the distribution of trial pits in the north-eastern triangle between Weston, St Thomas and Bermondsey streets was less dense, but the variety of archaeological deposits recorded in TP662a, 663 and 117 appear to demonstrate that this is an area of significant archaeological interest. The results of the monitoring are consistent with and considerably enhance those of previous fieldwork previously undertaken within the area of the site, notably the watching brief undertaken at London Bridge station- Joiner Street Level (Mackinder 2000).

12.5 Archaeological potential

Realisation of original research aims

The monitoring of geotechnical trial pits has provided the opportunity to address the following aims identified in the Written Scheme of Investigation (Network Rail 2009).

- *establish, as far as reasonably practicable, the presence, location extent, character, date and condition of any archaeological/cultural assets or palaeoenvironmental deposits*

The results are considered below, in relation to a number of significant themes.

The survival and extent of upper deposits in Guy's Channel

Channel deposits survived on the site in the form of blue-grey occasionally humic alluvium from about 1.2m OD. Only rarely was there evidence for truncation at deeper levels. In Trial Pit 025, early post-medieval walls truncated to at least 1.2m OD, and TP667 showed evidence for redeposited alluvium at –0.75m OD. In the Shunt Theatre complex (in the approximate area of the western boundary of Guys' channel) alluvium was recorded in Trial Pits 015, 015a, 042 and 530. It was no coincidence that these were amongst the deepest, implying that channel deposits survived across the site beyond the footprint of the viaduct footing, being unaffected by post-medieval truncation. Where observed, they usually contained charcoal and gastropod shells in the upper layers, becoming more dense and sterile with depth.

Archaeological features recorded within the channel deposit were limited as few trial pits were excavated to sufficient depth. However TP 662a (located to the south of Tooley street and east of Stainer Street) showed evidence for multi-phase timber structures, associated with the reclamation/ maintenance of the tidal area. There is therefore the likelihood of the preservation of medieval (or earlier) timber and related structures within the confines of the surviving channel deposit.

The possible location suggested by documentary evidence of the town house of the Prior of Christchurch, Canterbury and later medieval properties on Tooley Street

Documentary sources place the town house of the Prior of Christchurch, Canterbury roughly equidistant between Joiner and Stainer streets, slightly to the south of Tooley street. Whilst this area was well covered by trial pits, little evidence for medieval structures survived, apart from chalk blocks that had been incorporated in the viaduct concrete footings in trial pit 015, which may have been reused following levelling/demolition of nearby structures. It is possible that the town house only survives to the north of the Shunt Theatre complex, in the southern part of the London Dungeon, where no trial pits were located.

Similarly few trial pits were located near to or on Tooley Street. Those that were, were unlikely to uncover archaeologically relevant material, being either too shallow (TP112) which was also located near a modern manhole, or too deep (TP158) in the basement of 84 Tooley Street.

The levels of natural deposits and how they compare to adjacent sites

Natural deposits encountered on the site were universally limited to fine, occasionally humic alluvium, as the site footprint is entirely encompassed within the tidal area of Guy's Channel. Natural was encountered in nine trenches. The highest level observed was at 1.27m OD in Trial pit 042 in the Shunt Theatre complex. Very similar levels (1.2m OD, 1.2m OD and 1.21m OD) were recorded in Trial Pits 129, 659 & 661 respectively, clustered around the southern area of Weston Street. These probably represent a slightly higher area of mudflat deposition. Fine, sterile sandy deposits were recorded nearby at 0.55m OD in Trial Pit 655. This could be interpreted as evidence for the Horsleydown eyot. However surrounding trial pits were either omitted or too shallow to confirm this. The consistency in OD heights of the natural alluvial levels suggests these are untruncated deposits. Occasionally post-medieval truncation was recorded at this depth, e.g. TP 662a (–0.44m OD); however this generally appears to be the exception. Due to the location of the site entirely within the known confines of Guy's Channel, comparison of natural levels with adjacent sites is unhelpful.

The survival of post-medieval buildings in the area, and their significance
Masonry structures were observed in 17 trial pits in total, occurring at varying depths and states of preservation. Structures generally appeared to be more frequent and more robust the further east they were located. Trial Pit 674 for example revealed evidence supporting the existence of densely-packed domestic buildings identified in Ogilby & Morgan's map of 1676, bordering the western edge of Bermondsey Street. Multiple phases of masonry wall running parallel to Bermondsey street point to its alteration, perhaps due to street widening caused by higher volumes of traffic.

The vast majority of structures recorded were post-medieval walls, some of which due to their robustness were probably the remains of industrial premises that, along with densely packed tenements, occupied the area, as shown on Horwood's map of 1799. Where, observed masonry structures generally followed alignments dictated by the surrounding street layout. For example Trial Pit 40 contained a masonry wall perpendicular to nearby Stainer Street (probably the remains of garden wall or cess/rubbish pit); likewise Trial Pit 661 contained multiple phases of walls parallel to St Thomas Street (factory buildings). Trial Pit 662a was the exception however, with two associated curving 18th-century walls of substantial construction surviving; one of these truncated an earlier 17th-century N–S wall. These may have originally formed part of grand domestic dwelling or been part of an industrial structure.

A range of masonry floors were also recorded, some in a domestic context (TP 117, TP 148); others, due to floor wear and industrial residue found in associated contexts (TP 658 for example) appear to have been located in or around industrial premises.

The preservation of post-medieval buildings was generally substantial, and appeared to represent a cross-section of 19th century building styles, as would be expected in an area which had undergone little development in the past 170 years.

- *establish the extent and degree of modern truncation and disturbance of archaeologically significant deposits*

The most significant truncation on the site relates to the existing viaduct and in places the most recent truncation dates from 1836 (the earliest phase of station construction). As the

station expanded southwards, subsequent phases were gradually incorporated, up until the early 20th century. The viaduct footings are reasonably consistent in depth and width. Generally there are between 4–6 brick offsets starting around 1m below ground level, built directly on to a pebble concrete pier (of surprisingly poor construction). This pier is universally trench built, extending on average 0.6–0.9m from the standing wall at a depth of between 1.4–2m beneath ground level. Where exposed, it had caused truncation to an average depth of 6–6.5m beneath ground level. The construction cuts associated with these foundations were generally observed at around 1.5m from the standing wall at ground level, merging with the trench-built foundation pier.

Localised truncation from existing services was also observed, but in some instances there was undisturbed horizontal stratigraphy as shallow as 0.8m beneath ground level. From this it is possible to surmise that in the areas between the Viaduct footings there is undisturbed stratigraphy from at least 2m below ground level, though possibly surviving higher in localised areas.

General discussion of potential

The monitoring of geotechnical trial pits has shown that there is good potential for the survival of ancient ground surfaces (horizontal archaeological stratification) on the site beyond the areas of the existing viaduct foundations. There is also potential for the survival of early post-medieval masonry and timber structures as well as other cut features such as pits, wells and drainage features.

Archaeological survival is likely to be extremely limited within the footprint of the viaduct, and its construction cut, which generally extends no more then 1m from the standing masonry. The lower concrete and rubble pier base is trench built truncating deposits to an average depth of c –0.3m OD. Therefore there is considerable potential for the preservation of deeply stratified archaeological sequences between the viaduct footings where the average height of untruncated archaeological deposits is likely to be around 3m OD to 3.5m OD.

Significance

Whilst the archaeological remains are undoubtedly of local significance there is nothing to suggest that they are of regional or national importance.

12.6 Recommendations

See Section 7 of the main report.

12.7 Acknowledgements

The author would like to thank Chris Place (Network Rail Project Archaeologist) and Paul Goodwin (Vinci Site Manager) for their assistance throughout the project.

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14 Oasis form

OASIS ID: molas1-98353

Project details

Project name	Thameslink Programme - London Bridge Station
Short description of the project	This report represents the results of an archaeological evaluation combined with geotechnical investigations involving the excavation of 49 trial pits and two geoarchaeological cores. The project took place between July 2010 and January 2011 at London Bridge Station, concentrating on the railway viaduct (1836-1900) , bounded by Joiner Street to the west, Bermondsey Street to the east, and Tooley Street to the north and St Thomas Street to the south. The results of the field excavation enhance the initial assessment of the archaeological potential of the site. Excavations included the uncovering of two phases of timber revetment (potentially late medieval in date) located at a max depth of 5m beneath ground level (0.1m OD) in an area of tidal mudflats between the main tributaries of Guys' channel. The extensive survival of masonry structures, including both domestic (garden walls, floors etc) and industrial features (the area was characterised by a array of factories during the late 18th and early 19th centuries) are supported by contemporary maps of the area (Horwood 1799). Evidence for the expansion of Bermondsey Street was found in multi-phase brick structures running parallel to the current north-west south-east alignment (the earliest being of 16th-century date). Furthermore two related 17th-century curving walls and associated demolition levelling debris suggest the one time existence of an as yet unidentified brick building located immediately to the east of modern Weston Street.
Project dates	Start: 07-07-2010 End: 05-01-2011
Previous/future work	Yes / Not known
Any associated project reference codes	LBZ10 - Sitecode
Type of project	Field evaluation
Site status	Local Authority Designated Archaeological Area
Site status	Listed Building
Current Land use	Transport and Utilities 2 - Other transport infrastructure
Monument type	WALL Post Medieval

Monument type	CULVERT Post Medieval
Monument type	SEWER Post Medieval
Monument type	POST ALIGNMENT Uncertain
Monument type	SOAKAWAY Post Medieval
Monument type	GARDEN WALL Post Medieval
Significant Finds	BRICK Post Medieval
Significant Finds	ROOF TILE Post Medieval
Significant Finds	SHERD Medieval
Significant Finds	SHERD Post Medieval
Significant Finds	SHERD Roman
Significant Finds	BOTTLE Post Medieval
Significant Finds	BEAM Uncertain
Significant Finds	TOBACCO PIPE Post Medieval
Significant Finds	FIGURINE Post Medieval
Methods & techniques	'Test Pits'
Development type	Rail links/railway-related infrastructure (including Channel Tunnel)
Prompt	Planning condition
Position in the planning process	After full determination (eg. As a condition)

Project location

Country	England

Site location	GREATER LONDON SOUTHWARK SOUTHWARK Thameslink London Bridge Station
Postcode	E1
Study area	73000.00 Square metres
Site coordinates	TQ 3302 8010 51.5036598431 -0.08321819580630 51 30 13 N 000 04 59 W Point
Height OD / Depth	Min: -0.75m Max: 1.27m

Project creators

Name of Organisation	MoL Archaeology
Project brief originator	Network Rail
Project design originator	Network Rail
Project director/manager	Derek Seeley
Project supervisor	Sam Pfizenmaier
Project supervisor	Robert Hartle
Project supervisor	Michael Tetreau
Project supervisor	Craig Halsey
Type of sponsor/funding body	Network Rail
Name of sponsor/funding body	Network Rail

Project archives

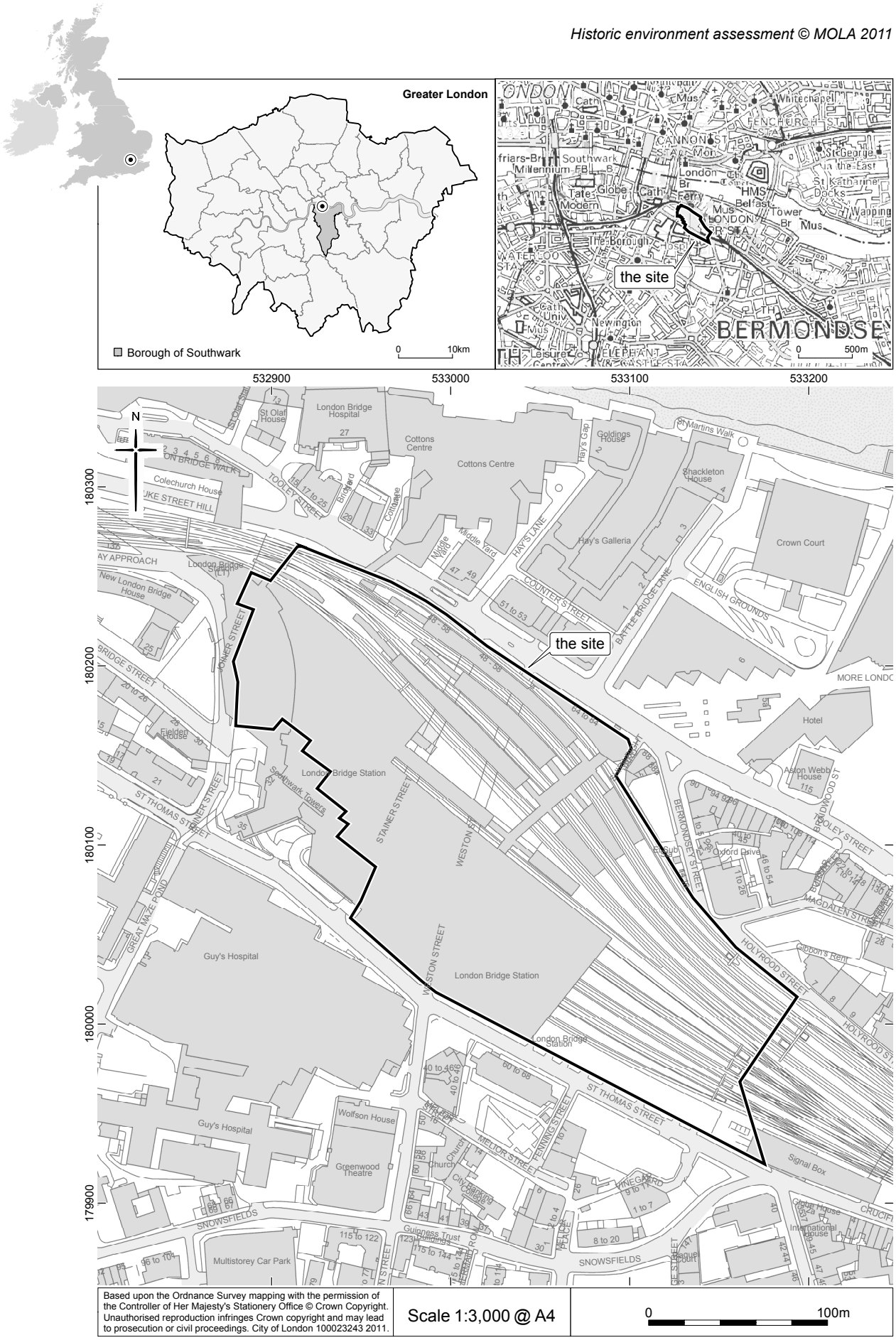
Physical Archive ID	LBZ10

Digital Archive ID	LBZ10
Paper Archive ID	LBZ10

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Thameslink-London Bridge Station
Author(s)/Editor(s)	Holloway,J.
Author(s)/Editor(s)	Tyler,K.
Author(s)/Editor(s)	Spurr,G.
Author(s)/Editor(s)	Pfizenmaier,P.
Date	2011
Issuer or publisher	Museum of London Archaeology
Place of issue or publication	london
Description	unpub. client report

Entered by	spfizenmaier (spfizenmaier@museumoflondon.org.uk)
Entered on	5 April 2011



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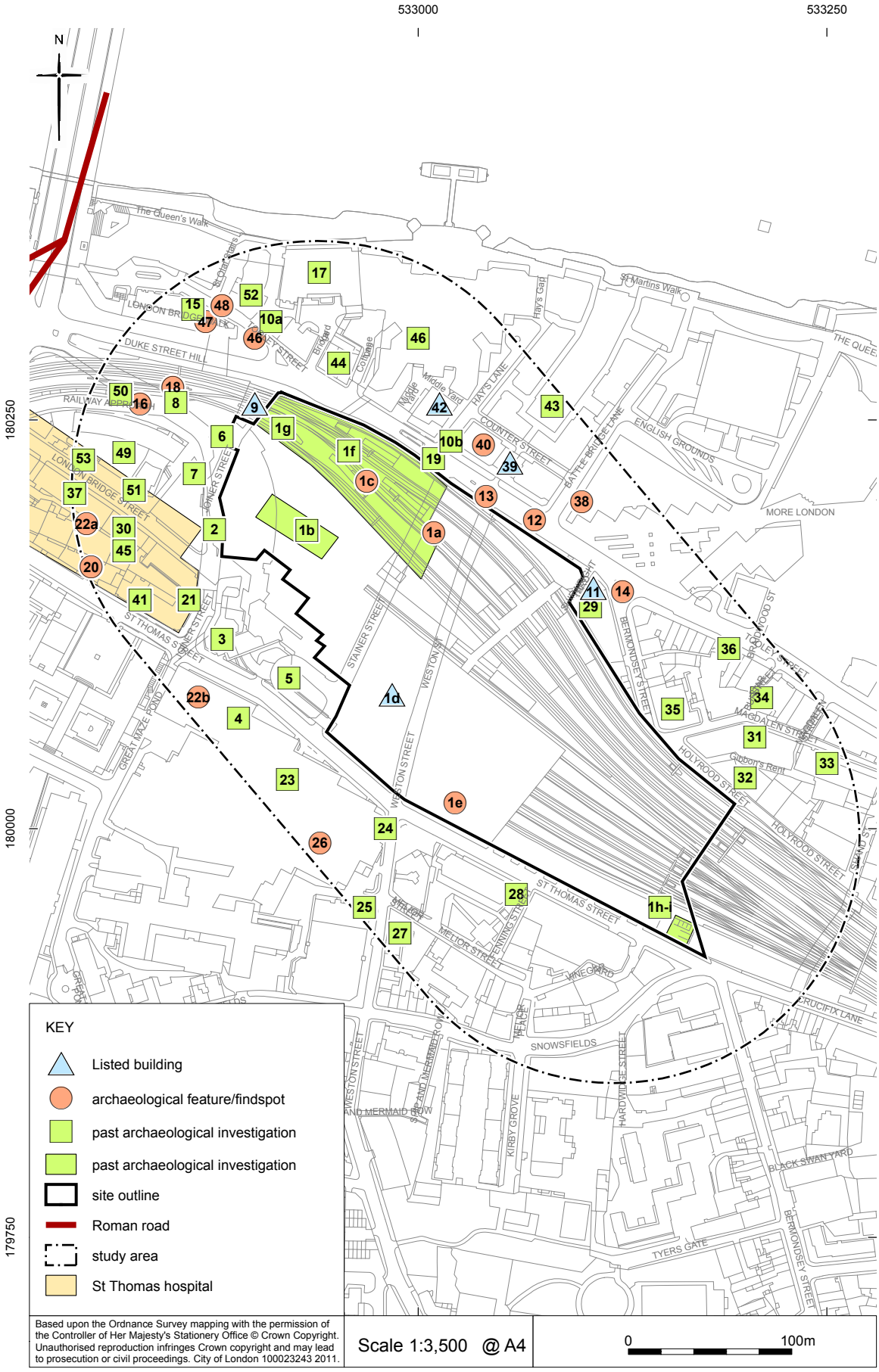

Fig 2 Historic environment features map

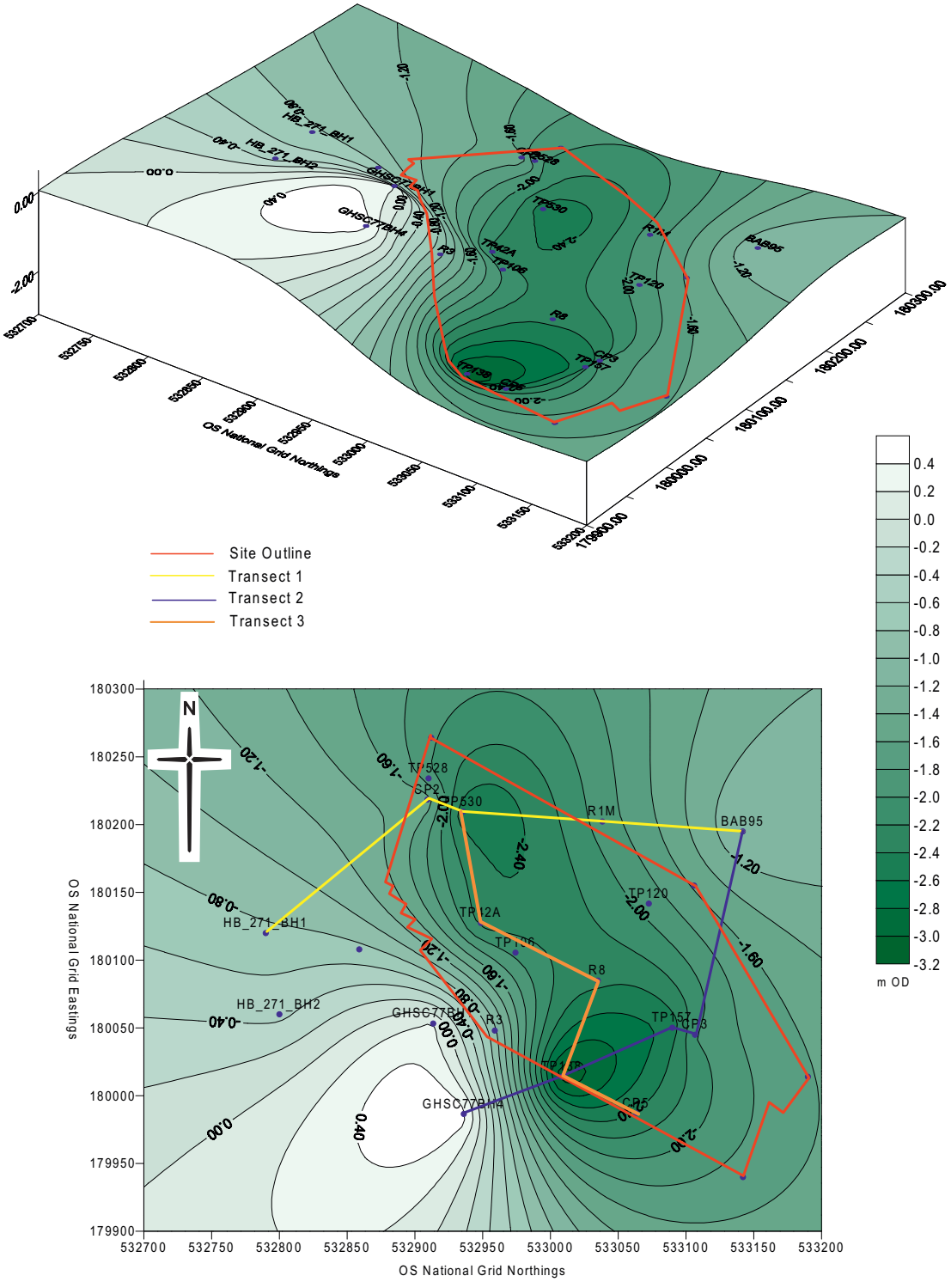

Fig 3 Topographic plot of the Early Holocene surface with borehole locations and lines of transects

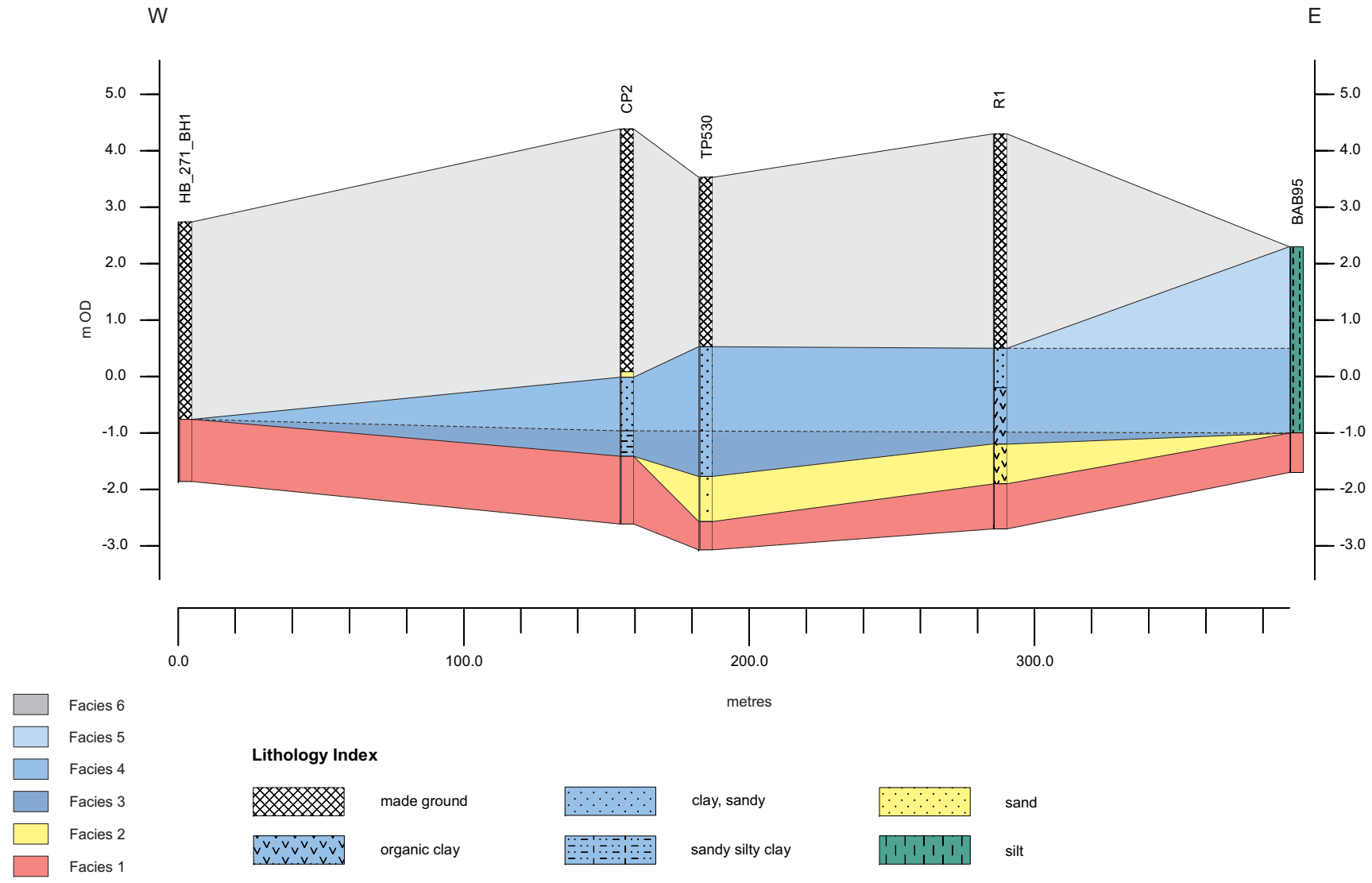

Fig 4 Transect 1

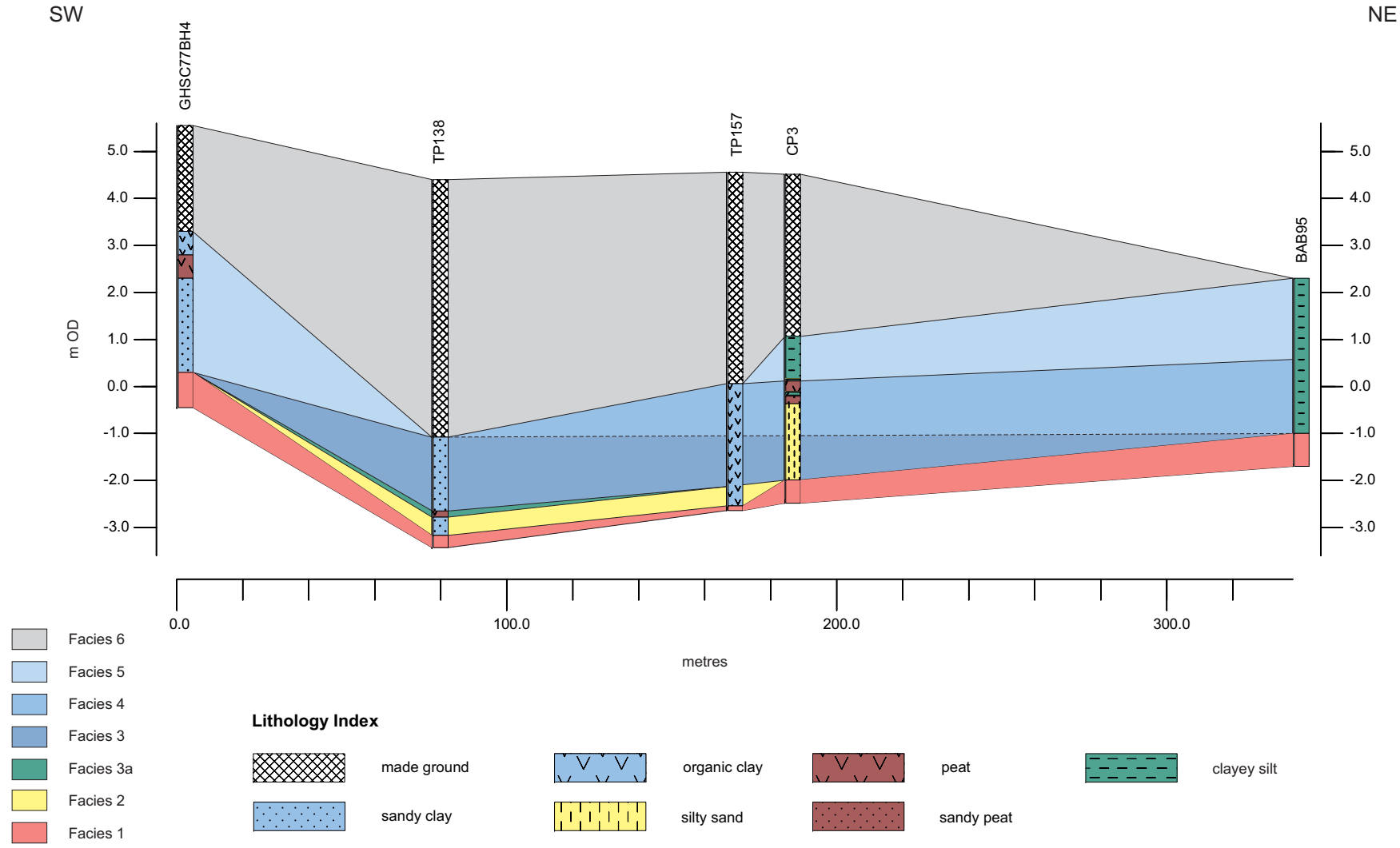

Fig 5 Transect 2

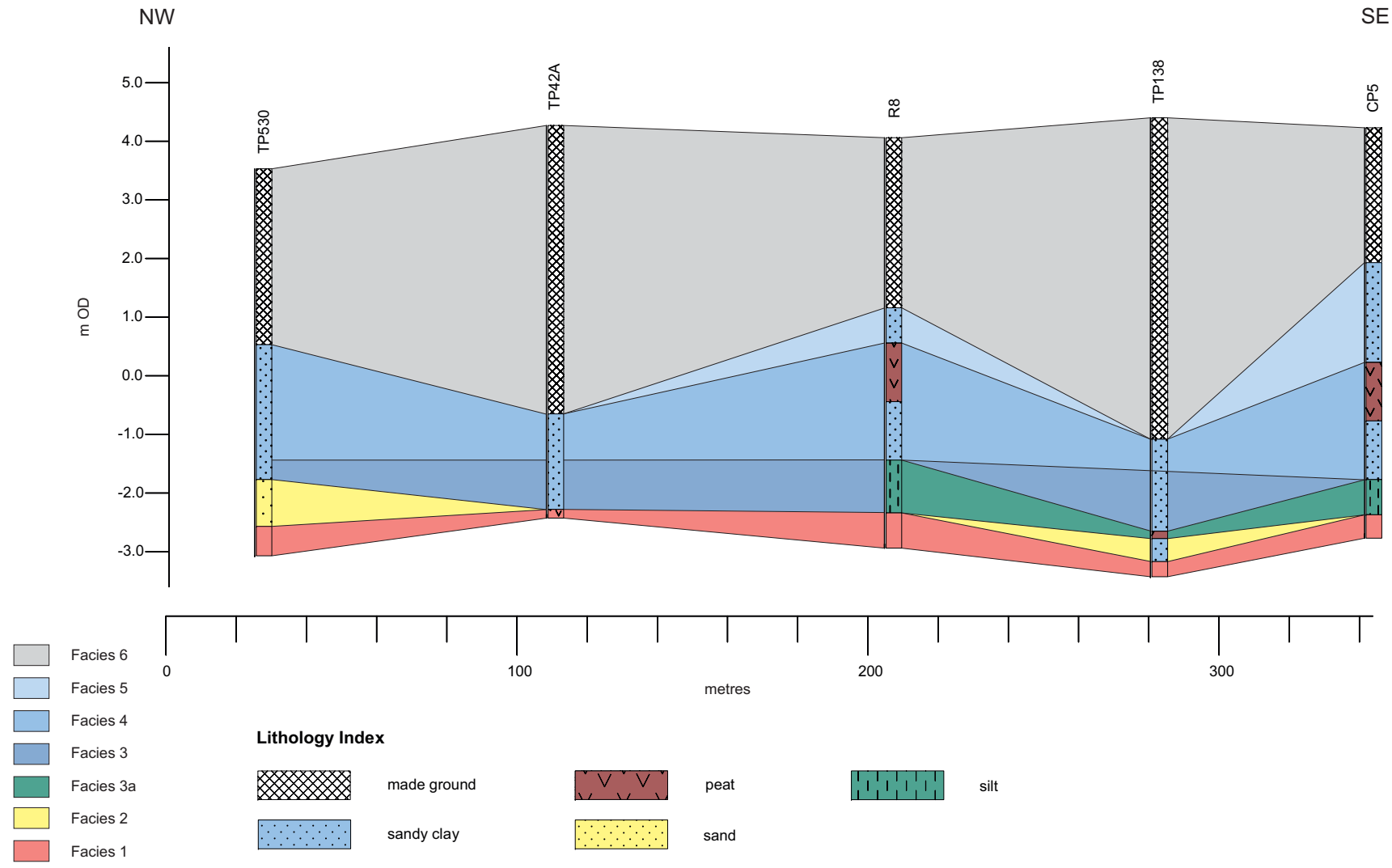

Fig 6 Transect 3

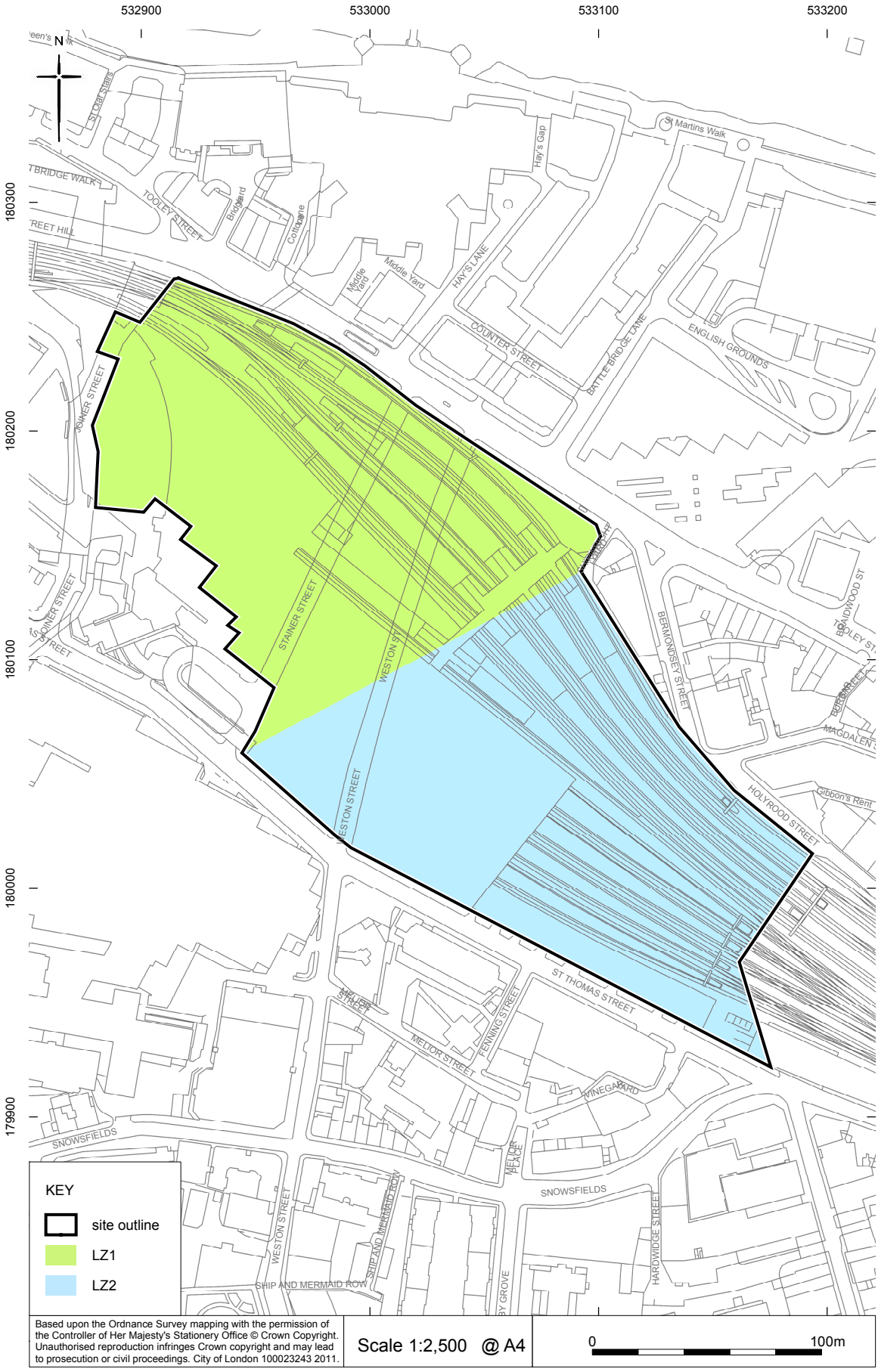

Fig 7 Distribution of landscape zones across the site

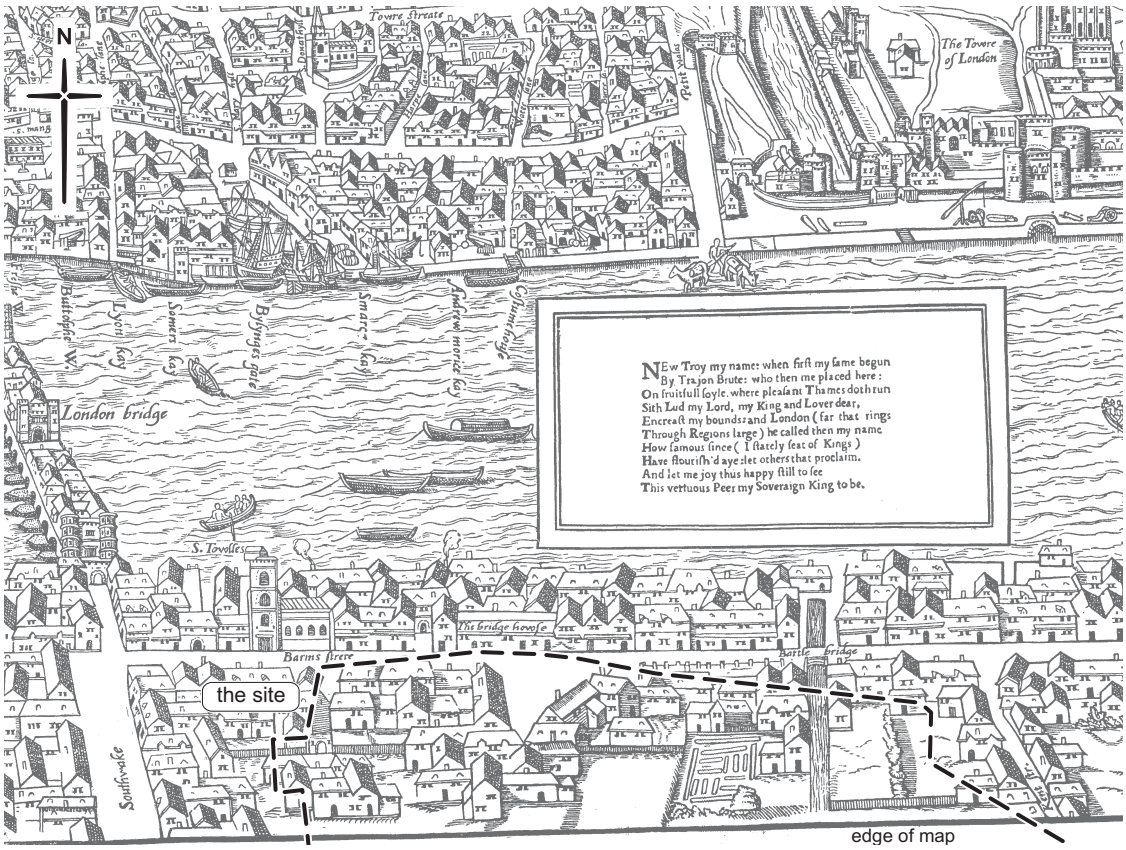

Fig 8 Extract from the Agas map, 1562

Fig 9 Extract from the Faithorne and Newcourt map, 1658

Fig 10 Extract from the Morgan map, 1682

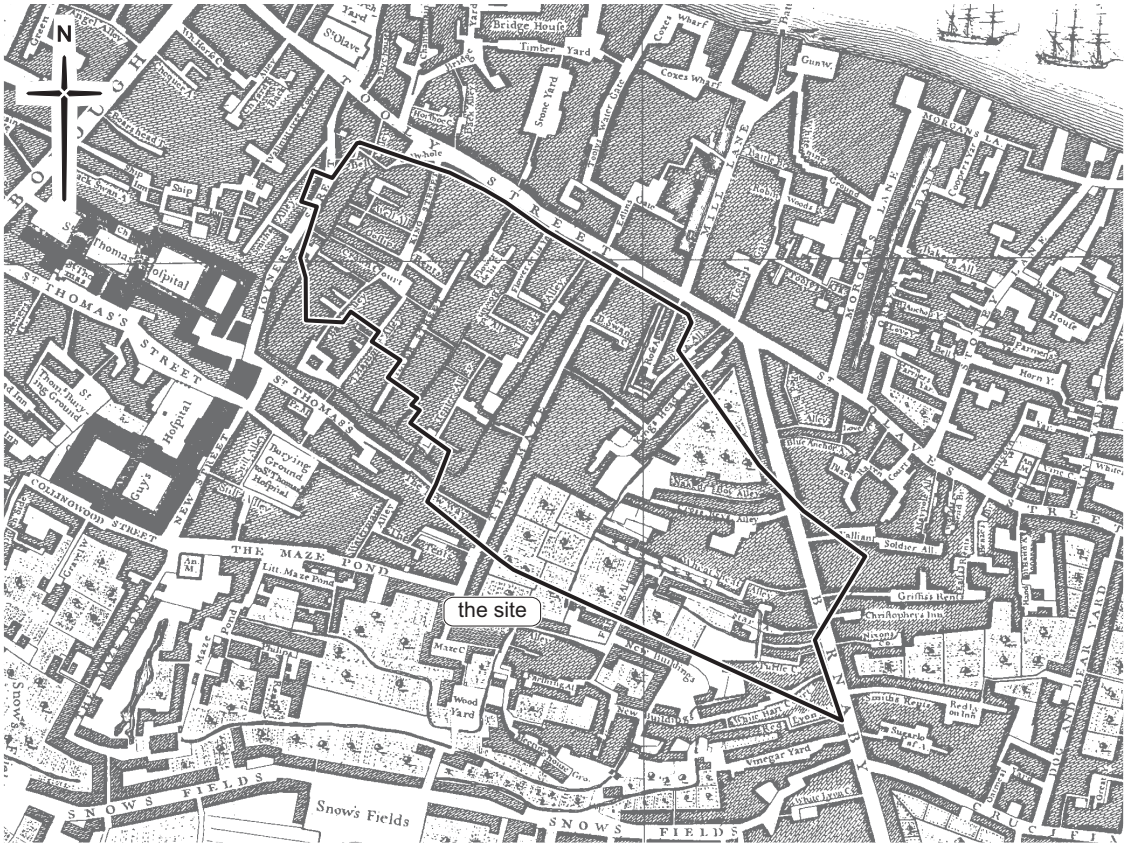

Fig 11 Extract from the Rocque map, 1746

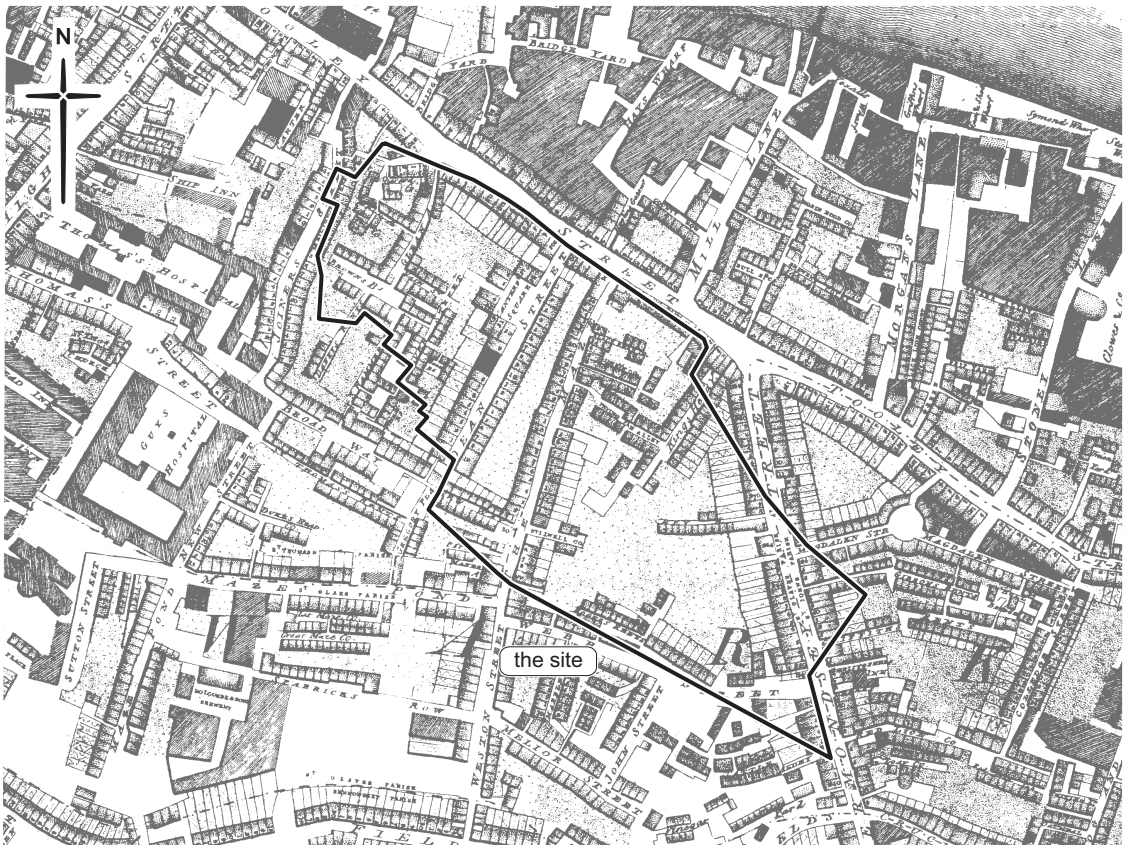

Fig 12 Extract from the Faden 1813 update of Horwood's 1799 map

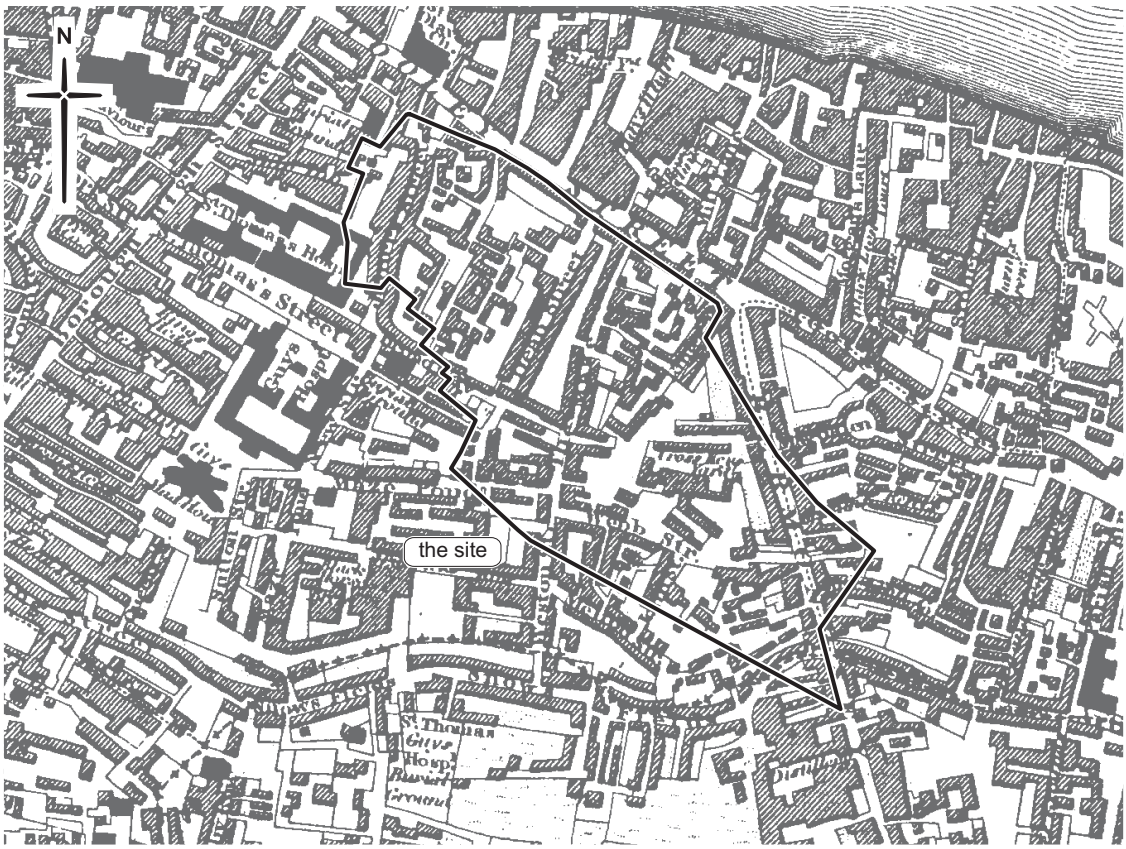

Fig 13 Extract from the Greenwood map, 1827

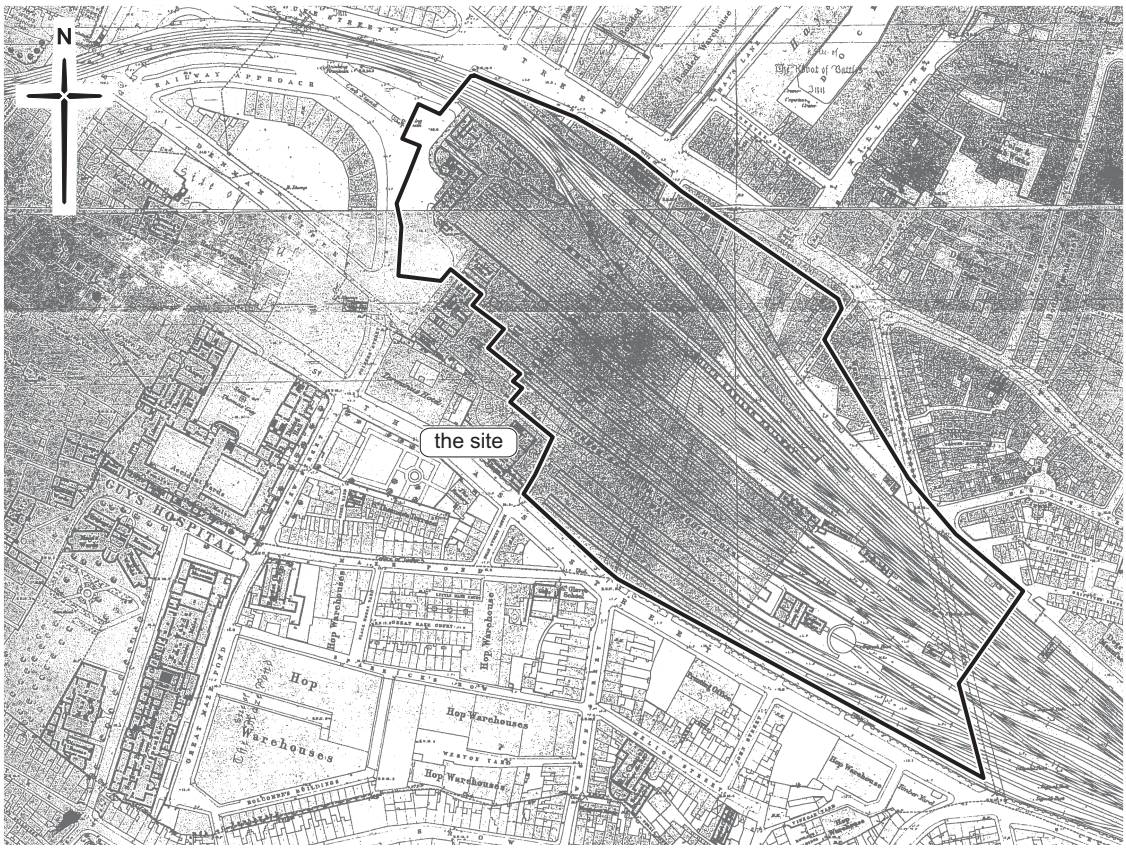

Fig 14 Extract from the First edition Ordnance Survey 5ft:mile map, 1875 (not to scale)

Fig 15 Key plan locating trial pits and boreholes

Fig 16 Location plan of geotechnical trial pits and archaeological boreholes (west)

Fig 17 Location plan of geotechnical trial pits and archaeological boreholes (east)

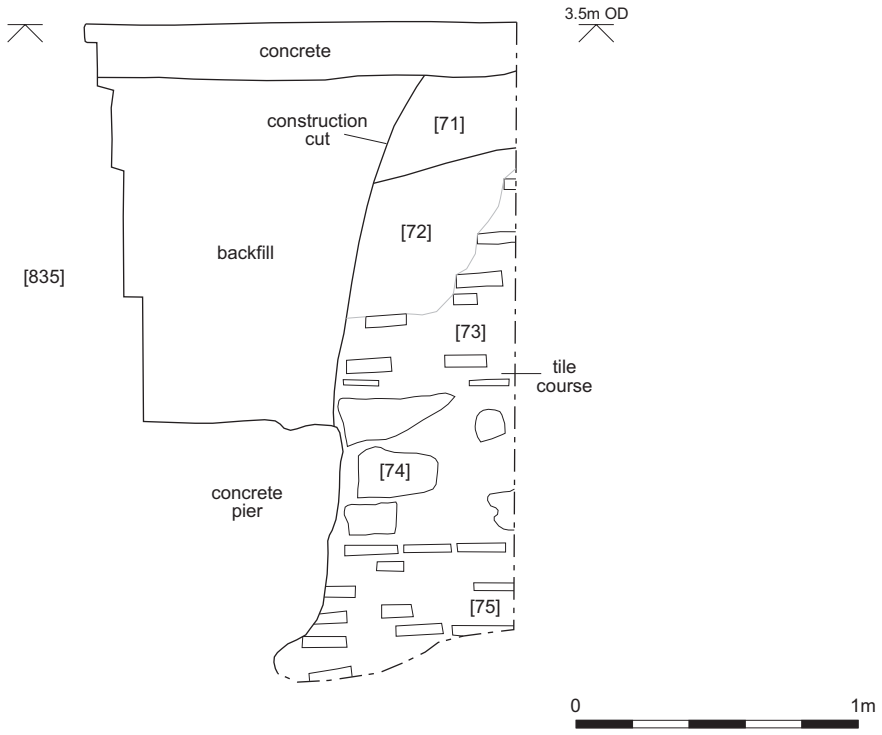

Fig 18 South-west facing section, Trial Pit 25 (S1)

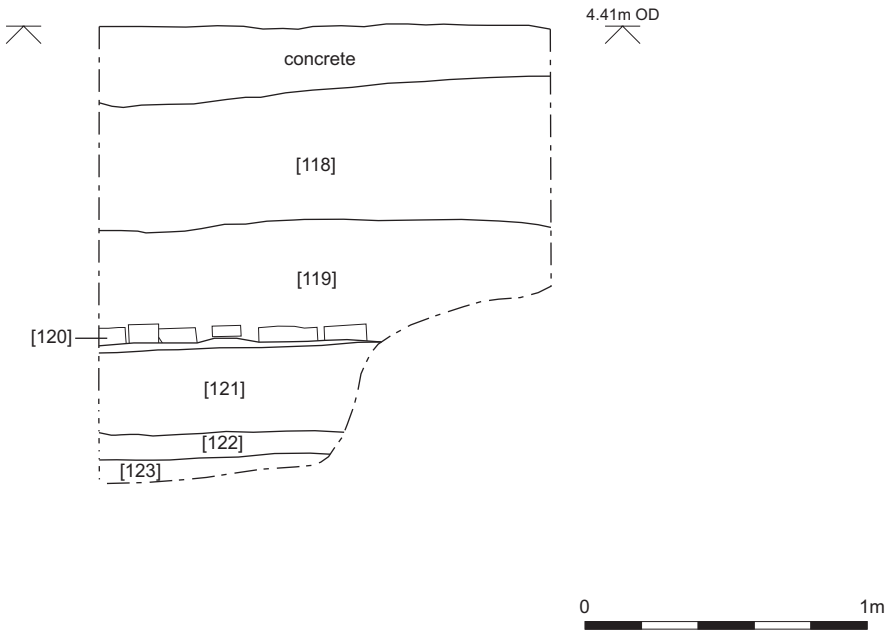

Fig 19 South-east facing section, Trial Pit 117 (S2)

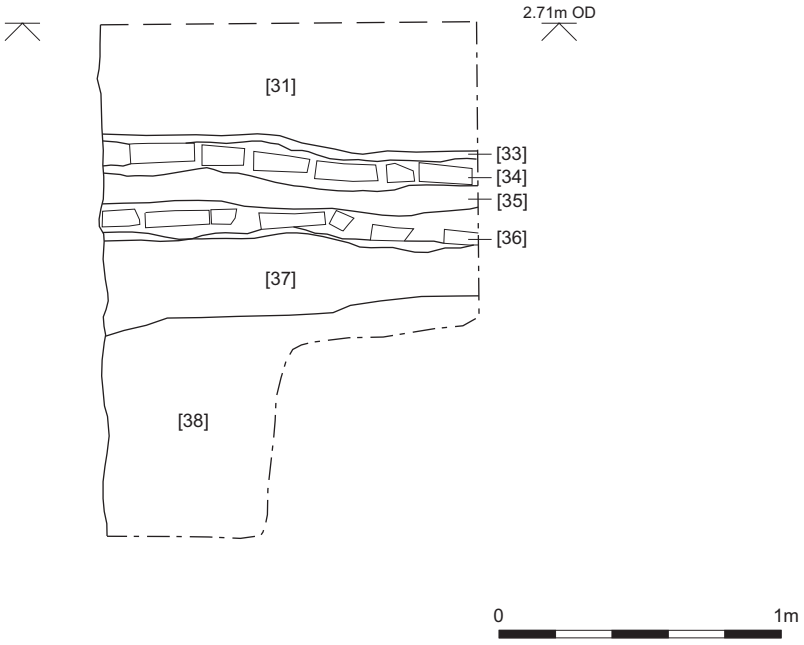

Fig 20 North-west facing section, Trial Pit 658 (S3)

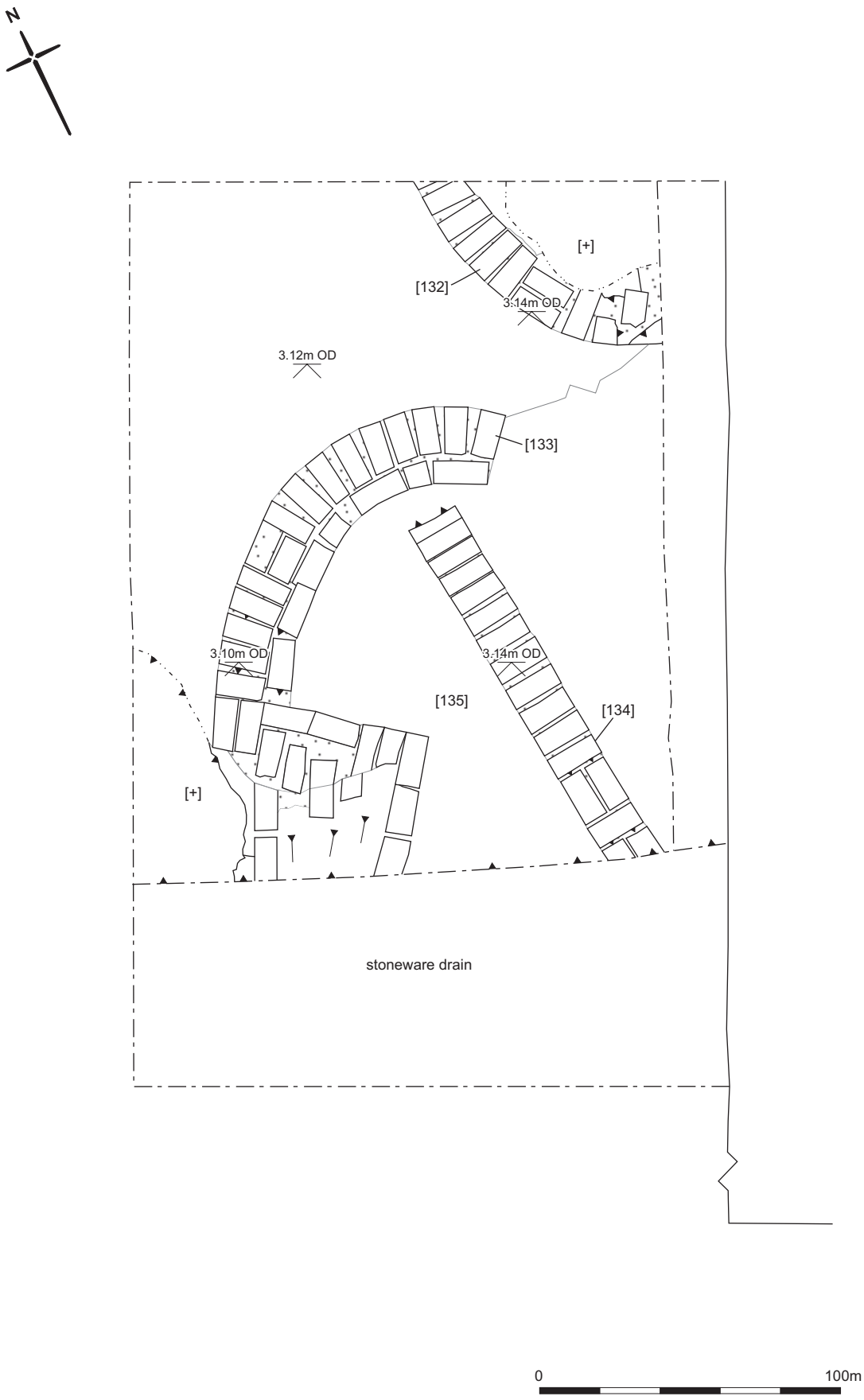

Fig 21 Plan of features at 3.14m OD, Trial Pit 662a

Fig 22 Plan of features at 0.14m OD, Trial Pit 662a

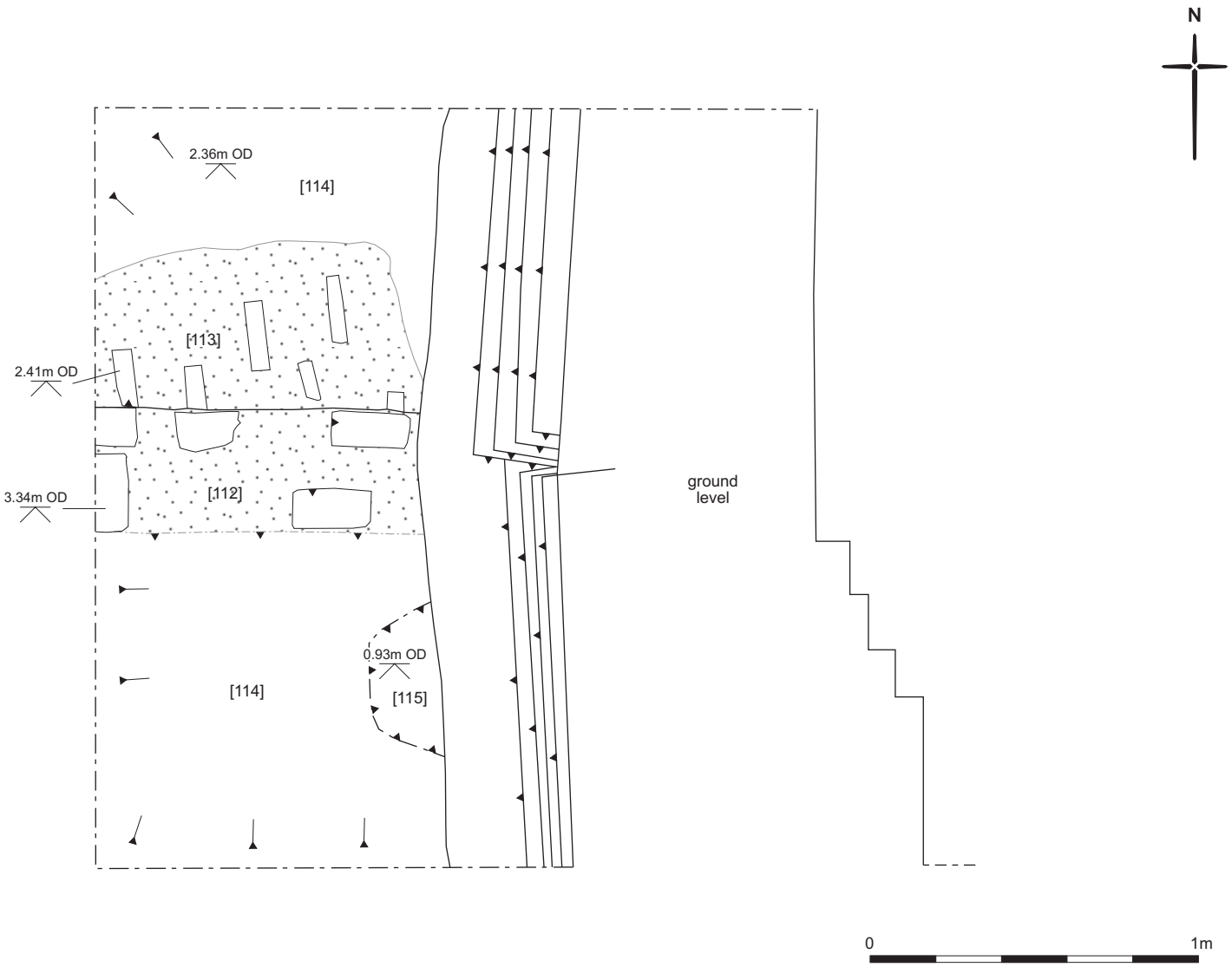

Fig 23 Plan of features, Trial Pit 663

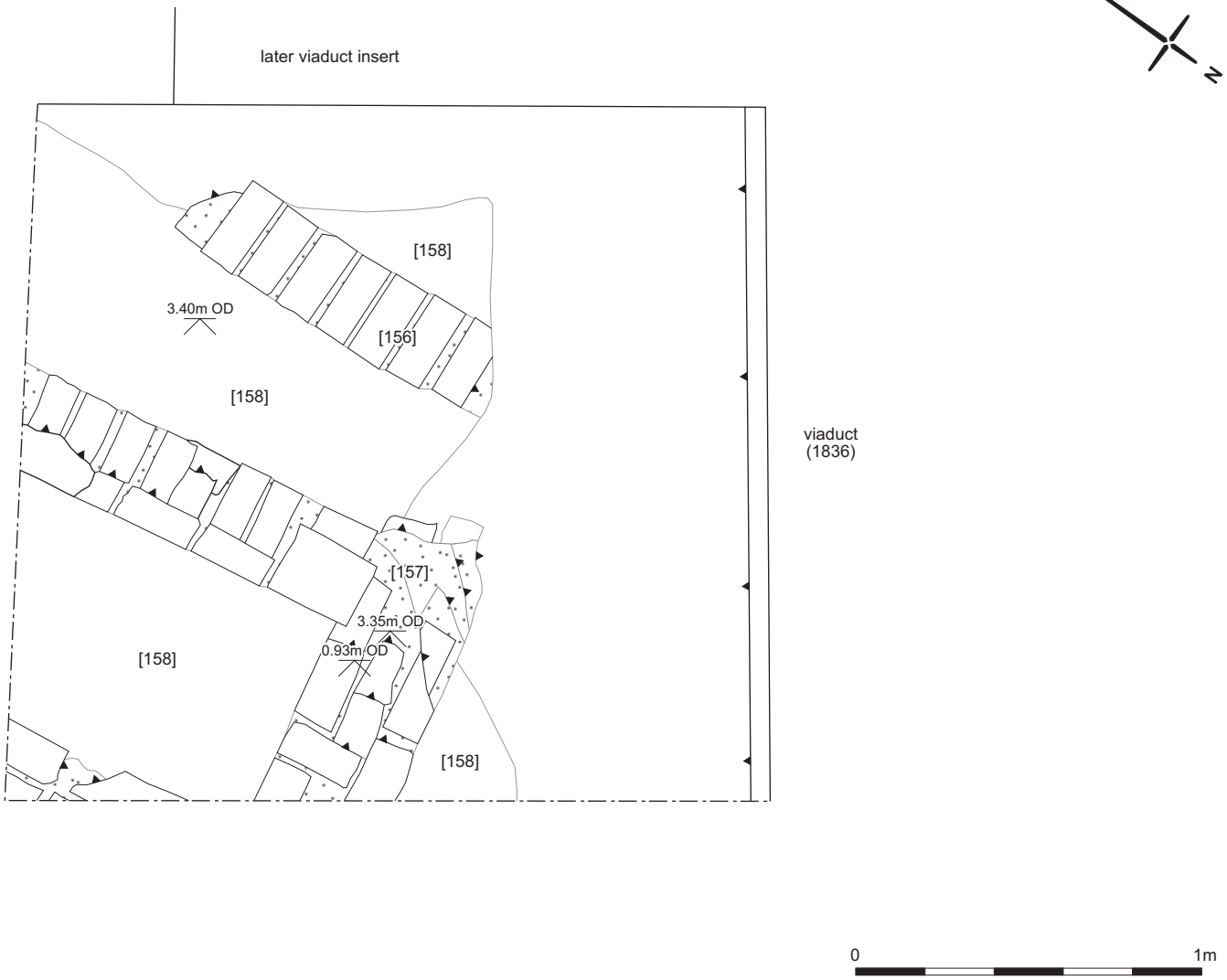

Fig 24 Plan of features, Trial Pit 674