



UCL

New Student Centre

Archaeological Desk Based Assessment

June 2015





ARCHAEOLOGICAL DESK BASED ASSESSMENT

**15 Gordon Street
Bloomsbury
London WC1H**

**June 2014
Updated October 2014**

Planning • Heritage

Specialist & Independent Advisors to the Property Industry

**Local Planning Authority:
London Borough of Camden**

**Site centred at:
TQ 2966 8229**

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CONTENTS

Executive Summary

- 1.0 Introduction and Scope of Study
- 2.0 Development Plan Framework
- 3.0 Geology and Topography
- 4.0 Archaeological and Historical Background, with Assessment of Significance
(Including map regression exercise)
- 5.0 Site Conditions and the Proposed Development
(Review of Potential Impact on Heritage Assets)
- 6.0 Summary and Conclusions

Sources Consulted

Appendix A – Geotechnical Survey Data

LIST OF ILLUSTRATIONS

- Fig. 1 Site Location
- Fig. 2 Summary of Cultural Heritage designations (data from GLHER)
- Fig. 3 1740 Rocque
- Fig. 4 1746 Rocque
- Fig. 5 1795 Horwood
- Fig. 6 1874 Ordnance Survey
- Fig. 7 1894 Ordnance Survey
- Fig. 8 1912 Ordnance Survey
- Fig. 9 1938 Ordnance Survey
- Fig. 10 1944-45 Bomb Damage Survey
- Fig. 11 1951 Ordnance Survey
- Fig. 12 1961 Ordnance Survey
- Fig. 13 1973-76 Ordnance Survey
- Fig. 14 1999 Google Earth View
- Fig. 15 2014 Existing Site Plan

EXECUTIVE SUMMARY

- The site of 15 Gordon Street, Bloomsbury, London WC1H has been reviewed for its below ground archaeological potential.
- The site has a modest archaeological potential for remains associated with the Palaeolithic period, and a limited potential for all other periods.
- Medieval agricultural activity is likely to have had a low, but widespread, negative impact on below ground archaeological deposits.
- The construction of buildings on the site during the 19th and 20th century will have had a severe widespread negative impact on below ground archaeological deposits due to the cutting of foundations, basements and services.
- Current redevelopment proposals comprise the construction of a new Student Centre.
- On the basis of the available information we recommend the implementation of further mitigation in the form of targeted archaeological watching brief, during construction groundworks, specifically the construction of the new basement.
- Due to the nature of the archaeological investigation required, such mitigation is anticipated to follow the granting of planning consent secured by an appropriate condition.

1.0 INTRODUCTION AND SCOPE OF STUDY

- 1.1 This archaeological desk-based assessment has been researched by Sophie Hudson, and prepared Chris Clarke of CgMs Consulting on behalf of the MACE Group.
- 1.2 The subject of this Assessment comprises the site of 15 Gordon Street, Bloomsbury, London WC1H. The site is centred at TQ 2966 8229 within the London Borough of Camden (see Figs. 1-2). Overall the site measures approximately 1,100m² in size.
- 1.3 The MACE Group have commissioned CgMs Consulting to establish the archaeological potential of the site, and to provide guidance on ways to accommodate any archaeological constraints identified.
- 1.4 In line with national and local policy and guidance, this desk-based assessment comprises an examination of evidence on the Greater London Historic Environment Record (GLHER) and other sources, including the Camden Archives. The report also includes the results of a comprehensive map regression exercise.
- 1.5 The Assessment thus enables relevant parties to assess the archaeological potential of various parts of the site and to consider the need for design, civil engineering, and archaeological solutions to the archaeological potential identified.

2.0 DEVELOPMENT PLAN FRAMEWORK

- 2.1 National legislation regarding archaeology, including scheduled ancient monuments, is contained in the Ancient Monuments and Archaeological Areas (AMAA) Act 1979, amended by the National Heritage Act 1983 and 2002.
- 2.2 In March 2012, the government published the National Planning Policy Framework (NPPF), which replaces national policy relating to heritage and archaeology (Planning Policy Statement 5: Planning for the Historic Environment). More recently (March 2014) National Planning Policy Guidance (NPPG) has been published.
- 2.3 Section 12 of the NPPF, entitled *Conserving and enhancing the historic environment* provides guidance for planning authorities, property owners, developers and others on the conservation and investigation of heritage assets. Overall, the objectives of Section 12 of the NPPF can be summarised as seeking the:
- Delivery of sustainable development
 - Understanding the wider social, cultural, economic and environmental benefits brought by the conservation of the historic environment
 - Conservation of England's heritage assets in a manner appropriate to their significance, and
 - Recognition that heritage contributes to our knowledge and understanding of the past.
- 2.4 Section 12 of the NPPF recognises that intelligently managed change may sometimes be necessary if heritage assets are to be maintained for the long term. Paragraph 128 states that planning decisions should be based on the significance of the heritage asset, and that level of detail supplied by an applicant should be proportionate to the importance of the asset and should be *no more than sufficient* to review the potential impact of the proposal upon the significance of that asset.
- 2.5 *Heritage Assets* are defined in Annex 2 of the NPPF as: a building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. They include designated heritage assets (as defined in the NPPF) and assets identified by the local planning authority during the process of decision-making or through the plan-making process.

- 2.6 Annex 2 also defines *Archaeological Interest* as a heritage asset which holds or potentially could hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
- 2.7 A *Designated Heritage Asset* comprises a: World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area.
- 2.8 *Significance* is defined as: The value of a heritage asset to this and future generations because of its heritage interest. This interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.
- 2.9 In short, government policy provides a framework which:
- Protects nationally important designated Heritage Assets (which include World Heritage Sites, Scheduled Ancient Monuments, Listed Buildings, Protected Wreck Sites, Registered Parks and Gardens, Registered Battlefields or Conservation Areas).
 - Protects the settings of such designations.
 - In appropriate circumstances seeks adequate information (from desk based assessment and field evaluation where necessary) to enable informed decisions.
 - Provides for the excavation and investigation of sites not significant enough to merit *in-situ* preservation.
- 2.10 In considering any planning application for development, the planning authority will be mindful of the framework set by government policy, in this instance the NPPF, by current Development Plan Policy and by other material considerations.
- 2.11 The relevant Strategic Development Plan framework is provided by the London Plan published 22 July 2011. Policy relevant to archaeology at the study sites include:

POLICY 7.8 HERITAGE ASSETS AND ARCHAEOLOGY

STRATEGIC

A LONDON'S HERITAGE ASSETS AND HISTORIC ENVIRONMENT, INCLUDING LISTED BUILDINGS, REGISTERED HISTORIC PARKS AND GARDENS AND OTHER NATURAL AND HISTORIC LANDSCAPES, CONSERVATION AREAS,

WORLD HERITAGE SITES, REGISTERED BATTLEFIELDS, SCHEDULED MONUMENTS, ARCHAEOLOGICAL REMAINS AND MEMORIALS SHOULD BE IDENTIFIED, SO THAT THE DESIRABILITY OF SUSTAINING AND ENHANCING THEIR SIGNIFICANCE AND OF UTILISING THEIR POSITIVE ROLE IN PLACE SHAPING CAN BE TAKEN INTO ACCOUNT.

B DEVELOPMENT SHOULD INCORPORATE MEASURES THAT IDENTIFY, RECORD, INTERPRET, PROTECT AND, WHERE APPROPRIATE, PRESENT THE SITE'S ARCHAEOLOGY.

PLANNING DECISIONS

C DEVELOPMENT SHOULD IDENTIFY, VALUE, CONSERVE, RESTORE, RE-USE AND INCORPORATE HERITAGE ASSETS, WHERE APPROPRIATE.

D DEVELOPMENT AFFECTING HERITAGE ASSETS AND THEIR SETTINGS SHOULD CONSERVE THEIR SIGNIFICANCE, BY BEING SYMPATHETIC TO THEIR FORM, SCALE, MATERIALS AND ARCHITECTURAL DETAIL.

E NEW DEVELOPMENT SHOULD MAKE PROVISION FOR THE PROTECTION OF ARCHAEOLOGICAL RESOURCES, LANDSCAPES AND SIGNIFICANT MEMORIALS. THE PHYSICAL ASSETS SHOULD, WHERE POSSIBLE, BE MADE AVAILABLE TO THE PUBLIC ON-SITE. WHERE THE ARCHAEOLOGICAL ASSET OR MEMORIAL CANNOT BE PRESERVED OR MANAGED ON-SITE, PROVISION MUST BE MADE FOR THE INVESTIGATION, UNDERSTANDING, RECORDING, DISSEMINATION AND ARCHIVING OF THAT ASSET.

LDF PREPARATION

F BOROUGHES SHOULD, IN LDF POLICIES, SEEK TO MAINTAIN AND ENHANCE THE CONTRIBUTION OF BUILT, LANDSCAPED AND BURIED HERITAGE TO LONDON'S ENVIRONMENTAL QUALITY, CULTURAL IDENTITY AND ECONOMY AS PART OF MANAGING LONDON'S ABILITY TO ACCOMMODATE CHANGE AND REGENERATION.

G BOROUGHES, IN CONSULTATION WITH ENGLISH HERITAGE, NATURAL ENGLAND AND OTHER RELEVANT STATUTORY ORGANISATIONS, SHOULD INCLUDE APPROPRIATE POLICIES IN THEIR LDFS FOR IDENTIFYING, PROTECTING, ENHANCING AND IMPROVING ACCESS TO THE HISTORIC ENVIRONMENT AND HERITAGE ASSETS AND THEIR SETTINGS WHERE APPROPRIATE, AND TO ARCHAEOLOGICAL ASSETS, MEMORIALS AND HISTORIC AND NATURAL LANDSCAPE CHARACTER WITHIN THEIR AREA.

- 2.12 Revised early minor alterations to the London Plan were published in October 2013, which includes amendments to paragraph 7.31 in support of Policy 7.8 above.
- 2.13 Draft Further Alterations to the London Plan were published in January 2014. No changes to Policy 7.8 has been proposed; amendments are proposed to the wording of Policy 7.10 World Heritage Sites, cross referencing this policy with the Supplementary Planning Guidance document for the setting of World Heritage Sites prepared in 2012.

- 2.14 The Camden Unitary Development Plan (UDP) 2006 has been replaced by the Core Strategy and Development Policies LDF documents as of 8 November 2010. The following Development Policy relates to Archaeology:

DP25 CONSERVING CAMDEN'S HERITAGE

ARCHAEOLOGY

THE COUNCIL WILL PROTECT REMAINS OF ARCHAEOLOGICAL IMPORTANCE BY ENSURING ACCEPTABLE MEASURES ARE TAKEN TO PRESERVE THEM AND THEIR SETTING, INCLUDING PHYSICAL PRESERVATION, WHERE APPROPRIATE.

- 2.15 In terms of designated heritage assets as defined above in the NPPF, and as shown on Figure 2, no World Heritage Sites, Scheduled Ancient Monuments, Historic Battlefield or Historic Wreck designations lie within a 500m radius study area. The site is not located within an Archaeological Priority Area.
- 2.16 The site lies immediately to the northwest of the Grade II listed 19th century terraced building 26 Gordon Square (1113030, TQ 29667 82284).
- 2.17 This desk based assessment therefore aims to meet the national, strategic and local council policy and policy guidance as set out above, in clarifying the archaeological potential of the study sites and the need or otherwise for further mitigation measures.

3.0 GEOLOGY AND TOPOGRAPHY

3.1 Geology

- 3.1.1 The solid geology of the study site is shown by the British Geological Survey (2013) as London Clay Formation, overlain by superficial Lynch Hill Gravel Member.
- 3.1.2 A geotechnical survey was undertaken on site in December 2013 (Appendix A) which recorded varying depths of modern made ground within the site, which appeared to average a thickness of in excess of 2m. Lynch Hill Gravels were observed as being sealed by the made ground in a limited number of test pits at a depth of between 1m and 1.70m below existing ground level (Soiltechnics 2014).

3.2 Topography

- 3.2.1 The study site is approximately level at a height of approximately 34m Above Ordnance Datum (AOD).
- 3.2.2 No naturally occurring bodies of water are present in the vicinity of the site.

4.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND, WITH ASSESSEMENT OF SIGNIFICANCE

(Including Historic Map Regression exercise)

4.1 Timescales used in this report:

Prehistoric

Palaeolithic	450,000	-	12,000	BC
Mesolithic	12,000	-	4,000	BC
Neolithic	4,000	-	1,800	BC
Bronze Age	1,800	-	600	BC
Iron Age	600	-	AD 43	

Historic

Roman	AD 43	-	410
Anglo Saxon/Early Medieval	AD 410	-	1066
Medieval	AD 1066	-	1485
Post Medieval	AD 1486	-	1749
Modern	AD 1750	-	Present

4.2 Introduction

- 4.2.1 What follows comprises a review of archaeological findspots within a 1km radius of the study site, also referred to as the study area, held on the Greater London Historic Environment Record (GLHER), together with a historic map regression exercise charting the development of the study area from the eighteenth century onwards until the present day.
- 4.2.2 In terms of designated heritage assets, as defined above and as shown on Figure 2, no designated World Heritage Sites, Scheduled Ancient Monuments, Historic Wrecks or Historic Battlefields lie within the study area. The site is not located within an Archaeological Priority Area.
- 4.2.3 The map regression exercise and a review of documentary evidence and secondary sources demonstrates that the site is located on a superficial geology of Lynch Hill Gravel, from which occasional isolated Palaeolithic artefacts have been recovered. During the Post-Medieval and Modern periods the site was extensively redeveloped.

During the mid 19th century two terraced houses and church were constructed on the site which were subsequently demolished and replaced by a 20th century institutional building, this had also been demolished by the late 20th century.

4.3 Palaeolithic & Mesolithic

4.3.1 A possible Palaeolithic flint was found during ground works at University College Hospital c325m to the west of the site (MLO75730, TQ 29340 82300), while a Palaeolithic handaxe was found near Woburn Place in 1908 to the southeast (MLO17749, TQ 3010 8215). A second handaxe was found on Malet Street c350m to the south of the site (081715/00/00, TQ 2980 8195).

4.3.2 A complete fossilised leg bone from a wild horse, dated to the middle Palaeolithic, was found at No 6 Taviton Place c125m to the northeast (MLO103259, TQ2970 8240). A red deer antler, dated to the same period, was found a further 100m to the north (MLO103258, TQ 2970 8248).

4.3.3 Wymer records a scatter of handaxes identified from the Lynch Hill and Hackney Gravels across an area reaching from the eastern end of Hyde Park, through Bloomsbury to Hackney (Wymer 1999: Vol. 1 63; Vol. 2 Map 9). In view of the finds from the study area and its underlying geology, a low to moderate potential can be identified for isolated Palaeolithic artefacts at depth below the study site itself.

4.4 Neolithic, Bronze Age & Iron Age

4.4.1 From around 4000 BC the mobile hunter-gathering economy of the Mesolithic gradually gave way to a more settled agriculture-based subsistence. The pace of woodland clearance to create arable and pasture-based agricultural land varied regionally and locally, depending on a wide variety of climatic, topographic, social and other factors. The trend was one of a slow, but gradually increasing pace of forest clearance.

4.4.2 Finds of Neolithic date within the 500m study area radius consist of two isolated stone axes within 2000m of the site found in locations on Gower Street during the 19th century (081720/00/00, TQ 2950 8220; 081718/00/00, TQ 2960 8210).

4.4.3 By the 1st millennium, i.e. 1000 BC, the landscape was probably a mix of extensive tracts of open farmland, punctuated by earthwork burial and ceremonial monuments

from distant generations, with settlements, ritual areas and defended locations reflecting an increasingly hierarchical society.

- 4.4.4 Only a limited number of Neolithic artefacts have been identified within the 500m study area radius, while no evidence for Bronze Age or Iron Age activity has been recorded. In view of this paucity a low archaeological potential can be identified for the later prehistoric periods at the study site itself.

4.5 Roman

- 4.5.1 The line of Oxford Street to the south of the site is thought to follow the line of a Roman road and earlier trackway (MLO11208, TQ2769 8096), together with the line of Theobalds Road to the southeast (MLO24965, TQ3061 8171). The line of Tottenham Court Road to the east is also believed to follow the line of a Roman road (MLO17799, TQ2950 8240).
- 4.5.2 Typical archaeological features associated with Roman roads can include evidence for settlement and occupation, roadside ditches and associated land division, together with quarry pits, burials and chance losses.
- 4.5.3 The GLHER does not contain any records that relate to Roman activity occurring within the 500m study area radius.
- 4.5.4 It is likely that the study site was located away from the centres of settlement at this time possible in a rural or wooded context. Accordingly a low archaeological potential can be considered for the Roman period at the study site.

4.6 Anglo-Saxon and Medieval

- 4.6.1 Evidence for Anglo-Saxon activity within the study area is limited the recovery of a small assemblage pottery found during archaeological work on Euston Road c375m to the northwest (081795/00/00, TQ 2930 8240), and a gold ring in Euston Road c275m to the north (MLO18046, TQ 2960 8260).
- 4.6.2 The site of Tottenham Hall Manor House has been identified on the north side of Euston Road to the northeast of the study site. Excavation in 1979 revealed yard surfaces and walls (MLO17706, MLO17810, MLO46419-20, MLO46609, TQ2930 8240). The site of

another manor house has been identified at Great Russell Street to the east (MLO18065, TQ3000 8180).

- 4.6.3 Given the above evidence it would appear that the site lay in open farmland surrounded by pockets of small scale settlement. The potential of the site for the Anglo-Saxon and Medieval periods can therefore be identified as generally low. Evidence of agricultural activity and land division could conceivably be present.

4.7 Post Medieval and Modern

- 4.7.1 Roque's map of 1740 (Fig. 3) shows the study site occupied by open ground to the east of the main area of settlement adjacent to Tottenham Court Road. The layout of the site remains unaltered in 1746 (Fig. 4).
- 4.7.2 Horwood's map of 1795 (Fig. 5) depicts the area in the vicinity of the site as becoming highly developed. The line of Gordon Street and Endsleigh Place have been laid out, but the site itself remains undeveloped.
- 4.7.3 The 1874 Ordnance Survey map (Fig. 6) shows the site as having been developed. Two terraced properties, and the yard of a third, have been constructed fronting onto Gordon Street in the southern part of the site. The footprint of All Saints Church lies within the northern part of the site. A review of the available literature and records held at the London Metropolitan Archive, do not indicate that burials were associated with All Saints Church. The terraced houses are likely to contain basements of a similar size to those terraced properties which survive to the south of the site. The layout of the site remains unaltered between 1894 and 1938 (Figs. 7-9).
- 4.7.4 A review of the 1944-45 Bomb Damage map (Fig. 10) indicated that the two terraced buildings on site were classified as damaged beyond repair. The church to the was considered totally destroyed.
- 4.7.5 By 1951 (Fig. 11) the bomb damaged buildings have been demolished and the site levelled, replaced by the southern wing of a new '*University College*' building in the northern part of the site, and an access road to the south. The layout of site remains unchanged between 1961 and 1976 (Figs. 12 & 13).
- 4.7.6 By 1999 (Fig. 14) college building has been demolished. The site is now occupied by a storage yard and temporary structures. By 2014 (Fig. 15) the existing access road has

been relocated, with the storage/temporary works located on either side of the access road.

- 4.7.7 The potential of the site for the Post-Medieval and Modern periods can be categorised as low.

4.8 Negative Evidence

- 4.8.1 Two negative archaeological watching briefs have been undertaken within the study area. The first was located adjacent to Tottenham Court Road approximately 375m southwest of the site (ELO11990, TQ 29533 81929), with a second watching brief undertaken on Euston Road c400m to the northeast (ELO11843, TQ 29838 82706).

4.9 Assessment of Significance

- 4.9.1 Existing national policy guidance for archaeology (the NPPF as referenced in section 2) enshrines the concept of the 'significance' of heritage assets. Significance as defined in the NPPF centres on the value of an archaeological or historic asset for its 'heritage interest' to this or future generations.
- 4.9.2 No archaeological designated heritage assets as defined in the NPPF are recorded on or in close proximity to the study site.
- 4.9.3 The assessment has identified a modest potential for Palaeolithic activity occurring within the study site. This activity likely to be related to isolated Palaeolithic artefacts associated with underlying gravel deposits located at depth below the study site itself. Such evidence would be of local significance.

5.0 SITE CONDITIONS AND THE PROPOSED DEVELOPMENT

(Review of potential impact upon Heritage Assets)

5.1 Site Conditions

- 5.1.1 The site is currently occupied by an open area in use for storage/temporary works, and an access road (Fig. 15).
- 5.1.2 Medieval agricultural activity is likely to have had a low, but widespread, negative impact on below ground archaeological deposits.
- 5.1.3 The construction of terraced buildings on the site during the 19th century, and subsequent demolition, will have had a severe widespread negative impact on below ground archaeological deposits, due to the cutting of foundations and basements.
- 5.1.4 The construction of institutional buildings and access road during the 20th century, and subsequent demolition, will have had a severe widespread negative impact on below ground archaeological deposits, due to the cutting of foundations and services.

5.2 The Proposed Development

- 5.2.1 The redevelopment proposals for the site comprise the construction of a new Student Centre, which will incorporate a three storey basement.

5.3 Review of potential development upon Heritage Assets

- 5.3.1 In view of the study site's modest archaeological potential, the proposed development is unlikely to have a widespread or substantial negative impact on below ground archaeological deposits.
- 5.3.2 Any below ground archaeological deposits previously present within the upper soil horizons on site will have been negatively impacted on by previous agricultural activity, and more significantly by 19th and 20th century development.
- 5.3.3 Following the demolition of the 19th century terraced houses, the existing basements would have been backfilled prior to the construction of the 20th century building and access road. Any potentially surviving Palaeolithic deposits associated with the Lynch

Hill Gravels would have been sealed below the former floor slab of the backfilled basement. Due to the depth of the proposed basements it is anticipated that the proposed development will have an impact on the underlying Lynch Hill Gravels.

- 5.3.4 Based on the modest archaeological potential and possible impacts, it is anticipated that the London Borough of Camden's archaeological advisor at the Greater London Archaeological Advisory Service (GLAAS) is anticipated to require further archaeological mitigation measures.

6.0 SUMMARY AND CONCLUSIONS

- 6.1 The site of 15 Gordon Street, Bloomsbury, London WC1H has been reviewed for its below ground archaeological potential.
- 6.2 In accordance with central and local government planning policy and guidance, a desk based assessment has been undertaken to clarify the archaeological potential of the study area.
- 6.3 The site has a modest archaeological potential for remains associated with the Palaeolithic period, and a limited potential for all other periods.
- 6.4 Medieval agricultural activity is likely to have had a low, but widespread, negative impact on below ground archaeological deposits.
- 6.5 The construction of buildings, on the site during the 19th and 20th century will have had a severe widespread negative impact on below ground archaeological deposits due to the cutting of foundations, basements and services.
- 6.6 Current redevelopment proposals comprise the construction of a new Student Centre.
- 6.7 On the basis of the available information we recommend the implementation of further mitigation in the form of targeted archaeological watching brief, during construction groundworks, specifically the construction of the new basement.
- 6.8 Due to the nature of the archaeological investigation required, such mitigation is anticipated to follow the granting of planning consent secured by an appropriate condition.

SOURCES CONSULTED

1. **General**

British Library
Greater London Historic Environment Record
Camden Local Studies Library
London Metropolitan Archive

2. **Internet**

<http://www.british-history.ac.uk/>
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3. **Cartographic**

1740 Rocque

1746 Rocque

1795 Horwood

1874 Ordnance Survey

1894 Ordnance Survey

1912 Ordnance Survey

1938 Ordnance Survey

1944-45 Bomb Damage Survey

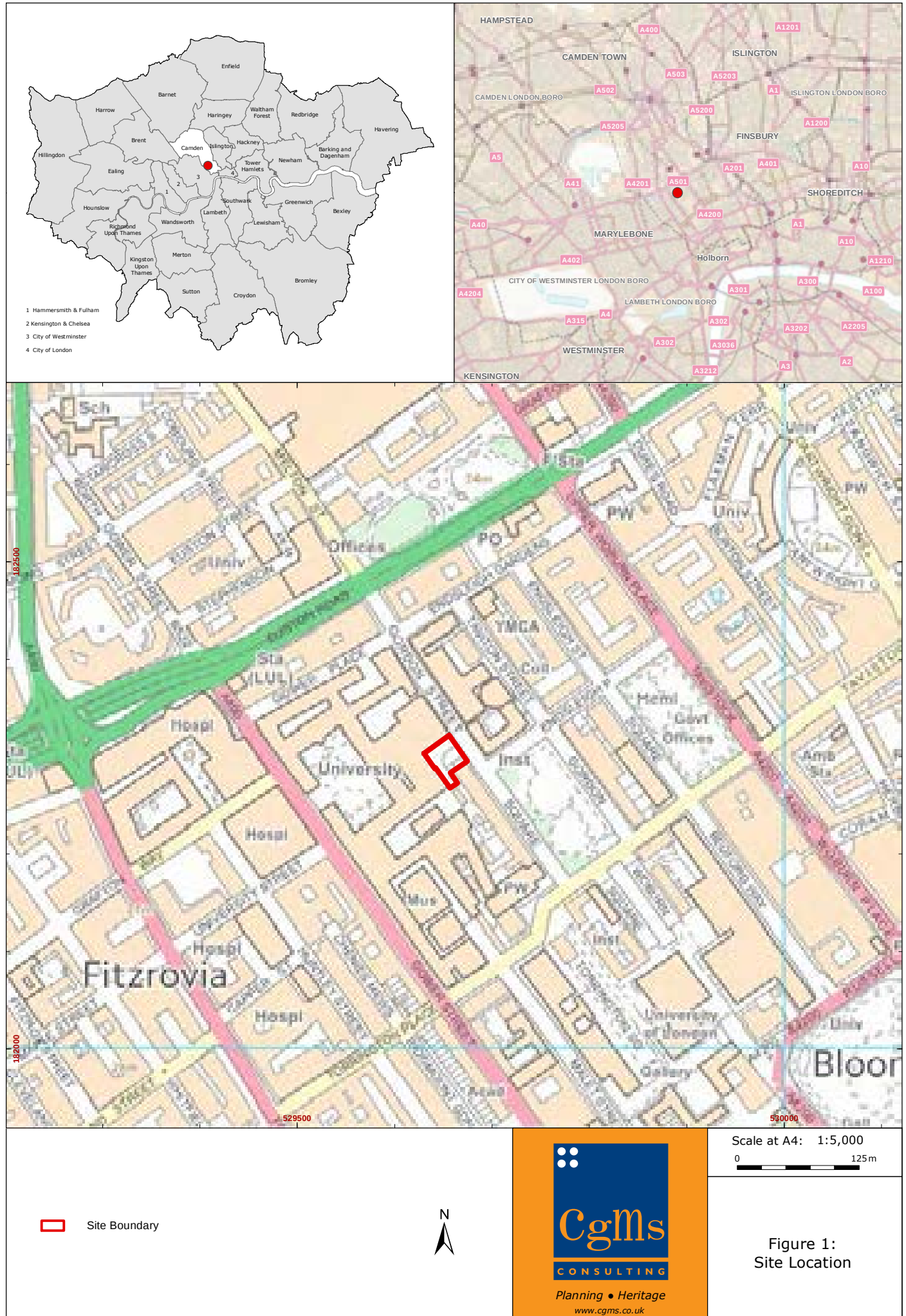
1951 Ordnance Survey

1961 Ordnance Survey

1973-76 Ordnance Survey

1999 Google Earth View

2014 Existing Site Plan



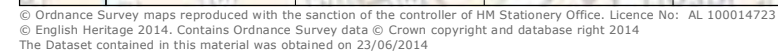


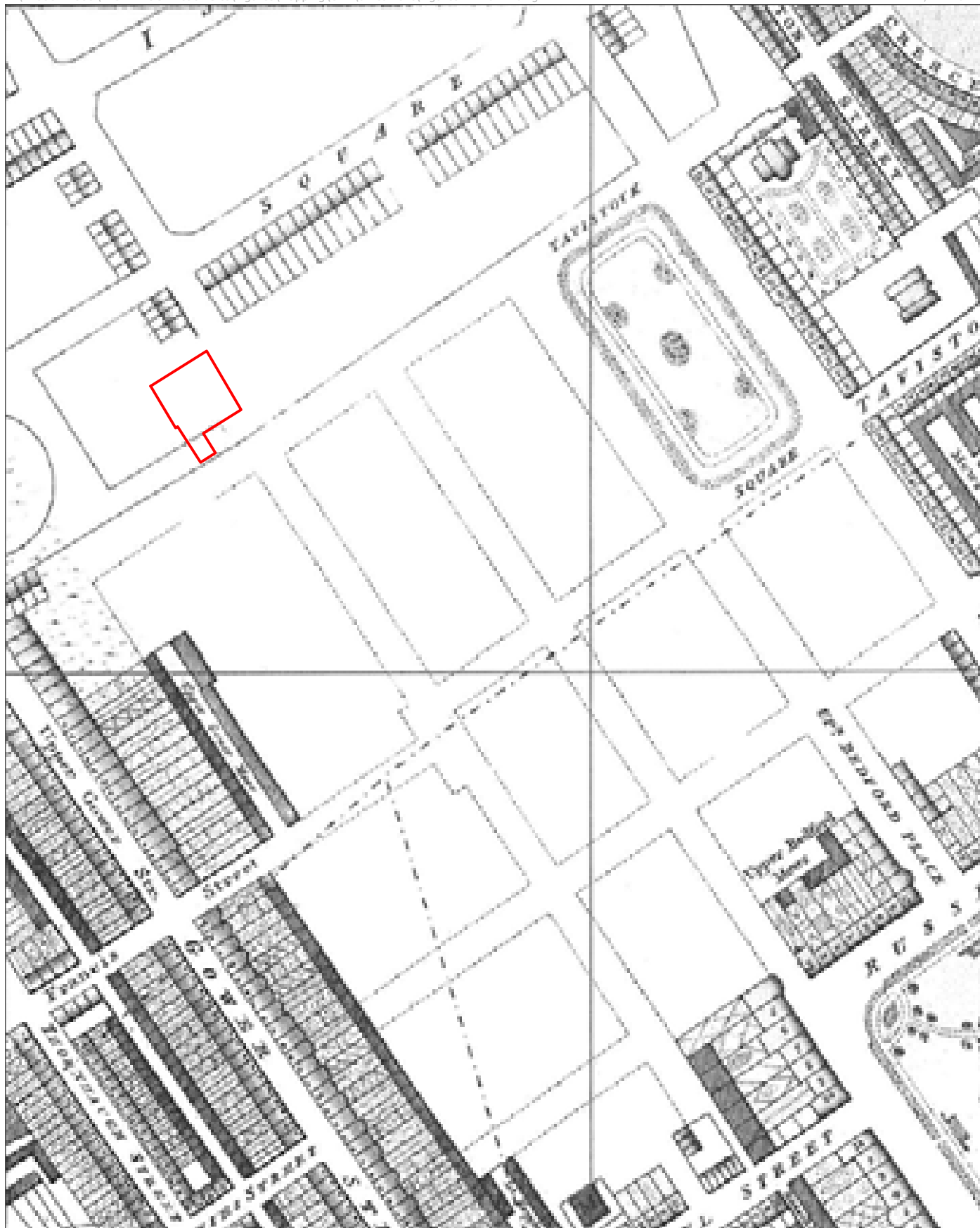
Figure 2:
Summary of cultural
heritage designations
(data from GLHER)



 Approximate Site Location 	 Planning • Heritage www.cgms.co.uk	Not to Scale: Illustrative Only Figure 3: 1740 Rocque
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 Approximate Site Location 	 Planning • Heritage www.cgms.co.uk	Not to Scale: Illustrative Only Figure 4: 1746 Rocque
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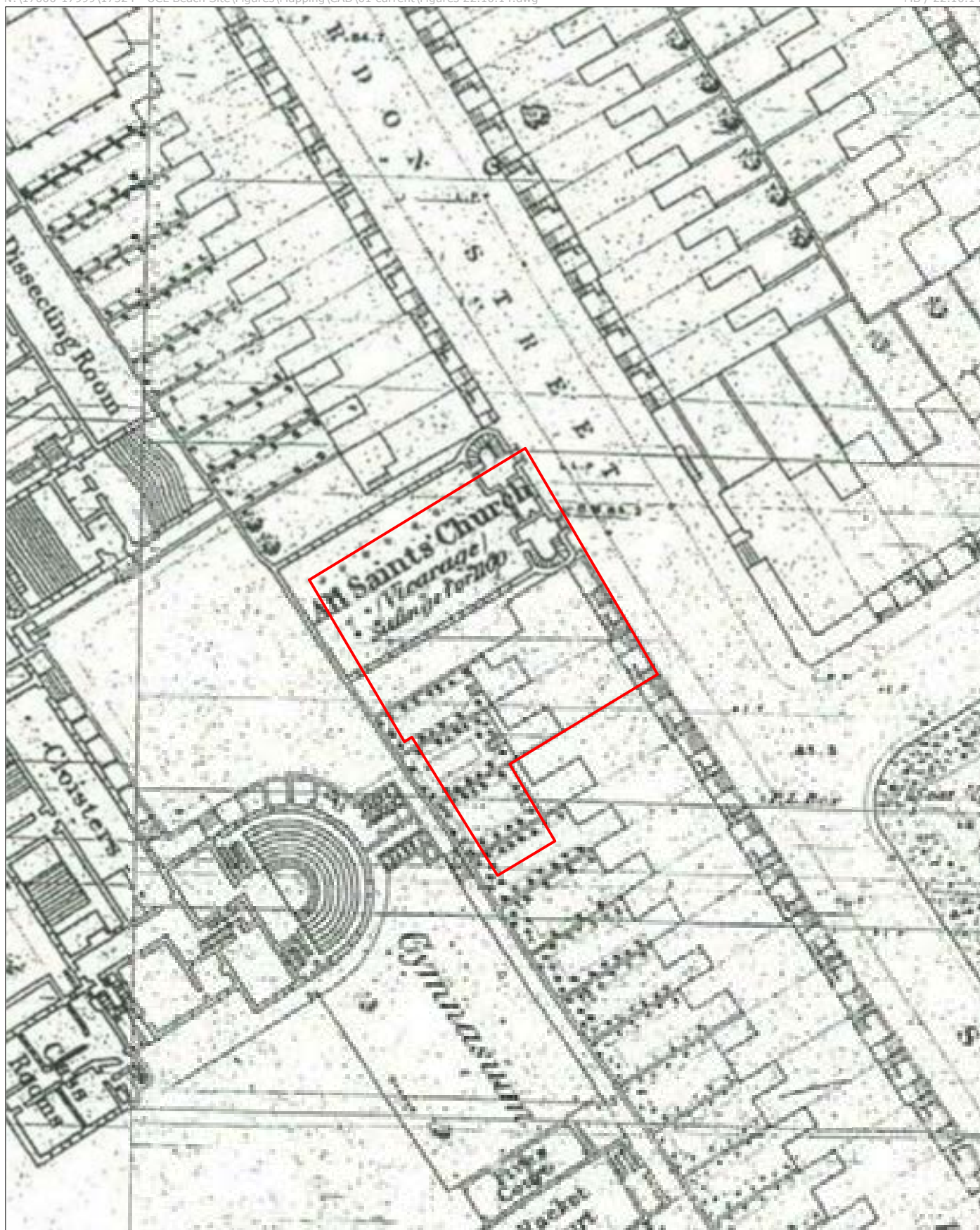


 Site Boundary



Not to Scale:
Illustrative Only

Figure 5:
1795 Horwood



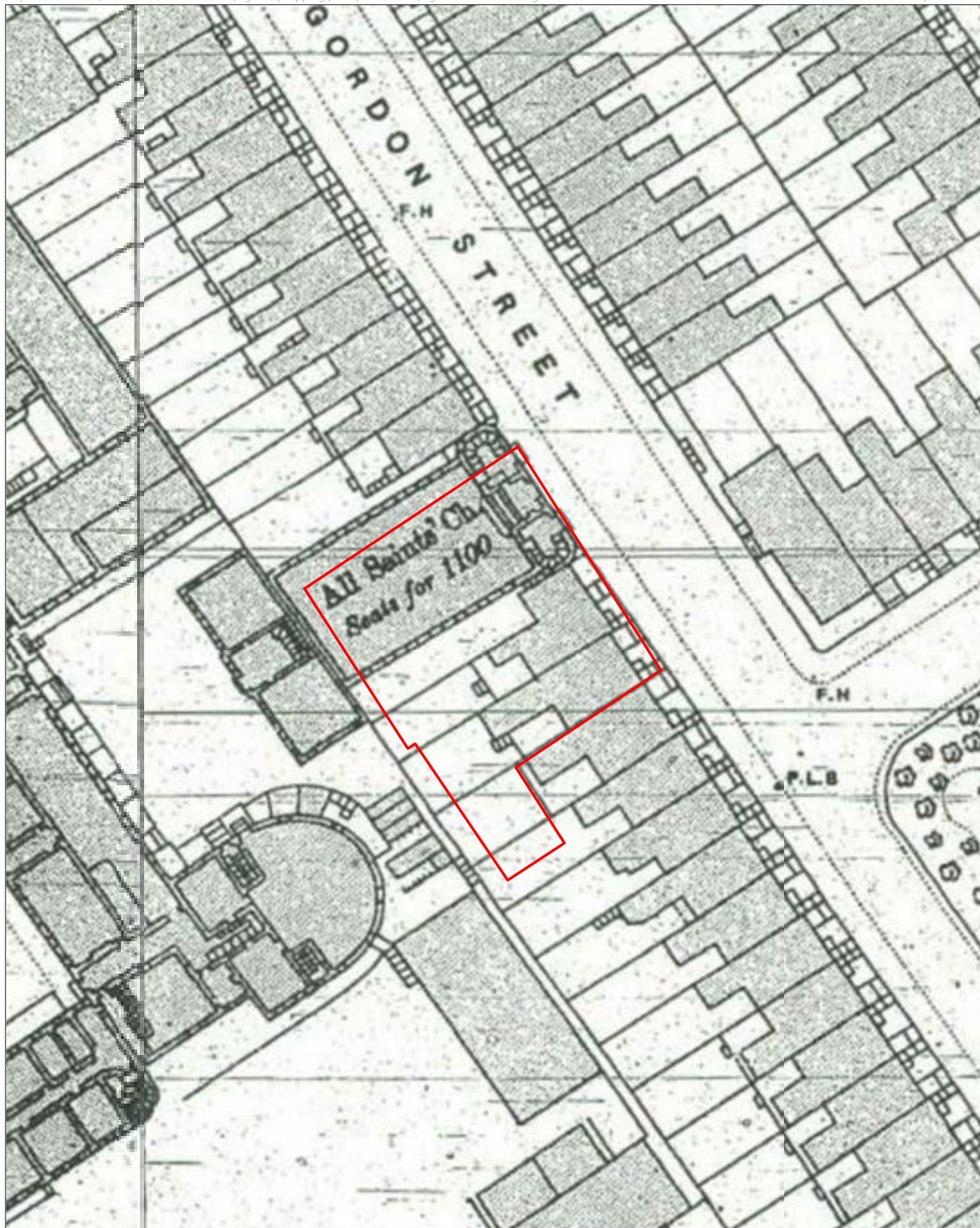
 Site Boundary



Planning • Heritage
www.cgms.co.uk

Not to Scale:
Illustrative Only

Figure 6:
1874 Ordnance Survey



 Site Boundary



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Not to Scale:
Illustrative Only

Figure 7:
1894 Ordnance Survey

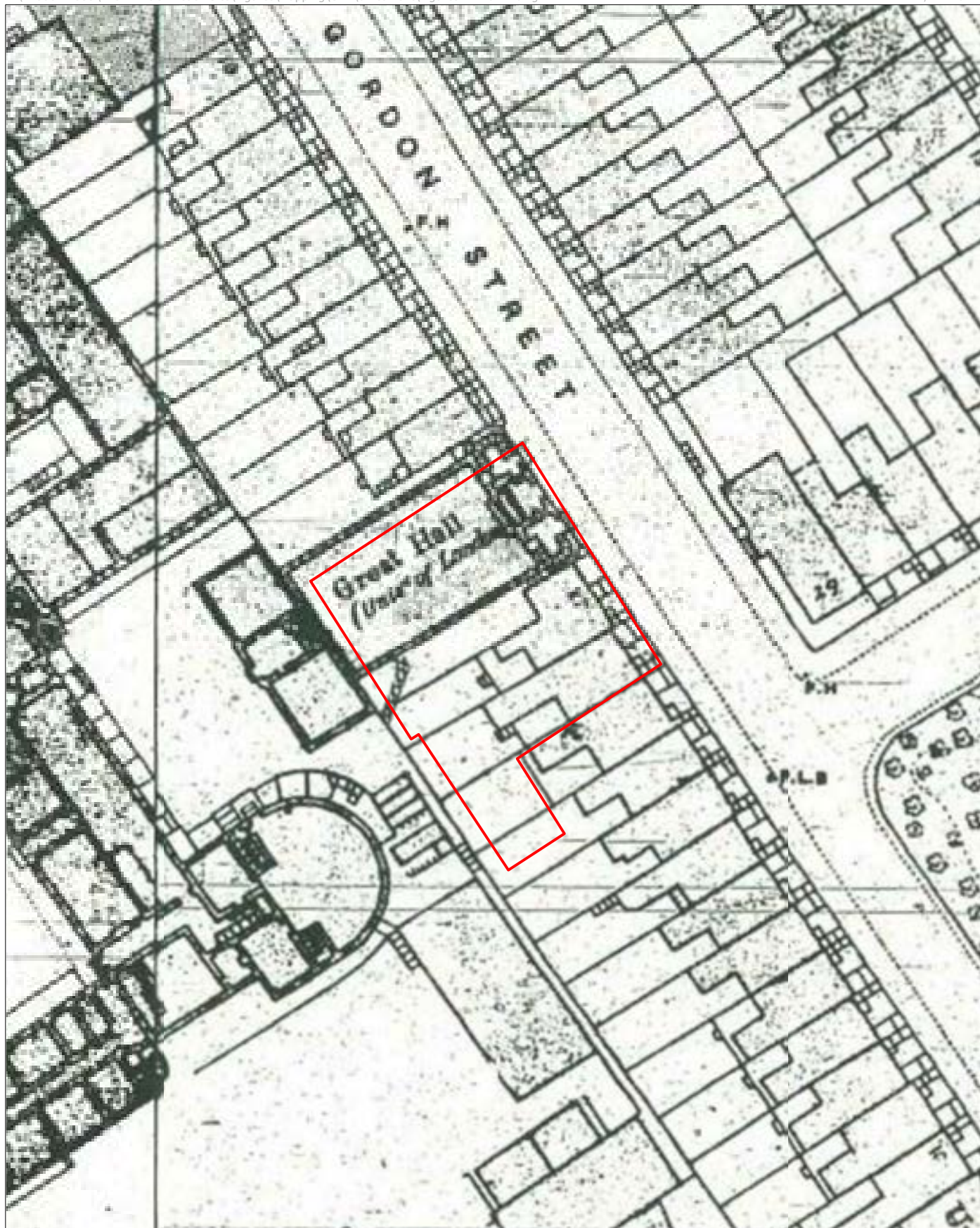


 Site Boundary



Not to Scale:
Illustrative Only

Figure 8:
1912 Ordnance Survey



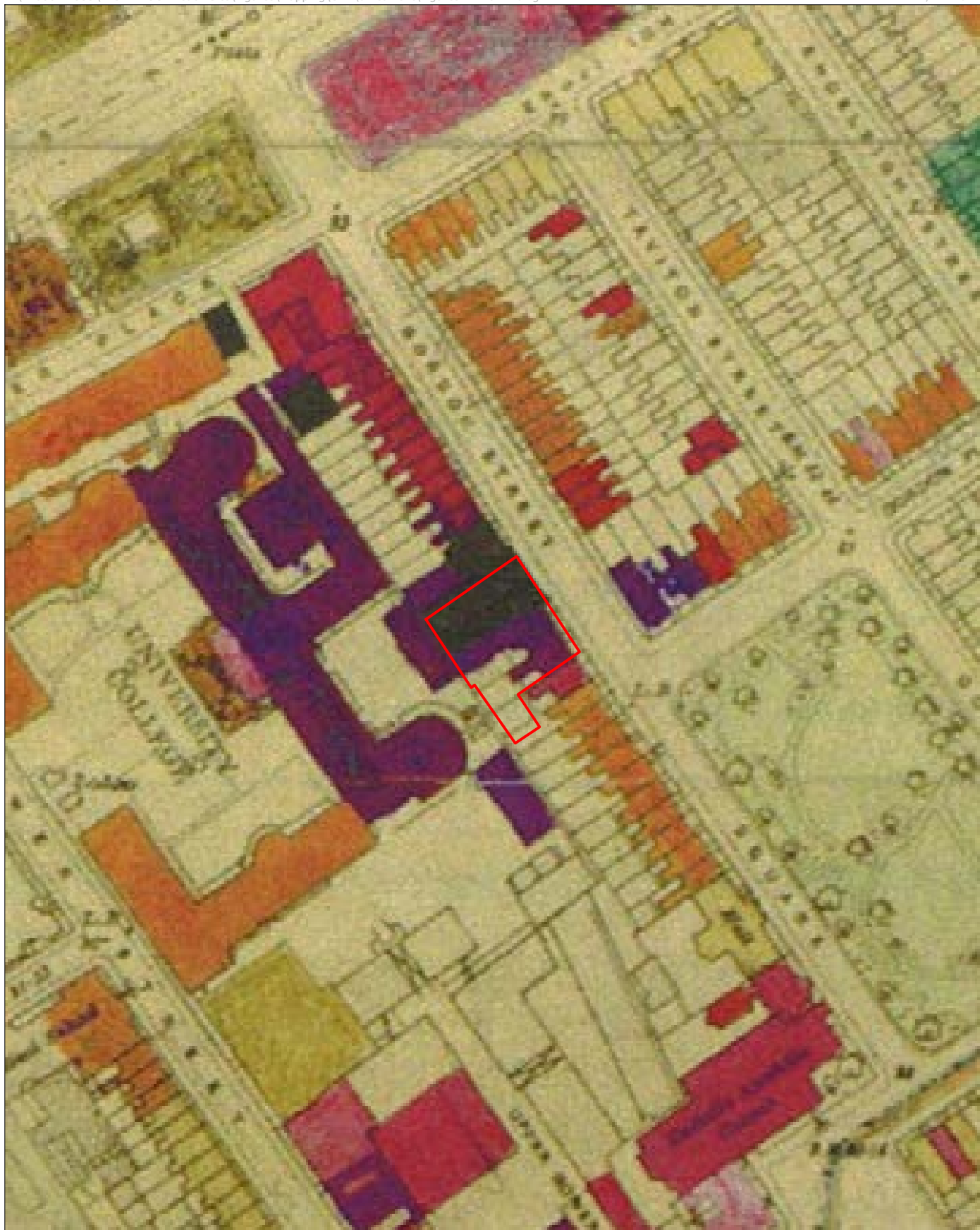
 Site Boundary



Planning • Heritage
www.cgms.co.uk

Not to Scale:
Illustrative Only

Figure 9:
1938 Ordnance Survey



 Site Boundary



Not to Scale:
Illustrative Only

Figure 10:
1944-45 Bomb Damage
Survey



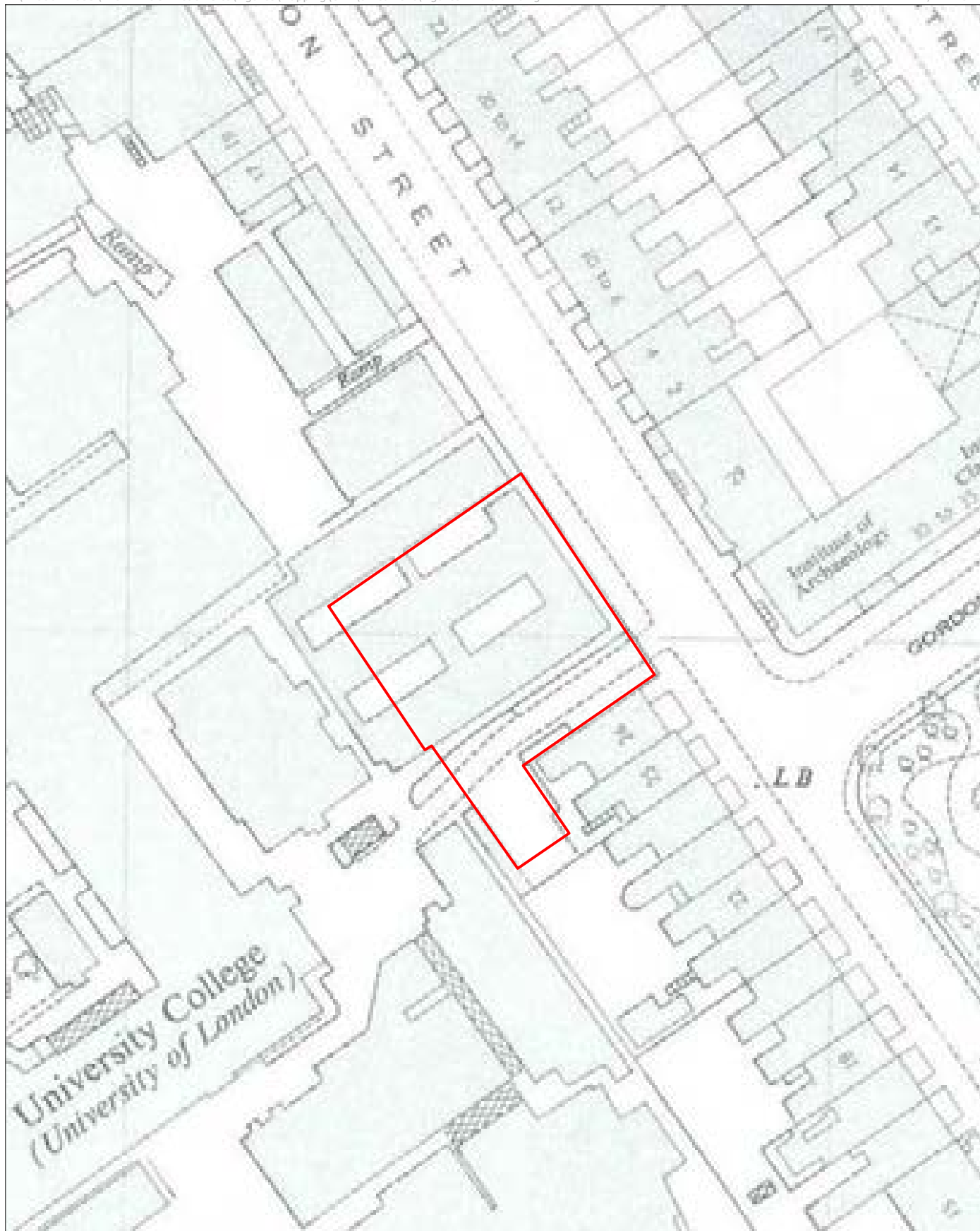
 Site Boundary



Planning • Heritage
www.cgms.co.uk

Not to Scale:
Illustrative Only

Figure 11:
1951 Ordnance Survey



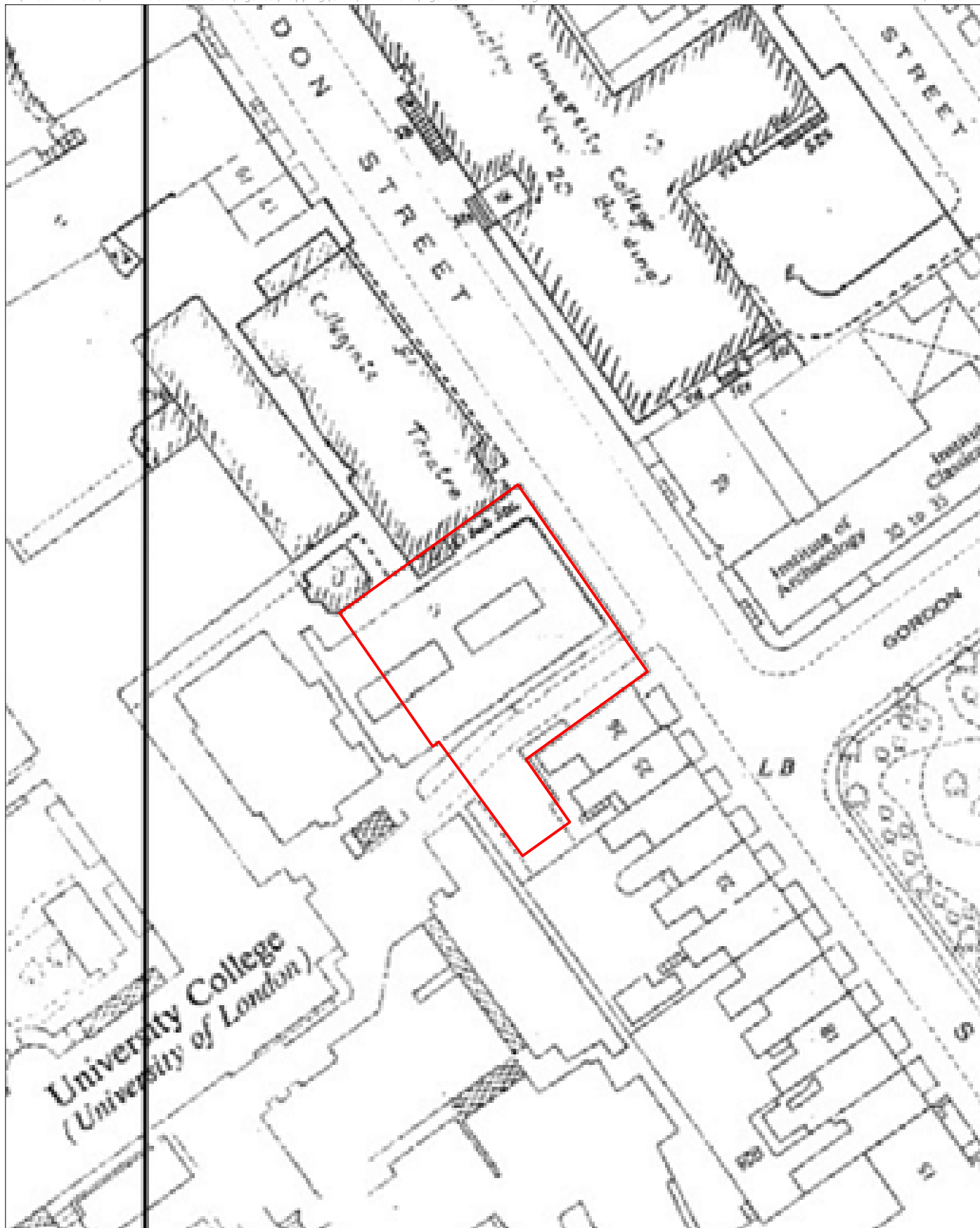
 Site Boundary



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www.cgms.co.uk

Not to Scale:
Illustrative Only

Figure 12:
1961 Ordnance Survey

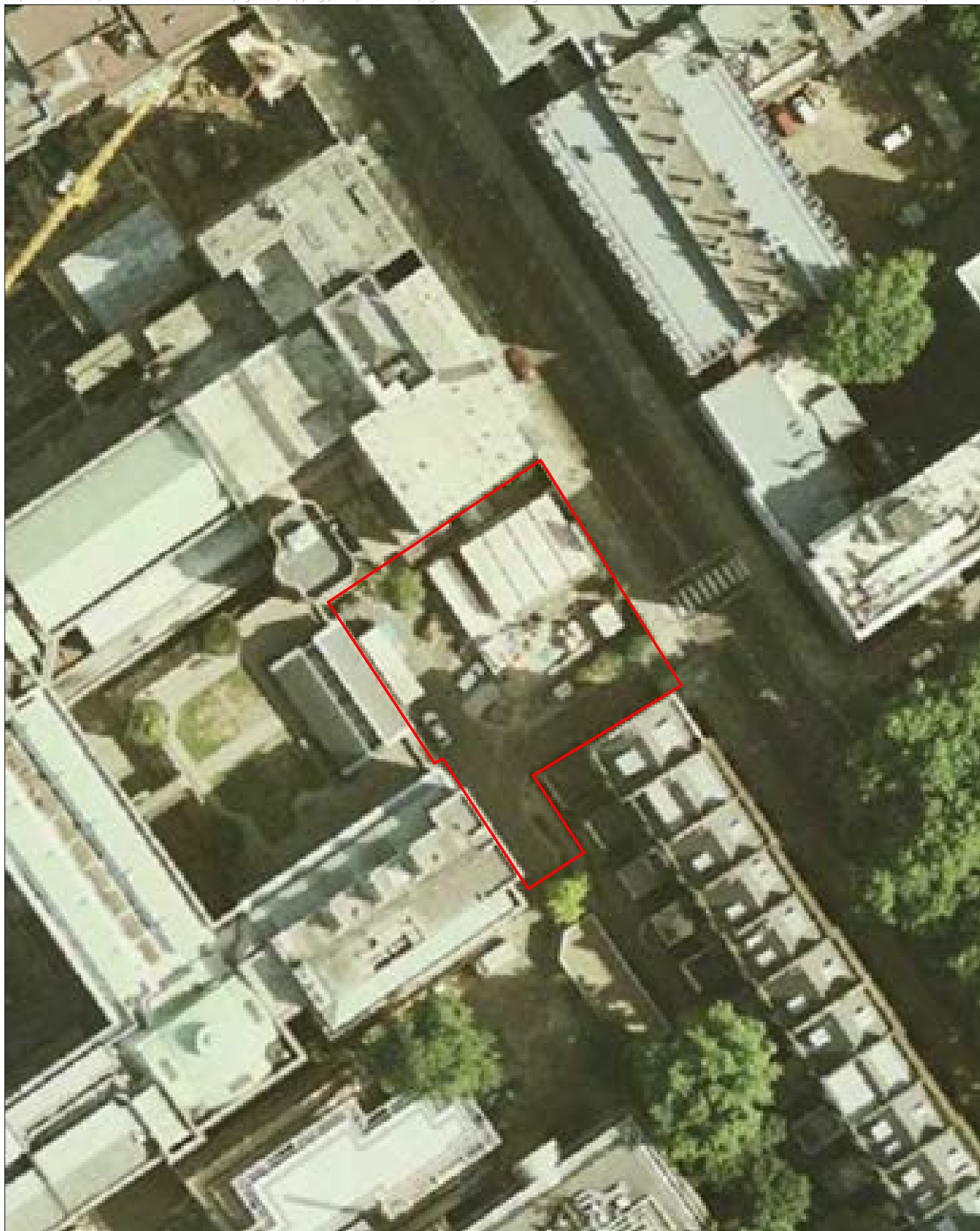


 Site Boundary



Not to Scale:
Illustrative Only

Figure 13:
1973-76 Ordnance Survey



 Site Boundary



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Not to Scale:
Illustrative Only

Figure 14:
1999 Google Earth View



 Site Boundary



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Not to Scale:
Illustrative Only

Figure 15:
2014 Existing Site Plan

Appendix A – Geotechnical Survey Data



Cedar Barn
White Lodge
Walgrave
Northamptonshire
NN6 9PY

t: 01604 781877
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w: www.soiltechnics.net

Richard Turner
Mulalley
Teresa Gavin House
Woodford Avenue
Woodford Green
Essex
IG8 8FA

Date: 31.01.2014
Your Ref:
Our Ref: L-STK2573Y-002

Dear Richard,

Re: University College London

Further to our investigations at University College London, we have now completed the fieldwork instructed to date and can now provide the following report.

Introduction

This report describes a ground investigation carried out for a proposed development at University College London. The principal objective of the ground investigation was to establish the location, size and condition of buried structures / assets at the site to help enable the proposed development.

The investigation was carried out in December 2013 and reported in January 2014 acting on instructions received from Mulalley on behalf of our mutual client, University College London. This report has been prepared for the sole benefit of our above named instructing client, but this report, and its contents, remains the property of Soiltechnics Limited until payment in full of our invoices in connection with production of this report.

This report is final based on our current instructions. This investigation has been carried out and reported based on our understanding of best practice.

Fieldwork

Fieldwork was undertaken during December 2013 comprised the following activities:-

- Excavation of trial pits to expose foundations in 8 locations
- Investigation of suspected vaults in 3 locations
- Excavation of 1 exploratory borehole formed using driven tube sampling equipment
- Dynamic cone penetration testing in 1 location
- Excavation of trial pits to expose pile caps in 5 locations
- Excavation of trial pits to expose buried electricity cables in 3 locations

A plan of the site showing observed site features and position of exploratory points is presented on Drawing 02. The position of exploratory points shown on these plans is approximate only and confirmation of these positions is subject to dimensional surveys, which is considered outside our brief.

The extent of fieldwork activities and position of exploratory points were defined by the client's engineer. Exploratory points were positioned to avoid known locations of underground services, to avoid possible location of proposed foundations but were also positioned to provide a reasonable coverage of the site. Prior to commencement of exploratory excavations an electronic cable locating tool was used to scan the area of the excavation. If we received a response to this equipment then the excavation would be relocated. All soils exposed in excavations were described in accordance with BS EN ISO 14688 '*Identification and Classification of soil*' and BS EN ISO 14689 '*Identification and classification of rock*'.

Trial pits were excavated using a combination of hand tools and a mini excavator to a maximum depth of 4m. Where necessary a hydraulic breaker was used to loosen surface materials prior to excavation. The trial pit excavations were backfilled with excavated material, which was compacted using hand held ramming tools, mechanically operated ramming tools or the excavator bucket. Where instructed by Mulalley, the surface was reinstated to match the original surroundings. A Geotechnical Engineer supervised the excavations. Whilst we attempted to reinstate the excavation to its original condition some short-term settlement of the backfilling materials may occur. Sampling and logging was carried out as trial pit excavations proceeded but were not entered at depths exceeding 1.2m or where trial pit sides were deemed unstable without appropriate shoring of the excavation. The density of granular soils encountered in excavations was gauged by the ease of excavation. Trial pit records are appended.

Borehole DTS01 was formed using driven tube sampling equipment. Driven tube sampling comprises driving 1m long steel sample tubes, which are screw coupled together or coupled to extension rods and fitted with a screw on cutting edge. The sample tubes are of various diameters, generally commencing with 100mm and reducing, with depth, to 50mm, and include a disposable plastic liner which is changed between sampling locations in order to limit the risk of cross contamination. On completion of excavation the liner containing the sample is cut open and the soil sample logged by a geo-environmental engineer. A pocket penetrometer was used in the cohesive soils retrieved from the borehole. This tool is deemed to measure the apparent ultimate bearing capacity of the soil under test. The pocket penetrometer is calibrated in kg/cm². The reading can be approximately converted to an equivalent undrained shear strength by multiplying the results by a factor of 50. The results are reported on borehole records. The pocket penetrometer is not covered by British Standards. Records of boreholes formed using driven tube sampling techniques are appended.

Dynamic Cone Penetration (DCP) testing was carried out in 1 location. Dynamic Cone Penetration testing consists of driving a 50mm diameter, 90° cone into the ground, via an anvil and extension rods with successive blows of a freefall hammer. The number of blows required to drive the cone each successive 100mm (N100) is recorded. Dynamic Cone Penetration testing was carried out following BS EN ISO 22476-2:2005 and the apparatus used was categorised as 'Super heavy' (DPSH-B) in accordance with the standard. Dynamic cone penetration test data is presented in graphical format on Drawing 03.

Commentary

TP01

Works on this exploratory trial pit were abandoned before the fieldwork phase commenced and no sub-surface investigation was undertaken in this location.

TP02

Exploratory excavations in this location encountered a reinforced concrete slab some 400mm thick over sandy fill material with unreinforced concrete between 1.7m and 2.0m depth. The base of the footing was located some 4.0m below surface level. This supported a cast-in-situ concrete column.

TP03

In location TP03 a concrete abutment was encountered extending some 1.6m from the face of Bloomsbury theatre wall. Closer to the wall a shuttered depression was formed into the concrete some 0.95m below surface level and extending around 0.55m from the wall face. Several unsuccessful attempts were made to penetrate the concrete in this depression to establish its thickness. The concrete was proven to extend to a depth in excess of 1.9m below surface level in this depression.

TP04

In location TP04 a shallow concrete footing was encountered extending some 0.4m from the face of the wall. The footing extended some 0.55m below surface level. Drill holes into the wall found it to comprise solid masonry in two locations. This was confirmed with a core hole in a third location some 0.65m above surface level.

TP05

In location TP05 the base of the wall foundation was encountered some 1.9m below surface level. This extended from the wall face by some 0.3m.

The adjacent vault beneath the public pavement was also broken out. The crown of the vault was found to have been broken away and the vault filled to the top. We did not continue with clearing out the vault due to concerns over compromising the stability of the vault ceiling and the overlying pavement. We were however able to establish that the vault was around 0.8m deep

TP05a

In location TP05a a layer of concrete (presumed to be the footing to the wall) was encountered at 1.8m depth. Drill holes and a corehole were carried out and the masonry was found to be 0.5m thick with fill beyond supporting the findings made in location TP05 which indicate that the vault had been completely filled, probably from a break in the vault crown.

TP06

The basement footing was exposed and the base located at 3.8m depth. The footing extended some 0.7m from the face of this wall.

TP07

The foundation of the basement was exposed in this location which consisted of a concrete strip the base of which was some 1.5m below surface level.

TP07a

A masonry footing was observed corbelled out onto the naturally deposited Lynch Hill Gravel Member deposits some 1.7m below surface level.

Pile caps - Line A

Pile caps were exposed in four locations (A1, A2, A3 and C1) and were found to comprise a secant piled wall across part of the length of this section (A2). The secant piles were 0.6m wide with the tops some 0.4m to 0.5m below surface level. The secant piles featured several concrete protrusions extending towards the south east. These appeared to be unshuttered and were around 0.45m across and spaced evenly along the wall at approximately 1.1m centres.

In addition to the secant piled wall, individual piles were observed along this section (A1, A3 and C1).

We understand that the precise location of piles has been surveyed by others during the investigation.

Pile caps – Line B

Piles were exposed along section B were exposed in two locations (B1 and TP07) and found to comprise concrete piles some 0.6m in diameter with the tops typically around 0.4m below surface level.

Again, we understand that the precise location of piles has been surveyed by others during the investigation.

Cable exposure

The suspected electricity cable was exposed in two locations (A1 and C1). This generally confirmed the findings of the utility drawings produced by Plowman Craven. This comprised two black plastic ribbed ducts approximately 170mm in diameter running parallel to one another. The use of a cable avoidance tool indicated that these cables were live.

DTS01 / DCP01

The borehole undertaken in location DTS01 encountered Made Ground to a depth of 1m consisting of unreinforced concrete over brown slightly gravelly silty clay. The naturally deposited Lynch Hill Gravel Member deposits consist of brown and mottled light grey slightly silty clay to around 1.7m over yellow and orange brown gravelly sand becoming sand. DCP data gathered adjacent to the borehole indicates that the granular Lynch Hill Gravel Member deposits are in a medium dense to dense state. Our exploratory excavations were halted at around 4m due to the density of these deposits. Based on a topographical survey provided by Plowman Craven surface level of the borehole is around 23.2m OD.

Ground bearing pressure

As part of our investigation we have been asked to advise on ground bearing pressure in locations TP03 and TP04. The following assessments are made on the investigatory data presented in the preceding sections of this report. Definitions of geotechnical terms used in the following paragraphs are provided in Appendix A.

In our opinion the Made Ground will not provide sufficiently uniform support under concentrated foundation loads. In all cases we recommend foundation excavations fully penetrate any Made Ground deposits and extend into the Lynch Hill Gravel Member deposits by a minimum of 0.3m, subject to an overall minimum foundation depth of 1m.

Essentially, in our opinion, the Lynch Hill Gravel Member deposits near surface are plastic where as those at greater depth will behave as a granular material. Based on our understanding of ground conditions at the site we conservatively recommend the following bearing values for various type foundations founded onto the cohesive and granular Lynch Hill Gravel member deposits respectively.

Table of bearing values – cohesive deposits

Foundation size	Ultimate bearing value kN/m ²	Presumed bearing value kN/m ²	Allowable bearing pressure kN/m ²
1m x 1m pad	670	230	120
0.6m wide strip	510	180	140
0.9m wide strip	480	170	110

Table 1

Table of bearing values – granular deposits

Foundation size	Ultimate bearing value kN/m ²	Presumed bearing value kN/m ²	Allowable bearing pressure kN/m ²
1m x 1m pad	590	200	190
0.6m wide strip	540	190	190
0.9m wide strip	610	210	200

Table 2

It is difficult to accurately predict the amount of total and differential movement caused by consolidation of the foundation supporting subsoils, however, providing the foundation loads do not exceed the allowable bearing pressure provided above, we suggest total settlement will be small, and probably less than 25mm. Differential settlements are totally dependent on the variation of foundation loads and consistency of the supporting ground. Assuming the foundation loads are reasonably uniform, we suggest differential settlement is unlikely to exceed say 15mm. It is likely settlement will be fully achieved within 20 years of construction.

The Lynch Hill Gravel Member deposits encountered in exploratory excavations are consistent and will provide uniform support to foundations. In the event foundation excavations encounter a soft area or are located on both granular and cohesive soils, we recommend foundation excavations continue to locate stiffer soils or reinforcement introduced into foundation concrete.

Conclusion

We trust this is satisfactory, however should you have any further queries please contact the undersigned.

Regards



Peter Knight B.Sc. (Hons.), M.Sc., F.G.S.

Geo-environmental engineer for Soiltechnics Ltd.

Reviewed



Dr Matthew Hooper B.Sc. (Hons.), M.Sc., Ph.D., F.G.S., MEnvSc.

Associate Director for Soiltechnics Ltd.

Enc

Drawings

01	Site location plan
02	Plan showing existing site features and location of exploratory positions
03	Plot summarising in-situ density testing

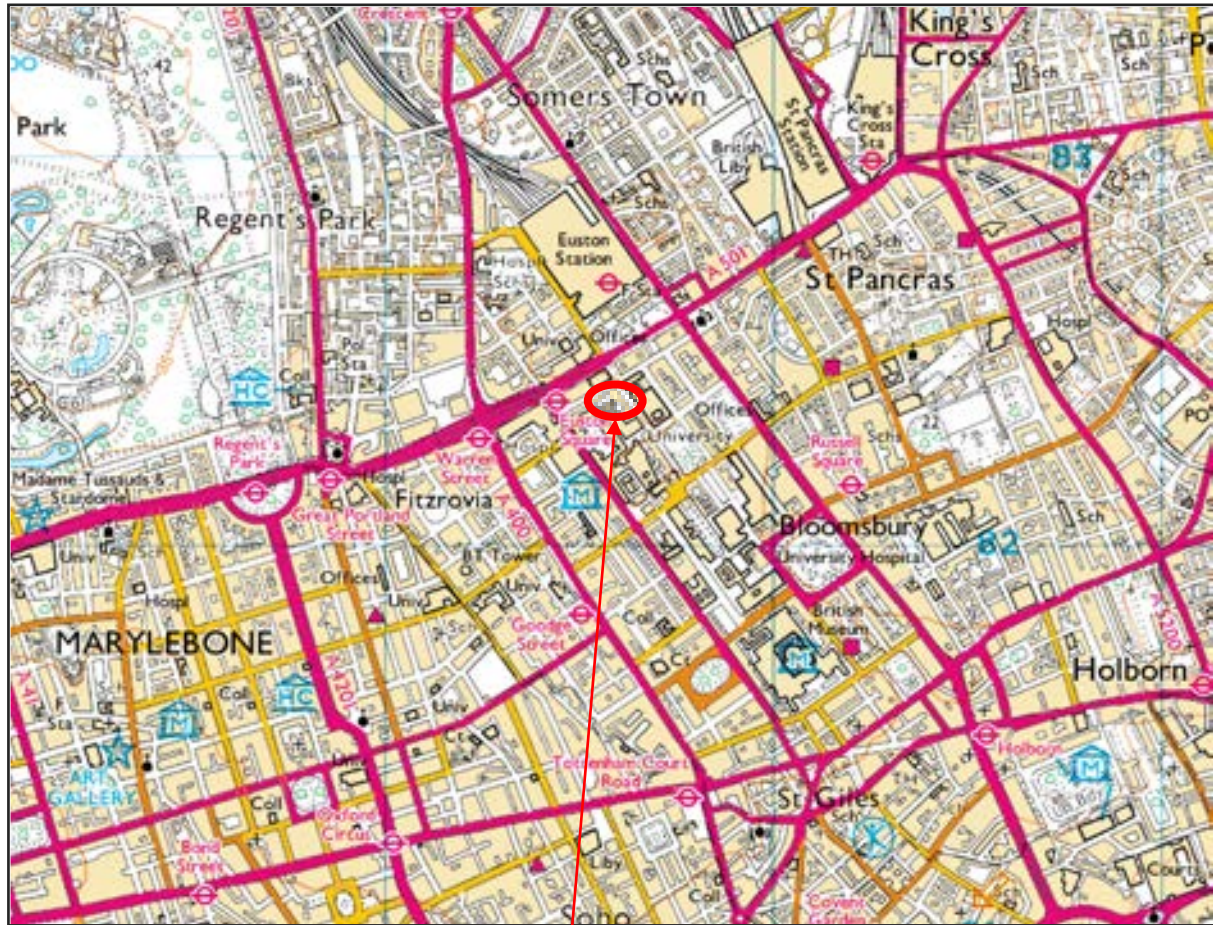
Fieldwork Records

TP02	Trial pit record
TP03	Trial pit record
TP04	Trial pit record
TP05	Trial pit record
TP05a	Trial pit record
TP06	Trial pit record
TP07	Trial pit record
TP07a	Trial pit record
A1	Pile exposure record
A2	Pile exposure record
C1	Cable exposure record
DTS01	Borehole record

Appendices

A	Definitions of geotechnical terms
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soiltechnics



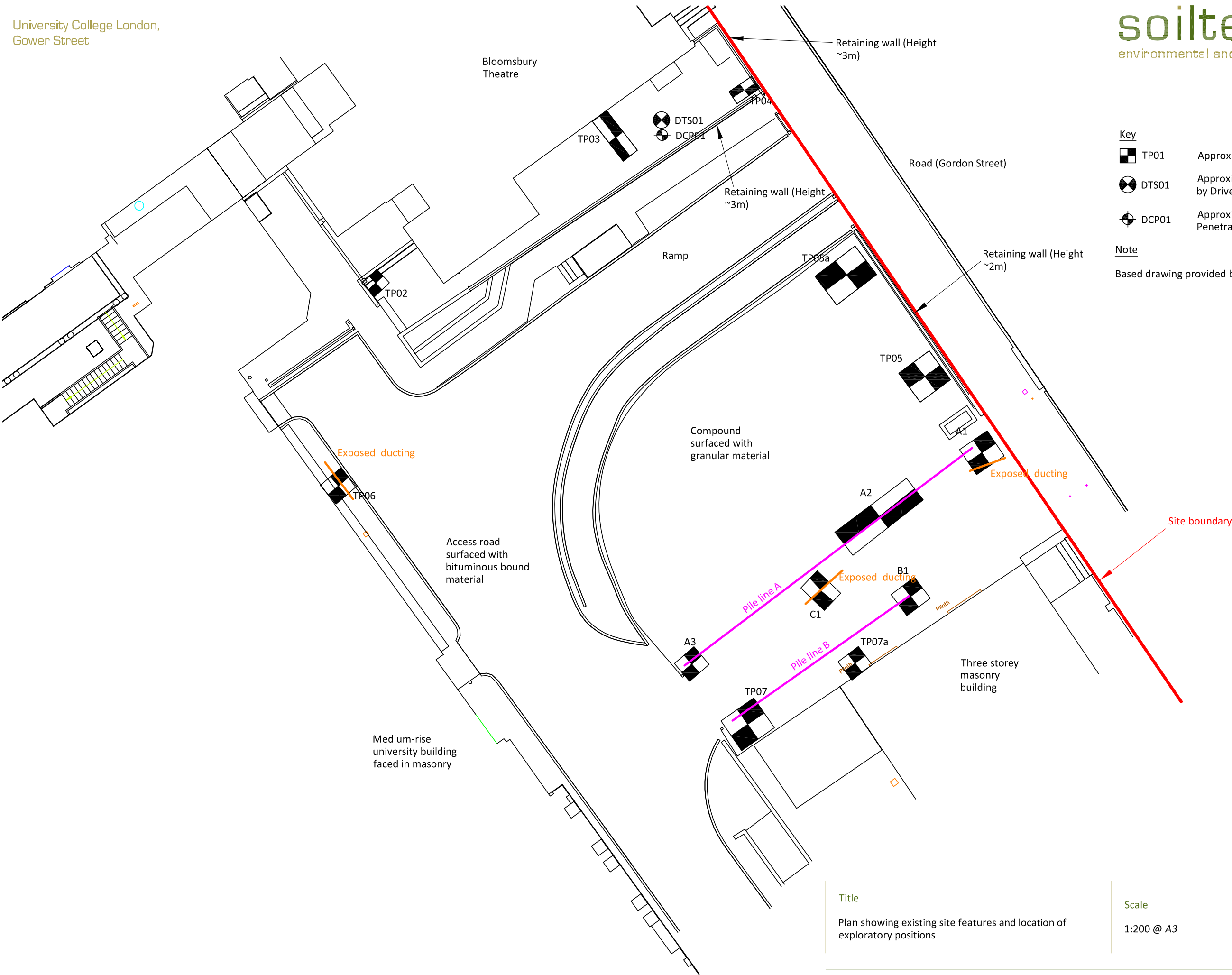
Approximate location of site

Title	Scale	Drawing number
Site location plan	Not to scale	01



- Key**
- TP01 Approximate location of trial pit excavation
 - DTS01 Approximate location of borehole formed by Driven Tube Sampling techniques
 - DCP01 Approximate location of Dynamic Cone Penetration testing

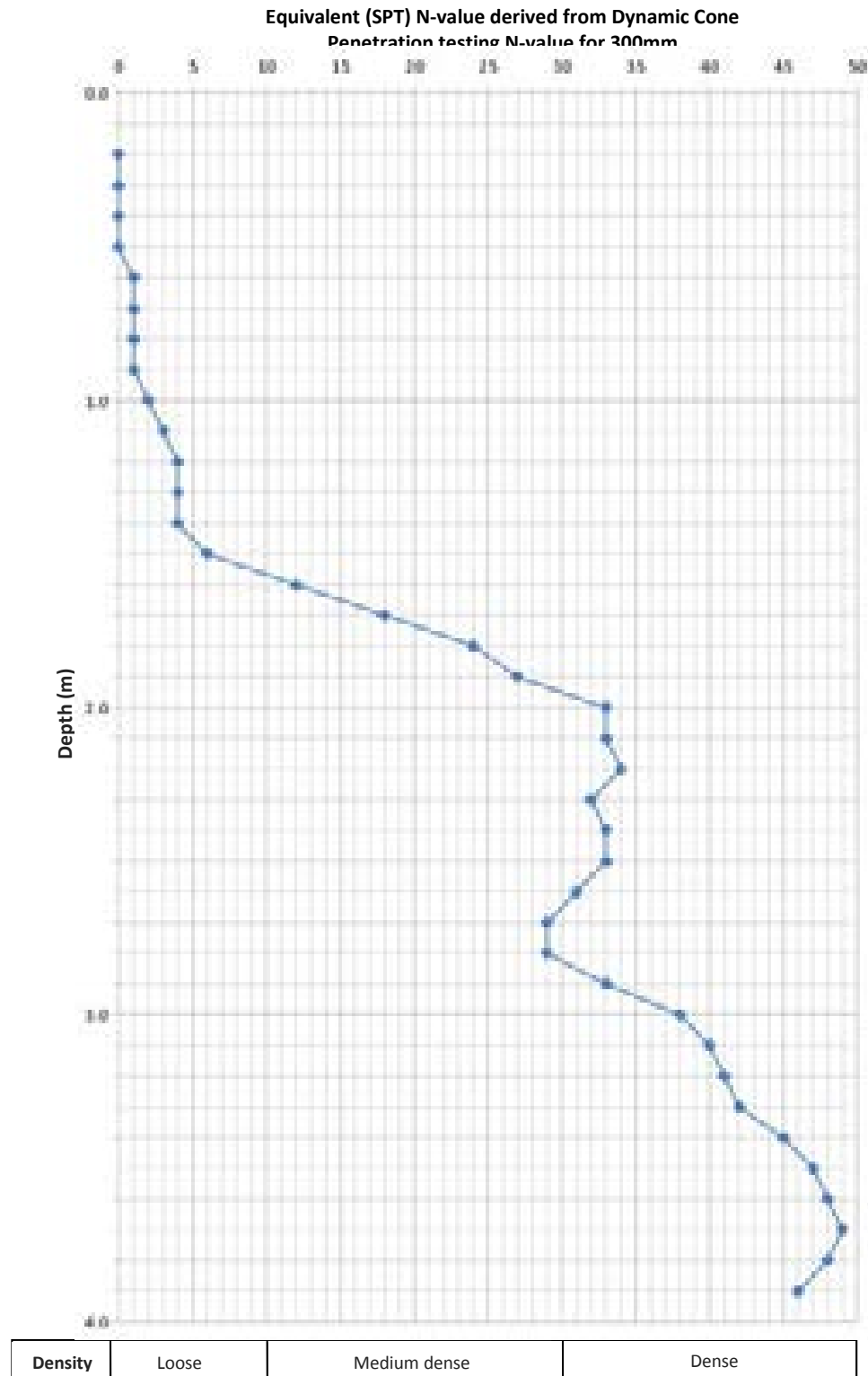
Note
Based drawing provided by Plowman Craven.



Title
Plan showing existing site features and location of exploratory positions

Scale
1:200 @ A3

Drawing number
02



Key — DCP01

Notes

1) Density descriptions obtained from EN ISO 14688-2:2004

Title

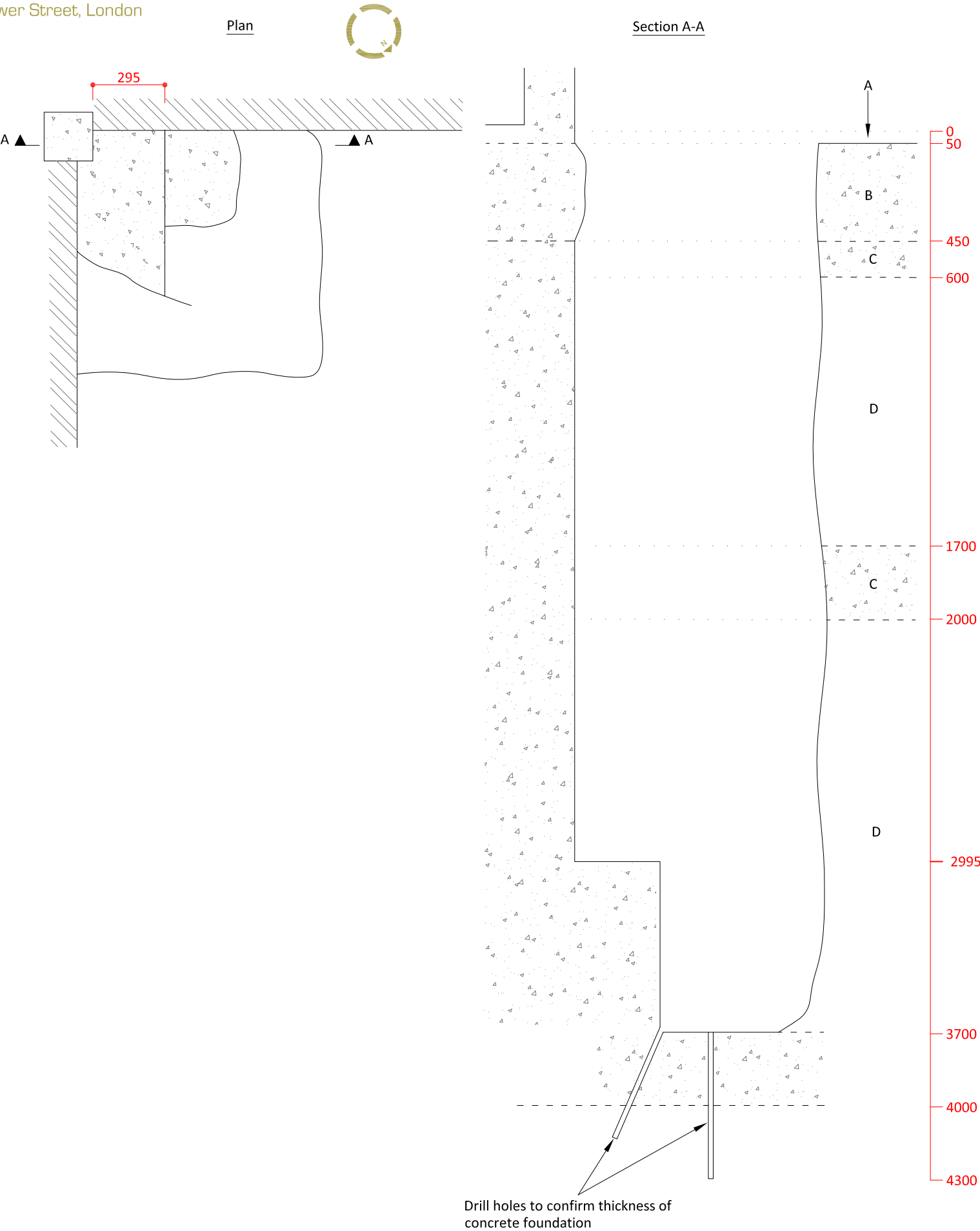
Plot summarising insitu density testing utilising
dynamic cone penetration (DCP) techniques

Scale

As shown

Drawing number

03



Photographic record



Key

- A. Grey concrete FLAGS.
(MADE GROUND)
- B. Light grey reinforced CONCRETE. Reinforcement bar is ~7 mm diameter plain gauge on an ~150mm mesh (C-C) located at ~100 mm and ~200 mm from top of slab.
(MADE GROUND)
- C. Light grey CONCRETE.
(MADE GROUND)
- D. Orangish brown gravelly SAND with occasional cobbles of brick. Gravel consists of flint and occasional brick fragments.
(MADE GROUND)

- Observed features
- - - Assumed features
..... Removed features

-  Denotes brickwork  Denotes concrete

Notes

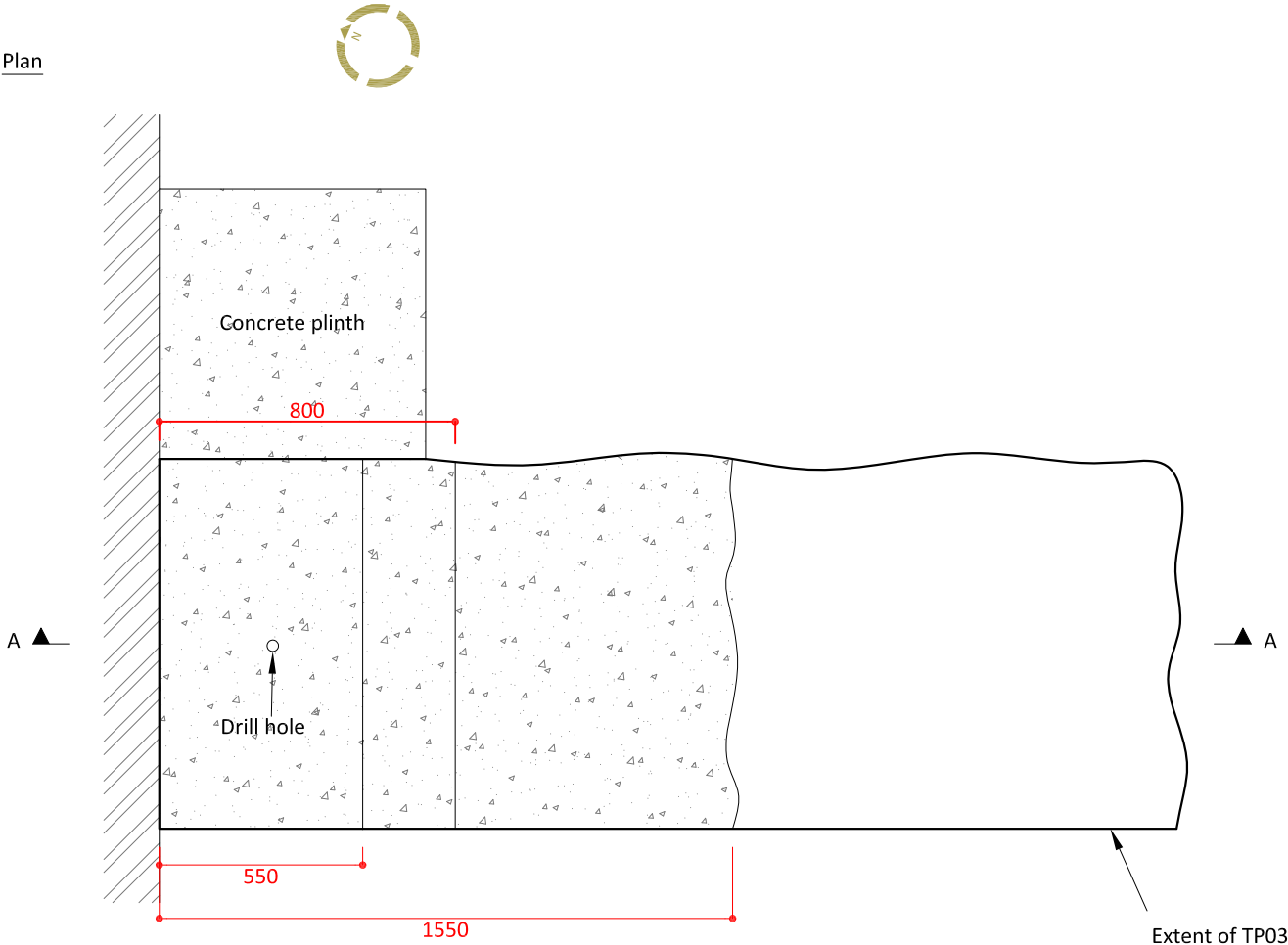
1. All dimensions shown in millimetres

Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

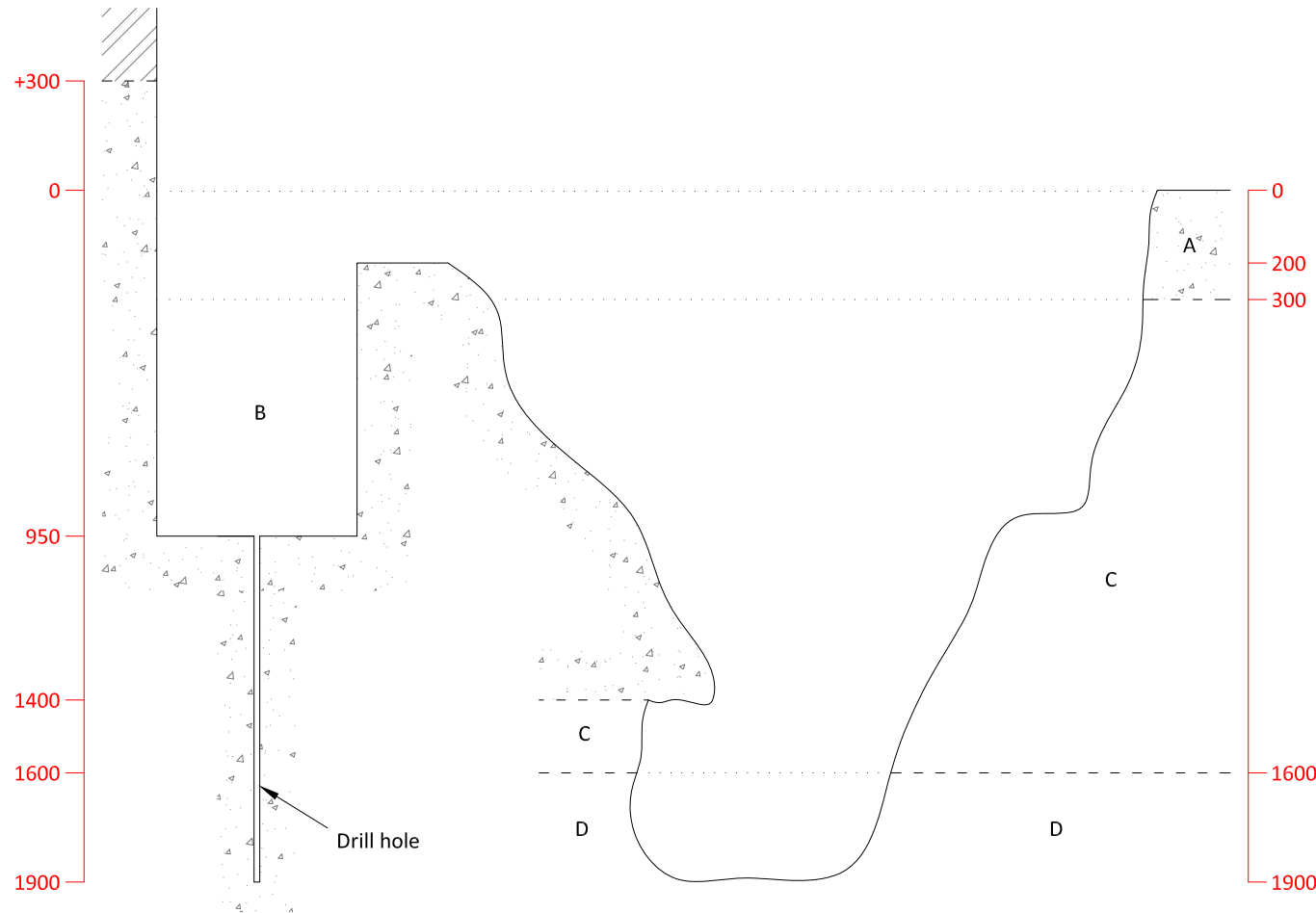
Title
Trial pit record
Date of excavation
December 2013
Scale
1:20 at A3

Trial pit number
TP02
Location plan on drawing number
02

Plan



Section A-A



Photographic record



Key

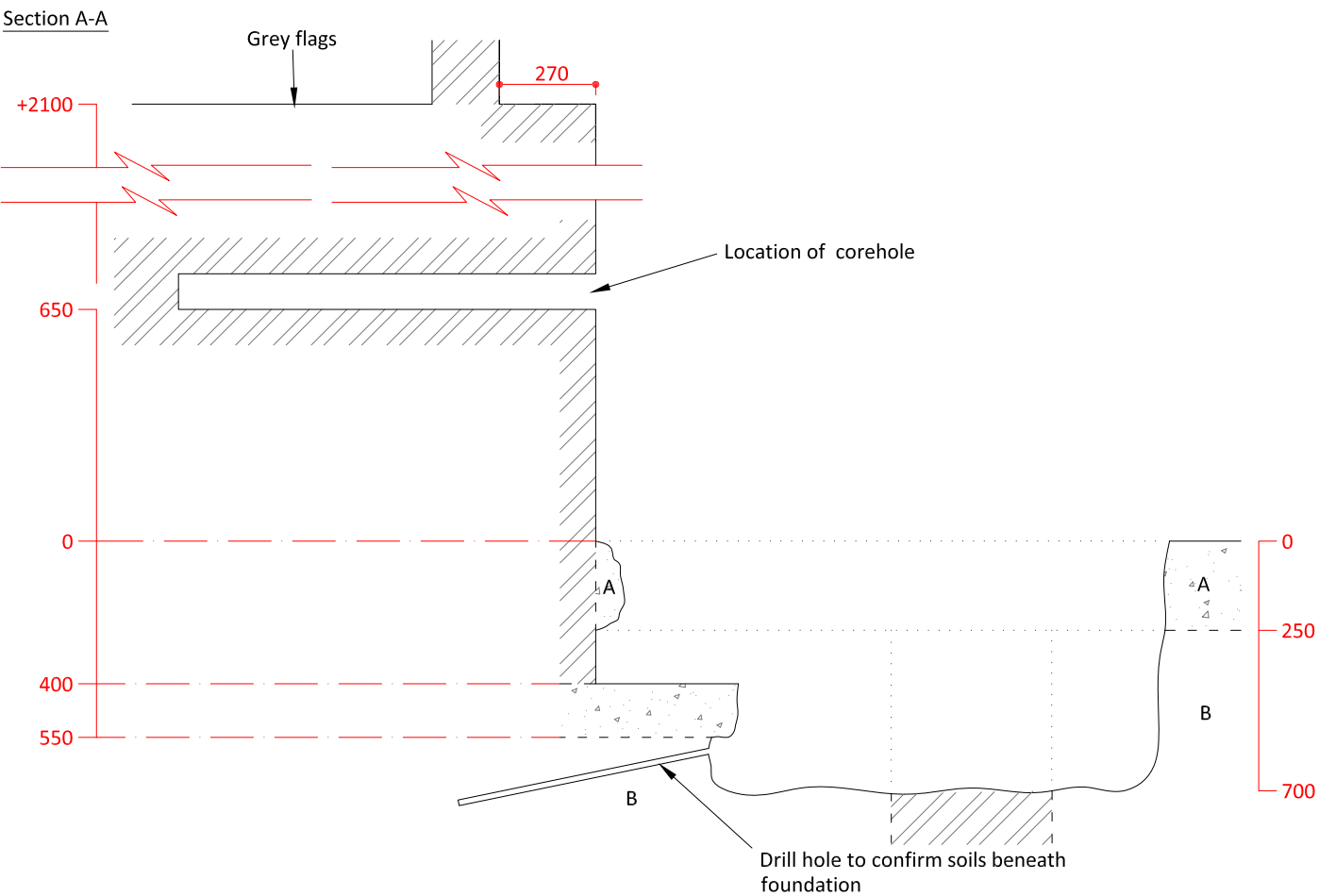
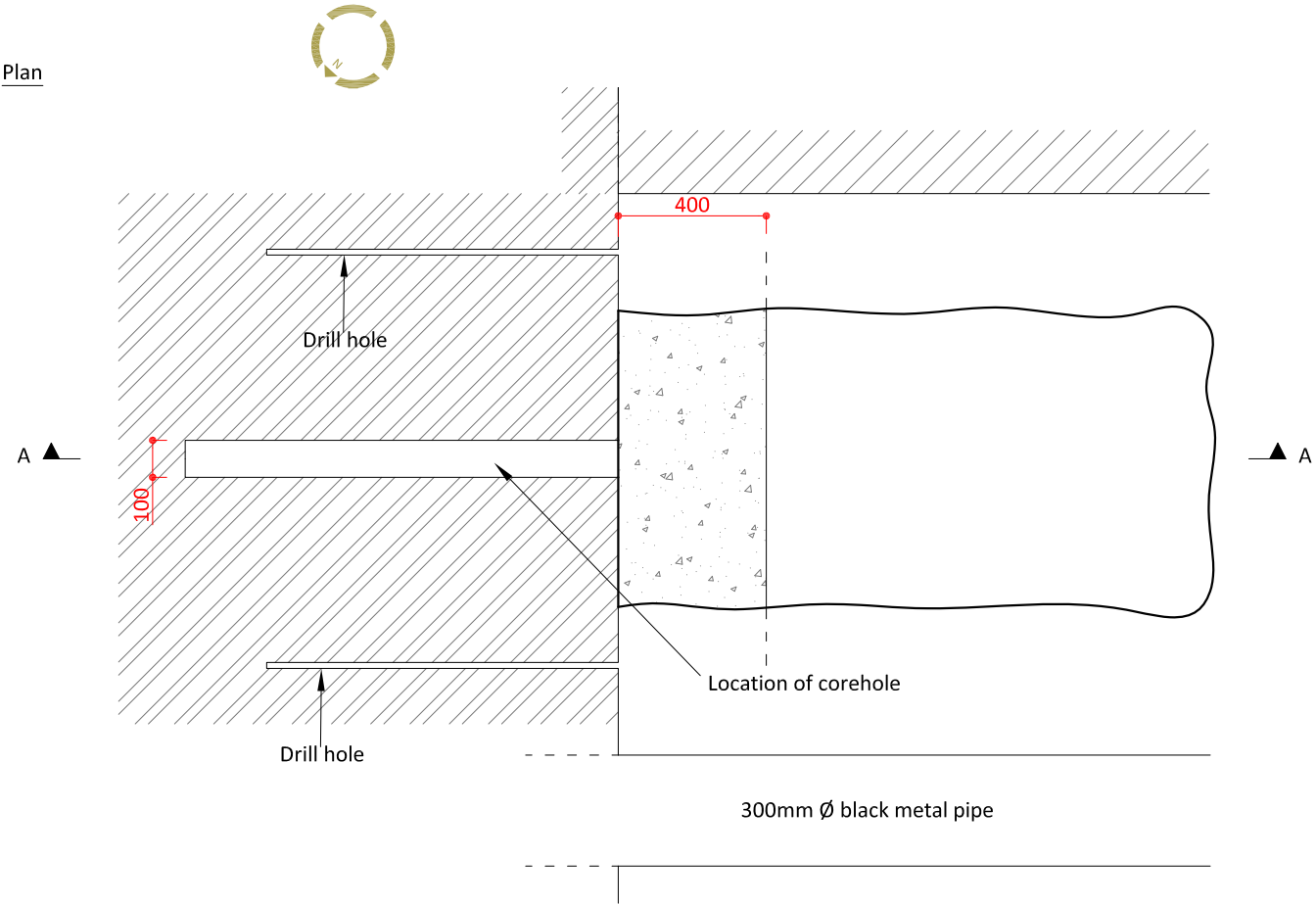
- A. Light grey reinforced CONCRETE. 5mm diameter plain guage reinforcement bar located at 150mm below ground level on a ~200mm grid.
(MADE GROUND)
- B. Yellow brown slightly gravelly clayey SAND. Gravel consists of flint.
(MADE GROUND)
- C. Orange brown slightly gravelly CLAY with occasional cobbles of brick. Gravel consists of brick, concrete and flint.
(MADE GROUND)
- D. Yellow brown medium grained SAND.
(MADE GROUND)

- Observed features
Assumed features
Removed features
- Denotes brickwork
Denotes concrete

Notes

1. All dimensions shown in millimetres

Method of excavation Hand tools Trial pit dimensions As shown Groundwater observations No groundwater encountered	Title Trial pit record Date of excavation December 2013 Scale 1:20 at A3	Trial pit number TP03 Location plan on drawing number 02
--	---	---



Photographic record



Key

- A. Light grey reinforced CONCRETE. 5mm diameter reinforcement bar located at 150mm below ground level. (MADE GROUND)
- B. Grey brown gravelly silty SAND with occasional cobbles of brick and concrete. Gravel consists of brick and concrete. (MADE GROUND)

- Observed features
- - - - - Assumed features
..... Removed features
- Denotes brickwork Denotes concrete Denotes blockwork

Notes

1. All dimensions shown in millimetres

Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title
Trial pit record
Date of excavation
December 2013
Scale
1:20 at A3

Trial pit number
TP04
Location plan on drawing number
02

Photographic record



Key

A. Loose to medium dense brown very gravelly sandy SILT with occasional cobbles of brick and concrete. Frequent rootlets to 1.5m depth.

B. Light grey CONCRETE. (MADE GROUND)

C. Loose to medium dense brown very gravelly sandy SILT with occasional cobbles of brick and concrete. Some rootlets present. (MADE GROUND)

D. Light grey reinforced CONCRETE. Reinforcement bar is ~6mm diameter plain on a ~200mm x 200mm grid.

E. Loose to medium dense brown very gravelly sandy SILT with occasional cobbles of brick and concrete. (MADE GROUND)

F. Medium strength orange brown sandy CLAY. (LYNCH HILL GRAVEL MEMBER)

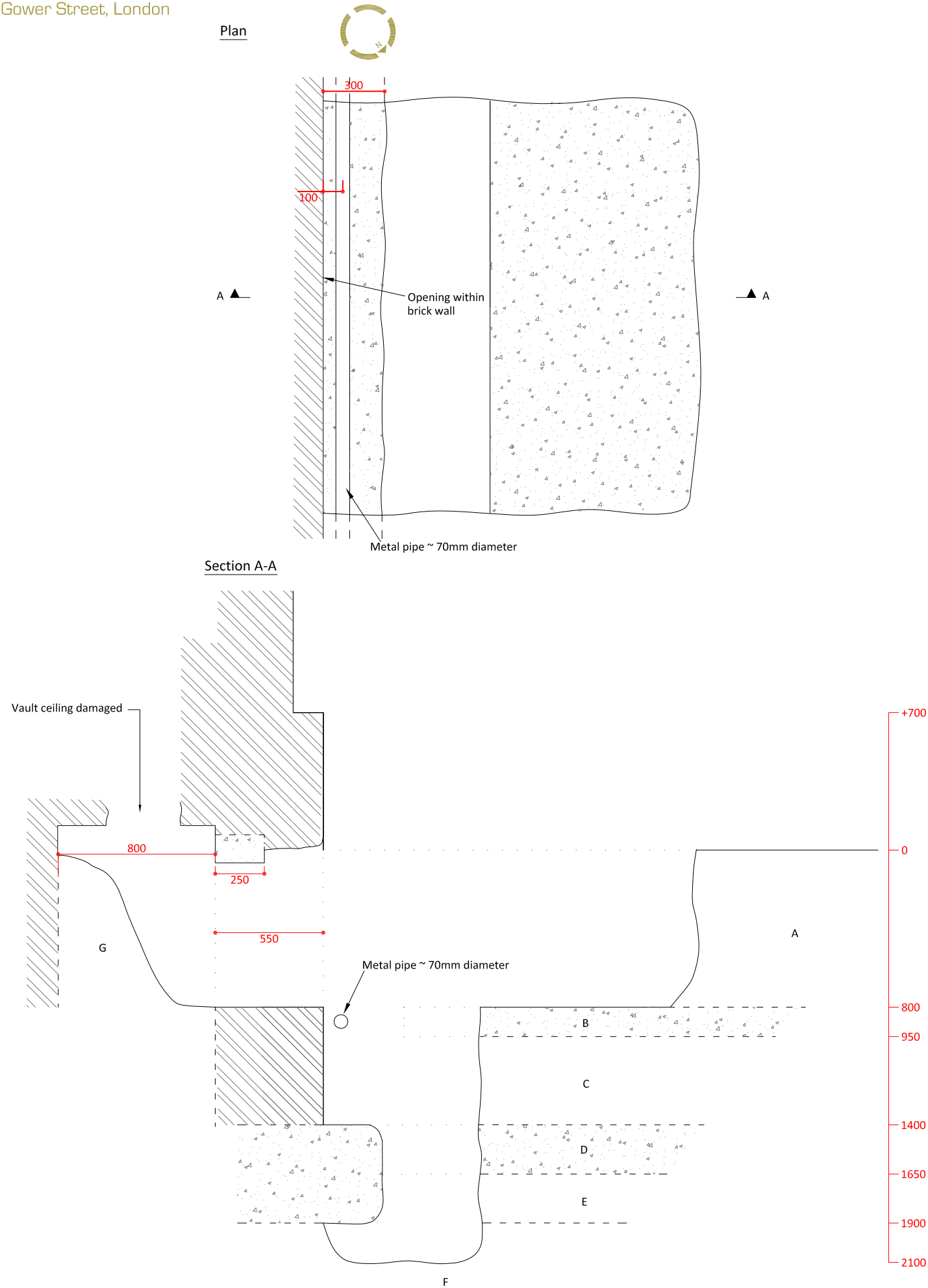
G. Grey brown gravelly SAND with frequent cobbles of metal, slate, concrete and brick. Gravel consists of metal, slate, concrete and brick. (MADE GROUND)

— Observed features
- - - Assumed features
... Removed features

Denotes brickwork
Denotes concrete

Notes

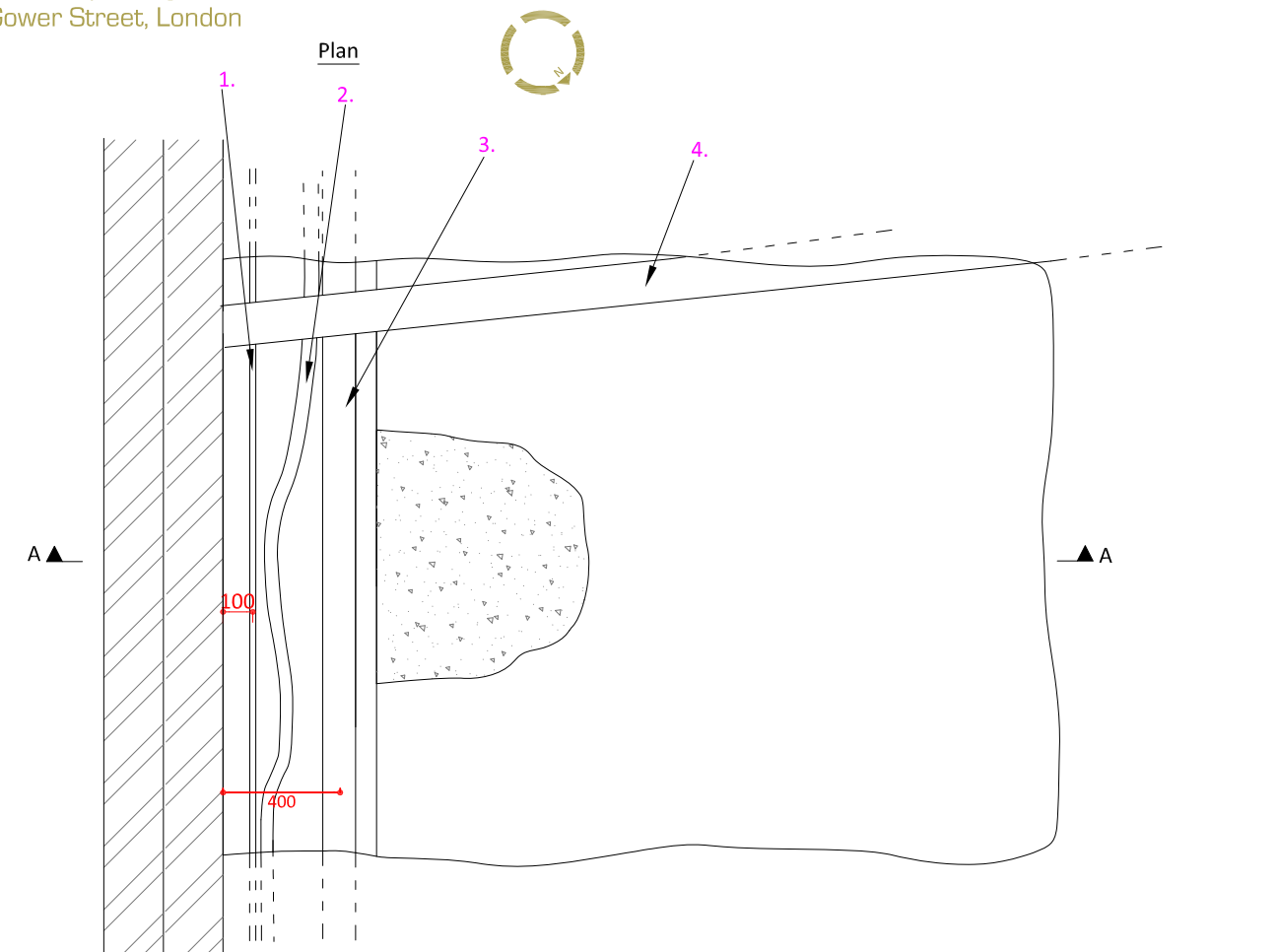
1. All dimensions shown in millimetres



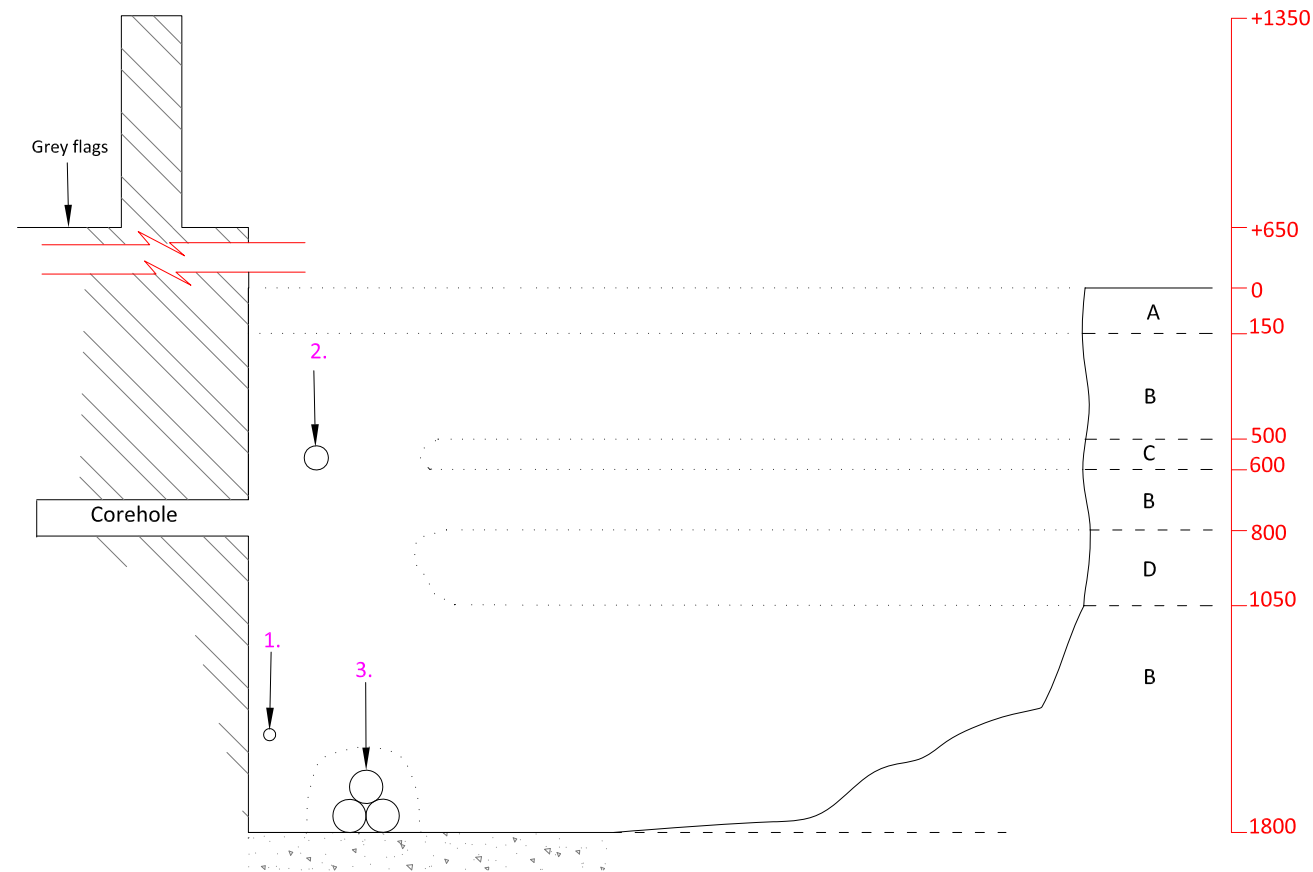
Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title
Trial pit record
Date of excavation
December 2013
Scale
1:25 at A3

Trial pit number
TP05
Location plan on drawing number
02



Section A-A



Key

1. Metal pipe exhibiting surface pitted corrosion ~20mm diameter
2. Armoured cable with black plastic sheath ~40mm diameter
3. 3 x Red brown ceramic pipes ~110mm diameter
4. Light grey metal pipe (suspected gas)

A. Pinkish blue grey sandy GRAVEL. Gravel consists of angular to sub angular igneous rock. (MADE GROUND)

B. Dark brown slightly gravelly sandy SILT. Gravel consists of brick and concrete. (MADE GROUND)

C. Light grey unreinforced CONCRETE. (MADE GROUND)

D. Light grey reinforced CONCRETE. Reinforcement bar is ~4mm diameter embedded at 75mm depth at ~ 150mm centres on a grid (MADE GROUND)

Observed features

Assumed features

Removed features

Denotes brickwork

Denotes concrete

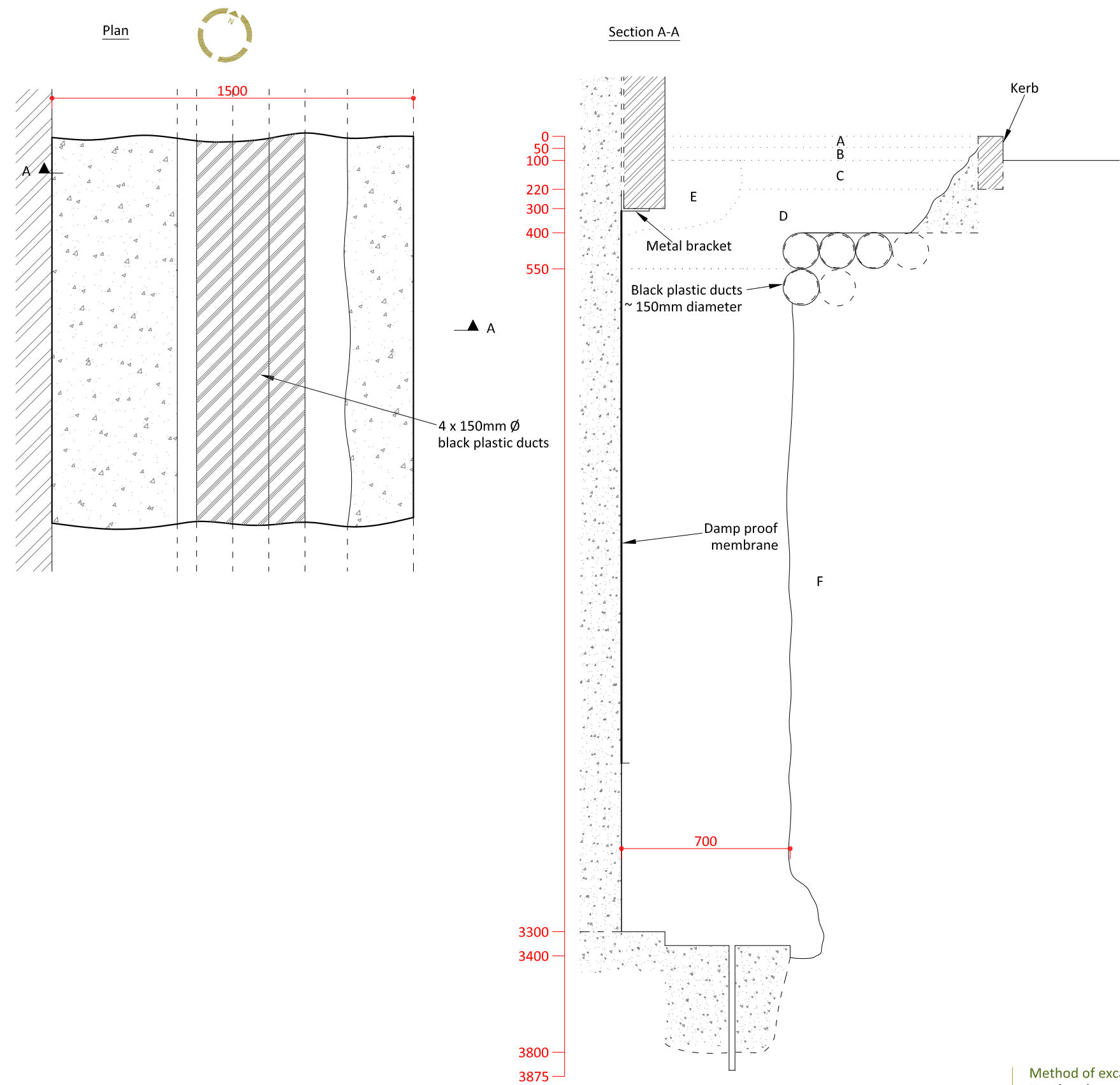
Notes

1. All dimensions shown in millimetres

Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title
Trial pit record
Date of excavation
December 2013
Scale
1:25 at A3

Trial pit number
TP05a
Location plan on drawing number
02



Photographic record



Key

- A. Grey concrete FLAGS. (MADE GROUND)
- B. Dark grey MORTAR (MADE GROUND)
- C. Light grey MORTAR (MADE GROUND)
- D. Dark grey very sandy GRAVEL. Gravel consists of angular igneous rock. (MADE GROUND - SUB BASE)
- E. Pink purple sandy GRAVEL. Gravel consists of granite. (MADE GROUND)
- F. Orange brown very sandy very gravelly silty CLAY with cobbles of timber. Gravel consists of flint. (MADE GROUND)

- Observed features
- - - - - Assumed features
- Removed features

- Denotes brickwork
- Denotes concrete
- Denotes plastic

Notes

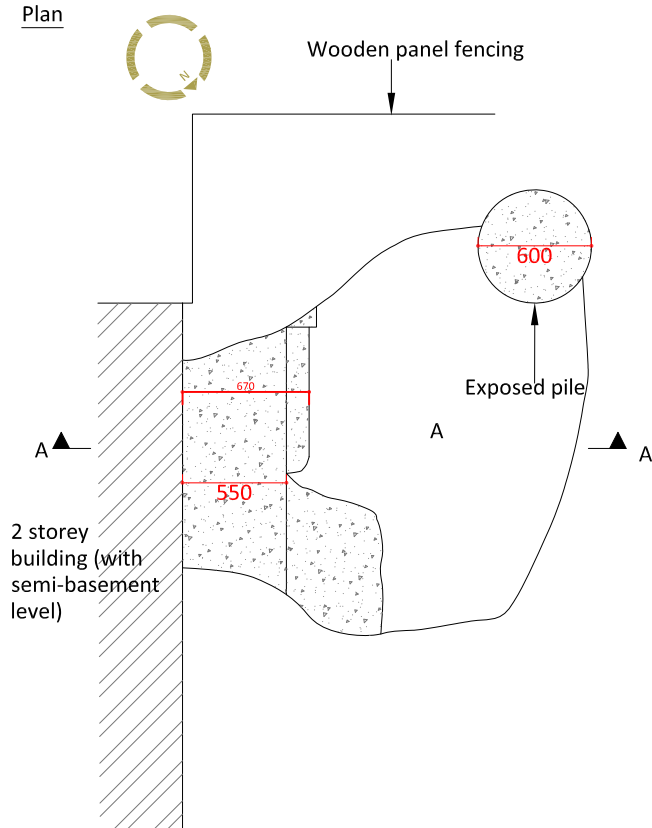
1. All dimensions shown in millimetres

Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title
Trial pit record
Date of excavation
December 2013
Scale
1:20 at A3

Trial pit number
TP06
Location plan on drawing number
02

Plan



Key

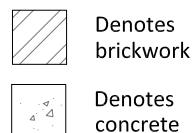
A. High strength brown silty CLAY.
(LYNCH HILL GRAVEL MEMBER)

B. Pinkish brown sandy GRAVEL. Gravel consists
of igneous rock.
(MADE GROUND)

C. Brown slightly gravelly silty slightly sandy
CLAY. Gravel consists of brick and concrete.
(MADE GROUND)

D. Brown slightly gravelly SAND. Gravel consists
of brick and concrete.
(MADE GROUND)

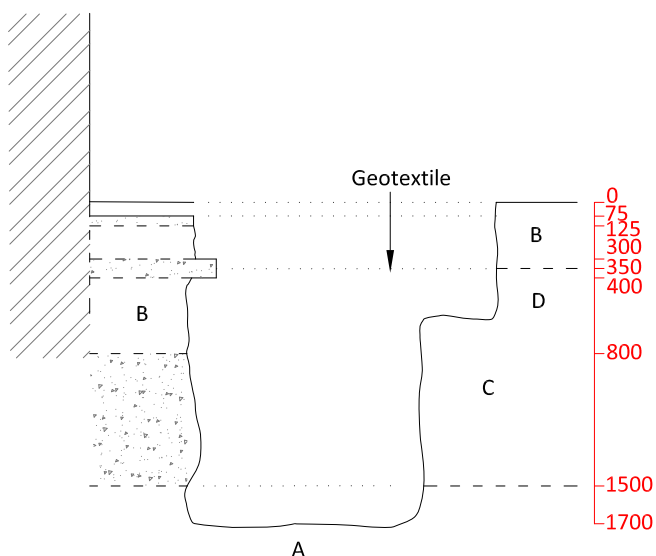
- Observed features
- - - Assumed features
- Removed features



Notes

1. All dimensions shown in millimetres

Section A-A



Method of excavation

Hand tools

Trial pit dimensions

As shown

Groundwater observations

No groundwater encountered

Title

Trial pit record

Date of excavation

December 2013

Scale

1:40 at A4

Trial pit number

TP07

Location plan on drawing number

02

Photographic record



Key

- A. Medium dense to dense blue/pink grey sandy GRAVEL. Gravel consists of sub-angular rock. (MADE GROUND)
- B. Loose to medium dense brown very sandy gravelly SILT with occasional boulder sized pockets of black sandy GRAVEL, occasional boulders of concrete to 0.3m x 0.3m x 0.2m and some cobbles of brick and concrete. Gravel consists of brick, concrete, flint and plastic. (MADE GROUND)
- C. Yellowish brown sandstone FLAGS. (MADE GROUND)
- D. Medium to high strength brown slightly silty CLAY. (LYNCH HILL GRAVEL MEMBER)

- Observed features
- - - - - Assumed features
..... Removed features

Notes

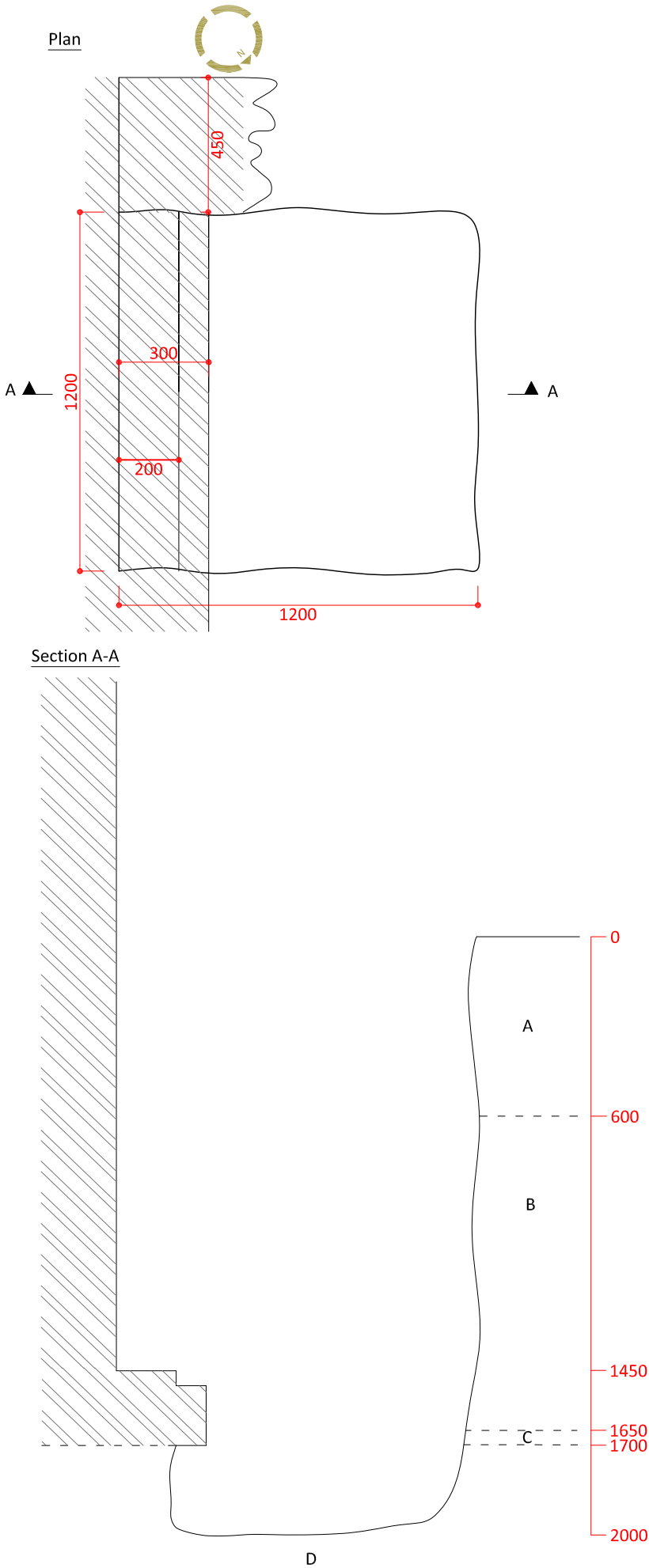
1. All dimensions shown in millimetres

-  Denotes brickwork
 Denotes concrete

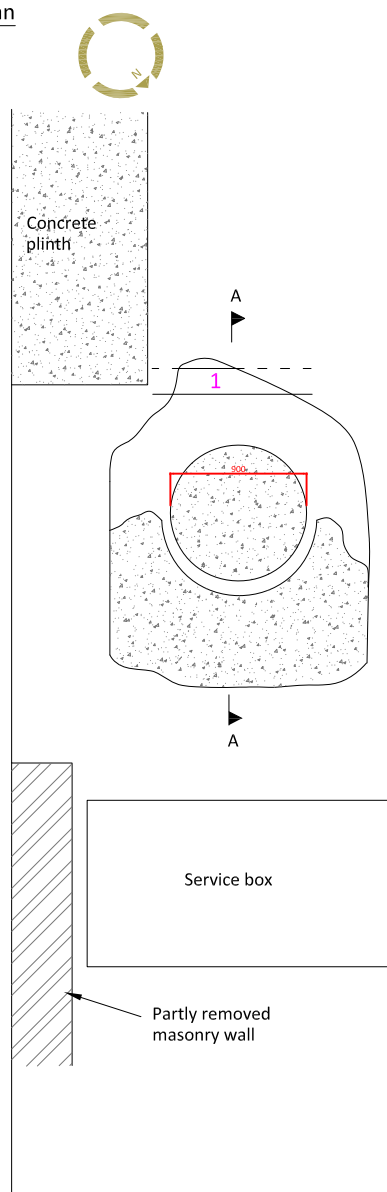
Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title
Trial pit record
Date of excavation
December 2013
Scale
1:20 at A3

Trial pit number
TP07a
Location plan on drawing number
02



Plan



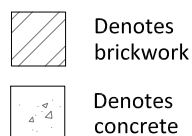
Key

1. Black plastic duct ribbed ~170mm diameter.
Yellow tape above with "electric cable" text.

A. Medium strength brown gravelly very sandy CLAY with some cobbles of brick, concrete and timber and occasional boulders of sandstone and masonry up to 0.6 x 0.1 x 0.5m in size. Gravel consists of brick, concrete, flint and plastic. (MADE GROUND)

B. Medium dense brown silty medium to coarse SAND.

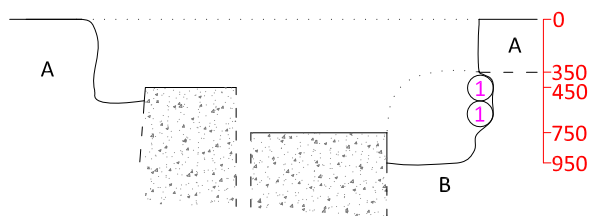
- Observed features
- - - Assumed features
- Removed features



Notes

1. All dimensions shown in millimetres

Section A-A



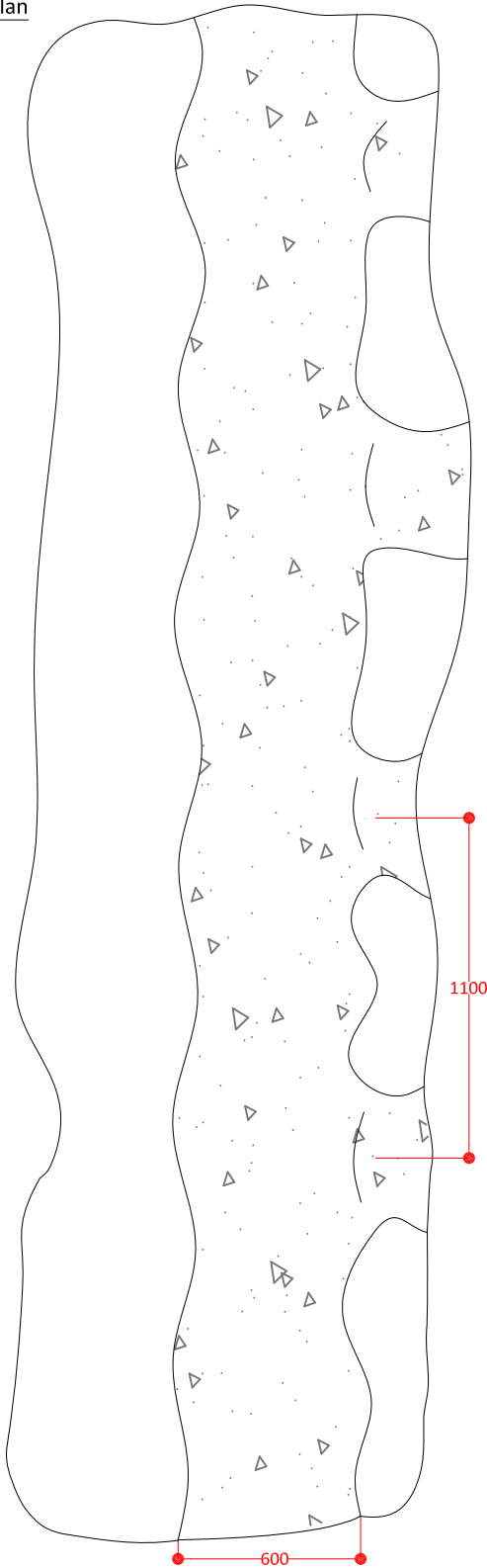
Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title
Trial pit record
Date of excavation
December 2013
Scale
1:50 at A4

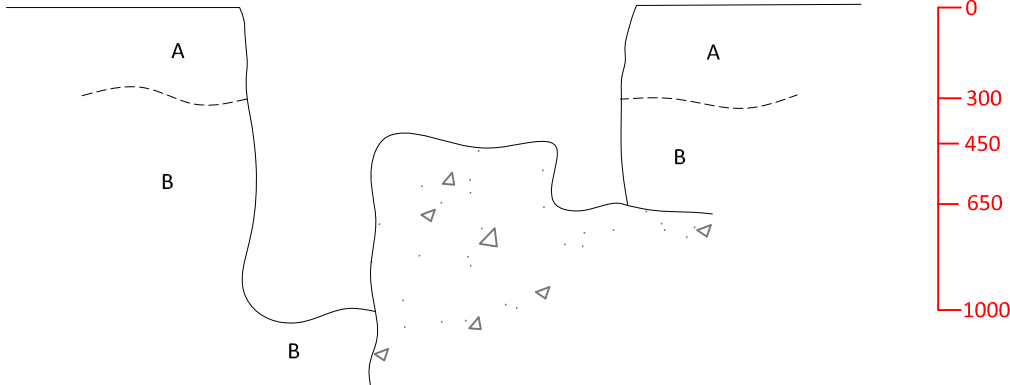
Trial pit number
A1
Location plan on drawing number
02



Plan



Section A-A



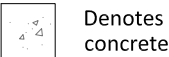
Photographic record



Key

- A. Pinkish grey sandy GRAVEL. Gravel consists of igneous rock.
(MADE GROUND)
- B. Brown gravelly very sandy SILT. Gravel consists of brick, concrete, flint and plastic.
(MADE GROUND)

- — — — — Observed features
- - - - - Assumed features



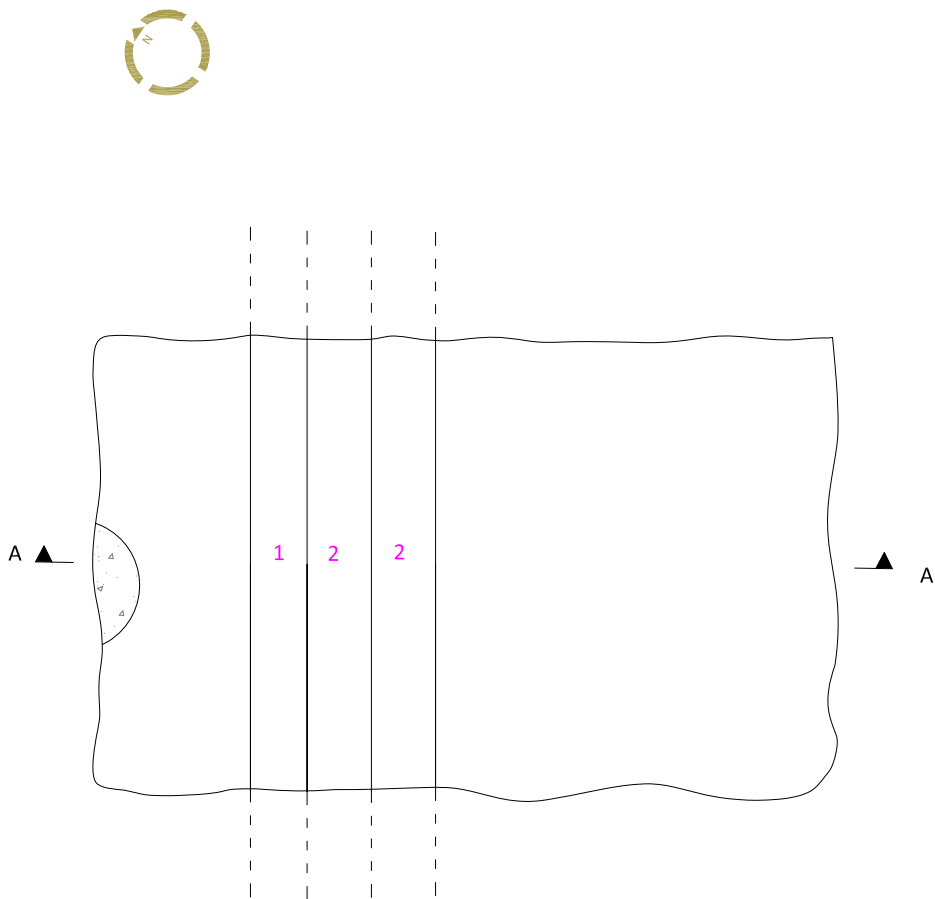
Notes

1. All dimensions shown in millimetres

Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title Trial pit record	Trial pit number A2
Date of excavation December 2013	Location plan on drawing number 02
Scale 1:25 at A3	

Plan



Key

- 1) Blue plastic pipe ~150mm diameter with blue mesh above.
- 2) Black ribbed plastic duct ~170mm diameter with yellow marker tape above.
- A) Dense pinkish purple grey sandy GRAVEL. Gravel consists of igneous rock. Black geotextile at base. (MADE GROUND)
- B) Medium dense brown silty gravelly SAND with occasional cobbles of brick. Gravel consists of brick, concrete, ash and igneous rock. (MADE GROUND)

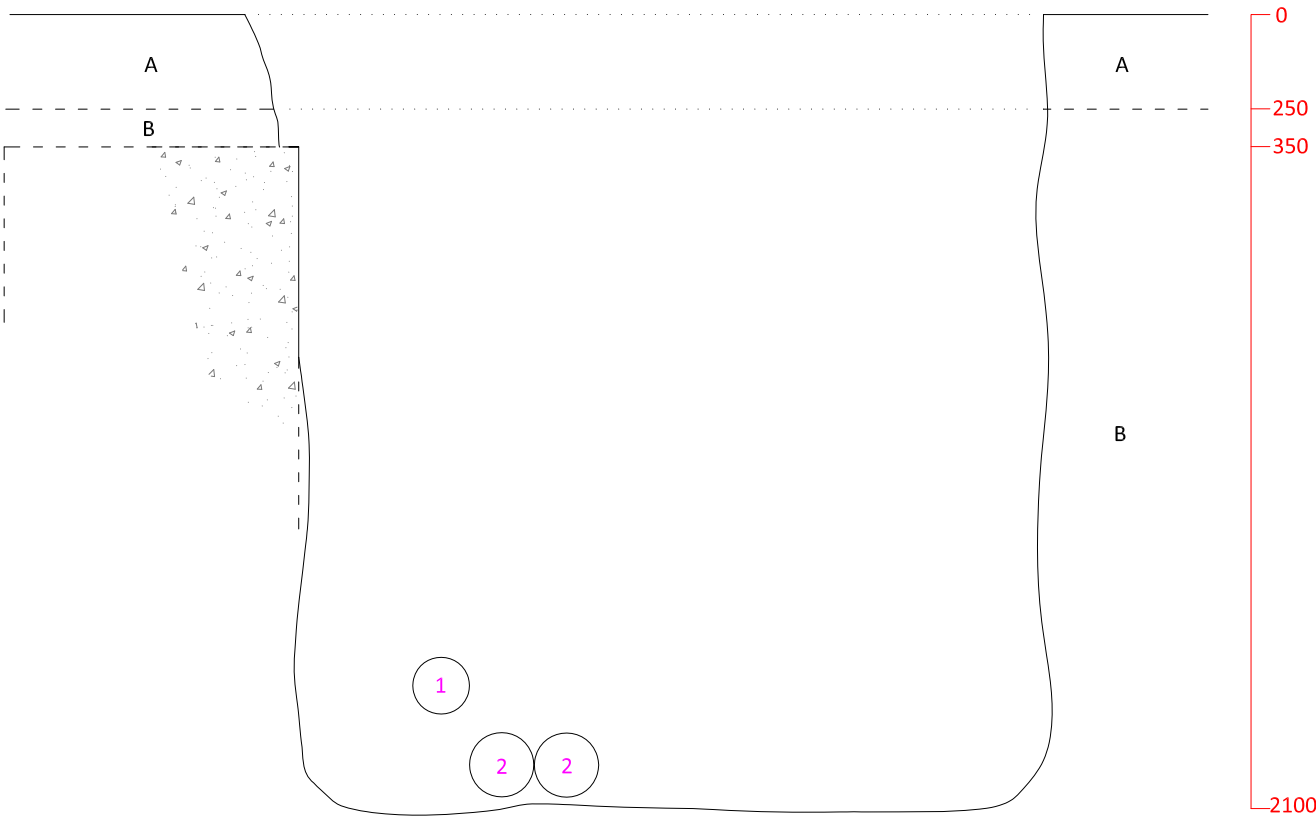
- Observed features
- - - - - Assumed features
- Removed features

Notes

1. All dimensions shown in millimetres

-  Denotes brickwork
-  Denotes concrete

Section A-A



Method of excavation
Hand tools
Trial pit dimensions
As shown
Groundwater observations
No groundwater encountered

Title	Trial pit record	Trial pit number
Date of excavation	December 2013	C1
Scale	1:20 at A3	Location plan on drawing number 02

Key to legends (extract from BS5930 table 11)

Soils		Sedimentary rocks	
	Topsoil		Chalk
	Made ground		Limestone
	Boulders & Cobbles		Sandstone
	Gravel		Siltstone
	Sand		Mudstone
	Silt		Shale
	Clay		Coal
	Peat/Organic clays		Conglomerate

Composite soil types are signified by combined symbols.

Key to 'test result' columns

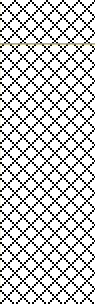
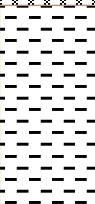
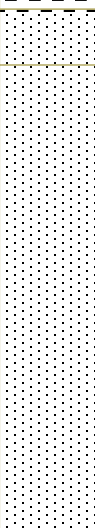
Column header	Explanation	
Type and depth	Records depth that the test was carried out ie at 2.1m or between 2.1 and 2.55m	
Result	P – Pocket penetrometer result	Carried out on
	V – Hand held shear vane result (KN/m ²)	undisturbed samples
	SPT – Standard penetration test result (uncorrected) CPT - Cone penetration test result (uncorrected)	Seating blows recorded in brackets

Key to 'sampling' columns

Column header	Explanation
From (m)	Records depth of sampling
To (m)	
Type	U100 (32) – Undisturbed sample 100mm diameter sampler with number of blows of driving equipment required to obtain sample D – Disturbed sample B – Bulk disturbed sample J – Disturbed sample placed in sealed amber jar W – Water sample

Water observations

Described at foot of log

DESCRIPTION	LEGEND	DEPTH (m)	TEST RESULTS		SAMPLING		
			TYPE & DEPTH	RESULT	FROM (m)	TO (m)	TYPE
Light grey CONCRETE. No reinforcement bar observed. Gravel consists of angular flint up to 20mm in size and brick cobbles. ~60% aggregates. ~1% voids. (MADE GROUND)		0.0 0.08	P 1.4m	75 kN/m ²	0.5		D
Brown slightly gravelly silty CLAY. Gravel consists of flint, concrete and ash. (MADE GROUND)							
Medium strength brown and mottled light grey slightly silty CLAY. (LYNCH HILL GRAVEL MEMBER)		1.0			1.2		D
Medium dense orange brown slightly gravelly SAND. Gravel consists of flint. (LYNCH HILL GRAVEL MEMBER)		1.7 1.9					
Medium dense becoming dense yellow brown medium grained SAND. (LYNCH HILL GRAVEL MEMBER)					3.0	3.5	B
BOREHOLE TERMINATED AT 3.5m DEPTH		3.5					
NOTES 1. Refer to key at beginning of this appendix for explanation of symbols 2. Ground level based on topographical survey drawing provided by Plowman Craven. 3. Borehole terminated due to density of soils							

Standpipe installation
N/A

Dynamic Probing within 1.0m
DCP01

Sampler diameter range
101mm – 68mm

Groundwater observations
No groundwater encountered

Title
Driven tube sampler borehole record

Surface coring
No

Location plan on drawing number
02

Co-ordinates
N/A

Ground level
23.2m

Date of excavation
10.12.2013

Borehole number
DTS01

Definition of geotechnical terms used in this report - foundations

Strip foundations.

A foundation providing a continuous longitudinal ground bearing.

Trench fill concrete foundation.

A trench filled with mass concrete providing continuous longitudinal ground bearing.

Pad foundation.

An isolated foundation to spread a concentrated load.

Raft foundation.

A foundation continuous in two directions, usually covering an area equal to or greater than the base area of the structure.

Substructure.

That part of any structure (including building, road, runway or earthwork) which is below natural or artificial ground level. In a bridge this includes piers and abutments (and wing walls), whether below ground level or not, which support the superstructure.

Piled foundations and end bearing piles. A pile driven or formed in the ground for transmitting the weight of a structure to the soil by the resistance developed at the pile point or base and the friction along its surface. If the pile supports the load mainly by the resistance developed at its point or base, it is referred to as an end-bearing pile; if mainly by friction along its surface, as a friction pile.

Bored cast in place pile.

A pile formed with or without a casing by excavating or boring a hole in the ground and subsequently filling it with plain or reinforced concrete.

Driven pile.

A pile driven into the ground by the blows of a hammer or a vibrator.

Precast pile.

A reinforced or prestressed concrete pile cast before driving.

Driven cast in place pile.

A pile installed by driving a permanent or temporary casing, and filling the hole so formed with plain or reinforced concrete.

Displacement piles.

Piled formed by displacement of the soil or ground through which they are driven.

Skin friction.

The frictional resistance of the surrounding soil on the surface of cofferdam or caisson walls, and pile shafts.

Downdrag or negative skin friction. A downwards frictional force applied to the shaft of a pile caused by the consolidation of compressible strata, e.g. under recently placed fill. Downdrag has the effect of adding load to the pile and reducing the factor of safety.

Definition of geotechnical terms used in this report – bearing values

Ultimate bearing capacity.

The value of the gross loading intensity for a particular foundation at which the resistance of the soil to displacement of the foundation is fully mobilised.

Presumed bearing value.

The net loading intensity considered appropriate to the particular type of ground for preliminary design purposes. The particular value is based on calculation from shear strength tests or other field tests incorporating a factor of safety against shear failure.

Allowable bearing pressure.

The maximum allowable net loading intensity at the base of the foundation, taking into account the ultimate bearing capacity, the amount and kind of settlement expected and our estimate of ability of the structure to accommodate this settlement.

Factor of safety.

The ratio of the ultimate bearing capacity to the intensity of the applied bearing pressure or the ratio of the ultimate load to the applied load.

Definition of geotechnical terms used in this report – road pavements

The following definitions are based on Transport and Road Research Laboratory (TRRL) Report LR1132.

Equilibrium CBR values.

A prediction of the CBR value, which will be attained under the completed pavement.

Thin pavement.

A thin pavement (which includes both bound and unbound pavement construction materials 1 in 300mm thick and a thick pavement is 1200mm thick (typical of motorway construction).

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