Basement Impact Assessment, 23 Ravenshaw Street, NW6 1PN

Hydrogeology, Hydrology and Land Stability

07 July 2016

MAUND GEO-CONSULTING

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Summary

A basement impact assessment (BIA) has been undertaken for hydrogeology and land stability in general accordance with CPG4 (2105) for the site at 23 Ravenshaw Street, NW6 1PN in the London Borough of Camden. A basement is proposed to a formation depth of approximately 3.50 m below ground level within the existing building foot print. The existing building was constructed between 1871 and 1896.

The BIA report considered relevant information from existing sources included in the 'Guidance for Subterranean Development' produced for the London Borough of Camden' (November 2010) and a Groundsure Enviro / Geoinsight Report with historical maps and BGS records.

A ground investigation at the site was undertaken by Maund Geo Consulting in December 2011 which comprised two boreholes to 20 and 10 m depth below ground level and two hand dug trial pits to expose existing foundations. An additional investigation was undertaken by Ground and Water Ltd in March 2015 which comprised two window sampler boreholes to 5 m for additional groundwater installations. The ground investigation confirmed the ground conditions as a layer of invert made ground made ground to a depth of 1.8 m which overlies stiff to very stiff London Clay Formation. Groundwater was recorded at an average of 2.71 m below ground level.

An assessment of hydrogeology has shown that the site is not located on an aquifer which has been confirmed as 'unproductive strata'. It is not anticipated that the development will have any significant impact on the perched groundwater. As a precaution the design groundwater is conservatively assumed at 0.5 m below ground level, for the basement design and construction method statement.

An assessment of hydrology has indicated there will be no significant impact of the development on adjacent properties, with an overall decrease in the impermeable surface of 5%. In addition, there is a decrease in the potential area subject to rainwater run-off from 381.13 m² to 112.65 m², a 70% reduction.

An assessment of land stability has been made from the excavation and construction of the basement. It has been calculated that heave is not expected to exceed 9 mm resulting from the excavation. Horizontal ground movements have been calculated to not exceed 5.3 mm. Total vertical movement outside the perimeter of the basement retaining walls has been calculated not to exceed 2.7 mm. The movement will be monitored before during and after construction as outlined in Croft Structural Monitoring Statement Ref 150122.

From an evaluation of the ground conditions it is concluded that a basement can be safely constructed at the site.

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1 Introduction

1.1 Terms of Reference

Maund Geo-Consulting Ltd was instructed originally on 16 November 2011 by Chris Taylor to undertake a Basement Impact Assessment (BIA) at 23 Ravenshaw Street, London NW61PN, in connection with a proposal to construct a basement associated with a new development at the site which will comprise the construction of apartments. The application was subsequently withdrawn and the scheme revised. Maund Geo-Consulting was re-appointed in June 2016 to support the revised submission in conjunction with Croft Structural Engineers Ltd (Croft).

1.2 Scope and Objective

This report has been written in general accordance with 'Camden geological, hydrogeological and hydrological study - Guidance for Subterranean Development' produced for the London Borough of Camden (LBC) by Arup (November 2010), hereafter referred to as the 'GSD'. The guidance sets out the methodology for a risk-based impact assessment to be undertaken with regard to hydrology, hydrogeology and land stability in support of planning policy DP27. The BIA comprises stages in which information is obtained to enable LBC to make a decision on the impact of the development for the planning application. The LBC Guidance CPG4 (July 2015) requires a BIA to be undertaken for new basements in 5 stages:

1. Screening
2. Scoping
3. Site investigation
4. Impact assessment
5. Review and decision making

This report includes stages 1 to 4 and has been undertaken by Dr Julian Maund, director of Maund Geo Consulting Ltd, who is a chartered engineer and chartered geologist with 30 years' experience.

A Screening report was undertaken by Maund Geo Consulting in December 2011, as the first stage in the BIA, which was undertaken as outlined in Section 6.2 of the GSD recommendations. It identified hydrological and geological issues associated with the proposed development that require detailed analysis and investigation. These actions are summarised in Table 1 below:

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Table 1.1: Summary of Screening Report Actions for 23 Ravenshaw Street

Item	Description
	Subterranean (Groundwater flow)
1.	Determination of groundwater levels associated with made ground materials and London Clay (perched water table)
	Slope / Land Stability
2.	Assessment of the geotechnical properties of the made ground and London Clay Formation by undertaking a ground investigation and laboratory testing of soil samples and interpretation of the results.
3.	Assessment of the stability on the adjacent cut slope leading down to the railway.
4.	Provide a Construction Method Statement to outline the mitigation of the impact on adjacent structures and highway.
	Surface flow and flooding
6.	No impact anticipated.

As a consequence of these impacts further steps in the BIA are required. In the case of this site these steps included a ground investigation, interpretative report and construction method statement report. These reports address the issues highlighted in the screening survey. A summary of the reports in relation to the BIA are summarized below in Table 2.

Table 1.2: BIA stages and corresponding reports

1. Screening	Screening Report by Maund Geo-Consulting February 2012.
2. Scoping	**BIA Hydrogeology and Land Stability Report by Maund Geo-Consulting, July 2016** and; Construction Method Statement Report by Croft Structural Engineers Ltd July 2016
3. Site investigation	
4. Impact Assessment	
5. Review and decision making	(to be carried out by London Borough of Camden)

This BIA Hydrogeology, Hydrology and Land Stability Report should be read in conjunction with the Basement Method Statement, Basement Monitoring Statement and the

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scheme calculations and drawings produced by Croft for 23 Ravenshaw Street, which submitted separately.

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2 Background Information on the Site

2.1 Information Sources

Background information has been derived from a Groundsure report obtained on 14/09/15 for the site (Appendix A). Geological information has been derived from on-line BGS sources (Geology of Britain Viewer) and the GSD. Mapping and aerial photography have been obtained from Streetmap and Google Earth. Information is also derived from two site investigations undertaken specifically for the proposed development by Maund Geo Consulting Ltd on 19 and 20th December 2011 and Ground and Water Ltd in April 2015.

2.2 Location

The site is located on the south-western side of Ravenshaw Street, at approximate National Grid Reference TQ249850, in West Hampstead, London Borough of Camden (Figure1).

2.3 Present use

The site, is occupied by an end-of-terrace house, with garden areas to the rear and a concrete hardstanding to the south east. Figure 2.1 shows a recent image of the site.

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Figure 2.1 Street View Image of the site - June 2015

2.4 Proposed use

The proposed development relevant to this BIA is understood to comprise the demolition of the existing building at 23 Ravenshaw Street, followed by the construction of a development of 8 flats. The proposed development is shown in Final Proposal Plans, Sections, Elevations and CGI's accompanying the main application.

2.5 Topography, geomorphology and drainage

The site itself is flat, varying by only 0.5 m across the site, as shown in a topographic survey undertaken on 21/3/2006 by NSL Surveys Ltd (Appendix B) in reference to site datum of 100 m. The site is at approximately 59 m AOD. The land around the site slopes from junction of Ravenshaw Street and Mill Lane in the north at 65 m AOD to 51 m at the south east end of Ravenshaw Street. To the west of the site there is a cutting which leads down to railway lines, which are approximately at 50 m AOD adjacent to the site. The angle of the cutting is estimated to be about 1 vertical to 5 horizontal adjacent to the site, although lack of access to the slope and lack of suitable spot height data made it not possible to determine the dimensions accurately.

The principle geomorphological feature is the railway cutting of approximately 1 vertical to 5 horizontal adjacent to the western boundary of the site. Drainage will follow the slope of the land to the south parallel to Ravenshaw Street.

2.6 Geology and ground conditions

Geological information obtained from the Figure 4 of the GSD and the BGS website with geological mapping at 1: 10 000 scale shows the site to be underlain by the London Clay Formation, with no superficial materials present.

2.7 Hydrogeology/groundwater

The property is located on the London Clay Formation. London Clay is classified as ‘unproductive strata’. The Camden Aquifer designation map (Figure 8 of the GSD) confirms the property is located on unproductive strata.

2.8 History of site

Historical map surveys (included in Appendix C of the Screening Survey) indicate the existing property, together with neighbouring properties were built between 1871 and 1896. The 1871 survey shows the site to be agricultural land, although the railway was present to the west in 1871, with the cutting location and track bed the same as the 2011 survey.

2.9 Underground features

There are no underground features (basements or tunnels) at the site. The GroundSure report (Appendix A) has not identified any mining, underground workings, natural cavities or tunnels within at least 500 m of the site.

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2.10 Other factors e.g. contamination and archaeology

On the basis of a walk over survey undertaken by Maund Geo-Consulting on 20/12/11 and a ground investigation undertaken by Dunbar Drilling on 19 to 20 December 2011 there is no visual or olfactory evidence of contamination of the soil and groundwater. The GroundSure report (Appendix A) has not identified any 'Environmental Permits, Incidents and Registers' or 'Landfill and Other Waste Sites' within at least 250 m of the site boundary.

No specific archaeological investigation has been undertaken. A 'GroundSure' survey undertaken by has not identified any known 'Environmentally Designated Sensitive Sites' within 250 m of the site (Appendix A). A search of the Archaeology Data Service similarly did not identify any sites in Ravenshaw Street.

2.11 Flooding

The GroundSure report (Appendix A) has not identified any flooding issues within 250 m of the site.

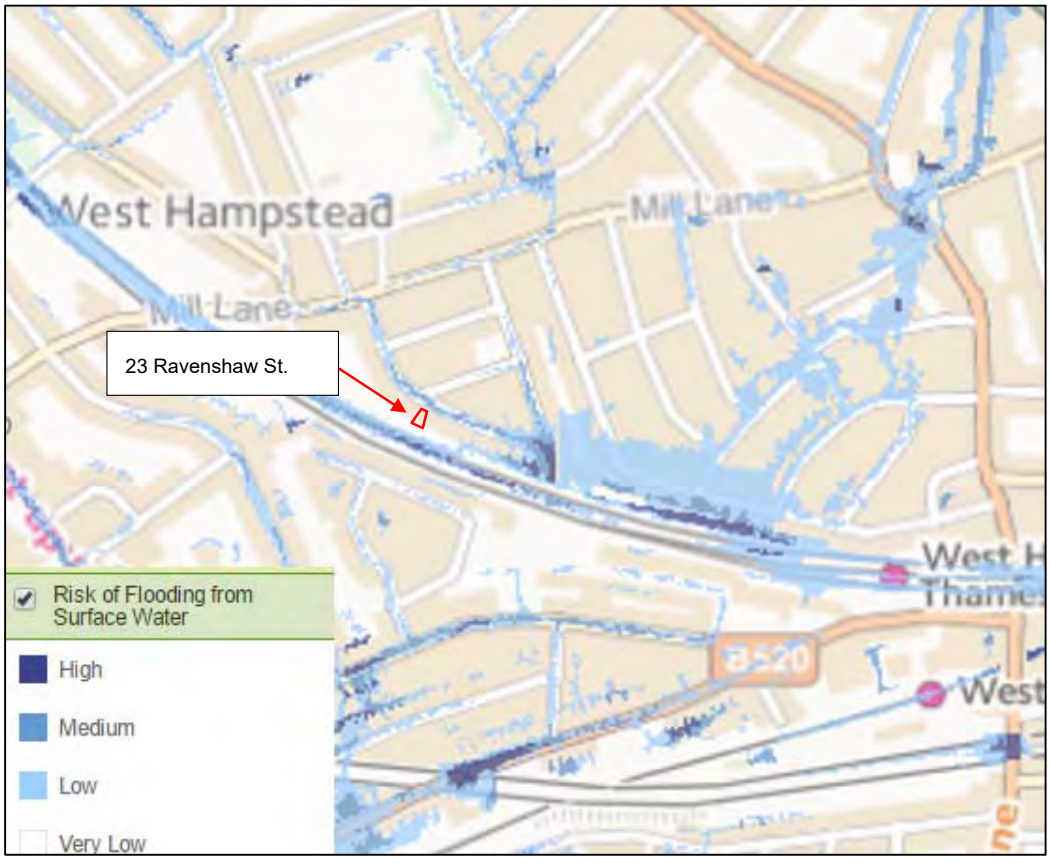

Figure 2.2 Environment Agency Risk of flooding from surface water

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The Environment Agency defines the site itself as a very low flood risk. Very low means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%). This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm. The street itself is defined as having a low risk of flooding.

2.12 Natural Hazards

The Groundsure report (Appendix A) findings on natural hazards are summarised in Table 2.1 below.

Table 2.1 Natural Hazards

Natural Hazard	Risk (Stated by BGS in Groundsure report)	Comment
Shrink Swell	Moderate	The site is on the London Clay Formation (LCF) which has potential shrink swell properties.
Landslides	Low	The railway cutting to the south west of the site is at an estimated angle of 1 vertical to 5 horizontal (_12^0). The angle of friction of the LCF is estimated at 24^0.
Soluble Rocks	Negligible	Not applicable to the site geology
Compressible Ground	Negligible	Clay soil of the LCF is subject to consolidation from additional imposed loads, which are limited by appropriate foundation design. (See section 5)
Collapsible Rocks	Very Low	Not applicable to the site geology
Running sand	Very Low	Not applicable to the site geology
Radon	Not in a Radon affected area	No Radon protection measures are necessary

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3 Site Investigation

3.1 Site Investigation 2011

A ground investigation was undertaken by Dunbar Drilling Ltd between 19th and 20th December 2011, which was supervised by Maund Geo-Consulting Ltd. A factual report of the ground investigation comprising exploratory hole records and laboratory test results is included in Appendix C. The purpose of the ground investigation was to help address the issues raised in the Screening Survey and to provide sufficient information for the outline design of the proposed structure to satisfy planning requirements.

The ground investigation comprised:

- Two 150 mm diameter light cable percussion boreholes to a depth of 20.00 m (BH1) and 10.00 m (BH3),
- Three hand excavated trial pit (TP1, TP2 and TP3) to determine the nature of the foundation to the existing foundations for 23 and 25 Ravenshaw Street.
- The in-situ strengths of the subsoil encountered were assessed by means of standard penetrations tests,
- Disturbed soil samples were obtained from both exploratory holes for appropriate laboratory geotechnical testing and further examination.
- A sealed 50 mm diameter standpipe was installed at a depth of 15 m in BH1 and 5 m in BH3.

The approximate locations of the above exploratory holes together with the exploratory hole records and laboratory test results are shown in Figure 3.1 below.

The ground investigation is referenced to BS 5930: 1999, amended in 2010 to comply with requirements of BS ENO 14688 Parts 1 and 2, BS EN 1997-2 Eurocode 7 Geotechnical Design Part 2 Ground Investigation and Testing, BS 1977: 1990 and BRE Special Digest 1(2005).

3.2 Details of boreholes and trial pits

Two light cable percussion 150 mm diameter boreholes to a depth of 20.00 m (BH1) and 10.00 m (BH3) depth. A BH2 was not bored because of the concern of the boring method affecting the adjacent building. Small disturbed samples were taken at 0.5 m to 1.0 m intervals. The insitu strength of the soil was obtained by SPTs at 1 m intervals 5 m depth then at 2 m intervals to the base of the borehole. Full sampling and testing details are shown on the exploratory hole records in Appendix C. The location of the boreholes is shown on Figure 3.1, with a larger scale plan included in Appendix B.

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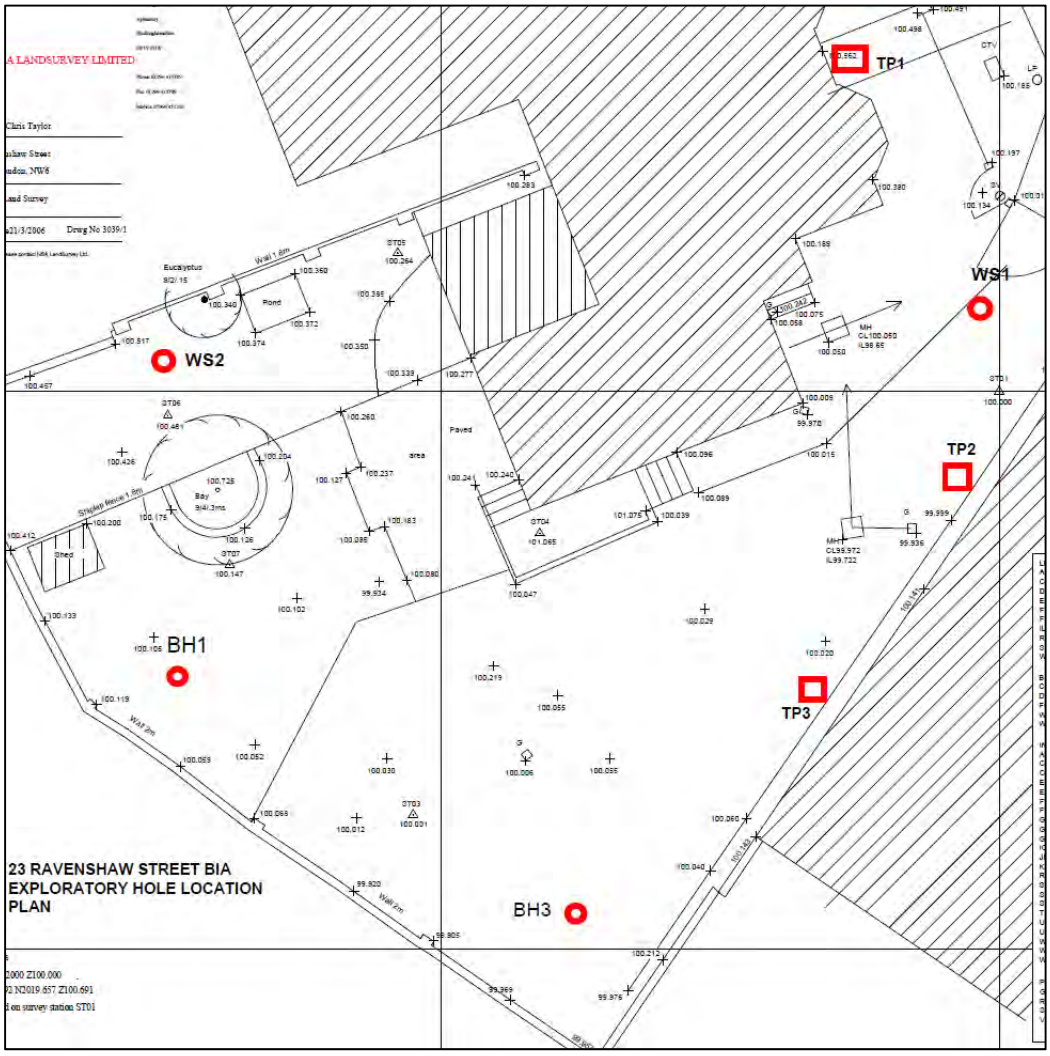

Figure 3.1 Borehole and Trial Pit Locations

A 50 mm diameter standpipe was installed to a depth of approximately 15 m in BH1 and 5 m in BH3. Details of the installations are show in Appendix C.

Two hand dug trail pits were excavated. Trial Pit TP1 located at the party wall with 21 Ravenshaw Street was excavated to approximately 0.5 m depth using a spade, and continued to 2 m depth with hand auger / tube to obtain disturbed samples. The purpose of the pit was to expose the foundations for the party wall and front wall of 23 Ravenshaw Street. Trial pit TP2 was an attempt to determine the foundation details of 25 Ravenshaw Street. The pit was excavated to a depth of 1.0 m, but the foundation was not accessed due to a concrete ground beam running parallel to the wall which extended approximately 0.5 m from the wall base. However, the trail pit did confirm the ground conditions of; sub base for the hardstanding lying directly on the London Clay Formation. An additional trial pit TP3 was attempted by the client at

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a later date, but also hit obstructions. Records of the trial pits are included in the Appendix C.

3.3 Details of laboratory tests

Laboratory tests to determine the geotechnical properties of the soil were carried out by Ian Farmer Associates Ltd. in accordance with BS1377:1990 and BRE Special Digest 1 2005. The tests included:

15 Moisture Content

14 Atterberg Limits

4 Sulphate and pH determinations

The results of the laboratory tests are included in Appendix C.

3.4 Site Investigation 2015

An additional site investigation was undertaken by Ground and Water Ltd in April 2015 to install additional groundwater monitoring wells, as a consequence of unexpected apparent high groundwater levels recorded in BH01 and BH03 during early 2015. The ground investigation comprised two window sampler boreholes to a depth of 5 m. Two groundwater / gas monitoring installations were included in the boreholes. Disturbed samples were taken for testing purposes. No insitu testing was undertaken in the boreholes. Lab testing comprised 5 no. plasticity and moisture content tests and 3 no. pH and sulphate (2:1 extract) tests. Full details of the 2015 site investigation are included within Appendix C.

The location of the 2015 window sampler locations are included on Figure 3.1 above and Appendix B.

The borehole records and lab test results of the 2015 investigation have been included in the overall geotechnical assessment in Section 5.

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4 Ground Conditions

4.1 Stratigraphy

The ground conditions encountered in BH1, BH3, WS01 and WS02 are summarised in Table 4.1 below: -

Table 4.1 Summary of Ground Conditions

Stratum	General description of Stratum	Thickness of Strata (m)	Undrained Cohesion (KN/m^2)
TOPSOIL	Brown stony topsoil with plant roots and some fine gravel sized brick fragments (in BH1 only).	G.L. to 0.50	n/a
MADE GROUND	Concrete hardstanding	G.L. to 0.30	n/a
MADE GROUND	Firm brown grey clay with sand and gravel sized brick, pottery and ash fragments	0.30 to 1.80	n/a
WEATHERED LONDON CLAY FORMATION	Firm becoming stiff brown mottled grey silty CLAY with occasional coarse sand sized Selenite crystal from 3 to 6 m Claystones encountered at 8.5 m in BH1 and 3.2 in BH3	0.50 to 11.00	36 to 99
LONDON CLAY FORMATION	Stiff to very stiff dark grey silty CLAY	11.00 to 20.00 proven	108 to 203

Note – No groundwater was encountered in boreholes or trail pits during the investigation

In summary the ground conditions comprise a layer of up to 1.80 m thickness of topsoil, or made ground associated with the concrete hardstanding, overlying the London Clay Formation. The London Clay formation has a characteristic brown grey colour associated with weathering in the upper 11 m. The presence of selenite crystals was noted in the upper 6 m of London Clay. In BH3 the presence of shear surfaces was noted in the London Clay. Claystones, which are silicified masses of clay, were encountered in BH1 at approximately 8.5 m and 3.2 m depth in BHs. The estimated size of the claystones was cobble sized.

The 2015 ground investigation undertaken by Ground and Water recorded Head Deposits between 0.30 m and 1.80 m depth, which was considered to be made ground in the 2011 investigation as there is no record of Head deposits in the vicinity of the

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site from the BGS 10,000 scale geological mapping (GSD Fig. 4). Both deposits display similar geotechnical characteristics on the site.

4.2 Groundwater

During the ground investigations, groundwater was not encountered in BH1, BH3 and WS1. A seepage was recorded in WS2 at 3.0 mbgl.

Groundwater / gas installation were placed in BH1, BH3, WS1 and WS2 for further monitoring to check if groundwater had entered the installation over time. Subsequent monitoring in March to June 2015 indicated water in the installations at between 0.57 m (WS02) and 5.86 m (BH01) below ground level. An overall average groundwater level is 2.71 m below ground level over a four-month period. A summary of groundwater depth from monitoring is shown in Figure 4.1. Full monitoring details are included in Appendix D.

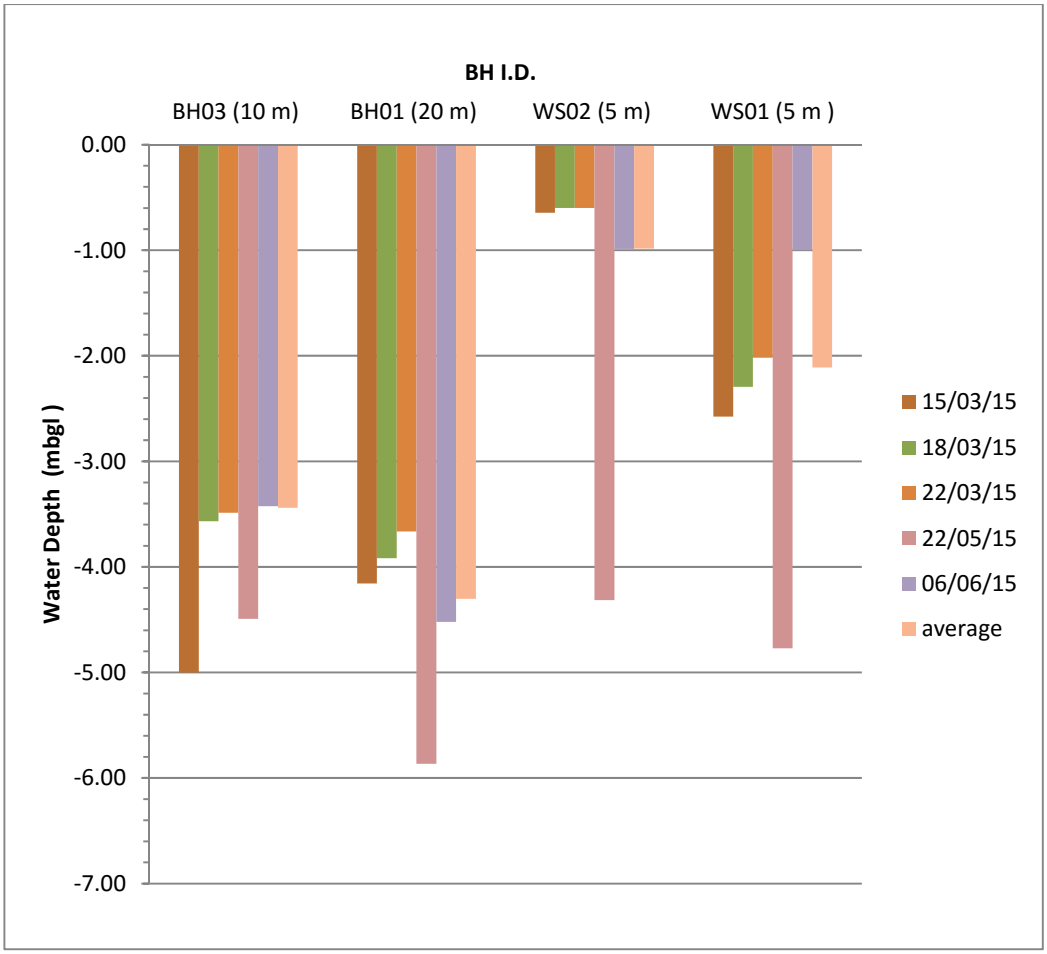

Figure 4.1 Groundwater monitoring Summary

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Due to the geology of the site being low permeability London Clay overlain by made ground of generally less than 1 m thickness it is concluded that the groundwater is perched water sitting on the London Clay. It is suspected that the water perched water level could in part be from the leakage of water pipes. There was a water main leakage during March / April 2015 at a higher level in Ravenshaw Street / Mill Lane, which flooded the ground above the relatively impermeable London Clay as shown in Figure 4.2.

Figure 4.2 Location of burst main relative to the site

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As a precaution to the high apparent groundwater level, the design groundwater level has been assumed conservatively at 0.5 m below ground level, or approximately at 99.5 m (site datum).

4.3 Plasticity

From the laboratory testing the London Clay shows high to very high plasticity with a Plasticity Index ranging from 29 to 48% and a Liquid Limit ranging from 50 to 79 %, as shown in the Atterberg Chart below in Figure 4.2.

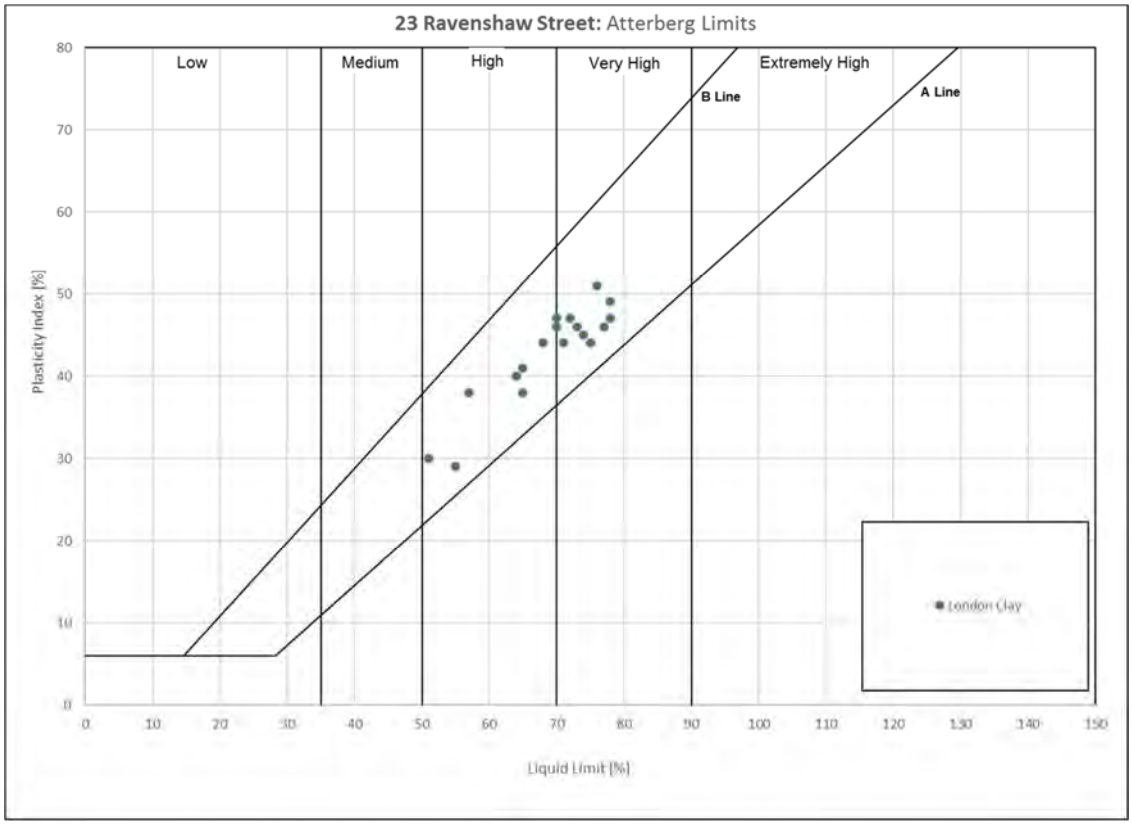

Figure 4.2 Plasticity Chart

4.4 Strength (Undrained Cohesion)

Using the plasticity index as a basis for determining the undrained cohesion from SPTs after Stroud and Butler (1974) a ‘f1’ of 4.5 has been applied to SPT values, giving a range of undrained cohesion from 36 to 99 kPa in the weathered London Clay and 108 to 203 kPa for the un-weathered London Clay from a depth of approximately 11m bgl.

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The increase of strength with depth on the basis of SPT N values is shown in Figure 4.3.

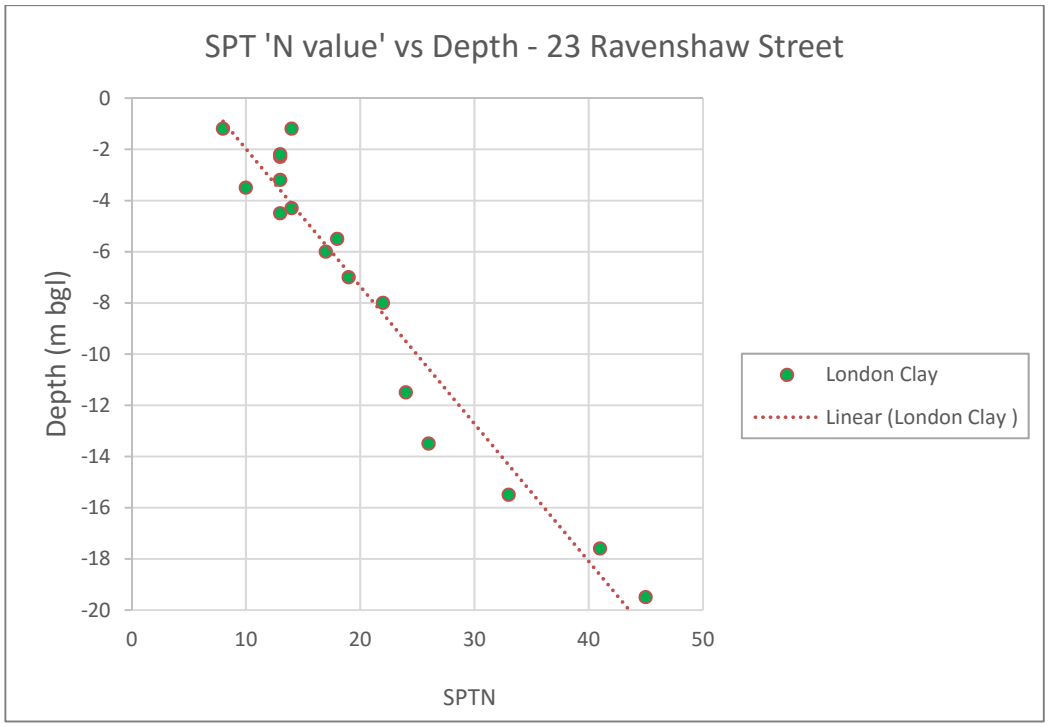

Figure 4.3 SPT 'N value' against depth below ground level

4.5 Sulphate and pH

Laboratory testing for sulphate (SO_4 in 2:1 water: soil) in accordance with BS 1377: Part 3 was carried out on 7 No. samples which range from 0.2 to 1.8 g/l. The higher sulphate levels are associated with the brown weathered clay, which is in agreement with visual examination in which selenite crystal were noted. The range of pH was from 7.5 to 8.5 or slightly alkaline as shown in Figure 4.4

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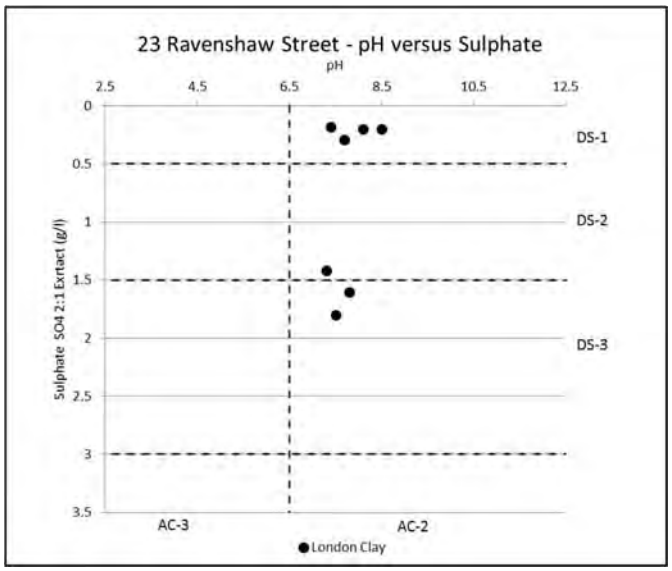

Figure 4.4 Sulphate against pH

4.6 Consideration of the individual strata in detail, with reference to any proposed foundations.

The anticipated formation level of the basement floor slab will be approximately 3.50 m below ground level. The undrained cohesion at the anticipated founding depth at 3.50 m is approximately 65 kPa or 'firm'.

The SPT data indicates that a maximum safe bearing pressure at 3.5 m depth can be taken conservatively as 120 kPa, on the basis of undrained cohesion of 65 kPa based on a factor of safety of 3 to limit settlement to < 25 mm, in agreement with the foundation loading designed by the structural engineer.

4.7 A review and summary of the derived values of geotechnical parameters.

The geotechnical parameters have been assessed on the basis of the data obtained from; the ground investigation, results of laboratory and in-situ testing obtained from the site investigations and published data for the London Clay. The geotechnical parameters are summarised in Table 4.2 as follows:

Table 4.2 Geotechnical Design Parameters

Stratum	Design Level	Classification	Undrained Cohesion	Effective angle of friction	Young's Modulus	Bulk unit weight	Concrete Class[c]
	Top of stratum (m) below		Cu (kPa)	Φ'	E' (MPa)[b]	kN/m^3	DC

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	datum of 100m						
Made Ground	100	n/a	n/a	n/a	n/a	n/a	n/a
Weathered London Clay	99.30	CH	36 to 99	24	20+ 6Z[a]	19	DC-3 AC-2s
London Clay	89.00	CH /CV	108 to 203	24		19	DC-1 AC-1s

a: z depth below surface of the London Clay

b: Based on $0.75E_u$. E_u is based on 600 C_u. Burland, Standing J.R., and Jardine F.M. (eds) (2001), Building response to tunneling, case studies from construction of the Jubilee Line Extension London, CIRIA Special Publication 200.

c: BRE SD1

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5 Geotechnical Assessment of Ground Conditions

5.1 Introduction

The information obtained from the ground investigation on the soil conditions in relation to the proposed basement construction has been assessed for impacts on existing building structures. The principle impacts are ground movements from the excavation for the basement. These movements are vertical movements of the foundation formation level from isostatic readjustment from the excavation and possible impacts of existing structures from the basement wall construction.

5.2 Allowable Bearing Pressure

The foundation formation level of the basement will be approximately between 3.5 and 2.8 m below ground level. On the basis of an undrained shear strength of 65 kPa at an allowable bearing pressure of 120kPa, which has been used as a basis for the loading from footings within the basement area, with the perimeter retaining wall designed to a loading of 40 kPa.

5.3 Effect of Heave from soil excavation

The excavation for the basement will take over a site which slopes slightly from north to south. For the purposes of the heave assessment the greatest depth of excavation is assumed which is approximately 3.50 m in the NE corner of the excavation.

The ground model is based on the ground conditions assessment in Section 4. The heave has been evaluated using Pdisp version 19.3, which shows a maximum heave of 8.7 mm, which occurs within the lightwell areas. (Appendix F for Pdisp output, plan and sections).

5.4 Effect of Lateral movement from excavation/ construction

Calculations undertaken by Croft in accordance with CIRIA C580 (Scheme Calculations- submitted separately) have shown that the maximum horizontal movement of 5.3 mm occurs at the wall. This reduces to 0mm at 1400 mm from the inside edge of the wall.

5.5 Effect of Vertical movement from excavation / construction outside the excavation

Calculations undertaken by Croft in accordance with CIRIA C580 (Scheme Calculations- submitted separately) have shown that the maximum vertical movement of 2.7 mm occurs 2000 mm from the wall. This reduces to 0mm at 1400 mm from the inside edge of the wall.

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5.6 Damage Category

Calculations undertaken by Croft in accordance with CIRIA C580 (Scheme Calculations- submitted separately) have shown that the maximum anticipated damage may be categorised as 'Very Slight' Category 1.

5.7 Sub –surface Concrete

The results of lab testing for sulphate and pH are summarised below in Figure 4.4. The full analysis is included in Appendix C. It is recommended that an overall design sulphate class of DS-3 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC2 is adopted.

5.8 Potential Impact on the Existing Structure from Basement Construction

The existing building at 23 Ravenshaw Street will be demolished prior to construction of the basement. The impact of the basement excavation and construction on the adjacent properties of 21 and 25 Ravenshaw Street are considered in the Basement Method Statement by Croft. Monitoring before, during and after construction will be undertaken as outlined in the Basement Monitoring Statement by Croft (submitted separately).

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6 Screening

6.1 Introduction

Screening is undertaken as outlined in Section 6.2 of the GSD recommendations. It identifies if there are hydrogeological, hydrology and land stability issues associated with the proposed development that requires detailed analysis and investigation. If there are no significant issues identified in the screening stage, then further stages are not required. The report follows the flow charts set out in CPG4, and makes reference to the GSD.

6.2 Subterranean (Groundwater) flow

This section answers questions in Figure 1 of CPG4:

The source of information for the assessment of subterranean flow is from the GSD and a site specific Groundsure Environmental Insight Report for 23 Ravenshaw Street (Appendix A).

Table 6.1: Responses to Figure 1, CPG4

Question	Response	Action required
1a. Is the site located directly above an aquifer	No The site directly overlies the London Clay formation	None.
1b. Will the proposed basement extend beneath the water table surface.	Yes Preliminary indications are that groundwater is between 0.57 and 5.86 m below ground level (overall average of 2.78 m), although it is considered this is perched water	The basement has been designed, with a design water level of 0.5 m below ground level. In addition, drainage is permitted by the installation of a permeable screen around the basement retaining wall.
2. Is the site within 100m of a watercourse, well, or potential spring line.	None. There are no known wells or spring-lines within 100 m of the site[b,c].	None
3. Is the site within the catchment of the pond chains on Hampstead Heath	No. The site is not within the catchment of the ponds[b]	None

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Question	Response	Action required
4. Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas.	Yes – see note below[d].	The permeable at the site will be increased by 5% with a decrease in the hard surface paved areas, providing a beneficial effect.
5. As part of site drainage, will more surface water than at present be discharged to ground (e.g. via soakaways and/or SUDS).	No	None
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 lines.	No. There are no recorded local ponds or spring lines within 250 m of the site	None

a. *Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 8).*

b. *Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 11).*

c. *Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 14).*

d. Rainwater Run Off and Harvesting:

The proposed development increases the permeable area on the site by 5% and due to a 7,500 litre rainwater collection tank feeding W.C.'s, irrigation and garden taps decreases the potential area subject to rainwater run-off from 381.13 m² to 112.65 m²; a 70%. reduction.

Site Area: 484.1 m²

Extant Permeable Area: 97.97 m²
Extant Impermeable Area: 386.13 m²
Rainwater Collection Area: 0 m²

Total Run Off Area: 386.13 m²

Proposed Permeable Area: 102.97 m²
Proposed Impermeable Area: 381.13 m²
Proposed Rainwater Collection Area: 243 m²
(100% to be collected in 7,500 Ltr Tank)

Total Run Off Area: 95.39 m²

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6.3 Slope / Land Stability

This section answers questions posed by Figure 2 in CPG4.

Table 6.2: Responses to Figure 2, CPG4

Question	Response	Action required
1. Does the site include slopes, natural or man-made, greater than about 1in 8?	No The site is on level ground at approximately 59.0 m AOD.	None
2. Will the proposed re-profiling of the landscaping at site change slopes at the property boundary to greater than about 1 in 8?	No.	None
3. Does the development neighbour land including railway cuttings and the like with a slope greater than about 1 in 8?	Yes, there is a railway cutting in the London Clay Formation at approximately 1 in 5 (~12^0) to the south west of the site boundary. The properties of the LCF indicate a conservatively assessed drained angle of shearing resistance of 24^0.	There has been no record of instability from the railway cutting and it is not considered that the cutting will have any significant impact on the basement development
4. Is the site within a wider hillside setting in which the general slope is greater than about 1 in 8?	No.	None
5. Is the London Clay the shallowest stratum on site?	No. There is a layer of made ground with a depth of up to 1.8 m. (This was assessed in a factual report as Head Deposits, although there is no British Geological Survey information to support this)	None
6. Will any tress 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, small trees and shrubs will be felled from the garden area.	None

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Question	Response	Action required
7. Is there a history of shrink/swell subsidence in the local area and/or evidence of such at the site	No records.	None.
8. Is the site within 100 m of a watercourse or a potential spring line?	No[a,b].	None
9. Is the site within an area of previously worked ground?	Borehole record for the site show made ground extends to 1.8 m bgl. The made ground is described in the borehole records for the site as a firm brown grey clay with sand and gravel sized brick, pottery, flint, coal and ash fragments.	Made ground will not form a founding stratum,
10. Is the site within an aquifer?	No	None
11. Is the site within 50m of the Hampstead Heath Ponds?	No.	None
12. Is the site within 5 m of a highway or pedestrian right of way?	Yes	Effects of any impact on the highway such as subsidence or damage to services will be mitigated by the hit and miss underpinning as outlined in the method statement.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	New foundations may be significantly deeper than those of neighbouring properties which do not have basements. This risk will be mitigated by design in accordance with relevant design standards.	Calculations have been undertaken of ground movements in this report (Section 5) and the mitigation of these movement is included in the Basement Construction Method Statement.
14. Is the site over (or within the exclusion zone of) any tunnels?	No	None

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Table 6.2 (continued): Responses to Figure 2, CPG4

a. *Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 8).*

b. *Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 11).*

c. *Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 14).*

d. Groundsure Report (Appendix C) October 2015

In summary, the site is located on level ground over made ground to 1.8 m depth which overlies the London Clay Formation.

Foundation levels will be lower with respect to adjacent properties which will require mitigation measures in the retaining wall design, which have been assessed in this report and the Basement Construction method statement.

6.4 Surface flow and flooding

This section answers questions in Figure 3 of CPG4:

The source of information for the assessment of subterranean flow is from the GSD and a site specific Groundsure Environmental Insight Report for 23 Ravenshaw Street (Appendix A).

Table 6.3: Responses to Figure 3, CPG4

Question	Response	Action required
1: Is the site within the catchment of the pond chains on Hampstead Heath?	No	None
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?	Yes- A reduction in rainwater into storm water sewer by 70% (see note below)	The reduction in rainwater discharge will be beneficial to the area so no further action is considered necessary
3: Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	Yes - A reduction in hard surfaced areas by 5% (see note below)	The reduction in rainwater discharge will be beneficial to the area so no further action is considered necessary

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Question	Response	Action required
4: Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	Yes - A reduction in rainwater into storm water sewer by 70% (see note below)	The reduction in rainwater discharge will be beneficial to the area so no further action is considered necessary
5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	None
6: Is the site in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?	A burst water main occurred in 2015 in Mill Street at a higher level than the site, which was replaced by the local water company. The basement is over 1 km from a surface water feature	The site has a very low flood risk as defined by the EA. Within Ravenshaw Street itself the flood risk is defined as low. No further action is required

Rainwater Run Off and Harvesting:

The proposed development increases the permeable area on the site by 5% and due to a 7,500 litre rainwater collection tank feeding W.C.'s, irrigation and garden taps decreases the potential area subject to rainwater run-off from 381.13 m² to 112.65 m²; a 70%. reduction.

Site Area: 484.1 m²

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Proposed Permeable Area: 102.97 m²
Proposed Impermeable Area: 381.13 m²
Proposed Rainwater Collection Area: 243 m²
(100% to be collected in 7,500 Ltr Tank)

Total Run Off Area: 95.39 m²

In summary it is concluded that the for surface water flow and flooding does not need to be taken forward to the scoping stage, as the proposed development will reduce the risk of surface water flooding as a consequence of the improvement of permeability by 5% on the site and reduction of rainwater run off by up to 70%.

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7 Scoping

7.1 Introduction

This section considers the output from the screening survey where further actions are required. It considers the scope of information required in addressing these actions and what the potential impacts are of the basement construction. The existing ground conditions and the location of the basement can be summarised in a conceptual model as indicated in Figure 7.1.

Figure 7.1 Conceptual Site Model

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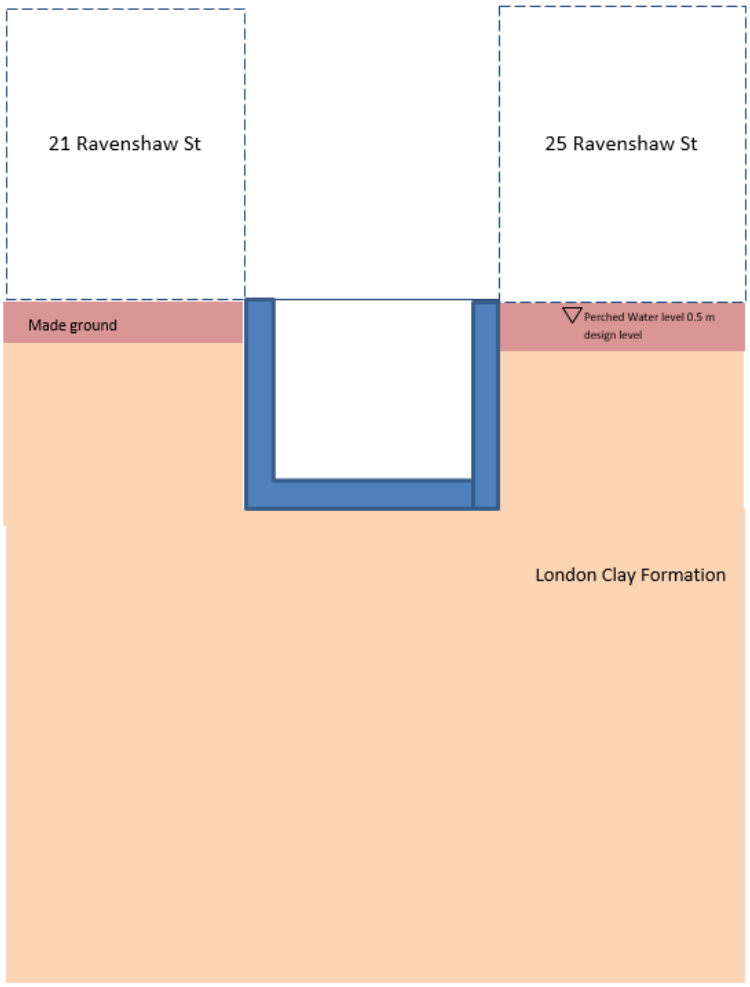

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Table 7.1 Summary of Scoping Requirements - Hydrogeology

Screening questions of concern - Hydrogeology	Potential Impact	Mitigation
1b. Will the proposed basement extend beneath the water table surface.	Yes	Allow for a very conservative groundwater level of 0.5 m below existing ground level in the design and construction.

Table 7.2 Summary of Scoping Requirements – Land Stability

Screening questions of concern – Land Stability	Potential Impact	Mitigation
9. Is the site within an area of previously worked ground?	None	The basement will be founded below made ground in firm to stiff London Clay
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	New foundations may be significantly deeper than those of neighbouring properties which do not have basements.	Calculations have been undertaken of ground movements in this report (Section 5) and the mitigation of these movement is included in the Basement Construction Method Statement.

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8 Impact Assessment

8.1 Groundwater

8.1.1 Groundwater level

The screening process has shown from preliminary borehole information that groundwater occurs at an average depth of 2.71 m bgl. At this level groundwater will be above the excavation depth of 3.5 m.

8.1.2 Impact on groundwater by any contamination from the made ground

The made ground is described as an inert material with no visual or olfactory indications of contamination. The building which is founded on the made ground appears to have been constructed prior to the 1873 mapping survey. The site does not lie over an aquifer.

8.2 Land Stability

8.2.1 Is the site within an area of previously worked ground?

The made ground is described as an inert material with no visual or olfactory indications of contamination. The building which is founded on the made ground appears to have been constructed between 1873 and 1896. As a precaution suitable Person Protective Equipment should be used by construction workers in the excavation of the made ground.

The basement foundation formation level will be below the base of the made ground, founding on the firm to very stiff London Clay Formation.

8.2.2 Is the site within an aquifer?

No.

8.2.3 Proximity to adjacent buildings

Calculations have been undertaken of ground movements in this report (Section 5) and the mitigation of these movement is included in the Basement Construction Method Statement.

8.2.4 Soil removal / Excavations

The ground investigation indicates that the soil can be readily excavated using conventional plant appropriate for the access constraints imposed by the location of the property. Groundwater in the form of perched water is anticipated to be encountered in the made ground, based on monitoring records at an average depth of 2.71 m below ground level, from the site investigation for the full depth of the excavation. It is anticipated the perched water can be managed by pumping.

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The impact of the excavation on ground heave has been assessed in Section 5 of this report, which concludes that heave will be less than 9 mm, which is considered within normal construction tolerance.

8.2.5 Stability of Temporary Excavations

It is proposed that the basement retaining walls will be constructed using a hit and miss underpinning technique, with temporary propping which is set out in the Basement Method Statement by Croft submitted as a separate document.

8.2.6 Groundwater Control

As discussed in Section 8.1.1 groundwater is not anticipated to effect the construction works. Groundwater has been measured at an average of 2.71 m bgl. If it is found that further to monitoring groundwater does impact the works, groundwater would be controlled by pumping to a tank prior to disposal by tanker to an approved facility. Alternatively discharge of the groundwater could be made to the sewer subject to an agreement from the local water company in terms of water quality, flow rate and quantity.

8.3 Monitoring of groundwater and ground movements

Groundwater levels have been monitored since the initial ground investigation was undertaken in 2011. The results of the ground monitoring are included within Section 5 of this report. It is recommended that monitoring of ground levels at adjacent structures and the highway should be carried out before, during and after construction. Earthworks and Drainage, as outlined in the Basement Monitoring Statement by Croft submitted separately.

8.4 Soil removal / Excavations

The ground investigation indicates that the soil can be readily excavated using conventional plant appropriate for the access constraints imposed by the residential location of the property. The presence of Claystones is not anticipated to cause a significant obstacle to conventional plant as Claystones tend to occur as isolated cobbles / boulders in the clay. The construction sequence is as outlined in the Basement Method Statement by Croft submitted separately.

8.5 Ground movements

Ground movements resulting from the basement construction have be evaluated using best practice in accordance with CIRIA 580 and are summarised in Section 5.0 of this report.

In summary it has been calculated that heave is not expected to exceed 9 mm resulting from the excavation. Horizontal ground movements have been calculated to

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not exceed 5.3 mm. Total vertical movement outside the perimeter of the basement retaining walls has been calculated not to exceed 2.7 mm.

8.6 Stability of Temporary Excavations

The cohesive nature of the soil (London Clay Formation) indicates that excavations will be stable in the short term. Excavation of the basement area will need to comply with appropriate health and safety criteria in terms of height and width of excavation face, as outlined in the Basement Method Statement by Croft submitted separately.

8.7 Surface Water

The topography of the site does not permit the ponding of surface water, as the site is situated on top of a cut slope which extends approximately 10 m to the railway on the west side of the site. The ground level also slopes to the south down Ravenshaw Street as discussed in Section 2.4.

A recent upgrade of sewers by Thames Water in Sumatra Road and adjacent streets as part of a flood alleviation scheme in 2008, indicates the ability of drainage to cope with flooding has been recently assessed and appropriate remedial measures taken. The site has a very low flood risk as defined by the EA. Within Ravenshaw Street itself the flood risk is defined as low.

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References

Camden Development Policy DP27 – Basement development.

Camden Planning Guidance – Basements and Lightwells CPG4 July 2015

Camden geological, hydrogeological and hydrological study – Guidance for subterranean development. Arup November 2010

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BRE Special Digest 1. *Concrete in aggressive ground.* Building Research Establishment. August 2005.

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BGS Geology of Britain Viewer
(http://mapapps.bgs.ac.uk/geologyofbritain/home.html borehole scans)

Stroud and Butler (1975) The SPT and engineering properties of glacial materials.

Look (2014) Handbook of Geotechnical Investigation and design tables 2nd ed.

CIRIA C580 2003 Embedded retaining walls – guidance for economic design.

Screening Report 23 Ravenshaw Street, NW6 1PN. Maund Geo- Consulting February 2012

Croft Structural Engineers Ltd 150122 Basement Method Statement

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Croft Structural Engineers Ltd 150122 Basement Monitoring

Statement Croft Structural Engineers Ltd 150122 Scheme

Calculations

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Appendix A Groundsure Report

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Maund Geo- Consulting Ltd
20, Mortlake Avenue,
Worcester, WR5 IQD

GroundSure Reference:	HMD-173160
Your Reference:	23 Ravenshaw St
Report Date	Oct 11, 2011
Report Delivery Method:	Email - pdf

GroundSure GeoInsight

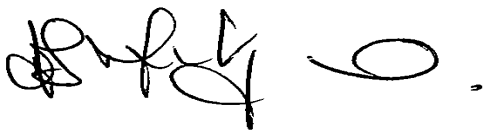
Address: 23, RAVENSHAW STREET, LONDON, NW6 1NP

Dear Sir/Madam,

Thank you for placing your order with GroundSure. Please find enclosed the **GroundSure GeoInsight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above GroundSure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
GroundSure GeoInsight

GroundSure GeoInsight

Address: 23, RAVENSHAW STREET, LONDON, NW6 1NP

Date: Oct 11, 2011

GroundSure Reference: HMD-173160

Your Reference: 23 Ravenshaw St

Brought to you by GroundSure

Aerial Photograph of Study Site

NW N NE

W E

SW S SE

Aerial photography supplied by Getmapping PLC.
© Copyright Getmapping PLC 2003. All Rights Reserved.

Site Name: 23, RAVENSHAW STREET, LONDON, NW6 1NP
Grid Reference: 524851,185026
Size of Site: 0.19 ha

Overview of Findings

The GroundSure GeoInsight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow Mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and GroundSure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Report Section	Number of records found within (X) m of the study site boundary
1. Geology	**Description**
1.1 Artificial Ground,	
1.1.1 Is there any Artificial Ground /Made Ground present beneath the study site?*	No
1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	No
1.2 Superficial Geology & Landslips	
1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	No
1.2.2 Are there any records relating to permeability of superficial geology within the study site* boundary?	No
1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
1.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No
1.3 Bedrock, Solid Geology & Faults	
1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
1.3.2 Are there any records relating to permeability of bedrock within the study site* boundary?	Yes
1.3.3 Are there any records of faults within 500m of the study site boundary?	No
1.3.4 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level
1.3.5 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary

* This includes an automatically generated 50m buffer zone around the site

Source:Scale 1:50,000 BGS Sheet No:256

2. Ground Workings	on-site	0-50	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	2	0	17	-	-
2.2 Historical Underground Workings Features from Small Scale Mapping	0	0	0	0	0
2.3 Current Ground Workings	0	0	0	0	0

3. Mining, Extraction & Natural Cavities	on-site	0-50	51-250	251-500	501-1000
3.1 Historical Mining	0	0	0	0	0
3.2 Coal Mining	0	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining*	0	0	0	0	0
3.5 Non–Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

*This includes an automatically generated 50m buffer zone around the site

4. Natural Ground Subsidence	on-site*	0-50	51-250	251-500	501-1000
4.1 Shrink-Swell Clay	Moderate	-	-	-	-
4.2 Landslides	Very Low	-	-	-	-
4.3 Ground Dissolution of Soluble Rocks	Negligible	-	-	-	-
4.4 Compressible Deposits	Negligible	-	-	-	-
4.5 Collapsible Deposits	Very Low	-	-	-	-
4.6 Running Sand	Negligible	-	-	-	-

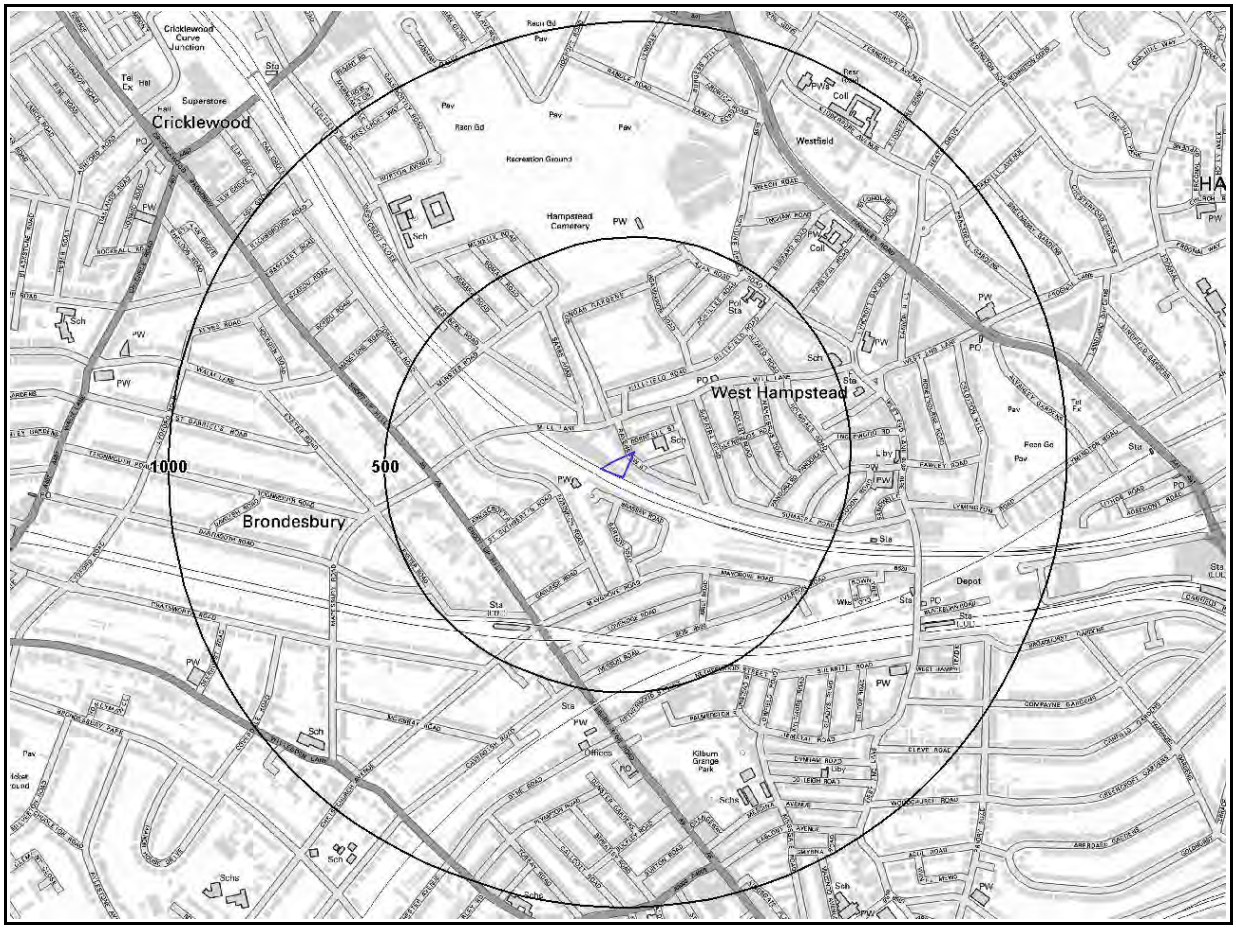
* This includes an automatically generated 50m buffer zone around the site

5. Borehole Records	on-site	0-50	51-250	251-500	501-1000
5.1 BGS Recorded Boreholes	0	1	0	-	-

6. Estimated Background Soil Chemistry	on-site	0-50	51-250	251-500	501-1000
6.1 Records of Background Soil Chemistry	2	0	0	-	-

1.1 Artificial Ground Map

NW N NE



W E

SW S SE

Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

Geological information represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:256

1.1.1 Artificial/Made Ground

Are there any records of Artificial/Made Ground within 500m of the study site boundary? **No**

Database searched and no data found.

1.1.2 Permeability of Artificial Ground

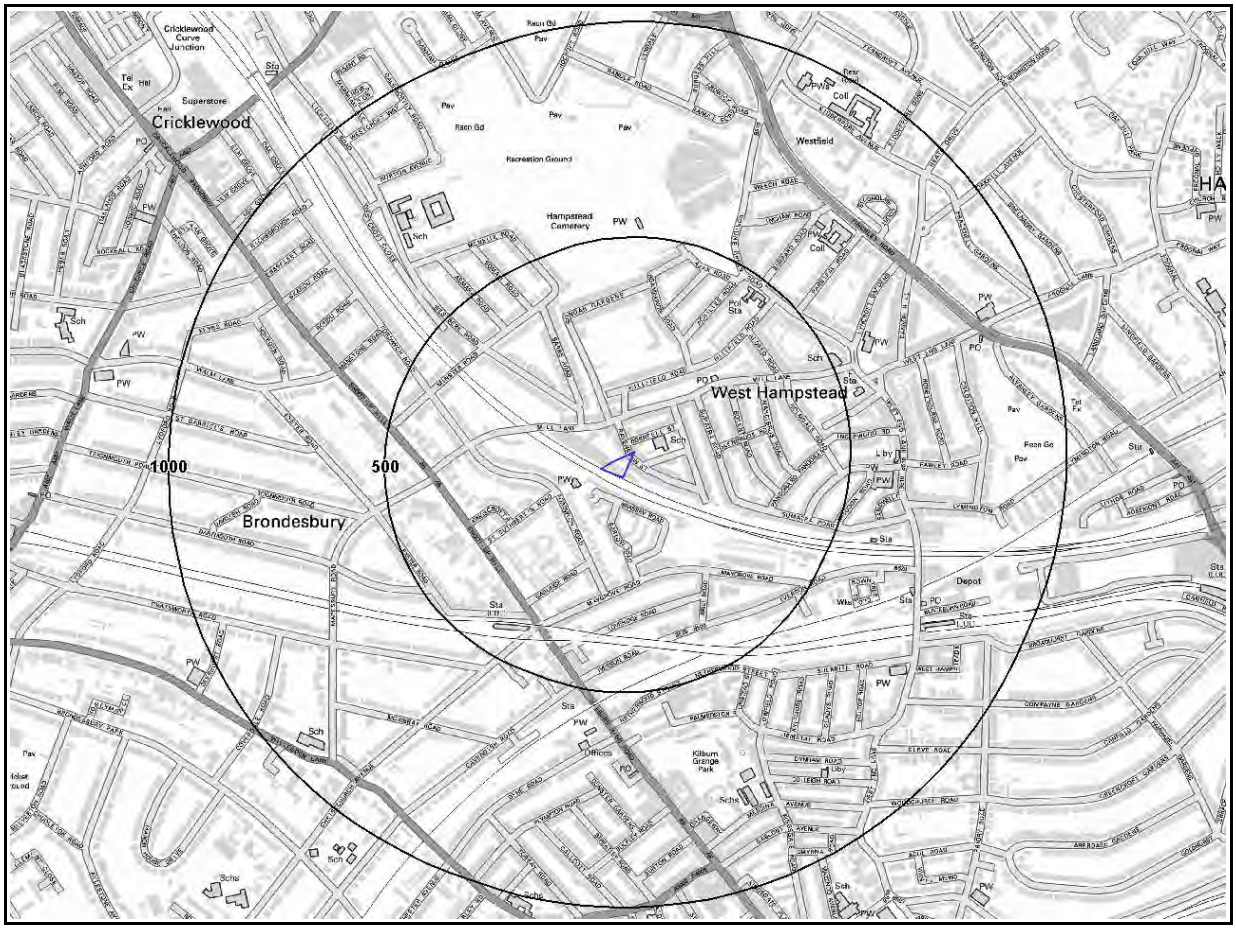
Are there any records relating to permeability of artificial ground within the study site* boundary? **No**

Database searched and no data found.

* This includes an automatically generated 50m buffer zone around the site.

1.2 Superficial Deposits and Landslips Map

NW N NE



W E

SW S SE

Superficial and Landslips Legend

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Site Outline

500
1000

Search Buffers (m)

Geological information represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

1.2Superficial Deposits and Landslips

1.2.1 Superficial Deposits/Drift Geology

Are there any records of Superficial Deposits/Drift Geology within 500m of the study site boundary? No

Database searched and no data found.

1.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site* boundary? No

Database searched and no data found.

1.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.2.4 Landslip Permeability

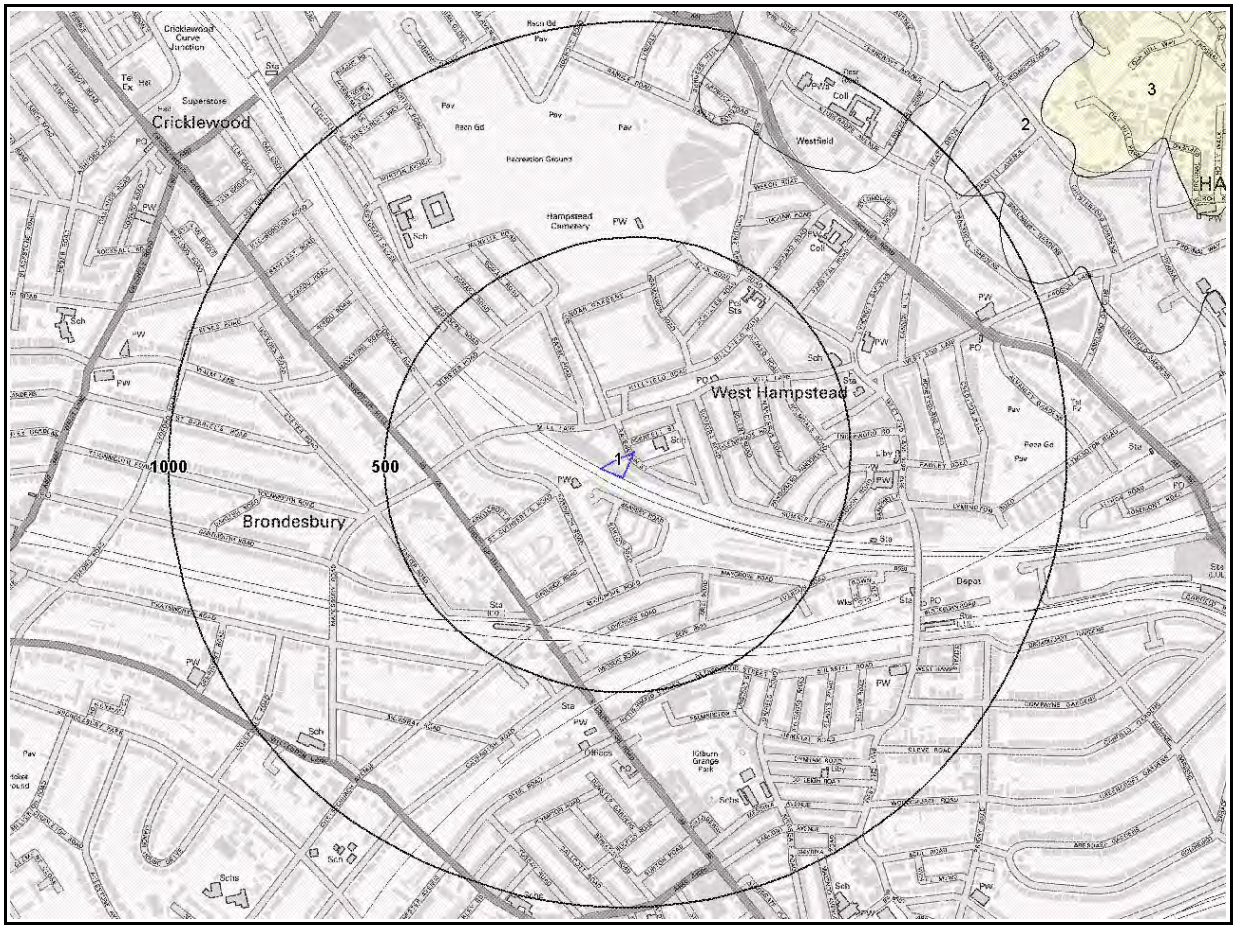
Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

*This includes an automatically generated 50m buffer zone around the site.

1.3 Bedrock and Faults Map

NW N NE



W E

SW S SE

Bedrock & Faults Deposits Legend

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Site Outline

500
1000

Search Buffers (m)

Geological information represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

1.3Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:256

1.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance (m)	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	LC-CLSS	London Clay Formation - Clay, Silt And Sand	Eocene

1.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site* boundary? Yes

Distance (m)	Direction	Flow type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Moderate	Very Low
0.0	On Site	Mixed	Moderate	Very Low

1.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3.4 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level

1.3.5 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?

No radon protective measures are necessary

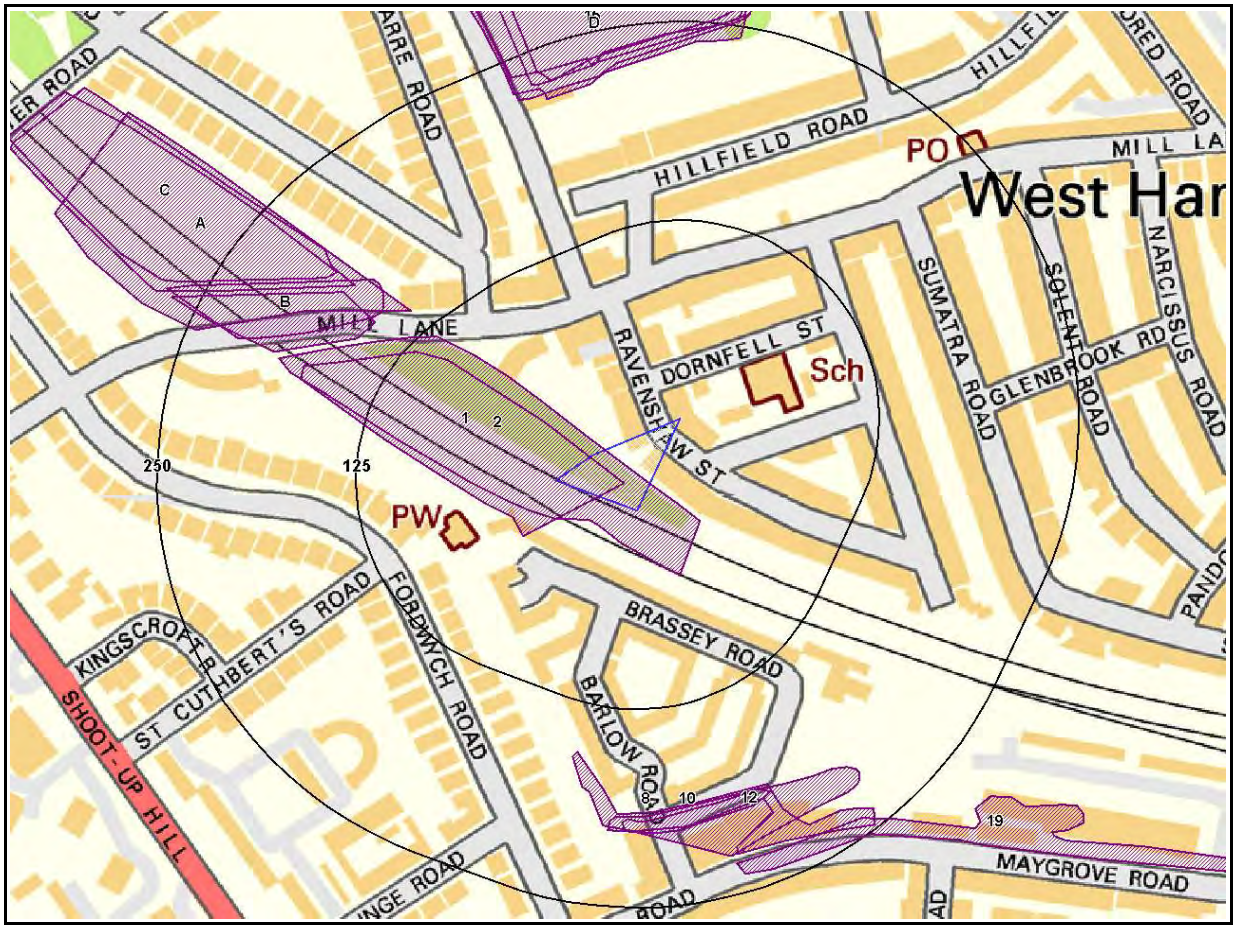
* This includes an automatically generated 50m buffer zone around the site.

2. Ground Workings Map

NW N NE

W E

SW S SE



Ground Workings Legend

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Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

2. Ground Workings

2.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on GroundSure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping.

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

The following Historical Surface Ground Working Features are provided by GroundSure:

ID	Distance (m)	Direction	NGR	Use	Date
1	0.0	On Site	524739,185032	Cuttings	1894
2	0.0	On Site	524756,185025	Cuttings	1866
3A	140.0	NW	524553,185172	Cuttings	1966
4A	140.0	NW	524553,185172	Cuttings	1976
5A	140.0	NW	524553,185172	Cuttings	1993
6B	151.0	NW	524620,185110	Cuttings	1894
7B	152.0	NW	524621,185117	Cuttings	1866
8	156.0	S	524903,184806	Unspecified Ground Workings	1940
9C	176.0	NW	524563,185192	Cuttings	1865
10	188.0	S	524881,184801	Unspecified Ground Workings	1920
11 C	190.0	NW	524556,185194	Cuttings	1894
12	191.0	S	524913,184801	Unspecified Pit	1866
13 D	218.0	N	524842,185306	Reservoir	1920
14 D	221.0	N	524842,185306	Covered Reservoir	1894
15	227.0	N	524834,185314	Reservoir	1940
16 D	228.0	N	524830,185316	Reservoir	1912
17 D	230.0	N	524841,185316	Covered Reservoir	1976
18 D	230.0	N	524841,185316	Covered Reservoir	1993
19	231.0	S	525079,184785	Unspecified Ground Workings	1866

2.2 Historical Underground Workings Features derived from Historical Mapping

This data is derived from the GroundSure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

2.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? **No**

Database searched and no data found.

3. Mining, Extraction & Natural Cavities Map

NW N NE

W E

SW S SE

Mining, Extraction & Natural Cavities Legend

Enabled by Ordnance Survey

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Site Outline

250
500
Search Buffers (m)

Historical Mining

Non-Coal Mining Cavities

Natural Cavities

Non-Coal Mining

Highly likely

Likely

Unlikely

Highly unlikely

Rare

3.Mining, Extraction & Natural Cavities

3.1 Historical Mining

This dataset is derived from GroundSure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? **No**

The following information provided by JPB is not represented on Mapping:

Database searched. No results found.

3.4 Non – Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.5 Non – Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? **No**

Database searched and no data found.

3.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? **No**

Database searched and no data found.

3.7 Brine Extraction

This dataset provides information from the Brine Compensation Board which has been discontinued and is now covered by the Coal Authority.

Are there any Brine Extraction areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level. More detailed information on potential Tin Mining may be found in Section 3.4 – Non-Coal Mining Hazards.

Are there any Tin Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

4. Natural Ground Subsidence
4.1 Shrink-Swell Clay Map

NW N NE

W E

SW S SE

Shrink-Swell Clay Legend

Enabled by Ordnance Survey

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Licence Number: 100035207

Site Outline

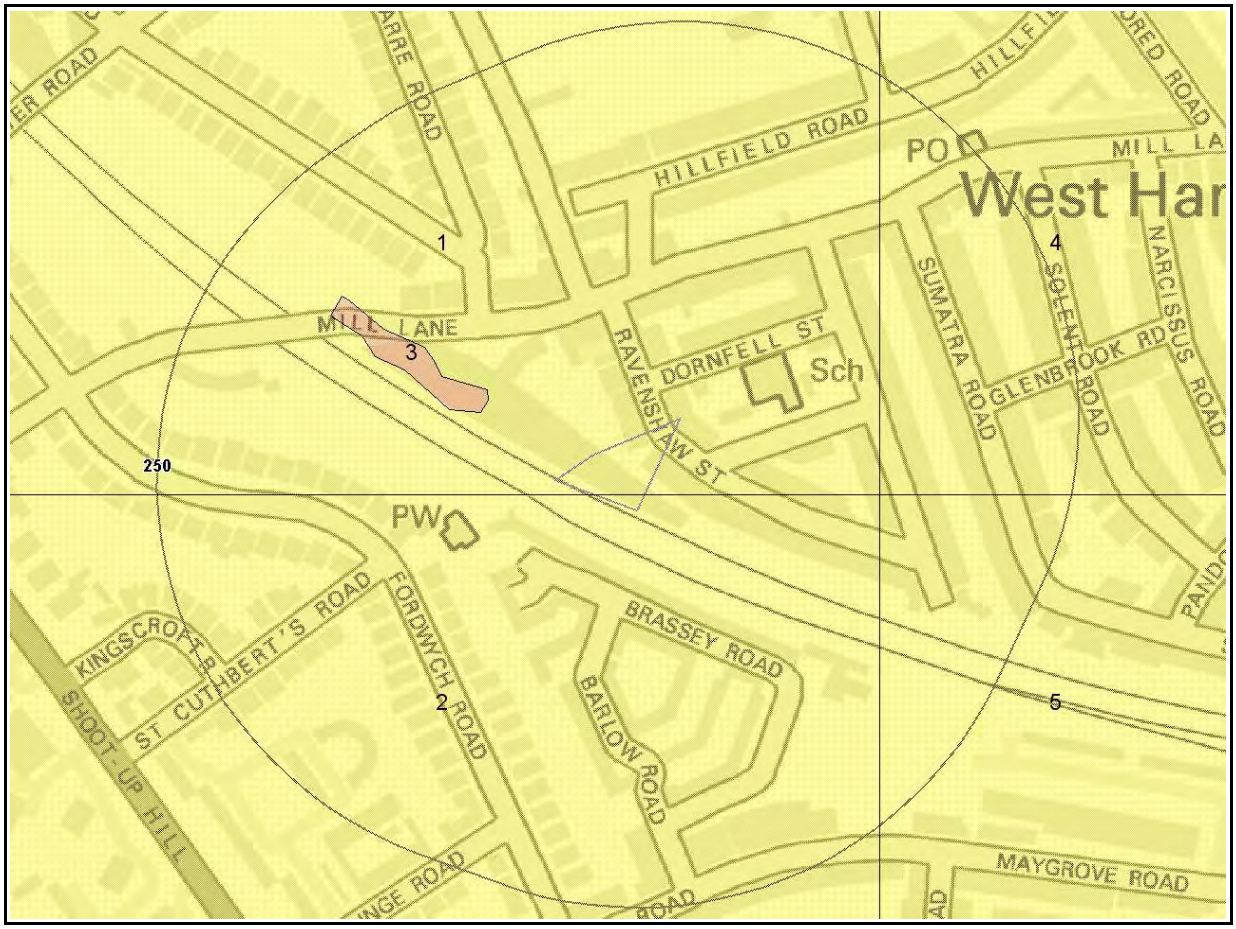
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.2 Landslides Map

NW N NE



W E

SW S SE

Landslides Legend

Enabled by Ordnance Survey

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Site Outline

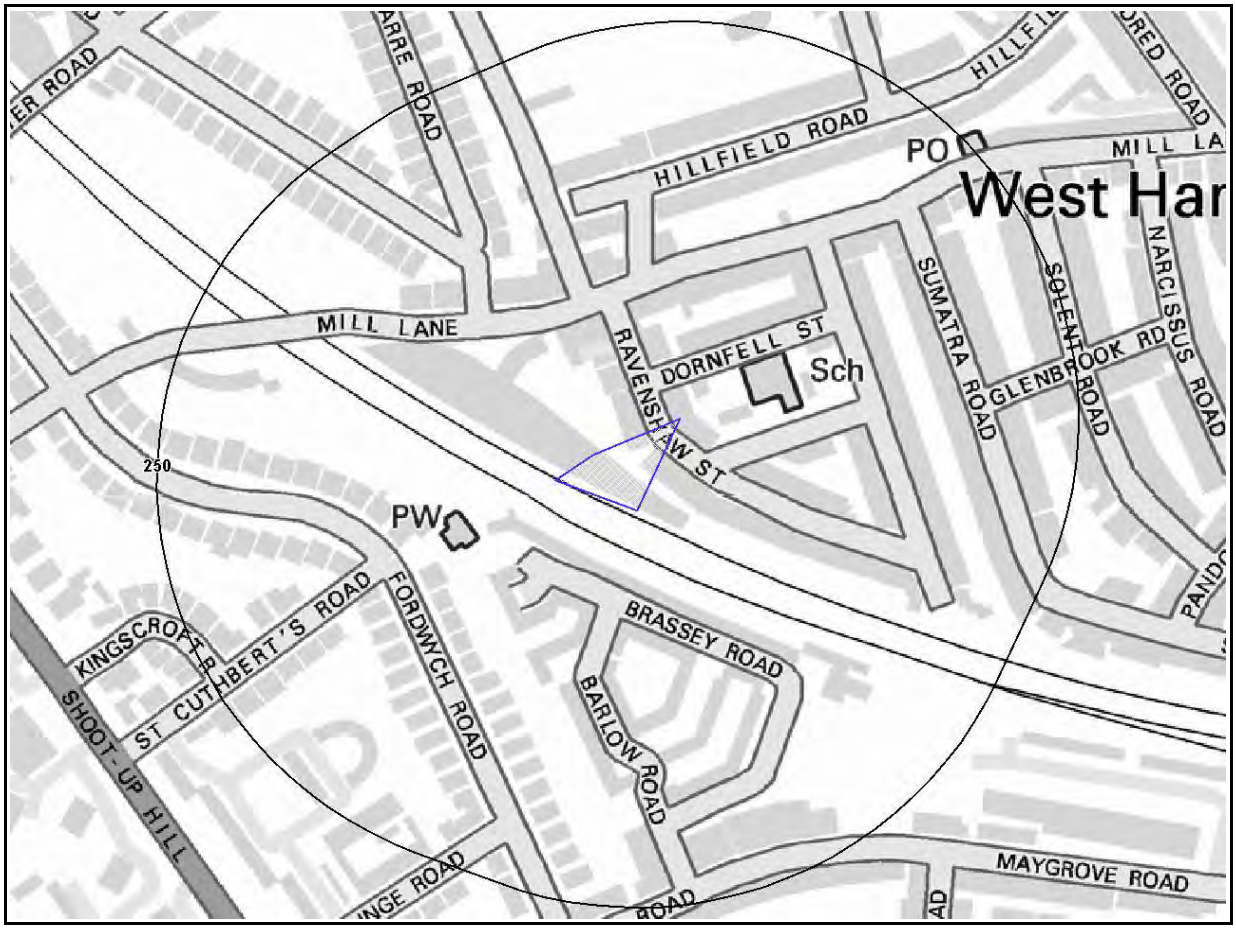
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.3 Ground Dissolution Soluble Rocks Map

NW N NE



W E

SW S SE

Ground Dissolution Soluble Rocks Legend

Enabled by Ordnance Survey

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Site Outline

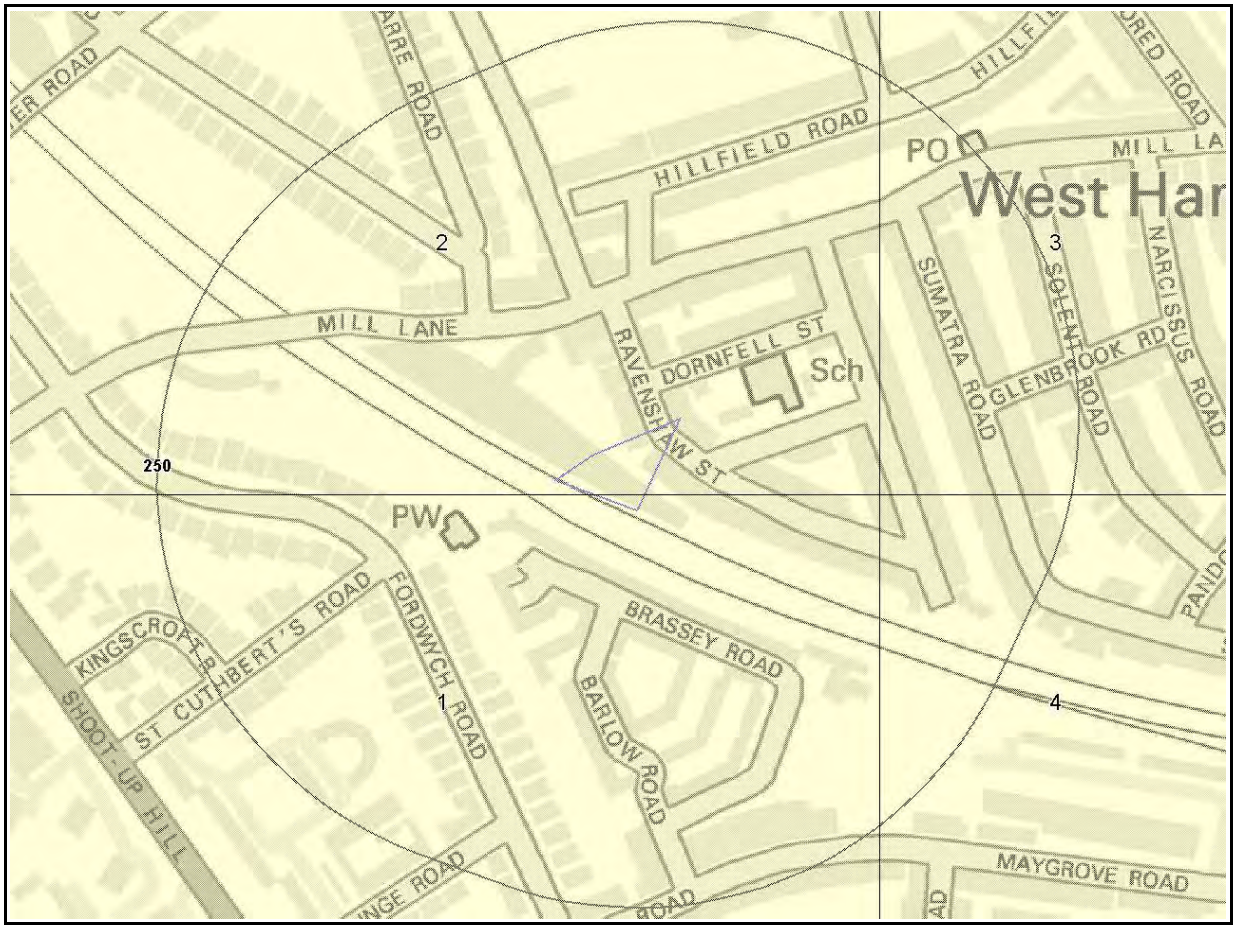
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.4 Compressible Deposits Map

NW N NE



W E

SW S SE

Compressible Deposits Legend

Enabled by Ordnance Survey

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Licence Number: 100035207

Site Outline

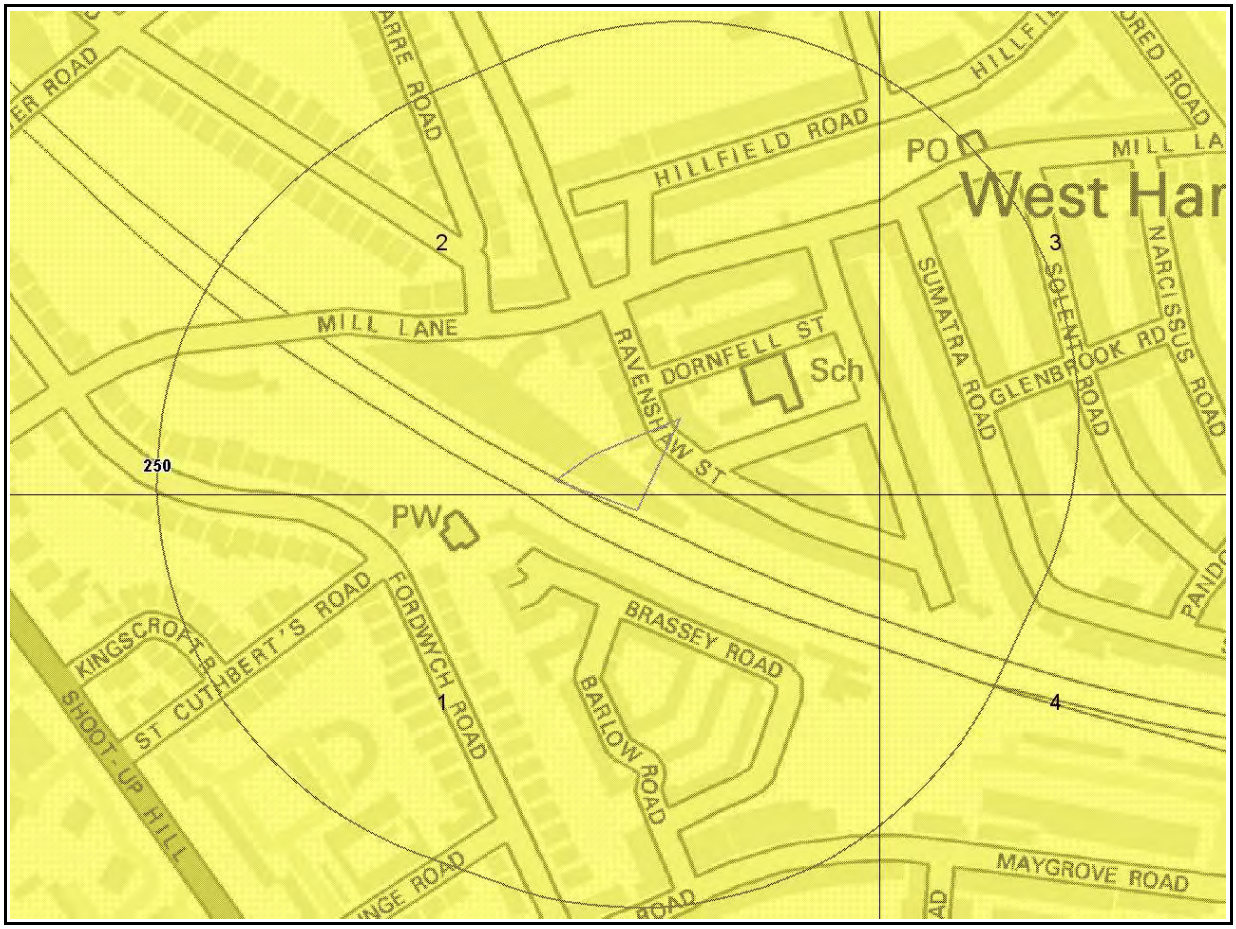
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.5 Collapsible Deposits Map

NW N NE



W E

SW S SE

Collapsible Deposits Legend

Enabled by Ordnance Survey

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Licence Number: 100035207

Site Outline

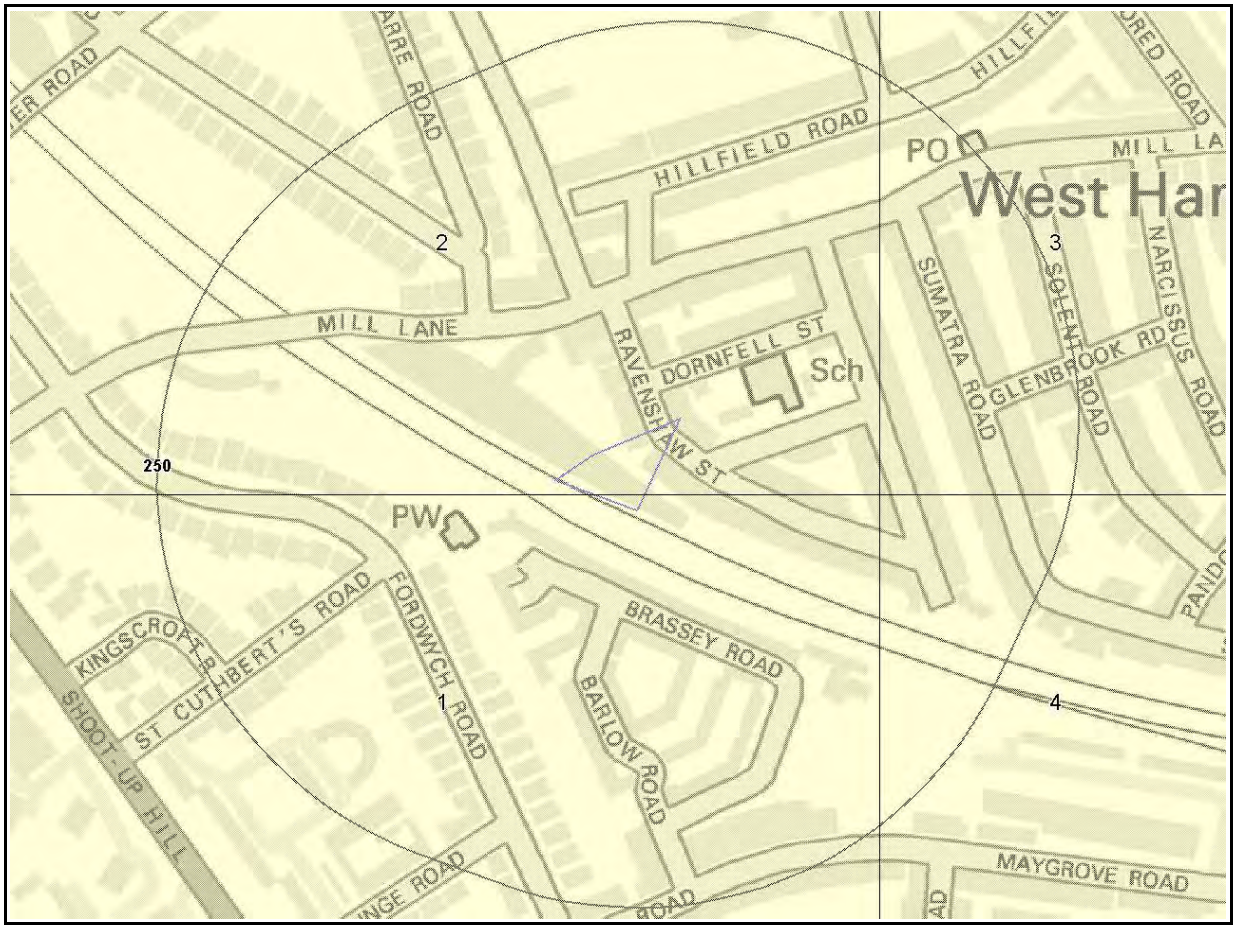
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.6 Running Sand Map

NW N NE



W E

SW S SE

Running Sand Legend

Enabled by Ordnance Survey

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Licence Number: 100035207

Site Outline

125
250
Search Buffers (m)

No Data / Null

Negligible

Very Low

Low

Moderate

High

4.Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site* boundary? Moderate

4.1 Shrink – Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Moderate	Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.
2	0.0	On Site	Moderate	Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

4.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.
2	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

4.3 Ground Dissolution of Soluble Rocks

The following Soluble Rocks information provided by the British Geological Survey:

Distance (m)*	Direction	Hazard Rating	Details
0.0	On site	Null-Negligible	Soluble rocks are not present in the search area. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

*This includes an automatically generated 50m buffer zone around the study site boundary.

4.4 Compressible Deposits

The following Compressible Ground information provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

4.5 Collapsible Deposits

The following Collapsible Rocks information is provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

4.6 Running Sands

The following Running Sands information is provided by the British Geological Survey:

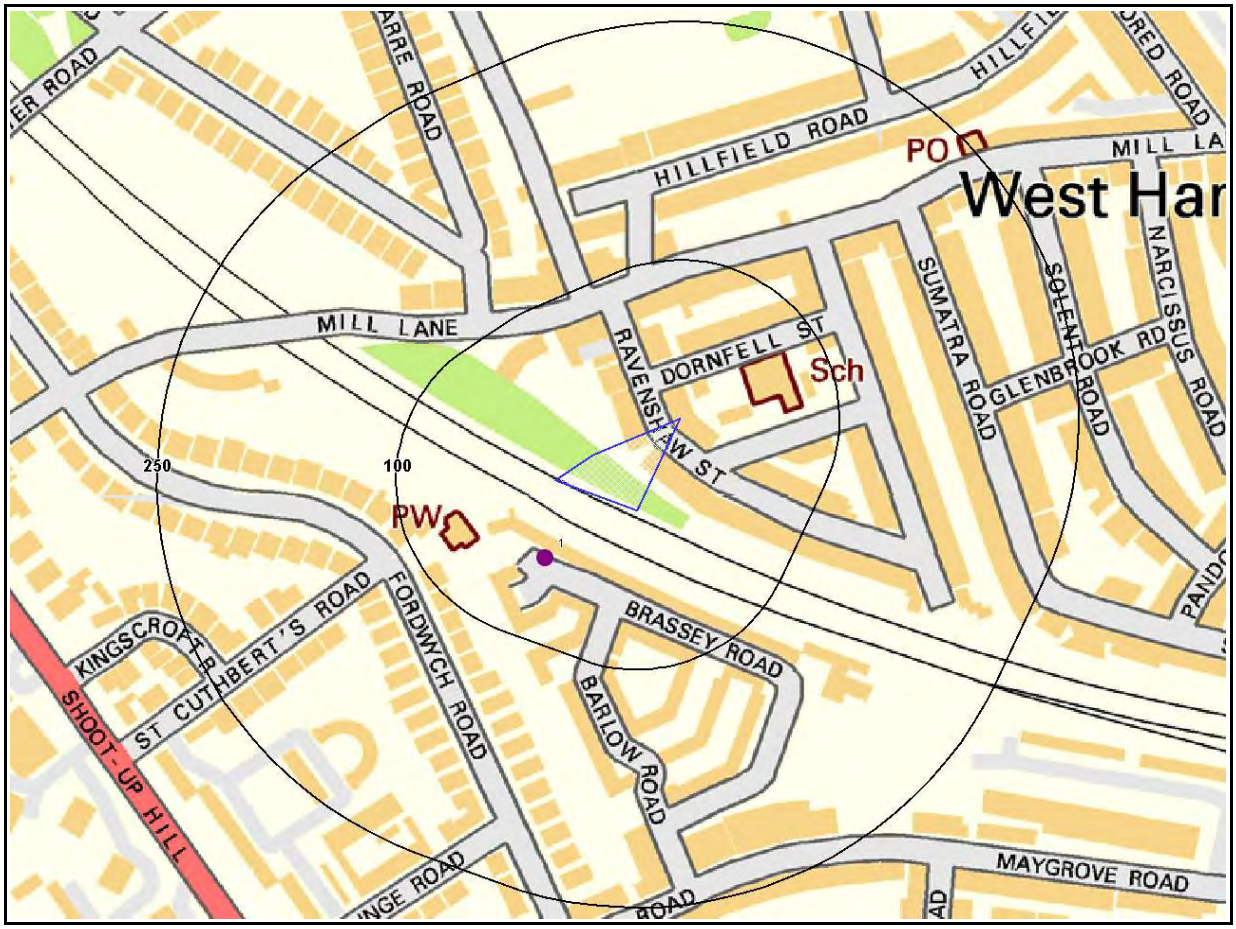
ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

5. Borehole Records Map

NW N NE

W E

SW S SE



Borehole Records Legend

Enabled by Ordnance Survey

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Site Outline

Borehole Locations

125
250
Search Buffers (m)

5.Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: **1**

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length (m)	Borehole Name
1	48.0	S	524790,184960	TQ28SW85	15.24	MAPESBURY RD WILLESDEN

6.Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary: 2

For further information on how this data is calculated and limitations upon its use, please see the GroundSure GeoInsight User Guide, available on request.

			Estimated Geometric Mean Soil Concentrations (mg/kg)				
Distance (m)*	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	London	No data	No data	No data	No data	No data
0.0	On Site	London	No data	No data	No data	No data	No data

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

7. Contacts

GroundSure Helpline
Telephone: 08444 159 000
info @ groundsure.com

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143. Fax: 0115 936 3276.
Email: enquiries@bgs.ac.uk
Web: www.bgs.ac.uk
BGS Geological Hazards Reports and general geological enquiries

British Gypsum
British Gypsum Ltd, East Leake, Loughborough, Leicestershire, LE12 6HX
Tel: www.british-gypsum.com

The Coal Authority
200 Lichfield Lane, Mansfield, Notts NG18 4RG
Tel: 0845 762 6848
DX 716176 Mansfield 5 www.coal.gov.uk

Johnson Poole & Bloomer Limited
Harris and Pearson Building, Brettel Lane, Brierley Hill, West Midlands DY5 3LH
Tel: +44 (0) 1384 262 000
Email: enquiries.gs@jpb.co.uk
Website: www.jpb.co.uk

Ordnance Survey
Romsey Road, Southampton SO16 4GU
Tel: 08456 050505

Getmapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444

Peter Brett Associates
Caversham Bridge House, Waterman Place, Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail: reading@pba.co.uk

Acknowledgements

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This report has been prepared in accordance with the GroundSure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

1 Definitions

In these conditions unless the context otherwise requires:

"Beneficiary"means the Client or the customer of the Client for whom the Client has procured the Services.

"Commercial"means any building which is not Residential.

"Commission"means an order for Consultancy Services submitted by a Client.

"Consultancy Services" mean consultancy services provided by GroundSure including, without limitation, carrying out interpretation of third party and in-house environmental data, provision of environmental consultancy advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Content" means any data, database or other information contained in a Report or Mapping which is provided to GroundSure by a Data Provider.

"Contract" means the contract between GroundSure and the Client for the performance of the Services which arises upon GroundSure's acceptance of an Order or Commission and which shall incorporate these conditions, the relevant GroundSure User Guide, proposal by GroundSure and the content of any subsequent report, and any agreed amendments in accordance with clause 11.

"Client" means the party that submits an Orderor Commission.

"Data Provider" means any third party providing Content to GroundSure.

"Data Report" means reports comprising factual data with no professional interpretation in respect ofthe level of likely risk and/or liability available from GroundSure.

"GroundSure" means GroundSure Limited, a company registered in England and Wales under number 03421028 and whose registered office is at Greater London House, Hampstead Road, London NW1 7EJ.

"Intellectual Property" means any patent, copyright, design rights, service marks, moral rights, data protection rights, know-how, trademark or any other intellectual property rights.

"Mapping" an historical map or a combination of historical maps of various ages, time periods and scales available from GroundSure.

"Order" means an order form submitted by the Client requiring Services from GroundSure in respect of a specified Site.

"Order Website" means online platform via which Orders may be placed.

"Report" means a Risk Screening Report or Data Report for commercial or residential property available from GroundSure relating to the Site prepared in accordance with the specifications set out in the relevant User Guide.

"Residential" means any building used as or suitable for use as an individual dwelling.

"Risk Screening Report" means one of GroundSure's risk screening reports, comprising factual data with interpretation in respect ofthe level of likely risk and/or liability, excluding **"Consultancy Services"**.

"Services" means the provision of any Report, Mapping or Consultancy Services which GroundSure has agreed to carry out for the Client/Beneficiary on these terms and conditions in respect of the Site.

"Site"means the landsite in respect of which GroundSure provides the Services.

"User Guide" means the relevant current version of the user guide, available upon request from GroundSure.

2 Scope of Services

2.1 GroundSure agrees to carry out the Services in accordance with the Contract and to the extent set out therein.

2.2 GroundSure shall exercise all the reasonable skill, care and diligence to be expected of experienced environmental consultants in the performance of the Services.

2.3 The Client acknowledges that it has not relied on any statement or representation made by or on behalf of GroundSure which is not set out and expressly agreed in the Contract.

2.4 Terms and conditions appearing on a Client's order form, printed stationery or other communication, including invoices, to GroundSure, its employees, servants, agents or other representatives or any terms implied by custom, practice or course of dealing shall be of no effect and these terms and conditions shall prevail over all others.

2.5 In the event that a Client/Beneficiary opts to take out insurance in conjunction with or as a result of the Services, such insurance shall be subject solely to the terms of any policy issued to it in that respect and GroundSure will have no liability therefore.

2.6 GroundSure's quotations/proposals are valid for a period of 30 days only. GroundSure reserves the right to withdraw any quotation at any time before GroundSure accepts an Order or Commission. GroundSure's acceptance of an Order or Commission shall be effective only where such acceptance is in writing and signed by GroundSure's authorised representative or where accepted via GroundSure's Order Website.

3 The Client's obligations

3.1 The Client shall ensure the Beneficiary complies with and is bound by the terms and conditions set out in the Contract and shall provide that Groundsure may in its own right enforce such terms and conditions against the Beneficiary pursuant to the Contracts (Rights of Third parties) Act 1999. The Client shall be liable for all breaches of the Contract by the Beneficiary as if they were breaches by the Client. The Client shall be solely responsible for ensuring that the Report/Mapping ordered is appropriate and suitable for the Beneficiary's needs.

3.2 The Client shall (or shall procure that the Beneficiary shall) supply to GroundSure as soon as practicable and without charge all information necessary and accurate relevant data including any specific and/or unusual environmental information relating to the Site known to the Client/Beneficiary which may pertain to the Services and shall give such assistance as GroundSure shall reasonably require in the performance of the Services (including, without limitation, access to a Site, facilities and equipment as agreed in the Contract).

3.3 Where Client/Beneficiary approval or decision is required, such approval or decision shall be given or procured in reasonable time as not to delay or disrupt the performance of any other part of the Services.

3.4 The Client shall not and shall not knowingly permit the Beneficiary to, save as expressly permitted by these terms and conditions, re-sell, alter, add to, amend or use out of context the content of any Report, Mapping or, in respect of any Services, information given by GroundSure. For the avoidance of doubt, the Client and Beneficiary may make the Report, Mapping or GroundSure's findings available to a third party who is considering acquiring the whole or part of the Site, or providing funding in relation to the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.5 The Client is responsible for maintaining the confidentiality of its user name and password if using GroundSure's internet ordering service and accepts responsibility for all activity that occurs under such account and password.

4 Reliance

4.1 Upon full payment of all relevant fees and subject to the provisions of these terms and conditions, the Client and Beneficiary are granted an irrevocable royalty-free licence to access the information contained in a Report, Mapping or in a report prepared by GroundSure in respect of or arising out of Consultancy Services. The Services may only be used for the benefit of the Client and those persons listed in clauses 4.2 and 4.3.

4.2 In relation to Data Reports, Mapping and Risk Screening Reports, the Client shall be entitled to make Reports available to (i) the Beneficiary, (ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate), (iv) the first purchaser or first tenant of the Site (v) the professional advisers and lenders of the first purchaser or tenant of the Site. Accordingly GroundSure shall have the same duties and obligations to those persons in respect of the Services as it has to the Client and those persons shall have the benefit of any of the Client's rights under the Contract as if those persons were parties to the Contract. For the avoidance of doubt, the limitations of GroundSure's liability as set out in clauses 7 and 11.6 shall apply.

4.3 In relation to Consultancy Services, reliance shall be limited to the Client, Beneficiary and named parties on the Report.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise agreed in writing with GroundSure, any other party considering the information supplied by GroundSure as part of the Services, including (but not limited to) insurance underwriters, does so at their own risk and GroundSure has no legal obligations to such party unless otherwise agreed in writing.

4.5 The Client shall not and shall not knowingly permit any person (including the Beneficiary) who is provided with a copy of any Report, (except as permitted herein or by separate agreement with GroundSure) to,: (a) remove, suppress or modify any trade mark, copyright or other proprietary marking from the Report or Mapping; (b) create any product which is derived directly or indirectly from the data contained in the Report or Mapping; (c) combine the Report or Mapping with, or incorporate the Report or Mapping into any other information data or service; or (d) re-format or otherwise change (whether by modification, addition or enhancement) data or images contained in the Report or Mapping.

4.6 Notwithstanding clause 4.5, if the Client acts in a professional capacity, it may make reasonable use of a Report and/or findings made as a result of Consultancy Services to advise Beneficiaries. However, GroundSure shall have no liability in respect of any opinion or report given to such Beneficiaries by the Client or a third party.

5 Fees and Disbursements

5.1 GroundSure shall charge the Client fees at the rate and frequency specified in the Contract together, in the case of Consultancy Services, with all proper disbursements incurred by GroundSure in performing the Services. For the avoidance of doubt, the fees payable for the Services are as set out in GroundSure's written proposal, Order Website or Order acknowledgement form. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services.

5.2 Unless GroundSure requires prepayment, the Client shall promptly pay all fees disbursements and other monies due to GroundSure in full without deduction, counterclaim or set off together with such value added tax or other tax as may be required within 30 days from the date of GroundSure's invoice or such other period as may be agreed in writing between GroundSure and the Client (**"Payment Date"**). GroundSure reserves the right to charge interest which shall accrue on a daily basis from 30 days after the date of Payment Date until the date of payment (whether before or after judgment) at the rate of five per cent per annum above the Bank of England base rate from time to time.

5.3 In the event that the Client disputes the amount payable in respect of GroundSure's invoice it shall notify GroundSure no later than 28 days after the date thereof that it is in dispute. In default of such notification the Client shall be deemed to have agreed the amount thereof. As soon as reasonably practicable following receipt of a notification in respect of any disputed invoice, a member of the management team at GroundSure shall contact the Client and the parties shall use all reasonable endeavours to resolve the dispute.

6 Intellectual Property

6.1 Subject to the provisions of clause 4.1, the Client and the Beneficiary hereby acknowledge that all Intellectual Property in the Services and Content are and shall remain owned by either GroundSure or the Data Providers and nothing in these terms purports to transfer or assign any rights to the Client or the Beneficiary in respect of the Intellectual Property.

6.2 The Client shall acknowledge the ownership of the Content where such Content is incorporated or used in the Client's own documents, reports, systems or services whether or not these are supplied to a third party.

6.3 Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client acknowledges that the proprietary rights subsisting in copyright, database rights and any other intellectual property rights in respect of any data and information contained in any Report are and shall remain (subject to clause 11.1) the property of GroundSure and/or any third party that has supplied data or information used to create a Report, and that these conditions do not purport to grant, assign or transfer any such rights in respect thereof to a Client and/or a Beneficiary.

6.5 The Client and each of the parties set out in clause 4.2 are permitted to make up to 8 (commercial) or 2 (residential) printed copies of the Report only. Further copies of the Report may not be made in whole or in part without the prior written permission of GroundSure who shall be entitled to make a charge for each additional copy.

6.6 The Client shall (and shall procure that any recipients of the Report as permitted under clause 4.2 shall):

(i) not remove, suppress or modify any trademark, copyright or other proprietary marking belonging to GroundSure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

(iii) not create any product or report which is derived directly or indirectly from the data contained in the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);
(iv) not combine the Services with or incorporate such Services into any other information data or service; and
(v) not reformat or otherwise change (whether by modification, addition or enhancement), data contained in the Services (save that those acting in a professional capacity to the Beneficiary shall not be in breach of this clause 6.6(v) where such reformatting is in the normal course of providing advice based upon the Services),
in each case of parts (iii) to (v) inclusive, whether or not such product or report is produced for commercial profit or not.
6.7 The Client and/or Beneficiary shall and shall procure that any party to whom the Services are made available shall notify GroundSure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

7. Liability

7.1 Nothing in these terms and conditions shall limit GroundSure's liability for causing death or personal injury through negligence or willful default.
7.2 Save as otherwise set out in these conditions, any information provided by one party ("**Disclosing Party**") to the other party ("**Receiving Party**") shall be treated as confidential except so far as authorised by the Disclosing Party to provide such information in whole or in part to a third party.
7.3 Nothing in these conditions shall affect the statutory rights of a consumer under the applicable consumer protection legislation from time to time.
7.4 In relation to Data Reports, Mapping and Risk Screening Reports, GroundSure's liability under the Contract shall cease upon the expiry of six years from the date when the Beneficiary became aware that it may have a claim against GroundSure in respect of the Services provided always that there shall be no liability at the expiration of twelve years from the completion of the Contract. For the avoidance of doubt, any claims in respect of which proceedings are notified to GroundSure in writing prior to the expiry of the time periods referred to in this clause shall survive the expiry of those time periods provided any such claim is actually commenced within six months of notification.
7.5 In relation to Consultancy Services GroundSure's liability under the Contract shall cease upon the expiry of six years from the date the Services were completed.
7.6 GroundSure shall not be liable to the Client or any person to whom the Client provides a copy of a Data Report, Mapping or Risk Screening Report in any circumstances whatsoever unless arising out of a breach on its part of the obligations set out in the Contract.
7.7 GroundSure shall not be liable if the Data Reports, Mapping or Risk Screening Report are used otherwise than as provided or referred to in these conditions and the relevant User Guide.
7.8 Subject to the provisions of clause 7.3, GroundSure makes no representation, warranties, express or implied, as to the accuracy, reliability, completeness, validity or fitness for purpose of any Content and shall not be liable for any omission, error or inaccuracy in relation thereto unless GroundSure should reasonably have been alerted to any omission, error or inaccuracy in the Content.
7.9 Subject to the provisions of clause 7.1 and irrespective of whether multiple parties make use of the same Services the total liability of GroundSure under or in connection with the Contract, whether in contract in tort for breach of statutory duty or otherwise shall not exceed £10 million per claim or series of connected claims,
7.10 Whilst GroundSure will use all reasonable endeavours to maintain operability of its internet ordering service it will not be liable for any loss or damages caused by a delay or loss of use of such service. The Client shall use GroundSure's internet ordering service at its own risk. GroundSure shall not be responsible for any damage to a Client or permitted assignee's computer, software, modem, telephone or other property resulting from the use of GroundSure's internet ordering service.
7.11 The Client accepts, and shall use all reasonable endeavours to procure that anyone who is provided with a copy of the Report accepts, that it has no claim or recourse to any Data Provider or to GroundSure in respect of the acts or omissions of such Data Providers including Content supplied by them.
7.12 GroundSure shall provide the Services using reasonable skill and care, however, GroundSure shall not be liable for any inaccurate statement or risk rating in a Report which resulted from a reasonable interpretation of the Content.
7.13 Subject to clause 7.1, GroundSure shall not be liable to the Client, the Beneficiary or any third party in contract, tort (including, without limitation, negligence) or for misrepresentation or breach of statutory duty or otherwise in respect of any loss of profits, goodwill, revenue or opportunity, or any indirect or consequential loss (even if such loss was reasonably foreseeable).
7.14 GroundSure undertakes for the duration of the liability periods referred to in clauses 7.4 and 7.5 to maintain professional indemnity insurance in respect of its liabilities under this Contract. GroundSure shall produce evidence of such insurance if requested by the Client. A greater level of cover may be available upon request and agreement with the Client.

8 GroundSure right to suspend or terminate

8.1 In the event that GroundSure reasonably believes that the Client or Beneficiary as applicable has not provided the information or assistance required to enable the proper performance of the Services, GroundSure shall be entitled on fourteen days written notice to suspend all further performance of the Services until such time as any such deficiency has been made good.
8.2 GroundSure may additionally terminate the Contract immediately on written notice in the event that:
(i) the Client shall fail to pay any sum due to GroundSure within 28 days of the Payment Date; or
(ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an Administration Order made against it or if a Receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or
(iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or
(iv) the Client or the Beneficiary breaches any material term of the Contract (including, but not limited to, the obligations in clause 4) incapable of remedy or if remediable, is not remedied within 14 days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.2, the Client may at any time after commencement of the Services by notice in writing to GroundSure require GroundSure to terminate or suspend immediately performance of all or any of the Services.
9.2 The Client waives all and any right of cancellation it may have under the Consumer Protection (Distance Selling) Regulations 2000 (as amended) in respect of the Order of a Report/Mapping. This does not affect the Beneficiary's statutory rights.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination or any suspension of the Services, GroundSure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client/Beneficiary any property of the Client/ Beneficiary in GroundSure's possession or control.
10.2 In the event of termination/suspension of the Contract under clauses 8 or 9, the Client shall pay to GroundSure all and any fees payable in respect of the performance of the Services up to the date of termination/suspension. In respect of any Consultancy Services provided, the Client shall also pay GroundSure any additional costs incurred in relation to the termination/suspension of the Contract.

11 General

11.1 The mapping contained in the Services is protected by Crown copyright and must not be used for any purpose outside the context of the Services or as specifically provided in these terms.
11.2 GroundSure reserves the right to amend these terms and conditions. No variation to these terms shall be valid unless signed by an authorised representative of GroundSure.
11.3 No failure on the part of GroundSure to exercise and no delay in exercising, any right, power or provision under these terms and conditions shall operate as a waiver thereof.
11.4 Save as expressly provided in clauses 4.2, 4.3, 6.3 and 11.5, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.
11.5 The Secretary of State for Communities and Local Government acting through Ordnance Survey may enforce breach of clause 6.1 of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
11.6 GroundSure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:
(i) the Client or Beneficiary's failure to provide facilities, access or information;
(ii) fire, storm, flood, tempest or epidemic;
(iii) Acts of God or the public enemy;
(iv) riot, civil commotion or war;
(v) strikes, labour disputes or industrial action;
(vi) acts or regulations of any governmental or other agency;
(vii) suspension or delay of services at public registries by Data Providers; or
(viii) changes in law.
11.7 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.
11.8 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email and on the second working day after the day of posting if sent by first class post.
11.9 The Contract constitutes the entire contract between the parties and shall supersede all previous arrangements between the parties.
11.10 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisionsshall not in any way be tainted or impaired.
11.11 These terms and conditions shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with these terms and conditions shall be subject to the exclusive jurisdiction of the English courts.
11.12 If the Client or Beneficiary has a complaint about the Services, notice can be given in any format eg writing, phone, email to the Compliance Officer at GroundSure who will respond in a timely manner.

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Maund Geo- Consulting Ltd
20, Mortlake Avenue,
Worcester, WR5 IQD

GroundSure Reference:	HMD-173159
Your Reference:	23 Ravenshaw St
Report Date:	Oct 11, 2011
Report Delivery Method:	**xml**
Client Email:	julian@maund-geo-consulting.co.uk

GroundSure EnviroInsight

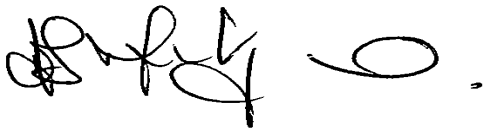
Address: 23, RAVENSHAW STREET, LONDON, NW6 1NP

Dear Sir/Madam,

Thank you for placing your order with GroundSure. Please find enclosed the GroundSure EnviroInsight as requested

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above GroundSure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
GroundSure EnviroInsight

GroundSure EnviroInsight

Address: 23, RAVENSHAW STREET, LONDON, NW6 1NP

Date: Oct 11, 2011

GroundSure Reference: HMD-173159

Your Reference: 23 Ravenshaw St

Client: Maund Geo- Consulting Ltd

Brought to you by GroundSure

Aerial Photograph of Study Site

NW ▲ N NE

◄W E►

SW ▼ S SE

Aerial photography supplied by Getmapping PLC.
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Site Name: 23, RAVENSHAW STREET, LONDON, NW6 1NP
Grid Reference: 524851,185026
Size of Site: 0.19 ha

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Report Section	Number of records found within (X) m of the study site boundary					
1. Environmental Permits, Incidents and Registers	on-site	0-50	51-250	251-500	501-1000	1000-1500
1.1 Industrial Sites Holding Environmental Permits and/or Authorisations						
Records of historic IPC Authorisations	0	0	0	0	-	-
Records of Part A(1) and IPPC Authorised Activities	0	0	0	0	-	-
Records of Water Industry Referrals (potentially harmful discharges to the public sewer)	0	0	0	0	-	-
Records of Red List Discharge Consents (potentially harmful discharges to controlled waters)	0	0	0	0	-	-
Records of List 1 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of List 2 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of Part A(2) and Part B Activities and Enforcements	0	0	0	3	-	-
Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0	-	-
Records of Licensed Discharge Consents	0	0	0	1	-	-
Records of Planning Hazardous Substance Consents and Enforcements	0	0	0	0		
1.2 Records of COMAH and NIHHS sites	0	0	0	0	-	-
1.3 Environment Agency Recorded Pollution Incidents						
National Incidents Recording System, List 2	0	0	0	-	-	-
National Incidents Recording System, List 1	0	0	0	-	-	-
1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0	0	0	-	-
2. Landfill and Other Waste Sites	on-site	0-50	51-250	251-500	501-1000	1000-1500
2.1 Landfill Sites						
Environment Agency Registered Landfill Sites	0	0	0	0	0	-
Landfill Data – Operational Landfill Sites	0	0	0	0	0	-
Environment Agency Historic Landfill Sites	0	0	0	0	0	1
Landfill Data – Non-Operational Landfill Sites	0	0	0	0	0	-
BGS/DoE Landfill Site Survey	0	0	0	0	0	0
GroundSure Local Authority Landfill Sites Data	0	0	0	0	0	0
2.2 Landfill and Other Waste Sites Findings						
Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	-	-
Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	1	-	-
Environment Agency Licensed Waste Sites	0	0	0	0	0	0

3. Current Land Uses	on-site	0-50	51-250	251-500	501-1000	1000-1500
3.1 Current Industrial Sites Data	0	0	13	-	-	-
3.2 Records of Petrol and Fuel Sites	0	0	0	1	-	-
3.3 Underground High Pressure Oil and Gas Pipelines	0	0	0	0	-	-

4. Geology	Description
4.1 Are there any records of Artificial Ground and Made Ground present beneath the study site? *	No
4.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site? *	No
4.3 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
Source: Scale: 1:50,000 BGS Sheet 256	

* This includes an automatically generated 50m buffer zone around the site.

5. Hydrogeology and Hydrology	on-site	0-50	51-250	251-500	501-1000	1001-2000
5.1 Are there any records of Productive Strata in the Superficial Geology within 500m of the study site?				No		
5.2 Are there any records of Productive Strata in the Bedrock Geology within 500m of the study site?				Yes		
5.3 Groundwater Abstraction Licences (within 1000m of the study site).	0	0	0	0	0	-
5.4 Surface Water Abstraction Licences (within 1000m of the study site).	0	0	0	0	0	-
5.5 Potable Water Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	0
5.6 Are there any Source Protection Zones within 500m of the study site?					No	
5.7 River Quality	on-site	0-50	51-250	251-500	501-1000	1001-1500
Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	No	No
5.8 Detailed River Network entries within 500m of the site	0	0	0	0	-	-
5.9 Surface water features within 250m of the study site	No	No	No	-	-	-

6. Flooding	
6.1 Are there any Environment Agency indicative Zone 2 floodplains within 250m of the study site?	No
6.2 Are there any Environment Agency indicative Zone 3 floodplains within 250m of the study site?	No
6.3 Are there any Flood Defences within 250m of the study site?	No
6.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
6.5 Are there any areas used for Flood Storage within 250m of the study site?	No
6.6 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Negligible
6.7 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Not Applicable

7. Designated Environmentally Sensitive Sites	on-site	0-50	51-250	251-500	501-1000	1001-1500
7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	-	-
7.2 Records of National Nature Reserves (NNR)	0	0	0	0	-	-

7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	-	-
7.3 Records of Local Nature Reserves (LNR)	0	0	0	2	-	-
7.4 Records of Special Areas of Conservation (SAC)	0	0	0	0	-	-
7.5 Records of Special Protection Areas (SPA)	0	0	0	0	-	-
7.6 Records of Ramsar sites	0	0	0	0	-	-
7.7 Records of World Heritage Sites	0	0	0	0	-	-
7.8 Records of Environmentally Sensitive Areas	0	0	0	0	-	-
7.9 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	-	-
7.10 Records of National Parks	0	0	0	0	-	-
7.11 Records of Nitrate Sensitive Areas	0	0	0	0	-	-
7.12 Records of Nitrate Vulnerable Zones	0	0	0	0	-	-

8. Natural Hazards

8.1 What is the maximum risk of natural ground subsidence?	Moderate

9. Mining

9.1 Are there any coal mining areas within 75m of the study site?	No
9.2 What is the risk of subsidence relating to shallow mining within 150m of the study site?	Negligible
9.3 Are there any brine affected areas within 75m of the study site?	No

Using this Report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between GroundSure and the Client. The document contains the following sections:

1. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

2. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

3. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure underground oil and gas pipelines.

4. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

5. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

6. Flooding

Provides information on surface water flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

7. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites. These searches are conducted using radii of up to 500m.

8. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence.

9. Mining

Provides information on areas of coal and shallow mining.

10. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, GroundSure provide a free Technical Helpline (08444 159000) for further information and guidance.

Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Environmental Permits, Incidents and Registers Map

NW ▲ N NE

◄W E►

SW ▼ S SE

Authorisations,Incidents and Registers Legend

Enabled by Ordnance Survey

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- Site Outline
- Search Buffers (m) — 250 / 500
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

1.Environmental Permits, Incidents and Registers

1.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

Records of historic IPC Authorisations within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(1) and IPPC Authorised Activities within 500m of the study site: **0**

Database searched and no data found.

Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: **0**

Database searched and no data found.

Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site: **0**

Database searched and no data found.

Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: **3**

The following Part A(2) and Part B Activities are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
2	304.0	NE	525119, 185229	Address: Cotton Club Dry Cleaners , 57 Mill Lane, NW6 1NB Process: Dry Cleaner Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

3	426.0	S	524933, 184573	Address: Ab Dyne, 52 Iverson Road,london, Nw6 2he Process: Vechicle Respraying , Vehicle Refinishing Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
4	449.0	S	524635, 184590	Address: Total Service Station, 409 Kilburn High Road, London, NW6 7QF Process: Petrol Station Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

Records of Category 3 or 4 Radioactive Substance Licences within 500m of the study site: **0**

Database searched and no data found.

Records of Licensed Discharge Consents within 500m of the study site: **1**

The following Licensed Discharge Consents records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
1	458.0	N	524800, 185500	Address: Shoot Up Hill, Shoot Up Hill Effluent Type: Trade Discharges - Unspecified Permit Number: TEMP.0234 Permit Version: 1	Receiving Water: River Thames Status: Revoked - Unspecified Issue date: 15/9/1989 Effective Date: 15/9/1989 Revocation Date: 5/10/2000

Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: **0**

Database searched and no data found.

1.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: **0**

Database searched and no data found.

1.3 Environment Agency Recorded Pollution Incidents

Records of National Incidents Recording System, List 2 within 250m of the study site: **0**

Database searched and no data found.

Records of National Incidents Recording System, List 1 within 250m of the study site: **0**

Database searched and no data found.

1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? **0**

Database searched and no data found.

2. Landfill and Other Waste Sites Map

NW N NE

W E

SW S SE

Landfill & Other Waste Sites Legend

Enabled by Ordnance Survey

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- Site Outline
- Search Buffers (m): 250, 500
- E.A. Active Landfill
- E.A. Historic Landfill (Area Data)
- E.A. Historic Landfill (Point Data)
- BGS / DoE Survey Landfill
- Local Authority Landfill (Area Data)
- Local Authority Landfill (Point Data)
- Operational Waste Treatment Licence
- Closed Waste Treatment Licence
- REGIS Waste Licence
- Operational Landfill
- Closed Landfill

2. Landfill and Other Waste Sites

2.1 Landfill Sites

Records from Environment Agency landfill data within 1000m of the study site: 0

Database searched and no data found.

Records of operational landfill sites sourced from Landmark within 1000m of the study site: 0

Database searched and no data found.

Records of Environment Agency historic landfill sites within 1500m of the study site: 1

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details	
Not shown	1178.0	E	526000, 184800	Site Address: Canfield Place, London NW6 Waste Licence: - Site Reference: DON009 Waste Type: - Regis Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: -

Records of non-operational landfill sites sourced from Landmark within 1000m of the study site: 0

Database searched and no data found.

Records of BGS/DoE non-operational landfill sites within 1500m of the study site: 0

Database searched and no data found.

Records of Local Authority landfill sites within 1500m of the study site: 0

Database searched and no data found.

2.2 Other Waste Sites

Records of operational waste treatment, transfer or disposal sites within 500m of the study site: 0

Database searched and no data found.

Records of non-operational waste treatment, transfer or disposal sites within 500m of the study site: 1

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details

1	395.0	SE	525207, 184826	Site Address: Unit 3 Liddell Road, Maygrove Road, CAMDEN, London, NW6 2EW Landfill Licence: 176APTAL EA Reference: - Waste Type: Difficult Waste Description: - Known Restrictions: No known restriction on source of waste	Record Date:01-Nov-1991 Transfer Date: Modification Date: Status: Licence lapsed/cancelled/defunct/not applicable/surrendered Category: SCRAPYARD Regulator: EA - Thames Region - North East Area (Hatfield-London N) Size: Very Small (<10,000 tonnes/year)

Records of Environment Agency licensed waste sites within 1500m of the study site: **0**

Database searched and no data found.

3. Current Land Use Map

NW N NE

◄W E►

SW S SE

Current Land Use Legend

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Site Outline

250
500 Search Buffers (m)

Current Industrial Sites

Petrol & Fuel Sites

Underground High Pressure Oil & Fuel Pipelines

3. Current Land Uses

3.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: **13**

The following records are represented as points on the Current Land Uses map.

ID	Distance	Direction	Company	Address	Activity	Category
1	69.0	E	Motor Works	1a, Glastonbury Street, London, NW6 1QJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
2A	76.0	N	Computer Clinic	52, Mill Lane, London, NW6 1NJ	Electrical Equipment Repair and Servicing	Repair and Servicing
3	76.0	E	Electricity Sub Station	NW6	Electrical Features	Infrastructure and Facilities
4A	77.0	N	A K Locksmiths Ltd	56, Mill Lane, London, NW6 1NJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
5	136.0	SW	Rentawreck UK	54, Fordwych Road, London, NW2 3TG	Vehicle Hire and Rental	Hire Services
6	148.0	NW	Electricity Sub Station	NW6	Electrical Features	Infrastructure and Facilities
7B	158.0	NE	Norman Motors	100, Mill Lane, London, NW6 1NF	Vehicle Parts and Accessories	Motoring
8	166.0	NE	Spatial Image Systems Ltd	9, Sumatra Road, London, NW6 1PS	Measurement and Inspection Equipment	Industrial Products
9B	171.0	NE	Brandon Hire	104, Mill Lane, London, NW6 1NF	Construction and Tool Hire	Hire Services
10 C	213.0	S	Works	NW6	Unspecified Works Or Factories	Industrial Features
11	226.0	SE	MixMash	67, Maygrove Road, London, NW6 2EG	Electronic Equipment	Industrial Products
12	232.0	SW	Cairnmead	1, Kingscroft Road, London, NW2 3QE	Vehicle Repair, Testing and Servicing	Repair and Servicing
13 C	233.0	SE	Electricity Sub Station	NW6	Electrical Features	Infrastructure and Facilities

3.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: **1**

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance	Direction	NGR	Company	Address	LPG	Status
14	437.0	S	524653, 184596	Total	Total/spar Kilburn, 409, Kilburn High Road, Kilburn High Road, Christchurch Ave, Kilburn, London, Greater London, NW6 7QE	No	Open

3.3 Underground High Pressure Oil and Gas Pipelines

Records of high pressure underground pipelines within 500m of the study site: **0**

4. Geology

4.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

4.2 Superficial Ground and Drift Geology

Database searched and no data found.
The database has been searched on site, including a 50m buffer.

4.3 Bedrock and Solid Geology

The database has been searched on site, including a 50m buffer.

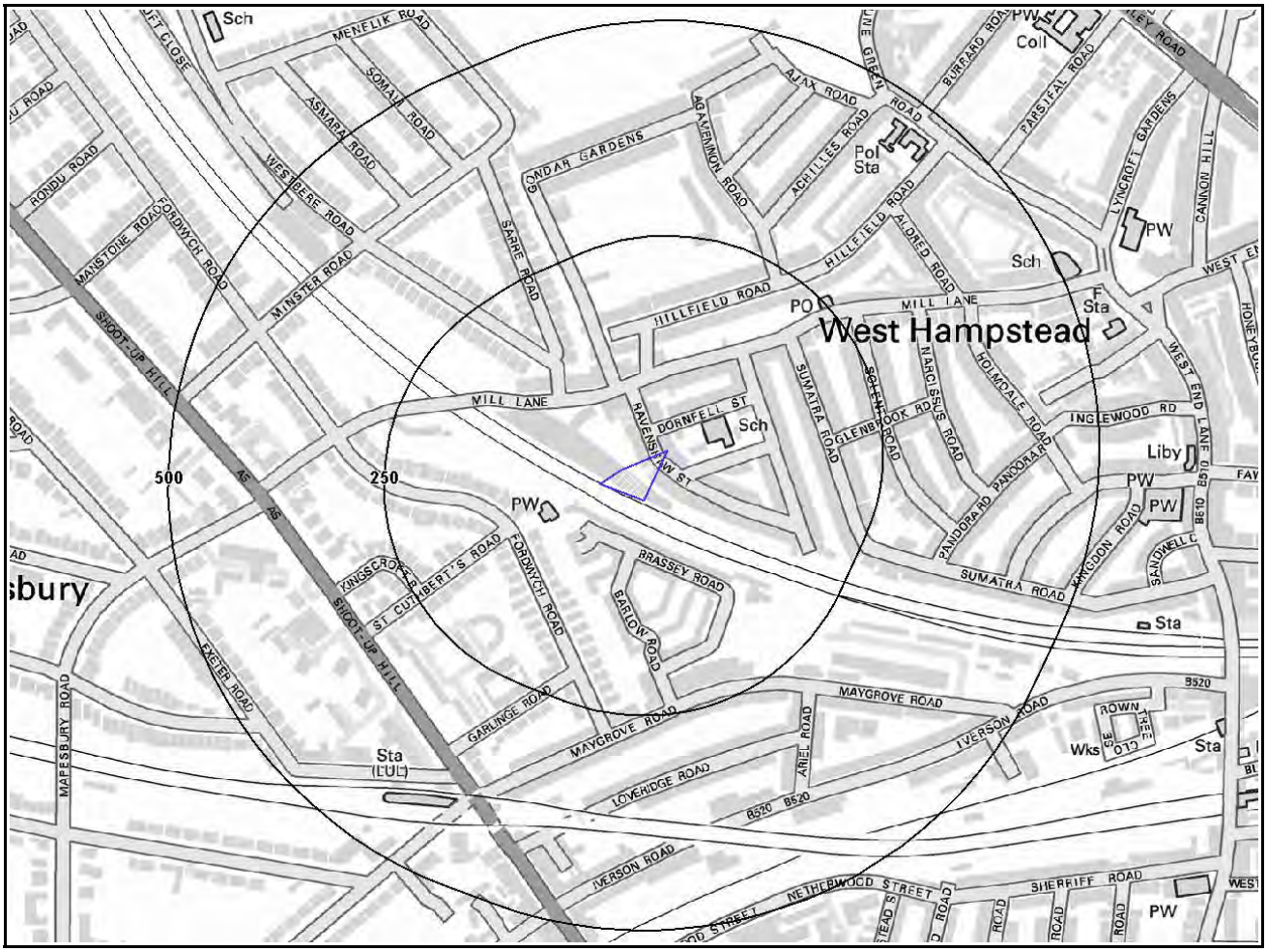
LEX Code	Description	Rock Type
LC-CLSS	LONDON CLAY FORMATION	CLAY, SILT AND SAND

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

For more detailed geological and ground stability data please refer to the "GroundSure GeoInsight". Available from our website.

5a. Hydrogeology - Aquifer Within Superficial Geology

NW N NE



W E

SW S SE

Aquifer Within Superficial Geology Legend

Enabled by Ordnance Survey

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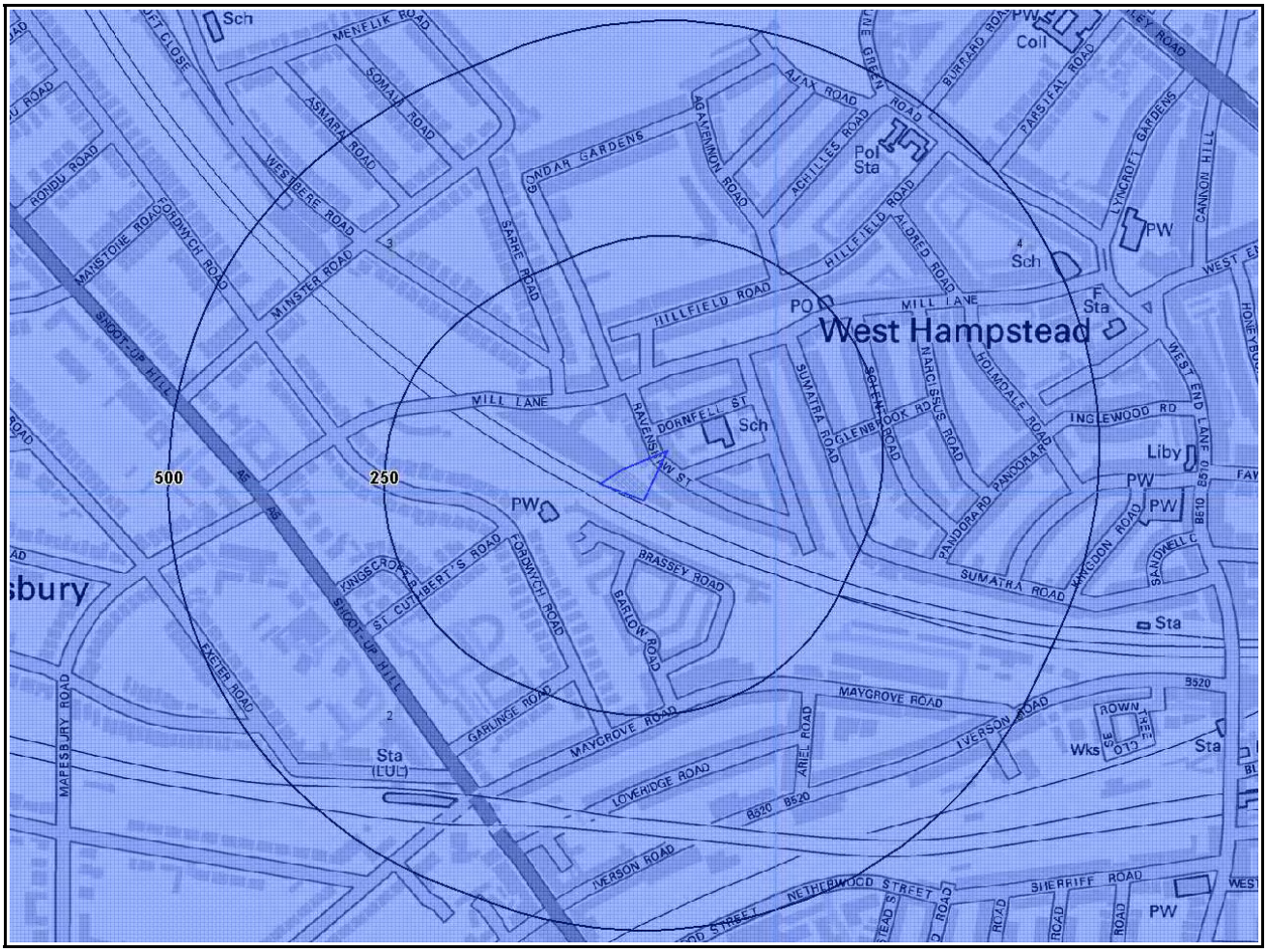
- Site Outline
- 250 / 500 Search Buffers (m)
- Principal Aquifer
- Secondary (A) Aquifer - Permeable Layers
- Secondary (B) Aquifer - Lower Permeability Layers
- Secondary Aquifer - Undifferentiated Layers
- Unproductive
- Unknown (lakes and landslip)

5b. Hydrogeology - Aquifer Within Bedrock Geology and Abstraction Licenses

NW N NE



W E

SW S SE

Aquifer Within Bedrock Geology Legend

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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

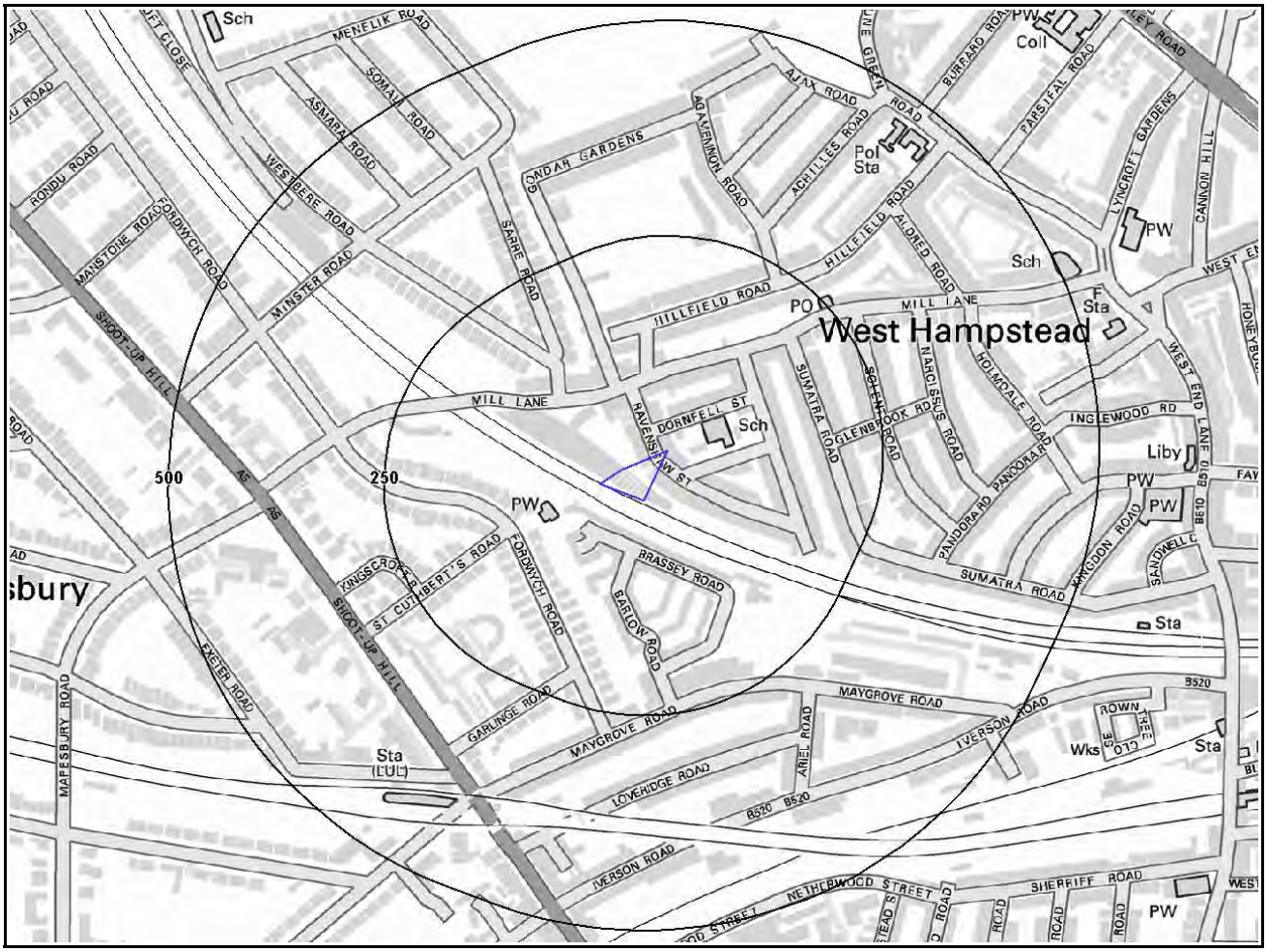
Surface Water Abstraction Licence

5c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses

NW N NE

W E

SW S SE



SPZ and Potable Water Abstraction Licenses Legend

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Site Outline

250
500
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2 - Outer Catchment

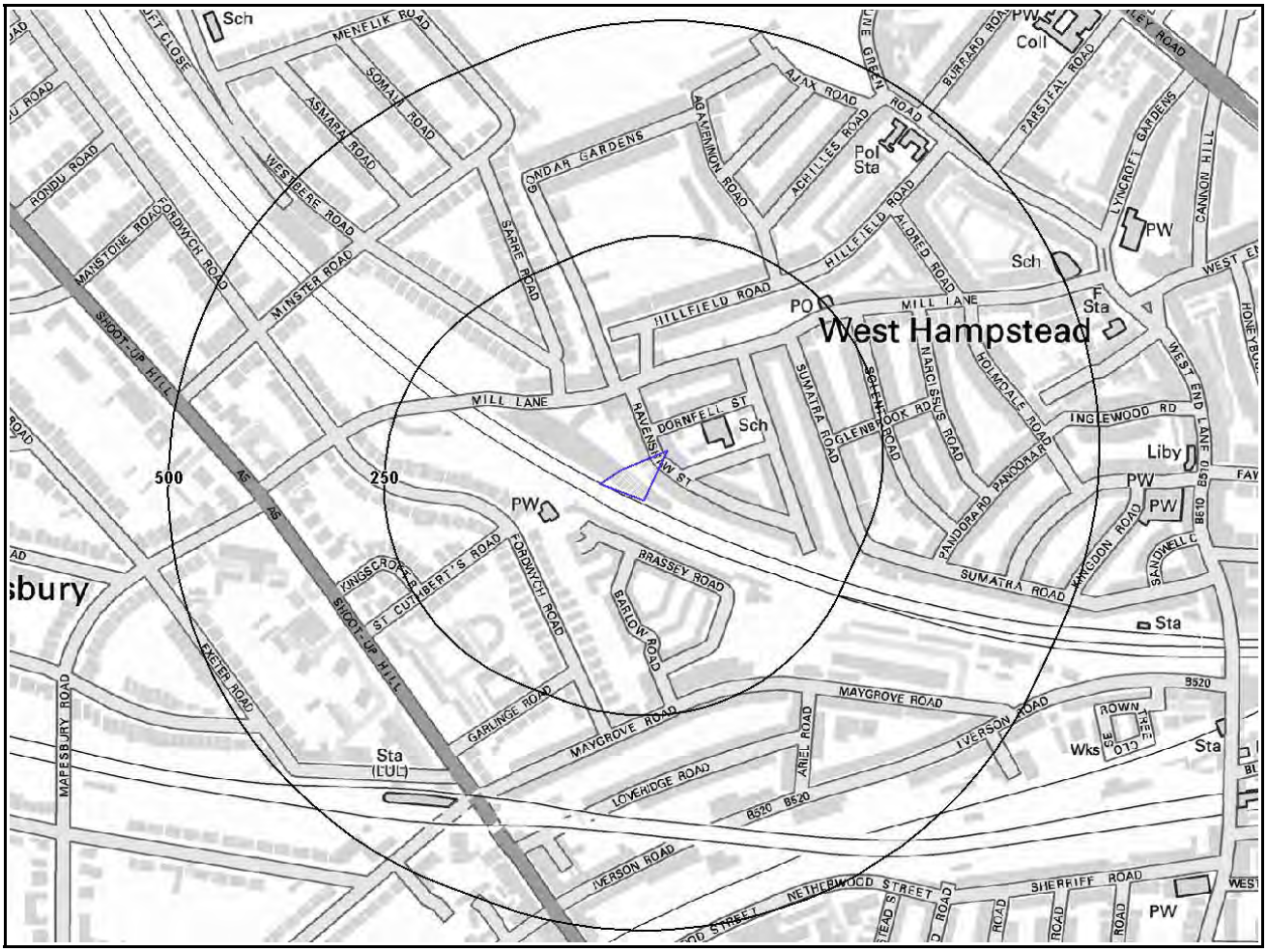
Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

5d. Hydrology – Detailed River Network and River Quality

NW N NE



W E

SW S SE

Hydrology Legend

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- Site Outline
- Search Buffers (m): 250, 500
- Primary River
- Secondary River
- Tertiary River
- Lake/Reservoir
- Underground River (inferred)
- General Quality Assessment: Chemistry
- Canal
- Canal Tunnel
- Extended Culvert (greater than 50m)
- D/S of High Water Mark
- D/S seaward extension
- General Quality Assessment: Biology

5.Hydrogeology and Hydrology

5.1 Aquifer within Superficial Deposits

Are there records of productive strata within the superficial geology at or in proximity to the property? No

Database searched and no data found.

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure Enviroinsight User Guide.

5.2 Aquifer within Bedrock Deposits

Are there records of productive strata within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (5b):

ID	Distance [m]	Direction	Designation	Description
2	0.0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
3	0.0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
4	125.0	E	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
5	134.0	E	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

5.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 1000m of the study site? No

Database searched and no data found.

5.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 1000m of the study site? No

Database searched and no data found.

5.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? **No**

Database searched and no data found.

5.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? **No**

Database searched and no data found.

5.7 River Quality

Is there any Environment Agency information on river quality within 1500m of the study site? **No**

Biological Quality:

Database searched and no data found.

Chemical Quality:

Database searched and no data found.

5.8 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? **No**

Database searched and no data found.

5.9 Surface Water Features

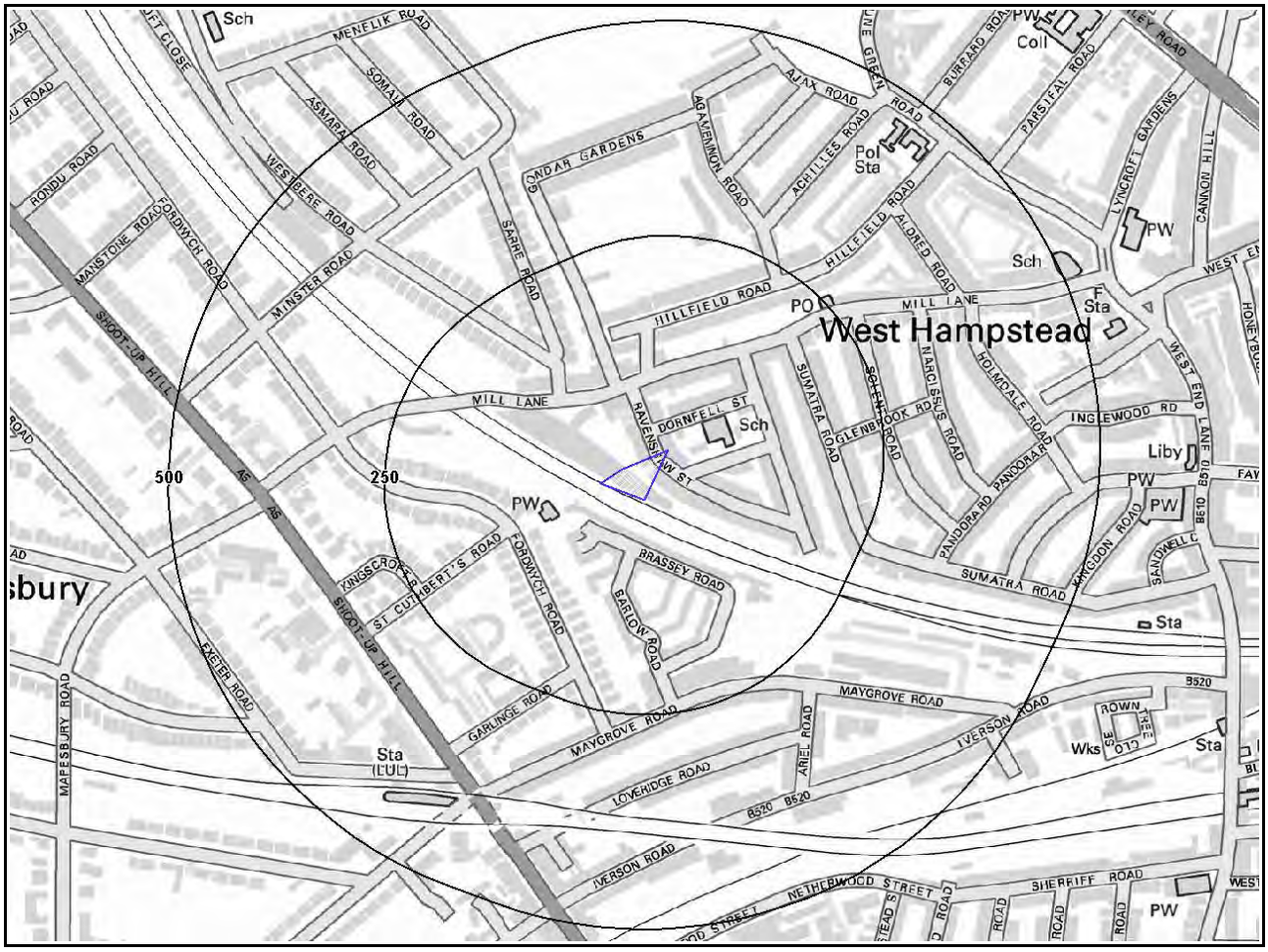
Are there any surface water features within 250m of the study site? **No**

Database searched and no data found.

6. Environment Agency Flood Map

NW ▲ N NE

◄W



E► SW ▼ S SE

Environment Agency Flood Legend

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Site Outline

250
500
Search Buffers (m)

Zone 2 Floodplain

Zone 3 Floodplain

Flood Storage Area

Area Benefiting from Flood Defences

Flood Defences

6. Flooding

6.1 Zone 2 Flooding

Zone 2 floodplain estimates the annual probability of flooding as one in one thousand (0.1%) or greater from rivers and the sea but less than 1% from rivers or 0.5% from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 2 floodplain? **No**

Database searched and no data found.

6.2 Zone 3 Flooding

Zone 3 estimates the annual probability of flooding as one in one hundred (1%) or greater from rivers and a one in two hundred (0.5%) or greater from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 3 floodplain? **No**

Database searched and no data found.

6.3 Flood Defences

Are there any Flood Defences within 250m of the study site? **No**

6.4 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? **No**

6.5 Areas used for Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? **No**

6.6 Groundwater Flooding Susceptibility Areas

Are there any British Geological Survey groundwater flooding susceptibility flood areas within 50m of the boundary of the study site? **No**

What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions? **Negligible**

6.7 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? **Not Applicable**

Notes:

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The **confidence rating** is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.