Appendix D – GEA Geotechnical Report

SITE INVESTIGATION & BASEMENT IMPACT ASSESSMENT REPORT

4 Wedderburn Road
London NW3

Client: Amanda Shorthouse

Engineer: Heyne Tillett Steel

J14267

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EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Heyne Tillett Steel, on behalf of Amanda Shorthouse, with respect to the proposed deepening and extending of the existing basement beneath the footprint of the entire house and into most of the rear garden; the proposed basement will extend to depths of 4.00 m and 6.00 m. The purpose of the investigation has been to research the history of the site with respect to possible contaminative uses, to determine the ground conditions and hydrogeology, to assess the extent of any contamination and to provide information to assist with the design of suitable foundations and retaining walls. The report also includes information required to comply with the London Borough of Camden (LBC) Planning Guidance CPG4, relating to the requirement for a Basement Impact Assessment (BIA).

SITE HISTORY

The site was first developed with the existing house at some time between 1896 and 1915 and has since remained unchanged. The desk study has not indicated the site or surrounding area to have had a contaminative history.

GROUND CONDITIONS

The investigation has confirmed the expected ground conditions in that, below a moderate thickness of made ground, the Claygate Member was encountered overlying the London Clay, which was proved to the full depth investigated of 20.00 m. The made ground extended to depths of between 0.40 m and 1.00 m and generally comprised brown clayey sand or silty sandy clay with occasional fragments of brick and burnt coal. Soils interpreted as the Claygate Member were found to extend to a depth of 4.00 m and generally comprised firm orange-brown mottled greenish grey silty sandy clay, overlying firm grey silty sandy clay, which was locally softened in the presence of water. The underlying London Clay initially comprised an upper weathered layer of firm brown mottled grey silty fissured clay with occasional partings of orange-brown fine sand and silt, which extended to a depth of 5.00 m. Below this depth firm becoming stiff grey silty fissured clay with rare partings of grey fine sand and silt and rare shell fragments was encountered and proved to the maximum depth investigated of 20.00 m.

Desiccation of the clay was encountered in the vicinity of existing trees to a maximum depth of about 2.5 m.

Groundwater was only encountered during drilling from within the Claygate Member and London Clay. Subsequent monitoring has measured groundwater at depths of between 1.12 m and 2.05 m (99.92 m TBM and 95.67 m TBM).

Contamination testing has revealed marginally elevated concentrations of lead within two samples of made ground.

RECOMMENDATIONS

Based on the observations to date, groundwater is expected to be encountered within the basement excavations and therefore a secant bored pile wall is likely to be the most appropriate means of supporting the basement excavation. Spread foundations excavated from basement level to bear within the Claygate Member or London Clay may be designed to provide an allowable bearing pressure of 120 kN/m^2, provided that groundwater inflows can be sufficiently controlled, or alternatively piles could also be used for the support of the structural loads. Excavations for the proposed basement structure will require support to maintain stability and prevent any excessive ground movements. The stability of neighbouring structures will need to be ensured at all times and the retaining walls will need to be designed to accommodate the loads from these foundations unless they are underpinned.

The made ground will be removed by the basement construction and there will therefore be no risk to end users unless any of the excavated material is to be re-used in a reinstated garden above the basement. If this is proposed there is likely to be a requirement for testing of the retained soil.

BASEMENT IMPACT ASSESSMENT

The BIA has not indicated any concerns with regard to the effects of the proposed basement on the site and surrounding area.

It has been concluded that the impacts identified can be mitigated by appropriate design and standard construction practice. An assessment of ground movements is currently in hand and will be reported as an addendum.

Part 1: INVESTIGATION REPORT

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by Heyne Tillett Steel, on behalf of Amanda Shorthouse, to carry out a desk study and ground investigation at 4 Wedderburn Road, London, NW3 5QE. This report also includes a Basement Impact Assessment (BIA), which has been carried out in support of a planning application.

In addition a ground movement analysis is currently underway and will be reported as a separate report.

1.1 Proposed Development

It is proposed to construct a single level basement beneath the existing house and most of the rear garden. This will involve deepening the existing basement by about 1.70 m and extending it beneath the entire footprint of the existing house. The proposed new basement will extend to a depth of about 4.00 m below the existing house, but below the rear garden the basement will be deepened to 6.00 below existing ground level with a reinstated garden above.

This report is specific to the proposed development and the advice herein should be reviewed if the proposals are amended.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- to check the history of the site and surrounding areas with respect to previous contaminative uses;
- to determine the ground conditions and their engineering properties;
- to assess the possible impact of the proposed development on the local hydrogeology;
- to provide advice with respect to the design of suitable foundations and retaining walls;
- to provide an indication of the degree of soil contamination present; and
- to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

In order to meet the above objectives, a desk study was carried out, followed by a ground investigation. The desk study comprised:

- a review of readily available geological and hydrogeological maps;

- a review of historical Ordnance Survey (OS) maps and environmental searches sourced from the Envirocheck database; and
- a walkover survey of the site carried out in conjunction with the fieldwork.

In light of the desk study, an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- a single cable percussion borehole, advanced to a depth of 20.0 m beneath the front driveway, by means of a dismantlable cable percussion drilling rig;
- standard penetration tests (SPTs), carried out at regular intervals in the borehole, to provide quantitative data on the strength of the soils;
- three drive-in window sampler boreholes advanced to depths of 7.00 m;
- installation of three groundwater monitoring standpipes, to depths of between 6.40 m and 10.00 m and two subsequent groundwater monitoring visits carried out to date;
- laboratory testing of selected soil samples for geotechnical purposes and for the presence of contamination; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

The report includes a contaminated land assessment which has been undertaken in accordance with the methodology presented in Contaminated Land Report (CLR) 11[1] and involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. The risk assessment is thus divided into three stages comprising Preliminary Risk Assessment, Generic Quantitative Risk Assessment, and Site-Specific Risk Assessment.

1.3.1 Basement Impact Assessment

The work carried out also includes a Hydrological and Hydrogeological Assessment and Land Stability Assessment (also referred to as Slope Stability Assessment), all of which form part of the BIA procedure specified in the London Borough of Camden (LBC) Planning Guidance CPG4[2] and their Guidance for Subterranean Development[3] prepared by Arup. The aim of the work is to provide information on surface water, land stability and groundwater and in particular to assess whether the development will affect neighbouring properties or groundwater movements and whether any identified impacts can be appropriately mitigated by the design of the development.

1.3.2 Qualifications

The land stability element of the Basement Impact Assessment (BIA) has been carried out by Martin Cooper, a BEng in Civil Engineering, a chartered engineer (CEng), member of the Institution of Civil Engineers (MICE), and Fellow of the Geological Society (FGS) who has over 20 years' specialist experience in ground engineering. The subterranean (groundwater) flow assessment has been carried out by John Evans, MSc in Hydrogeology, Chartered Geologist (CGeol) and Fellow of the Geological Society of London (FGS). The surface water

1 *Model Procedures for the Management of Land Contamination* issued jointly by the Environment Agency and the Department for Environment, Food and Rural Affairs (DEFRA) Sept 2004
2 London Borough of Camden Planning Guidance CPG4 *Basements and lightwells*
3 Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development.* For London Borough of Camden November 2010

and flooding assessment has been carried out by Rupert Evans, a hydrologist with more than ten years consultancy experience in flood risk assessment, surface water drainage schemes and hydrology / hydraulic modelling. Rupert Evans is a Chartered Environmentalist, Chartered Water and Environmental Manager and a Member of CIWEM.

The assessments have been made in conjunction with Steve Branch, a BSc in Engineering Geology and Geotechnics, MSc in Geotechnical Engineering, a chartered geologist (CGeol) and Fellow of the Geological Society (FGS) with over 25 years' experience in geotechnical engineering and engineering geology.

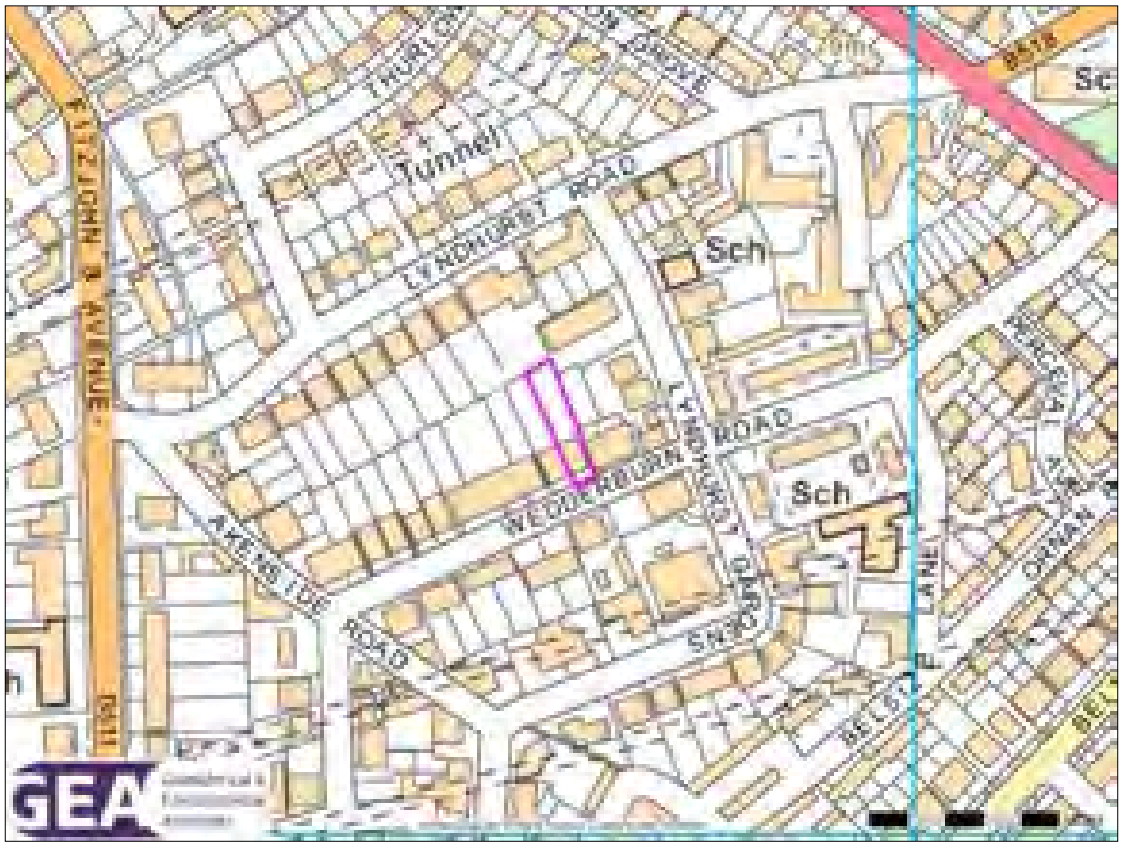
All assessors meet the qualification requirements of the Council guidance.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted and the number of locations where the ground was sampled. No liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

2.1 Site Description



The site is located in a residential area in the London Borough of Camden, to the south of Hampstead Village, approximately 630 m to the northwest of Belsize Park London Underground Station. It fronts onto Wedderburn Road to the south and is adjoined to the west by a three-storey semi-detached brick house plus roof accommodation, which is assumed to have a similar basement footprint to No 4 Wedderburn. It is bordered to the east by the apartment block of 2 Wedderburn Road, known as 'Andrew Court', which is cut into the slope, such that it comprises five-storeys at the front and four-storeys at the rear and is bounded to the north and northeast by the rear gardens of Nos 22 and 17 Lyndhurst Gardens, respectively. The site may additionally be located by National Grid Reference 526810, 185220 and is shown on the map extract above.

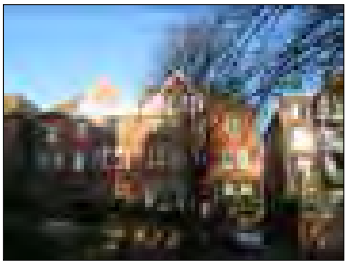
A walkover of the site was carried out by a geotechnical engineer from GEA at the time of the fieldwork. The site is rectangular in shape and measures approximately 60 m north-south by 12 m east-west. The local topography slopes down towards the south, as does the site from about 103 m TBM to roughly 98 m TBM and the site is on a number of different levels to accommodate the change in the slope. A section through the site, provided by the consulting engineers is shown below.

The site is currently occupied by a three-storey semi-detached brick house plus roof accommodation, single storey rear extension and single level basement, located beneath the central eastern part of the house. The current basement extends to a depth of about 2.30 m (97.69 m TBM) below existing ground floor level. At the front of the house there are steps leading up from pavement level (97.76 m TBM), which equates to about 80 m OD, to a raised front garden and front door at raised ground floor level at 100 m TBM.

A driveway is located in the southeastern corner at the front of the house, located at the same level as the pavement, with retaining walls on three sides to support the surrounding higher ground. There are steps from the driveway which lead up to a passageway along the eastern elevation of the existing house to the rear garden.

The rear garden is terraced and is on four levels, with a patio along the northern elevation at ground floor level at 100.00 m TBM. Steps lead up to two levelled terraced areas of lawn with tree and shrub borders at levels of 101.43 m TBM and 102.01 m TBM with the highest level at 103.15 m TBM, which comprises dense vegetation.

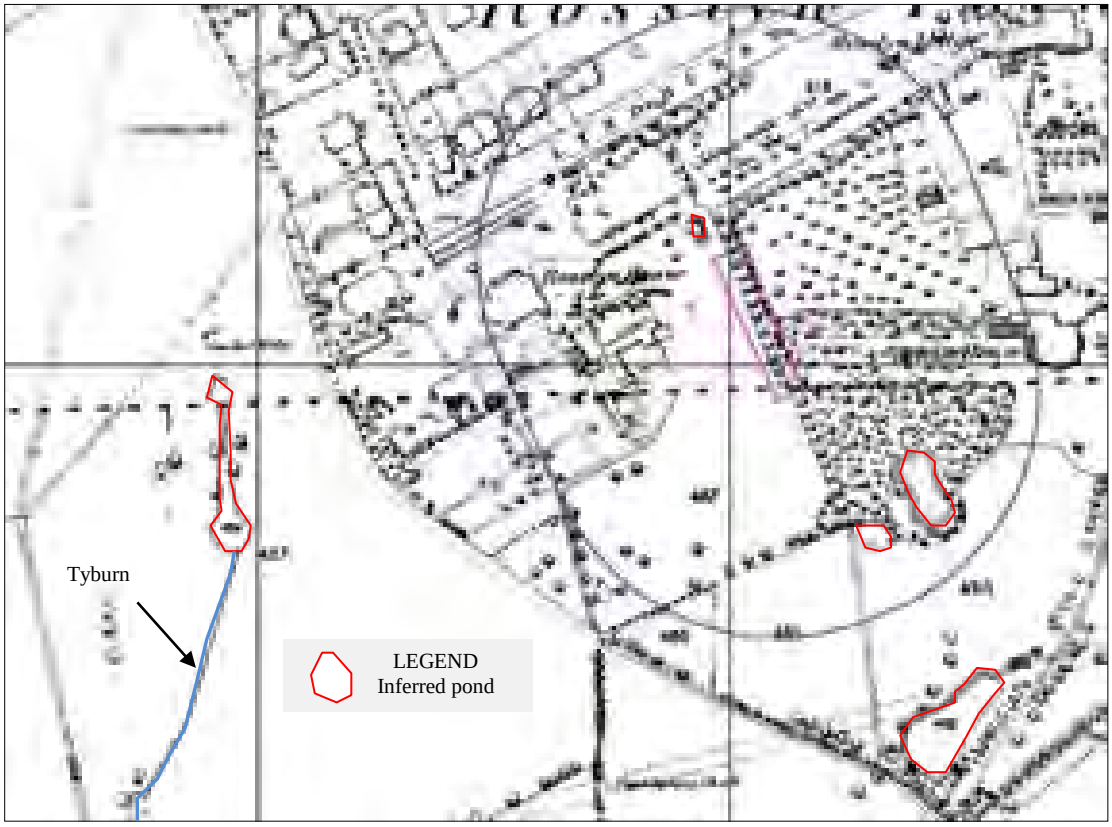
Numerous trees are present along the perimeters.


2.2 Site History

The site history has been researched by reference to internet sources and historical Ordnance Survey (OS) maps obtained from the Envirocheck database.

At the time of the earliest historical map studied, dated 1871, five features that may be inferred as ponds were located within 200 m of the site. The inferred pond features have been annotated on the historical OS map extract below for clarity and a brief summary of each pond is described in the table below.



Location of inferred pond	History
30 m to the NNW of the northern boundary of the site	By 1896 a building was constructed over the entire footprint of the pond.
60 m to the SSE of the southern boundary of the site within boundary of No 11 Lyndhurst Gardens	Pond no longer shown by time of 1896 map. An extension built at some time between1935 and 1954 along the southern elevation of No 11 Lyndhurst Gardens would have been constructed over part of pond. At some time between 1970 and 1979 No 11 Lyndhurst Gardens was demolished and replaced with the Marie Curie Hospital, which was built over the entire footprint of pond Nos 2 and 3.
60 m to the SE is a cutting within which are three circular features, which may represent ponds within boundary of No 11 Lyndhurst Gardens	Pond no longer shown by time of 1896 map, but built on at some time between 1970 and 1979 with Marie Curie Hospital.
150 m to the SSE of the southern boundary of the site, labelled on the map as 492.	Pond no longer shown by time of 1896 map, but never built on. Former pond appears to have been infilled and is located in the rear gardens of houses fronting onto Lyndhurst Gardens.

Location of inferred pond	History
200 m to the west of the site, labelled as 436 on the map.	This pond (436) was fed by a spring which is annotated on the map as Conduit Wells and is the headwaters of the western branch of the River Tyburn tributary and flows in a roughly southerly direction. By 1896 map the Tyburn is no longer shown on maps after the construction of Fitzjohn's Avenue, which has been culverted.

The site was undeveloped at the time of the 1871 map, and occupied by a number of trees. On the next map studied, dated 1896 map, the trees on the site are no longer shown, Wedderburn Road had been constructed to the south of the site and buildings had been constructed to the north and northeast. At some time between 1896 and 1915 the existing house was constructed along with the neighbouring houses to the north and west. At some time between 1935 and 1954, another two buildings were constructed to the east of the site. Between 1979 and 1991, the building at No 2 Wedderburn Road was demolished and replaced with the existing Andrew Court apartment block. The site and the surrounding area have since remained essentially unchanged.

2.3 Other Information

A search of public registers and databases has been made via the Envirocheck database and relevant extracts from the search are appended. Full results of the search can be provided if required.

The Envirocheck report has indicated no landfill sites, waste management or waste transfer sites located within 500 m of the site. In addition there have been no pollution incidents within 1 km of the site.

Reference to records compiled by the Health Protection Agency (formerly the National Radiological Protection Board) indicates that the site falls within an area where less than 1% of homes are affected by radon emissions and therefore radon protective measures will not be necessary.

The site is not located within a nitrate vulnerable zone or any other sensitive land use.

There are no fuel stations within 250 m of the site.

There is a tunnel to the north of the site and two tunnels to the south of the site, but the site is not underlain by any tunnels. The closest tunnel is located approximately 75 m to the south of the site.

2.4 Geology

The British Geological Survey (BGS) map of the area (Sheet 256) indicates that the site is underlain by the Claygate Member, overlying the London Clay. According to the geology map, the boundary between the Claygate Member and London Clay is located approximately 60 m to the southeast of the site. An extract from Findmaps is included below, indicating the location of the site with respect to the geological boundaries.

The geology in this area is generally approximately horizontally bedded, such that the boundary between the geological formations roughly follows the ground surface contours lines.

The boundary between the Claygate Member and London Clay can however be very difficult to determine as it is a gradational contact with close similarities in composition and geotechnical properties between the Claygate Member and underlying Unit D of the London Clay.

According to the British Geological Society memoir, the Claygate Member comprises alternating beds of clayey silt, very silty clay, sandy silt and glauconitic silty fine sand. The lower part of the Claygate Member is generally more bioturbated. A bed of calcareous concretions is present near the base in many places. The London Clay Formation is homogenous, slightly calcareous silty clay to very silty clay, with some beds of clayey silt grading to silty fine grained sand.

A nearby investigation carried out by GEA to the north of the site on Lyndhurst Road, indicated the Claygate Member to extend to a depth of 8.60 m (83.10 m OD). However, the contours and spot heights shown on the OS and geological maps would suggest that the Claygate Member extends to a depth of approximately 77.00 m OD, where it is in turn underlain by London Clay. Groundwater was measured at a depth of 5.00 m (86.70 m OD) at this nearby site.

On another site located on Wedderburn Road to the west of the site, near the junction with Akenside Road, the Claygate Member was found to extend to depths of 8.00 m (71.50 m OD), 5.10 m (72.21 m OD) and 6.00 m (71.41 m OD) and initially comprised firm locally soft brown mottled orange-brown and greenish grey silty sandy clay with rare flint gravel, which extended to depths of between 4.30 m and 5.80 m (74.20 m OD and 72.91 m OD), overlying firm becoming stiff grey silty sandy clay. The underlying London Clay comprises firm

becoming stiff grey silty fissured clay, with rare partings of grey silt and fine sand and rare fragments of shells, which was proved to the maximum depth investigated of 15.00 m (65.00 m OD). Monitoring of the standpipes measured groundwater at levels of between 76.33 m OD and 75.84 m OD.

2.5 Hydrology and Hydrogeology

The Claygate Member is classified by the Environment Agency as a Secondary 'A' Aquifer, which refers to 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. In the absence of significant sand horizons the Claygate Member is not capable of storing and transmitting water in usable amounts and receives very low levels of annual recharge due to very low permeability. Under the same classification system the London Clay is designated as unproductive strata, which refers to deposits that have low permeability and negligible significance for water supply or river base flow.

There are no Environment Agency designated Groundwater Source Protection Zones (SPZs) on the site and there are no listed water abstraction points within 500 m of the site.

The nearest surface water feature is the Hampstead Heath chain of ponds located 655 m northeast of the site.

A number of spring lines issue on Hampstead Heath at the interface of the Bagshot Beds and the Claygate Member, and to a lesser extent at the boundary between the Claygate Member and the underlying essentially impermeable London Clay. These springs have been the source of a number of London's "lost" rivers, notably the Fleet, Westbourne and Tyburn, which all rose on Hampstead Heath at the base of the Bagshot Beds. There are no known documented springs on the site.

A search of Camden's online planning records did not find any planning applications relating to No 4 Wedderburn Road between 1926 and present, apart from relating to trees on the site.

Historically the Tyburn River[4] rose approximately 200 m west of the site, under what is now No 41 Lyndhurst Road. It is shown on the map dated 1871 rising from a small pond near to what is annotated as Shepherd's Well / Conduit Wells, although is no longer shown on maps dated after 1896, after the construction of Fitzjohn's Avenue. The Tyburn stream flowed in a southerly direction, where it merged with another tributary, issuing to the southeast of site, just north of Regent's Park where it flowed into a large lake that is still present today. From there the river then flowed through central London and into the Thames.

Given the location of the source of the Tyburn, it is likely that it was formed by a spring issuing from within the Claygate Beds close to the boundary with the London Clay, which is located approximately 50 m to the south of the source. Therefore groundwater in the area would most likely to have been flowing to the source of the Tyburn, directly west of the site. The direction of groundwater flow within the Claygate Member beneath the site is likely to be controlled by the local topography and is therefore likely to be in a southerly direction, in the direction that the former river flowed. Water infiltrating the underlying London Clay will generally tend to flow vertically downwards at a very slow rate towards the lower chalk aquifer.

4 Nicholas Barton (2000) *London's Lost Rivers.* Historical Publications Ltd

Due to the predominantly cohesive nature of the soils, the groundwater flow rate is unlikely to be particularly high. Information provided in the Envirocheck report indicates that the permeability of the Claygate Member may range from "very low" to "high". Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10^{-10} m/s and 1 x 10^{-8} m/s, with an even lower vertical permeability.

The site is not at risk of flooding from rivers or sea, as defined by the Environment Agency; Wedderburn Road has not been identified as a street at risk of surface water flooding, specified in the London Borough of Camden (LBC) Planning Guidance CPG4 and therefore a flood risk assessment will not be required.

2.6 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

2.6.1 Source

The desk study findings indicate the site not to have had a contaminative history as the site has been developed with the existing house for its entire developed history. The site and immediate surrounding areas are not considered to have had a contaminative history. In addition, there are no historical or existing landfill sites within 500 m and a risk of soil gas has not been identified.

2.6.2 Receptor

The site will continue to have a residential end use following the excavation of the basement and no new receptors will result. However, the residential end use is considered a high sensitivity end-use. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are likely to come into direct contact with any contaminants present in the soil and through inhalation of vapours during basement excavation and construction. Being underlain by a Secondary 'A' Aquifer, groundwater may be considered to be a moderately sensitive target.

2.6.3 Pathway

The proposed development comprises construction of a basement beneath the majority of the garden area. As such, end users will be isolated from direct contact with any contaminants present within the near surface soils by the presence of the building, whilst a potential for direct contact will exist in the garden area above the proposed basement. The presence of negligibly permeable London Clay beneath the site will limit the potential for groundwater percolation into the underlying chalk, and thus a pathway is not considered likely to exist to the principal aquifer. There will be limited potential for contaminants to move on or off the site, except horizontally within any made ground or upon the interface with the Claygate Member if present in association with perched groundwater movements, this pathway is also already in existence. A pathway for ground workers to come into contact with any contamination will exist during demolition and construction work and services will come into contact with any contamination within the soils in which they are laid.

There is thus considered to be a low potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

2.6.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a LOW risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work. Furthermore as there is no evidence of filled ground within the vicinity of the site and no landfill sites, there is not considered to be a significant potential for hazardous soil gas to be present on or migrating towards the site: there should thus be no need to consider landfill gas exclusion systems.

3.0 SCREENING

The London Borough of Camden guidance suggests that any development proposal that includes a subterranean basement should be screened to determine whether or not a full Basement Impact Assessment (BIA) required.

3.1 Screening Assessment

A number of screening tools are included in the Arup document and for the purposes of this report reference has been made to Appendix E which includes a series of questions within a screening flowchart for three categories; groundwater flow; land stability; and surface water flow. Responses to the questions are tabulated on the following pages.

3.1.1 Subterranean (groundwater) Screening Assessment

Question	Response for 4 Wedderburn Road
1a. Is the site located directly above an aquifer?	*Yes the site is located above a Secondary 'A' Aquifer as designated by the EA.*
1b. Will the proposed basement extend beneath the water table surface?	*Possibly. This needs to be established by ground investigation.*
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	*Possibly. The site is not within 100 m of a former watercourse. However, there were a number of former ponds within 100 m of the site, but are no longer shown on historical maps after 1896.*
3. Is the site within the catchment of the pond chains on Hampstead Heath?	*No*
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes, It is understood that the proposal will increase the amount of hardstanding from 180 m² to 211 m².*
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	*Unlikely, given that the site is underlain by clay soils and is unlikely to be suitable for a soakaway or similar SUDS based system and therefore site drainage will be directed to public sewer.*
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than, the mean water level in any local pond or spring line?	*Possibly. The proposed basement excavation may extend below the mean water level in former ponds, located within 100 m of the site, however they have since been infilled.*

The above assessment has identified the following potential issues that need to be assessed:

Q1a. The site is located above a Secondary 'A' Aquifer as designated by the EA.
Q1b. The proposed basement may extend beneath the water table surface.
Q2. The site may be located within 100 m of a former springline.
Q4. There will be an increase in hardstanding.
Q6. The excavation may extend below the water level in former pond / springline.

The potential issues that need to be assessed, along with the possible effects of the basement construction on the local hydrology and hydrogeology and are discussed further in Part 2 of this report.

3.1.2 Stability Screening Assessment

Question	Response for 4 Wedderburn Road
1. Does the existing site include slopes, natural or manmade, greater than 7°?	*No*
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	*No*
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	*No*
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	*No*
5. Is the London Clay the shallowest strata at the site?	*No*
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	*Yes. It is understood that all trees within the footprint of the proposed basement will be removed.*
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	*Yes. The area is prone to these effects as a result of the presence of shrinkable clay and abundant mature trees.*
8. Is the site within 100 m of a watercourse or potential spring line?	*Possibly. The site is not within 100 m of a former watercourse. However, there were a number of former ponds within 100 m of the site, but are no longer shown on historical maps after 1896.*
9. Is the site within an area of previously worked ground?	*No*
10a. Is the site within an aquifer?	*Yes the site is located above a Secondary 'A' Aquifer as designated by the EA.*
10b. Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	*Possibly.*
11. Is the site within 50 m of Hampstead Heath ponds?	*No*
12. Is the site within 5 m of a highway or pedestrian right of way?	*Yes - the site fronts onto a public road to the south.*
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	*Yes - The development will increase the foundation depths relative to the neighbouring properties to a relatively significant extent.*
14. Is the site over (or within the exclusion zone of) any tunnels, eg railway lines?	*No*

The above assessment has identified the following potential issues that need to be assessed:

Q6. Trees will be felled as part of the development.
Q7. The site is within an area of seasonal shrink-swell.
Q8. The site may be located within 100 m of a former springline or pond.
Q10a. The site is located above a Secondary 'A' Aquifer as designated by the EA.
Q10b. The proposed basement may extend beneath the water table
Q12. The site is within 5 m of a public highway.
Q13. The development will increase the foundation depths relative to the neighbouring properties to a relatively significant extent.

The potential issues that need to be assessed, along with the possible effects of the basement construction on the local hydrology and hydrogeology and are discussed further in Part 2 of this report.

3.1.3 Surface Flow and Flooding Screening Assessment

Question	Response for 4 Wedderburn Road
1. Is the site within the catchment of the pond chains on Hampstead Heath?	*No. Figure 14 of the Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010, confirms that the site is not located within this catchment area.*
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	*No. There will be no surface expression of the basement development, so surface water flows and drainage will be unchanged.* *There will be a reduction in impermeable area across the ground surface above the basement.* *Although the basement will be located under the dwelling, it is proposed that the basement will also extend below ground into the garden area somewhat. There will be a reduction in impermeable area across the ground surface above the basement. This will ensure no increase in runoff rate or volume as a result of the proposed basement construction.* *Additionally, there will be at least 1m distance between the roof of the basement and ground surface to maintain infiltration capacity as recommended by the Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010.*
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes. There will be an increase in the proportion of hardstanding from 180 m² to 211 m². The garden will be reinstated above the basement and there will be no surface expression of the basement development.*
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	*No There will be no surface expression of the basement development, so the surface water flow regime will be unchanged.* *There will be a reduction in impermeable area across the ground surface above the basement.* *Additionally, there will be at least 1m distance between the roof of the basement and ground surface to maintain infiltration capacity as recommended by the Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010.*
5. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	*No. Discharges off-site will be of no different quality to existing. Additionally, off-site discharge will be via the sewer and so there will be no impact on adjacent properties or off-site watercourses.* *There will be no surface expression of the basement development, so the surface water flow regime will be unchanged.* *There will not be an increase in impermeable area and therefore no increased quantity of surface water being discharged from the site.* *Additionally, there will be at least 1m distance between the roof of the basement and ground surface to maintain infiltration capacity as recommended by the Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010.*
6. Is the site in an area known to be at risk from surface water flooding such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding because the proposed basement is below the static water level of a nearby surface water feature?	*No. The Camden Flood Risk Management Strategy dated 2013, North London Strategic Flood Risk Assessment dated 2008, and Environment Agency online flood maps show that the site has a low flooding risk from surface water, sewers, reservoirs (and other artificial sources), groundwater and fluvial/tidal watercourses.* *The site is located within the Critical Drainage Area number GROUP3-005 as identified in the Camden SWMP.*

The above assessment has identified the following potential issues that need to be assessed:

Q3. There will be an increase in hardstanding areas.

The potential issues that need to be assessed, along with the possible effects of the basement construction on the local hydrology and hydrogeology and are discussed further in Part 2 of this report.

4.0 SCOPING AND SITE INVESTIGATION

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential impacts are assessed for each of the identified potential impact factors.

The potential impacts of the proposed development on surface flow and flooding and subterranean flow will need to be dealt with in separate assessments, such that the following section focuses on the potential impacts that may have an impact on slope stability.

4.1 Potential Impacts

The following potential impacts have been identified.

Potential Impact	Consequence
Seasonal shrink-swell can result in foundation movements.	If a new basement is not dug to below the depth likely to be affected by tree roots this could lead to damaging differential movement between the subject site and adjoining properties.
Marginal increase in areas of hardstanding.	Less surface cover for surface water infiltration. The Claygate Member and London Clay are of relatively low permeability so it will not make much difference. It is understood that attenuation is proposed to store the increase amount of water.
The site may be located within 100 m of former pond / springline.	This may affect flow to former springlines.
Site within 5 m of a highway or pedestrian right of way.	Excavation of a basement may result in structural damage to the road or footway.
Founding depths relative to neighbours.	If not designed and constructed appropriately, the excavation of a basement may result in structural damage to neighbouring buildings and structures.
Trees will be felled as part of the proposals.	Heave of the clay soils may result in structural damage to the buildings.
The site is located above a Secondary 'A' Aquifer as designated by the EA.	The proposed basement level may be below monitored water levels, but there will not be a consistent 'water table' in the clay.
The proposed basement may extend beneath the water table.	

These potential impacts have been investigated through the site investigation, as detailed in Section 9.0.

4.2 Exploratory Work

Access was limited by the presence of the existing building and was further restricted by scaffolding poles overhanging from the neighbouring property of Andrew Court. Therefore, in order to meet the objectives described in Section 1.2, as far as possible within the constraints presented by the restricted access, a single cable percussion borehole was

advanced to a depth of 20.00 m, using a dismantlable drilling rig on the front driveway. Standard Penetration Tests (SPTs) were carried out at regular intervals in the cable percussion borehole to provide quantitative data on the strength of soils encountered.

In addition, three window sampler boreholes were drilled to depths of 7.00 m to provide coverage of the rear garden, access to which was severely limited by the presence of scaffolding erected along the side passageway.

Groundwater monitoring standpipes were installed in three boreholes, to depths of between 6.40 m and 10.00 m and have been monitored on two occasions to date, with a further monitoring visit planned. The results of subsequent monitoring will reported as an addendum letter.

During drilling disturbed and undisturbed samples were obtained from the boreholes for subsequent laboratory examination and testing. Standard Penetration Tests (SPTs) were carried out at regular intervals to provide additional quantitative data on the strength of soils encountered.

A selection of the samples recovered from the boreholes was submitted to a soil mechanics laboratory for a programme of geotechnical testing and an analytical laboratory for a programme of contamination testing.

All of the above work was carried out under the supervision of a geotechnical engineer from GEA.

The borehole records and results of the laboratory testing are appended, together with a site plan indicating the exploratory positions.

Temporary bench mark levels indicated on the borehole records and quoted within the report have been interpolated from spot heights shown on the site survey drawing by Stiff and Trevillon Architects Ltd (ref PO1, dated July 2014) provided by the consulting engineers. Ground floor level has been attributed the level 100 m TBM.

4.3 Sampling Strategy

The scope of the works was specified by the consulting engineers, with input from GEA. The boreholes were positioned on site by GEA, in accessible locations, whilst avoiding areas of buried services.

Four samples of made ground were subjected to analysis for a range of common industrial contaminants and contamination indicative parameters. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. The soil samples were selected to provide a general view of the chemical conditions of the soils that are likely to be involved in a human exposure or groundwater pathway and to provide advice in respect of re-use or for waste disposal classification.

The contamination analyses were carried out at a MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. Details of the MCERTs accreditation and test methods are included in the Appendix together with the analytical results.

5.0 GROUND CONDITIONS

The investigation has confirmed the expected ground conditions in that, below a moderate thickness of made ground, the Claygate Member was encountered overlying the London Clay, which was proved to the full depth investigated of 20.00 m (77.76 m TBM).

The precise location of the boundary between the Claygate Member and London Clay is often difficult to define due to its gradational contact, and the close similarities in composition and geotechnical properties of each stratum. The boundaries have therefore been placed on the attached borehole records as described below, but part of what is described as Claygate Member may in fact comprise Unit D of the London Clay, and vice versa.

5.1 Made Ground

The made ground extended to depths of between 0.40 m and 1.00 m (101.41 m TBM and 97.36 m TBM) and generally comprised brown clayey sand or silty sandy clay with occasional fragments of brick and burnt coal.

Apart from the presence of fragments of extraneous material noted above, no visual or olfactory evidence of contamination was observed during the fieldwork. Four samples of the made ground have been sent for contamination testing as a precautionary measure and the results are presented in Section 5.5.

5.2 Claygate Member

The Claygate Member initially comprised firm orange-brown mottled greenish grey silty sandy clay and was found to extend to depths of between 4.20 m (102.01 m TBM) and 5.00 m (100.12 m TBM), which was underlain by firm locally soft grey silty sandy clay, proved to the full depth investigated of 7.00 m (95.01 m TBM to 93.12 m TBM) in the rear garden.

The clay was locally softened at depth by the presence of water encountered during drilling.

In Borehole No 1, drilled at the lowest level, the Claygate Member comprised stiff becoming firm orange-brown mottled brown and grey silty sandy clay, which extended to a depth of 4.00 m (93.76 m TBM). The composition of the soil was much sandier than that of London Clay.

Roots were noted to depths of between 0.50 m and 2.00 m in all boreholes, with decaying rootlets noted to extend to a maximum depth of 5.50 m. The clay of the Claygate Member was noted to be stiff initially in Borehole Nos 1, 2 and 3, and was desiccated to depths of between 1.40 m and 2.45 m.

In Borehole No 2, flint gravel was noted to a depth of 0.80 m, and in Borehole No 4 flint gravel was noted from 1.00 m to 2.50 m, which may indicate the presence of naturally reworked soils. A layer of brownish grey sandy silt was encountered between 4.65 m and 4.80 m. No sand layers were encountered in any other boreholes at this elevation and this sand layer is therefore not laterally continuous.

An undrained triaxial compression test was carried out on a single sample of the Claygate Member from Borehole No 1 at a depth of 2.00 m and the undrained shear strength was measured to be 91 kN/m², indicating high strength.

The results of laboratory plasticity index tests indicate that the clay is of moderate and high volume change potential.

These soils were observed to be free of any evidence of soil contamination.

5.3 London Clay Formation

The London Clay was only encountered in Borehole No 1 and initially comprised an upper weathered layer of firm brown mottled grey silty fissured clay with occasional partings of orange-brown fine sand and silt, which extended to a depth of 5.00 m (92.76 m TBM). Below this depth firm becoming stiff grey silty fissured clay with rare partings of grey fine sand and silt and rare shell fragments was encountered and proved to the maximum depth investigated of 20.00 m (77.76 m TBM).

The results from the laboratory undrained triaxial compression tests indicate the clay to be of medium strength and high strength. Laboratory plasticity index test results indicate the clay to be of high volume change potential.

No evidence of contamination was noted in these soils.

5.4 Groundwater

During drilling of Borehole No 1 slow seepages were noted at depths of 5.00 m (92.76 m TBM) and 8.00 m (89.60 m TBM) from within the London Clay.

Groundwater was also encountered during drilling from within the Claygate Member at depths of 5.30 m (96.71 m TBM), 5.20 m (96.23 m TBM) and 5.00 m (95.12 m TBM) in Borehole Nos 2 to 4 respectively, drilled in the rear garden.

The results of the monitoring visits are shown in the table below. Borehole Nos 2 and 3 were drilled on 19 September 2014 and Borehole No 1 was drilled three weeks later on 10 October 2014.

Borehole No	Standpipe depth in m (m TBM)	Depth to groundwater in m Level of ground water (m TBM)	
		29/10/2014	10/11/2014
1	9.59 (88.17)	1.12 (95.67)	-
2	6.17 (95.84)	2.09 (99.92)	1.90 (100.11)
3	6.30 (95.13)	1.70 (99.73)	1.92 (99.51)

A strong odour was noted when the standpipe was monitored on the driveway and may indicate a nearby leaking drain or sewer.

A car was parked over the security cover on the driveway on the second groundwater monitoring visit.

Groundwater monitoring will be carried out on another occasion and will be reported as an addendum.

5.5 Soil Contamination

The table below sets out the values measured within four samples of the made ground analysed; all concentrations are in mg/kg unless otherwise stated.

Determinant	BH1: 0.30 m	BH2: 0.50 m	BH3: 0.40 m	BH4: 0.50m
pH	8.7	6.2	6.7	7.6
Arsenic	17	13	8.9	11
Cadmium	0.13	0.17	0.13	0.26
Chromium	19	37	33	18
Copper	34	39	32	33
Mercury	0.15	0.29	0.89	0.44
Nickel	14	33	21	15
Lead	**210**	130	**220**	160
Selenium	<0.20	<0.20	<0.20	<0.20
Zinc	87	100	78	100
Total Cyanide	<0.50	<0.50	<0.50	<0.50
Total Phenols	<0.30	<0.30	<0.30	<0.30
Sulphide	12	<0.50	<0.50	<0.50
Total PAH	10	2.1	<2.0	<2.0
Benzo(a)pyrene	0.92	<0.10	<0.10	<0.10
Naphthalene	0.12	<0.10	<0.10	<0.10
TPH	51	<10	<10	<10
Total organic carbon %	1.4	3.2	1.7	4.4

Notes: Figure in **bold** indicates concentration in excess of risk-based soil guideline values, as discussed in Part 2 of this report

5.5.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. To this end the table below indicates those contaminants of concern that have values in excess of a generic human health risk based guideline values which are either that of the CLEA[5] Soil Guideline Value where available, or is a Generic Screening Value calculated using the CLEA UK Version 1.06[6] software assuming a residential end use, or is based on the DEFRA Category 4 Screening values[7]. The key generic assumptions for this end use are as follows:

- that groundwater will not be a critical risk receptor;
- that the critical receptor for human health will be young female children aged zero to six years old;

5 *Updated Technical Background to the CLEA Model (Science Report SC050021/SR3) Jan 2009* and Soil Guideline Value reports for specific contaminants; all DEFRA and Environment Agency.
6 Contaminated Land Exposure Assessment (CL|EA) Software Version 1.06 Environment Agency 2009
7 CL:AIRE (2013) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Final Project Report SP1010 and DEFRA (2014) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Policy Companion Document SP1010

- that the exposure duration will be six years;
- that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and indoor dust, and inhalation of indoor and outdoor dust and vapours; and
- that the building type equates to a two-storey small terraced house.

It is considered that these assumptions are acceptable for this generic assessment of this site. The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of these generic screening values there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include;

- additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

Marginally elevated concentrations of lead above the respective generic risk-based guideline values were measured within two samples of made ground tested.

The significance of these results is considered further in Part 2 of the report.

Part 2: DESIGN BASIS REPORT

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to the basement excavation, contamination and foundation issues.

6.0 INTRODUCTION

It is proposed to construct a single level basement beneath the existing house and most of the rear garden. This will include deepening and extending the existing basement beneath the entire footprint of the existing house.

The proposed new basement will extend to a depth of about 4.00 m (96.00 m TBM) beneath the existing house with a deepened section in the rear garden, extending to a depth of 6.00 m (94.00 m TBM) below existing ground level with a reinstated garden above.

7.0 GROUND MODEL

The desk study has revealed that the site has not had a potentially contaminative historical use as the site has been developed with the existing house for its entire developed history, and on the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- the investigation encountered a moderate thickness of made ground, the Claygate Member was encountered overlying the London Clay, which was proved to the full depth investigated of 20.00 m (77.76 m TBM);
- the made ground typically comprises brown clayey sand or silty sandy clay with occasional fragments of brick and burnt coal and extends to depths of between 0.40 m and 1.00 m (101.41 m TBM and 97.36 m TBM);
- the Claygate Member extends to a depth of 4.00 m (93.76 m TBM), where proved; and was proved to the full depth investigated of 7.00 m (95.01 m TBM and 93.12 m TBM) in the rear garden;
- the Claygate Member initially comprises firm orange-brown mottled greenish grey silty sandy clay, extending to depths of between 4.20 m (102.01 m TBM) and 5.00 m (100.12 m TBM), overlying firm locally soft grey silty sandy clay, proved to the full depth investigated of 7.00 m (95.01 m TBM to 93.12 m TBM) in the rear garden;
- the clay was locally softened at depth by the presence of water encountered during drilling;
- in Borehole No 1, drilled at the at the lowest level, the Claygate Member comprises stiff becoming firm orange-brown mottled brown and grey silty sandy clay, which extends to a depth of 4.00 m (93.76 m TBM);
- the London Clay initially comprises an upper weathered layer of firm brown mottled grey silty fissured clay with occasional partings of orange-brown fine sand and silt, which extends to a depth of 5.00 m (92.76 m TBM). Below this depth, unweathered London Clay comprising firm becoming stiff fissured medium strength and high strength grey silty clay with rare partings of grey fine sand and silt and rare shell fragments was encountered and proved to the maximum depth investigated;

- desiccation of the clay was encountered in the vicinity of existing trees;
- groundwater was encountered during drilling at depths of 5.30 m (96.71 m TBM), 5.20 m (96.23 m TBM) and 5.00 m (95.12 m TBM) from within the Claygate Member in Borehole Nos 2, 3 and 4 respectively;
- seepages were encountered in Borehole No 1 at depths of 5.00 m (92.76 m TBM) and 8.00 m (89.60 m TBM) from within the London Clay;
- subsequent monitoring on two occasions has measured groundwater at depths of between 1.12 m and 2.05 m (99.92 m TBM and 95.67 m TBM); and
- contamination testing has revealed marginally elevated concentrations of lead within two samples of made ground.

8.0 ADVICE AND RECOMMENDATIONS

It is proposed to deepen and extend the existing basement beneath the footprint of the entire house and most of the rear garden. The basement will extend to a depth of 4.00 m below existing ground floor level with a formation level of approximately 96.00 m TBM, within the Claygate Member. The deepened section beneath the rear garden extending to a depth of 6.00 m (94.00 m TBM) is likely to have a formation level close to the base of the Claygate Member or top of the London Clay, present at a depth of 4.00 m (93.76 m TBM).

Given the proposed basement depths, it can been assumed that all of the desiccated soils will be removed from the basement excavation. The results of the groundwater monitoring to date indicate that it will not be possible to construct the basement without some form of groundwater control.

Excavations for the proposed basement structure will require temporary support to maintain stability of the excavation and surrounding structures at all times. It will be necessary to underpin the foundations of the existing house and neighbouring structures or to design the new retaining walls to accommodate the load from the existing structures. It is recommended that trial pits are undertaken to investigate the foundations of the existing house and boundary walls prior to the excavation of the proposed basement.

8.1 Basement Construction

8.1.1 Basement Excavations

It is understood that it is proposed to deepen the existing basement by 1.70 m and extend beneath the footprint of the entire house and beneath the majority of the rear garden. The proposed new basement will extend to a depth of about 4.00 m (96.00 m TBM) beneath the existing house with a deepened section in the rear garden, extending to a depth of 6.00 m (94.00 m TBM) below existing ground level with a reinstated garden above.

Formation level for the 4.00 m deep basement is likely to be within the Claygate Member and the excavation for the 6.00 m deep basement may extend through the Claygate Member to the top of the London Clay.

Groundwater was encountered during drilling at depths of between 5.00 m and 5.30 m (96.71 m TBM and 95.12 m TBM) from within the Claygate Member in Borehole Nos 2 to 4, drilled in the rear garden. Seepages were encountered in Borehole No 1, drilled on the

driveway at the lower level at depths of 5.00 m (92.76 m TBM) and 8.00 m (89.60 m TBM) from within the London Clay. Subsequent monitoring on two occasions has measured water in the standpipes at depths of between 1.12 m and 2.05 m (99.92 m TBM and 95.67 m TBM). On this basis groundwater is likely to be encountered within the basement excavation, although monitoring of the standpipes should be continued to establish equilibrium levels and determine the extent of any seasonal fluctuations. In any case, inflows could conceivably occur from perched water tables, particularly in the vicinity of existing foundations, but should be adequately dealt with through sump pumping.

It should be noted that the monitored water levels in the standpipes are shallower than the existing basement level, but that this basement is known to be dry. Shallow water levels are commonly observed in clay strata, but this does not indicate that it can contribute to any significant flow.

Whilst monitoring should be continued, it is not possible to draw entirely meaningful conclusions from the measurements made in the standpipes, as the level of the water table is not necessarily as significant as the volume of water that may flow into the excavation. For example, a high level of water measured in a standpipe may not be significant if this represents only a small volume of water. It would be prudent to pump out the standpipes and monitor the rate at which groundwater levels in the standpipes recover to establish the rate of rise in groundwater and permeability of the underlying Claygate Member.

As the basement excavation will cover a much larger area than that covered by the investigation, trial excavations to the proposed full depth of the basement should be carried out, along with pumping tests to provide meaningful information on the likely inflow rate in the basement excavation.

There are a number of methods by which the sides of the basement excavations could be supported in the temporary and permanent conditions. The choice of wall may be governed to a large extent by whether it is to be incorporated into the permanent works and have a load bearing function, and the extent to which groundwater inflows need to be prevented. The choice of wall may be governed to a large extent by the access restrictions.

The design of basement support in the temporary and permanent conditions needs to take account of the need to maintain the stability of the excavation and surrounding structures, namely the neighbouring houses and to protect against groundwater inflows.

Although no trial pits have been carried out to date to determine the depth of the existing foundations, which should be carried out in due course to confirm, it is likely that the existing foundations will need underpinning.

Based on the groundwater observations to date it is unlikely to be possible to form the retaining walls by concrete underpinning the existing foundations without some form of groundwater control. The Claygate Member is of low permeability but in the presence of water inflows it will soften and lose strength. A bored pile wall may be the most reliable method of supporting the basement excavation, and would have the benefit of providing support for structural loads in the permanent condition.

Given the depth of the proposed basement, it is unlikely to be possible to carry out trial excavations and pumping trials that would provide meaningful information on the likely inflow rate into the basement excavation and on this basis a secant piled wall is likely to be the most appropriate method of supporting the basement excavation. In addition, a secant wall

could overcome the requirement for any secondary groundwater protection in the permanent works and maximise the basement area. Consideration will need to be given to the limited access and a limited access piling rig is likely to be required.

The ground movements associated with the basement excavation will depend on the method of excavation and support and the overall stiffness of the basement structure in the temporary condition. Thus, a suitable amount of propping will be required to provide the necessary rigidity. In this respect the timing of the provision of support to the wall will have an important effect on movements.

An assessment of the ground movements associated with the basement excavation may be required as part of the planning process or could be completed as design progresses.

8.1.2 Retaining Walls

The following parameters are suggested for the design of the permanent basement retaining walls.

Stratum	Bulk Density (kg/m^3)	Effective Cohesion (c' – kN/m^2)	Effective Friction Angle (Φ' – degrees)
Made Ground	1700	Zero	20
Claygate Member	1900	Zero	25
London Clay	1950	Zero	25

Groundwater has been measured at depths of between 1.12 m and 2.05 m (99.92 m TBM and 95.67 m TBM) and further monitoring should be continued in order to establish a design water level. On this basis, groundwater is anticipated to be encountered in the 4.00 m and 6.00 m deep basements. Further monitoring and trial excavations should be undertaken as detailed in Section 8.1.1. Reference should be made to BS8102:2009[8] with regard to requirements for waterproofing and design with respect to groundwater pressures.

8.1.3 Basement Heave

The existing basement is located beneath the central eastern part of the existing house, and will be lowered by roughly 1.70 m, which will result in a net unloading of about 34 kN/m². The basement will also be extended beneath the entire footprint of the existing house to a depth of 4.00 m and will result in a net unloading of about 80 kN/m². The construction of the 6.00 m deep basement in the rear garden will result in a net unloading of about 120 kN/m².

The proposed excavations will result in elastic heave and long term swelling of the underlying Claygate Member and London Clay. The effects of the longer term swelling movement will be mitigated to some extent by the load applied by the new foundations and the continued presence of the existing house.

Consideration will need to be given to the effects of differential movement that will occur through lowering of the existing basement and beneath the remainder of the house. The movements in the rear garden area are likely to be more significant as no structure is proposed above ground level and consideration may need to be given to the requirement for tension piles.

A detailed analysis of the heave movements is being undertaken as part of the ground movement analysis. The results will be presented in a separate report.

8 BS8102 (2009) *Code of practice for protection of below ground structures against water from the ground*

8.2 Spread Foundations

The excavation to form the single level basement beneath the existing house will result in a formation level in the Claygate Member, whereas the 6.00 m deep basement in the rear garden may extend to the top of the London Clay.

Groundwater inflows are likely to be encountered within the basement excavation, but inflows should be relatively slow, given the low permeability of the Claygate Member, but it may not be possible to form spread foundations, although this will depend on the basement support system and the extent to which a water-tight excavation is maintained at formation level, although some form of pumping will be required in any case to deal with water within the excavation. The volume of groundwater anticipated in the basement excavation should be further investigated, as discussed in Section 8.1.1.

If a dry excavation can be maintained, moderate width pad or strip foundations, bearing within firm silty sandy clay of the Claygate Member or firm London Clay, may be designed to apply a net allowable bearing pressure of 120 kN/m^2 below the level of the proposed 4.00 m and 6.00 m deep basements. This value incorporates an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits.

The depth of the proposed 4.00 m and 6.00 m deep basement excavations should be such that foundations will be placed below the depth of actual or potential desiccation. A check should be taken once proposals have been finalised to confirm this view.

Consideration may be given to piled foundations which would provide a suitable foundation option.

8.3 Basement Raft Foundation

The suitability of a raft foundation will be governed by the net load of the new development, taking into consideration the weight of soil removed by the basement excavation. On this site, in view of the depth of the proposed excavation and the estimated heave it is anticipated that the gross load on the raft will not be sufficient to balance the weight of soil removed and the raft may need to be anchored into the ground by piles to resist movements. The raft could be constructed so that it forms a rigid box with the retaining walls such that differential movements are minimised. Further analyses should be carried out once the proposed uniform distributed load is known.

8.4 Piled Foundations

For the ground conditions at this site some form of bored pile is likely to be the most appropriate type. Piles installed using continuous flight auger (cfa) techniques are likely to be the most suitable in order to avoid potential problems associated with instability and groundwater inflows.

The following table of ultimate coefficients may be used for the preliminary design of bored piles, based on the measured SPT and cohesion / depth graph in the appendix. There is some variation between the SPTs and shear strengths, which is considered to be due to sampling disturbance as a result of the sandy and very silty zones within the clay. Greater reliance should therefore be placed on the results of the SPTs.

Ultimate Skin Friction		**kN/m²**
Made Ground and Claygate Member	Ground floor level to 6.00 m (100 m TBM to 94 m TBM)	Ignore (basement excavation)
London Clay ($\alpha = 0.5$)	6.00 m to 20.00 m (94 m TBM to 78 m TBM)	Increasing linearly from 35 to 65
Ultimate End Bearing		**kN/m²**
London Clay (Nc = 9)	15.00 m to 20.00 m (83 m TBM to 78 m TBM)	Increasing linearly from 990 to 1170

In the absence of pile tests, guidance from the London District Surveyors Association[9] (LDSA) suggests that a factor of safety of 2.6 should be applied to the above coefficients in the computation of safe theoretical working loads.

On the basis of the above coefficients and a factor of safety of three, it has been estimated that a 450 mm diameter pile extending to a depth of 10 m below basement formation level (a toe level of about 84.00 m TBM) should provide a safe working load of about 315 kN.

The above example is not intended to constitute any form of recommendation with regard to pile size or type, but merely serves to illustrate the use of the above coefficients. Specialist piling contractors should be consulted with regard to the design of a suitable piling scheme for this site and their attention should be drawn to groundwater inflows in the Claygate Member and London Clay.

8.5 Shallow Excavations

Accurate assessment of the likely ease and stability of excavations is not readily available from the investigation techniques used; however, on the basis of the borehole findings it is considered likely that it will be feasible to form relatively shallow excavations for services terminating within the made ground without the requirement for lateral support, although localised instabilities may occur.

Should deeper excavations be considered or if excavations are to remain open for prolonged periods it is recommended that provision be made for battered side slopes or lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

8.6 Basement Floor Slab

Following the excavation of the basement, it is possible that the floor slab for the proposed basement will need to be suspended over a void or layer of compressible material to accommodate the anticipated heave unless the slab can be suitably reinforced to cope with these movements. This should be reviewed once the levels and loads are known. Consideration may need to be given to the requirement for tension piles.

9 LDSA (2009) *Foundations No 1 – Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA Publication

8.7 Effect of Sulphates

Chemical analyses carried out on four samples, including two samples of made ground, a single sample of Claygate Member and a single sample of London Clay have revealed low concentrations of soluble sulphate and near-neutral pH in accordance with Class DS-1 and DS-2 conditions of Table C2 of BRE Special Digest 1 Part C (2005). The measured pH value of the samples shows that an ACEC class of AC-1s and AC-2s would be appropriate for the site. This assumes a static water condition at the site. The guidelines contained in the above digest should be followed in the design of foundation concrete.

8.8 Site Specific Risk Assessment

The desk study research has indicated that the site has not had a potentially contaminative history, having been occupied by the existing house throughout its developed history.

The chemical analyses revealed marginally elevated concentration of lead at 210 mg/kg and 220 mg/kg above the screening value of 200 mg/kg within two of the four samples of made ground tested from Borehole Nos 1 and 3 at depths of 0.30 m and 0.40 m respectively.

The results do not indicate widespread contamination of lead and the source of the lead is likely to be from an extraneous fragment of burnt coal noted within the sample.

The lead is considered to be non-volatile or of a low volatility and does not thus present a significant vapour risk. In addition the compounds are considered likely to be of low solubility and a risk to groundwater has not been identified.

The made ground will be removed by the basement construction and there will therefore be no risk to end users unless any of the excavated material is to be re-used in a reinstated garden above the basement. If this is proposed there is likely to be a requirement for testing of the retained soil.

Site workers will be protected from the contamination through adherence to normal high standards of site safety.

8.8.1 Site Workers

Site workers should be made aware of the contamination and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE and CIRIA[10] and the requirements of the Local Authority Environmental Health Officer.

8.9 Waste Disposal

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE guidance[11], will need to be disposed of to a licensed tip. Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste going to landfill is subject to landfill tax at either the standard rate of £64 per tonne (about £120 per m^3) or at the lower rate of £2.50 per tonne (roughly £5 per m^3). However, the classifications for tax purposes and disposal purposes differ and currently all

[10] CIRIA (1996) *A guide for safe working on contaminated sites* - Report 132, Construction Industry Research and Information Association

[11] CL:AIRE (2011) *The Definition of Waste: Development Industry Code of Practice* Version 2, March 2011

made ground and topsoil is taxable at the 'standard' rate and only naturally occurring rocks and soils, which are accurately described as such in terms of the 2011 Order[12], would qualify for the 'lower rate' of landfill tax.

Based upon on the technical guidance provided by the Environment Agency[13] it is considered likely that the made ground from this site, as represented by the three chemical analyses carried out, would be classified as NON-HAZARDOUS waste under the waste code 17 05 04 (soils and stones not containing dangerous substances) and would be taxable at the standard rate. It is likely that the natural soils, if separated out, could be classified as an INERT waste also under the waste code 17 05 04. This material would be taxable at the lower rate, if accurately described as naturally occurring clay in terms of the 2011 Order on the waste transfer note. This would however need to be confirmed by the receiving landfill site.

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper[14] which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be "segregated" onsite by sufficiently characterising the soils in-situ prior to excavation.

The above opinion with regard to the classification of the excavated soils and its likely landfill taxable rate is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified.

The local waste regulation department of the Environment Agency (EA) should be contacted to obtain details of tips that are licensed to accept the soil represented by the test results. The tips will be able to provide costs for disposing of this material but may require further testing.

If consideration were to be given to the re-use of the soil as a structural fill on this or another site, in accordance with the Code of Practice for the definition of waste, it would be necessary to confirm its suitability for use, its certainty of use and to confirm that only as much material is to be used as is required for the specific purpose for which it was being used. A materials management plan could then be formulated and a tracking system put in place such that once placed the material would no longer be regarded as being a waste and thus waste management licensing and landfill tax would not apply.

12 *Landfill Tax (Qualifying Material) Order 2011*

13 Environment Agency (2008) *Hazardous Waste: Interpretation of the definition and classification of hazardous waste. Technical Guidance* WM2 Second Edition Version 2.2, May 2008

14 Regulatory Position Statement (2007) *Treating non-hazardous waste for landfill - Enforcing the new requirement* Environment Agency 23 Oct 2007

9.0 BASEMENT IMPACT ASSESSMENT

The screening identified a number of potential impacts. The desk study and ground investigation information has been used to review the potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

It is proposed to deepen and extend the existing basement beneath the footprint of the entire house and most of the rear garden. The basement will extend to a depth of 4.00 m below existing ground floor level with a formation level of approximately 96.00 m TBM, within the Claygate Member. The deepened section beneath the rear garden extending to a depth of 6.00 m (94.00 m TBM) is likely to have a formation level close to the base of the Claygate Member or top of the London Clay, present at a depth of 4.00 m (93.76 m TBM).

The Claygate Member extends to a depth of 4.00 m (93.76 m TBM), where proved; and was proved to the full depth investigated of 7.00 m 95.01 m TBM to 93.12 m TBM) in the rear garden. Monitoring of the standpipes has measured water at depths of between 1.12 m and 2.05 m (99.92 m TBM and 95.67 m TBM).

The proposed 6.00 m deep basement excavation in the rear garden is likely to extend through the Claygate Member and toe into the London Clay. The Claygate Member is not capable of storing and transmitting water in usable amounts and receives very low levels of annual recharge due to its lowly permeable nature. The Claygate Member strata does not support flow to any watercourses within 100 m of the site. As part of the proposal there will be a slight reduction in hardstanding areas.

On the basis of the results of the ground investigation, it is not considered that the proposed basement would result in a significant change to the groundwater flow regime in the vicinity of the proposal or on the amount of annual recharge into the Claygate Member.

The table below summarises the previously identified potential impacts and the additional information that is now available from the site investigation in consideration of each impact.

Potential Impact	Site Investigation Conclusions
Seasonal shrink-swell can result in foundation movements	*Plasticity index tests indicate the Claygate Member to be of moderate and high volume change potential at the site and the London Clay has been confirmed to be of high volume change potential. Shrinkable clay is present within a depth that can be affected by tree roots. The proposed 4.00 m and 6.00 m deep basements are however likely to extend well below the potential depth of root action, but this should be confirmed once proposals have been finalised.*
Site within 5 m of a highway or pedestrian right of way	*The site fronts onto Wedderburn Road, but the proposed basement is set back from the road. In any case, a retention system will be adopted that maintains the stability of the excavation at all times.*
The site is located within 100 m of three former ponds, which may have been fed by a spring	*Groundwater was encountered during drilling at a depth of about 5.00 m in the rear garden from within the Claygate Member.*
Felling of trees – heave of clay soils	*Removal of trees may result in long term swelling of clay. Foundations should however bypass the zone affected by tree root activity. An arboriculturist should be consulted for advice.*
Founding depths relative to neighbours	*The house is semi-detached and the existing foundations will need to be underpinned to ensure the stability of the house and neighbouring adjoining house. The retention system will ensure the stability of the excavation and neighbouring*

Potential Impact	Site Investigation Conclusions
	properties at all times.
Change in surface runoff	*The proposed development for the site will marginally increase the amount of hard-standing and paved areas.*
Site is underlain by Secondary Aquifer – the basement may extend into the underlying aquifer and affect the groundwater flow regime	*The basement is likely to encounter water during excavation, however, the Claygate Member and London Clay beneath the site are characterised by a very low permeability and cannot store or transmit significant quantities of groundwater. It is not considered that the proposed basement would result in a significant change to the groundwater flow regime in the vicinity of the proposal.*
The proposed basement may extend beneath the water table	*Monitored water levels in the standpipes have been measured between 1.12 m and 2.05 m (99.92 m TBM and 95.67 m TBM) and groundwater inflows are likely to be encountered within the 4.0 m and 6.0 m deep basement excavations. This will be allowed for within the design. The 4.00 m deep basement is wholly within the Claygate Member. On the basis of the findings from the site investigation the 6.00 m deep basement will have a formation level near the base of the Claygate Member and may extend into the London Clay.*

The results of the site investigation have been used below to review the remaining potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

The site may be located within 100 m of former springline

On the 1871 historical map, three features inferred as ponds were located within 100 m of the site, but are no longer shown on subsequent map, dated 1896, and have supposedly been infilled.

Proposed basement *structure is located over Secondary 'A' Aquifer and may extend below groundwater table*

The ground investigation has confirmed the presence of Claygate Member strata beneath the site extending to a depth of 4.00 m (93.76 m TBM), which is in turn underlain by the London Clay. The Claygate Member is classified by the Environment Agency as a Secondary Aquifer due to the presence of sand beds in some areas. Where no sand beds are present, as is the case beneath 4 Wedderburn Road, the Claygate Member silty sandy clays have the hydrogeological properties of Non Productive strata, i.e. not capable of storing and transmitting groundwater in sufficient quantities to support baseflow to watercourses.

Groundwater has been measured within the standpipes at depths of between 1.12 m and 2.05 m (99.92 m TBM and 95.67 m TBM), however these are not necessarily representative of a water table. Shallow groundwater levels monitored within standpipes are a common feature of low permeability clay strata, as the Claygate Member has been shown to be beneath the site, and is not indicative of a consistent water table within a permeable water bearing strata.

Formation level of the 4.00 m deep basement is likely to be within the Claygate Member, although the deepened section beneath the rear garden, extending to a depth of about 6.00 m, is likely to be close to or within the London Clay.

Previous investigations have indicated that the Claygate Member has very low bulk hydraulic permeability. Movement of groundwater within the silty sandy clay of the Claygate Member

is very slow. The Claygate Member receives very low levels of annual recharge due to its lowly permeable nature and this stratum is not capable of supporting flow to any watercourses within 100 m of the site. On the basis of the above, the proposed basement would not affect the amount of annual recharge into the Claygate Member (as it is naturally very limited) and it would not result in a significant change to the groundwater flow regime in the vicinity of the proposal.

Shallow monitored groundwater levels within standpipes is a common feature of low permeability clay strata and is not necessarily indicative of a consistent water table as would be the case within a permeable water bearing strata. Thus, although the basement may extend below the monitored water levels in standpipes it is not the case that it extends below a general groundwater table.

Increase in hardstanding and paved areas

The proposed development for the site will marginally increase the amount of hard-standing and paved areas, but this will have little effect as the ground is of low permeability. The ground conditions will not be suitable for a soakaway or similar SUDS based system. It is understood that an attenuation system will be installed to store the water.

Shrink / swell potential of Claygate Member / London Clay

Shrinkable clay is present within a depth that can be affected by tree roots. Numerous trees are present on the site and desiccation was noted within the boreholes, drilled in close proximity to existing trees. The proposed single or double level basement is likely to extend well below the potential depth of root action, but this should be confirmed once proposals have been finalised.

Felling of trees – heave of clay soils

Removal of trees may result in long term swelling of clay. However the foundations of the basement will extend beyond the zone of tree root activity. A check will need to be made to ensure that the foundations of neighbouring properties are not affected if trees are removed along the perimeter of the site.

Location of public highway

A retention system will be adopted that maintains the stability of the excavation at all times.

The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties

The stability of neighbouring properties and structures will be ensured at all times, through a suitable retention system. There is nothing unusual or exceptional in the proposed development or the findings of the investigation that give rise to any concerns with regard to stability over and above any development of this nature.

A ground movement analysis should be carried out once the basement designs have been finalised in order to assess the damage to nearby neighbouring structures.

9.1 BIA Conclusion

A Basement Impact Assessment has been carried out following the information and guidance published by the London Borough of Camden. Information from a Site Investigation has been used to assess potential impacts identified by the screening process.

It is concluded that the proposed development is unlikely to result in any specific land or slope stability issues, groundwater or surface water issues.

10.0 OUTSTANDING RISKS AND ISSUES

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive, but covers the main areas where additional work is considered to be required.

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the ground conditions based on the discrete points at which the ground was sampled, but the ground conditions should be subject to review as the work proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

As discussed throughout the report, groundwater inflows are likely to be encountered during the basement excavation although groundwater monitoring should be continued to further assess groundwater levels and trial excavations should be considered to assess the extent of inflows to be expected from within the Claygate Member. It is also recommended that trial pits are undertaken to investigate the existing of the house and boundary walls prior to the excavation of the proposed basement.

If during ground works any visual or olfactory evidence of contamination is identified it is recommended that further investigation be carried out and that the risk assessment is reviewed.

A ground movement analysis is in hand and will be reported as an addendum.

These areas of doubt should be drawn to the attention of prospective contractors and further investigation will be required or sufficient contingency should be provided to cover the outstanding risk.

APPENDIX

Borehole Records

SPT Summary Sheet

Laboratory Geotechnical Test Results

SPT and Cohesion / Depth Plot

Chemical Analyses (soil)

Risk-based Generic Guideline Values

Envirocheck Extracts

Historical Maps

Site Plan

Geotechnical & Environmental Associates Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** 4 Wedderburn Road, London, NW3 5QE		**Borehole Number** **BH1**
Boring Method Cable Percussion	**Casing Diameter** 150mm cased to 2.00m	**Ground Level (mTBM)** 97.77	**Client** Amanda Shorthouse	**Job Number** J14267
	Location	**Dates** 10/10/2014	**Engineer** Heyne Tillett Steel	**Sheet** 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
					97.57	(0.20) 0.20	Tarmac surface overlying concrete		
0.30	D1				97.37	(0.20) 0.40	MADE GROUND (grey clay with fine rootlets and fragments of concrete and brick)		
0.50	B2						'Stiff' high strength orange-brown mottled grey silty sandy CLAY. Roots and carbonaceous material noted to a depth of 1.75 m. Suspected desiccated soil to a depth of about 2.45 m		
1.20-1.65 1.20	CPT N=9 D3			3,1/2,2,2,3		(2.05)			
1.75	D4								
2.00-2.45	U5			23 blows					
					95.32	2.45	Firm orange-brown mottled grey silty sandy CLAY		
2.75	D6								
3.00-3.45 3.00	SPT N=13 D7			1,2/3,3,3,4		(1.55)			
3.75	D8								
4.00-4.45	U9			28 blows	93.77	4.00	Firm brown mottled grey silty fissured clay with occasional partings of orange-brown fine sand and silt		
4.50	D10					(1.00)			
5.00	D11			Water strike(1) at 5.00m.	92.77	5.00	Firm becoming stiff fissured medium strength and high strength grey silty clay with rare partings of grey fine sand and silt and rare shell fragments		▽1
5.00-5.45	SPT N=15			1,2/3,4,4,4					
6.00	D12								
6.50-6.95	U13			35 blows					
7.50	D14								
8.00	D15			Water strike(2) at 8.00m.					▽2
8.00-8.45	SPT N=16			2,3/3,4,4,5					
9.00	D16								
9.50-9.95	U17			35 blows					

Remarks
Hand-dug trial pit to a depth of 1.20 m
One hour spent demobilising rig
One hour spent setting up rig
Standpipe installed to a depth of 10.00 m
Groundwater measured at a depth of 1.12 m on 29/10/2014
Car parked over standpipe on 10/11/2014

Scale (approx)	Logged By
1:50	HD

Figure No.
j14267.BH1

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** 4 Wedderburn Road, London, NW3 5QE		**Borehole Number** **BH1**
Boring Method Cable Percussion	**Casing Diameter** 150mm cased to 2.00m	**Ground Level (mTBM)** 97.77	**Client** Amanda Shorthouse	**Job Number** J14267
	Location	**Dates** 10/10/2014	**Engineer** Heyne Tillett Steel	**Sheet** 2/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
10.50	D18								
11.00-11.45	SPT N=23			3,4/5,5,6,7					
11.00	D19								
12.00	D20								
12.50-12.95	U21			40 blows					
13.50	D22								
14.00-14.45	CPT N=0			25,25/					
14.00	D23								
15.00	D24					(15.00)			
15.50-15.95	U25			45 blows					
16.50	D26								
17.00-17.45	SPT N=25			2,4/5,6,7,7					
17.00	D27								
18.00	D28								
18.50-18.95	U29			45 blows					
19.50	D30								
20.00-20.45	SPT N=30			2,5/6,7,8,9	77.77	20.00			

Remarks

Scale (approx)	Logged By
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Figure No.
j14267.BH1

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** 4 Wedderburn Road, London, NW3 5QE	**Borehole Number** **BH1**

Boring Method Cable Percussion	**Casing Diameter** 150mm cased to 2.00m	**Ground Level (mTBM)** 97.77	**Client** Amanda Shorthouse	**Job Number** J14267
	Location	**Dates** 10/10/2014	**Engineer** Heyne Tillett Steel	**Sheet** 3/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
20.00	D31								

Remarks	**Scale (approx)** 1:50	**Logged By** HD
	Figure No. j14267.BH1	

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Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** 4 Wedderburn Road, London, NW3 5QE		**Number** **BH2**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mTBM)** 102.02	**Client** Amanda Shorthouse	**Job Number** J14267
	Location	**Dates** 19/09/2014	**Engineer** Heyne Tillett Steel	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL / MADE GROUND (brown clayey sand with flint gravel, roots and fragments of fine brick)		
0.20	D1			101.72	0.30			
					(0.30)	MADE GROUND (brown silty sandy clay with occasional orange-brown partings of sand, flint gravel, and fragments of brick and burnt coal and ash)		
0.50	D2			101.42	0.60			
			PP(2.5)			'Stiff' orange-brown mottled greenish grey silty sandy CLAY with carbonaceous material and roots. Flint gravel noted to a depth of 0.80 m - suspected desiccated soil to a depth of 1.55 m		
1.00	D3		PP(2.5)		(0.95)			
1.50	D4		PP(3.0)	100.47	1.55	Firm orange-brown mottled greenish grey silty sandy CLAY with abundant carbonaceous material. Roots noted to a depth of 2.00 m. Decaying roots noted to 3.50 m		
2.00	D5		PP(1.5)					
2.50	D6		PP(2.0)					
					(2.65)			
3.00	D7		PP(1.5)					
3.50	D8		PP(1.0)					
4.00	D9		PP(1.5)					
				97.82	4.20			
					(0.30)	Soft to firm grey silty sandy CLAY		
4.50	D10		PP(2.0)	97.52	4.50	Firm grey silty sandy CLAY		
					(0.50)			
5.00	D11		PP(3.0)	97.02	5.00	Firm locally soft dark grey silty sandy CLAY - softened by presence of water		▽1
			Water strike(1) at 5.30m.					
5.50	D12							
					(2.00)			
6.00	D13							
6.50	D14							
7.00	D15			95.02	7.00			
						Complete at 7.00m		

Remarks
PP denotes Pocket Penetrometer reading
Standpipe (19 mm diameter) installed to a depth of 6.90 m - response zone from 1.00 m to 6.90 m
Groundwater measured at a depth of 2.09 m on 29/10/2014 and 1.90 m on 10/11/2014

Scale (approx)	**Logged By**
1:50	HD

Figure No.
J14267.BH2

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Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** 4 Wedderburn Road, London, NW3 5QE		**Number** **BH3**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mTBM)** 101.44	**Client** Amanda Shorthouse	**Job Number** J14267
	Location	**Dates** 19/09/2014	**Engineer** Heyne Tillett Steel	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
				101.29	(0.15)	TOPSOIL / MADE GROUND (dark brown silty sand with rootlets and brick fragments)		
					0.15			
					(0.35)			
0.40	D1			100.94	0.50	MADE GROUND (dark brown silty sandy CLAY with fragments of brick and ash)		
0.60	D2				(0.20)			
0.80	D3			100.74	0.70	MADE GROUND (orange-brown mottled greenish grey silty sandy CLAY with occasional fragments of brick)		
1.00	D4		PP(3.0)		(0.30)			
				100.44	1.00	MADE GROUND (brown mottled orange-brown silty sandy clay with flint gravel and occasional fragments of brick and burnt coal)		
					(0.40)			
1.50	D5		PP(1.5)	100.04	1.40	'Stiff' orange-brown mottled greenish grey silty sandy CLAY with occasional carbonaceous material and decaying rootlets- suspected dessicated soil		
2.00	D6		PP(1.5)			Firm locally soft orange-brown mottled greenish grey silty sandy CLAY with occasional carbonaceous material. Decaying rootlets noted to a depth of 2.00 m		
2.50	D7		PP(2.0)					
					(3.10)			
3.00	D8		PP(1.5)					
3.50	D9		PP(1.0)					
4.00	D10		PP(1.5)					
4.50	D11		PP(2.5)	96.94	4.50	Firm grey silty sandy CLAY		
					(0.50)			
5.00	D12		PP(3.0)	96.44	5.00	Firm locally soft dark grey silty sandy CLAY with occasional partings of dark grey sand and shell fragments from 6.50 m. Decaying roots noted to a depth of 5.50 m -softened by the presence of water		▽1
			Water strike(1) at 5.20m.					
5.50	D13							
6.00	D14				(2.00)			
6.50	D15							
7.00	D16			94.44	7.00	Complete at 7.00m		

Remarks
PP denotes Pocket Penetrometer reading
Standpipe (19 mm diameter) installed to a depth of 6.40 m - response zone from 1.00 m to 6.40 m
Groundwater measured at a depth of 1.70 m on 29/10/2014 and 1.92 on 10/11/2014

Scale (approx)	**Logged By**
1:50	HD

Figure No.
J14267.BH3

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** 4 Wedderburn Road, London, NW3 5QE	**Number** **BH4**

Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mTBM)** 100.12	**Client** Amanda Shorthouse	**Job Number** J14267
	Location	**Dates** 19/09/2014	**Engineer** Heyne Tillett Steel	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D1				(1.00)	MADE GROUND (brown silty sand with occasional pockets of clay and abundant brick fragments)		
1.00	D2		PP(1.5)	99.12	1.00	Firm locally soft orange-brown mottled greenish grey silty sandy CLAY with occasional carbonaceous material and fine to medium subrounded to subangular flint gravel at depths of 1.00 m and 2.50 m. Between 1.65 m to 1.75 m pocket of greenish grey clayey silt. Roots noted to a depth of 0.50 m		
1.50	D3		PP(1.5)					
2.00	D4		PP(1.5)					
2.50	D5		PP(2.0)		(3.30)			
3.00	D6		PP(1.75)					
3.50	D7		PP(1.75)					
4.00	D8		PP(1.5)					
4.50	D9		PP(1.5)	95.82	4.30 (0.70)	Firm locally soft brownish grey silty sandy CLAY. Pocket of brownish grey sandy silt between 4.65 m to 4.80 m. Decaying roots noted to a depth of 5.00 m		
5.00	D10		Water strike(1) at 5.00m. PP(2.5)	95.12	5.00	Firm locally soft dark grey silty sandy CLAY with rare shell fragments		▽1
5.50	D11							
6.00	D12				(2.00)			
6.50	D13							
7.00	D14			93.12	7.00	Complete at 7.00m		

Remarks
PP denotes Pocket Penetrometer reading

Scale (approx)	Logged By
1:50	HD

Figure No.
J14267.BH4

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Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Standard Penetration Test Results

Site : 4 Wedderburn Road, London, NW3 5QE

Client : Amanda Shorthouse

Engineer : Heyne Tillett Steel

Job Number J14267

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	1.20	1.35	1.65	CPT	3	1	2	2	2	3	N=9	
BH1	3.00	3.15	3.45	SPT	1	2	3	3	3	4	N=13	
BH1	5.00	5.15	5.45	SPT	1	2	3	4	4	4	N=15	
BH1	8.00	8.15	8.45	SPT	2	3	3	4	4	5	N=16	
BH1	11.00	11.15	11.45	SPT	3	4	5	5	6	7	N=23	
BH1	14.00	14.15	14.45	CPT	25	25					N=0	
BH1	17.00	17.15	17.45	SPT	2	4	5	6	7	7	N=25	
BH1	20.00	20.15	20.45	SPT	2	5	6	7	8	9	N=30	

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SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression			Chemical Tests			Other tests and comments
Borehole / Trial Pit	Sample Ref	Depth (m)	Type	Description	MC (%)	LL (%)	PL (%)	PI (%)	<425 •m (%)	Bulk Mg/m³	Dry Mg/m³	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 (g/L)	W/S Mg (mg/L)	
BH1	D11	9.00	D												7.6	0.87		
BH1	U1	2.00-2.45	U	Stiff brown silty CLAY with rare sand	23					1.97	1.60	40	183	91				
BH1	U2	4.00-4.00	U	Stiff fissured brown silty CLAY	30					1.96	1.51	80	187	94				
BH1	U3	6.50-6.95	U	Stiff fissured brownish grey silty CLAY	31					1.99	1.52	130	133	66				
BH1	U4	9.50-9.95	U	Stiff fissured brownish grey silty CLAY	27	73	27	46	100	1.95	1.54	190	136	68				
BH1	U5	12.50-12.95	U	Stiff fissured brownish grey silty CLAY	25					1.98	1.58	250	240	120				
BH1	U6	15.50-15.95	U	Stiff fissured brownish grey silty CLAY	31					1.97	1.50	310	173	86				
BH1	U7	18.50-18.95	U	Stiff fissured brownish grey silty CLAY	27					1.98	1.56	370	249	125				
BH2	D1	0.20	D												6.7	0.05		
BH2	D3	1.00	D	Dark orange and brown fine sandy CLAY with rare rootlets	23	59	22	37	100									
BH2	D4	1.50	D	Mottled brown and dark orange slightly fine sandy CLAY with rare rootlets	22													
BH2	D5	2.00	D	Mottled dark orange-brown and grey silty CLAY with rare rootlets	29	60	25	35	100									

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression			Chemical Tests			Other tests and comments
Borehole / Trial Pit	Sample Ref	Depth (m)	Type	Description	MC (%)	LL (%)	PL (%)	PI (%)	<425 •m (%)	Bulk Mg/m³	Dry Mg/m³	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 (g/L)	W/S Mg (mg/L)	
BH2	D6	2.50	D	Mottled dark orange, grey and brown silty CLAY with rare black staining	28													
BH2	D7	3.00	D	Dark orange and grey silty CLAY	28													
BH2	D8	3.50	D	Mottled dark orange, brown grey silty CLAY	25													
BH2	D9	4.00	D	Mottled dark orange, brown grey silty CLAY	25													
BH3	D2	0.60	D												6.7	0.02		
BH3	D9	3.50	D												6.5	0.14		
BH4	D2	1.00	D	Mottled brown and orange silty CLAY with rare fine to medium flint gravel and rootlets	28	65	24	41	99									
BH4	D3	1.50	D	Mottled brown, orange and grey silty CLAY	28													
BH4	D4	2.00	D	Mottled brown and grey silty CLAY	19	41	19	22	99									
BH4	D5	2.50	D	Mottled dark orange, brown and grey CLAY with rare fine flint gravel	24													
BH4	D6	3.00	D	Mottled orange, brown and grey silty CLAY	24													
BH4	D7	3.50	D	Dark orange-brown silty CLAY	28													

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

GEOLABS

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression			Chemical Tests			Other tests and comments
Borehole / Trial Pit	Sample Ref	Depth (m)	Type	Description	MC (%)	LL (%)	PL (%)	PI (%)	<425 •m (%)	Bulk Mg/m³	Dry Mg/m³	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 (g/L)	W/S Mg (mg/L)	
BH4	D8	4.00	D	Dark orange-brown and grey silty CLAY with rare orange silt	26													

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

GEOLABS

BS 1377 : Part 7 : 1990 Clause 8

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No	BH1
Sample Ref	U1
Depth (m)	2.00-2.45
Sample Type	U

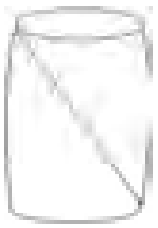
Description:

Stiff brown silty CLAY with rare sand

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.0
Diameter	(mm)	102.6
Moisture Content	(%)	23
Bulk Density	(Mg/m³)	1.97
Dry Density	(Mg/m³)	1.60
Test Details		
Latex membrane thickness	(mm)	0.30
Membrane correction	(kPa)	0.82
Axial displacement rate	(%/min)	1.98
Cell pressure	(kPa)	40
Strain at failure	(%)	13.4
Maximum Deviator Stress	(kPa)	183
Shear Stress Cu	(kPa)	91

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	120

Checked and Approved by:

S Burke

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

GEOLABS

BS 1377 : Part 7 : 1990 Clause 8

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No	BH1
Sample Ref	U2
Depth (m)	4.00-4.00
Sample Type	U

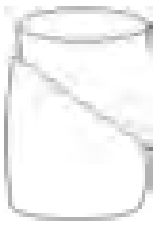
Description:

Stiff fissured brown silty CLAY

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.1
Diameter	(mm)	103.0
Moisture Content	(%)	30
Bulk Density	(Mg/m³)	1.96
Dry Density	(Mg/m³)	1.51
Test Details		
Latex membrane thickness	(mm)	0.30
Membrane correction	(kPa)	0.87
Axial displacement rate	(%/min)	1.98
Cell pressure	(kPa)	80
Strain at failure	(%)	14.3
Maximum Deviator Stress	(kPa)	187
Shear Stress Cu	(kPa)	94

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	30

Checked and Approved by:

S Burke

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

BS 1377 : Part 7 : 1990 Clause 8

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No	BH1
Sample Ref	U3
Depth (m)	6.50-6.95
Sample Type	U

Description:

Stiff fissured brownish grey silty CLAY

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	201.7
Diameter	(mm)	102.6
Moisture Content	(%)	31
Bulk Density	(Mg/m³)	1.99
Dry Density	(Mg/m³)	1.52
Test Details		
Latex membrane thickness	(mm)	0.30
Membrane correction	(kPa)	0.80
Axial displacement rate	(%/min)	1.98
Cell pressure	(kPa)	130
Strain at failure	(%)	12.9
Maximum Deviator Stress	(kPa)	133
Shear Stress Cu	(kPa)	66

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	40

Checked and Approved by:

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

BS 1377 : Part 7 : 1990 Clause 8

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No	BH1
Sample Ref	U4
Depth (m)	9.50-9.95
Sample Type	U

Description:

Stiff fissured brownish grey silty CLAY

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.0
Diameter	(mm)	102.6
Moisture Content	(%)	27
Bulk Density	(Mg/m³)	1.95
Dry Density	(Mg/m³)	1.53
Test Details		
Latex membrane thickness	(mm)	0.30
Membrane correction	(kPa)	0.26
Axial displacement rate	(%/min)	1.98
Cell pressure	(kPa)	190
Strain at failure	(%)	3.2
Maximum Deviator Stress	(kPa)	136
Shear Stress Cu	(kPa)	68

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	60

Checked and Approved by:

S Burke

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

GEOLABS

BS 1377 : Part 7 : 1990 Clause 8

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No	BH1
Sample Ref	U5
Depth (m)	12.50-12.95
Sample Type	U

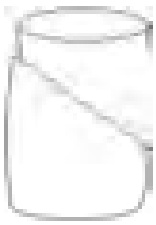
Description:

Stiff fissured brownish grey silty CLAY

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.1
Diameter	(mm)	103.4
Moisture Content	(%)	25
Bulk Density	(Mg/m³)	1.98
Dry Density	(Mg/m³)	1.58
Test Details		
Latex membrane thickness	(mm)	0.30
Membrane correction	(kPa)	0.70
Axial displacement rate	(%/min)	1.98
Cell pressure	(kPa)	250
Strain at failure	(%)	10.9
Maximum Deviator Stress	(kPa)	240
Shear Stress Cu	(kPa)	120

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	40

Checked and Approved by:

S Burke

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

GEOLABS

BS 1377 : Part 7 : 1990 Clause 8

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No	BH1
Sample Ref	U6
Depth (m)	15.50-15.95
Sample Type	U

Description:

Stiff fissured brownish grey silty CLAY

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	201.9
Diameter	(mm)	101.8
Moisture Content	(%)	31
Bulk Density	(Mg/m³)	1.97
Dry Density	(Mg/m³)	1.51
Test Details		
Latex membrane thickness	(mm)	0.30
Membrane correction	(kPa)	1.01
Axial displacement rate	(%/min)	1.98
Cell pressure	(kPa)	310
Strain at failure	(%)	17.3
Maximum Deviator Stress	(kPa)	173
Shear Stress Cu	(kPa)	86

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	40

Checked and Approved by:

S Burke

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE

J14267

GEOLABS

BS 1377 : Part 7 : 1990 Clause 8

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No	BH1
Sample Ref	U7
Depth (m)	18.50-18.95
Sample Type	U

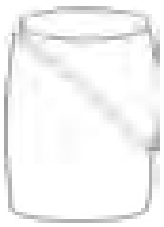
Description:

Stiff fissured brownish grey silty CLAY

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.1
Diameter	(mm)	102.6
Moisture Content	(%)	27
Bulk Density	(Mg/m³)	1.98
Dry Density	(Mg/m³)	1.55
Test Details		
Latex membrane thickness	(mm)	0.30
Membrane correction	(kPa)	0.52
Axial displacement rate	(%/min)	1.98
Cell pressure	(kPa)	370
Strain at failure	(%)	7.4
Maximum Deviator Stress	(kPa)	249
Shear Stress Cu	(kPa)	125

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	100

Checked and Approved by:

S Burke

Senior Technician
06/11/2014

Project Number:

GEO / 21874

Project Name:

4 WEDDERBURN ROAD, LONDON, NW3 5QE
J14267

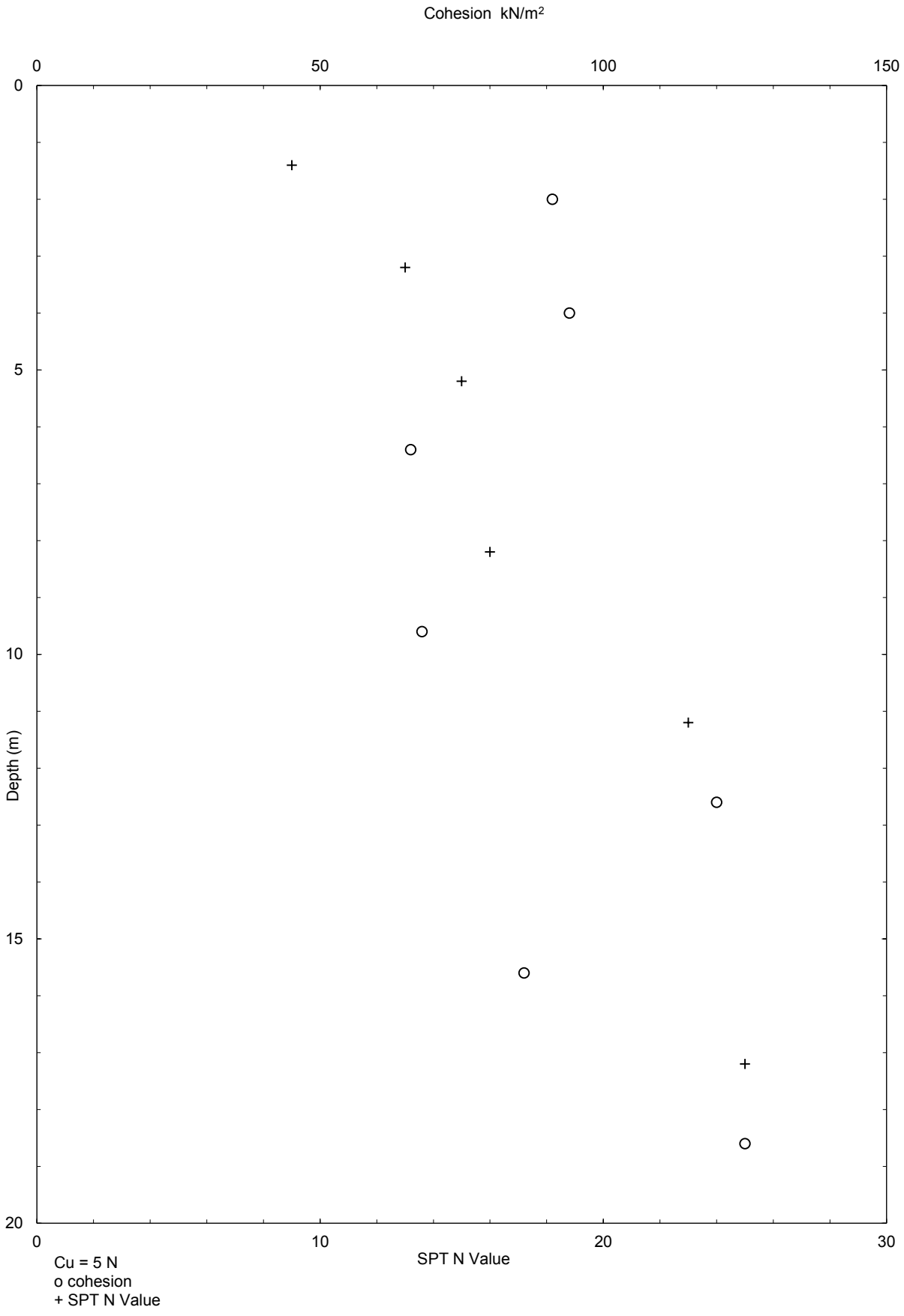
Tyttenhanger House
Coursers Road
St Albans
Herts AL4 0PG

SPT & Cohesion / Depth Graph

Site	4 Wedderburn Road, London, NW3 5QE
Client	Amanda Shorthouse
Engineer	Heyne Tillett Steel

Job Number J14267

Sheet 1 / 1



Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	14-10790 Issue-1
Initial Date of Issue:	30-Sep-14
Client:	GEA
Client Address:	Tyttenhanger House Coursers Road Saint Albans Hertfordshire AL4 0PG
Contact(s):	Hannah Dashfield
Project:	J14267 4 Wedderburn Road, London, NW3 5QE

Quotation No.:		**Date Received:**	26-Sep-14
Order No.:	J14267	**Date Instructed:**	26-Sep-14
No. of Samples:	3	**Results Due:**	30-Sep-14
Turnaround: (Weekdays)	3		
Date Approved:	30-Sep-14		

Approved By:

Details: Phil Hellier, Project Director

The results reported herein relate only to the material supplied to the laboratory.
This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Results Summary - Soil

Project: J14267 4 Wedderburn Road, London, NW3 5QE

Client: GEA		Chemtest Job No.:			14-10790	14-10790	14-10790
Quotation No.:		Chemtest Sample ID.:			52694	52695	52696
Order No.: J14267		Client Sample Ref.:					
		Client Sample ID.:			BH2	BH3	BH4
		Sample Type:			SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.40	0.50
		Bottom Depth(m):					
		Date Sampled:					
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Moisture	N	2030	%	0.02	19	17	18
Stones	N	2030	%	0.02	< 0.020	< 0.020	< 0.020
Soil Colour	N				brown	brown	black
Other Material	N				none	stones	stones
Soil Texture	N				clay	clay	loam
pH	M	2010			6.2	6.7	7.6
Chloride (Extractable)	U	2220	g/l	0.01	< 0.010	< 0.010	< 0.010
Cyanide (Total)	M	2300	mg/kg	0.5	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.5	< 0.50	< 0.50	< 0.50
Sulphate (Total)	M	2430	mg/kg	100	520	480	1200
Arsenic	M	2450	mg/kg	1	13	8.9	11
Cadmium	M	2450	mg/kg	0.1	0.17	0.13	0.26
Chromium	M	2450	mg/kg	1	37	33	18
Copper	M	2450	mg/kg	1	39	32	33
Mercury	M	2450	mg/kg	0.1	0.29	0.89	0.44
Nickel	M	2450	mg/kg	1	33	21	15
Lead	M	2450	mg/kg	1	130	220	160
Selenium	M	2450	mg/kg	0.2	< 0.20	< 0.20	< 0.20
Zinc	M	2450	mg/kg	1	100	78	100
Total Organic Carbon	M	2625	%	0.2	3.2	1.7	4.4
TPH >C5-C6	N	2670	mg/kg	1	A < 1.0	A < 1.0	A < 1.0
TPH >C6-C7	N	2670	mg/kg	1	A < 1.0	A < 1.0	A < 1.0
TPH >C7-C8	N	2670	mg/kg	1	A < 1.0	A < 1.0	A < 1.0
TPH >C8-C10	N	2670	mg/kg	1	A < 1.0	A < 1.0	A < 1.0
TPH >C10-C12	N	2670	mg/kg	1	A < 1.0	A < 1.0	A < 1.0
TPH >C12-C16	N	2670	mg/kg	1	A < 1.0	A < 1.0	A < 1.0
TPH >C16-C21	N	2670	mg/kg	1	A < 1.0	A < 1.0	A 2.0
TPH >C21-C35	N	2670	mg/kg	1	A < 1.0	A < 1.0	A < 1.0
Total TPH >C5-C35	N	2670	mg/kg	10	A < 10	A < 10	A < 10
Naphthalene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10

Results Summary - Soil

Project: J14267 4 Wedderburn Road, London, NW3 5QE

Client: GEA							
Quotation No.:				**Chemtest Job No.:**	14-10790	14-10790	14-10790
Order No.: J14267				**Chemtest Sample ID.:**	52694	52695	52696
				Client Sample Ref.:			
				Client Sample ID.:	BH2	BH3	BH4
				Sample Type:	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	0.40	0.50
				Bottom Depth(m):			
				Date Sampled:			
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Phenanthrene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.1	0.95	0.28	0.94
Pyrene	M	2700	mg/kg	0.1	1.1	0.40	0.82
Benzo[a]anthracene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2	2.1	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.3	< 0.30	< 0.30	< 0.30

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Chemtest Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Containers Received:	Deviation Code(s):
52694		BH2	None Supplied	Amber Glass 250ml	A
52694		BH2	None Supplied	Plastic Bag	A
52695		BH3	None Supplied	Amber Glass 250ml	A
52695		BH3	None Supplied	Plastic Bag	A
52696		BH4	None Supplied	Amber Glass 250ml	A
52696		BH4	None Supplied	Plastic Bag	A

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers

Sample Retention and Disposal

All soil samples will be retained for a period of 1 month following the date of the test report
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	14-13607 Issue-1
Initial Date of Issue:	10-Nov-14
Client:	GEA
Client Address:	Tyttenhanger House Coursers Road Saint Albans Hertfordshire AL4 0PG
Contact(s):	Hannah Dashfield
Project:	J14267, 4 Wedderburn Rd

Quotation No.:		**Date Received:**	06-Nov-14
Order No.:		**Date Instructed:**	06-Nov-14
No. of Samples:	1	**Results Due:**	10-Nov-14
Turnaround: (Weekdays)	3		
Date Approved:	10-Nov-14		

Approved By:

Details: Keith Jones, Technical Manager

The results reported herein relate only to the material supplied to the laboratory.
This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Results Summary - Soil

Project: J14267, 4 Wedderburn Rd

Client: GEA			**Chemtest Job No.:**		14-13607
Quotation No.:			**Chemtest Sample ID.:**		66243
Order No.:			Client Sample Ref.:		
			Client Sample ID.:		BH1
			Sample Type:		SOIL
			Top Depth (m):		0.3
			Bottom Depth(m):		
			Date Sampled:		10-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Moisture	N	2030	%	0.02	13
Stones	N	2030	%	0.02	< 0.020
Soil Colour	N				brown
Other Material	N				stones
Soil Texture	N				clay
pH	M	2010			8.7
Chloride (Extractable)	U	2220	g/l	0.01	0.034
Cyanide (Total)	M	2300	mg/kg	0.5	< 0.50
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.5	12
Sulphate (Total)	M	2430	mg/kg	100	510
Arsenic	M	2450	mg/kg	1	17
Cadmium	M	2450	mg/kg	0.1	0.13
Chromium	M	2450	mg/kg	1	19
Copper	M	2450	mg/kg	1	34
Mercury	M	2450	mg/kg	0.1	0.15
Nickel	M	2450	mg/kg	1	14
Lead	M	2450	mg/kg	1	210
Selenium	M	2450	mg/kg	0.2	< 0.20
Zinc	M	2450	mg/kg	1	87
Total Organic Carbon	M	2625	%	0.2	1.4
TPH >C5-C6	N	2670	mg/kg	1	B < 1.0
TPH >C6-C7	N	2670	mg/kg	1	B < 1.0
TPH >C7-C8	N	2670	mg/kg	1	B < 1.0
TPH >C8-C10	N	2670	mg/kg	1	B < 1.0
TPH >C10-C12	N	2670	mg/kg	1	B 2.2
TPH >C12-C16	N	2670	mg/kg	1	B 9.3
TPH >C16-C21	N	2670	mg/kg	1	B 14
TPH >C21-C35	N	2670	mg/kg	1	B 26
Total TPH >C5-C35	N	2670	mg/kg	10	B 51
Naphthalene	M	2700	mg/kg	0.1	0.12
Acenaphthylene	M	2700	mg/kg	0.1	0.16
Acenaphthene	M	2700	mg/kg	0.1	< 0.10
Fluorene	M	2700	mg/kg	0.1	0.12

Results Summary - Soil

Project: J14267, 4 Wedderburn Rd

Client: GEA			**Chemtest Job No.:**		14-13607
Quotation No.:			**Chemtest Sample ID.:**		66243
Order No.:			Client Sample Ref.:		
			Client Sample ID.:		BH1
			Sample Type:		SOIL
			Top Depth (m):		0.3
			Bottom Depth(m):		
			Date Sampled:		10-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Phenanthrene	M	2700	mg/kg	0.1	1.3
Anthracene	M	2700	mg/kg	0.1	0.28
Fluoranthene	M	2700	mg/kg	0.1	2.0
Pyrene	M	2700	mg/kg	0.1	1.9
Benzo[a]anthracene	M	2700	mg/kg	0.1	0.65
Chrysene	M	2700	mg/kg	0.1	0.43
Benzo[b]fluoranthene	M	2700	mg/kg	0.1	0.75
Benzo[k]fluoranthene	M	2700	mg/kg	0.1	0.34
Benzo[a]pyrene	M	2700	mg/kg	0.1	0.92
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.1	0.32
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.1	0.23
Benzo[g,h,i]perylene	M	2700	mg/kg	0.1	0.50
Total Of 16 PAH's	M	2700	mg/kg	2	10
Total Phenols	M	2920	mg/kg	0.3	< 0.30

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Chemtest Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Containers Received:	Deviation Code(s):
66243		BH1	10-Oct-2014	Amber Glass 250ml	B
66243		BH1	10-Oct-2014	Plastic Bag	B

Report Information

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Comments or interpretations are beyond the scope of UKAS accreditation
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Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Generic Risk-Based Soil Screening Values

Site	4 Wedderburn Road, London, NW3 5QE	**Job Number** J14267
Client	Amanda Shorthouse	**Sheet** 1 / 1
Engineer	Heyne Tillett Steel	

Proposed End Use Residential with plant uptake

Soil pH 8

Soil Organic Matter content % 6.0

Contaminant	Screening Value mg/kg	Data Source
Metals		
Arsenic	37	C4SL
Cadmium	26	C4SL
Chromium (III)	3000	LQM/CIEH
Chromium (VI)	21	C4SL
Copper	2,330	LQM/CIEH
Lead	200	C4SL
Elemental Mercury	1	SGV
Inorganic Mercury	170	SGV
Nickel	130	LQM/CIEH
Selenium	350	SGV
Zinc	3,750	LQM/CIEH
Hydrocarbons		
Benzene	0.87	C4SL
Toluene	610	SGV
Ethyl Benzene	350	SGV
Xylene	230	SGV
Aliphatic C5-C6	110	LQM/CIEH
Aliphatic C6-C8	370	LQM/CIEH
Aliphatic C8-C10	110	LQM/CIEH
Aliphatic C10-C12	540	LQM/CIEH
Aliphatic C12-C16	3000	LQM/CIEH
Aliphatic C16-C35	76,000	LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH
Aromatic C8-C10	151	LQM/CIEH
Aromatic C10-C12	346	LQM/CIEH
Aromatic C12-C16	593	LQM/CIEH
Aromatic C16-C21	770	LQM/CIEH
Aromatic C21-C35	1230	LQM/CIEH
PRO (C_5 –C_{10})	1352	Calc
DRO (C_{12} –C_{28})	80,363	Calc
Lube Oil (C_{28} –C_{44})	77,230	Calc
TPH	**1000**	Trigger for speciated testing

Contaminant	Screening Value mg/kg	Data Source
Anions		
Soluble Sulphate	0.5 g/l	Structures
Sulphide	50	Structures
Chloride	400	Structures
Others		
Organic Carbon (%)	6	Methanogenic potential
Total Cyanide	140	WRAS
Total Mono Phenols	420	SGV
PAH		
Naphthalene	12.40	Rev. LQM/CIEH
Acenaphthylene	850	LQM/CIEH
Acenaphthene	1,000	LQM/CIEH
Fluorene	780	LQM/CIEH
Phenanthrene	380	LQM/CIEH
Anthracene	9,200	LQM/CIEH
Fluoranthene	670	LQM/CIEH
Pyrene	1,600	LQM/CIEH
Benzo(a) Anthracene	8.7	Rev. LQM/CIEH
Chrysene	14	Rev. LQM/CIEH
Benzo(b) Fluoranthene	10.5	Rev. LQM/CIEH
Benzo(k) Fluoranthene	15.0	Rev. LQM/CIEH
Benzo(a) pyrene	5.00	C4SL
Indeno(1 2 3 cd) Pyrene	6.2	Rev. LQM/CIEH
Dibenzo(a h) Anthracene	1.35	Rev. LQM/CIEH
Benzo (g h i) Perylene	71	Rev. LQM/CIEH
Screening value for PAH	**71.4**	B(a)P / 0.15
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	28	LQM/CIEH
tetrachloroethane (PCA)	4.8	LQM/CIEH
tetrachloroethene (PCE)	4.8	LQM/CIEH
trichloroethene (TCE)	0.49	LQM/CIEH
1,2-dichloroethane (DCA)	0.014	LQM/CIEH
vinyl chloride (Chloroethene)	0.00099	LQM/CIEH
tetrachloromethane (Carbon tetra	0.089	LQM/CIEH
trichloromethane (Chloroform)	2.7	LQM/CIEH

Notes

Concentrations measured below the above values may be considered to represent 'uncontaminated conditions' which pose 'LOW' risk to human health. Concentrations measured in excess of these valuesindicate a potential risk which require further, site specific risk assessment.

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009

LQM/CIEH - Generic Assessment Criteria for Human Health Risk Assessment 2nd edition (2009)derived using CLEA 1.04 model 2009

C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk

Rev LQM/CIEH calculated using C4SL revisions to exposure assessment but LQM/CIEH health croiteria values

Calc - sum of nearest available carbon range specified including BTEX for PRO fraction

B(a)P / 0.15 - GEA experince indicates that Benzo(a) pyrene (one of the most common and most carcenogenic of the PAHs) rarely exceeds 15% of the total PAH concentration, hence this Total PAH threshold is regarded as being conservative

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
60268981_1_1

Customer Reference:
J14267

National Grid Reference:
526810, 185220

Slice:
A

Site Area (Ha):
0.09

Search Buffer (m):
1000

Site Details:

4 Wedderburn Road
LONDON
NW3 5QE

Client Details:

Mr S Branch
GEA Ltd
Tyttenhanger House
Coursers Road
St Albans
Herts
AL4 0PG

Contents

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v49.0

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents					
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 1		1	1	13
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 3				Yes
Pollution Incidents to Controlled Waters					
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances	pg 3				37
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 9				1
Water Abstractions	pg 9				4 (*3)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 11	Yes	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 11	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones	pg 11				1
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Detailed River Network Lines	pg 12			Yes	n/a
Detailed River Network Offline Drainage					n/a

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites	pg 13				1
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites	pg 13				2
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS 1:625,000 Solid Geology	pg 14	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 14	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 16		Yes	Yes	Yes
BGS Urban Soil Chemistry Averages	pg 19	Yes			
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 19	Yes	Yes	n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 20	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 20	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 20	Yes	Yes	n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Industrial Land Use					
Contemporary Trade Directory Entries	pg 21		1	28	146
Fuel Station Entries	pg 35			1	1
Sensitive Land Use					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves	pg 36				1
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Local Authority Pollution Prevention and Controls** Name: Pyramid Cleaners Location: 52 Besize Lane, London, Nw3 5ar Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC8 Dated: 1st January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A13SE (S)	207	3	526872 184985
2	**Local Authority Pollution Prevention and Controls** Name: Belsize Park Service Station Location: 215 Haverstock Hill, LONDON, NW3 4RE Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC21 Dated: 2nd January 1999 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status: Permitted** Positional Accuracy: Automatically positioned to the address	A14NW (E)	358	3	527187 185227
3	**Local Authority Pollution Prevention and Controls** Name: The Royal Free Hospital Location: Pond Street, LONDON, NW3 2QG Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 24th July 1992 Process Type: Local Authority Air Pollution Control Description: PG5/1Clinical waste incineration processes under 1 tonne an hour **Status: Authorisation revokedRevoked** Positional Accuracy: Manually positioned to the address or location	A14NW (E)	514	3	527296 185410
4	**Local Authority Pollution Prevention and Controls** Name: Perkins Dry Cleaners Location: 171 Haverstock Hill, London, Nw3 4qs Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC7 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	529	3	527342 185055
4	**Local Authority Pollution Prevention and Controls** Name: Swan Dry Cleaners Location: 163 Haverstock Hill, London, Nw3 4qt Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC42 Dated: 24th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	563	3	527371 185032
5	**Local Authority Pollution Prevention and Controls** Name: Perkins Dry Cleaners Location: 40 Heath Street, London, Nw3 6te Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC9 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A17SE (NW)	637	3	526374 185724
6	**Local Authority Pollution Prevention and Controls** Name: Hampstead Express Dry Cleaning Location: 279a Finchley Road, London, Nw3 6lt Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC6 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A12SE (SW)	702	3	526178 184902

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Thames Water Utilities Ltd Licence Number: 28/39/39/0231 Permit Version: 1 Location: Barrow Hill Pumping Station - Borehole Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Barrow Hill Pumping Station Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4SE (SE)	1704	5	527640 183690
	Water Abstractions Operator: Thames Water Utilities Ltd Licence Number: 28/39/39/0202 Permit Version: 1 Location: Barrow Hill Pumping Station - Borehole Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Barrow Hill Pumping Station Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 26th September 2002 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A4SE (SE)	1704	5	527640 183690
	Groundwater Vulnerability Soil Classification: Soils of High Leaching Potential (U) - Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) assumed, until proved otherwise Map Sheet: Sheet 39 West London Scale: 1:100,000	A13NE (NW)	0	5	526813 185218
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 39 West London Scale: 1:100,000	A13SE (SE)	0	5	526826 185201
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A13NE (NW)	0	2	526813 185218
	Superficial Aquifer Designations No Data Available				
18	**Source Protection Zones** Name: Barrow Hill Source: Environment Agency, Head Office Reference: Th405 Type: Zone II (Outer Protection Zone): Either 25% of the source area or a 400 day travel time whichever is greater.	A8NE (S)	553	5	526927 184642
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: St Agnes's Well Hydrographic Area: D006 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14SW (E)	380	5	527211 185204
	Detailed River Network Offline Drainage None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
20	**Historical Landfill Sites** Licence Holder: Not Supplied Location: London NW6 Name: Canfield Place Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD12043 First Input Date: Not Supplied Last Input Date: Not Supplied Specified Waste Type: Not Supplied EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: Not Supplied BGS Ref: Not Supplied Other Ref: DON009	A7NW (SW)	836	5	526072 184813
	Local Authority Landfill Coverage Name: London Borough of Camden - Has no landfill data to supply		0	8	526813 185218
21	**Registered Waste Transfer Sites** Licence Holder: P B Donoghue Licence Reference: DL140 Site Location: BR Goods Yard at 269 Finchley Road, CAMDEN, London, NW3 Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Transfer Max Input Rate: Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 1st February 1992 Preceded By Licence: DL140 Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Lwra Cat. A = Inert Wastes; Lwra Cat. Bi Gen.Non-Putresc; Max.Waste Permitted By Licence-Stated Prohibited Waste: Clinical - As In Coll/Disp.Regs Of '88; Liquid/Slurry/Sludge Wastes; Poisonous, Noxious, Polluting Wastes; Special Wastes; Waste N.O.S.	A7NE (SW)	741	5	526200 184780
21	**Registered Waste Transfer Sites** Licence Holder: P B Donoghue Licence Reference: DL140 Site Location: BR Goods Yard, 269 Finchley Road, CAMDEN, London, NW3 Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Transfer Max Input Rate: Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Record supersededSuperseded Dated: 1st August 1983 Preceded By Licence: Not Given Superseded By Licence: DL140 Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Commercial Waste; Construction Ind. Wastes; Max.Waste Permitted By Licence(Stated) Prohibited Waste: Clinical Waste -Clause 2 & 4 Hsc 1982; Notifiable Wastes; Putrescible Waste; Special Wastes	A7NE (SW)	741	5	526200 184780

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: London Clay	A13NE (NW)	0	2	526813 185218
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13NE (NW)	0	6	526813 185218
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SE (SE)	73	6	526877 185132
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13NE (E)	169	6	527000 185218
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SE (S)	185	6	526813 185000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13NE (NE)	213	6	527000 185339
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SE (SE)	254	6	527000 185000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13NW (NW)	333	6	526546 185467
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18NE (N)	749	6	526813 186000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18NE (N)	765	6	527000 185991
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18NE (N)	774	6	527000 186000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18NE (N)	778	6	527016 186000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	794	6	526000 185218

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12NW (W)	798	6	526000 185329
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18NW (N)	803	6	526517 186000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A12SW (W)	831	6	526000 185000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A17SW (NW)	920	6	526000 185710
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526763, 185153 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 18.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 55.00 mg/kg Lead Measured Concentration: 618.00 mg/kg Nickel Measured Concentration: 22.00 mg/kg	A13SW (SW)	66	2	526763 185153
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526732, 185657 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 40.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 97.00 mg/kg Lead Measured Concentration: 660.00 mg/kg Nickel Measured Concentration: 34.00 mg/kg	A18SW (N)	412	2	526732 185657

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527216, 185357 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 20.00 mg/kg Cadmium Measured Concentration: 0.80 mg/kg Chromium Measured Concentration: 97.00 mg/kg Lead Measured Concentration: 626.00 mg/kg Nickel Measured Concentration: 28.00 mg/kg	A14NW (E)	420	2	527216 185357
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526703, 184701 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 33.00 mg/kg Cadmium Measured Concentration: 0.70 mg/kg Chromium Measured Concentration: 79.00 mg/kg Lead Measured Concentration: 770.00 mg/kg Nickel Measured Concentration: 44.00 mg/kg	A8NW (S)	498	2	526703 184701
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527169, 184808 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 21.00 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 83.00 mg/kg Lead Measured Concentration: 2154.00 mg/kg Nickel Measured Concentration: 35.00 mg/kg	A9NW (SE)	510	2	527169 184808
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526278, 185352 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 25.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 122.00 mg/kg Lead Measured Concentration: 274.00 mg/kg Nickel Measured Concentration: 20.00 mg/kg	A12NE (W)	527	2	526278 185352
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527233, 185694 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 32.00 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 126.00 mg/kg Lead Measured Concentration: 478.00 mg/kg Nickel Measured Concentration: 46.00 mg/kg	A19SW (NE)	615	2	527233 185694

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527207, 184291 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 13.00 mg/kg Cadmium Measured Concentration: 0.70 mg/kg Chromium Measured Concentration: 81.00 mg/kg Lead Measured Concentration: 714.00 mg/kg Nickel Measured Concentration: 26.00 mg/kg	A9SW (SE)	974	2	527207 184291
	BGS Urban Soil Chemistry Averages Source: British Geological Survey, National Geoscience Information Service Sample Area: London Count Id: 7189 Arsenic Minimum Concentration: 1.00 mg/kg Arsenic Average Concentration: 17.00 mg/kg Arsenic Maximum Concentration: 161.00 mg/kg Cadmium Minimum Concentration: 0.30 mg/kg Cadmium Average Concentration: 0.90 mg/kg Cadmium Maximum Concentration: 165.20 mg/kg Chromium Minimum Concentration: 13.00 mg/kg Chromium Average Concentration: 79.00 mg/kg Chromium Maximum Concentration: 2094.00 mg/kg Lead Minimum Concentration: 11.00 mg/kg Lead Average Concentration: 280.00 mg/kg Lead Maximum Concentration: 10000.00 mg/kg Nickel Minimum Concentration: 2.00 mg/kg Nickel Average Concentration: 28.00 mg/kg Nickel Maximum Concentration: 506.00 mg/kg	A13NE (NW)	0	2	526813 185218
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	185	2	526813 185000
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	185	2	526813 185000
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	185	2	526813 185000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	185	2	526813 185000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	73	2	526877 185132
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	185	2	526813 185000
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	185	2	526813 185000
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13NE (NW)	0	2	526813 185218

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
22	**Contemporary Trade Directory Entries** Name: Pyramid Location: 52, Belsize Lane, London, NW3 5AR Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (S)	208	-	526874 184984
23	**Contemporary Trade Directory Entries** Name: Tenancy Cleaners London Location: 4, Shepherds Walk, London, NW3 5UE Classification: Cleaning Services - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NW (N)	268	-	526744 185512
24	**Contemporary Trade Directory Entries** Name: Comac Motors Location: 19, Daleham Mews, London, NW3 5DB Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	278	-	526770 184911
24	**Contemporary Trade Directory Entries** Name: Continental Autos Location: 10, Daleham Mews, London, NW3 5DB Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	278	-	526749 184917
24	**Contemporary Trade Directory Entries** Name: Daleham Garage Location: 14, Daleham Mews, London, NW3 5DB Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (S)	300	-	526749 184894
24	**Contemporary Trade Directory Entries** Name: Smoother You Ltd Location: 1, McCrone Mews, Belsize Lane, London, NW3 5BG Classification: Electrolysis **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (S)	304	-	526777 184884
24	**Contemporary Trade Directory Entries** Name: Auto Reliant Suspension Co Location: 25, Daleham Mews, London, NW3 5DB Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	306	-	526768 184884
25	**Contemporary Trade Directory Entries** Name: Gems Dry Cleaning Co Ltd Location: 90, Belsize Lane, London, NW3 5BE Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	317	-	526784 184870
25	**Contemporary Trade Directory Entries** Name: Mr Lewis Cohens Fry Cleaning Co Location: 90, Belsize Lane, London, NW3 5BE Classification: Dry Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8NW (S)	317	-	526784 184870
26	**Contemporary Trade Directory Entries** Name: Hampstead Cleaners Location: 63, Rosslyn Hill, London, NW3 5UQ Classification: Carpet, Curtain & Upholstery Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SW (N)	332	-	526714 185571
27	**Contemporary Trade Directory Entries** Name: Bang & Olufsen Location: 44, Rosslyn Hill, London, NW3 1NH Classification: Electrical Goods Sales, Manufacturers & Wholesalers **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SW (N)	349	-	526764 185598
27	**Contemporary Trade Directory Entries** Name: Lily'S Kitchen Location: 6, Rosslyn Mews, London, NW3 1NN Classification: Pet Foods & Animal Feeds **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18SW (N)	362	-	526769 185611

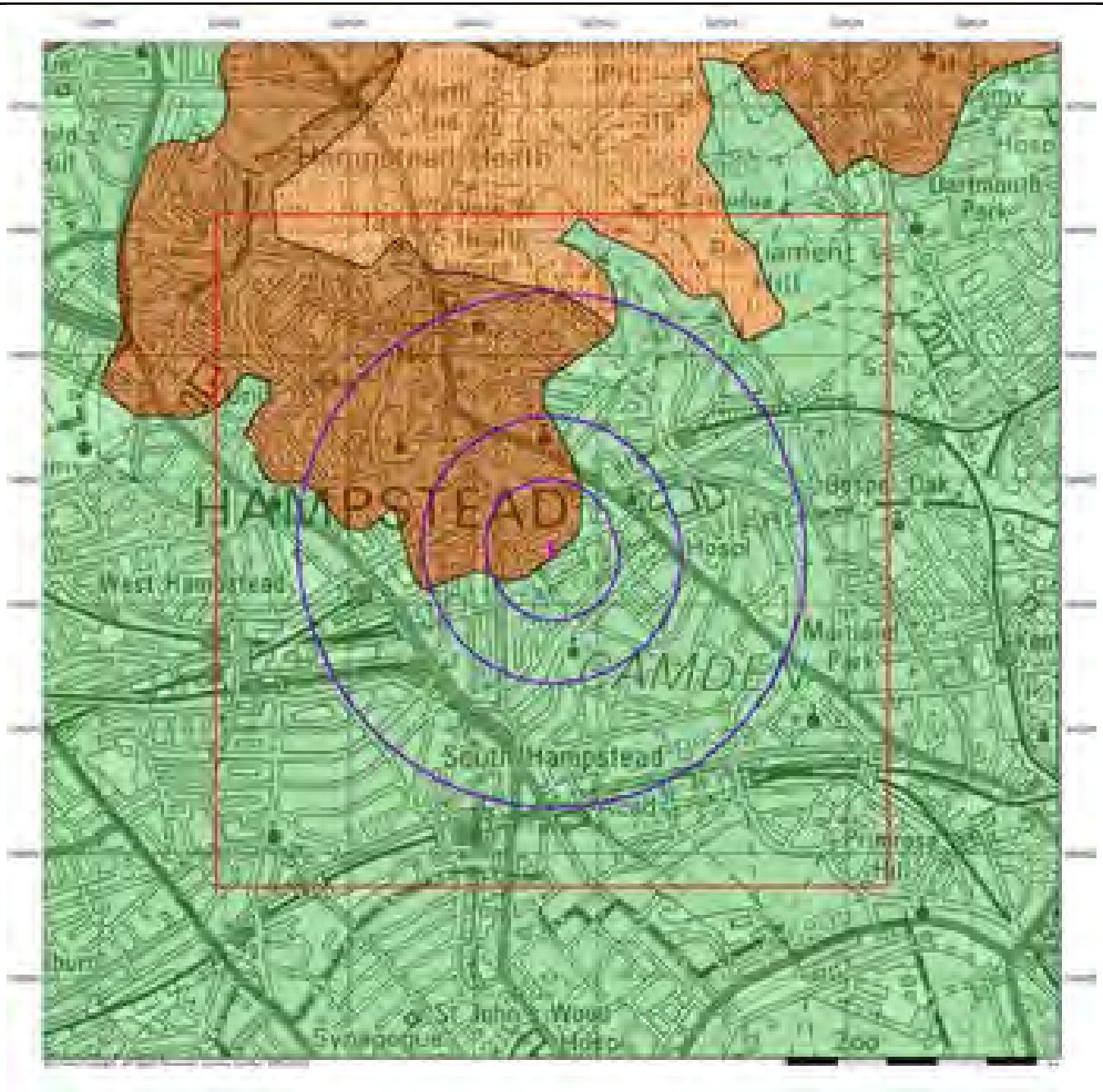
Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
95	**Contemporary Trade Directory Entries** Name: Cleaning Services (Belsize Park) Location: 64, Parkhill Road, London, NW3 2YT Classification: Cleaning Services - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SE (E)	930	-	527761 185189
96	**Contemporary Trade Directory Entries** Name: Kara Services Location: 38, Fellows Road, London, NW3 3LH Classification: Cleaning Services - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A9SW (SE)	936	-	527417 184459
97	**Contemporary Trade Directory Entries** Name: Scotts Location: Flat 15, Bray, Fellows Road, London, NW3 3JX Classification: Cabinet Makers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9SW (SE)	949	-	527247 184337
98	**Contemporary Trade Directory Entries** Name: Plycraft Industries Location: 7, Parkhill Road, London, NW3 2YH Classification: Furniture Manufacturers - Home & Office **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (E)	962	-	527746 184892
99	**Contemporary Trade Directory Entries** Name: Cincimanio Location: 60, Dunboyne Road, London, NW3 2YY Classification: Architectural Woodwork **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14NE (E)	967	-	527784 185355
99	**Contemporary Trade Directory Entries** Name: A M Location: 71, Dunboyne Road, London, NW3 2YY Classification: Waste Disposal Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NE (E)	978	-	527795 185357
100	**Contemporary Trade Directory Entries** Name: Zerodegree Location: Flat 5, 1, Winchester Mews, London, NW3 3NH Classification: Air Conditioning & Refrigeration Contractors **Status: Active** Positional Accuracy: Automatically positioned to the address	A3NE (S)	982	-	526819 184203
101	**Contemporary Trade Directory Entries** Name: All Rubbish Cleared Location: Redington Rd, London, NW3 7QX Classification: Rubbish Clearance **Status: Active** Positional Accuracy: Manually positioned to the road within the address or location	A17SW (NW)	983	-	525919 185694
102	**Fuel Station Entries** Name: Belsize Park Service Station Location: Belzier Park Service Station, 215, Haverstock Hill, London, NW3 4QE Brand: BP Premises Type: Petrol Station **Status: Open** Positional Accuracy: Automatically positioned to the address	A14NW (E)	358	-	527187 185227
103	**Fuel Station Entries** Name: Hampstead Connect Location: 104a, Finchley Road, London, NW3 5EY Brand: BP Premises Type: Petrol Station **Status: Open** Positional Accuracy: Automatically positioned to the address	A7NE (SW)	721	-	526471 184554

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
104	**Local Nature Reserves** Name: Belsize Wood Multiple Area: N Area (m2): 2722.98 Source: Natural England Designation Date: 28th March 2012	A14NW (E)	650	7	527475 185277

Useful Contacts

Contact	Name and Address	Contact Details
2	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
3	**London Borough of Camden - Pollution Projects Team** Seventh Floor, Town Hall Extension, Argyle Street, London, WC1H 8EQ	Telephone: 020 7278 4444 Fax: 020 7860 5713 Website: www.camden.gov.uk
4	**London Borough of Waltham Forest - Environmental Health Department** 154 Blackhorse Road, Walthamstow, London, E17 6NW	Telephone: 020 8496 3000 Fax: 0181 524 8960 Website: www.lbwf.gov.uk
5	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
6	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmark.co.uk Website: www.landmarkinfo.co.uk
7	**Natural England** Suite D, Unex House, Bourges Boulevard, Peterborough, Cambridgeshire, PE1 1NG	Telephone: 0845 600 3078 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
8	**London Borough of Camden** Town Hall, Judd Street, London, WC1H 9JE	Telephone: 020 7974 4444 Fax: 020 7974 6866 Email: info@camden.gov.uk Website: www.camden.gov.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

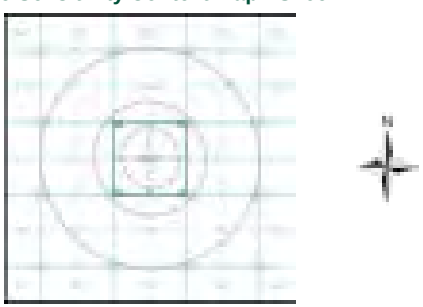
Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.



GEA Geotechnical & Environmental Associates

Groundwater Vulnerability

Site Sensitivity Context Map - Slice A



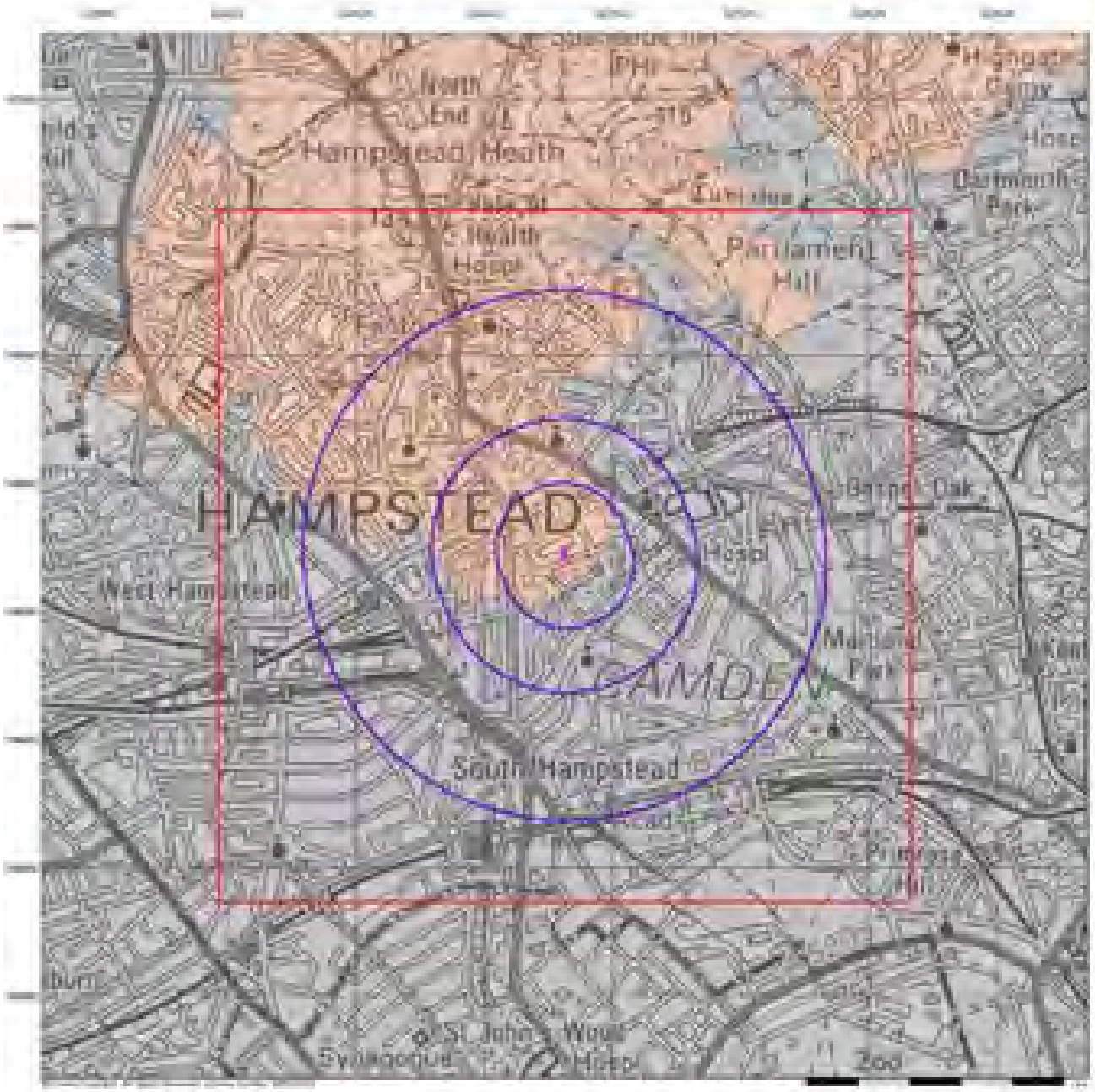
Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

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



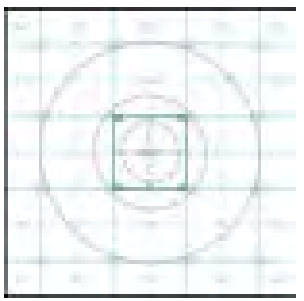
GEA Geotechnical & Environmental Associates

Bedrock Aquifer Designation

Agency and Hydrological

Geological Classes

Site Sensitivity Context Map - Slice A



Order Details

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Customer Ref:	J14267
National Grid Reference:	526810, 185220
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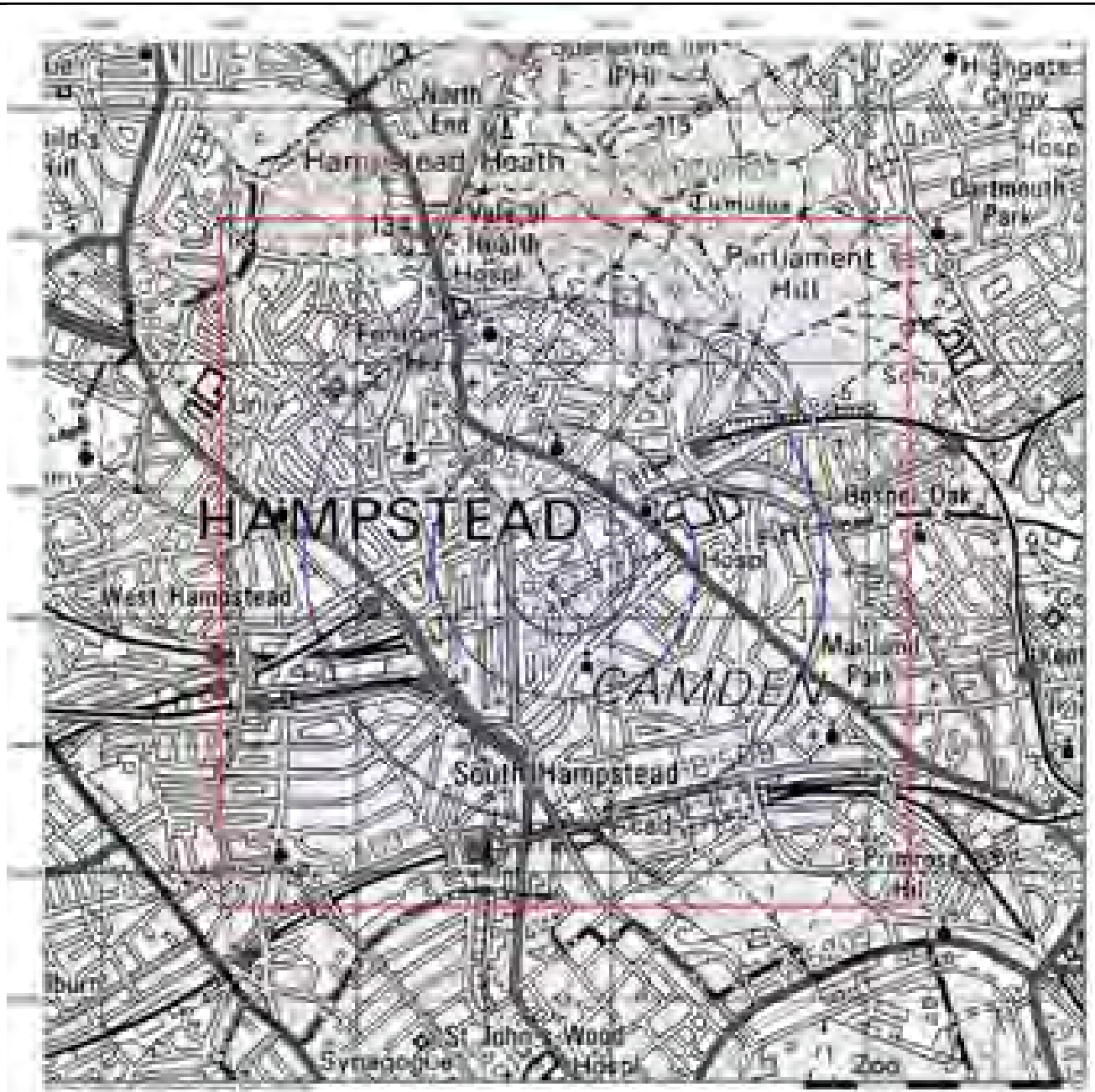
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

4 Wedderburn Road, LONDON, NW3 5QE



GEA Geotechnical & Environmental Associates

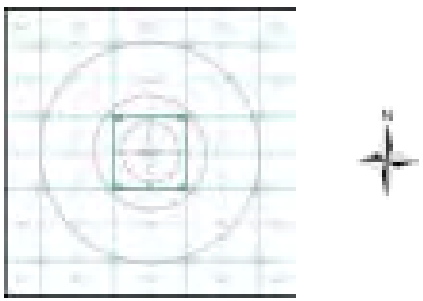
Superficial Aquifer Designation

General

Agency and Hydrological

Geological Classes

Site Sensitivity Context Map - Slice A



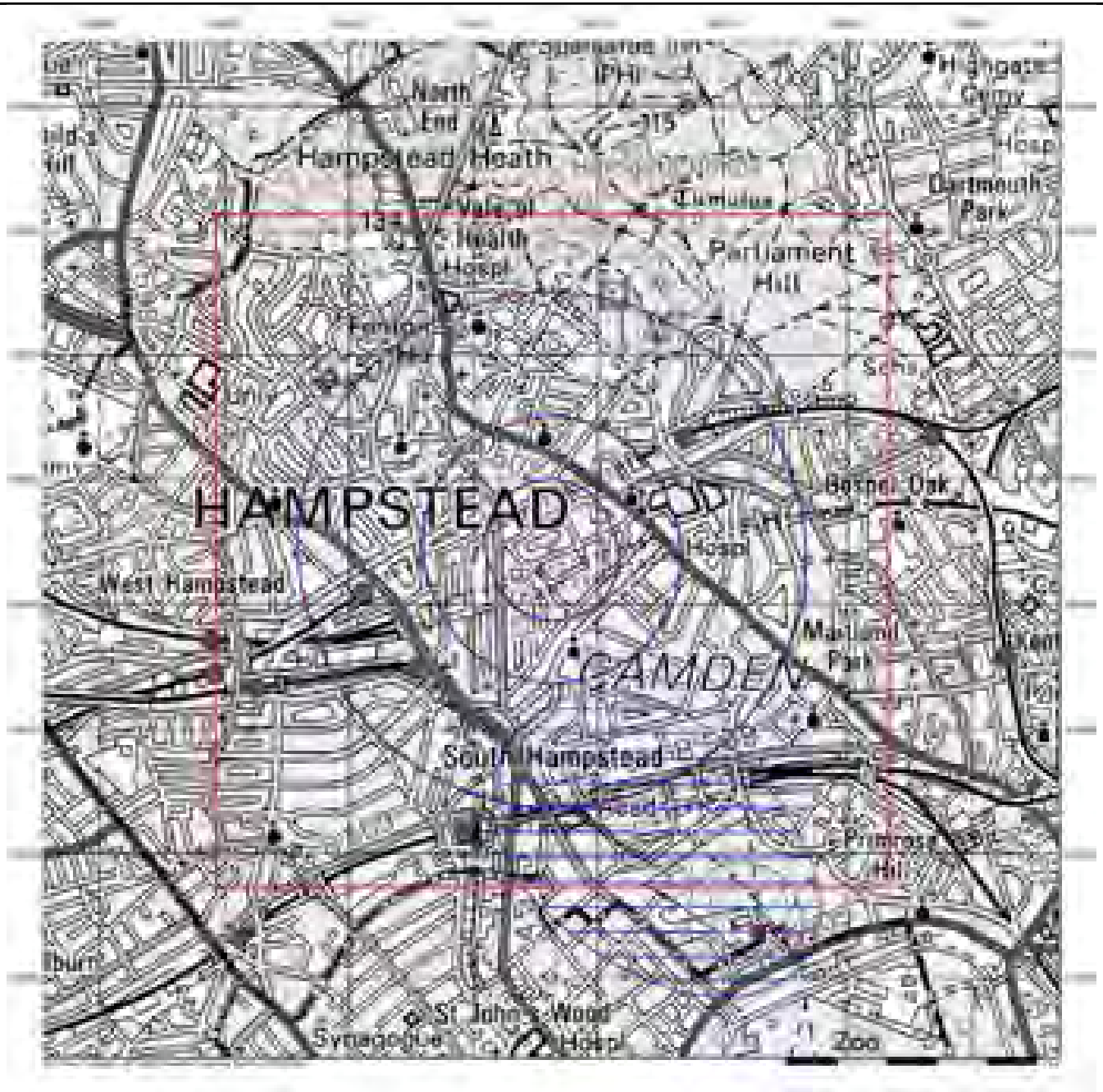
Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

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



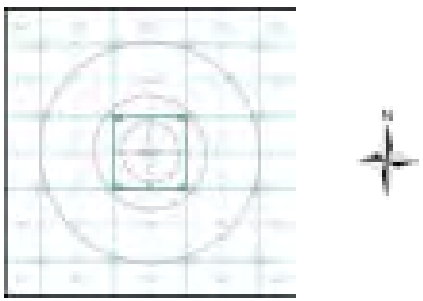
GEA Geotechnical & Environmental Associates

Source Protection Zones

General

Agency and Hydrological

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

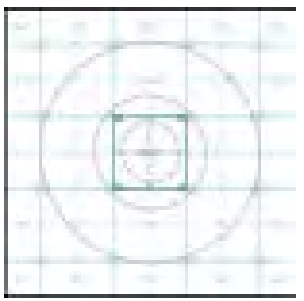
GEA Geotechnical & Environmental Associates

Sensitive Land Uses

General

Sensitive Land Uses

Site Sensitivity Context Map - Slice A



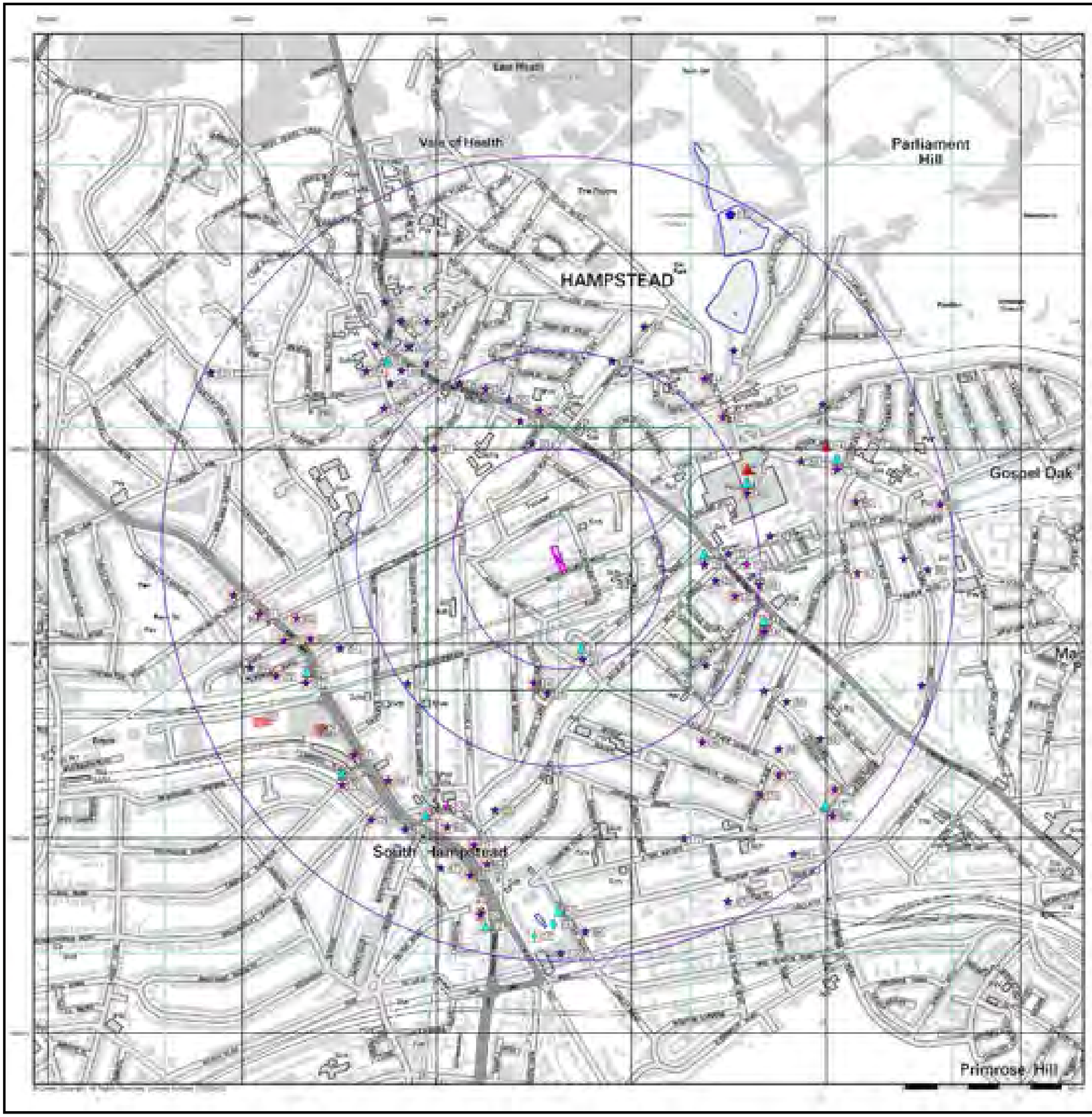
Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

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



GEA Geotechnical & Environmental Associates

General

Agency and Hydrological

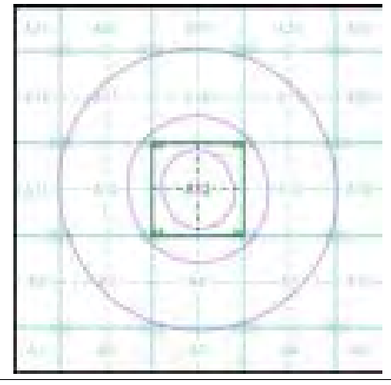
Waste

Geological

Industrial Land Use

Hazardous Substances

Site Sensitivity Map - Slice A



Order Details

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National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

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Landmark
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Geotechnical & Environmental Associates

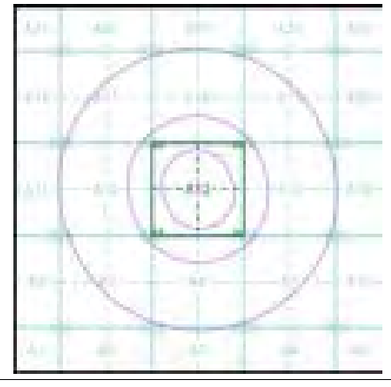
General

- Searched Site
- Searched Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 3)
- Flooding from Rivers or Sea without Defences (Zone 2)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

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

Geotechnical & Environmental Associates

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

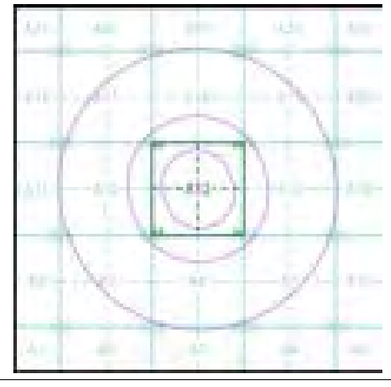
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

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GEA Geotechnical & Environmental Associates

General

- Specified Site
- Specified Buffer(s)
- Nearby Reference Point(s)
- Map ID

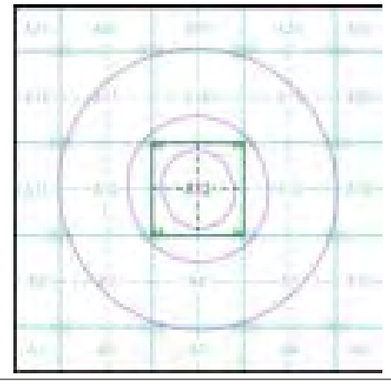
Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Underlined River
- Lake/Reservoir
- Offline Drainage Feature(s)
- Embanked Culvert (grease River ID no.)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Contours (lengths in metres)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

EA/NRW Detailed River Network Map - Slice A



Order Details

Order Number:	60268981_1_1
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National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

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GEA Geotechnical & Environmental Associates

General

Agency and Hydrological

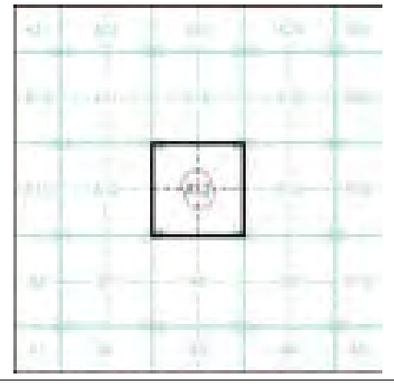
Waste

Geological

Hazardous Substances

Industrial Land Use

Site Sensitivity Map - Segment A13



Order Details

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National Grid Reference:	526810, 185220
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Site Details

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Landmark
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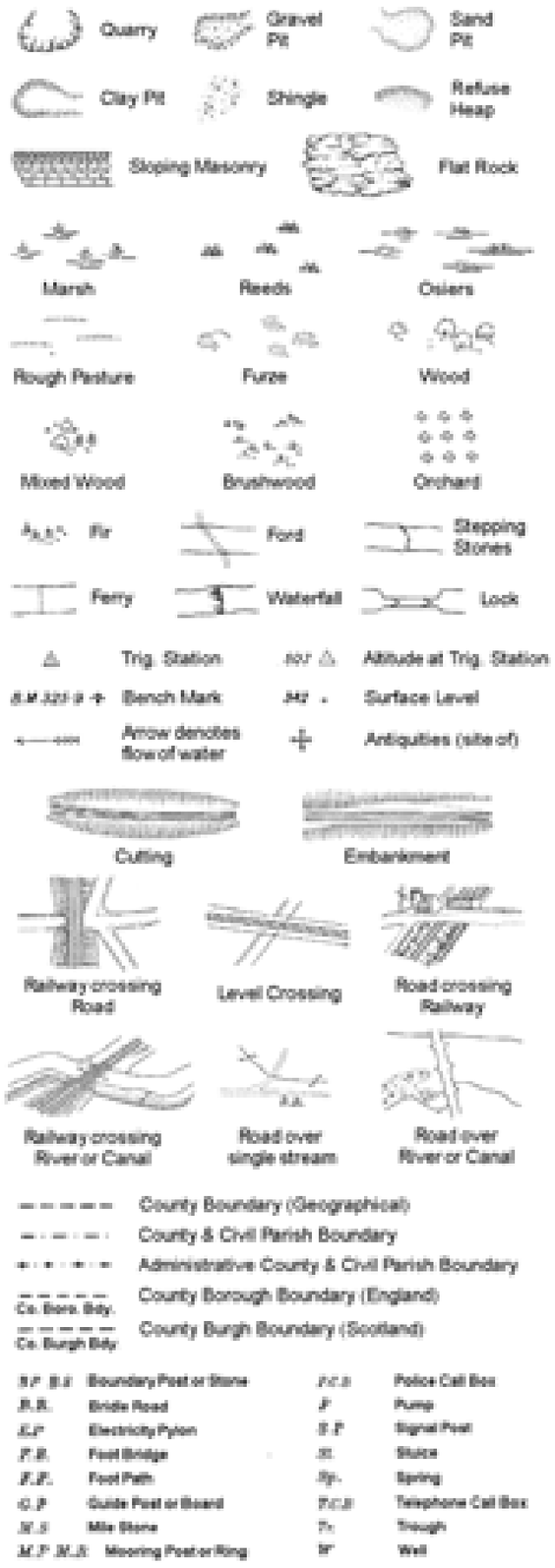
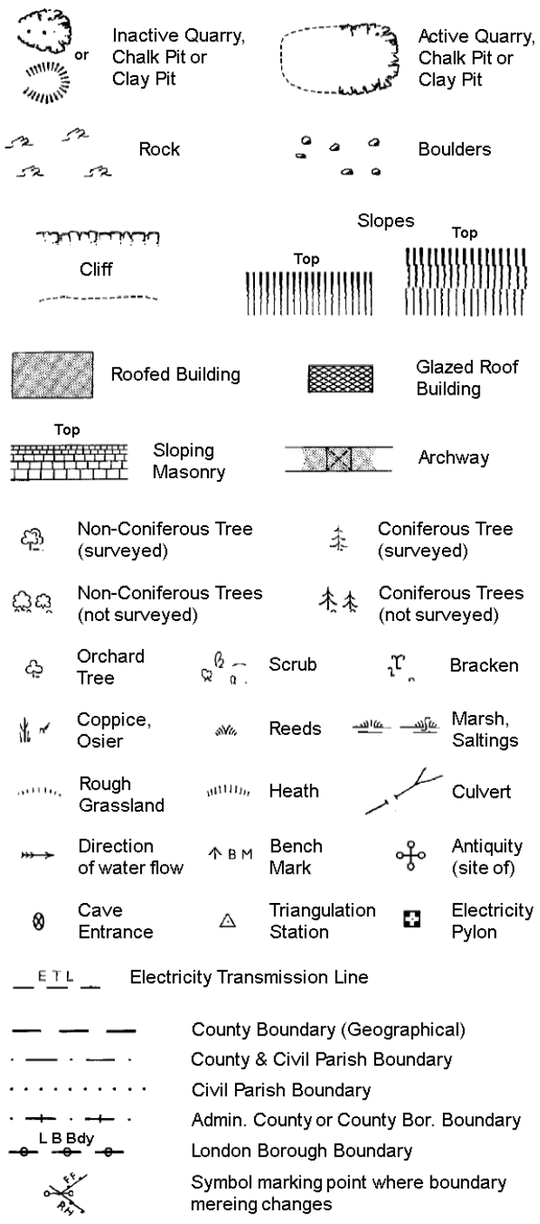
Historical Mapping Legends

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

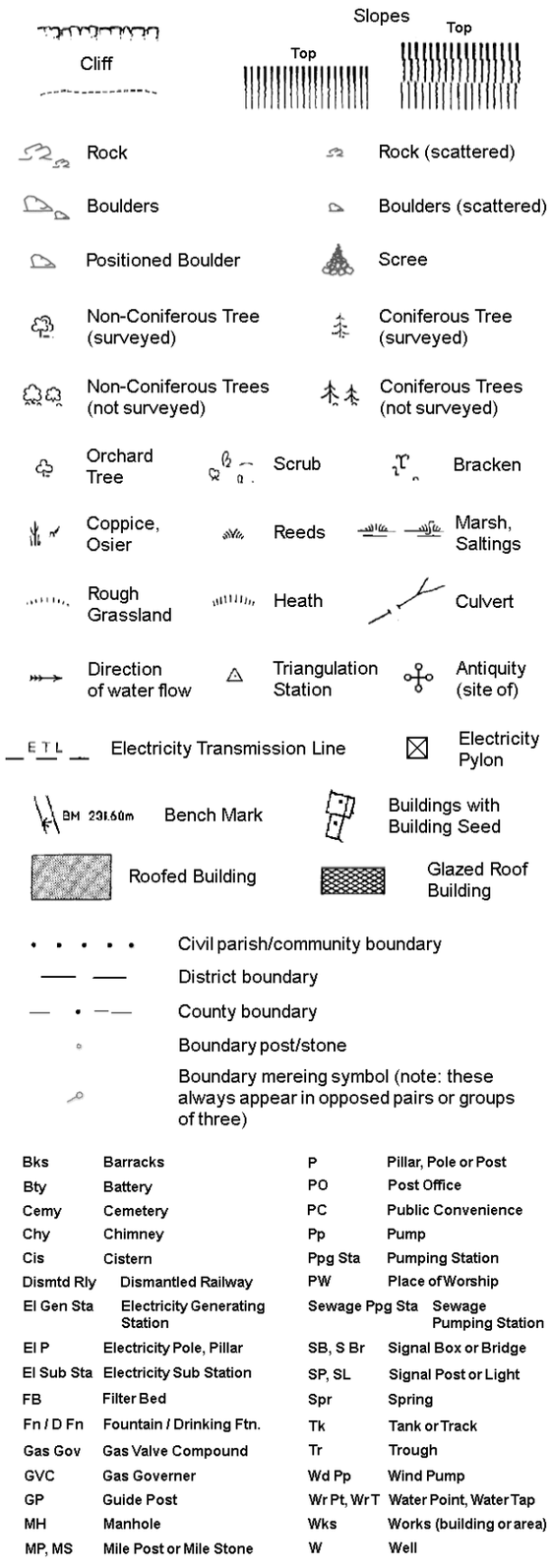


Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



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
El 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

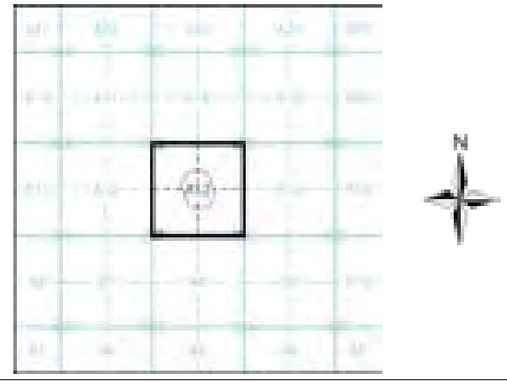


Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El 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 Governer	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

GEA Geotechnical & Environmental Associates

Historical Mapping & Photography included:

Historical Map - Segment A13



Order Details

Order Number: 60268981_1_1
Customer Ref: J14267
National Grid Reference: 526810, 185220
Slice: A
Site Area (Ha): 0.09
Search Buffer (m): 100

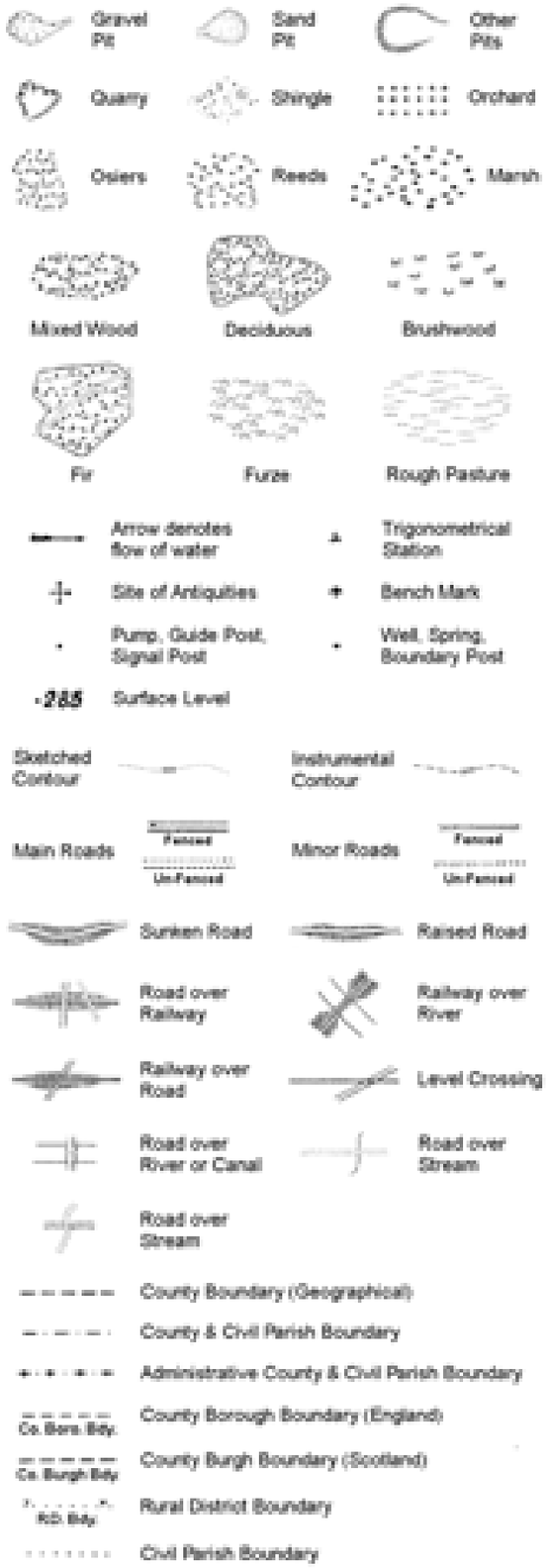
Site Details

4 Wedderburn Road, LONDON, NW3 5QE

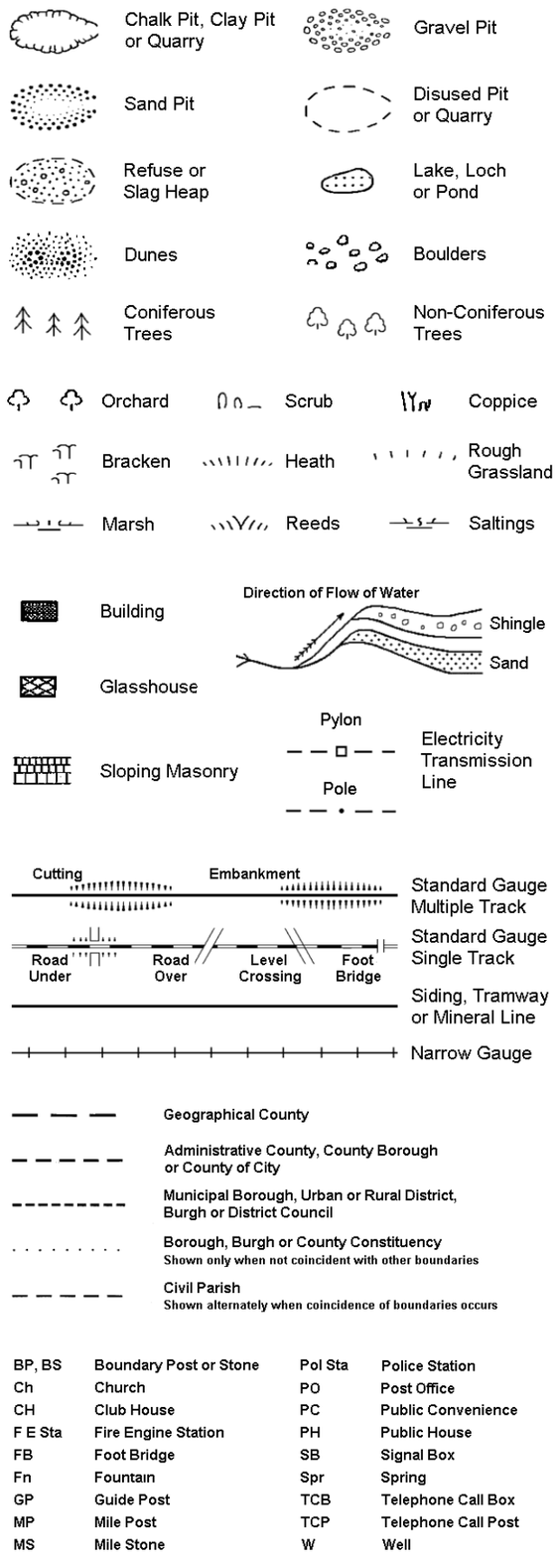
Landmark
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Historical Mapping Legends

Ordnance Survey County Series 1:10,560



Ordnance Survey Plan 1:10,000



BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

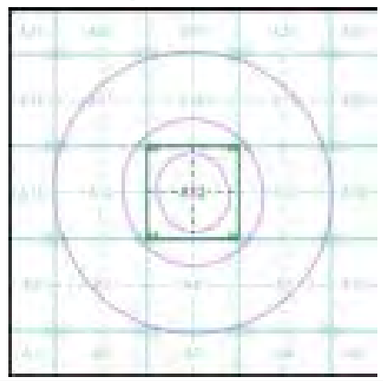
1:10,000 Raster Mapping

GEA Geotechnical & Environmental Associates

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Middlesex	1:10,560	1873 - 1882	3
Middlesex	1:10,560	1879	4
London	1:10,560	1896	5
Essex	1:10,560	1920	6
London	1:10,560	1920	7
Essex	1:10,560	1938	8
London	1:10,560	1938	9
Historical Aerial Photography	1:10,560	1950	10
Ordnance Survey Plan	1:10,000	1951	11
Ordnance Survey Plan	1:10,000	1957 - 1958	12
Ordnance Survey Plan	1:10,000	1968	13
Ordnance Survey Plan	1:10,000	1974 - 1976	14
London	1:25,000	1985	15
Ordnance Survey Plan	1:10,000	1991 - 1996	16
10K Raster Mapping	1:10,000	2006	17
VectorMap Local	1:10,000	2014	18

Historical Map - Slice A



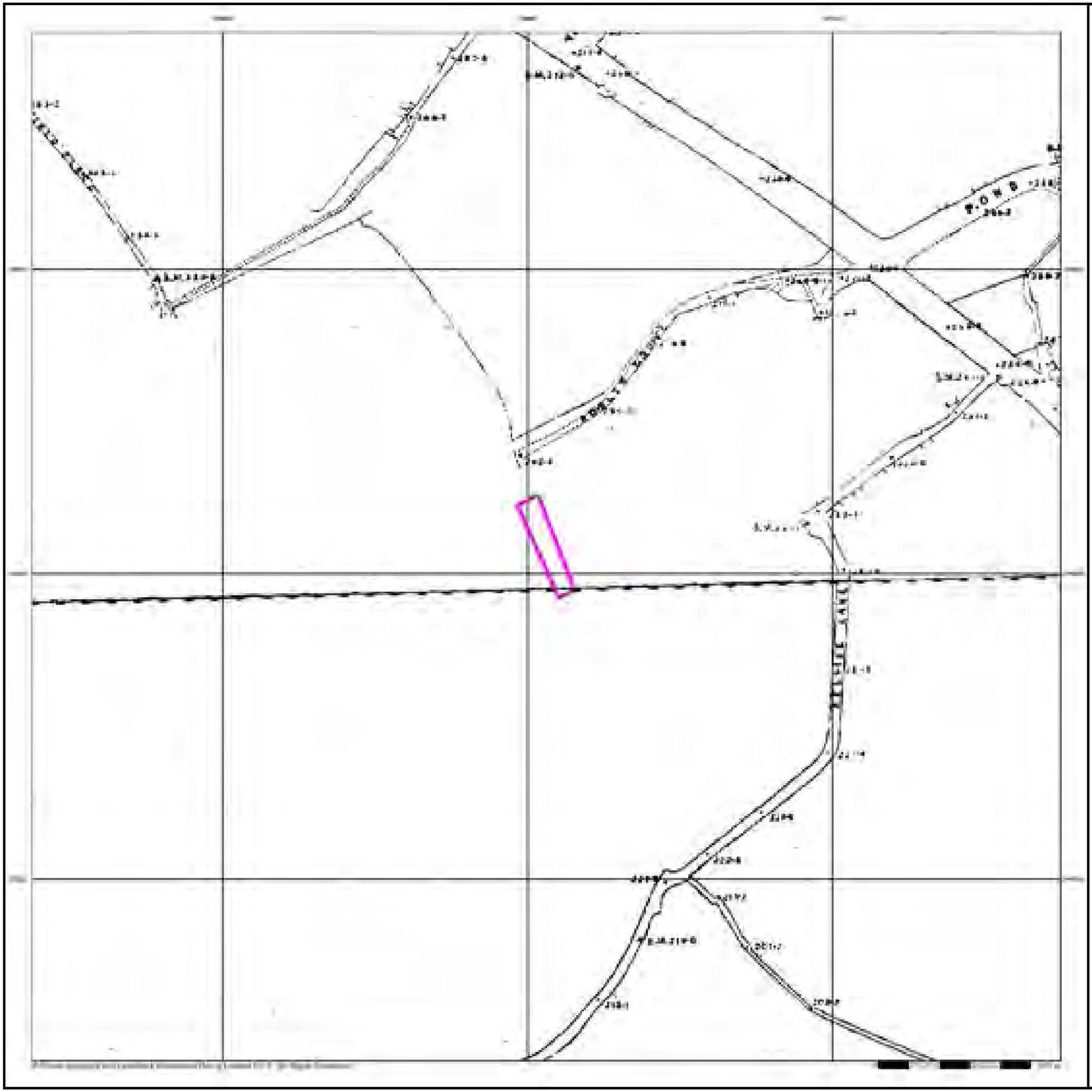
Order Details

Order Number: 60268981_1_1
Customer Ref: J14267
National Grid Reference: 526810, 185220
Slice: A
Site Area (Ha): 0.09
Search Buffer (m): 1000

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

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



Geotechnical & Environmental Associates

London

Published 1850

Source map scale - 1:5,280

The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2640 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Osborne Estate of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards.
1:5280 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of content similar to the more contemporary 1:10.560 mapping. The scale was also used for a reduction of the 1:1056 'skeleton survey' of London that was undertaken between 1848 and 1850.

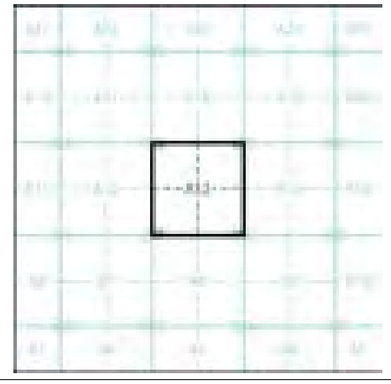
Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)

002_00_000_SE
1850
1:5,280

006_00_000_NE
1850
1:5,280

Historical Town Plan - Segment A13



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Customer Ref:	J14267
National Grid Reference:	526810, 185220
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Search Buffer (m):	0

Site Details

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Landmark

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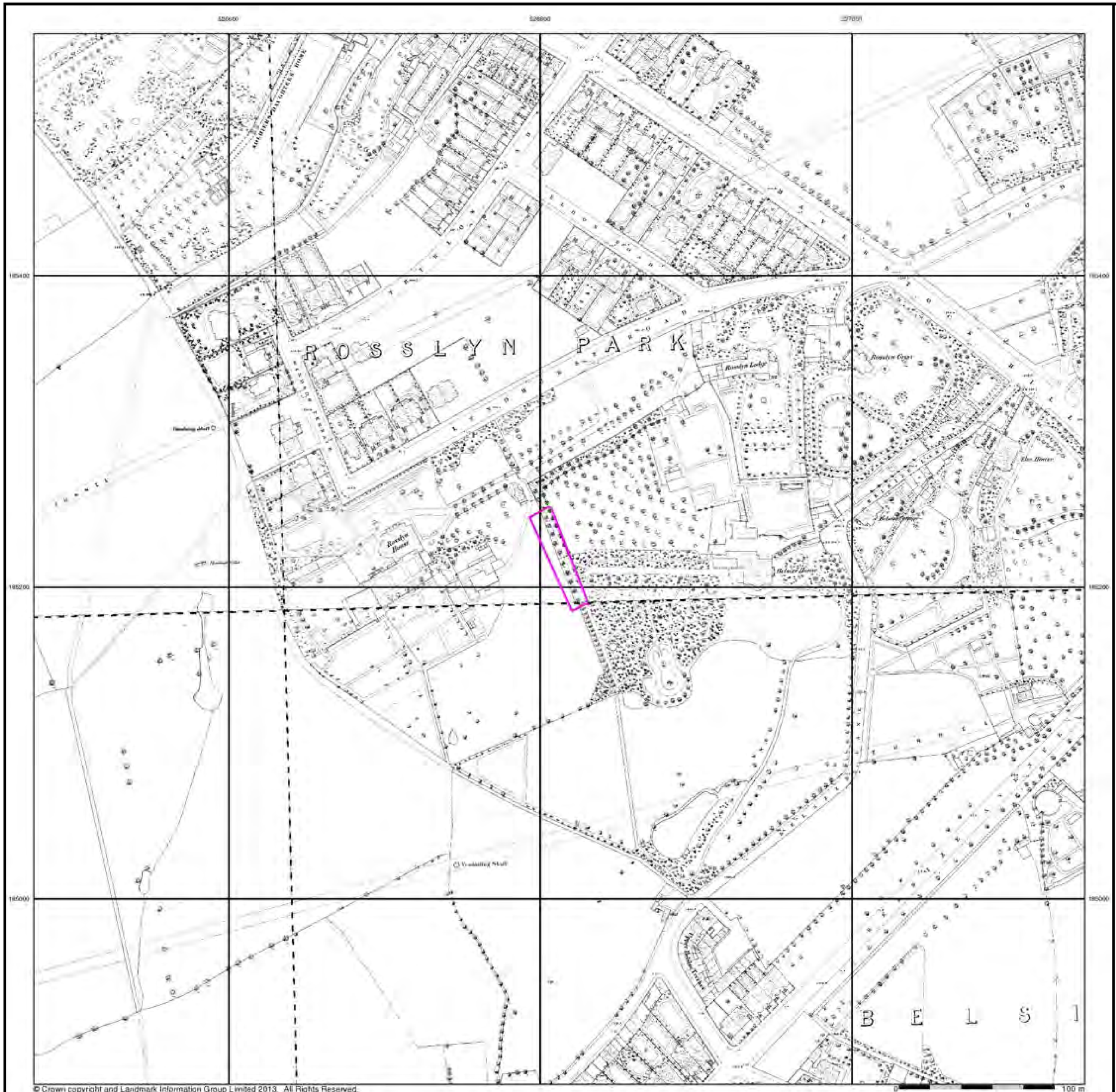

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GEA Geotechnical & Environmental Associates

London

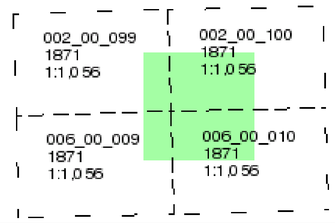
Published 1871

Source map scale - 1:1,056

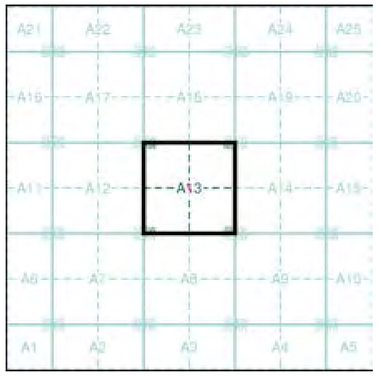
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)



Historical Town Plan - Segment A13



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Order Number:	60268981_1_1
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4 Wedderburn Road, LONDON, NW3 5QE

Landmark Information Group

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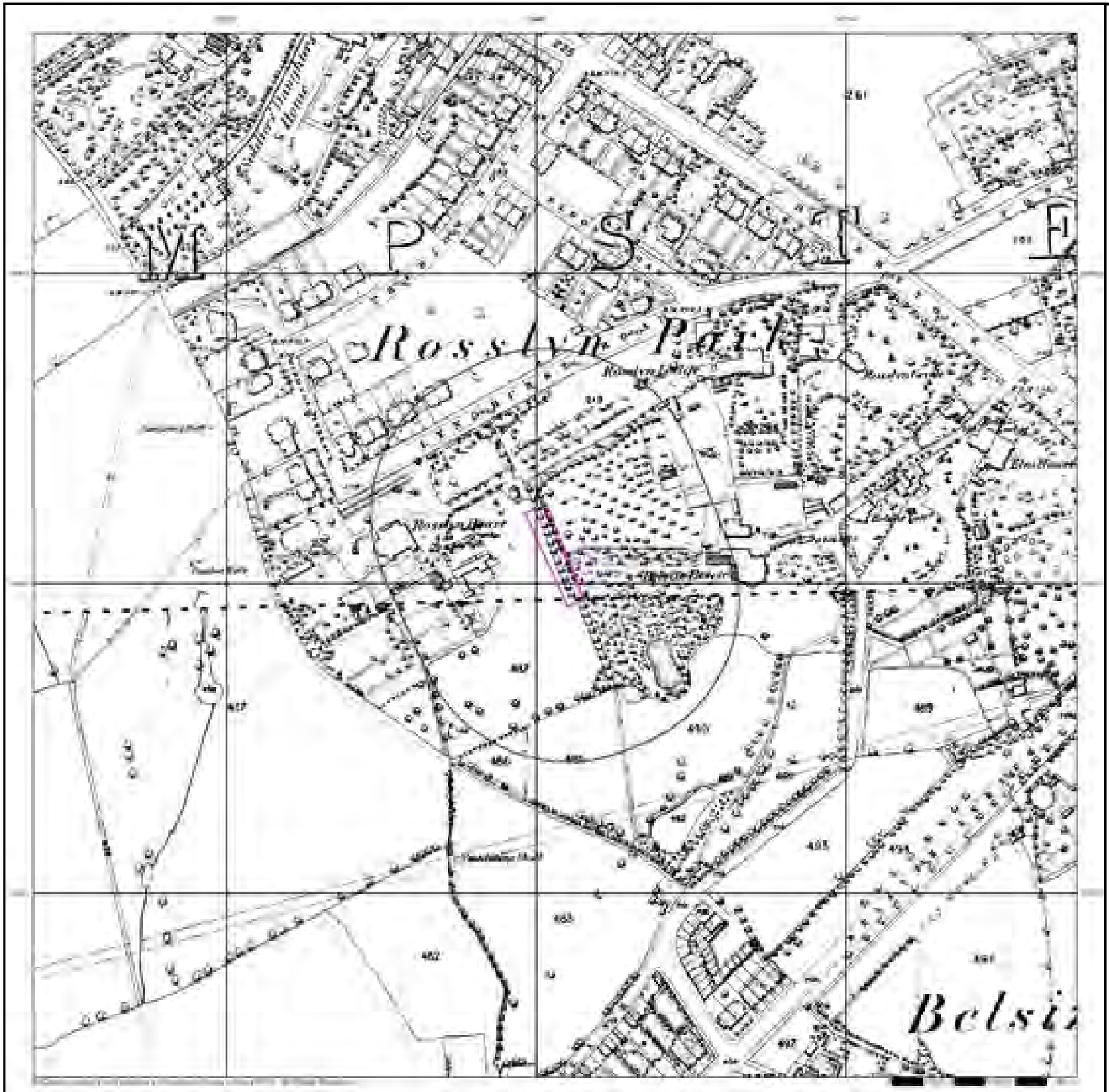
Web: www.envirocheck.co.uk



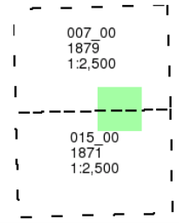
London

Published 1871 - 1879

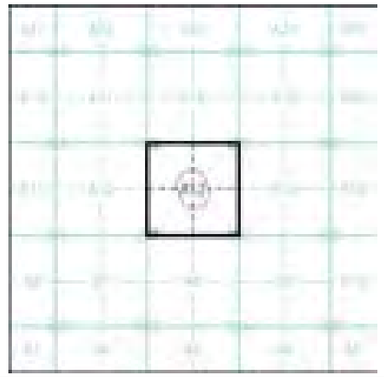
Source map scale - 1:2,500

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)



Historical Map - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	100

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

Landmark
Tel: 0844 844 9952
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GEA Geotechnical & Environmental Associates

London

Published 1896

Source map scale - 1:2,500

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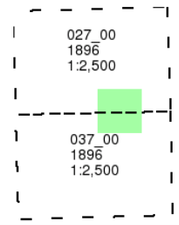
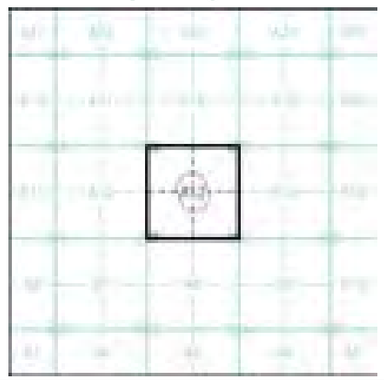
Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	100

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

GEA Geotechnical & Environmental Associates

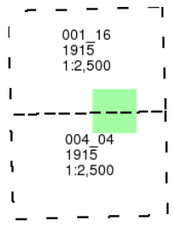
London

Published 1915

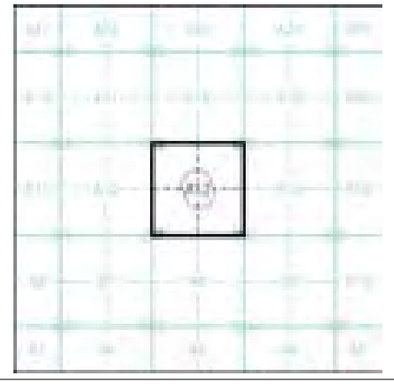
Source map scale - 1:2,500

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)



Historical Map - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	100

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

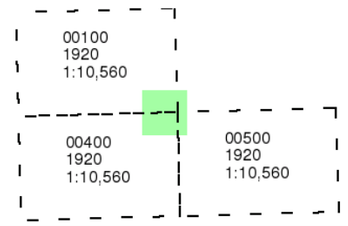
London

Published 1920

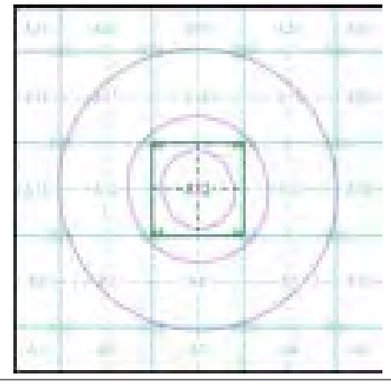
Source map scale - 1:10,560

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; these maps were used to update the 1:10,560 maps. The published date given therefore 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. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



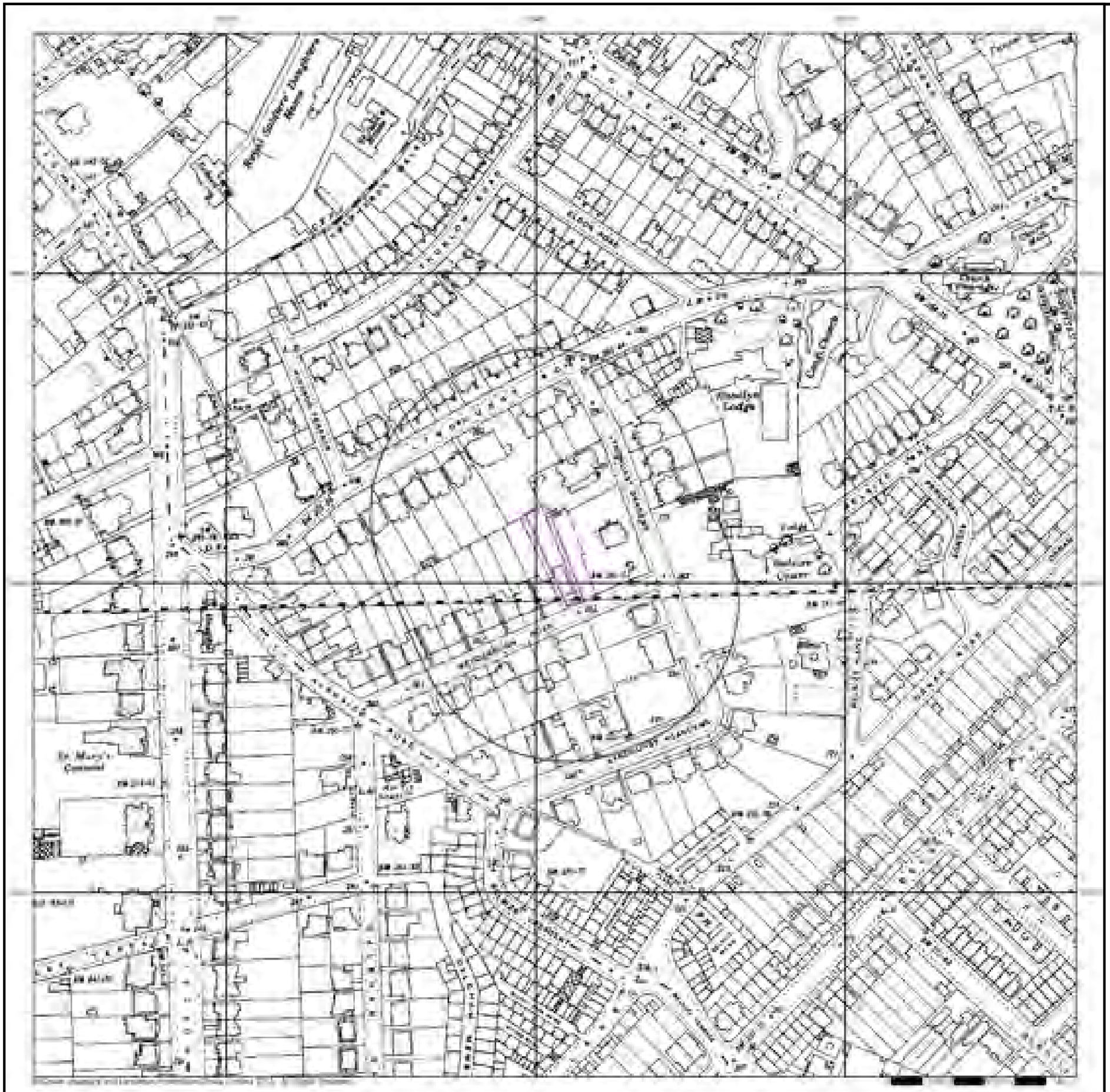
Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	1000

Site Details

4 Wedderburn Road, LONDON, NW3 5QE

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



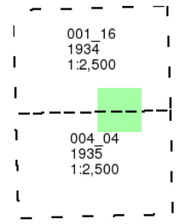
London

Published 1934 - 1935

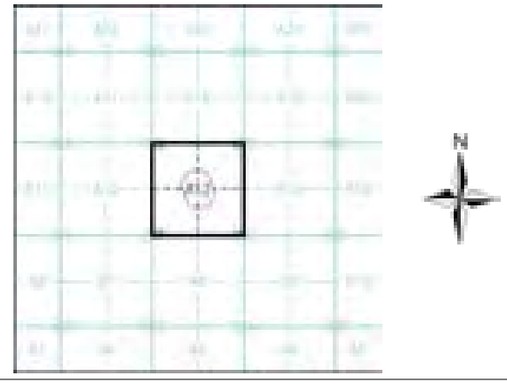
Source map scale - 1:2,500

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)



Historical Map - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	100

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Historical Aerial Photography

Published 1946 - 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.

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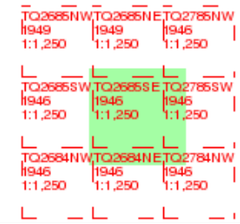
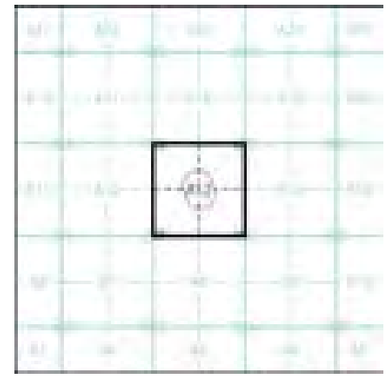
Map Name(s) and Date(s)



Historical Aerial Photography - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
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Site Area (Ha):	0.09
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Ordnance Survey Plan

Published 1954

Source map scale - 1:1,250

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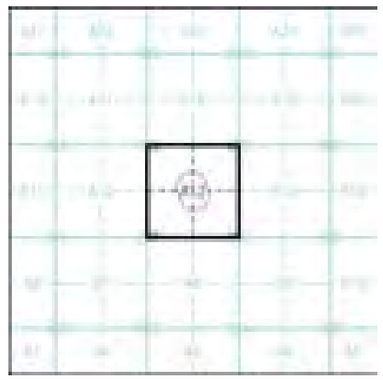
Map Name(s) and Date(s)

Historical Map - Segment A13



Order Details

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Customer Ref:	J14267
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Ordnance Survey Plan

Published 1954 - 1955

Source map scale - 1:2,500

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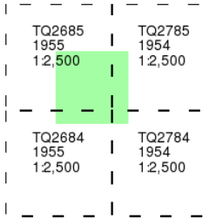
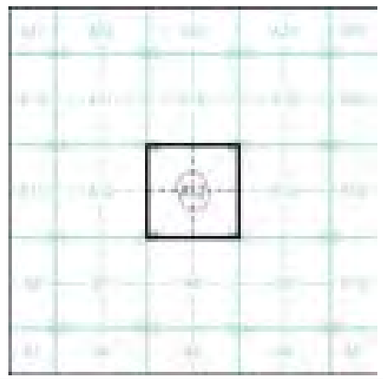
Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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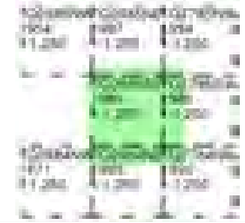
Additional SIMs

Published 1954 - 1990

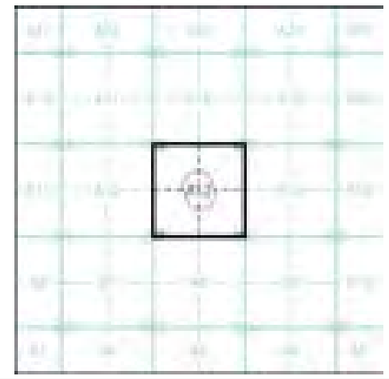
Source map scale - 1:1,250

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:	60268981_1_1
Customer Ref:	J14267
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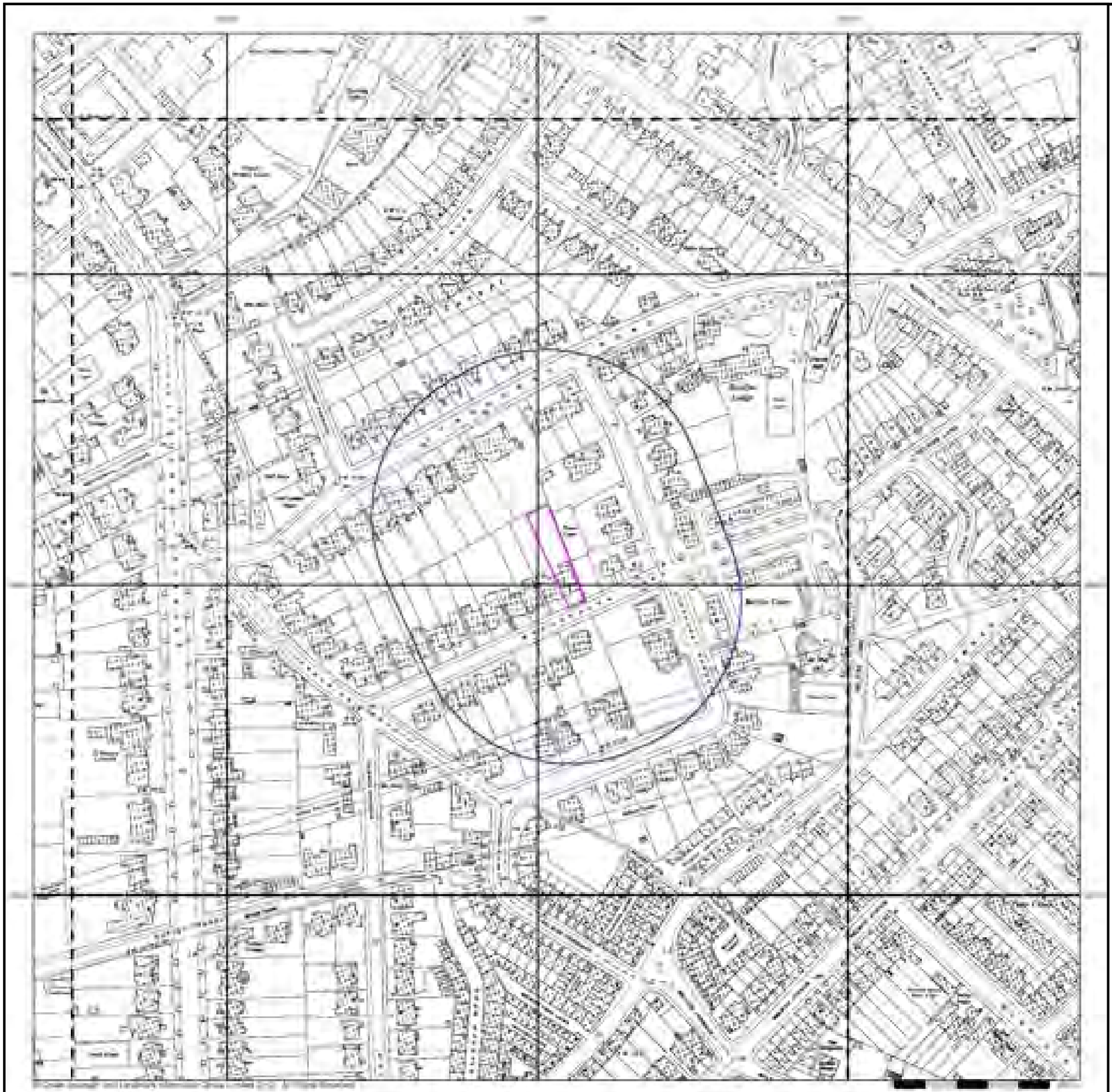
Site Area (Ha):	0.09
Search Buffer (m):	100

Site Details

4 Wedderburn Road, LONDON, NW3 5QE



Ordnance Survey Plan

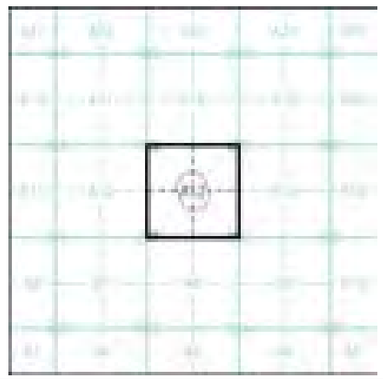
Published 1960 - 1972

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)

Historical Map - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	100

Site Details

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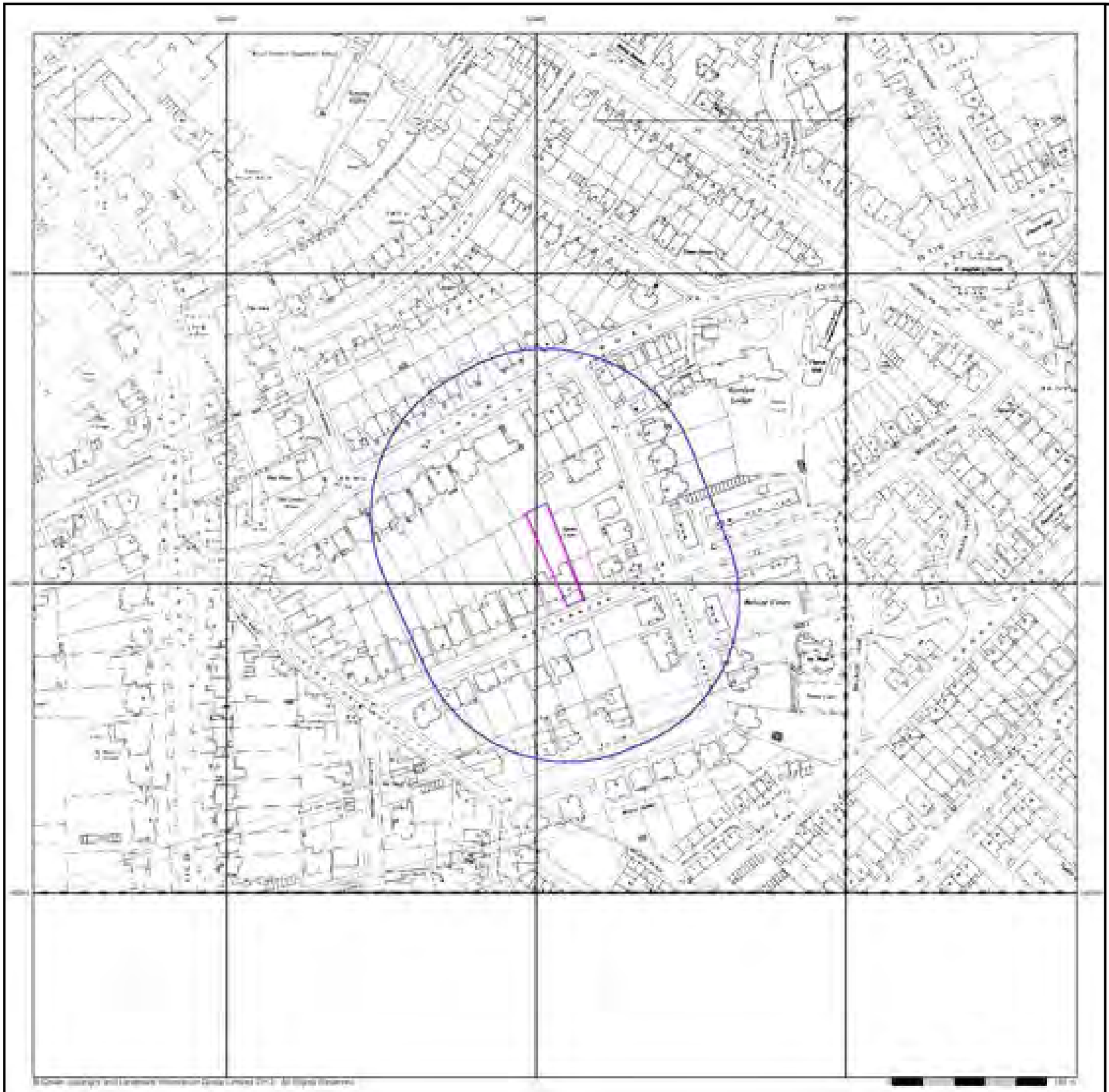


Geotechnical & Environmental Associates

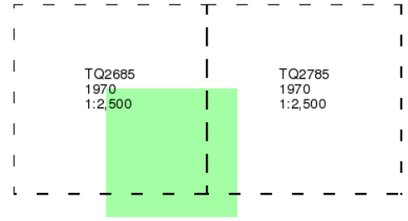
Ordnance Survey Plan

Published 1970

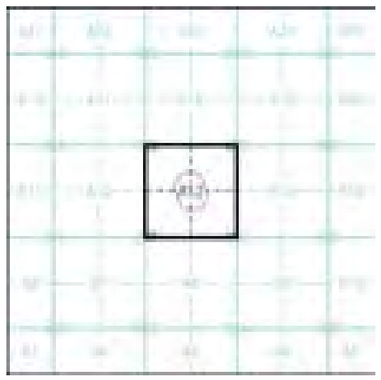
Source map scale - 1:2,500

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)



Historical Map - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	100

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Ordnance Survey Plan

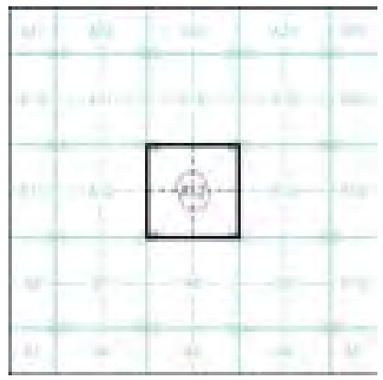
Published 1971 - 1979

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)

Historical Map - Segment A13



Order Details

Order Number:	60268981_1_1
Customer Ref:	J14267
National Grid Reference:	526810, 185220
Slice:	A
Site Area (Ha):	0.09
Search Buffer (m):	100

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Geotechnical & Environmental Associates

Supply of Unpublished Survey Information

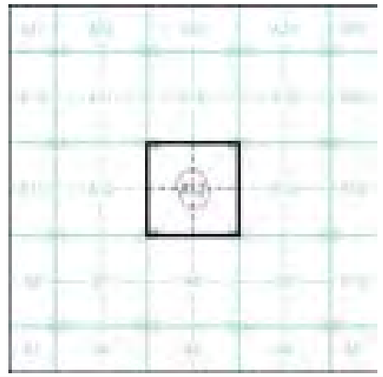
Published 1974

Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

Historical Map - Segment A13



Order Details

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National Grid Reference:	526810, 185220
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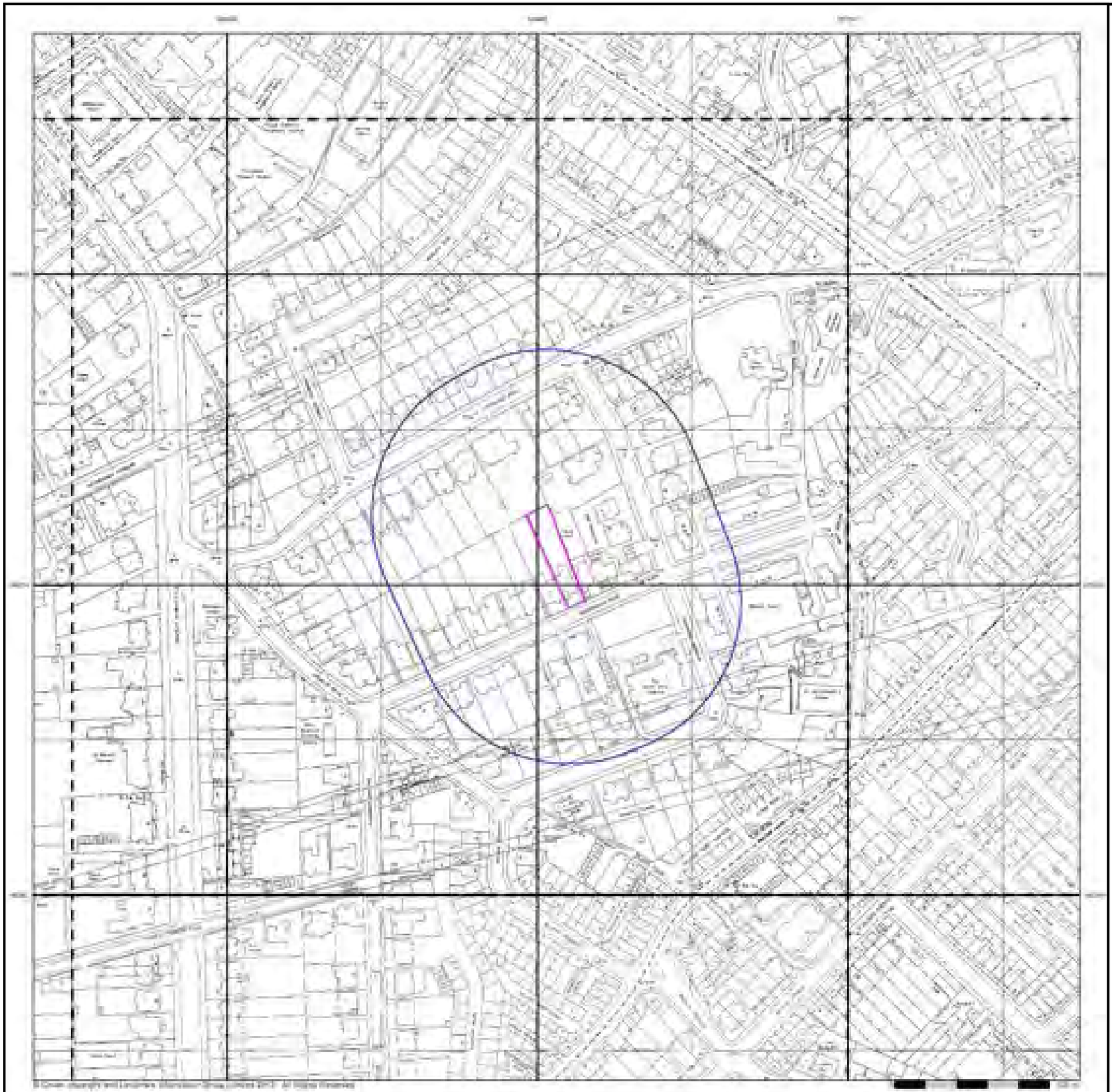


Geotechnical & Environmental Associates

Large-Scale National Grid Data

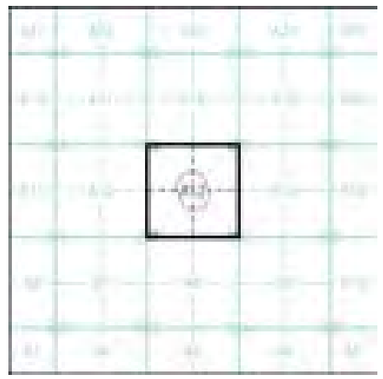
Published 1991

Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. 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

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National Grid Reference:	526810, 185220
Slice:	A
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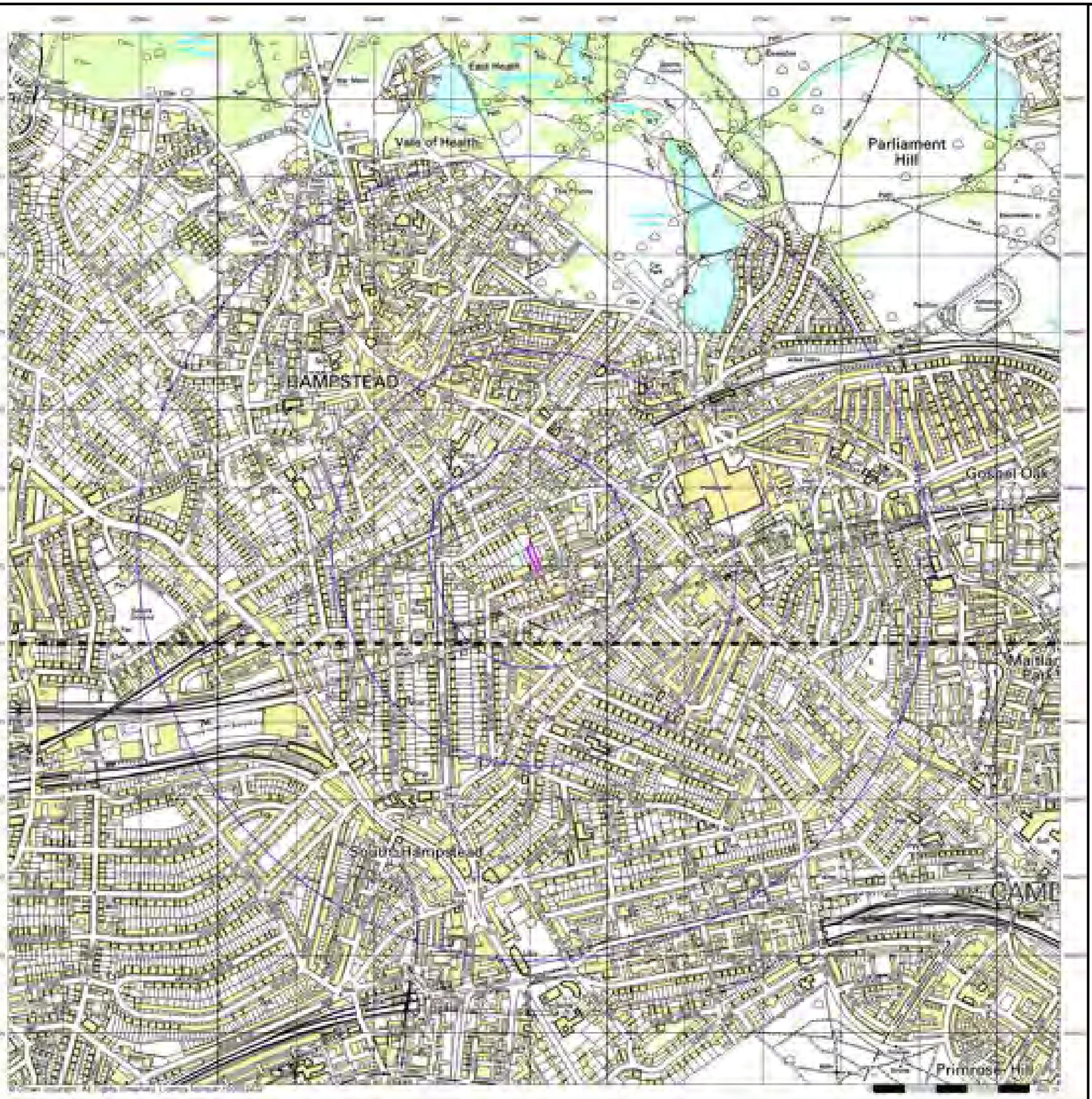
Site Details

4 Wedderburn Road, LONDON, NW3 5QE



Geotechnical & Environmental Associates

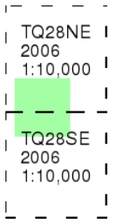
10k Raster Mapping

Published 2006

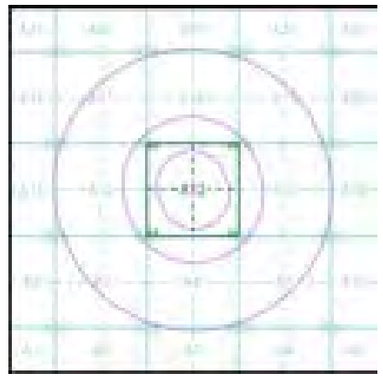
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	60268981_1_1
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Site Details

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Landmark

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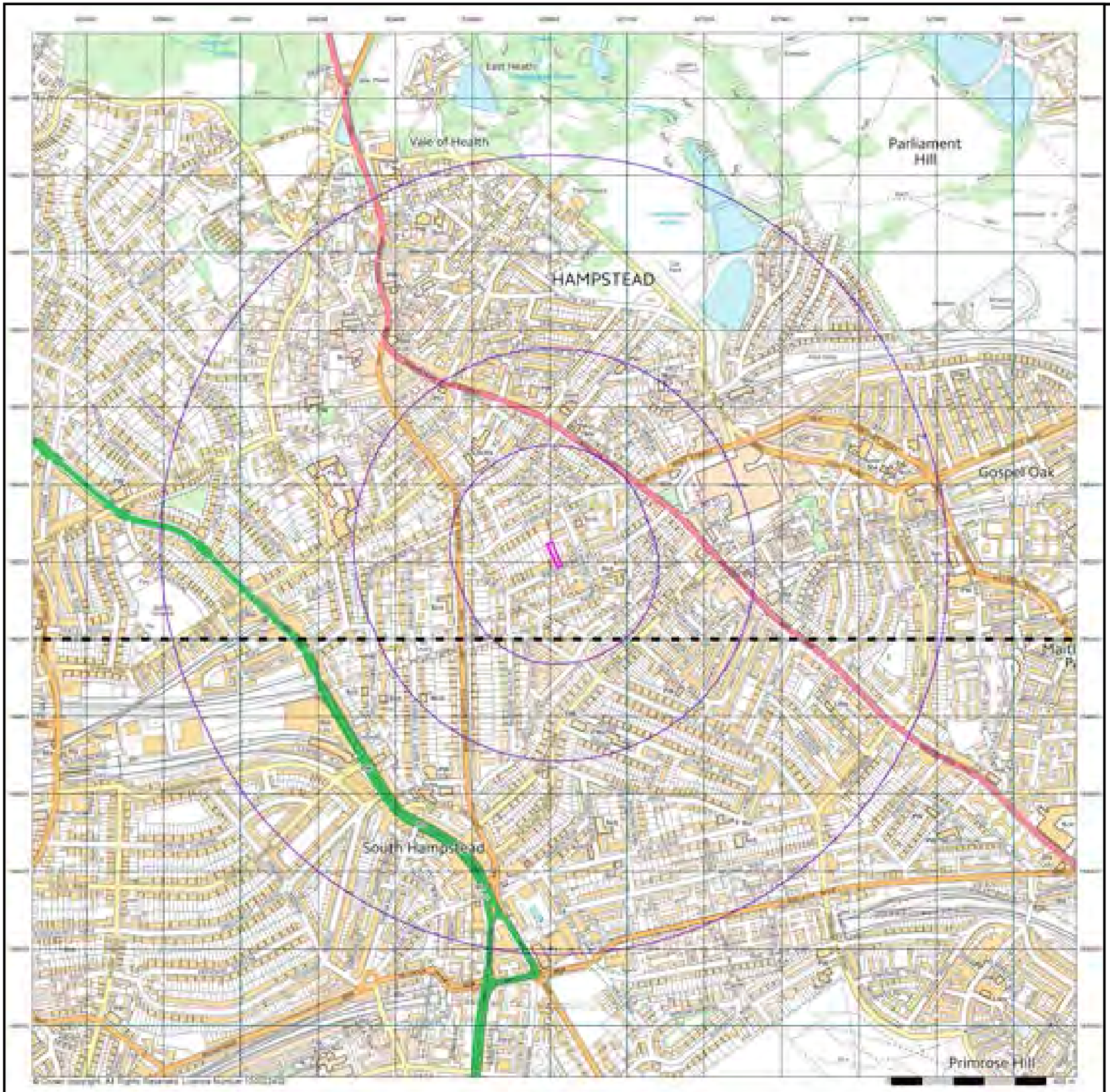


Geotechnical & Environmental Associates

VectorMap Local

Published 2014

Source map scale - 1:10,000

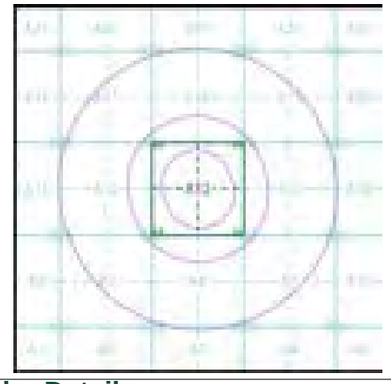
VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

TQ28NE 2014 Variable

TQ28SE 2014 Variable

Historical Map - Slice A



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Landmark

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Tyttenhanger House
Coursers Road
St Albans
Herts AL4 0PG

Site Plan

Site	4 Wedderburn Road, London, NW3 5QE
Client	Amanda Shorthouse
Engineer	Heyne Tillett Steel

Job Number J14267

Sheet 1 / 1

Wedderburn Road

NOTE: Not to Scale

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tel 01509 674888
midlands@gea-ltd.co.uk

Enquiries can also be made on-line at

www.gea-ltd.co.uk

where information can be found on all of the services that we offer.