



Report
Title:

Phase 1 Geo-Environmental Desk Study

Project
Name:

32-33 Torrington Square, London



Report Reference: **BRD2903-OR1-A**
Date: **April 2017**



REPORT CONTROL SHEET

| | |
|--------------|--------------------------------------|
| REPORT TITLE | PHASE 1 GEO-ENVIRONMENTAL DESK STUDY |
| PROJECT | 32-33 TORRINGTON SQUARE, LONDON |
| CLIENT | BIRKBECK UNIVERSITY OF LONDON |

| REPORT REFERENCE | ISSUE DETAIL | DATE | PREPARED BY | CHECKED BY |
|------------------|--------------|------------|-------------|-------------|
| BRD2903-OR1-A | First Issue | 07/04/2017 | M Morgan | J Brockwell |

BRD Environmental Limited

Geotechnical and Environmental Services

Specialists in the investigation, assessment and reclamation of development land.

Hawthorne Villa, 1 Old Parr Road,
Banbury, Oxfordshire. OX16 5HT

T: 01295 272244
F: 01295 270098

www.brduk.com
info@brduk.com

The information and advice contained within this report is provided by BRD Environmental Limited (BRD) for the sole use and reliance by its Client in performance of BRD's duties under its contract with the Client. Any advice, opinions or recommendations within this report should be read and relied upon only in the context of the report as a whole. The advice within the report is based upon the information made available to BRD within the financial and timeframe constraints imposed. BRD relied on the accuracy of the information contained in the third party documents consulted and is in no circumstances responsible for the accuracy of such information or data supplied. The report is prepared with reasonable skill and care based generally on UK standards, codes and common practice current at the time of writing. When considering this report due regard should be given to the terms and conditions of BRD's contract with the Client under which the report was prepared. The copyright of this report is held by BRD. Should the Client wish to release this report to a Third Party for that party's reliance, BRD agree to such release provided that BRD assumes no duties, liabilities or obligations to the Third Party, that the Third Party does not acquire any rights whatsoever against BRD, and BRD accepts no responsibility for any loss incurred by the Client through the Client's release of the report to the Third Party. Following final issue of this report, BRD has no further obligation to advise the Client on any matters such as changes in legislation or codes of practice that may affect the advice contained within the report.

REPORT LAYOUT

This report is divided into the following four sections: Summary Report, Technical Report, Supporting Information and Appendices.

SUMMARY REPORT

This expanded executive summary provides the main findings of the work undertaken in brief non-technical language. This section provides an overview of the key outcomes for the benefit of non-specialists and concludes with the main recommendations. This section should only be relied upon in the context of the whole report and the Technical Report should be referred to with respect to any design decisions.

TECHNICAL REPORT

The main report section is intended to provide the technical detail of the investigation and is intended to provide the level of information required by current guidance documents and practice. The Technical Report is written in a language that, in part, assumes knowledge of subject matter so that it can be written in as concise a form as possible. Its intended audience is peers, regulators and other professionals in related disciplines.

| | | |
|-----------|--|----------|
| 1. | INTRODUCTION TO TECHNICAL REPORT | 1 |
| 1.1. | CONTRACT DETAILS | 1 |
| 1.2. | SCOPE OF WORKS | 1 |
| 1.3. | REPORT LIMITATIONS | 2 |
| 2. | SITE CHARACTERISTICS | 3 |
| 2.1. | SITE SETTING | 3 |
| 2.2. | SITE DESCRIPTION | 3 |
| 2.3. | SITE HISTORY | 5 |
| 2.4. | GEOLOGY | 6 |
| 2.5. | HYDROGEOLOGY | 7 |
| 2.6. | HYDROLOGY | 7 |
| 2.7. | ENVIRONMENTAL ASPECTS | 8 |
| 2.8. | PREVIOUS GROUND INVESTIGATIONS | 8 |
| 2.9. | UXO DESK STUDY | 8 |
| 3. | PRELIMINARY CONTAMINATION RISK ASSESSMENT | 9 |
| 3.1. | HAZARD IDENTIFICATION | 9 |
| 3.2. | RECEPTOR ASSESSMENT | 10 |
| 3.3. | INITIAL CONCEPTUAL MODEL | 11 |
| 3.4. | PRELIMINARY ASSESSMENT OF CONTAMINATION RISKS | 11 |

| | | |
|---|-------------------------------------|-----------------------------------|
| 3.5. | RECOMMENDATIONS | 12 |
| 4. | IMPLICATIONS FOR CONSTRUCTION | 13 |
| 4.1. | GEOTECHNICAL CONSIDERATIONS | 13 |
| 4.2. | CONSTRUCTION CONSIDERATIONS | 14 |
| REFERENCES | | |
| SUPPORTING INFORMATION | | |
| <p>This section of the report provides background details of a generic nature together with specific technical approaches adopted by BRD and details of the guidance documents that are commonly referenced in the report. The section also includes explanations of technical terms to assist non-specialist readers in understanding the Technical Report. It should be noted that not all the information within this section is necessarily applicable to this specific report.</p> | | |
| APPENDICES | | |
| <p>The final section of the report presents the factual data collected and employed as part of the investigation.</p> | | |
| APPENDIX 1 | SITE PLANS & PHOTOGRAPHS | |
| | Site Location Plan | Ref. BRD2903-OP1-A |
| | Walkover Photographs | Ref. BRD2903-OP2-A |
| | Initial Conceptual Site Model | Ref. BRD2903-OP3-A |
| APPENDIX 2 | HISTORICAL PLANS | |
| | Order No. 119760713 | 43 x A3 pages |
| APPENDIX 3 | ENVIROCHECK REPORT | |
| | Order No. 119760713 | 180 x A4 pages & 12 x A3 pages |

SUMMARY REPORT

| SUBJECT | COMMENTS |
|---------------------------|---|
| CURRENT USE & DESCRIPTION | <p>The site comprises the existing five storey Georgian property of No. 32 Torrington Square in the south eastern half and a ramped access road down to the adjacent Warburg Institute across the north western half.</p> <p>The property of No. 32 has most recently been used as offices and laboratories associated with the Birkbeck College Centre for Brain and Cognitive Development (CBCD) but is currently vacant.</p> |
| PROPOSED USE | <p>It is proposed to extend the existing property of No.32 Torrington Square across the north western half of the site in the current location of the access road to create a new five storey structure. This will include a new basement extending beneath both properties. The site will form part of the Birkbeck CBCD Toddler Laboratory.</p> |
| HISTORICAL SUMMARY | <p>The site was originally developed with two terraced residential properties in the 1820s. No. 32 is still present and is now used by the University. The surrounding area was heavily bombed during the Second World War, however, research has shown that No. 33 was demolished in the 1950s to provide the access to the adjacent Warburg Institute built at this time as opposed to being bomb damaged.</p> |
| PUBLISHED GEOLOGY | <p>The site is shown to be underlain by superficial deposits comprising the Lynch Hill Gravels.</p> <p>The shallowest bedrock unit is shown to be London Clay Formation.</p> |
| RADON GAS | <p>The site is not located in an area where radon protection measures are required in new dwellings.</p> |
| HYDROGEOLOGY | <p>The site is situated upon superficial deposits designated a Secondary A Aquifer.</p> <p>The underlying bedrock geology is designated as Unproductive Strata.</p> <p>The site is not located within a groundwater Source Protection Zone.</p> |
| HYDROLOGY | <p>The closest surface water feature to the site is an extended culvert shown approximately 400m to the east of the site, presumed to be a section of the River Fleet, which is a tributary to the River Thames. The River Thames itself is 1.6km to the south of the site.</p> <p>The site is not in an area indicated to be at risk of flooding.</p> |
| PREVIOUS GROUND REPORTS | <p>BRD is not aware of any previous ground investigations having been conducted at the site.</p> |
| UXO | <p>A separate UXO assessment report has been completed by Zetica and has identified that the site has a Low risk. The previous property of No. 33 does not appear to have been bombed during WWII but was demolished in the 1950s to make way for the Warburg Institute which was constructed at this time.</p> |

PRELIMINARY CONTAMINATION RISK ASSESSMENT

The only potential contamination source identified relates to the presence of Made Ground which could be present in the north western half of the site, arising from the demolition of the former property and construction of the access ramp.

However, this does not give rise to any significant contamination risks as future site users will not be exposed to any of the soils due to the proposed building cover across the entire site. In addition, the construction of the basement and raft foundation will remove any potential Made Ground regardless.

Therefore it is not considered that there are any significant contamination risks at the site in the context of the proposed development.

PRELIMINARY GEOTECHNICAL ASSESSMENT

It is anticipated that the requirements of a Party Wall Act will apply in relation to the adjoining properties.

The soil underlying the site at depth may have a volume change potential i.e. the soils swells and shrinks with changing moisture content. This property will have an influence on foundation type and depths for the proposed development particularly near existing or proposed trees.

There is the potential that any groundwater in the underlying gravels may present construction difficulties and complicate the design of the basement.

RECOMMENDATIONS

| | |
|-----------------------------------|---|
| Phase 2 Contamination Assessment | No further contamination assessment is considered necessary. However, limited sampling as part of the proposed geotechnical assessment would be prudent in order to determine waste classification and any health and safety implications to construction workers. |
| Geotechnical Ground Investigation | For any form of development, BRD recommend that an intrusive ground investigation is undertaken in order to confirm ground conditions and allow design of the new structures. An intrusive ground investigation incorporating a geotechnical assessment is proposed for the site including a cable percussive borehole to 15m depth together with two windowless sample boreholes to be forwarded up to 8m depth, the excavation of seven hand dug trial pits to expose the existing foundations and the completion of one in-situ California Bearing Ratio (CBR) test. |

1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

| | |
|--------------------------|--|
| CLIENT | Birkbeck University of London |
| SITE | Land situated at 32-33 Torrington Square, London, WC1E 7JL. |
| CLIENT'S ADVISORS | BRD Environmental Limited (BRD) has been commissioned directly by the Client. |
| REPORT CONTEXT | It is understood that the Client intends to extend the existing property of 32 Torrington Square across the north western half of the site in the current location of the access road to create a new five storey structure. This will include a new basement extending beneath both properties. The site will form part of the Birkbeck Centre for Brain and Cognitive Development (CBCD) Toddler Laboratory. |
| REPORT TYPE | Factual and interpretative geo-environmental desk study. |
| REPORT OBJECTIVES | The purpose of the report is to assess whether or not there are any potential soil contamination risks to inform the design of an intrusive investigation prior to the redevelopment. |

1.2. SCOPE OF WORKS

The agreed scope of works was:

- Purchase of an Envirocheck database report and historical Ordnance Survey plans.
- Interpretation of the geological, hydrogeological and hydrology setting of the site from published sources.
- A site walkover survey by a suitably experienced Geo-Environmental Consultant involving the inspection of the site and the surrounding area for indications of contamination and other ground related issues.
- Prepare a factual and interpretative report based on the information collected to identify and assess any geotechnical or contamination hazards. Where appropriate, it shall provide detailed recommendations for further work.

Due to the potential that the former No. 33 property had been bombed during World War Two (WWII), a separate Unexploded Ordnance (UXO) desk study assessment has been completed by Zetica Ltd to assess the potential UXO risk. The Zetica report is referenced at the rear of this report and summarised within.

1.3. REPORT LIMITATIONS

Any site boundary lines depicted on plans included within this report are approximate only and do not imply legal ownership of land. Any observations of tree species, asbestos containing materials within structures or invasive weeds, such as Japanese Knotweed, does not constitute a formal survey of such features. The identification of such features is therefore tentative only. The report does not consider whether sensitive ecology or archaeology is present as these require consideration by professionals specialising in these matters. It should be recognised that the collection of desk study information may not be exhaustive and that other information pertinent to the site may be available.

It is emphasised that a desk study and walkover can only indicate the potential for contamination on the site. This study aims to highlight potential pollutant linkages in line with current guidance. The plausibility of these linkages can only be proved by an intrusive ground investigation.

It should be noted that a desk study and walkover can only reveal the potential for certain types of ground conditions and geotechnical hazards. For any form development an intrusive ground investigation is recommended. The scope of this investigation excludes a formal slope stability study and any observations made regarding slopes are for information only.

2. SITE CHARACTERISTICS

2.1. SITE SETTING

| | |
|-----------------------------------|--|
| SITE ADDRESS AND POST CODE | 32 Torrington Square, London WC1E 7JL. |
| NATIONAL GRID REFERENCE | 529800E, 182120N. |

2.2. SITE DESCRIPTION

| | |
|------------------------|---|
| INSPECTION DATE | 12 th January 2017. |
| CURRENT USE | <p>The site comprises the existing five storey Georgian property of No. 32 Torrington Square across the south eastern half and a ramped access road to the adjacent Warburg Institute across the north western half.</p> <p>No. 32 has most recently been used as offices and laboratories associated with the Birkbeck College Centre for Brian and Cognitive Development, but is currently vacant.</p> |
| AREA | Approximately 400m ² . |
| SHAPE | Rectangular |
| ACCESS | The existing building is accessed directly from Torrington Square. The open north western section is accessed via a large metal gate off Torrington Square. |
| BOUNDARIES | <p>The south western boundary is formed by Torrington Square and is demarked by metal railings and a gate to the north and wooden hoarding to the south in front of the existing property.</p> <p>The south eastern boundary is formed by the adjacent terraced property.</p> <p>The northern boundary is formed by brick retaining wall to the rear of the courtyard garden to No. 32 and the northern corner of the site is open to the courtyard within the Warburg Institute.</p> <p>The western half of the north western boundary is formed by the external wall of the Warburg Institute.</p> |
| TOPOGRAPHY | <p>In the north western half of the site a vehicle ramp runs adjacent to the No. 32 property with a change in level of around 2.80m. The ramp leads down to the courtyard area of the Warburg Institute which is all at the lower level in relation to Torrington Square, along with the north western section of the site adjacent to the ramp.</p> <p>The existing basement level to No. 32 appears to be at the same approximate level as the lower courtyard area to the Warburg Institute. The enclosed garden area to No. 32 appears to be approximately 0.5m to 1.0m higher than the lower courtyard area.</p> |

| | |
|--|---|
| SURFACING | The ramp is surfaced in asphalt. The remaining external areas in the north western half of the site comprise paving slabs. The small courtyard garden to No. 32 is covered with gravel. |
| BUILDINGS | <p>The existing building at No. 32 Torrington Square is a five storey masonry structure of the typical Georgian style of the area. The lower ground floor comprises a basement extending beneath the entire structure with an open light well at the south western end adjacent to the street.</p> <p>Along the north western façade is evidence of the former No. 33 property with brick buttresses protruding from the gable end wall.</p> <p>The building was not in use at the time of the walkover and comprised vacated offices, psychology labs and store rooms.</p> |
| VEGETATION | Some shrubs are present in the small courtyard garden to No. 32, but no significant trees or vegetation are present at the site. |
| NOTABLE FEATURES AND OBSERVATIONS | <p>Immediately to the south west adjacent to the light well is understood to be a below ground heating chamber within some vaults extending beneath Torrington Square. It is understood that the area may contain asbestos containing materials. The vaults were not inspected as part of the walkover, but they are accessed via a small doorway from the light well.</p> <p>Along the north western boundary adjacent to the Warburg Institute buildings were two large heating ducts which ran along the wall and beneath Torrington Square. They are likely to enter the heating chamber discussed above.</p> <p>Within the building, the rooms predominantly comprised former cognitive behaviour laboratories. In one of the basement rooms was a Faraday Cage and several of the other upstairs rooms had reinforced doors and walls to block out radio waves for the various cognitive experiments conducted in the building.</p> |

| | |
|-----------------------------|---|
| SURROUNDING LAND USE | The site is set in a mainly commercial/academic area of central London with much of the immediate surroundings comprising various buildings associated with the University of London. |
| To the North | The Warburg Institute (part of the University of London) is present immediately to the north. Beyond is Gordon Square Garden. |
| To the East | The Warburg Institute with Woburn Square beyond. |
| To the South | The terrace of No's 27-32 Torrington Square extend to the south east and the square itself is present to the south and south west. |
| To the West | The University of London is present beyond Torrington Square to the south west and west of the site. A church is present beyond Byng Place to the north west of the site. |

2.3. SITE HISTORY

| MAPPED HISTORY | | |
|----------------|---|---|
| DATE RANGE | SITE | SURROUNDING AREA |
| 1851-1954 | <p>The site is shown as comprising two terraced properties, namely Nos. 32 and 33 Torrington Place.</p> <p>No. 32 is shown in the same layout as the present day and both properties have similar garden areas to the north east.</p> | <p>Throughout this period the surrounding area is dominated by terraces of residential properties similar to those present on site. Open spaces comprising Tavistock Square, Gordon Square and Russell Square are present within 200m of the site.</p> <p>University College is shown 150m to the north west.</p> <p>Throughout the first half of the 20th Century several areas of the terraced housing begin to be replaced with larger buildings generally comprising academic establishments or museums.</p> <p>The maps from the late 1940s and early 1950s show several areas of 'ruins' in the surrounding area associated with WWII bomb damage. The closest of these is located immediately to the east off Woburn Square, however it is noted that No. 33 Torrington Square (on site) is not shown to be damaged at this time.</p> |
| 1961-present | <p>The property of No. 33 Torrington Square is no longer shown and has been replaced by an access road to the adjacent newly constructed Warburg Institute building.</p> | <p>The Warburg Institute has been constructed immediately to the north and east, following the demolition of several residential properties.</p> <p>Further redevelopment of the surrounding area occurs throughout this period, notably with several more buildings associated with the University of London in the area within 200m of the site.</p> |

| | |
|-------------------------|---|
| PREVIOUS REPORTS | <p>Further details of the site history have been collated as part of a Heritage Appraisal report completed by Turley Heritage, dated December 2016 (referenced at the rear of this report).</p> <p>A map included dating from 1795 shows the location of the site as undeveloped ground, however, new developments were encroaching towards the site at this time with the British Museum to the south and the Euston Road to the north. Subsequent maps extracts from the 1930s onwards show the site as having been developed with No. 32 and 33 Torrington Square.</p> <p>The report goes on to conclude that the property was built between 1821 and 1825 as a residential property for the middle or professional classes in London at the time.</p> |
| INTERNET SEARCH | <p>An earlier map of London from 1775 was identified on the Mapco website (www.mapco.net) and this shows the area of the site as open fields.</p> |
| ANECDOTAL | <p>No additional anecdotal evidence of site history was gained during the study.</p> |

2.4. GEOLOGY

| | |
|-----------------------------|--|
| GEOLOGICAL CONTEXT | <p>The site is situated within the influence zone of the River Thames and therefore the surface geology is dominated by superficial post divisionary River Terrace Deposits. The underlying bedrock consists of the London Clay Formation dating from the Paleogene and formed within a deep ocean basin.</p> |
| SUPERFICIAL DEPOSITS | <p>The site is shown to be underlain by River Terrace Deposits comprising the Lynch Hill Gravel Formation which consist of sands and gravels.</p> |
| BEDROCK GEOLOGY | <p>The site is shown to be underlain by the London Clay Formation comprising clays which are silty in part and sometimes sandy in the lower part.</p> |
| BGS BOREHOLE RECORDS | <p>A nearby borehole drilled in 1964 approximately 50m to the south of the site encountered Made Ground (bricks, clay and stones) to a depth of 2.7m, 'compact sandy gravel' to 5.6m followed by 'stiff brown clay' proven to 18.6m. The borehole was noted to be dry.</p> <p>Similar ground conditions were encountered in other historic boreholes in the wider area although it is noted that these encountered groundwater in the range 4.8m to 5.7m below ground level.</p> |
| SOIL GEOCHEMISTRY | <p>The site is shown to be in an area where the urban concentrations of lead in topsoils are elevated in the range 600-900mg/kg, although this would not exceed the commercial human health thresholds that would be applicable to the proposed form of redevelopment. In addition there is unlikely to be any topsoil present at the site due to the hard cover, therefore this does not raise any significant cause for concern.</p> |
| RADON | <p>The site is not located in an area where radon protection measures are required for new properties.</p> |

2.5. HYDROGEOLOGY

| | |
|---|---|
| SUPERFICIAL AQUIFER | Secondary A aquifer. |
| BEDROCK AQUIFER | Unproductive Strata. |
| AQUIFER PROPERTIES | Due to the proximity of the River Thames, the groundwater flow direction within the Lynch Hill Gravel is likely to be in a south to south easterly direction. The groundwater is likely to be in the upper few metres of the stratum and perched upon the surface of the London Clay present beneath. |
| LICENSED GROUNDWATER ABSTRACTIONS | None within 250m from the site. |
| GROUNDWATER SOURCE PROTECTION ZONE (SPZ) | Not located within a SPZ. |

2.6. HYDROLOGY

| | |
|--|---|
| SITE DRAINAGE CHARACTERISTICS | Surface water drainage is likely to be via mains sewer and the site is currently covered almost entirely with hardstanding or building and therefore there is unlikely to be any significant soil infiltration. |
| SURFACE WATER FEATURES | The closest surface water feature to the site is an extended culvert shown approximately 400m to the east of the site. This is likely to be a section of the River Fleet, a tributary of the River Thames. The River Thames is 1.6km to the south of the site. |
| SURFACE WATER ABSTRACTIONS | None within 250m from the site. |
| DISCHARGE CONSENTS | None relevant to consideration of the site. |
| FLOODING | Zone 1 area and is highly unlikely to be affected by flooding. |

2.7. ENVIRONMENTAL ASPECTS

| | |
|--|--|
| LANDFILL | There are no recorded landfill sites within 250m of the site. |
| CONTEMPORARY TRADE DIRECTORY ENTRIES | There are no nearby contemporary trade entries of relevance to assessment of the site. |
| REGISTERED HAZARDOUS SITES | None within 250m of the site. |
| POLLUTION INCIDENTS TO CONTROLLED WATERS | There have been no recorded pollution incidents of relevance within 250m of the site. |
| ECOLOGICALLY SENSITIVE LAND USE | None identified within 250m. |

2.8. PREVIOUS GROUND INVESTIGATIONS

BRD is not aware of any previous ground investigation at the site.

2.9. UXO DESK STUDY

The UXO desk study completed by Zetica has identified that the site offers a Low UXO risk. Although two high explosive devices fell adjacent to the site, this does not appear to have caused any damage to the site. The property of No 33 appears to have been demolished in the 1950s to make way for the Warburg Institute building rather than having been destroyed by a WWII bomb.

3. PRELIMINARY CONTAMINATION RISK ASSESSMENT

3.1. HAZARD IDENTIFICATION

| INVALID CONTAMINATION SOURCES | |
|-----------------------------------|---|
| HISTORIC LAND USE | DISCUSSION AS TO WHY THE HISTORICAL USE IS NOT CONSIDERED TO PRESENT A PLAUSIBLE HAZARD |
| Cognitive Behaviour Laboratory | The previous use of the site by the university as a cognitive behaviour laboratory does not give risk to any significant ground contamination risks. The 'laboratories' do not relate to the use of any chemicals etc and only relate to experiments and monitoring of brain activity. |
| Adjacent off site heating chamber | It is understood that a heating chamber is present running adjacent to the light well beneath Torrington Square adjacent to the south western boundary. A door to the heating chamber is present within the light well but the chamber was not accessed during the walkover. Various pipework can be seen entering the chamber both from the light well and from the external area adjacent to the access ramp in the north western corner of the site. The exact nature of this feature is unknown but it is presumed to be associated with the adjacent Warburg Institute and surrounding university buildings. It has been highlighted that the chamber may contain asbestos containing materials (potentially pipe lagging) however this is not a direct contamination risk to the underlying soils on the site as there is no means for fibres to have entered the soils. Therefore it is not considered that this off site feature presents a significant contamination source to the underlying soils. |

| POTENTIAL ON SITE SOURCES | | |
|--|--|---|
| HISTORIC LAND USE | DESCRIPTION OF POTENTIAL CONTAMINATION HAZARD | POTENTIAL CONTAMINANTS OF CONCERN |
| Made Ground associated with previous demolition. | <p>The former property of No 33 Torrington Square has been demolished and an access road and ramp was constructed to the Warburg Institute constructed in the 1950's. It is likely that Made Ground is present beneath the ramp.</p> <p>There is a low potential that hazardous materials such as clinker or asbestos could have been incorporated within any Made Ground during the demolition works.</p> | <p>Asbestos containing materials.</p> <p>Metals.</p> <p>Polycyclic Aromatic Hydrocarbons (PAH).</p> |

| POTENTIAL OFF SITE SOURCES | | |
|---|---|-----------------------------------|
| HISTORIC LAND USE | DESCRIPTION OF POTENTIAL CONTAMINATION HAZARD | POTENTIAL CONTAMINANTS OF CONCERN |
| No significant potential off site contamination sources have been identified in the surrounding area. | | |

3.2. RECEPTOR ASSESSMENT

| CONTEXT | |
|----------------------------------|--|
| ASSESSMENT LAND USE CATEGORY | The site will be used for academic purposes which falls within the "commercial" land use category in the context of human health risk assessment. |
| DESCRIPTION OF PROPOSED LAND USE | <p>It is understood that the Client intends to extend the existing property of No. 32 Torrington Square across the north western half of the site in the current location of the access road to create a new five storey structure. This will include a new basement extending beneath both properties and this will also extend to the north east in the location of the current courtyard garden. A new access ramp/tunnel to the Warburg Institute will run along the north western boundary (over part of the basement and beneath the upper floors).</p> <p>The site will form part of the Birkbeck Centre for Brain and Cognitive Development (CBCD) Toddler Laboratory.</p> |

| RECEPTORS | |
|---------------------------------|--|
| RECEPTOR | DISCUSSION |
| HUMAN HEALTH | Although children will visit the site, it is not considered that they will spend any significant length of time at the site in the long term. Therefore adult workers/academics who frequent the site will be the most appropriate receptor. |
| CONTROLLED WATERS GROUNDWATER | Secondary A aquifer. |
| CONTROLLED WATERS SURFACE WATER | Not considered to be a valid receptor as no nearby surface water bodies. |
| BUILDING MATERIALS AND SERVICES | <p>Water service pipes.</p> <p>Buried concrete.</p> |

3.3. INITIAL CONCEPTUAL MODEL

| | |
|--------------------------------------|--|
| POLLUTANT LINKAGES | The pollutant linkages are best presented in a diagrammatic form and therefore the initial conceptual site model plan is presented in Appendix 1. The individual pollutant linkages as numbered on the plan are described further in Section 3.4. |
| INVALID POLLUTANT LINKAGES | <p>Due to the development proposals whereby there will be no soft cover or landscaping and the vast majority of the site will be building cover, it is not considered that there will be any valid pollutant linkages via human exposure to the underlying soils.</p> <p>Given the relatively inert, non-volatile nature of any potential contamination associated with the Made Ground, it is not considered that there is any vapour intrusion pathway associated with the potential contamination.</p> <p>Therefore there are no valid potential pollutant linkages to human health from the minor potential contamination source identified.</p> |
| LIMITATIONS AND UNCERTAINTIES | The preliminary conceptual model has been developed based solely on desk based research and assessment. The only way to conclusively determine the presence or absence of contamination is with intrusive site investigation. |

3.4. PRELIMINARY ASSESSMENT OF CONTAMINATION RISKS

The following table further assesses the potential risks that exist to the other receptors through each of the identified pollutant linkages in the conceptual site model. The Initial Conceptual Site Model Plan is presented in Appendix 1.

| POTENTIAL SOURCES AND CONTAMINANTS | PATHWAYS (REFERENCE FROM MODEL) | RECEPTORS | HAZARD SEVERITY | PROBABILITY OF OCCURRENCE | POTENTIAL RISK |
|--|-------------------------------------|----------------------------------|--|---|----------------|
| Made Ground at the site associated with previous demolition. | Direct contact | Building materials and services. | Minor degradation of subsurface structures [mild]. | The vast majority of any Made Ground will be excavated to form the new basement. [unlikely] | Negligible |
| | Migration through permeable strata. | Groundwater | Contamination of a Secondary A Aquifer but no nearby water abstractions [mild] | Contaminants likely to be intrinsic to the soil and non-leachable. The vast majority of any Made Ground will be excavated to form the new basement. [unlikely] | Negligible |

3.5. RECOMMENDATIONS

Following the preliminary risk assessment, no plausible pollutant linkages have been identified. Accordingly no Phase 2 Contamination Assessment involving intrusive ground investigation is deemed necessary.

However, as a geotechnical ground investigation is required, it would be prudent to undertake some limited contamination testing of soils to provide further evidence of the lack of contamination risks, to assist in waste soil classification and determine any health and safety risks to construction workers.

4. IMPLICATIONS FOR CONSTRUCTION

4.1. GEOTECHNICAL CONSIDERATIONS

The following is a checklist summary of geotechnical hazards and their likelihood to have an impact on the proposed development of the site.

| GEOTECHNICAL HAZARD | LIKELY TO AFFECT SITE? | COMMENT |
|--|------------------------|--|
| Removal of existing sub-structures affecting new foundations. | ✘ | The new basement structure is likely to be founded beneath any previously disturbed ground. |
| Deep Made Ground. | ✘ | The new basement structure is likely to be founded beneath any existing Made Ground. |
| Historic wells. | ✘ | |
| Soft or compressible natural deposits such as Alluvium or Peat. | ✘ | |
| Changes in ground conditions within short distances. | ✘ | |
| Fine soils that have a volume change capacity. | ✔ | The underlying London Clay is known to have a high volume change potential which could impact the design of sub-surface structures. |
| Dissolution features or 'swallow holes'. | ✘ | |
| Cambering of valley sides with possibility of 'gulls'. | ✘ | |
| Risk of slope instability. | ✘ | |
| Shallow groundwater. | ✔ | Although not anticipated to be particularly shallow (at around 4m-5m bgl), the underlying groundwater could impact upon the proposed basement design and construction. |
| Underground structures. | ✘ | |
| Geological faults. | ✘ | |
| Aggressive chemical environment for concrete e.g. high sulphate soils. | ✔ | May affect the design and construction of sub-surface structures as the London Clay is known to contain elevated sulphate concentrations. |

| GEOTECHNICAL HAZARD | LIKELY TO AFFECT SITE? | COMMENT |
|---------------------|------------------------|---|
| Nearby Properties | ✓ | It is anticipated that the requirements of a Party Wall Act will apply in relation to the adjoining property and potentially the underground tube line to the north. The early involvement of a Party Wall surveyor and London Underground (if required) in the project is therefore recommended. |

For any form of development, BRD recommend that an intrusive ground investigation is undertaken in order to confirm ground conditions and allow design of the new structures. It is understood that a geotechnical investigation is proposed for the site including a cable percussive borehole to 15m depth together with two windowless sample boreholes to be forwarded up to 8m depth, excavation of seven hand dug trial pits to expose the existing foundations and the completion of one in-situ California Bearing Ratio (CBR) test.

4.2. CONSTRUCTION CONSIDERATIONS

As with any construction site, if any anomalous material is encountered during the redevelopment then expert environmental advice should be sought.

In accordance with Health and Safety Executive (HSE) guidance, a 'Refurbishment Demolition Survey' (RDS) should be undertaken to identify whether or not asbestos containing materials are present in the existing structure(s) prior to demolition or refurbishment, including the off-site heating chamber. The results of the survey should then be used to plan for the safe management, removal and disposal of asbestos containing materials from the existing buildings and infrastructure should such materials be present.

REPORT SPECIFIC REFERENCES

- 'Heritage Appraisal - 32 Torrington Square, London, WC1E 7JL', Turley Heritage, December 2016.
- 'UXO Desk Study and Risk Assessment - 32-33 Torrington Square', Zetica UXO report ref. P6813-17-R1, 4th April 2017.
- British Geological Survey sheet 256 "North London" Solid and Drift edition (1:50,000) published 2006.

SUPPORTING INFORMATION

SITE CHARACTERISTICS

The site characteristics are collated from various information sources, including but not limited to Ordnance Survey, British Geological Survey (BGS), Environment Agency (EA) and local authorities.

BRD generally commission the Landmark Information Group to produce an Envirocheck Report for study sites and where employed this is included in the Appendices. It should be noted that some of the data provided in the Envirocheck report is not considered within BRD's interpretation for the site characteristics as it is not relevant. Examples of this are:

- Nitrate Sensitive Zones and Nitrate Vulnerable Zones are ignored as these are only applicable to agricultural activities relating to the application of manure and fertilisers to land.*
- River Quality is ignored as at this preliminary stage of risk assessment as all surface water bodies are considered equally sensitive to contamination risks.*

In assessing site characteristics, BRD also consider the area within a surrounding 250m buffer zone extending from the site boundary.

HISTORY

Mapped History

The site history summarises the changes in use or layout of the site over time and is largely developed from a study of available Ordnance Survey maps. It should be noted that changes to the site may have occurred between the editions of the maps employed to assess the history of the site. Historical information of relevance within the 250m surrounding the site is also discussed in a separate section. The historical plans referred to in the text are generally included in an Appendix.

Aerial photography

As a minimum, current and historical aerial images of the site and surrounding areas are studied from the Google Earth program. Where additional historic aerial photographs have been purchased then these are referenced within the technical report.

Internet Searches

A simple search of the internet for relevant material relating to the use or history of the site is made. Information obtained from internet searches has been accepted as fact without validation by BRD except for ensuring the source is reputable. It should be recognised that due to programme and budgetary constraints the search conducted may not have revealed all the information available.

GEOLOGY

The geology of the site is assessed by reference to the relevant British Geological Survey (BGS) 1:50,000 scale sheet in *Bedrock and Superficial (historically Solid and Drift)* edition. Many of these geological maps are relatively old with superseded terminology and descriptions. BRD therefore employ the BGS Open Geoscience website to determine current nomenclature of strata and to assist in determining geological boundaries against current topographic features. BRD also employ BGS Regional Geology Guides to assist in understanding the geological context of the site.

Ground Stability Hazards

Ground stability hazards caused by mining, ground dissolution, landslide potential, collapsible ground and natural cavities are identified by the Envirocheck database search of records held by The Coal Authority, British Geological Survey and studies completed by Ove Arup and Peter Brett Associates.

The Envirocheck database ground stability hazard entries for compressible ground, running sands and shrinking or swelling clays are not discussed directly. This is because these hazards are very common and are considered within the preliminary geotechnical assessment where necessary.

Radon

Radon is a naturally occurring colourless and odourless gas that is radioactive. It is formed by the radioactive decay of radium which in turn is derived from the radioactive decay of uranium, both of which are minerals that can be found in many soil types. Whilst it is recognised that the air inside every house contains radon, some houses built in certain defined areas of the country might have unacceptably high concentrations and require special precautions to be taken during construction to reduce this risk.

Radon can move through cracks and fissures in the soil into the atmosphere or into dwellings via basements and/or underfloor voids. If radon enters the living space of dwellings its concentration can potentially increase and provide a risk to human health as the inhalation of the radioactive decay products of radon gas can increase the risk of developing lung cancer.

The maps contained within BRE211:2007 'Radon: guidance on protective measures for new buildings' identify areas where no radon protection measures are necessary or where higher concentrations are present that either basic or full radon protection measures are required to be fitted to all new dwellings. However, some local authorities have local bylaws, that BRD may not be aware of, that insist on radon protection to all new dwellings within their area regardless of the recommendations of the BRE211 Radon report.

Basic radon protection measures comprise incorporation of a continuous gas resistant membrane sealed at joints and around service entries into the floor construction and extended across the cavity tray.

Full radon protection measures comprise incorporating a continuous gas resistant membrane into the floor construction together with a ventilated sub-floor void through either the use of suspended floor construction or a 'radon sump'. The membrane is sealed at joints and around service entries into the floor and extended across the cavity tray.

BRE211 should be referred to for detail on the construction of the protective measures.

HYDROGEOLOGY

Aquifer Designations

The Environment Agency's Groundwater Protection Policy uses designations that reflect the importance of aquifers in terms of groundwater as a drinking water resource, but also their role in supporting surface water flows and wetland ecosystems.

In defining groundwater vulnerability, both the superficial (drift) deposits and bedrock (solid) geology are considered separately with the following aquifer designations:

- *Principal Aquifers: These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.*
- *Secondary Aquifers: These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:*
 - *Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.*
 - *Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.*
- *Secondary Undifferentiated - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type.*
- *Unproductive Strata: These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.*

Source Protection Zones

The Environment Agency (EA) has defined Source Protection Zones for groundwater sources, such as boreholes and springs, that are used for public water supply. The EA uses the zones to target pollution prevention measures and monitor the activities of potential polluters within the affected area. There are three types Source Protection Zone:

- *Zone 1 (Inner Protection Zone) is the most sensitive area within which pollution could reach the borehole within 50 days. Alternatively it is defined by a minimum 50m radius around the borehole.*
- *Zone 2 (Outer Protection Zone) are defined by the area within which pollution could reach the borehole within 400 days or 25% of the total catchment area.*
- *Zone 3 (Total Catchment) are defined by the total area required to support the removal of water from the borehole.*

HYDROLOGY

Flooding

The Environment Agency has zoned England and Wales in respect of the risk from flooding from 'highly unlikely' in Zone 1 to 'likely' in Zone 3. The zones ignore the presence of flood defences or certain other manmade structures and channel improvements.

National Planning Policy Framework, Department for Communities and Local Government, dated March 2012 states "A site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding".

ENVIRONMENTAL ASPECTS

Landfill

The database of the Environment Agency of active and historic landfills is searched for all sites. Sometimes additional historic landfill data is available from the British Geological Society and local authorities to identify nearby landfill sites. It should be noted that landfill sites that closed prior to 1974 and unlicensed disposal activities will not necessarily be revealed by this search.

Pollution Incidents

The Environment Agency ceased recording 'Pollution Incidents to Controlled Waters' in 2000, when they commenced the replacement 'Substantiated Pollution Incident Register'. BRD do not consider any 'Category 3 - Minor Incident' on the 'Pollution Incidents to Controlled Waters' database as relevant to assessing the site due to the time elapsed and the low level of impact that occurred. Again due to the time elapsed and the fact that remedial measures would have been undertaken at the time, 'Category 1 - Major Incident' and 'Category 2 - Significant Incident' are only considered relevant if the impacted controlled water was on or immediately adjacent to the site.

On the 'Substantiated Pollution Incident Register', BRD approach to this information in the following manner:

- Pollution incidents impacting 'air' only are not considered relevant.*
- Pollution incidents to 'water' are only considered where the surface water impacted is either on, flows through or is immediately adjacent to the site.*
- Pollution incidents to 'land' are only considered where these are on or immediately adjacent to the site unless there are grounds to consider that the incident had the potential to impact groundwater that may have migrated beneath the site.*
- Category 4 potential pollutant incidents are recorded, but upon investigation were found to have had no impact and accordingly are not considered relevant.*

Ecologically Sensitive Land Use

The land uses that are identified as ecologically sensitive are those identified as Sites of Special Scientific Interest (SSSI), Special Areas of Conservation, Special Protection Areas, Ramsar sites, Natural Parks, Natural Nature Reserves, Marine Nature Reserves, Local Nature Reserves, Green Belt, Forest Parks, Environmentally Sensitive Areas, or Areas of Outstanding Natural Beauty.

CONTAMINATION ASSESSMENT METHODOLOGY

UK Policy

The UK Government's policy in relation to land affected by historic contamination is based on a 'suitable for use' approach. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Contamination risks therefore need to be assessed on a site-by-site basis. The 'suitable for use' approach limits requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to either the current use or future use of the land.

The three main drivers for contamination assessment and remediation are:

- *Voluntary action.*
- *Development as part of the planning regime.*
- *Regulatory action to mitigate unacceptable risks e.g. Part 2A of the Environmental Protection Act 1990.*

Pollutant Linkages

For a contamination risk to exist there must be a 'pollutant linkage' from the contaminant (source) via a pathway (the route from contaminant to receptor) to a receptor (the entity that could be harmed). The absence of a contaminant, pathway or receptor breaks the pollutant linkage and therefore no contamination risk exists.

Contamination is typically present at a site (in the ground and/or in the underlying groundwater) as a result of a historic or current industrial use, usually as a result of leaks, spills or disposal of residues, wastes and excess raw materials from the industrial processes. Contamination may also be present due to:

- *The deliberate application of chemicals e.g. the spraying of herbicide/pesticide.*
- *Migration of pollutants from adjacent land.*
- *Naturally occurring processes e.g. elevated concentrations of particular heavy metals associated with specific geological strata.*

Conceptual Site Model

The conceptual site model can be defined as a textual or graphical representation of the identified pollutant linkages for a given site. The model forms the basis for designing the investigation as the aim will be to target all of the potential pollutant linkages to determine, through the subsequent phases of risk assessment, whether or not they pose an actual risk.

It is important that the conceptual site model is updated with new information as the various investigation, risk assessment and remediation works are completed.

Technical Guidance

The technical and legal framework for contamination assessment is complex. The process adopted through this report for assessing contamination risks is in general accordance with the following guidance, as listed below:

- 'Investigation of Potentially Contaminated Sites - Code of Practice - BS 10175: 2011', BSi, 2011.
- 'Model Procedures for the management of Land Contamination - CLR Document No. 11', Environment Agency, 2004.
- 'Guidance for the safe development of housing on land affected by contamination - R&D66: 2008', NHBC/Environment Agency, 2008.

Risk Assessment Methodology

In line with the technical guidance, the contamination risk assessment follows a series of phased stages for each particular site:

| PHASE | DESCRIPTION | RISK ASSESSMENT STAGE |
|---------|---|--|
| PHASE 1 | Generally limited to desk based research and a site walkover survey to develop an initial conceptual site model and identify what risks, if any, are likely to be presented by the site. | <i>Hazard Identification and Assessment</i> A preliminary stage of risk assessment concerned with identifying and characterising the hazards that may be associated with a particular site and identifying potential pollutant linkages. |
| PHASE 2 | This phase is concerned with establishing whether contamination is present, usually through intrusive ground investigation, and then evaluating the degree and magnitude of the associated risks. | <i>Risk Estimation</i> A stage concerned with estimating the likelihood that receptors will suffer adverse effects if they come into contact with, or are otherwise affected by, a hazardous substance or agent under defined conditions. <i>Risk Evaluation</i> A stage of risk assessment concerned with evaluating the acceptability of estimated risks, taking into account the nature and scale of the risk estimates, any uncertainties associated with the assessment and the broad costs and benefits of taking action to mitigate risks. |
| PHASE 3 | The appraisal and selection of remediation techniques, their implementation and verification. | <i>Risk Management</i> The process whereby decisions are made to accept a known or assessed risk and/or the implementation of action to reduce the consequences or probabilities of occurrence. |

Risk Classification

The objective of risk assessment is to identify the nature and magnitude of the potential risks and should be based on a consideration of both:

- The likelihood/probability of an event [taking into account both the presence of the hazard and receptor and the integrity of the pathway].
- The severity of the potential consequence [taking into account both the potential severity of the hazard and the sensitivity of the receptor].

There is a need for a logical, transparent and repeatable system in defining the categories of severity of consequence and likelihood as well as for the risk itself and therefore the following risk rating matrix is employed:

| | | SEVERITY OF CONSEQUENCE | | | |
|-------------|-----------------|-------------------------|-------------------|-------------------|-------------------|
| | | SEVERE | MEDIUM | MILD | MINOR |
| PROBABILITY | HIGH LIKELIHOOD | Very High Risk | High Risk | Moderate Risk | Moderate/Low Risk |
| | LIKELY | High Risk | Moderate Risk | Moderate/Low Risk | Low Risk |
| | LOW LIKELIHOOD | Moderate Risk | Moderate/Low Risk | Low Risk | Negligible Risk |
| | UNLIKELY | Moderate/Low Risk | Low Risk | Negligible Risk | Negligible Risk |

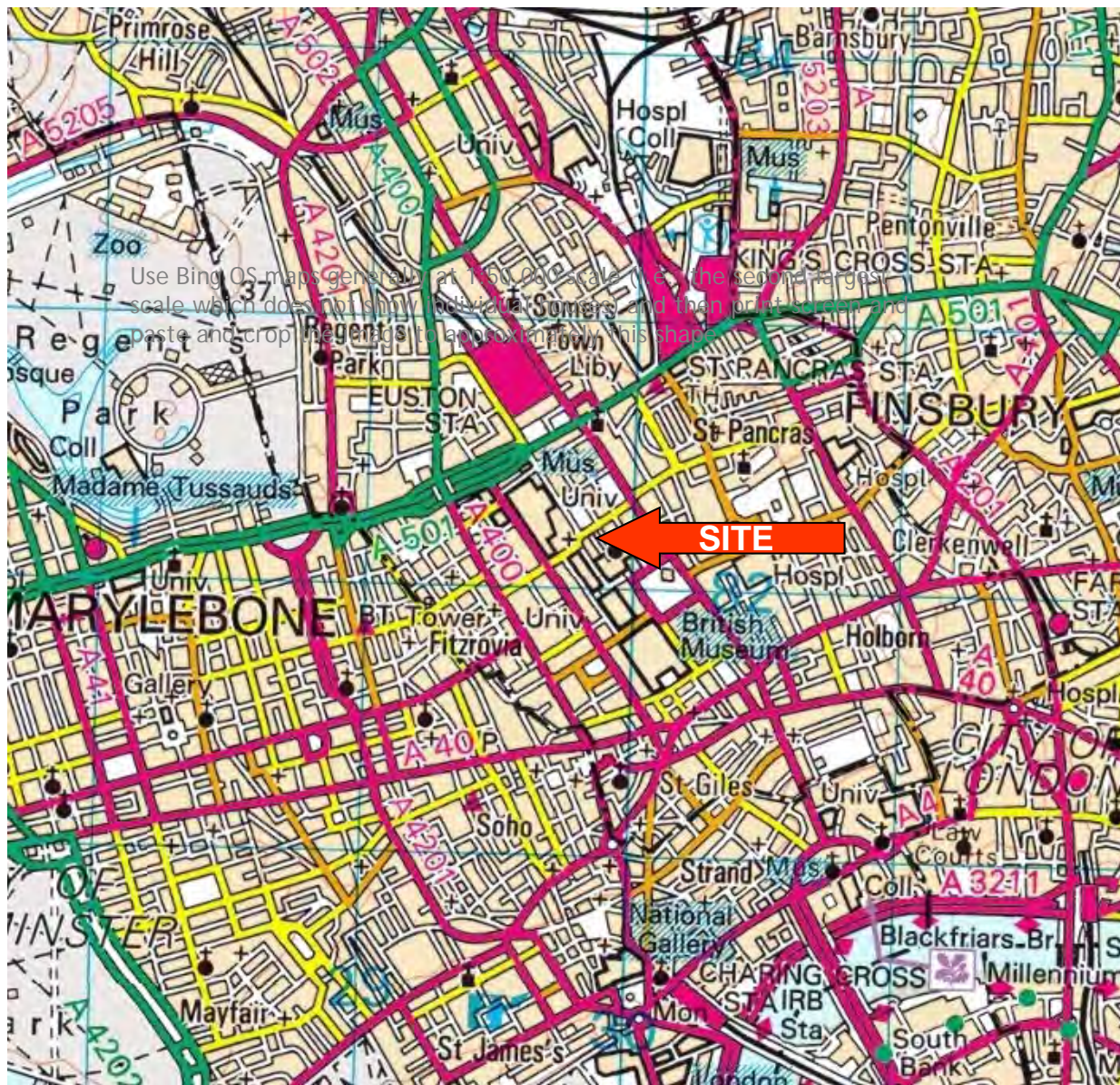
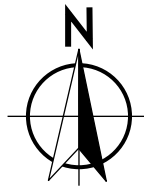
These risk classifications are defined as follows:

- **Very High Risk** - There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **High Risk** - Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **Moderate Risk** - It is possible that without appropriate remediation action harm could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
- **Low Risk** - It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at worst if any harm was realised any effects would be mild.
- **Negligible Risk** - The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

This preliminary risk assessment matrix and classification system is based on guidance produced by Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency in connection with contaminated land assessment.

APPENDIX 1

Site Location Plan



Reproduced by permission of Ordnance Survey® on behalf of The Controller of Her Majesty's Stationery Office.

© Crown copyright. All rights reserved. Licence number WL6195.

Not to scale.

Project Title: 32-33 Torrington Square, London
Client: Birkbeck University of London
BRD Reference: BRD2903-OP1-A
Date Issued: April 2017



01295 272244
info@brduk.com

Site Walkover Photographs



Plate 1:
Frontage of No
32 Torrington
Square.



Plate 2: Access ramp section
of the site with metal access
gates.

Project Title: 32-33 Torrington Square, London
Client: Birkbeck University of London
BRD Reference: BRD2903-OP2-A
Date Issued: April 2017

Site Walkover Photographs

Plate 3: North western section of site with access ramp and lower area.



Plate 4: Lower section along north western boundary.

Site Walkover Photographs

Plate 5: Light well at south western corner of the site.



Plate 6: Enclosed courtyard garden area to the rear of No. 32.

Site Walkover Photographs

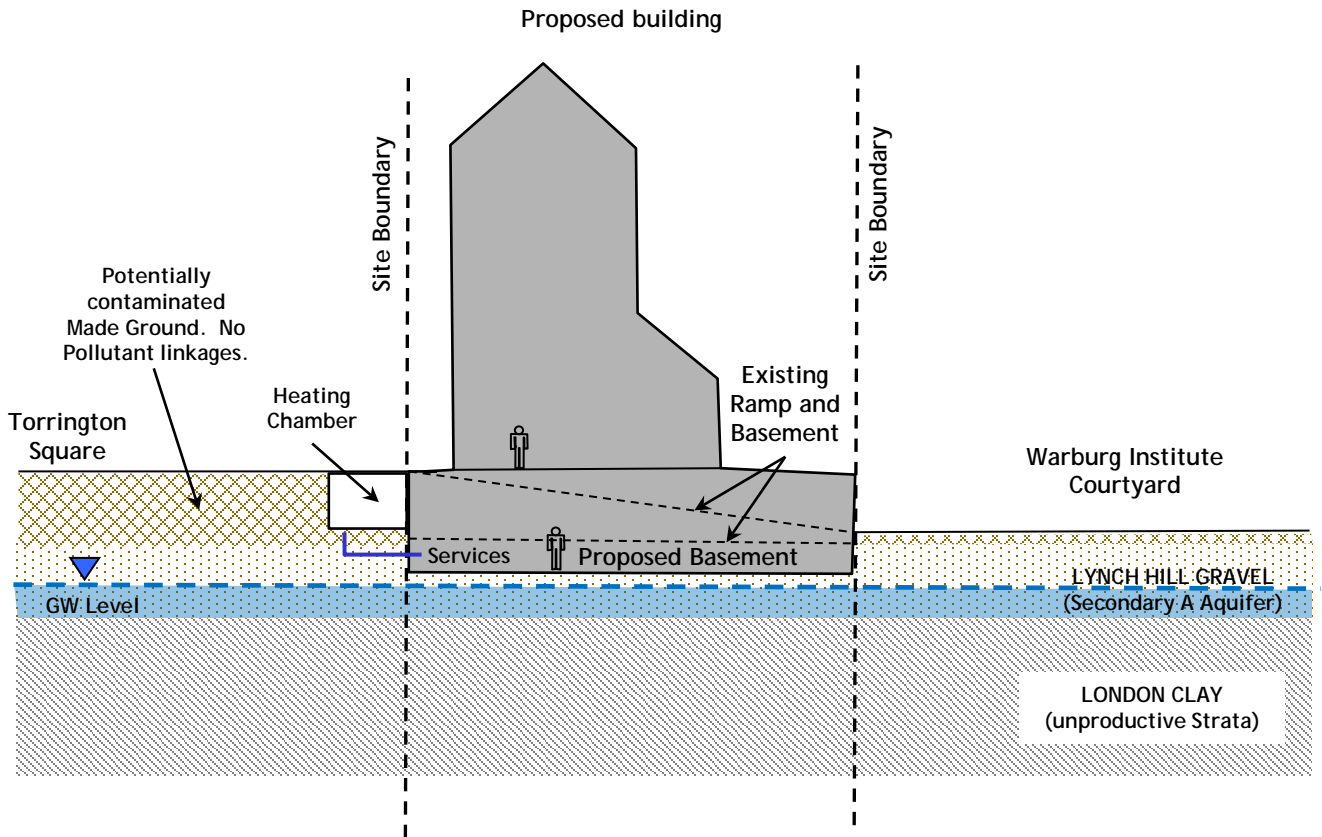


Plate 7: Hallway and offices / labs within basement.

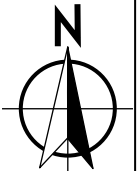
Plate 8: Stairwell down to the basement.



Initial Conceptual Model



Potential Contaminated Made Ground beneath ramp, but this will be removed as part of the basement construction.



Project Title: 32-33 Torrington Square, London
 Client: Birkbeck University of London
 BRD Reference: BRD2903-OP3-A
 Date Issued: April 2017

APPENDIX 2

Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500

Quarry **Gravel Pit** **Sand Pit**
Clay Pit **Shingle** **Refuse Heap**
Sloping Masonry **Flat Rock**
Marsh **Reeds** **Osiers**
Rough Pasture **Furze** **Wood**
Mixed Wood **Brushwood** **Orchard**
Fir **Ford** **Stepping Stones**
Ferry **Waterfall** **Lock**
Trig. Station **Altitude at Trig. Station**
B.M. 325.9 **Bench Mark** **Surface Level**
Arrow denotes flow of water **Antiquities (site of)**
Cutting **Embankment**
Railway crossing Road **Level Crossing** **Road crossing Railway**
Railway crossing River or Canal **Road over single stream** **Road over River or Canal**
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
County Borough Boundary (England)
County Burgh Boundary (Scotland)
Co. Boro. Bdy.
Co. Burgh Bdy.
BP BS Boundary Post or Stone **P.C.B** Police Call Box
B.R. Bridle Road **P** Pump
E.P Electricity Pylon **S.P** Signal Post
F.B. Foot Bridge **Sl** Sluice
F.P. Foot Path **Sp.** Spring
G.P Guide Post or Board **T.C.B** Telephone Call Box
M.S Mile Stone **Tr.** Trough
M.P M.R Mooring Post or Ring **W** Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250

Inactive Quarry, Chalk Pit or Clay Pit **Active Quarry, Chalk Pit or Clay Pit**
Rock **Boulders**
Cliff **Slopes** **Top**
Roofed Building **Glazed Roof Building**
Sloping Masonry **Archway**
Non-Coniferous Tree (surveyed) **Coniferous Tree (surveyed)**
Non-Coniferous Trees (not surveyed) **Coniferous Trees (not surveyed)**
Orchard Tree **Scrub** **Bracken**
Coppice, Osier **Reeds** **Marsh, Saltings**
Rough Grassland **Heath** **Culvert**
Direction of water flow **Bench Mark** **Antiquity (site of)**
Cave Entrance **Triangulation Station** **Electricity Pylon**
Electricity Transmission Line
County Boundary (Geographical)
County & Civil Parish Boundary
Civil Parish Boundary
Admin. County or County Bor. Boundary
London Borough Boundary
Symbol marking point where boundary mereing changes
BH Beer House **P** Pillar, Pole or Post
BP, BS Boundary Post or Stone **PO** Post Office
Cn, C Capstan, Crane **PC** Public Convenience
Chy Chimney **PH** Public House
D Fn Drinking Fountain **Pp** Pump
EI P Electricity Pillar or Post **SB, S Br** Signal Box or Bridge
FAP Fire Alarm Pillar **SP, SL** Signal Post or Light
FB Foot Bridge **Spr** Spring
GP Guide Post **Tk** Tank or Track
H Hydrant or Hydraulic **TCB** Telephone Call Box
LC Level Crossing **TCP** Telephone Call Post
MH Manhole **Tr** Trough
MP Mile Post or Mooring Post **Wr Pt, Wr T** Water Point, Water Tap
MS Mile Stone **W** Well
NTL Normal Tidal Limit **Wd Pp** Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250

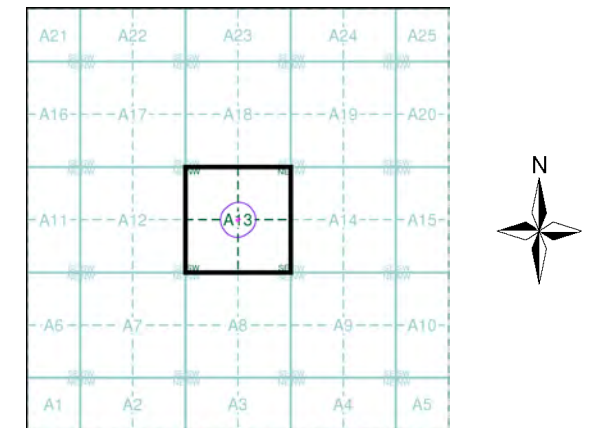
Cliff **Slopes** **Top**
Rock **Rock (scattered)**
Boulders **Boulders (scattered)**
Positioned Boulder **Scree**
Non-Coniferous Tree (surveyed) **Coniferous Tree (surveyed)**
Non-Coniferous Trees (not surveyed) **Coniferous Trees (not surveyed)**
Orchard Tree **Scrub** **Bracken**
Coppice, Osier **Reeds** **Marsh, Saltings**
Rough Grassland **Heath** **Culvert**
Direction of water flow **Triangulation Station** **Antiquity (site of)**
Electricity Transmission Line **Electricity Pylon**
B.M. 231.60m Bench Mark **Buildings with Building Seed**
Roofed Building **Glazed Roof Building**
Civil parish/community boundary
District boundary
County boundary
Boundary post/stone
Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)
Bks Barracks **P** Pillar, Pole or Post
Bty Battery **PO** Post Office
Cemy Cemetery **PC** Public Convenience
Chy Chimney **Pp** Pump
Cis Cistern **Ppg Sta** Pumping Station
Dismtd Rly Dismantled Railway **PW** Place of Worship
EI Gen Sta Electricity Generating Station **Sewage Ppg Sta** Sewage Pumping Station
EI P Electricity Pole, Pillar **SB, S Br** Signal Box or Bridge
EI Sub Sta Electricity Sub Station **SP, SL** Signal Post or Light
FB Filter Bed **Spr** Spring
Fn / D Fn Fountain / Drinking Ftn. **Tk** Tank or Track
Gas Gov Gas Valve Compound **Tr** Trough
GVC Gas Governor **Wd Pp** Wind Pump
GP Guide Post **Wr Pt, Wr T** Water Point, Water Tap
MH Manhole **Wks** Works (building or area)
MP, MS Mile Post or Mile Stone **W** Well



Historical Mapping & Photography included:

| Mapping Type | Scale | Date | Pg |
|--|---------|-------------|----|
| London | 1:2,500 | 1875 - 1878 | 2 |
| London | 1:2,500 | 1896 | 3 |
| London | 1:2,500 | 1916 | 4 |
| Historical Aerial Photography | 1:1,250 | 1948 - 1949 | 5 |
| Ordnance Survey Plan | 1:1,250 | 1952 - 1953 | 6 |
| Ordnance Survey Plan | 1:2,500 | 1953 - 1954 | 7 |
| Additional SIMs | 1:2,500 | 1954 - 1965 | 8 |
| Ordnance Survey Plan | 1:1,250 | 1958 - 1966 | 9 |
| Additional SIMs | 1:1,250 | 1958 - 1990 | 10 |
| Ordnance Survey Plan | 1:2,500 | 1965 - 1970 | 11 |
| Ordnance Survey Plan | 1:1,250 | 1966 - 1977 | 12 |
| Ordnance Survey Plan | 1:1,250 | 1973 - 1987 | 13 |
| Supply of Unpublished Survey Information | 1:1,250 | 1973 - 1976 | 14 |
| Additional SIMs | 1:1,250 | 1982 - 1986 | 15 |
| Large-Scale National Grid Data | 1:1,250 | 1991 | 16 |
| Large-Scale National Grid Data | 1:1,250 | 1992 - 1995 | 17 |
| Large-Scale National Grid Data | 1:1,250 | 1995 | 18 |
| Large-Scale National Grid Data | 1:1,250 | 1996 | 19 |
| Historical Aerial Photography | 1:2,500 | 1999 | 20 |

Historical Map - Segment A13



Order Details

Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



London

Published 1875 - 1878

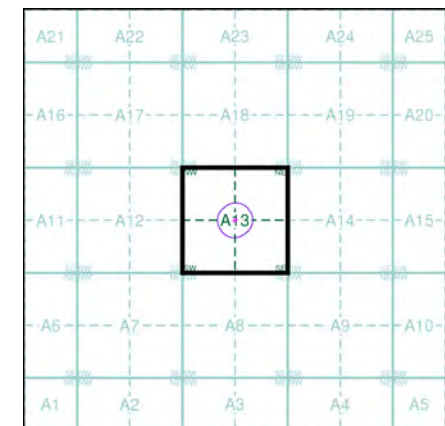
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

| | |
|---------------------------|---------------------------|
| 025_00 1876 1:2,500 | 026_00 1877 1:2,500 |
| 034_00 1875 1:2,500 | 035_00 1878 1:2,500 |

Historical Map - Segment A13



Order Details

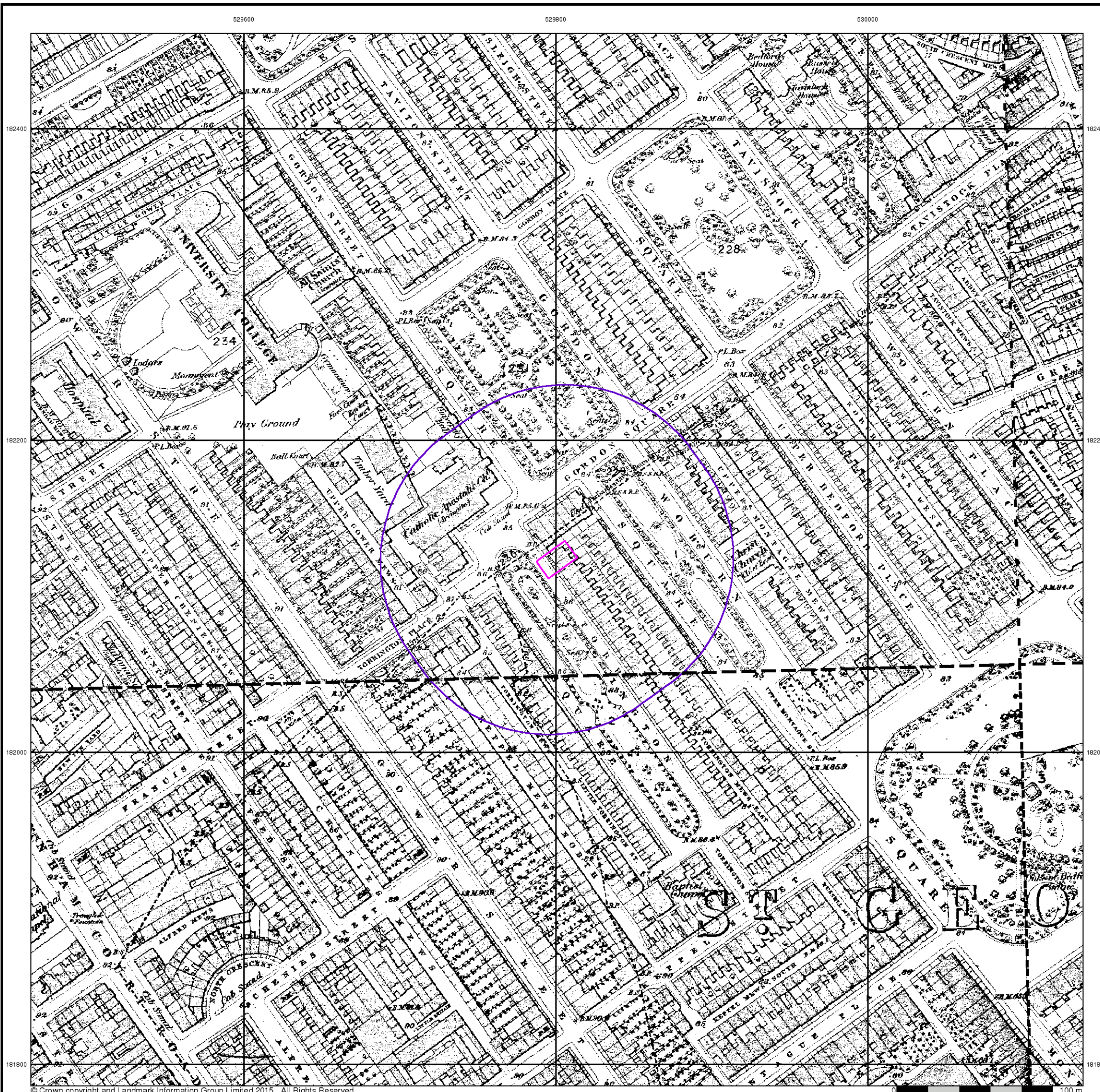
Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk





London

Published 1896

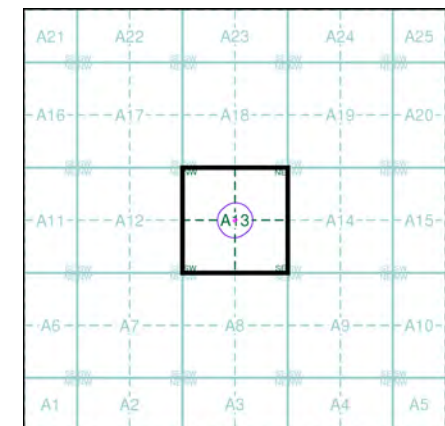
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

| | |
|---------------------------|---------------------------|
| 049_00 1896 1:2,500 | 050_00 1896 1:2,500 |
| 061_00 1896 1:2,500 | 062_00 1896 1:2,500 |

Historical Map - Segment A13



Order Details

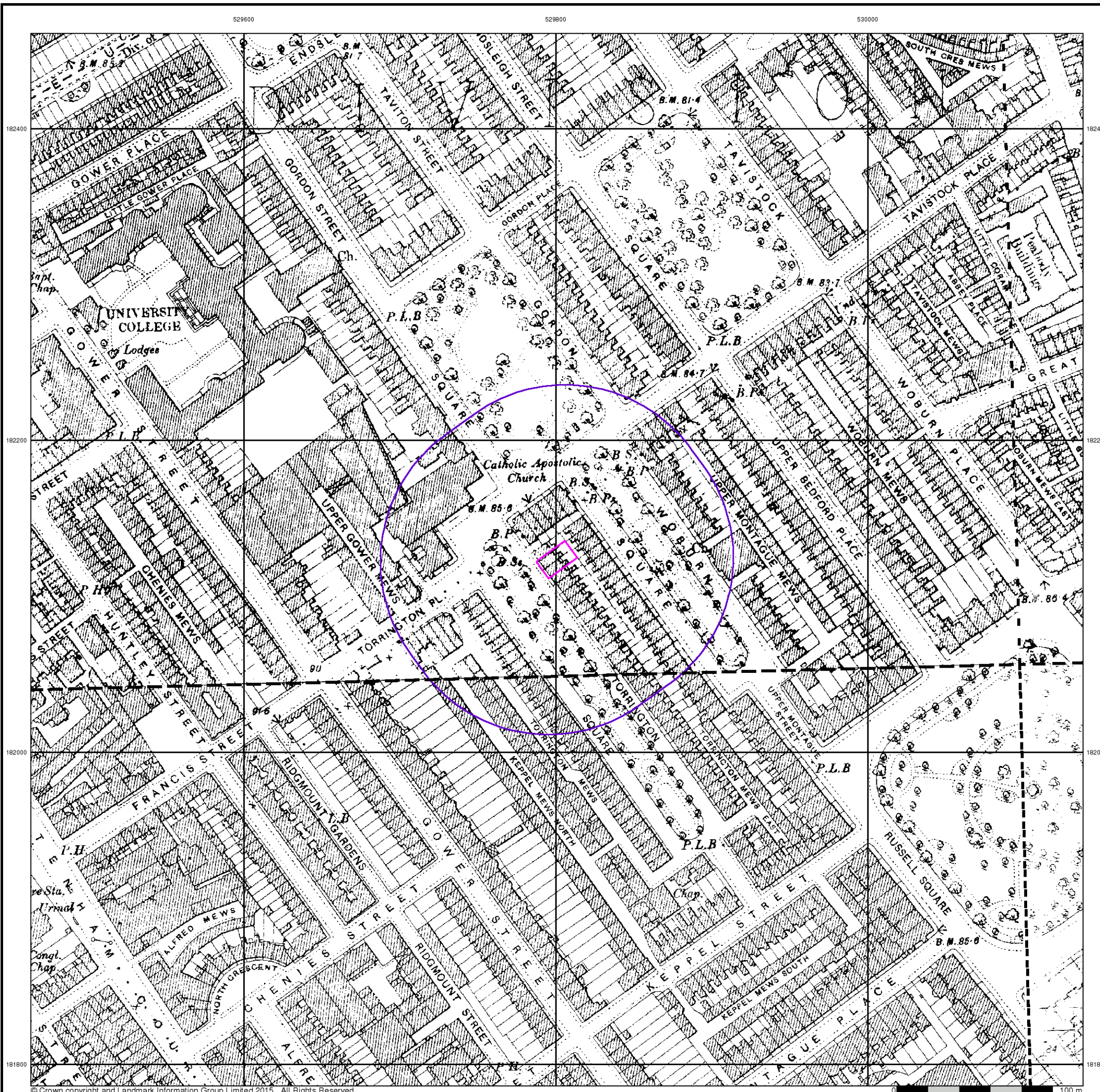
Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk





London

Published 1916

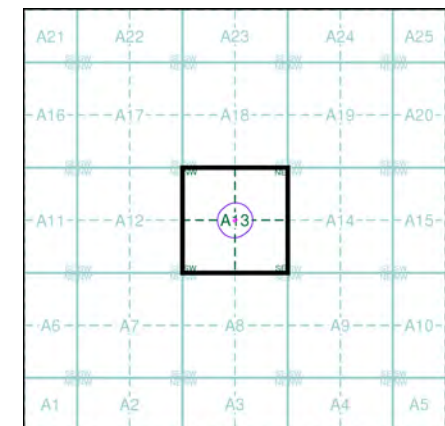
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

| | |
|---------------------------|---------------------------|
| 005_05 1916 1:2,500 | 005_06 1916 1:2,500 |
| 005_09 1916 1:2,500 | 005_10 1916 1:2,500 |

Historical Map - Segment A13



Order Details

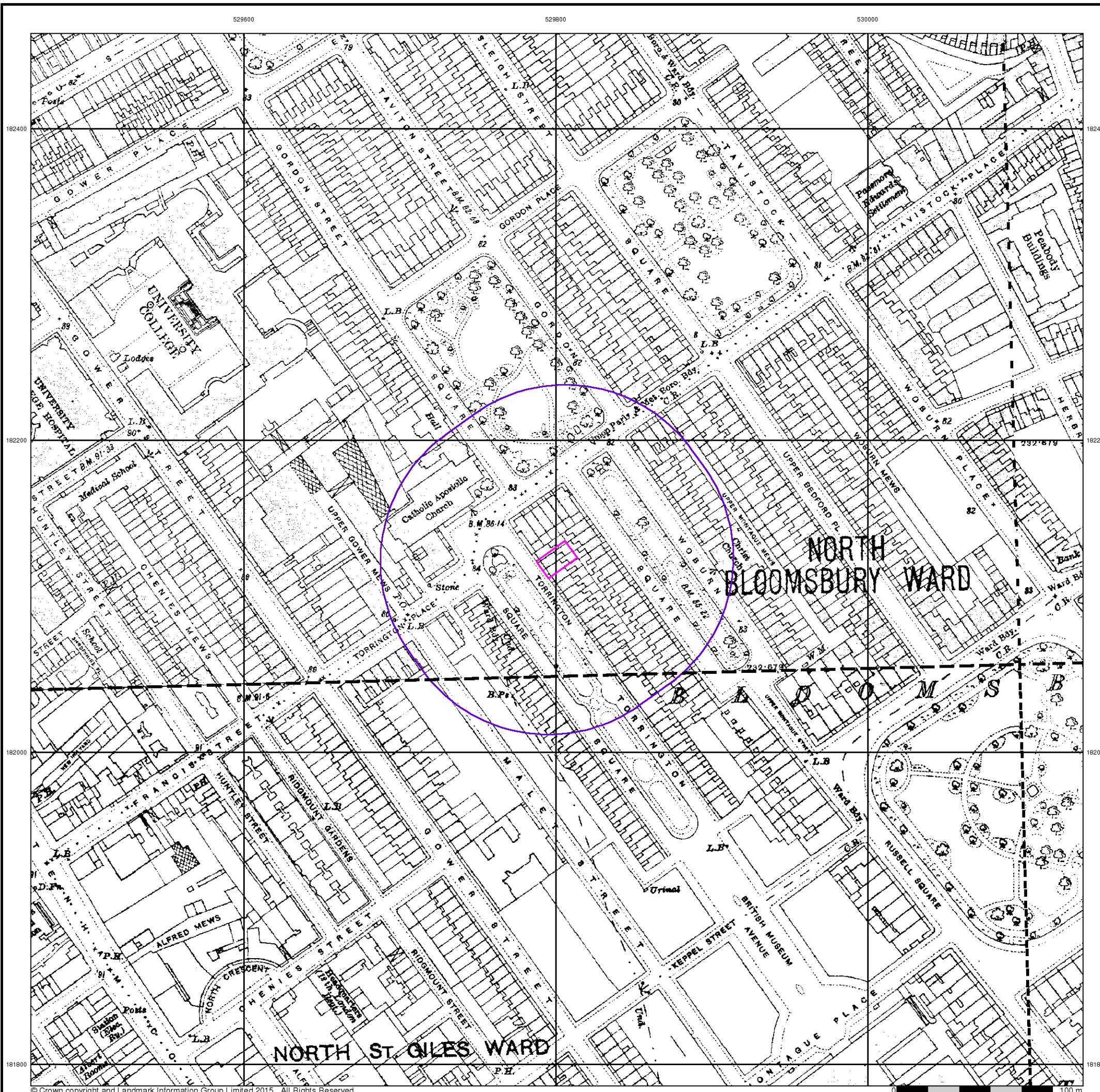
Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk





Historical Aerial Photography

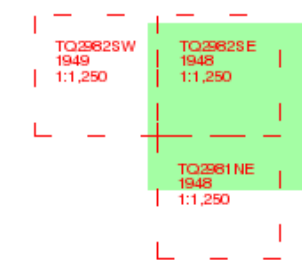
Published 1948 - 1949

Source map scale - 1:1,250

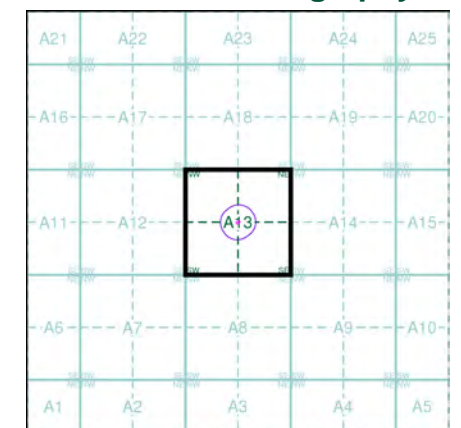
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

© THE BRITISH LIBRARY BOARD. ALL RIGHTS RESERVED. Licence No:8048

Map Name(s) and Date(s)



Historical Aerial Photography - Segment A13



Order Details

Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL

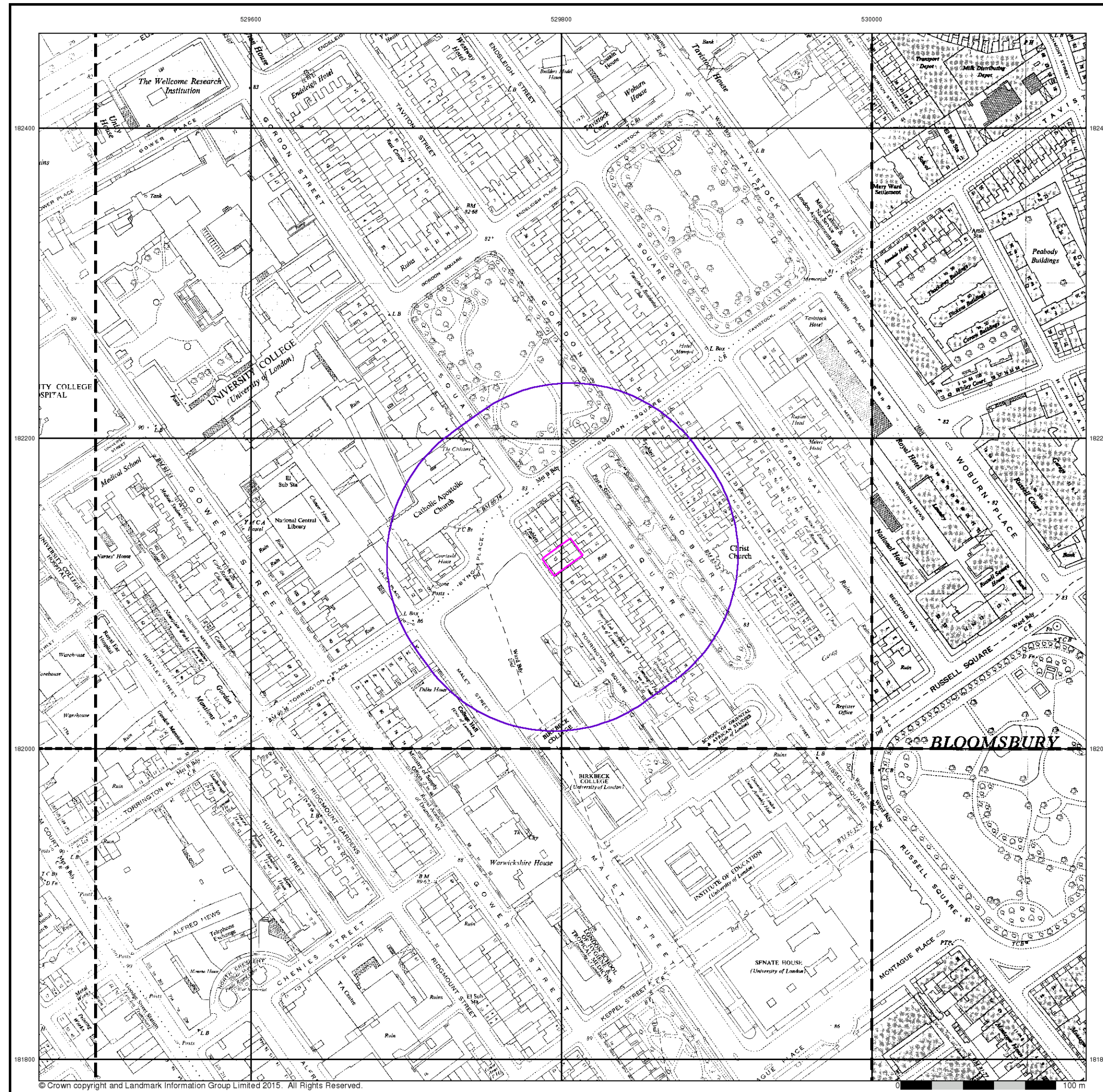


Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



© THE BRITISH LIBRARY BOARD. ALL RIGHTS RESERVED. Licence No:8048

0 100 m



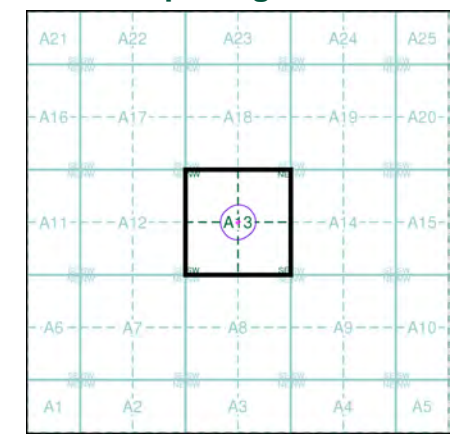
Ordnance Survey Plan
Published 1952 - 1953
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

| | | |
|-----------------------------|-----------------------------|-----------------------------|
| TQ2982SW 1953 1:1,250 | TQ2982SE 1953 1:1,250 | TQ3082SW 1953 1:1,250 |
| TQ2981NW 1953 1:1,250 | TQ2981NE 1953 1:1,250 | TQ3081NW 1952 1:1,250 |

Historical Map - Segment A13



Order Details

Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk

529600

529800

530000



Ordnance Survey Plan

Published 1953 - 1954

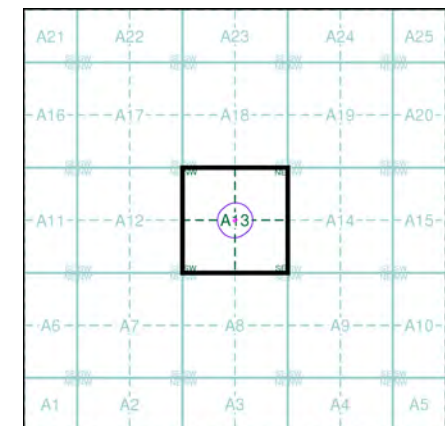
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

| | |
|---------------------------|---------------------------|
| TQ2982 1954 1:2,500 | TQ3082 1954 1:2,500 |
| TQ2981 1954 1:2,500 | TQ3081 1953 1:2,500 |

Historical Map - Segment A13



Order Details

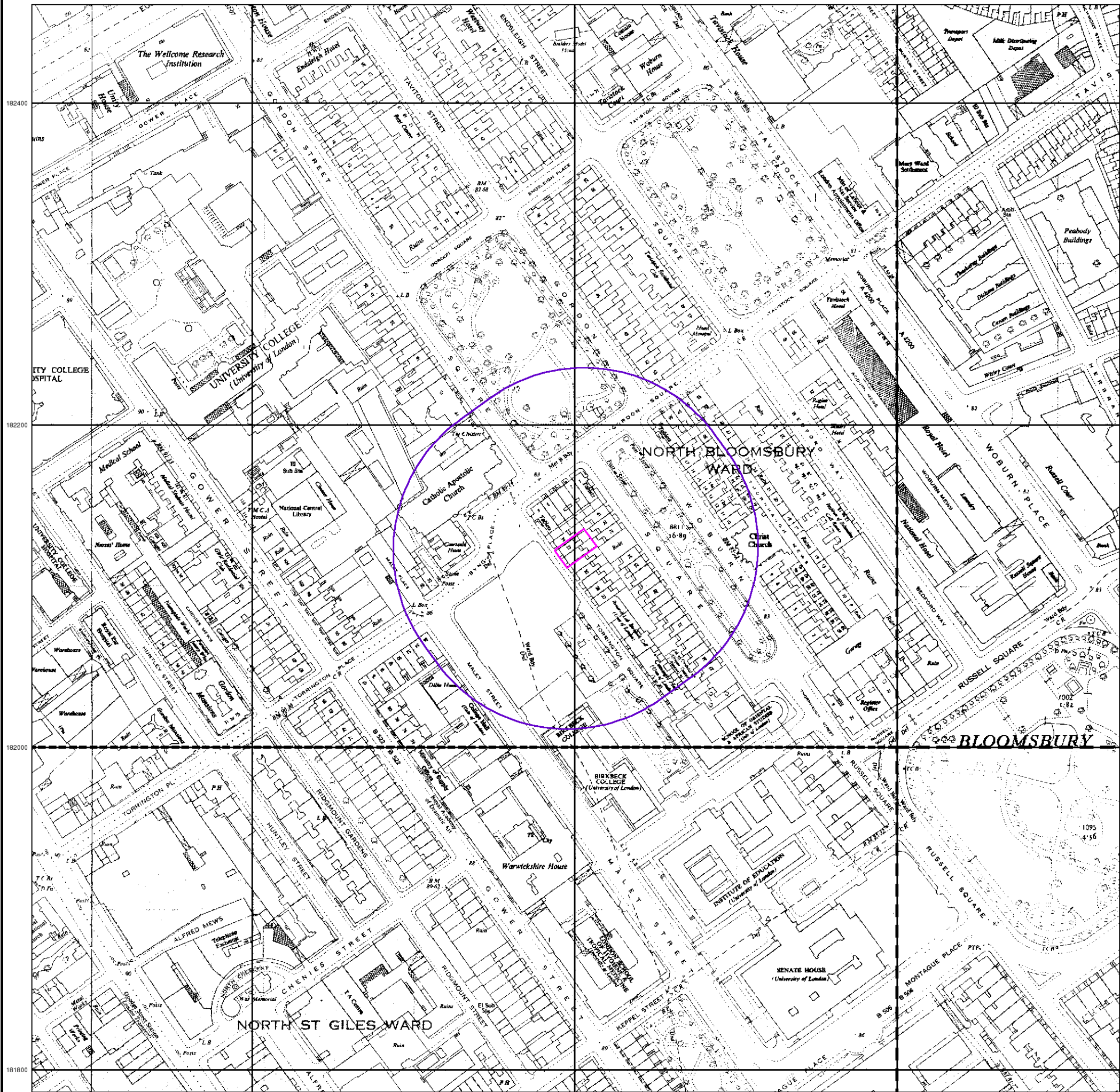
Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

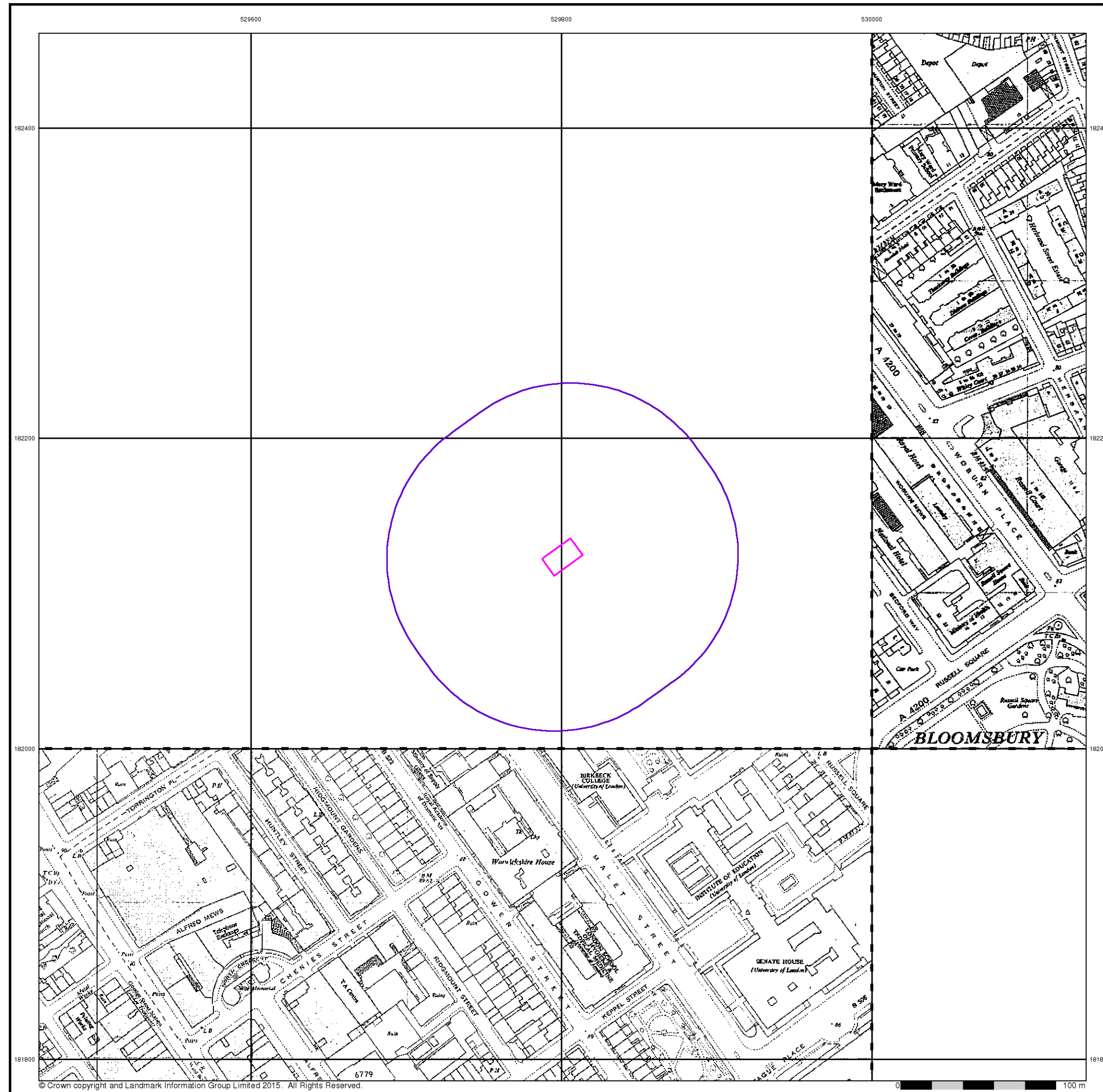
Site Details

Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk

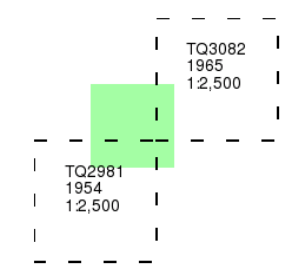




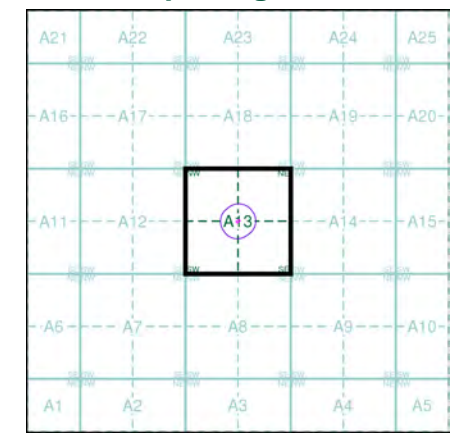
Additional SIMs
Published 1954 - 1965
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details
 Order Number: 119760713_1_1
 Customer Ref: BRD2903
 National Grid Reference: 529800, 182120
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details
 Centre for Brain & Cognitive Development, Birkbeck College,
 32, Torrington Square, LONDON, WC1E 7JL