GROUND INVESTIGATION REPORT

The Water House
Millfield Lane
London N6

Client: Leonard and Ingrid Lewis

Engineer: Price & Myers

J17146

June 2017




GEA Geotechnical & Environmental Associates

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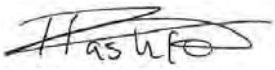
Report prepared by			
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	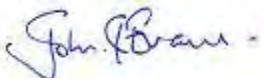		
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This report is intended as a Ground Investigation Report (GIR) as defined in BS EN1997-2, unless specifically noted otherwise. The report is not a Geotechnical Design Report (GDR) as defined in EN1997-2 and recommendations made within this report are for guidance only.

CONTENTS

EXECUTIVE SUMMARY

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

BRIEF

This report describes the findings of a ground investigation carried out by Geotechnical and Environmental Associates (GEA) on the instructions of Price and Myers, on behalf of Leonard & Ingrid Lewis, with respect to the refurbishment and extension of the existing single-storey and two-storey house, including the construction of a new hydrotherapy pool. GEA has previously carried out a ground investigation at the site (ref J07385, dated 29 February 2008) in support of a previous planning application (ref 2008/1303/P) that was later withdrawn. Further ground investigation was subsequently carried out by RSK Group Plc (RSK) in 2011 and GEA has been commissioned to carry out additional ground investigation in support of a future planning application. The previous findings are discussed herein where appropriate. The report also includes information required to comply with London Borough of Camden (LBC) Planning Guidance CPG4, relating to the requirement for a Basement Impact Assessment (BIA) screening and scoping.

GROUND CONDITIONS

Beneath a moderate to significant thickness of made ground, London Clay was generally encountered to the full depth investigated, although suspected Head Deposits were encountered over the London Clay in a number of locations. Topsoil and made ground was present across the site to depths of between 0.30 m and 2.00 m (81.82 m OD and 77.85 m OD) and generally comprised brown sandy clay with brick fragments. Directly beneath the made ground in Borehole Nos 101 to 103, GEA Borehole Nos 2, 3 and 4 and RSK Borehole No 1, suspected Head Deposits were encountered, generally comprised of soft or firm orange-brown or brown mottled grey silty sandy clay, with rare flint gravel and a reworked texture, extending to depths of between 0.50 m and 2.60 m (79.96 m OD and 77.60 m OD). Below the Head Deposits or made ground, the London Clay generally comprised medium strength becoming high strength fissured soft becoming firm becoming stiff brown mottled grey clay with partings of grey silt, pockets of orange-brown fine sand, roots and rootlets to depths of between 5.50 m and 6.50 m (76.22 m OD and 74.66 m OD). This weathered horizon was underlain by stiff becoming very stiff medium strength and high strength fissured dark brownish grey silty clay with partings of silt, pockets of sand and claystone fragments and was encountered to the maximum depth investigated, of 20.00 m (60.46 m OD).

Groundwater was encountered during drilling in GEA Borehole No 2 at a depth of 3.80 m (76.20 m OD) from within the London Clay and in RSK WS2 and WS3 at depths of 1.70 m (78.15 m OD) and 1.10 m (79.11 m OD) respectively from within the made ground. A seepage was encountered in the RSK Borehole No 1 at a depth of 11.50 m (68.96 m OD). Monitoring of standpipes installed in a number of the boreholes has found some of the pipes to be dry on a couple of occasions and water has been measured at depths of between 1.00 m and 4.77 m (81.26 m OD and 78.63 m OD).

Contamination testing has indicated elevated concentrations of lead within six samples of made ground.

RECOMMENDATIONS

The investigation has indicated that the excavation of the 1.85 m deep hydrotherapy pool will result in a formation level in Head Deposits or London Clay. Some form of groundwater control is likely to be locally required to construct the basement. All new foundations should bypass the made ground, and any potentially desiccated clay soils and soft clay. Based on the ground conditions encountered, shallow foundations are likely to provide the most economic foundation solution. Additional contamination testing is recommended once levels have been finalised to ensure the absence of any significant lead contamination within the new garden areas.

BASEMENT IMPACT ASSESSMENT SCREENING AND SCOPING

The BIA screening and scoping assessment has not indicated any concerns with regard to the effects of the proposed pool construction on the site and surrounding area. It has been concluded that the impacts identified can be mitigated by appropriate design and standard construction practice. A slope stability assessment may be required, but the requirement should be confirmed with the planners.

Part 1: INVESTIGATION REPORT

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

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by Price & Myers, on behalf of Leonard & Ingrid Lewis, to carry out a supplementary ground investigation at the Water House, Millfield Lane, London, N6 6HQ, in support of a new planning application.

The site has previously been the subject of site investigations by GEA and RSK and the following reports are referred to, where relevant.

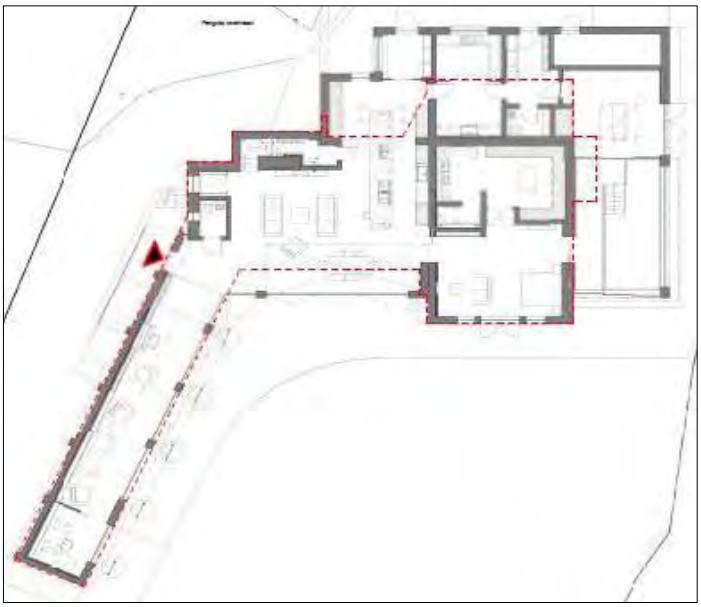
- *Desk Study and Ground Investigation Report. GEA (Ref J07385, dated 29 February 2008); and*
- *Geotechnical, Hydrogeological and Geoenvironmental Site Investigation by RSK (ref 241830-01 (00)) available from the London Borough of Camden (LBC) Planning Portal*

This report also includes the screening and scoping elements of a Basement Impact Assessment (BIA) in accordance with the requirements of London Borough of Camden (LBC).

1.1 Proposed Development

It is understood that it is proposed to refurbish the existing house, including the revised layout of rooms and extension of the house in the east. The proposed development will also include the construction of a new hydrotherapy pool with a proposed depth of 1.85 m (78.6 m OD) to the southeast of the existing house.

A plan of the proposed development is shown on the extract below (drawing ref; 17007-P100, revision B, dated 05/02/2017), by KSR Architects LLP which was provided by the consulting engineers.



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

1.2 Purpose of Work

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

- to obtain new environmental and historical information from the Landmark Envirocheck database;
- to assess the level of risk from Unexploded Ordnance (UXO);
- to provide further coverage of the ground conditions and their engineering properties;
- to confirm the hydrogeological setting;
- to provide information on the configuration of the existing foundations; and
- to provide supplementary advice with respect to the design of suitable foundations and retaining walls.

1.3 Scope of Work

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

- a review of historical Ordnance Survey (OS) maps, aerial photographs, and environmental searches sourced from the Envirocheck database;
- a review of readily available geology maps, including a search of the British Geological Survey borehole database and GEA archives;
- a preliminary UXO risk assessment, carried out by 1st Line Defence (ref EP4894-00, dated 31 May 2017; and
- a review of the previous ground investigation reports.

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

- three open-drive sampler boreholes advanced to a depth of 5.00 m;
- installation of three 50 mm diameter standpipes within the boreholes to a depth of 5.00 m;
- a single subsequent groundwater monitoring visit to record groundwater levels within the existing and new standpipes;
- inspection of a number of trial pits excavated by others to expose the existing foundations; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

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

The exploratory methods adopted in this investigation have been selected on the basis of the constraints of the site including but not limited to access and space limitations, together with any budgetary or timing constraints. Where it has not been possible to reasonably use an EC7 compliant investigation technique a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

1.3.1 Basement Impact Assessment Screening and Scoping

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

1.3.2 Qualifications

The land stability element of the Basement Impact Assessment (BIA) Screening and Scoping has been carried out by Martin Cooper, a BEng in Civil Engineering, a chartered engineer (CEng), member of the Institution of Civil Engineers (MICE), and Fellow of the Geological Society (FGS) who has over 25 years' specialist experience in ground engineering. The subterranean (groundwater) flow assessment has been carried out by John Evans, MSc in Hydrogeology, Chartered Geologist (CGeol) and Fellow of the Geological Society of London (FGS). The surface water and flooding assessment has been carried out by Rupert Evans, a hydrologist with more than ten years consultancy experience in flood risk assessment, surface water drainage schemes and hydrology / hydraulic modelling. Rupert Evans is a Chartered Environmentalist, Chartered Water and Environmental Manager and a Member of CIWEM.

The assessments have been made in conjunction with Steve Branch, a BSc in Engineering Geology and Geotechnics, MSc in Geotechnical Engineering, a chartered geologist (CGeol) and Fellow of the Geological Society (FGS) with some 30 years' experience in geotechnical engineering and engineering geology.

All assessors meet the qualification requirements of the Council guidance.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted and the number of locations where the ground was sampled. No liability can be accepted for information in other data sources or conditions

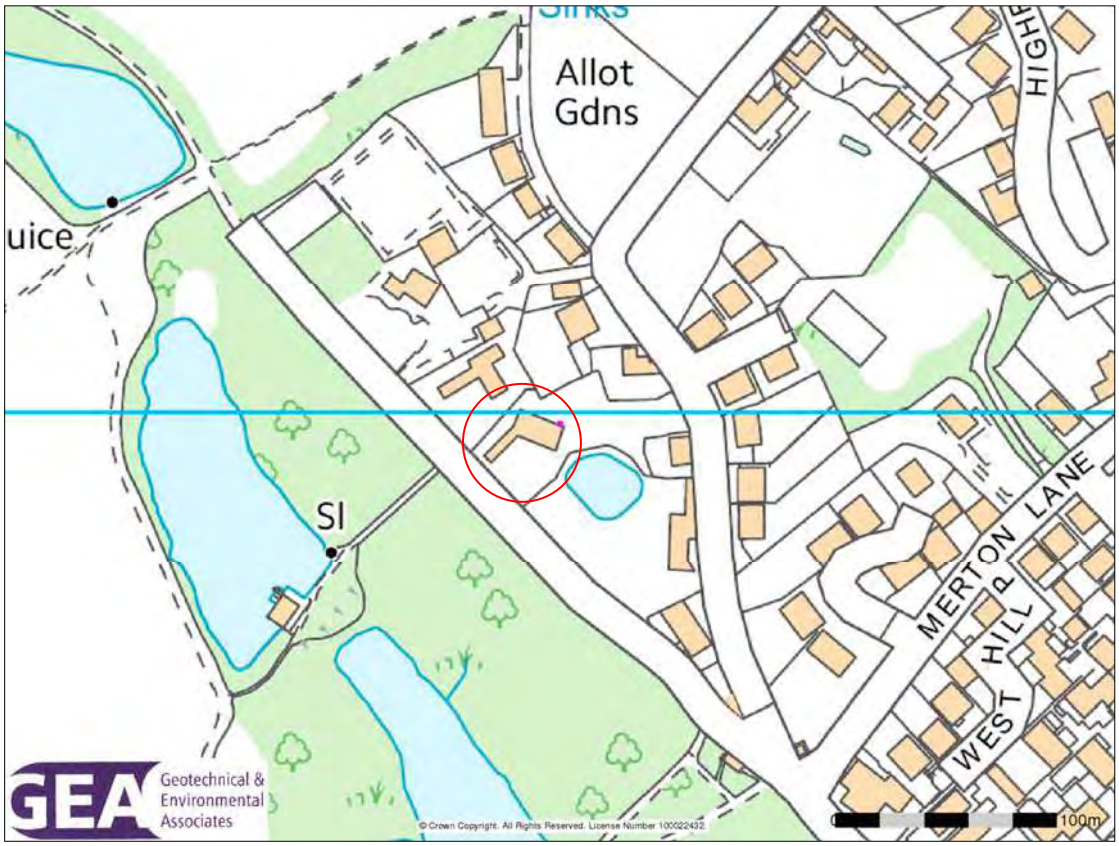
1 *Model Procedures for the Management of Land Contamination* issued jointly by the Environment Agency and the Department for Environment, Food and Rural Affairs (DEFRA) Sept 2004
2 London Borough of Camden Planning Guidance CPG4 *Basements and lightwells*
3 Ove Arup & Partners (2010) *Camden geological,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

not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

2.1 Site Description

The site is located in the London Borough of Camden, approximately 2.5 km to the northeast of Hampstead Heath railway station. It is accessed from Millfield Lane to the west and is bounded to the north, south and east by detached houses and associated private gardens. A pond is located to the east of the site, while a smaller pond is located within the grounds of Wallace House to the west of the site. The site may additionally be located by National Grid Reference 527737,186993 and is shown on the map extract overleaf.



A walkover survey of the site was carried out by a geotechnical engineer from GEA at the time of the supplementary fieldwork, which took place on 1 June 2017, and the description below is based on these observations. Selected photographs from the walk over are included in the appendix.

The site is irregular in shape, measuring 35 m by 70 m in maximum dimensions. There is a densely vegetated valley feature that follows the southeastern boundary of the site.

The site slopes down from a level of 84.8 m OD in the north to 79.1 m OD in the south. The pond appears to have a surface water level of roughly 79.7 m OD, and the topographic survey of the site indicates the overall site slope is around 3°, while localised slopes occur with a

slope angle of around about 8°. The site appears to have been historically cut or levelled to allow for the development of the existing building.

The site is occupied by a two-storey house that includes a single-storey pool house that is cut into the hillside setting and small single-storey building in the northwestern corner. There is a single-storey extension to the southwest of the main house, which was formerly the location of a pool. The pool was boarded over at the time of the investigation.

The house is separated from the western boundary by a gravel driveway and, apart from a small gravel area on the western side of the house; the site is covered by grass, shrubs and bushes. Several trees are present within the site including several oaks between 10 m and 20 m in height, two eucalyptus trees at approximately 15 m, with a 10 m high silver birch and a maple and beech tree both about 15 m high. A row of 3 m high silver birches run along the western boundary and a small pond is located in the southeastern corner of the site and a willow tree directly to the south. During the walkover, Japanese knotweed was noted to the south of the pond. Reeds and bamboo were noted along the perimeter of the southeastern corner of the site.

During the recent walkover, completed after a period of heavy rainfall, water could be seen flowing 5 m from the southern boundary in a southerly direction before flowing southwest across Millfield Lane, which might represent a former watercourse.

2.2 Site History

The site history has been reported previously in the desk study and ground investigation report by GEA and the previous reports should be referred to for full details relating to the site history and contamination issues.

The site formed part of Fitzroy Park Farm at the time of the 1870 to 1879 map and was occupied by a single square building. Both Fitzroy Lane and Millfield Lane had been constructed by this time and the large pond that is present immediately to the south of the site is shown on the map. Highgate Ponds had also been excavated to the west of the site as reservoirs forming part of the New River Company's Water Works. Apart from the addition of some small buildings some time between 1896 and 1915, the site remained unchanged until 1934, by which time the previous square building and associated smaller buildings had been demolished and replaced by an L-shaped building. Also by this time, Fitzroy Park Farm was shown as Fitzroy Farm and occupied a much smaller area. The L-shaped building was demolished at some time between 1996 and 1999 and replaced with what appears to be the existing building. The site and surrounding area have remained essentially unchanged since that time to the present day.

A search of the LBC online portal found a number of planning applications that relate to the proposed development site. The main applications are detailed below.

Application Reference	Description	Date of Application	Status
2008/1303/P	Demolition of existing 2 storey dwelling and single storey swimming pool building, and replacement with new dwelling with accommodation over basement, ground and first floor levels with single room located within roof space at second floor level.	23/05/2008	Withdrawn
2008/1396/C	Demolition of existing 2 storey dwelling and single storey swimming pool building.	23/05/2008	Withdrawn
2011/4390/P	Erection of a new 2 storey plus basement dwelling house (Class C3) with garage, including associated green roofs and landscaping works, following the demolition of the existing dwelling house.	02/11/2011	Refused
2011/4392/C	Demolition of existing dwelling house.	02/11/2011	Refused

2.3 Preliminary UXO Risk Assessment

A preliminary UXO risk assessment has been carried out by 1st Line Defence and their report (ref EP4894-00, dated 31 May 2017) is included in the appendix. The risk assessment has been carried out in accordance with the guidelines provided by CIRIA, which state that the likelihood of encountering and detonating UXO below a site should be assessed along with establishing the consequences that may arise. The first phase comprises a preliminary risk assessment, which should be undertaken at an early stage of the development planning. If such an assessment identifies a high level of risk then a detailed risk assessment should be carried out by a UXO specialist, which will identify an appropriate course of action with regard to risk mitigation.

The preliminary UXO risk assessment has indicated that the site was located in the London Borough of St Pancras which was subject to a high density bombing campaign during World War II (WWII). In-house records indicate that the site was not subject to any bomb strikes, although it did fall under the area of an incendiary shower. The site itself is not recorded as sustaining any damage during this incendiary shower on London County Council mapping. As the site was located within a residential and public area the site and the surrounding area is likely to have had regular and frequent access, with no indication that this access would have been severely reduced by the bomb strikes that fell close to the southeast of the site in open land. It is therefore anticipated that conditions largely conducive to the observation of evidence of UXO would have been present across the site area.

The UXO report concludes that no further action needs to be taken for this site with regard to UXO.

2.4 Other Information

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

The site is located within the Highgate Village Conservation Area.

The Envirocheck report has indicated no landfill sites waste management facilities, waste transfer sites or areas of potentially infilled land recorded within 500 m of the site. There are no discharge consents or recorded pollution incidents within 250 m. In addition, there are no listed fuel stations or contemporary trade directory entries listed within 250 m of the site.
The site is not located within a nitrate vulnerable zone or any other sensitive land use. There are two areas located 325 m to the west of the site within Hampstead Heath that are classified as sites of special scientific interest, one of which is Ken Wood and is classified as ancient woodland.

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

2.5 Previous Investigations

The findings of the previous investigations are discussed in detail in Section 3.0.

2.5.1 Original Investigation by GEA (2008)

The GEA investigation undertaken in 2008 comprised a single cable percussion borehole advanced to a depth of 15.0 m and four open-drive percussive sampler boreholes to depths of between 4.0 m and 5.0 m. Groundwater monitoring standpipes were installed within three of the boreholes, to depths of 5.0 m and 6.0 m.

2.5.2 Investigation by RSK (2011)

The RSK ground investigation in 2011 comprised two cable percussion boreholes, advanced to depths of 10.00 m and 20.00 m and six window sampler boreholes to depths of between 4.0 m and 5.0 m. Five standpipes were installed, to depths of between 3.5 m and 9.2 m, with dataloggers in three of the standpipes to monitor the flow of water within the London Clay. In addition, rising head tests were carried out within the standpipes.

3.0 GROUND CONDITIONS

3.1 Geology

The British Geological Survey (BGS) map (Sheet 256) of the area indicates that the site is directly underlain by the London Clay. The boundary with the overlying Claygate Member is located close to the site to the northeast and east. The site is also located within an area of "Head Propensity". Head propensity is shown on the BGS map as areas denoted as most likely to be covered by Quaternary Head Deposits as interpreted from digital slope analysis and confirmed by borehole data. These deposits are not mapped and have not been verified by fieldwork; they are noted as having properties similar to that of the London Clay and are shown to occur close to the boundary with the overlying Claygate Member.

A borehole drilled by the BGS on Hampstead Lane, generally referred to as the Hampstead Heath borehole, to a depth of 66.74 m (61.97 m OD), about 1.63 km to the west of the site at National Grid Reference 526455, 186890, found the Bagshot Formation to extend to a level of 109.71 m OD and penetrated the full thickness of the Claygate Member. This borehole found the base of the the Claygate Member at a level of 93.71 m OD, overlying the London Clay Formation. The maximum site level is about of 84.8 m OD in the north of the site and therefore some way below the anticipated base of the Claygate in this area.

The previous GEA ground investigation encountered a nominal thickness of made ground or topsoil over the London Clay, which was encountered to the full depth of the investigation, of 15.0 m. Topsoil was encountered in Borehole Nos 1, 2 and 3 to depths of between 0.4 m and 1.0 m and made ground was encountered in Borehole Nos 2, 4 and 5 to depths of between 0.8 m and 1.8 m. The London Clay was found, in general, to initially comprise soft to firm fissured orange-brown clay with partings of grey silt and selenite crystals, which extended to depths of between 2.0 m and 4.5 m. Underlying this upper layer, firm becoming stiff brown fissured clay with partings of silt, pockets of sand and selenite crystals was encountered to a depth of 6.5 m, and was in turn underlain by stiff brownish grey fissured clay with abundant pockets of sand and selenite crystals to a depth of 9.5 m. Below 9.5 m, the London Clay generally comprised very stiff grey fissured clay with partings of sandy silt and selenite crystals to the maximum depth of investigation of 15.0 m.

In Borehole Nos 2 and 3 soft brownish grey slightly sandy clay with occasional fine gravel was encountered beneath the made ground to depths of 1.80 m (78.20 m OD and 1.00 m (79.40 m OD) and may represent soils of the Head Deposits.

The RSK investigation encountered made ground to depths of between 0.20 m (80.33 m OD) and 1.70 m (77.97 m OD) and to the maximum depth of Borehole WS2, of 2.0 m (77.85 m OD). The made ground generally comprised dark brown and brown silty gravelly sandy clay and clayey sandy gravel with brick, concrete, ash, slate, pottery fragments and roots. In the southwest and southeast of the site, made ground described as reworked London Clay was recorded during the RSK investigation. This stratum was found to extend to depths of 1.2 m (79.01 m OD) and 1.4 m (80.5 m OD) in the southwest and to the maximum depth of Borehole WS2, of 2.0 m (77.85 m OD) in the southeast. This stratum was found to comprise brown and orange-brown mottled silty sandy clay with occasional gravel, organic material, roots, ash and fine fragments of brick, wood and charcoal. Beneath the made ground, the London Clay initially comprised soft becoming firm fissured brown mottled greyish green silty clay with iron oxide, selenite crystals, partings of fine sand and carbonate precipitate to depths of 5.50 m (76.72 m OD) and 5.80 m (74.66 m OD). Underlying this, the London Clay was found to comprise stiff, locally firm, becoming very stiff fissured dark brownish grey silty clay with partings of fine sand and claystones and was encountered to the full depth investigated, of 20.00 m (60.46 m OD).

A review of the RSK logs indicates Head Deposits in Borehole No 1, which have been logged as made ground by RSK. The soil is described as brown slightly clayey sandy gravel, which contained no extraneous fragments and may therefore represent natural soils, and directly overlies London Clay.

The BGS borehole database includes a record of a deeper borehole drilled roughly 280 m to the northeast of the site. The borehole encountered made ground over the London Clay to a depth of 127 m, below which the Thanet Sand extended to a depth of 144 m and was underlain by Chalk with flints to the full depth investigated, of 206 m.

3.2 Hydrology and Hydrogeology

According to the Envirocheck report the site is directly underlain by an Unproductive Stratum, which refers to deposits that have low permeability and negligible significance for water supply or river base flow. The Claygate Member to the northeast and east is classified as a Secondary 'A' Aquifer, which refers to permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

A private pond is located in the southeast of the site. Beyond this, the nearest surface water feature is the Kenwood Ladies' Bathing Pond of the Highgate Chain of Ponds, located roughly 90 m to the southwest of the site.

The site is located close to a tributary of the Highgate Chain of Ponds, formerly known as the Highgate Brook, which historically[4] formed one of the sources of the River Fleet, one of London's "lost rivers". The Fleet originated to the northwest and southwest of the site, and flowed in a southeasterly direction towards Clerkenwell, beyond which it joined with the River Thames. Today the Fleet is entirely covered and culverted and forms part of the surface water sewerage system.

The ponds on the Heath are fed by natural springs. Some of the ponds are natural but the Hampstead and Highgate Chains are artificial and were created in the 18th Century by damming tributaries of the Fleet, to provide drinking water for London.

Information provided to RSK from the residents' association suggested that drainage in the valley located along the southeastern boundary of the site was previously diverted away from the valley through a culvert or buried channel, and this is likely to form the existing sewer network in the area.

During the recent walkover by GEA, surface water was noted to be seeping under a fence roughly 5 m from the boundary of the site to the south in a southerly direction before flowing southwest. The origin of this water was not clear but it is likely that it was surface water following the the local topography within the valley that follows the southeastern boundary of the site.

There are no Environment Agency designated Groundwater Source Protection Zones (SPZs) within 500 m of the site. There are no water abstractions listed within 250 m of the site.

Any groundwater flow within the London Clay will be at a very slow rate, due to its negligible permeability. The permeability will be predominantly secondary, through fissures in the clay. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10^{-10} m/s and 1 x 10^{-8} m/s, with an even lower vertical permeability. Head Deposits also have low permeability rates in the range of 1 x 10-8 m/s.

As the London Clay comprises predominantly clay soils, they cannot support groundwater flow and as such do not support a "water table" or continuous piezometric surface. Boreholes constructed within clays do fill with water, due to the often high water content of shallow clays or by the collection of surface water drainage, which is unable to drain through the clay, however, this is not reflective of the type of groundwater flow that would occur in a porous and permeable saturated stratum. Although shallow Head Deposits are more sandy than the insitu London Clay, they comprise predominantly transported clay material and therefore

[4] Nicholas Barton and Stephen Myers (2016) *London's Lost Rivers. Revised Edition.* Historical Publications Ltd

have a cohesive matrix which would not be able to support groundwater flow to support water courses. The local ponds have been constructed within the Head Deposits and are able to prevent the collected water from draining.

The site is not at risk of flooding from rivers or the sea, as defined by the Environment Agency and is shown as being within an area at low to high risk of surface water flooding. The search indicates that parts of the site are located in an area with limited potential for groundwater flooding to occur.

During the original GEA investigation at the site, groundwater was encountered at a depth of 3.8 m in the borehole located close to the private pond. A standpipe was installed in this borehole and monitoring visits indicated water at depths of 1.0 m (79.00 m OD) and 1.20 m (78.80 m OD). All other boreholes were found to be dry.

Subsequent groundwater monitoring following the RSK investigations measured groundwater at depths of between 2.71 m and 4.77 m (79.00 m OD and 76.96 m OD), and the standpipes in WS5 and WS6 were dry at the time of the first monitoring visit, to depths of 4.00 m and 5.00 m (75.67 m OD and 77.28 m OD).

3.3 Preliminary Risk Assessment

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

3.3.1 Source

The desk study has revealed that the site does not have a contaminative history in that it has been developed with houses and outbuildings for its entire history.

3.3.2 Receptor

The occupants of the house represent relatively high sensitivity receptors. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are likely to come into contact with any contaminants present during construction works.

Perched water may be present in the made ground or in the vicinity of existing foundations, although such pockets of water are likely to be localised and unlikely to form part of a wider aquifer. The underlying chalk aquifer at depth is considered to be a highly sensitive receptor.

3.3.3 Pathway

Within the site, end users will be isolated from direct contact with any contaminants present within the made ground by the existing house and surrounding hard surfacing, thus no potential contaminant exposure pathways will exist with respect to end users. Only in areas of soft landscaping will end users potentially come into contact with contaminants. There will be a potential for contaminants to move onto or off the site horizontally within the made ground, although these pathways are already in existence. A pathway for ground workers to come into contact with any contamination will exist during construction work and services will come into contact with any contamination within the soils in which they are laid.

3.3.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a LOW risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work.

4.0 SCREENING

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

4.1 Screening Assessment

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

4.1.1 Subterranean (groundwater) Screening Assessment

Question	Response for the Water House, Highgate
1a. Is the site located directly above an aquifer?	No. The site is directly underlain by the London Clay which is classified by the EA as an unproductive stratum. The site is located close to the boundary with the Claygate Member in the northeast and is located within an area of Head Propensity.
1b. Will the proposed basement extend beneath the water table surface?	*Unlikely.* The London Clay and Head Deposits cannot support groundwater flow and does not have a water table consistent with a permeable water bearing strata. During the site investigations perched water was encountered at a depth of 3.8 m in GEA Borehole No 2 next to the pond. If the pond was groundwater fed then water would have been close to pond level. The clay soils are stopping the collected water in the ponds from draining away and there is no consistent water level in the London Clay as it cannot support groundwater flow, which results in dry pipes and shallow water. The Head Deposits have a cohesive clay matrix and will behave hydraulically as a clay. Therefore these deposits cannot support groundwater flow, even if they are slightly more permeable in lab tests than the in situ London Clay. The excavated pond on site and on the adjacent site are in the Head Deposits and hold water. If the Head Deposits were relatively permeable then this water would drain away.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	*Yes. There is a private pond in the southeast of the site and the Highgate chain of ponds which are thought to be man-made located roughly 90 m to the southwest of the site.*
3. Is the site within the catchment of the pond chains on Hampstead Heath?	*Yes. The proposed pool development is within the Highgate Chain catchment as shown on Figure 14 of the Arup report.*
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes. The proposed development includes extending the house to the east.*
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No. Given that the site is underlain by clay soils and is unlikely to be suitable for a soakaway or similar SUDS based system, the site drainage will therefore be directed to public sewers. Site drainage will therefore be designed to generally maintain the existing situation.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than, the mean water level in any local pond or spring line?	*Yes. The private pond in the southeast is at a level of roughly 79.7 m OD and the proposed hydrotherapy pool will extend to a depth of 78.6 m OD.*

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

Q2 The site is within 100 m of the Highgate chain of ponds and there is a private pond on site.
Q3 The site lies within the Highgate Chain catchment.
Q4 The proposed basement will slightly increase the proportion of hard surfaced/paved areas to the east of the existing house.
Q6 The lowest point of the proposed excavation will be below the mean water level of the private pond in the southeast of the site.

4.1.2 Stability Screening Assessment

Question	Response for the Water House, Highgate
1. Does the existing site include slopes, natural or manmade, greater than 7°?	*Possibly. The topographical survey of the site indicates the overall site slope is around 3°, but some localised slopes of around 8° may be present.*
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No. It is assumed that the site is not to be significantly re-profiled as part of the development.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	*Yes, the land to the northeast and south of the site is designated as having a slope angle of between 7° and 10° and greater than 10° according to the Slope Angle Map Fig 16 of the Arup report.*
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	*Yes, the land to the northeast and south of the site is designated as having a slope angle of between 7° and 10° and greater than 10° according to the Slope Angle Map Fig 16 of the Arup report.*
5. Is the London Clay the shallowest stratum at the site?	*Yes. The London Clay is the shallowest stratum on the site.*
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	*Yes, a single tree to the east of the existing house is likely to be felled as part of the proposed development.*
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	*Yes. The area is prone to these effects as a result of the presence of shrinkable London Clay.*
8. Is the site within 100 m of a watercourse or potential spring line?	*Yes. There is a private pond in the southeast of the site and the Highgate chain of ponds is located roughly 90 m to the southwest of the site.*
9. Is the site within an area of previously worked ground?	No. According to the BGS geological map the site is not within an area of previously worked ground.
10a. Is the site within an aquifer?	No. The site is directly underlain by the London Clay which is classified by the EA as an unproductive stratum. The site is located close to the boundary with the Claygate Member in the northeast.
10b. Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	*Unlikely.* The London Clay cannot support groundwater flow and does not have a water table consistent with a permeable water-bearing stratum. The Head Deposits have a cohesive clay matrix and will behave hydraulically as a clay. Therefore these deposits cannot support groundwater flow, even if they are slightly more permeable in lab tests than the in situ London Clay.
11. Is the site within 50 m of Hampstead Heath ponds?	*Yes. The proposed development is within the Highgate Chain catchment.*
12. Is the site within 5 m of a highway or pedestrian right of way?	*Yes. The site is located within 5 m of Millfield Lane to the southeast, although the house itself is located roughly 10 m from the road.*
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No. The nearest neighbouring building is located roughly 10 m to the west of the site and the proposed hydrotherapy pool will be constructed to the east of the house.

Question	Response for the Water House, Highgate
14. Is the site over (or within the exclusion zone of) any tunnels, eg railway lines?	No.

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

Q1 The existing site includes slopes, natural or manmade, greater than 7°.
Q3 The development neighbours land with a slope greater than 7°.
Q4 The site is within a wider hillside setting in which the general slope is greater than 7°.
Q5 The site is directly underlain by the London Clay.
Q6 A single tree to the east of the existing house is likely to be felled as part of the proposed development.
Q7 The site is in an area likely to be affected by seasonal shrink-swell.
Q8 The site is within 100 m of a watercourse.
Q11 The site is located within the Highgate Chain Catchment.
Q12 The site is located within 5 m of Millfield Lane to the southeast.

4.1.3 Surface Flow and Flooding Screening Assessment

Question	Response for the Water House, Highgate
1. Is the site within the catchment of the pond chains on Hampstead Heath?	*Yes. Figure 14 of the Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010, confirms that the site is located within the Highgate Chains catchment area.*
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No. Any additional surface water from the increased hardstanding area will be either attenuated and discharged into the Thames Water sewers or infiltrated to ensure the surface water flow regime will be unchanged. The hydrotherapy pool will largely be beneath the building footprint and therefore the 1m distance between the roof of the hydrotherapy pool and ground surface as recommended by the Arup report and para 2.16 of the CPG4 does not apply across these areas. Where the basement extends beyond the building footprint/hardstanding, a minimum of 1m of soil will be above the hydrotherapy pool roof thus complying with the CPG4.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes. The hydrotherapy pool and dwelling footprint will cover a larger proportion of the site.*
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	No. It is assumed that any additional surface water from the increased hardstanding area will be either attenuated and discharged into the Thames Water sewers or infiltrated to ensure the surface water flow regime will be unchanged.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No. The proposed hydrotherapy pool and development is very unlikely to result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses. It is proposed to allow for new SUDS measures to control how water is dealt with from additional hardstanding areas and it will be unpolluted roof water or low pollution hazard land uses draining from the site.
6. Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk of flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	*Yes. The findings of this BIA together with the Camden Flood Risk Management Strategy dated 2013 and Figures 3iii, 4e, 5a and 5b of the SFRA dated 2014, in addition to the Environment Agency online flood maps show that the existing and proposed building has a very low flooding risk from surface water, sewers, reservoirs (and other artificial sources), groundwater and fluvial/tidal watercourses, shown along the southeastern boundary of the site.*

Question	Response for the Water House, Highgate
	It is possible that the pool will be constructed within a perched water table and the recommendations outlined in the BIA with regards to water-proofing and tanking of the basement will reduce the risk to acceptable levels. *In accordance with paragraph 5.11 of the CPG a positive pumped device will be installed in the basement in order to further protect the site from sewer flooding.* *The site is located within the Critical Drainage Area Group3_001, but not in a Local Flood Risk Zone as identified in the Camden SWMP and Updated SFRA Figure 6/Rev 2.*

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

Q1 The site is located within the pond chains on Hampstead Heath.
Q3 The proposed pool development may result in a change in the proportion of hard surfaced / paved areas.
Q6 The site is located in an area identified to have a surface water flood risk.

5.0 SCOPING AND SITE INVESTIGATION

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

5.1 Potential Impacts

The following potential impacts have been identified.

Screening answers	Potential impact
The site is within 100 m of the Highgate chain of ponds and there is a private pond on site. The site lies within the Highgate Chain catchment. The lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) is close to or lower than, the mean water level in local pond or spring line	The proposed pool may affect the groundwater flow regime. Flow from a spring if diverted or restricted could affect flow elsewhere. Changes in flow to the ponds could affect water quality.
The proposed basement development will result in a change in the proportion of hard surfaced / paved areas	The proportional increase in hardstanding could potentially reduce rates of recharge, reducing groundwater flow to a nearby watercourse. The increase could also increase rates of runoff, exacerbating flood risk.
The existing site includes slopes, natural or manmade, greater than 7° The development neighbours land, including railway cuttings and the like, with a slope greater than 7° The site is within a wider hillside setting in which the general slope is greater than 7°	The proposed development has the potential to alter the existing slope profile which may lead to local instabilities.
The site is directly underlain by the London Clay. The site is in an area likely to be affected by seasonal shrink-swell. A single tree to the east of the existing house is likely to be felled as part of the proposed development.	Multiple potential impacts depending on the specific setting of the basement development. The proposed excavation will occur a significant distance away from any neighbouring structures, such that any movement as a result of shrinkable soils and tree removable is only likely to impact the existing house.
The site is located within 5 m of Millfield Lane to the southeast.	The excavation of the new pool is in excess of 5 m from the road and will not result in structural damage to the road or footway.

Screening answers	Potential impact
The site is located in an area identified to have a surface water flood risk along its southeastern boundary	Part of the site may be at risk of flooding but the location of the existing house and new extensions are set back from this area.

6.0 EXPLORATORY WORK

The scope of the works was specified by the consulting engineers, with input from GEA. In order to meet the objectives described in Section 1.2, three open-drive sampler boreholes were advanced to a depth of 5.00 m.

The boreholes were positioned on site by GEA, avoiding the existing house and known areas of services.

The boreholes were numbered BH101 to BH103 in order to differentiate them from the previous investigations.

A further three standpipes were installed to a depth of 5.0 m and have been monitored on a single occasion, roughly two weeks following installation. The standpipes installed during the previous investigations by GEA and RSK have also been monitored.

The borehole records are appended, together with a site plan indicating the exploratory positions. A copy of the boreholes completed by GEA in 2008 and RSK in 2011 are also included in the appendix. The Ordnance Datum (OD) levels on the borehole and trial pit records have been interpolated from a topographic survey provided by the consulting engineers (ref ACAD-C3D WITH BUILDING 83.52).

7.0 GROUND CONDITIONS

The supplementary investigation has confirmed the findings of the previous investigations at the site, in that below a moderate thickness of made ground, the London Clay was encountered to the full depth investigated, of 20.00 m (60.4 m OD), and is locally overlain by Head Deposits. The ground investigation has not established the presence of any alluvial deposits beneath the site that could be deemed to provide a flow path to any of the nearby ponds.

The following summary of the ground conditions is based on both GEA investigations and the RSK investigations.

7.1 Made Ground / Topsoil

Topsoil was encountered in Borehole Nos 1 and 2 and comprised dark brown silty clay with gravel and rootlets to depths of between 0.40 (79.6 m OD) and 1.0 m (80.5 m OD).

Made ground was encountered in all other boreholes to depths of between 0.2 m (80.33 m OD) in the vicinity of the existing house, to 1.7 m (77.97 m OD) in the south of the site and to 2.00 m in WS2. The made ground was found to generally comprise greyish brown, orange-brown and brown silty sandy clay with gravel, chalk, ash, coal, brick, black fabric mesh, occasional veins of brown staining, slate and pottery fragments, roots and rootlets.

The made ground in the east of the site was found to extend locally to a depth of 1.8 m (80.40 m OD) and this is most probably associated with the construction of the gravel driveway, through which the borehole was advanced.

In the southwest and southeast of the site, made ground described as reworked London Clay was recorded during the RSK investigation. This stratum was found to extend to depths of 1.2 m (79.01 m OD) and 1.4 m (80.5 m OD) in the southwest and to the maximum depth of Borehole WS2, of 2.0 m (77.85 m OD) in the southeast. This stratum was found to comprise brown and orange-brown mottled silty sandy clay with occasional gravel, organic material, roots, ash and fine fragments of brick, wood and charcoal.

The deepening of the made ground towards the south of the site probably reflects the presence of material that has been used to level and landscape the garden area.

In RSK Borehole No 1, the made ground was noted on the RSK log as brown slightly clayey sandy gravel, which contained no extraneous fragments and may therefore represent natural soils.

No visual or olfactory evidence of contamination was observed in the topsoil or made ground; however, samples of the soils were selected for confirmatory analyses and the results are presented in Section 7.4.

7.2 London Clay

Directly beneath the made ground in Borehole Nos 101 to 103, GEA Borehole Nos 2, 3 and 4 and RSK Borehole No 1, suspected Head Deposits were encountered and generally comprised soft or firm orange-brown or brown mottled grey silty sandy clay, with rare flint gravel and a reworked texture and extended to depths of between 0.50 m and 2.60 m (79.96 m OD and 77.60 m OD). A similar material to that noted above was encountered by RSK in 2011 in WS2, WS3 and WS4 but included extraneous fragments of brick.

The underlying London Clay generally comprised soft becoming firm becoming stiff medium strength becoming high strength fissured brown mottled grey clay with partings of grey silt, pockets of orange-brown fine sand, roots and rootlets to depths of between 5.50 m and 6.50 m (76.22 m OD and 74.66 m OD). The initial weathered horizon extended to the full depth of the majority of the window samples.

The underlying London Clay comprised typical unweathered stiff becoming very stiff fissured dark brownish grey silty clay with partings of silt, pockets of sand, claystone fragments and selenite crystals. This stratum was found to become very stiff from a depth of 9.50 m (72.70 m OD) in Borehole No 5. This stratum was encountered to the maximum depth investigated, of 20.0 m (60.46 m OD).

Geotechnical testing carried out during the original GEA investigation identified that the London Clay has a high volume change potential.

No evidence of desiccated soil was encountered during the investigation.

7.3 Groundwater

Groundwater was encountered during drilling in GEA Borehole No 2 at a depth of 3.80 m (76.20 m OD) from within the London Clay and in RSK WS2 and WS3 at depths of 1.70 m (78.15 m OD) and 1.10 m (79.11 m OD), respectively from within the made ground. A seepage was encountered in RSK Borehole No 1 at a depth of 11.50 m (68.96 m OD).

The results of the RSK data logger monitoring indicate a permeability of between 2.4 x 10^{-8} m/s and 4.1 x 10^{-8} m/s within the weathered London Clay and Head Deposits and 8.1 x 10^{-9} m/s within the unweathered London Clay.

The following table shows the results of groundwater monitoring. The datalogger results are not included in the table below.

Date	Borehole No	Depth to water (m) [Level m OD]
21/01/08	BH1	DRY to 5.00 (76.50)
	BH2	1.0 [79.00]
	BH5	DRY to 6.00 (76.20)
04/02/08	BH1	DRY to 5.00 (76.50)
	BH2	1.2 [78.8]
	BH5	DRY to 6.00 (76.20)
23/11/10	RSK WS5	DRY to 4.00 (75.67)
	RSK WS6	DRY to 5.00 (77.28)
30/11/10	RSK WS5	3:67 [79.0]
	RSK WS6	4.77 [77.51]
10/01/11	RSK WS5	2.71 [76.96]
	RSK WS6	3.53 [78.75]
14/06/17	BH101	1.37 [78.83]
	BH102	1.28 [79.12]
	BH103	3.17 [78.63]
	RSK WS6	1.02 [81.26]

The investigation completed in June 2017 was carried out after a period of wet weather, and surface water was observed shedding off the slopes of the Head Deposits and coincides with high water levels measured in the standpipes from rainwater that cannot soak quickly into the low permeability clay soils of the Head Deposits and London Clay.

7.4 Soil Contamination

A total of seven samples of the made ground have been tested for contamination from across the site by GEA and RSK. Three of the tests were undertaken during the original ground investigation and a further four tests were completed during the RSK ground investigation. The table below sets out the values measured within all seven samples analysed; all concentrations are in mg/kg unless otherwise stated.

Determinant	RSK BH1 0.2 m	RSK BH2 0.2 m	RSK WS1 0.1 m	RSK WS4 0.5 m	BH1 0.5 m	BH2 0.7 m	BH4 0.5 m
pH	7.4	8.0	7.6	8.1	7.3	7.9	7.6
Arsenic	26	18	20	15	20	5.4	18
Cadmium	0.6	0.8	0.8	< 0.5	0.6	< 0.5	0.6
Chromium	26	37	32	24	39	16	23
Copper	80	58	73	66	51	15	61
Mercury	0.5	0.4	0.6	0.6	1.0	< 0.6	0.9

Determinant	RSK BH1 0.2 m	RSK BH2 0.2 m	RSK WS1 0.1 m	RSK WS4 0.5 m	BH1 0.5 m	BH2 0.7 m	BH4 0.5 m
Nickel	23	32	27	19	27	6.6	19
Lead	**302**	**300**	**431**	**317**	**310**	65	**430**
Selenium	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5	< 2.5	< 2.5
Zinc	204	308	352	195	250	36	240
Total Cyanide	Not recorded	Not recorded	Not recorded	Not recorded	< 1.0	< 1.0	< 1.0
Total Phenols	Not recorded	Not recorded	Not recorded	Not recorded	< 0.1	< 0.1	< 0.1
Sulphide	Not recorded	Not recorded	Not recorded	Not recorded	< 10	< 10	< 10
Total TPH	< 10	Not recorded	Not recorded	14	< 25	< 25	100
Total PAH	41.6	13.1	20.5	1.3	Not recorded	Not recorded	Not recorded
Benzo(a)pyrene	4.41	1.5	2.2	0.2	Not recorded	Not recorded	Not recorded
Naphthalene	0.1	0.1	0.1	0.1	Not recorded	Not recorded	Not recorded
Total Organic Carbon %	Not recorded	Not recorded	Not recorded	Not recorded	3.8	0.7	3.7

7.4.1 Generic Quantitative Risk Assessment

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

- that groundwater will not be a critical risk receptor;
- that the critical receptor for human health will be a young female child aged 0 to 6 years old;
- that young children will not have prolonged exposure to the site;
- that the exposure duration will be six years;
- that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and dust, and inhalation of dust and vapours; and
- that the building type equates to a two-storey small terraced house.

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

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

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

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

This assessment is based upon the potential for risk to human health, which at this site is considered to be the critical risk receptor.

The results of the contamination testing indicate elevated concentrations of lead within six samples of the seven samples of made ground tested.

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

Part 2: DESIGN BASIS REPORT

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

8.0 INTRODUCTION

It is understood that it is proposed to refurbish the existing house, including the revised layout of rooms and single-storey extension of the house in the east. The proposals also include the construction of a new hydrotherapy pool with a depth of 1.85 m (78.6 m OD) to the southeast of the existing house.

9.0 GROUND MODEL

The desk study has revealed that the site does not have a contaminative history in that it has been developed with the existing and previous houses for its entire history, and on the basis of the fieldwork and the findings of the previous ground investigations at the site, the ground conditions at this site can be characterised as follows:

- Beneath a moderate to significant thickness of made ground, the London Clay was encountered to the full depth investigated, of 20.00 m (60.4 m OD), and is locally overlain by Head Deposits;
- topsoil and made ground is present across the site at depths of between 0.2 m (80.33 m OD) in the vicinity of the existing house, and 1.7 m (77.97 m OD) in the south of the site, with a deepening beneath the drive of 1.8 m (80.40 m OD) and generally comprised brown sandy clay with brick fragments;
- directly beneath the made ground in Borehole Nos 101 to 103, GEA Borehole Nos 2, 3 and 4 and RSK Borehole No 1, Head Deposits were encountered and generally comprised soft or firm orange-brown or brown mottled grey silty sandy clay, with rare flint gravel and a reworked texture and extended to depths of between 0.50 m and 2.60 m (79.96 m OD and 77.60 m OD);
- the underlying London Clay generally comprised soft becoming firm becoming stiff medium strength becoming high strength fissured brown mottled grey clay with partings of grey silt, pockets of orange-brown fine sand, roots and rootlets to depths of between 5.50 m and 6.50 m (76.22 m OD and 74.66 m OD);
- below this depth, medium strength and high strength fissured stiff becoming very stiff dark brownish grey silty clay with partings of silt, pockets of sand and claystone fragments was encountered and proved to the maximum depth investigated of 20.00 m (60.46 m OD);
- groundwater was encountered during drilling in GEA Borehole No 2 at a depth of 3.80 m (76.20 m OD) from within the London Clay and in RSK WS2 and WS3 at depths of 1.70 m (78.15 m OD) and 1.10 m (79.11 m OD), respectively from within the made ground. A seepage was encountered in RSK Borehole No 1 at a depth of 11.50 m (68.96 m OD);

- groundwater was not encountered during the drilling of Borehole Nos 1, 3, 4, 5 or Borehole Nos 101 to 103;
- monitoring undertaken at the site has recorded Borehole 1 and 5 and WS5 and WS6 to be dry on a couple of occasions;
- water has been measured in some of the pipes between depths of 1.00 m and 4.77 m (81.26 m OD and 78.63 m OD);
- the water levels measured in the pipes may be associated with rainfall collecting within the standpipes; and
- contamination testing has indicated elevated concentrations of lead within six samples of made ground.

10.0 ADVICE AND RECOMMENDATIONS

The new hydrotherapy pool will occupy a small area beneath the new extension to the east of the existing house, and the proposed pool depth of 1.85 m is likely to result in a formation level within either Head Deposits or London Clay. Although the proposed loads are not known, it is likely that the new extension could be supported by spread foundations, provided that any desiccation is bypassed and foundations are deepened in accordance with NHBC guidelines.

Some form of groundwater control is likely to be locally required to construct the pool and inflows should be expected from within the sandier layers of the Head Deposits. However, given the results of the groundwater monitoring any inflows are anticipated to be localised.

All new foundations will need to bypass the made ground and any potentially desiccated clay soils and NHBC guidelines should be followed in this respect.

10.1 Pool Construction

10.1.1 Pool Excavation

The proposed house extension will incorporate a new hydrotherapy pool in the east, with a proposed depth of 1.85 m (78.6 m OD), such that the proposed formation level is likely to be within either the Head Deposits or London Clay.

The investigation has indicated that the depth of excavation will result in the removal of most of the sandier clay of the Head Deposits. Groundwater seepages should be anticipated from within this stratum, so it should only be necessary to deal with seepages or slow inflows from the sides of the excavation in the shallow soils.

The Head Deposits comprise a cohesive clay matrix that will behave hydraulically as a clay. Therefore these deposits cannot support groundwater flow and the RSK report indicates a permeability in the order of 10^{-8} m/s. The excavated ponds on site and on the adjacent site are apparently within the Head Deposits and / or London Clay and are able to hold water. If the Head Deposits were relatively permeable then this water would drain away.

The investigation did not encounter a general water table across the site. Perched water may be encountered from made ground and around claystones. A groundwater strike was encountered in GEA Borehole No 2 at a depth of 3.80 m (76.20 m OD) from within the London Clay. This

borehole was drilled adjacent to the pond on site, but the water level encountered during drilling is lower than the level of the pond. No evidence of a spring line feeding the apparently transient stream 5 m to the south of the site was found on site. The Highgate Ponds are artificial and it is thought that the pool construction is not likely to have an effect on, or be affected by ground water regimes.

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

Although the measurements made in the standpipes provide useful information, the level of the water table is not necessarily as significant as the volume of water that may flow into the basement excavation. For example, a high level of water measured in a standpipe may not be significant if this represents only a small volume of water. It would therefore be prudent to carry out a number of trial excavations, to depths as close to the full pool depth as possible, to provide an indication of the likely ground water conditions. The basement excavation will expose a greater volume of soil than has been investigated by the boreholes and it is possible that larger pockets or inter-connected layers of higher permeability soils could be encountered.

The most suitable method of pool construction is likely to be by open excavation with insitu concrete to form the pool floor and walls. A sheet piled wall could be used as a temporary measure, prior to the construction of a permanent retaining wall.

Alternatively, there are a number of retaining wall options in the temporary and permanent conditions. The choice of wall may be governed to a large extent by whether it is to be incorporated into the permanent works and have a load bearing function. The final choice will depend to a large extent on the required overall stiffness of the support system and the need to control ground water movement through the wall in the temporary condition.

It may be suitable to use sheet piles to allow a concrete retaining wall to be constructed in-situ, although alternatively, a bored pile retaining wall could be used which would have the benefit of providing support for structural loads. The standpipes should continue to be monitored to determine whether a contiguous bored pile wall will be sufficient, or whether secant piles will be required to prevent groundwater inflows.

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

10.1.2 Retaining Walls

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

Stratum	Bulk Density (kg/m3)	Effective Cohesion (c' – kN/m2)	Effective Friction Angle (Φ' – degrees)
Made Ground	1700	Zero	25
London Clay	1950	Zero	23

Groundwater was not encountered during drilling of the new supplementary boreholes. Monitoring of standpipes installed has measured water in the pipes at depths of between 1.00 m and 4.77 m (81.26 m OD and 78.63 m OD), but this represents perched water.

At this stage, it is therefore recommended that a design water level of two-thirds of the excavation depth is adopted, unless a fully effective drainage system can be ensured. Reference should be made to BS8102:2009[8] with regard to requirements for waterproofing and design with respect to groundwater pressures.

10.1.3 Ground Movements - Heave

It has been estimated that the pool excavation of a 1.85 m depth of soil will lead to an unloading of approximately 35 kN/m^2, resulting in short term elastic heave of the London Clay, together with long term swelling which will theoretically take many years to complete. It would be prudent to carry out an analysis of the likely movements once the loadings and final levels are known.

10.2 Spread Foundations

All new foundations should bypass the made ground, soft clay and any potentially desiccated clay soils.

Groundwater may be encountered within the pool excavation as perched water.

Provided that a dry excavation can be maintained, spread foundations excavated to bear within the firm clay of the Head Deposits or London Clay may be designed to apply a net allowable bearing pressure of 100 kN/m^2 below the level of the pool. These values incorporate an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits.

The depth of the pool excavation is expected to be such that foundations will be placed below the depth of actual or potential desiccation, but this should be checked once the proposals have been finalised, with the survey drawing showing former and existing trees. Notwithstanding NHBC guidelines, all foundations should extend beyond the zone of any potential desiccation. In this respect it would be prudent to have all foundation excavations inspected by a suitably experienced engineer. Due allowance should be made for future growth of existing / proposed trees. The requirement for compressible material alongside foundations should be determined by reference to the NHBC guidelines. High volume change potential soils should be assumed at the site.

The requirement for compressible material alongside foundations should be determined by reference to the NHBC guidelines.

If for any reason spread foundations are not considered appropriate, piled foundations would provide a suitable alternative.

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

10.3 Excavations

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

Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

Inflows of groundwater into shallow excavations from within the clay soils of the Head Deposits may be encountered, but are not likely to be significant. Seepages may also be encountered from perched water tables within the made ground, particularly within the vicinity of existing foundations, although such inflows should be suitably controlled by sump pumping, but this should be confirmed with rising head tests and if access permits, trial excavations.

10.4 Ground / Pool Floor Slab

Following the excavation of the pool it should be possible to adopt a ground bearing floor and pool slab on the firm clay soils of the London Clay. The formation level should be proof rolled in any case and any soft spots should be replaced with compacted granular fill. Further consideration may need to be given to the need to design the slab to take account of heave due to unloading. A void may need to be provided below the slab to accommodate the theoretical potential movement.

10.5 Effect of Sulphates

High concentrations of soluble sulphate have been measured in the natural soil. These results indicate that buried concrete should be designed in accordance with the requirements of Class DS4 and ACEC Class AC4 of Table C2 of BRE Special Digest 1 Part C (2005). The guidelines contained in the above digest should be followed in the design of foundation concrete.

10.6 Site Specific Risk Assessment

The desk study has revealed that the site does not have a contaminative history in that it has been developed with the existing and previous houses for its entire history.

The results of the contamination testing have indicated elevated concentrations of lead within six samples of made ground above the screening value of 200 mg/kg. The highest concentration of lead was 431 mg/kg.

The source of the lead contamination is likely to be the results of inclusions of ash.

End users will be effectively isolated from direct contact with the identified contaminants by the extent of buildings and areas of external hardstanding. Only in landscaped areas could end users conceivably come into direct contact with the contaminated soils.

As only a limited number of samples have been tested, it would be prudent to carry out contamination testing on additional samples of made ground / topsoil recovered from the areas of the site that are to remain as soft landscaped gardens, in order to ensure the absence

of any significant contamination. However, the development will not result in any change to the present level of risk to end users.

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

10.7 Waste Disposal

Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process and this investigation represents the preliminary sampling exercise of that process. Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should however be noted that the Environment Agency guidance WM3[9] states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes.

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE[10] guidance, will need to be disposed of to a licensed tip. Waste going to landfill is subject to landfill tax at either the standard rate of £86.10 per tonne (about £155 per m^3) or at the lower rate of £2.70 per tonne (roughly £5 per m^3). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the 'standard' rate and only naturally occurring soil and stones, which are accurately described as such in terms of the 2011 Order, would qualify for the 'lower rate' of landfill tax.

Based upon on the technical guidance provided by the Environment Agency it is considered likely that the soils encountered during this ground investigation, as represented by the seven chemical analyses carried out, would be generally classified as follows below. The waste classification is based on results obtained from the previous investigations and the results may be limited by the omission of some contaminants from the testing regime due to the age of the testing.

Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Comments
Made ground	Non-hazardous (17 05 04)	No	-
Natural Soils	Inert (17 05 04)	Should not be required but confirm with receiving landfill	-

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper[11] which states that in certain circumstances,

9 Environment Agency 2015. *Guidance on the classification and assessment of waste.* Technical Guidance WM3 First Edition
10 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2
11 Environment Agency 23 Oct 2007 *Regulatory Position Statement Treating non-hazardous waste for landfill - Enforcing the new requirement*

segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite prior to excavation by sufficiently characterising the soils insitu prior to excavation.

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

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

10.8 Scoping and Site Investigation

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

Potential Impact	Site Investigation Conclusions
The site is within 100 m of the Highgate chain of ponds and there is a private pond on site. The site lies within the Highgate Chain catchment. The lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) is close to or lower than, the mean water level in any local pond or spring line	The proposed hydrotherapy pool level is located below the pond level. During the previous site investigations perched water was encountered at depth of 3.8 m in GEA Borehole No 2 next to the pond. If the pond was groundwater fed then water would have been close to pond level. The clay soils are stopping the collected water in the ponds from draining away and there is no consistent water level in the London Clay as it cannot support groundwater flow, which results in dry pipes and shallow water. The Highgate chain of ponds is man-made and the proposed pool excavation will not impact upon the local groundwater regime.
The proposed pool development will result in a change in the proportion of hard surfaced / paved areas	The proportional increase in hardstanding could potentially reduce rates of recharge reducing groundwater flow to a nearby watercourse. The increase could also increase rates of runoff exacerbating flood risk.
The existing site include slopes, natural or manmade, greater than 7° The development neighbours land, including railway cuttings and the like, with a slope greater than 7° The site within a wider hillside setting in which the general slope is greater than 7°	The proposed development has the potential to alter the existing slope profile which may lead to local instabilities. A slope stability assessment may be required, but the requirement for this should be reviewed once the construction sequence is known.
The site is directly underlain by the London Clay. The site is possibly in an area likely to be affected by seasonal shrink-swell. A single tree to the east of the existing house is likely to be felled as part of the proposed development.	Multiple potential impacts depending on the specific setting of the basement development. The proposed excavation will occur a significant distance away from any neighbouring structures, such that any movement as a result of shrinkable soils and tree removable is only likely to impact the existing house.
The site is located within 5 m of Millfield Lane to the southeast.	The pool excavation is located in excess of 5 m from the highway and will not result in damage.
The site is located in an area identified to have a surface water flood risk.	The proposed pool and extension are located just outside of the area at risk of surface water flooding, located along the southeastern boundary of the site.

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

The site is within 100 m of a watercourse

The nearby watercourse has been culverted to form a drain and is, therefore, unlikely to have any impact on, or be influenced by, the surrounding groundwater. The proposed pool excavation will be limited in depth and plan to the east of the existing house such that an impact on the wider groundwater regime is not anticipated.

London Clay is the shallowest stratum

The investigation indicated that beneath a covering of made ground, Head Deposits are covering the majority of the site, in turn overlying the London Clay.

The Head Deposits may be prone to seasonal shrink-swell (settlement and heave).

Shrink / swell potential of shallow soils

Tree coverage has been identified in close proximity to the development area. Due to this, the proposed construction should make allowance for the presence or removal of any nearby trees and the NHBC guidelines should be followed.

Provided that foundations extend below the required depths in accordance with NHBC guidelines, and subject to inspection of foundation excavations in the normal way to ensure that there is not significant unexpectedly deep root growth, it is not considered that the occurrence of shrink-swell issues in the local area has any additional bearing on the proposed development.

Increase in hardstanding and paved areas

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

The existing site includes slopes, natural or manmade, greater than 7°

A slope stability assessment may need to be completed, but should be confirmed by the planners.

Surface Water Flooding

The proposed pool and extension are located just outside of the area at risk of surface water flooding, located along the southeastern boundary of the site. On this basis a flood risk assessment is not deemed to be required for the proposed development.

Location of Highway

The pool excavation is located in excess of 5 m from Millfield Lane and will not result in damage to the highway given the distance.

11.0 OUTSTANDING RISKS AND ISSUES

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

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

Further assessment of slope stability may need to be completed.
Further testing is likely to be required in areas of soft landscaping, once the proposals have been finalised, in order to determine if remediation will be required to protect end users and ensure successful plant growth.

If during ground works any visual or olfactory evidence of contamination is identified it is recommended that further investigation be carried out and that the risk assessment is reviewed. These areas of doubt should be drawn to the attention of prospective contractors and further investigation will be required or sufficient contingency should be provided to cover the outstanding risk.

Consideration should be given to the presence of the Japanese Knotweed on site, and its treatment at the earliest possible stage of the project.

APPENDIX

GEA Borehole Records

Copy of RSK Borehole Records

SPT Summary Sheet

Laboratory Geotechnical Test Results

Chemical Analyses (soil)

Risk-based Generic Guideline Values

Envirocheck Report

Historical Maps

Preliminary UXO Risk Assessment

Site Photographs

Site Plan

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** The Water House, Millfield Lane, London N6 6HQ	**Number** **BH101**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Opendrive precussive sampler (Terrier rig)		80.20	Leonard and Ingrid Lewis	J17146
	Location	**Dates** 01/06/2017	**Engineer** Price & Myers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	D1			79.90	(0.30) 0.30	MADE GROUND (greyish brown silty clay with rootlets, chalk, ash, coal, brick and black fabric mesh)		
0.50	D2			79.30	(0.60) 0.90	MADE GROUND (brown silty very sandy clay with chalk, flint and brick)		
0.90	D3							
1.00	D4		PP= 1.75		(0.45)	Soft brown mottled orange-brown silty CLAY with dead and live rootlets, common carbonaceous material, mica and rare fine to medium subrounded flint gravel		
1.30	D5		PP= 1.50	78.85	1.35	Coarse angular flint gravel piece at 1.10 m Large decayed root at 1.15 m		
1.60	D6		PP= 1.75			Soft brown mottled greyish very silty CLAY with common grey silt partings, frequent black carbonacous material and mica. Firm from 2.00 m		
1.90	D7		PP= 2.25		(1.25)	Decayed root at 1.70 m		
2.20	D8		PP= 2.25			Orange-brown silt pocket at 2.30 m		
2.50	D9		PP= 1.50	77.60	2.60			
2.80	D10		PP= 2.50			Firm fissured brown mottled grey silty CLAY with decayed rootlets, carbonaceous material, mica and rare orange fine sand and silt pockets. Stiff from 2.80 m		
3.10	D11		PP= 2.50		(0.90)	Very silty at 3.00 m		
3.40	D12		PP= 2.50	76.70	3.50	Silt parting at 3.40 m		
3.70	D13		PP= 2.25		(0.60)	Stiff fissured orange-brown mottled grey vrey silty CLAY with decayed rootlets, frequent carbonaceous material and mica. Locally softened where siltier		
4.00	D14		PP= 2.00	76.10	4.10			
4.30	D15		PP= 3.00			Stiff fissured brown silty CLAY with common fine selenite, black carbonaceous material, abundant mica and frequent grey and orange silt partings. Decayed rootlets to 4.10 m and abundant medium selenite from 4.60 m to 5.00 m		
4.60	D16		PP= 3.25		(0.90)	Silt and fine to medium selenite parting at 4.10 m Pale silt parting at 4.50 m Red silt parting at 4.85 m		
4.90	D17		PP= 3.50	75.20	5.00			
						Complete at 5.00m		

Remarks
Standpipe installed to 5.00 m
Groundwater not encountered during drilling
Borehole cased to 1.00 m

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

Figure No.
J17146.BH101

GEA Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Site
The Water House, Millfield Lane, London N6 6HQ

Number
BH102

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Opendrive precussive sampler (Terrier rig)		80.40	Leonard and Ingrid Lewis	J17146
	Location	**Dates** 01/06/2017	**Engineer** Price & Myers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				80.39	0.01			
					(0.19)	Gravel over Hessian matt		
				80.20	0.20			
					(0.40)	MADE GROUND (brown sandy clay with gravel, ash, coal, brick and rootlets)		
0.40	D1			79.80	0.60			
					(0.40)	MADE GROUND (orange-brown silty very sandy clay with carbonaceous material and brick)		
0.70	D2					Roots to 0.50 m		
0.80	D3							
1.00	D4		PP= 2.00	79.40	1.00			
1.30	D5		PP= 2.00			Firm orange-brown mottled grey silty CLAY with carbonaceous material and rootlets		
					(1.00)	Firm brown silty CLAY with rare pale grey mottling, carbonaceous material and decayed roots and rootlets		
1.60	D6		PP= 2.25			Cluster of fine claystone fragments at 1.50 m		
1.90	D7		PP= 2.25	78.40	2.00	Decayed root at 1.90 m		
2.20	D8		PP= 2.75			Firm fissured brown mottled grey silty CLAY with rare orange-brown silt partings, carbonaceous material and mica		
2.50	D9		PP= 2.25		(1.20)			
2.80	D10		PP= 2.50			Abundant selenite at 2.90 m		
3.10	D11		PP= 2.25	77.20	3.20			
3.40	D12		PP= 2.75			Stiff fissured brown mottled grey silty CLAY with rare orange-brown silt partings, carbonaceous material to 3.80 m, mica and decayed rootlets to 3.80 m. Becoming very silty from 3.10 m to 3.20 m.		
3.70	D13		PP= 3.50					
4.00	D14		PP= 3.50		(1.80)	Abundant selenite at 4.00 m		
4.30	D15		PP= 3.50					
4.60	D16					Black decayed root at 4.60 m		
4.90	D17		PP= 4.00 (Abundant selenite) PP= 3.75 (Abundant selenite)	75.40	5.00	Abundant selenite at 5.00 m		
						Complete at 5.00m		

Remarks
Groundwater not encountered during drilling
Borehole cased to 1.00 m
Groundwater monitoring standpipe installed to 5.00 m

Scale (approx)	Logged By
1:50	HD

Figure No.
J17146.BH102

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Site
The Water House, Millfield Lane, London N6 6HQ

Number
BH103

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Opendrive precussive sampler (Terrier rig)		81.80	Leonard and Ingrid Lewis	J17146
	Location	**Dates** 01/06/2017	**Engineer** Price & Myers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.26)	MADE GOUND (brown silty sandy clay with gravel, coal, brick and rootlets)		
0.30	D1			81.54	0.26			
					(0.19)			
				81.35	0.45	MADE GROUND (dark brown silty sandy clay with flint, ash, brick, roots and rootlets)		
0.60	D2				(0.55)			
0.80	D3		PP= 1.75			Orange-brown becoming brown at 1.00 m silty CLAY with orange partings of silt, rare fine subangular flint gravel, carbonaceous material and rootlets		
				80.80	1.00			
1.30	D4		PP= 2.25			Firm brown silty CLAY with rare pale grey mottling, fine claystones, rare orange-brown partings of fine sand and silt and carbonaceous material. Locally softened around silt pockets		
			PP= 2.25		(0.90)			
1.60	D5		PP= 2.50					
1.90	D6			79.90	1.90			
			PP= 2.50			Firm fissured brown mottled bluish grey silty CLAY with mica, pockets of abundant fine selenite and decayed rootlets to 2.20 m. Becoming stiff from 2.60 m		
2.20	D7		PP= 2.25			Decayed rootlets at1.90 m		
2.50	D8					Abundant selenite at 2.50 m Silt parting at 2.58 m		
2.80	D9		PP= 3.00			Abundant selenite from 2.70 m to 3.00 m		
			PP= 3.25		(2.30)			
3.10	D10		PP= 3.25			Silt parting from 3.15 m to 3.40 m		
3.40	D11							
			PP= 3.00			Cluster of dead rootlets from 3.75 m to 3.90 m		
3.70	D12		PP= 3.50					
4.00	D13			77.60	4.20			
4.30	D14		PP= 2.75			Stiff fissured brown silty CLAY with abundant orange sand partings and fine selenite Silt parting at 4.30 m Silt parting at 4.36 m		
			PP= 3.00		(0.80)			
4.60	D15		PP= 4.00			Silt parting at 4.74 m Claystone fragments at 4.80 m		
4.90	D16			76.80	5.00	Silt parting at 4.90 m		
						Complete at 5.00m		

Remarks
Groundwater not encountered during drilling
Borehole cased to 1.00 m
Groundwater monitoring standpipe installed to 5.00 m

Scale (approx)	Logged By
1:50	HD

Figure No.
J17146.BH103

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** The Waterhouse, Millfield Lane, London, N6	**Number** **BH1**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open Drive Percussive Sampler		81.50	Kearsley Property Ltd	J07385
	Location	**Dates** 15/01/2008	**Engineer** Price and Myers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Made Ground (orange-brown sand with shingle gravel)		
0.30	D1			81.20	0.30	Topsoil (dark brown sandy silty clay with occasional angular gravel and rootlets to 0.7 m)		
					(0.70)			
0.80	D2							
1.00-1.45	SPT	DRY	1,2/2,2,3,4	80.50	1.00	Soft to firm orange-brown mottled grey fissured CLAY with pockets of orange-brown fine sand		
			pp 1.0					
1.20	D3		pp 1.3					
			pp 1.3					
1.70	D4		pp 1.5					
			pp 1.7		(1.80)			
2.00-2.45	SPT	DRY	2,1/2,3,2,4					
			pp 1.7					
			pp 1.7					
2.50	D5		pp 1.5					
			pp 1.8	78.70	2.80	Firm becoming stiff pale brown fissured CLAY with partings of grey silt and occasional pockets of fine sand and selenite crystals		
			pp 1.9					
3.00-3.45	SPT	DRY	1,1/2,2,2,3					
3.00	D6		pp 1.8					
			pp 1.8					
3.50	D7		pp 2.0					
3.80	D8		pp 2.2					
			pp 2.5		(2.20)			
4.00-4.45	SPT	DRY	2,2/3,3,3,3					
			pp 2.8					
			pp 2.8					
4.40	D9		pp 2.6					
4.80	D10		pp 3.1					
			pp 3.3					
5.00-5.45	SPT	DRY	2,2/3,3,4,5	76.50	5.00	Complete at 5.00m		

Remarks
Ground water monitoring standpipe installed in borehole to 5.0 m.
Ground water not encountered
pp denotes result of pocket penetrometer test

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

Figure No.
J07385.BH1

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** The Waterhouse, Millfield Lane, London, N6	**Number** **BH2**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open Drive Percussive Sampler		80.00	Kearsley Property Ltd	J07385
	Location	**Dates** 15/01/2008	**Engineer** Price and Myers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Topsoil (dark brown sandy silty clay with gravel and rootlets)		
0.30	D1			79.60	0.40	Made Ground (orange-brown sandy silty clay with ash, charcoal and brick fragments and veins of brown staining)		
0.70	D2							
1.00-1.45	SPT	DRY	1,1/1,1,2,3		(1.20)			
				78.40	1.60			
					(0.20)	Soft brownish grey slightly sandy CLAY with occasional fine rounded gravel		
1.70	D3			78.20	1.80			
			pp 1.0			Firm orange-brown fissured CLAY with partings of grey silt		
2.00-2.45	SPT	DRY	1,2/3,4,3,4					
2.00	D4		pp 1.8					
			pp 2.0		(1.00)			
2.40	D5							
			pp 2.0					
2.70	D6			77.20	2.80	Firm becoming stiff orange-brown fissured CLAY with partings of grey silt and occasional pockets of fine sand		
			pp 2.3					
3.00-3.45	SPT	DRY	1,2/2,3,2,4					
3.30	D7		pp 2.1					
			pp 2.5					
			pp 2.7					
3.80	D8		Water strike(1) at 3.80m.					▽1
			pp 2.7		(2.20)			
4.00-4.45	SPT	0.20	1,2/2,3,2,3					
4.50	D9		pp 2.6					
			pp 2.8					
			pp 2.9					
5.00-5.45	SPT	1.00	1,2/2,3,3,3	75.00	5.00			
5.00	D10					Complete at 5.00m		

Remarks
Standpipe monitored on 04/02/08 recorded a ground water level of 1.2 m.
Standpipe monitored on 21/01/08 recorded a ground water level of 1.0 m.
pp denoted results of pocket penetrometer test.
Ground water monitoring standpipe installed in borehole to 5.0 m.

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

Figure No.
J07385.BH2

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** The Waterhouse, Millfield Lane, London, N6	**Number** **BH3**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open Drive Percussive Sampler		80.40	Kearsley Property Ltd	J07385
	Location	**Dates** 15/01/2008	**Engineer** Price and Myers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Topsoil (dark brown sandy silty clay with gravel, brick fragmnets and rootlets)		
0.20	D1			79.90	0.50			
					(0.50)	Soft slightly sandy orange-brown CLAY with partings of grey silt		
0.80	D2		pp 0.8					
			pp 0.9	79.40	1.00			
1.00-1.45	SPT	DRY	2,2/3,3,4,5			Firm orange-brown fissured CLAY with partings of grey silt and selenite crystals		
			pp 1.5					
1.30	D3		pp 1.5					
			pp 1.8		(1.20)			
1.80	D4		pp 1.9					
			pp 2.0					
2.00-2.45	SPT	DRY	1,3/2,3,3,5					
			pp 2.1	78.20	2.20			
			pp 2.3			Firm becoming stiff pale brown fissured CLAY with partings of grey silt, pockets of fine sand and abundant selenite crystals		
2.40	D5							
			pp 2.3					
2.70	D6		pp 2.4					
			pp 2.5					
3.00-3.45	SPT	DRY	1,2/2,3,3,4					
			pp 2.6					
3.20	D7		pp 2.6					
			pp 2.7		(2.80)			
3.80	D8		pp 2.8					
			pp 2.8					
4.00-4.45	SPT	DRY	2,3/4,3,5,5					
			pp 2.8					
			pp 2.9					
4.50	D9		pp 2.9					
			pp 3.1					
			pp 3.0					
5.00-5.45	SPT	DRY	3,3/4,4,4,6	75.40	5.00			
5.00	D10					Complete at 5.00m		

Remarks
Soil noted to be damp at 2.0 m
Ground water note enocutered
pp denotes results of pocket penetrometer test

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

Figure No.
J07385.BH3

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** The Waterhouse, Millfield Lane, London, N6	**Number** **BH4**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open Drive percussive Sampler		80.50	Kearsley Property Ltd	J07385
	Location	**Dates** 15/01/2008	**Engineer** Price and Myers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.80)	Made Ground (topsoil, orange-brown sandy silty clay with gravel, brick fragments and rootlets)		
0.50	D1			79.70	0.80			
					(0.40)	Soft orange-brown very sandy CLAY with rare rounded fine gravel		
1.00-1.45	SPT	DRY	1,2/2,2,2,4					
1.00	D2		pp 0.9	79.30	1.20	Firm orange-brown fissured CLAY with pockets of fine sand and occasional selenite crystals		
			pp 1.4		(0.80)			
1.70	D3		pp 1.4 pp 1.5					
2.00-2.45	SPT	DRY	1,2/2,4,3,5	78.50	2.00	Firm becoming stiff pale brown fissured CLAY with partings of grey silt, pockets of fine sand and selenite crystals		
2.50	D4		pp 1.8					
			pp 1.9 pp 1.9		(2.00)			
3.00-3.45	SPT	DRY	3,3/4,4,6,5					
3.30	D5		pp 2.2 pp 2.3					
			pp 2.5					
3.80	D6		pp 2.6 pp 2.9					
4.00-4.45	SPT	DRY	2,2/4,4,4,4	76.50	4.00	Complete at 4.00m		

Remarks
Ground water not encountered
pp denotes results of pocket penetrometer test

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

Figure No.
J07385.BH4

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** The Waterhouse, Millfield Lane, London, N6	**Borehole Number** **BH5**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 2.00m	82.20	Kearsley Property Ltd	J07385
	Location	**Dates** 21/01/2008	**Engineer** Price and Myers	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30)	Surfacing layer of gravel		
					81.90	0.30	Made Ground (dark brown silty sandy clay with ash, gravel and brick fragments)		
0.50	D1								
1.00-1.45 1.00	SPT(C) D2	1.00	DRY	3/,1,1,1		(1.50)			
1.80	D3				80.40	1.80	Firm brown fissured CLAY with grey staining along fissure planes		
2.00	U1								
2.50	D4								
3.00-3.45 3.00	SPT D5	2.00	DRY	4,2/2,3,2,2		(2.70)			
4.00	U2								
4.50	D6				77.70	4.50	Stiff brown mottled grey fissured CLAY with partings of silt and occasional pockets of sand and selenite crystals		
5.00-5.45 5.00	SPT D7	2.00	DRY	3,4/4,3,5,5		(2.00)			
6.50	U3				75.70	6.50	Stiff brownish grey fissured CLAY with abundant pockets of sand and selenite crystals		
7.00	D9								
8.00-8.45 8.00 8.00	SPT D10 D8	2.00	DRY	8,5/8,9,11,8		(3.00)			
9.00	D11								
9.50	U4				72.70	9.50	Very stiff grey fissured CLAY with abundant selenite crystals		

Remarks
Ground water monitoring standpipe installed to 6.0 m.
Ground water not encountered
Services inspection pit excavated from GL to 1.0 m for 1hr.

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

Figure No.
J07385.BH1

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** The Waterhouse, Millfield Lane, London, N6	**Borehole Number** **BH5**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 2.00m	82.20	Kearsley Property Ltd	J07385
	Location	**Dates** 21/01/2008	**Engineer** Price and Myers	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00	D12					(1.50)			
11.00-11.45 11.00	SPT D13	2.00	DRY	10,8/11,13,14,14	71.20	11.00	Very stiff grey fissured CLAY with abundant partings of sandy silt and selenite crystals		
12.00	D14					(2.00)			
12.50	U5								
13.00	D15				69.20	13.00	Very stiff grey fissured CLAY		
13.50-13.95 13.50	SPT D16	2.00	DRY	12,8/11,13,13,15		(2.00)			
14.50	U6								
15.00	D17				67.20	15.00	Complete at 15.00m		

Remarks
Ground water monitoring standpipe installed to 6.0 m.
Ground water not encountered
Services inspection pit excavated from GL to 1.0 m for 1hr.

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

Figure No.
J07385.BH1

RSK GROUP PLC STATS

BOREHOLE RECORD (Percussive)

Borehole Number: BH1

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 80.46mAOD

Date: 16 Nov 10

Job No: 241830

GROUND WATER | SAMPLES/TESTS | STRATA RECORD | Sheet 1 of 2

Strike	Well	Depth (m)	Depth/Type (m)	SPT 'N' or U Blows	Depth (m)	Level (mAOD)	Key	Description
			0.20 D 1 0.30-0.50 B 2		0.30	80.16	0.30	MADE GROUND: Dark-brown slightly sandy clay with fine roots and occasional fine brick, concrete and ash fragments.
					0.50	79.96	0.20	MADE GROUND: Brown slightly clayey sandy gravel of fine to coarse rounded to angular flint.
		1	0.80-1.10 B 3					Soft, becoming firm, fissured brown mottled grey-green silty CLAY, locally with powdery iron oxide and carbonate precipitate. (WEATHERED LONDON CLAY FORMATION).
			1.20-1.65 U 4	U30				
			1.65 D 5					…selenite crystals (generally coarse sand size) between 1.65m and 4m
		2	2.20-2.65 SPTLS6 S 2.20-3.10 B 7	N=9 [1,1](2,2,2,3)				
		3	3.10-3.55 U 8	U35			5.30	
			3.55 D 9					
		4	4.00-4.45 SPTLS10 S	N=16 [2,2](3,4,4,5)				…slightly sandy (fine) at 4.0m
		5	5.00-5.45 U 11	U45				
			5.45 D 12					…with occasional very thin laminae of fine sand
					5.80	74.66		
		6	6.00 D 13					Stiff, locally firm, becoming very stiff fissured dark-brownish grey silty CLAY. (LONDON CLAY FORMATION).
			6.50-6.95 SPTLS14 S	N=20 [2,3](3,5,6,6)				
		7						
			7.50 D 15					...slightly sandy (fine) at 7.5m
		8	8.00-8.45 U 16	U55				
			8.45 D 17					
		9	9.00 D 18					
			9.50-9.95 SPTLS19 S	N=21 [2,3](3,5,6,7)				***Continued next sheet***

Remarks and Water Observations
Cased to 1.5m with 150mm casing. No groundwater encountered except minor perched water seepage on 'claystone' band at 11.5m bgl.

Scale: 1:50

Logged by: CG

Figure:

RSK GROUP PLC STATS

BOREHOLE RECORD (Percussive)

Borehole Number: BH1

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 80.46mAOD

Date: 16 Nov 10

Job No: 241830

GROUND WATER | SAMPLES/TESTS | STRATA RECORD

Strike	Well	Depth (m)	Depth/Type (m)	SPT 'N' or U Blows	Depth (m)	Level (mAOD)	Key	Description
			10.50 D 20					
		11	11.00-11.45 U 21	U80				
			11.50 D 22					...'claystone' band at 11.3m
		12						
			12.50-12.95 D 23	S N=16 [2,3](3,4,4,5)		14.20		
		13						
			13.50 D 24					...slightly sandy (fine) at 13.5m
		14	14.00-14.45 U 25	U60				
		15	15.00 D 26					
			15.50-15.95 D 27	S N=27 [3,5](6,6,7,8)				
		16						
			16.50 D 28					
		17	17.00-17.45 U 29					
		18	18.00 D 30					...slightly sandy (fine) below 18m
			18.50-18.95 D 31	S N=41 [5,7](9,10,10,12)				
		19						
			19.20 D 32					
			19.50-19.95 U 33					

Remarks and Water Observations

Cased to 1.5m with 150mm casing. No groundwater encountered except minor perched water seepage on 'claystone' band at 11.5m bgl.

End of Borehole at 20.00 m

Scale: 1:50

Logged by: CG

Figure:

RSK GROUP PLC STATS

BOREHOLE RECORD (Percussive)

Borehole Number: BH2

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 82.22mAOD

Date: 23 Nov 10

Job No: 241830

GROUND WATER | SAMPLES/TESTS | STRATA RECORD | Sheet 1 of 1

Strike	Well	Depth (m)	Depth/Type (m)	SPT 'N' or U Blows	Depth (m)	Level (mAOD)	Key	Description
			0.20 D 1		0.40	81.82		MADE GROUND: Dark-brown slightly sandy clay with fine roots and rare fine brick and flint fragments.
			0.70-0.90 B 2					Soft, becoming firm, fissured brown mottled grey-green silty CLAY, locally with powdery iron oxide and carbonate precipitate. (WEATHERED LONDON CLAY FORMATION).
		1	1.00-2.00 B 4					…selenite crystals (generally coarse sand size) between 1.2m and 2.5m
			1.20-1.65 SPTLS3	S N=8 [1,1](1,2,2,3)				
		2	2.00-2.45 U 5	U35				
			2.45 D 6					
		3	3.00-4.00 B 7	S				…locally slightly sandy (fine) with occasional very thin laminae of fine sand between 3.0m and 4.0m
			3.00-3.45 SPTLS8	N=13 [1,2](3,3,3,4)				
		4	4.00-4.45 U 9	U40				
			4.45 D 10					
		5	5.00-5.45 SPTLS11	S N=17 [2,2](4,4,4,5)				
					5.50	76.72		Stiff, locally firm, fissured dark-brownish grey silty CLAY. (LONDON CLAY FORMATION).
		6	6.00 D 12					…slightly sandy (fine) between 6.0m and 7.5m
			6.50-6.95 U 13	U55				
		7	6.95 D 14					
			7.50 D 15					
		8	8.00-8.45 SPTLS16	S N=21 [12,5](5,5,5,6)				…'claystone' band at 8m
		9	9.00 D 17					
			9.50-9.95 SPTLS18	S N=19 [5,3](4,4,5,6)				…with occasional very thin laminae of fine sand

0.40 5.10 4.50

End of Borehole at 10.00 m

Remarks and Water Observations
Cased to 1.5m with 150mm casing. No groundwater encountered.

Scale: 1:50

Logged by: CG

Figure:

BOREHOLE RECORD (Windowless Sampler)

Borehole Number: WS1

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 80.53mAOD

Dates: 18 Nov 10

Job No.: 241830

GROUND WATER | SAMPLES/TESTS | STRATA RECORD

Sheet 1 of 1

Strike	Well	Depth (m)	Type/Depth (m)	In-situ Tests	Depth (m)	Level (mAOD)	Key	Description
					0.20	80.33		MADE GROUND: Flint shingle and geotextile layer over soft dark-brown slightly sandy clay with roots and occasional fragments of flint, brick and ash/clinker. (0.20)
		1	D1 1.00	S N=8 (1,1)(1,2,2,3)				Soft, becoming firm, fissured brown mottled grey-green silty CLAY, locally with powdery iron oxide and carbonate precipitate. (WEATHERED LONDON CLAY FORMATION).
								…with abundant selenite crystals (generally coarse sand size) and fine 'claystone' fragments
		2		S N=10 (1,2)(2,2,3,3)				…locally slightly sandy between 2.0m and 3.7m
		3		S N=14 (2,2)(2,3,4,5)				
		4			4.00	76.53		*End of Borehole at 4.00 m* (3.80)

Remarks and Water Observations

No groundwater encountered.

Key for Insitu tests

HV-Hand Vane (kN/m2)
PP-Pocket Penotometer (kN/m2)
MP-Mackintosh Probe (N150)

Scale: 1:25

Logged by: CG

Figure:

RSK GROUP PLC STATS

BOREHOLE RECORD (Windowless Sampler)

Borehole Number: WS2

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 79.85mAOD

Dates: 18 Nov 10

Job No.: 241830

GROUND WATER | SAMPLES/TESTS | STRATA RECORD | Sheet 1 of 1

Strike	Well	Depth (m)	Type/Depth (m)	In-situ Tests	Depth (m)	Level (mAOD)		Key	Description
					0.45	79.40	0.45		MADE GROUND: Grass over soft dark-brown slightly sandy slightly gravelly clay occasional concrete cobbles and roots. Gravel of fine to coarse concrete and brick with occasional fragments of flint and charcoal.
		1							MADE GROUND: Soft brown mottled silty clay with roots and fine fragments of brick and ash/charcoal. (REWORKED WEATHERED LONDON CLAY).
					1.20	78.65	0.75		Orangey-brown and grey silty clay with occasional fine to medium flint gravel and fragments of organic material. Bricks encountered at 1.7m. (POSSIBLE REWORKED GROUND).
		2			2.00	77.85	0.80		***End of Borehole at 5.00 m***
		3							
		4							

Remarks and Water Observations

Groundwater strike at 1.7m in association with bricks.

Key for Insitu tests

HV-Hand Vane (kN/m2)
PP-Pocket Penotometer (kN/m2)
MP-Mackintosh Probe (N150)

Scale: 1:25

Logged by: CG

Figure:

RSK GROUP PLC STATS

BOREHOLE RECORD (Windowless Sampler)

Borehole Number: WS3

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 80.21mAOD

Dates: 17 Nov 10

Job No.: 241830

GROUND WATER | **SAMPLES/TESTS** | **STRATA RECORD** | Sheet 1 of 1

Strike	Well	Depth (m)	Type/Depth (m)	In-situ Tests	Depth (m)	Level (mAOD)		Key	Description
					0.50	79.71	0.50		MADE GROUND: Grass over soft dark-brown very sandy gravelly clay with roots. Gravel of fine to coarse flint, concrete and brick with occasional fragments of coal, slate and pottery.
					0.70	79.51	0.20		MADE GROUND: Brown sandy gravelly clay with roots. Gravel of fine to coarse rounded to subangular flint.
		1							MADE GROUND: Soft brown mottled sandy silty clay with roots and fine fragments of brick. (REWORKED WEATHERED LONDON CLAY).
					1.20	79.01	0.50		Firm fissured brown mottled grey-green silty CLAY with roots, locally with powdery iron oxide and carbonate precipitate. (WEATHERED LONDON CLAY FORMATION).
		2							…locally slightly sandy with abundant selenite crystals (generally coarse sand size)
		3							… with occasional partings of coarse silt/fine sand
		4							

Remarks and Water Observations

Minor perched water seepage at 1.1m bgl.

End of Borehole at 5.00 m

Key for Insitu tests

HV-Hand Vane (kN/m2)
PP-Pocket Penotometer (kN/m2)
MP-Mackintosh Probe (N150)

Scale: 1:25

Logged by: CG

Figure:

RSK GROUP PLC STATS

BOREHOLE RECORD (Windowless Sampler)

Borehole Number: WS4

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 81.90mAOD

Dates: 17 Nov 10

Job No.: 241830

Sheet 1 of 1

GROUND WATER		SAMPLES/TESTS			STRATA RECORD			
Strike	Well	Depth (m)	Type/Depth (m)	In-situ Tests	Depth (m)	Level (mAOD)		Key	Description
					0.40	81.50	0.40		MADE GROUND: Flint shingle driveway over soft brown and grey slightly sandy gravelly clay with brick cobbles. Gravel of fine to coarse flint, brick, slate, concrete and occasional fragments of metal, cable, wood and ash/clinker.
		1			1.10	80.80	0.70		MADE GROUND: Black/dark-brown sandy slightly gravelly organic clay with roots and plant fragments. Gravel of fine to coarse flint and brick with fragments of glass, pottery, wood and coal.
				S	1.40	80.50	0.30		MADE GROUND: Soft brown mottled silty clay with fragments of brick and wood. (REWORKED WEATHERED LONDON CLAY).
			D1 1.50	N=7 (1,1)(1,2,2,2)					Firm fissured brown mottled grey-green silty CLAY with roots, locally with powdery iron oxide and carbonate precipitate. (WEATHERED LONDON CLAY FORMATION).
		2		S N=13 (1,2)(2,3,3,5)					…locally with selenite crystals (generally coarse sand size)
		3		S N=16 (2,3)(3,3,4,6)					…slightly sandy (fine) between 3.5m and 3.8m
		4		S N=18 (3,3)(4,4,5,5)					… with occasional partings of coarse silt/fine sand

End of Borehole at 5.00 m

Remarks and Water Observations

No groundwater encountered.

Key for Insitu tests

HV-Hand Vane (kN/m2)
PP-Pocket Penotometer (kN/m2)
MP-Mackintosh Probe (N150)

Scale: 1:25

Logged by: CG

Figure:

BOREHOLE RECORD (Windowless Sampler)

Borehole Number: WS5

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 79.67mAOD

Dates: 17 Nov 10

Job No.: 241830

GROUND WATER | SAMPLES/TESTS | STRATA RECORD | Sheet 1 of 1

Strike	Well	Depth (m)	Type/Depth (m)	In-situ Tests	Depth (m)	Level (mAOD)		Key	Description
					0.75	78.92	0.75		MADE GROUND: Dark-brown/black very silty slightly gravelly sand and desiccated clay with roots and occasional fragments of flint, brick and tile.
		1			1.25	78.42	0.50		MADE GROUND: Very stiff dark-grey sandy slightly gravelly clay (desiccated) with fragments of flint, concrete, glass and clay tile.
					1.70	77.97	0.45		MADE GROUND: Dark-brown slightly sandy slightly gravelly clay with roots and fragments of flint, brick and ash.
		2							Firm fissured brown mottled grey-green silty CLAY with roots, locally with powdery iron oxide and carbonate precipitate. (WEATHERED LONDON CLAY FORMATION).
									…locally with selenite crystals (generally coarse sand size)
		3							…slightly sandy (fine) from 3m
									…parting of coarse silt/fine sand
		4							…slightly sandy (fine) between 4.0m and 4.5m

Remarks and Water Observations

End of Borehole at 5.00 m

Key for Insitu tests
HV-Hand Vane (kN/m2)
PP-Pocket Penotometer (kN/m2)
MP-Mackintosh Probe (N150)

Scale: 1:25

Logged by: CG

Figure:

RSK GROUP PLC STATS

BOREHOLE RECORD (Windowless Sampler)

Borehole Number: WS6

Site: The Waterhouse

Location: The Waterhouse

Client: Mr and Mrs Munford

Ground Level: 82.28mAOD

Dates: 18 Nov 10

Job No.: 241830

Sheet 1 of 1

GROUND WATER			SAMPLES/TESTS				STRATA RECORD	
Strike	Well	Depth (m)	Type/Depth (m)	In-situ Tests	Depth (m)	Level (mAOD)	Key	Description
					0.55	81.73		MADE GROUND: Grass over dark-brown/black slightly sandy slightly gravelly clay with roots and fragments of brick, pottery, slate and coal. 100mm diameter plastic drainage pipe at 0.3m bgl.
		1						Firm fissured brown mottled grey-green silty CLAY with roots, locally with powdery iron oxide and carbonate precipitate. (WEATHERED LONDON CLAY FORMATION).
								…locally with selenite crystals (generally coarse sand size)
		2						…locally slightly sandy (fine) between 2m and 3m
		3						…parting of coarse silt/fine sand
		4						…parting of coarse silt/fine sand

Remarks and Water Observations

End of Borehole at 5.00 m

Key for Insitu tests
HV-Hand Vane (kN/m2)
PP-Pocket Penotometer (kN/m2)
MP-Mackintosh Probe (N150)

Scale: 1:25

Logged by: CG

Figure:

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Standard Penetration Test Results

Site : The Waterhouse, Millfield Lane, London, N6

Client : Kearsley Property Ltd

Engineer : Price and Myers

Job Number J07385

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	1.00	1.15	1.45	SPT	1	2	2	2	3	4	N=11	
BH1	2.00	2.15	2.45	SPT	2	1	2	3	2	4	N=11	
BH1	3.00	3.15	3.45	SPT	1	1	2	2	2	3	N=9	
BH1	4.00	4.15	4.45	SPT	2	2	3	3	3	3	N=12	
BH1	5.00	5.15	5.45	SPT	2	2	3	3	4	5	N=15	
BH2	1.00	1.15	1.45	SPT	1	1	1	1	2	3	N=7	
BH2	2.00	2.15	2.45	SPT	1	2	3	4	3	4	N=14	
BH2	3.00	3.15	3.45	SPT	1	2	2	3	2	4	N=11	
BH2	4.00	4.15	4.45	SPT	1	2	2	3	2	3	N=10	
BH2	5.00	5.15	5.45	SPT	1	2	2	3	3	3	N=11	
BH3	1.00	1.15	1.45	SPT	2	2	3	3	4	5	N=15	
BH3	2.00	2.15	2.45	SPT	1	3	2	3	3	5	N=13	
BH3	3.00	3.15	3.45	SPT	1	2	2	3	3	4	N=12	
BH3	4.00	4.15	4.45	SPT	2	3	4	3	5	5	N=17	
BH3	5.00	5.15	5.45	SPT	3	3	4	4	4	6	N=18	
BH4	1.00	1.15	1.45	SPT	1	2	2	2	2	4	N=10	
BH4	2.00	2.15	2.45	SPT	1	2	2	4	3	5	N=14	
BH4	3.00	3.15	3.45	SPT	3	3	4	4	6	5	N=19	
BH4	4.00	4.15	4.45	SPT	2	2	4	4	4	4	N=16	
BH5	1.00	1.15	1.45	CPT	3			1	1	1	N=3	
BH5	3.00	3.15	3.45	SPT	4	2	2	3	2	2	N=9	
BH5	5.00	5.15	5.45	SPT	3	4	4	3	5	5	N=17	
BH5	8.00	8.15	8.45	SPT	8	5	8	9	11	8	N=36	
BH5	11.00	11.15	11.45	SPT	10	8	11	13	14	14	N=52	
BH5	13.50	13.65	13.95	SPT	12	8	11	13	13	15	N=52	

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Standard Penetration Test Results

Site : The Waterhouse, Millfield Lane, London, N6

Client : Kearsley Property Ltd

Engineer : Price and Myers

Job Number J07385

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	1.00	1.15	1.45	SPT	1	2	2	2	3	4	N=11	
BH1	2.00	2.15	2.45	SPT	2	1	2	3	2	4	N=11	
BH1	3.00	3.15	3.45	SPT	1	1	2	2	2	3	N=9	
BH1	4.00	4.15	4.45	SPT	2	2	3	3	3	3	N=12	
BH1	5.00	5.15	5.45	SPT	2	2	3	3	4	5	N=15	
BH2	1.00	1.15	1.45	SPT	1	1	1	1	2	3	N=7	
BH2	2.00	2.15	2.45	SPT	1	2	3	4	3	4	N=14	
BH2	3.00	3.15	3.45	SPT	1	2	2	3	2	4	N=11	
BH2	4.00	4.15	4.45	SPT	1	2	2	3	2	3	N=10	
BH2	5.00	5.15	5.45	SPT	1	2	2	3	3	3	N=11	
BH3	1.00	1.15	1.45	SPT	2	2	3	3	4	5	N=15	
BH3	2.00	2.15	2.45	SPT	1	3	2	3	3	5	N=13	
BH3	3.00	3.15	3.45	SPT	1	2	2	3	3	4	N=12	
BH3	4.00	4.15	4.45	SPT	2	3	4	3	5	5	N=17	
BH3	5.00	5.15	5.45	SPT	3	3	4	4	4	6	N=18	
BH4	1.00	1.15	1.45	SPT	1	2	2	2	2	4	N=10	
BH4	2.00	2.15	2.45	SPT	1	2	2	4	3	5	N=14	
BH4	3.00	3.15	3.45	SPT	3	3	4	4	6	5	N=19	
BH4	4.00	4.15	4.45	SPT	2	2	4	4	4	4	N=16	
BH5	1.00	1.15	1.45	CPT	3			1	1	1	N=3	
BH5	3.00	3.15	3.45	SPT	4	2	2	3	2	2	N=9	
BH5	5.00	5.15	5.45	SPT	3	4	4	3	5	5	N=17	
BH5	8.00	8.15	8.45	SPT	8	5	8	9	11	8	N=36	
BH5	11.00	11.15	11.45	SPT	10	8	11	13	14	14	N=52	
BH5	13.50	13.65	13.95	SPT	12	8	11	13	13	15	N=52	

UKAS TESTING
No 2652

Clive Gerring
RSK STATS GEOCONSULT LIMITED
18 Frogmore Road
Hemel Hempstead
Herts
HP3 9RT

STRUCTURAL SOILS LTD

SITE INVESTIGATION

SOIL, ROCK & MATERIAL TESTING

GEOTECHNICAL CONSULTANCY

CONTAMINATED LAND ASSESSMENT

11th December 2010

TESTING REPORT

YOUR REF: 241830

SITE: The Waterhouse, Fitzroy Park

CERTIFICATE NUMBER: 581445

DATE SAMPLES RECEIVED: 1st December 2010
DATE TESTING COMMENCED: 1st December 2010

DATE OF SAMPLE DISPOSAL: 11th January 2011

INSTRUCTIONS: Please carry out Moisture Content, Atterberg Limits, Particle Size Distribution and Quick Undrained Triaxial tests on samples provided.

I have pleasure in enclosing the test report for the above project that you submitted to us for testing.

Yours sincerely

Paul Kent
Laboratory Manager

Enc.

18 FROGMORE ROAD
HEMEL HEMPSTEAD
HERTS
HP3 9RT
TEL: 01442 416660
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HEAD OFFICE:
Bristol

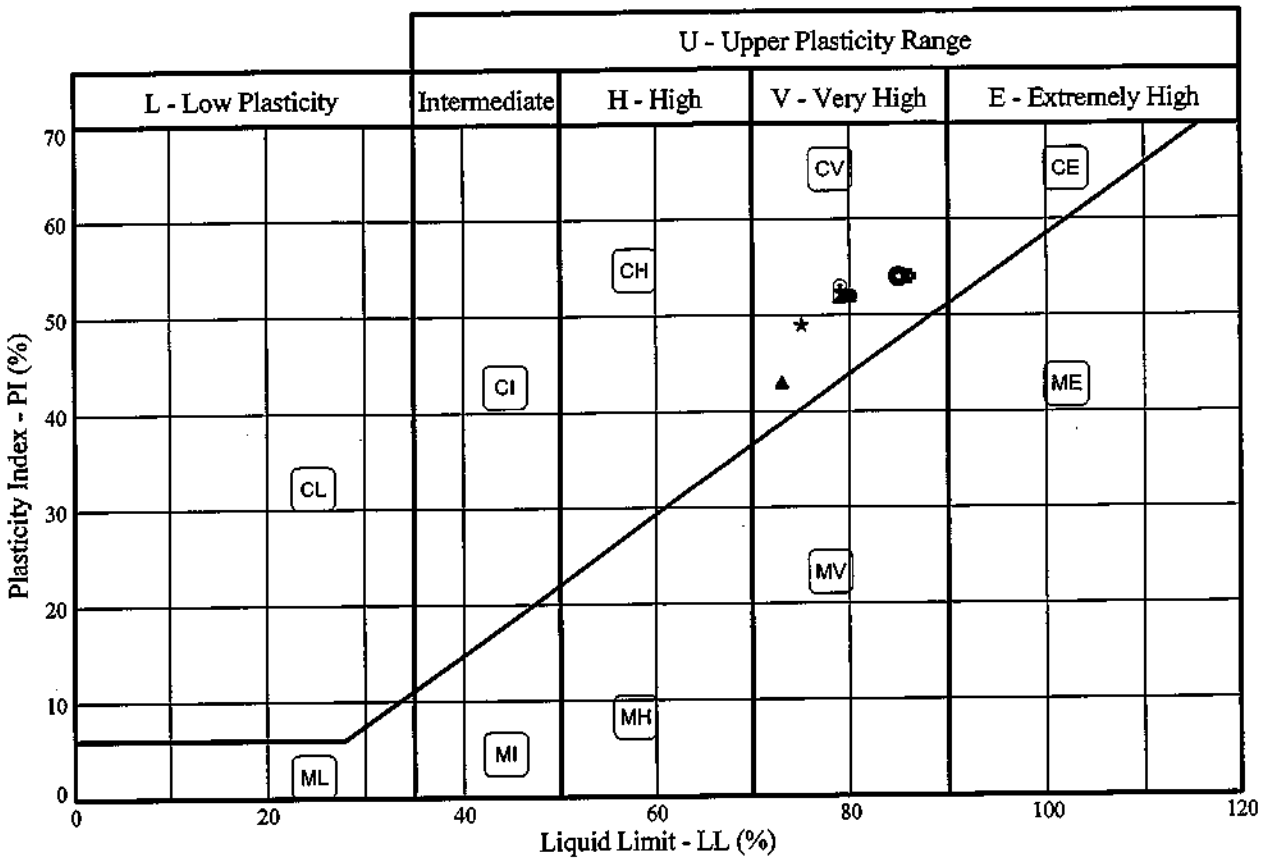
BRANCH OFFICE:
Castleford
West Yorkshire

SUMMARY OF MOISTURE CONTENT TESTING

Exploratory Position ID	Depth (m)	Sample Ref	Sample Type	Moisture Content (%)
BH1	0.80		B	35
BH1	1.20		U	35
BH1	5.00		U	30
BH1	8.00		U	30
BH1	11.00		U	29
BH1	14.00		U	31
BH1	17.00		U	31
BH1	19.50		U	26
BH2	0.70		B	37
BH2	2.00		U	36
BH2	4.00		U	30
BH2	6.50		U	28
WS1	1.00		D	33
WS4	1.50		D	34

PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1981
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC	LL	PL	PI	<425um
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%
●	BH1	B	0.80	3.2/4.4/5.3/5.4	4.2.3	35	80	28	52	100
⊠	BH1	U	1.20	3.2/4.4/5.3/5.4	4.2.3	35	79	27	52	100
▲	BH1	U	5.00	3.2/4.4/5.3/5.4	4.2.3	30	73	30	43	100
★	BH1	U	8.00	3.2/4.4/5.3/5.4	4.2.3	30	75	26	49	100
⊙	BH1	U	11.00	3.2/4.4/5.3/5.4	4.2.3	29	79	26	53	100
✤	BH1	U	14.00	3.2/4.4/5.3/5.4	4.2.3	31	86	32	54	100
◉	BH1	U	17.00	3.2/4.4/5.3/5.4	4.2.3	31	85	31	54	100
△	BH1	U	19.50	3.2/4.4/5.3/5.4	4.2.3	26	80	28	52	100

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non standard test, NP = Non plastic.

Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

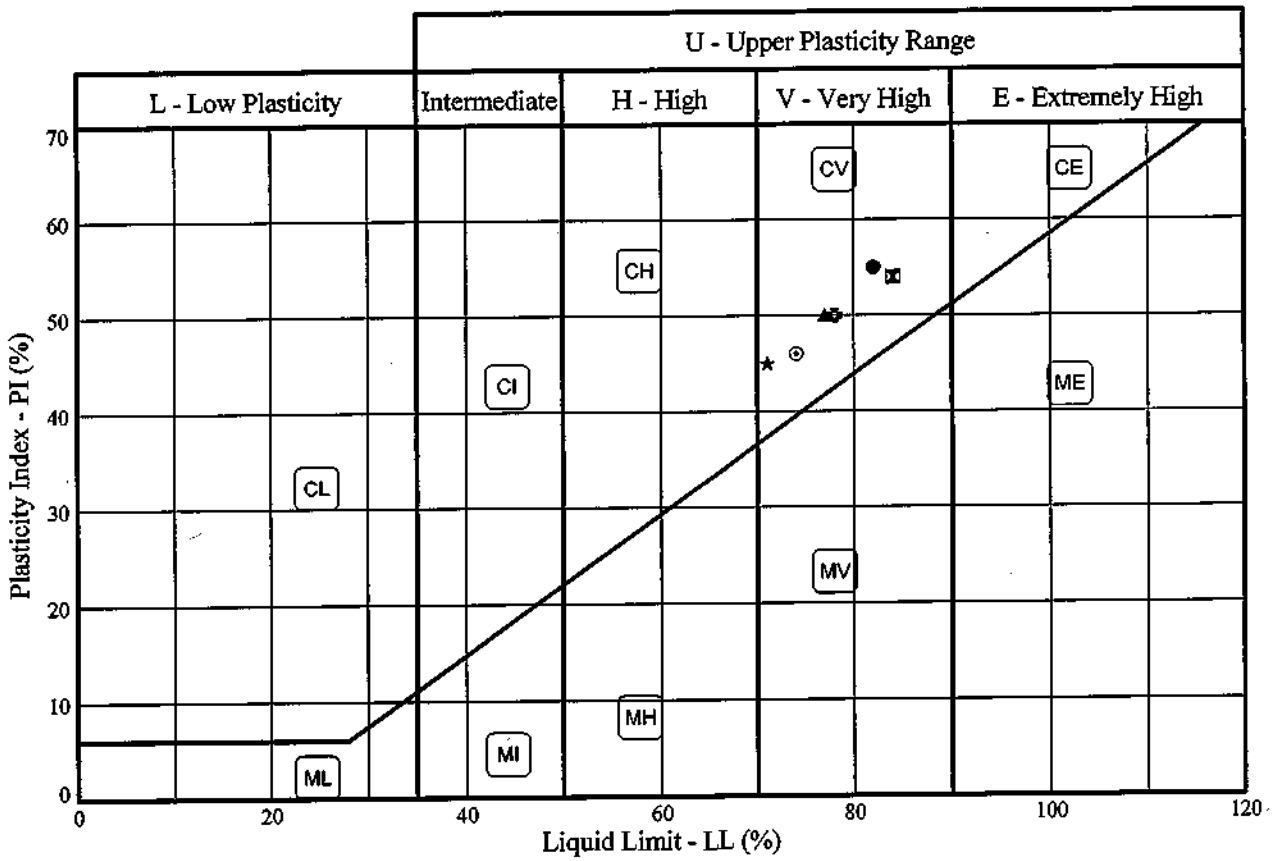
Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1981
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425um %
Exploratory Position ID	Sample		Depth (m)							
●	BH2	B	0.70	3.2/4.4/5.3/5.4	4.2.3	37	82	27	55	100
⊠	BH2	U	2.00	3.2/4.4/5.3/5.4	4.2.3	36	84	30	54	100
▲	BH2	U	4.00	3.2/4.4/5.3/5.4	4.2.3	30	77	27	50	100
★	BH2	U	6.50	3.2/4.4/5.3/5.4	4.2.3	28	71	26	45	100
⊙	WS1	D	1.00	3.2/4.4/5.3/5.4	4.2.3	33	74	28	46	99
✿	WS4	D	1.50	3.2/4.4/5.3/5.4	4.2.3	34	78	28	50	100

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non standard test, NP = Non plastic.

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Hemel Hempstead
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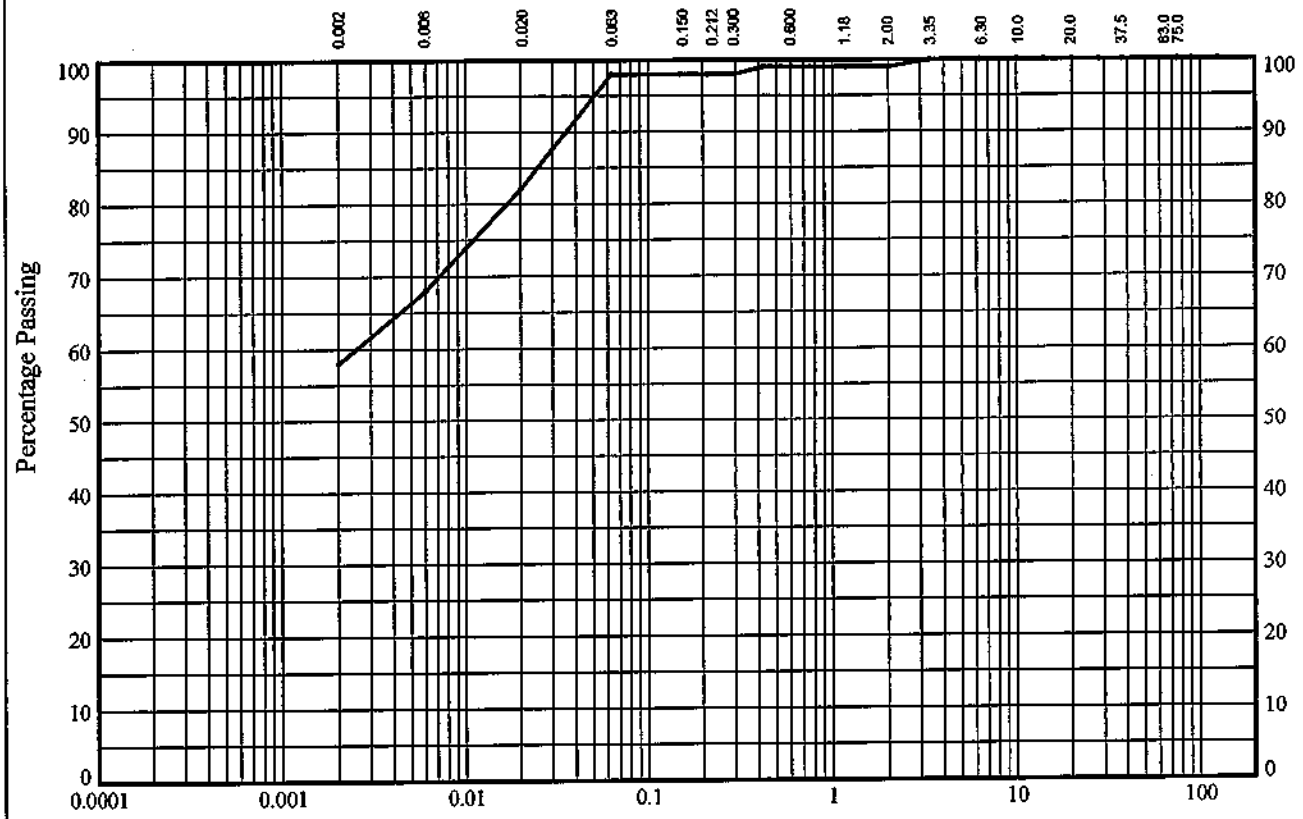
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.4 of BS1377:Part 2:1990

Borehole : **BH1** Sample Ref: Sample Type: **B** Depth (m): **2.20**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5	100
3.35	100
2	99
1.18	99
0.6	99
0.425	99
0.3	98
0.212	98
0.15	98
0.063	98

Particle Diameter	Percentage Passing
0.02	**82**
0.006	**68**
0.002	**58**

Soil Fraction	Sieve Percentage
GRAVEL	**1**
SAND	**1**
SILT	**40**
CLAY	**58**

Soil Description:

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18 Frogmore Road
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Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

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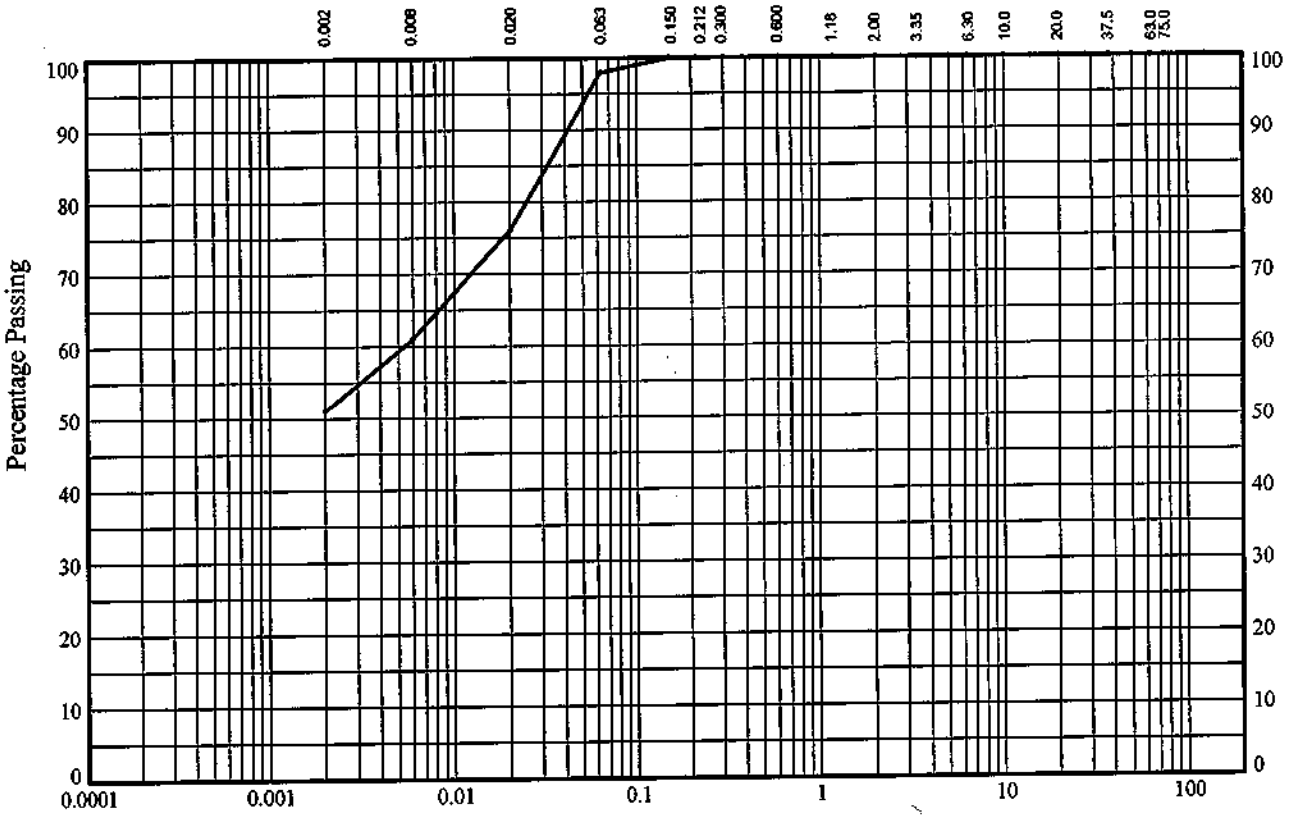
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.4 of BS1377:Part 2:1990

Borehole : **BH2** Sample Ref: Sample Type: **B** Depth (m): **1.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5	100
3.35	100
2	100
1.18	100
0.6	100
0.425	100
0.3	100
0.212	100
0.15	100
0.063	98

Particle Diameter	Percentage Passing
0.02	76
0.006	61
0.002	51

Soil Fraction	Sieve Percentage
GRAVEL	0
SAND	2
SILT	47
CLAY	51

Soil Description:

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Contract Ref: **581445**

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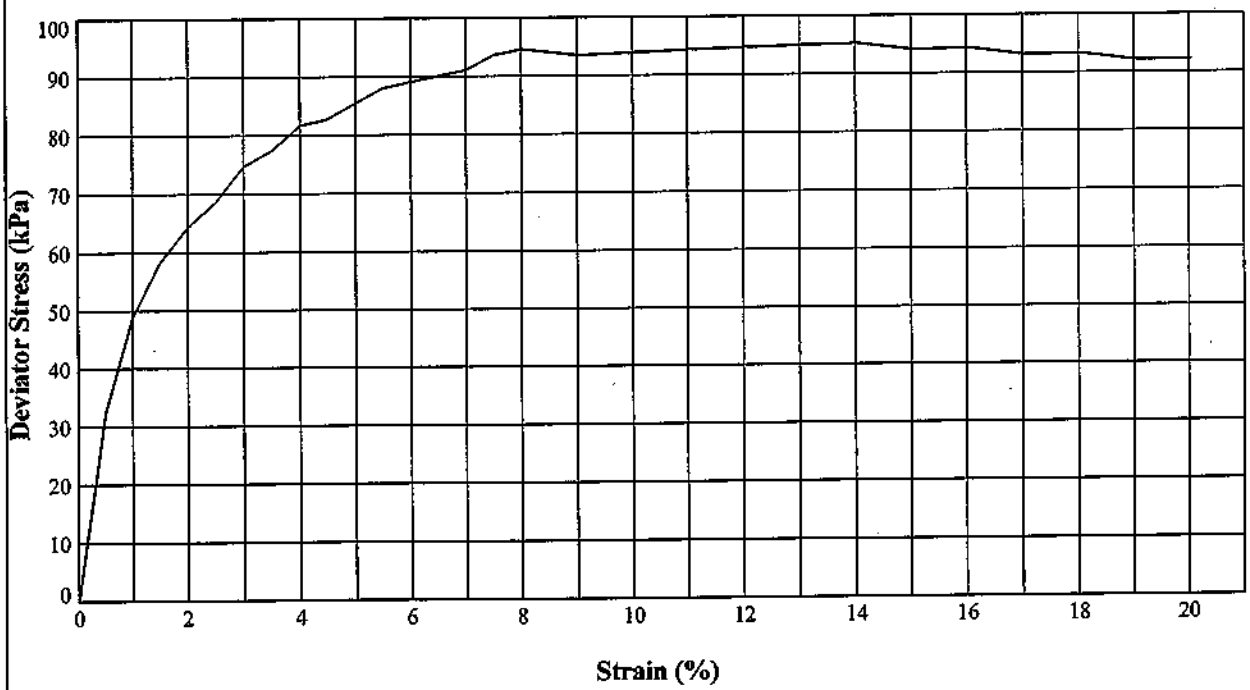
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH1** Sample Ref: Sample Type: **U** Depth (m): **1.20**

Description : **Brown CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	101.39		
	Height	(mm)	209.47		
	Moisture Content	(%)	33		
	Bulk Density	(Mg/m^3)	1.90		
	Dry Density	(Mg/m^3)	1.43		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.01		
	Cell Pressure	(kPa)	24		
	Membrane Correction	(kPa)	0.69		
	Corrected Deviator Stress	(kPa)	95		
	Undrained Shear Strength	(kPa)	48		
	Strain at Failure	(%)	14.0		
	Mode of Failure		Compound		



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18 Frogmore Road
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HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

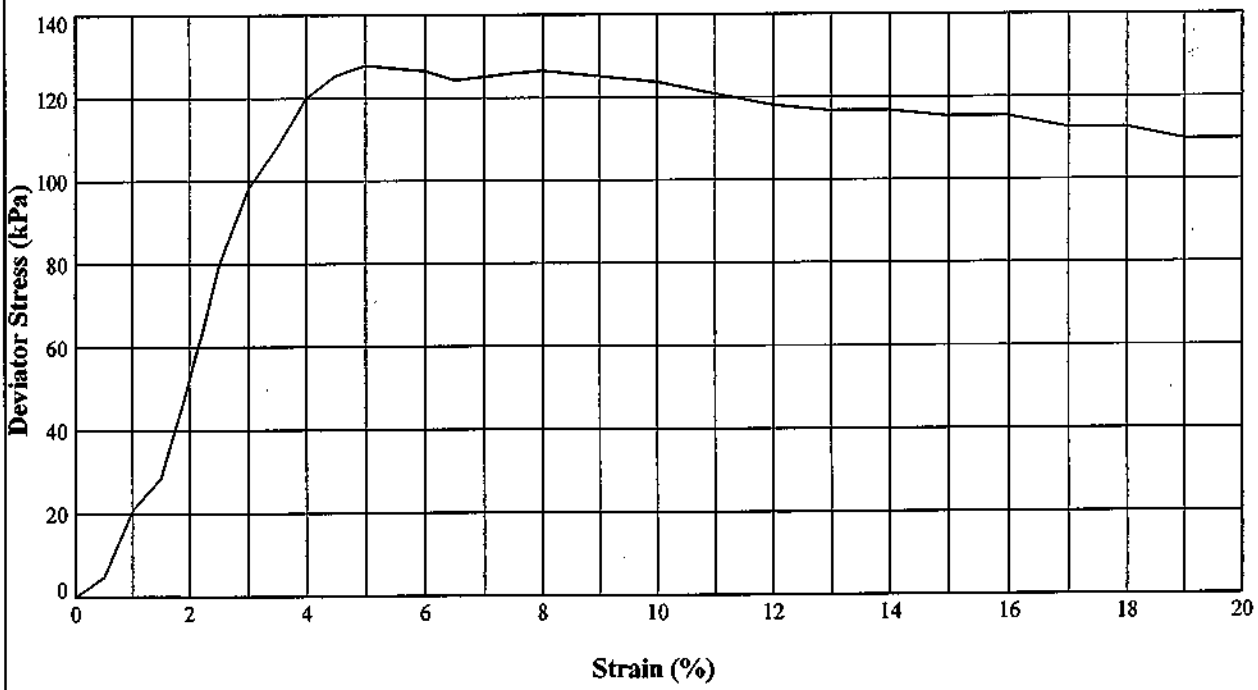
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH1** Sample Ref: Sample Type: **U** Depth (m): **5.00**

Description : **Brown CLAY with occasional pockets of grey silty fine sand**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	102.49		
	Height	(mm)	210.17		
	Moisture Content	(%)	31		
	Bulk Density	(Mg/m^3)	1.89		
	Dry Density	(Mg/m^3)	1.44		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	100		
	Membrane Correction	(kPa)	0.32		
	Corrected Deviator Stress	(kPa)	128		
	Undrained Shear Strength	(kPa)	64		
	Strain at Failure	(%)	5.0		
	Mode of Failure		Brittle		



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STRUCTURAL SOILS
18 Frogmore Road
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HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

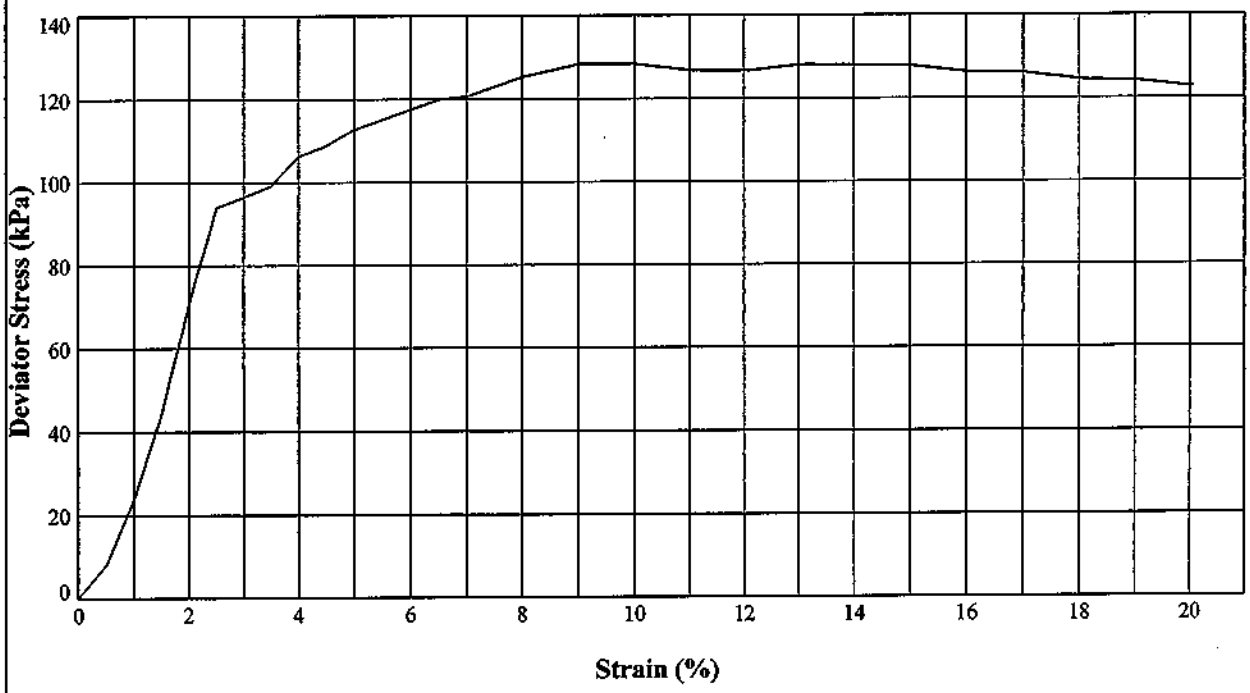
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH1** Sample Ref: Sample Type: **U** Depth (m): **8.00**

Description : **Brownish black CLAY with some black staining**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	102.41		
	Height	(mm)	209.42		
	Moisture Content	(%)	30		
	Bulk Density	(Mg/m^3)	1.95		
	Dry Density	(Mg/m^3)	1.50		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	160		
	Membrane Correction	(kPa)	0.50		
	Corrected Deviator Stress	(kPa)	128		
	Undrained Shear Strength	(kPa)	64		
	Strain at Failure	(%)	9.0		
	Mode of Failure		Brittle		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

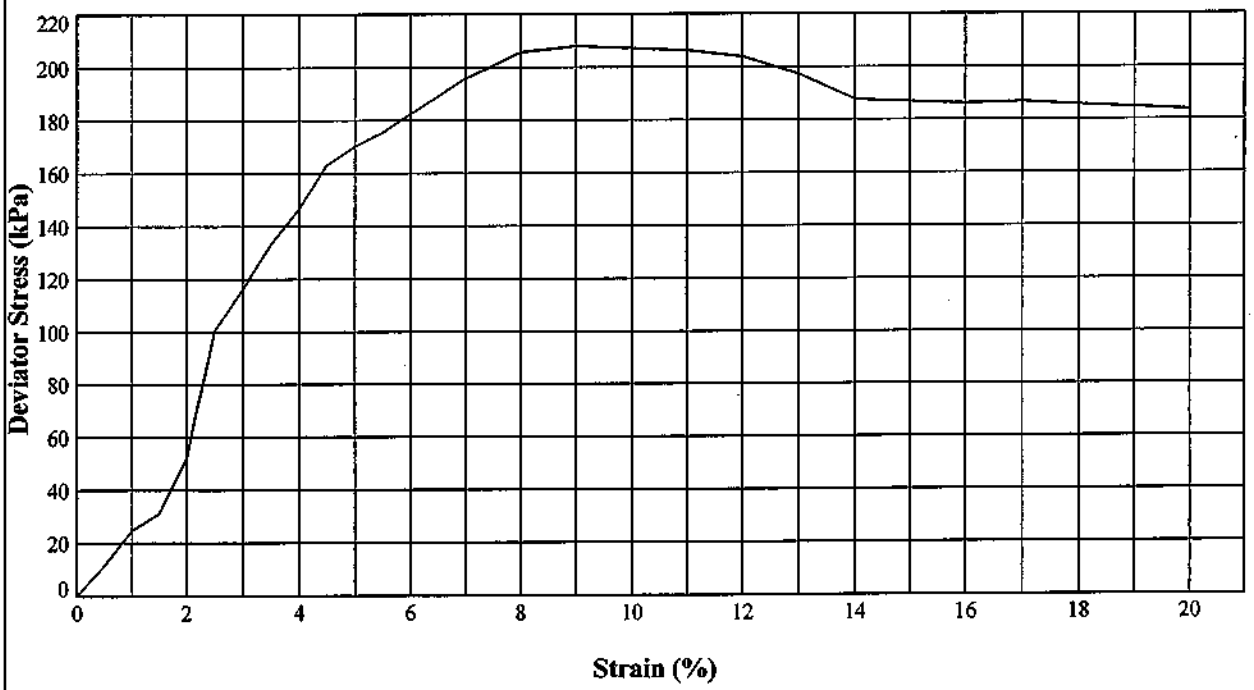
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH1** Sample Ref: Sample Type: **U** Depth (m): **11.00**

Description : **Brownish black CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	100.83		
	Height	(mm)	209.86		
	Moisture Content	(%)	30		
	Bulk Density	(Mg/m^3)	1.93		
	Dry Density	(Mg/m^3)	1.48		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	220		
	Membrane Correction	(kPa)	0.50		
	Corrected Deviator Stress	(kPa)	208		
	Undrained Shear Strength	(kPa)	104		
	Strain at Failure	(%)	9.0		
	Mode of Failure		Brittle		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

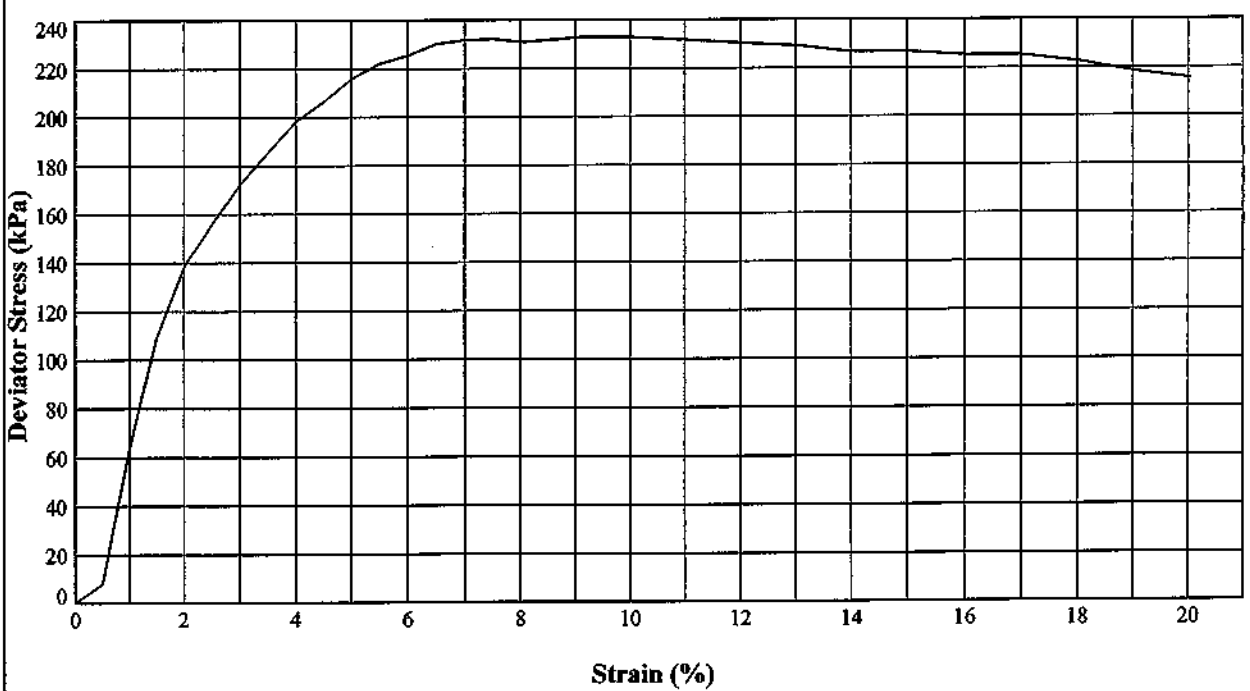
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH1** Sample Ref: Sample Type: **U** Depth (m): **14.00**

Description : **Brownish black CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	102.63		
	Height	(mm)	209.56		
	Moisture Content	(%)	32		
	Bulk Density	(Mg/m^3)	1.91		
	Dry Density	(Mg/m^3)	1.45		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	280		
	Membrane Correction	(kPa)	0.54		
	Corrected Deviator Stress	(kPa)	233		
	Undrained Shear Strength	(kPa)	117		
	Strain at Failure	(%)	10.0		
	Mode of Failure		Brittle		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

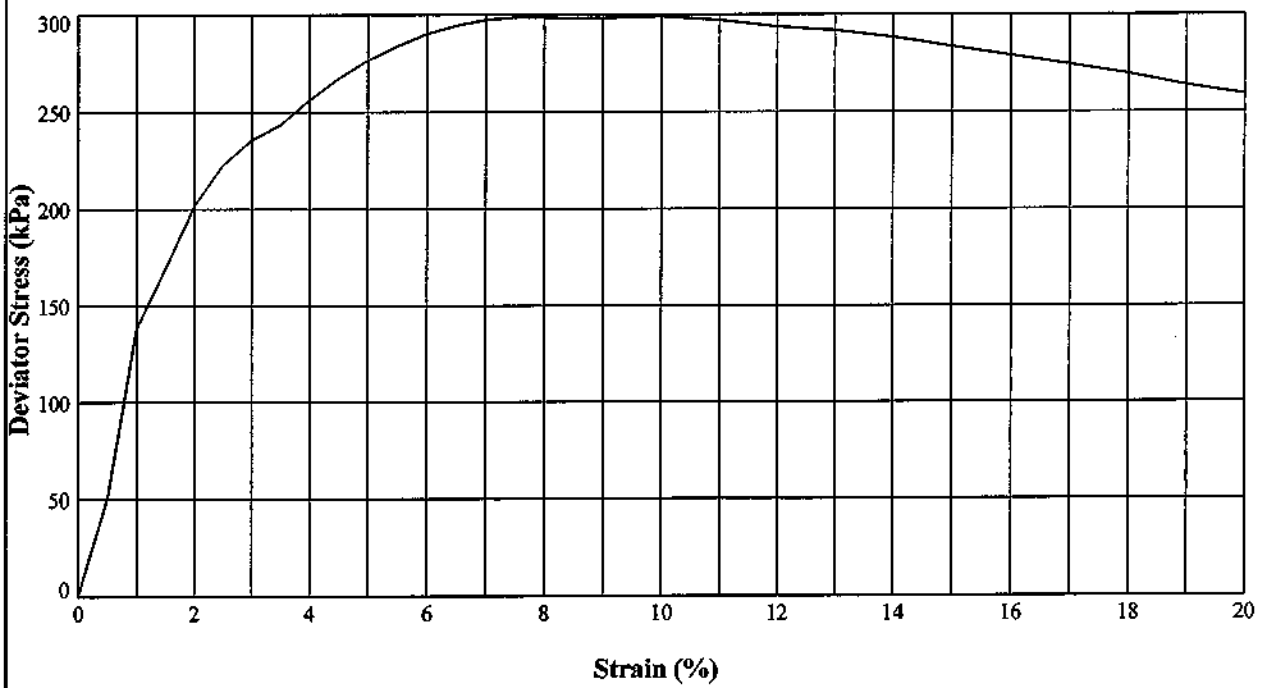
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH1** Sample Ref: Sample Type: **U** Depth (m): **17.00**

Description : **Brownish black CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	102.41		
	Height	(mm)	210.27		
	Moisture Content	(%)	27		
	Bulk Density	(Mg/m^3)	1.90		
	Dry Density	(Mg/m^3)	1.50		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	340		
	Membrane Correction	(kPa)	0.54		
	Corrected Deviator Stress	(kPa)	300		
	Undrained Shear Strength	(kPa)	150		
	Strain at Failure	(%)	10.0		
	Mode of Failure		Brittle		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

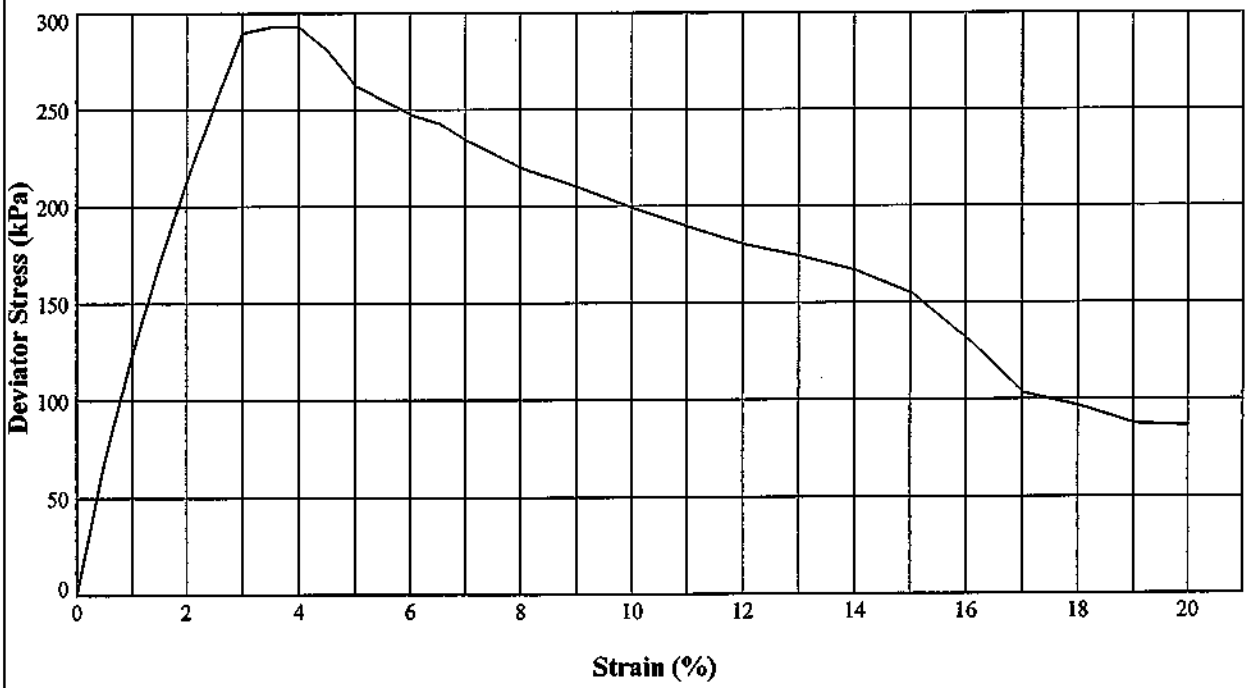
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH1** Sample Ref: Sample Type: **U** Depth (m): **19.50**

Description : **Brownish black CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	102.45		
	Height	(mm)	209.76		
	Moisture Content	(%)	26		
	Bulk Density	(Mg/m^3)	1.94		
	Dry Density	(Mg/m^3)	1.54		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	390		
	Membrane Correction	(kPa)	0.23		
	Corrected Deviator Stress	(kPa)	293		
	Undrained Shear Strength	(kPa)	147		
	Strain at Failure	(%)	3.5		
	Mode of Failure		Brittle		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
	PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

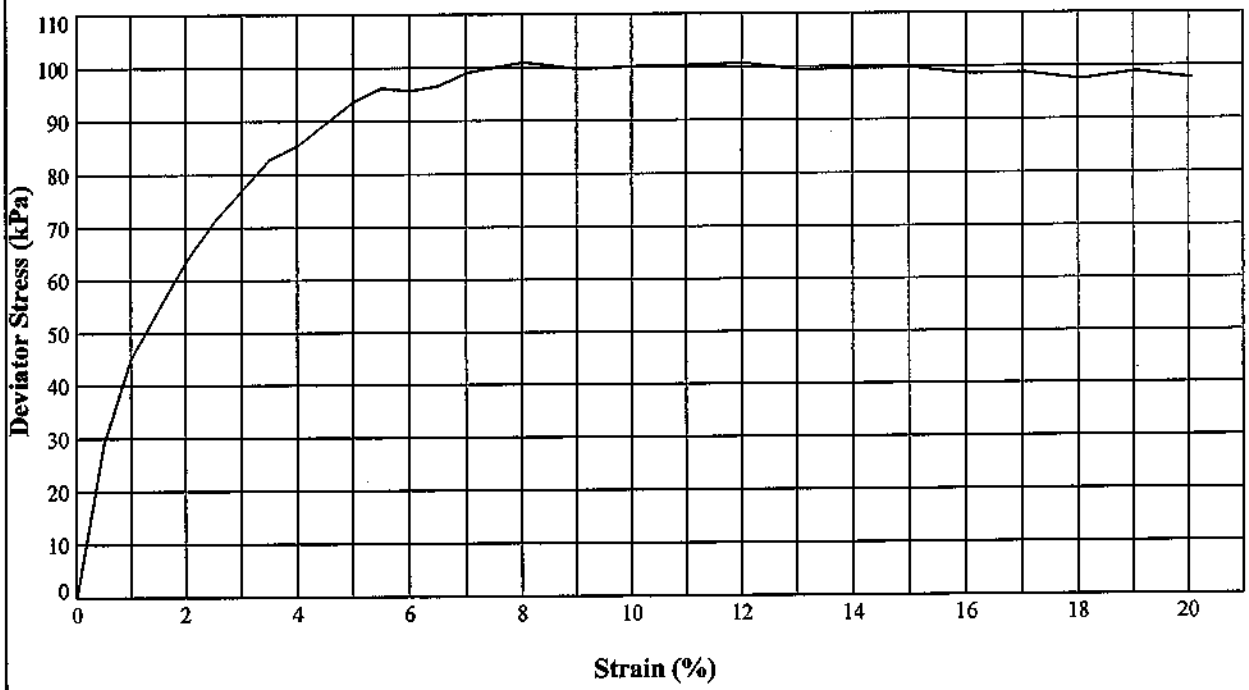
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH2** Sample Ref: Sample Type: **U** Depth (m): **2.00**

Description : **Brown mottled grey CLAY with occasional fine gypsum**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	102.03		
	Height	(mm)	209.33		
	Moisture Content	(%)	36		
	Bulk Density	(Mg/m^3)	1.91		
	Dry Density	(Mg/m^3)	1.40		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	40		
	Membrane Correction	(kPa)	0.45		
	Corrected Deviator Stress	(kPa)	101		
	Undrained Shear Strength	(kPa)	50		
	Strain at Failure	(%)	8.0		
	Mode of Failure		Compound		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

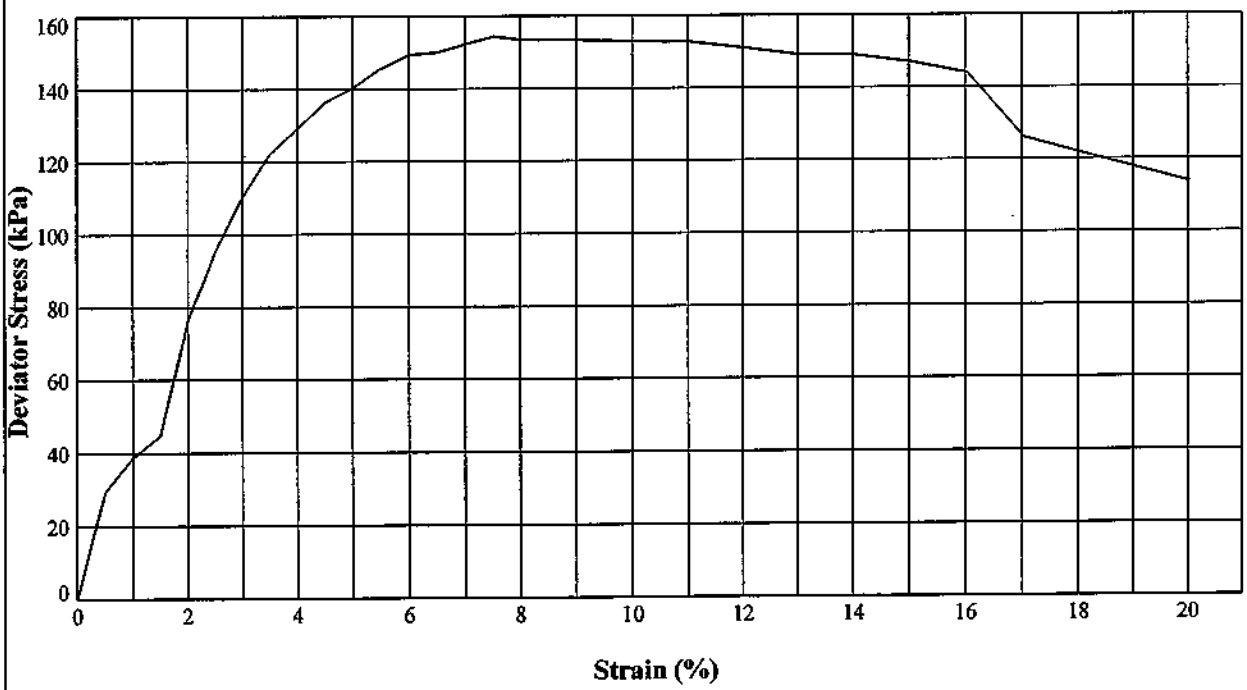
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH2** Sample Ref: Sample Type: **U** Depth (m): **4.00**

Description : **Brown mottled grey CLAY with frequent fine gypsum**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	101.89		
	Height	(mm)	209.67		
	Moisture Content	(%)	31		
	Bulk Density	(Mg/m^3)	1.92		
	Dry Density	(Mg/m^3)	1.46		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	80		
	Membrane Correction	(kPa)	0.43		
	Corrected Deviator Stress	(kPa)	154		
	Undrained Shear Strength	(kPa)	77		
	Strain at Failure	(%)	7.5		
	Mode of Failure		Brittle		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By	Date
PAUL KENT	10/12/10

Contract: **The Waterhouse, Fitzroy Park**

Contract Ref: **581445**

AGS

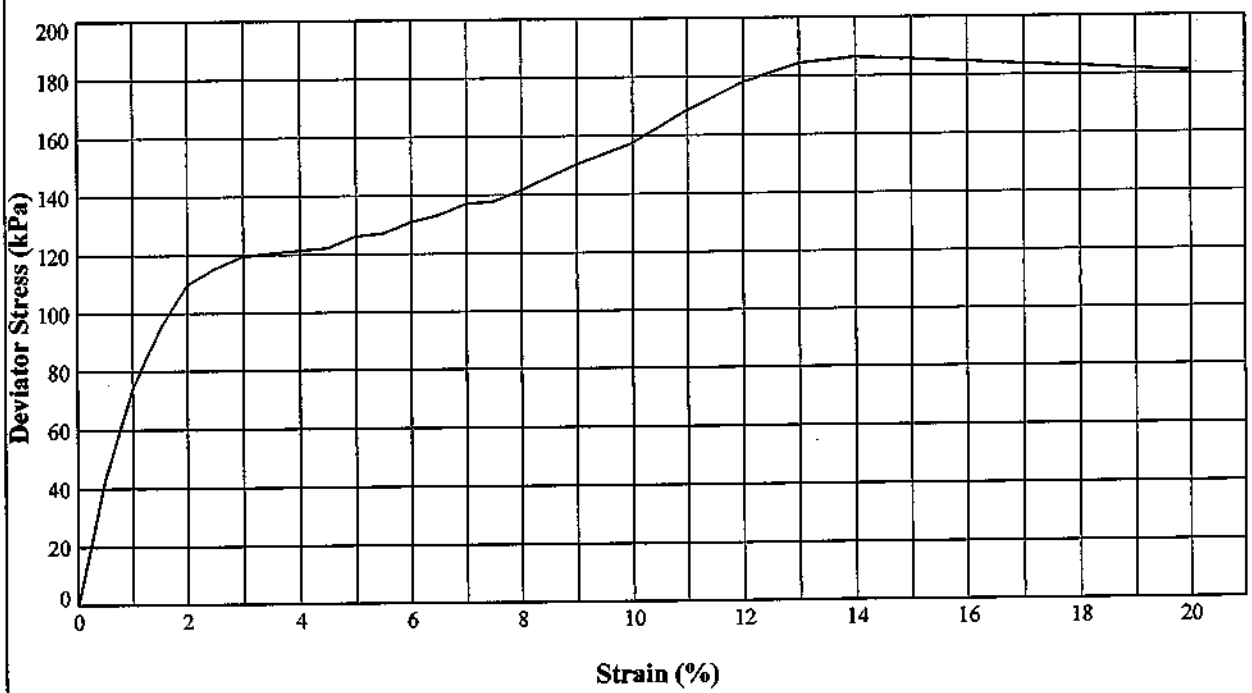
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole : **BH2** Sample Ref: Sample Type: **U** Depth (m): **6.50**

Description : **Very dark brownish grey slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	101.92		
	Height	(mm)	209.98		
	Moisture Content	(%)	28		
	Bulk Density	(Mg/m^3)	1.95		
	Dry Density	(Mg/m^3)	1.53		
TEST DETAILS	Membrane Thickness	(mm)	0.24		
	Rate of Axial Displacement	(%/min)	2.00		
	Cell Pressure	(kPa)	130		
	Membrane Correction	(kPa)	0.69		
	Corrected Deviator Stress	(kPa)	187		
	Undrained Shear Strength	(kPa)	93		
	Strain at Failure	(%)	14.0		
	Mode of Failure		Brittle		



Approved Signatories: P. KENT S. CAIRNS

STRUCTURAL SOILS 18 Frogmore Road Hemel Hempstead Hertfordshire HP3 9RT	Compiled By	PAUL KENT	Date 10/12/10
	Contract **The Waterhouse, Fitzroy Park**	Contract Ref: **581445**	
		Page 16 of 16	AGS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 10/04186
Issue Number: 1 **Date:** 13 December, 2010

Client:
RSK STATS Hemel Hempstead
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Clive Gerring
Project Name: The Waterhouse
Project Ref: 241830
Order No: Not specified
Date Samples Received: 02/12/10
Date Instructions Received: 02/12/10
Date Analysis Completed: 13/12/10

Prepared by:
Melanie Marshall
Laboratory Coordinator

Approved by:
Iain Haslock
Analytical Consultant

Notes - Soil analysis
All results are reported as dry weight (<40°C).
Stones >10mm are removed from the sample prior to analysis and results corrected where appropriate.

Notes - General
For soil samples subscript A indicates analysis performed on the sample as received, D indicates analysis performed on dried & crushed sample.
Superscript M indicates method accredited to MCERTS.

Predominant Matrix Codes - 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER.
Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our MCERTS accreditation.
Secondary Matrix Codes - A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.
IS indicates Insufficient sample for analysis. NDP indicates No Determination Possible. NFI indicates No Fibres Identified.
Superscript # indicates method accredited to ISO 17025.
Accreditation for TPH (C6-C40) applies to the range C6-C36 only.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.

MCERTS
UKAS TESTING 1247

Envirolab Job Number: 10/04186

Client Project Name: The Waterhouse

Client Project Ref: 241830

Lab Sample ID	10/04186/1	10/04186/2	10/04186/3	10/04186/4	10/04186/5	10/04186/6	10/04186/7	10/04186/8	Units	Method ref
Client Sample No										
Client Sample ID	BH1	BH2	WS1	WS4	BH2	BH2	BH2	BH1		
Depth to Top	0.20	0.20	0.10	0.50	0.70	3.00	6.00	5.45		
Depth To Bottom				0.80	0.90					
Date Sampled										
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6AE	6AE	6AE	6AE	5	5	5	5		
ACM Screen$_A$	NFI	NFI	NFI	NFI	-	-	-	-		Visual
pH$_D$ M#	7.4	8.0	7.6	8.1	8.0	7.8	8.0	7.8	pH	A-T-031s
Sulphate (water sol 2:1)$_D$ M#	0.24	-	-	-	0.22	1.75	1.34	1.02	g/l	A-T-026s
Organic matter$_D$ M#	12.2	-	8.9	-	-	-	-	-	% w/w	A-T-032 OM
Arsenic$_D$ M#	26	18	20	15	-	-	-	-	mg/kg	A-T-024
Boron (water soluble)$_D$ M#	8.5	2.3	1.6	1.4	-	-	-	-	mg/kg	A-T-027s
Cadmium$_D$ M#	0.6	0.8	0.8	<0.5	-	-	-	-	mg/kg	A-T-024
Copper$_D$ M#	80	58	73	66	-	-	-	-	mg/kg	A-T-024
Chromium$_D$ M#	26	37	32	24	-	-	-	-	mg/kg	A-T-024
Lead$_D$ M#	302	300	431	317	-	-	-	-	mg/kg	A-T-024
Mercury$_D$	0.50	0.39	0.60	0.62	-	-	-	-	mg/kg	A-T-024
Nickel$_D$ M#	23	32	27	19	-	-	-	-	mg/kg	A-T-024
Selenium$_D$ M#	<1	<1	<1	<1	-	-	-	-	mg/kg	A-T-024
Zinc$_D$ M#	204	308	352	195	-	-	-	-	mg/kg	A-T-024
TPH total (C6-C40)$_A$	<10	-	14	-	-	-	-	-	mg/kg	A-T-007s

Envirolab Job Number: 10/04186

Client Project Name: The Waterhouse

Client Project Ref: 241830

Lab Sample ID	10/04186/1	10/04186/2	10/04186/3	10/04186/4	10/04186/5	10/04186/6	10/04186/7	10/04186/8	Units	Method ref
Client Sample No										
Client Sample ID	BH1	BH2	WS1	WS4	BH2	BH2	BH2	BH1		
Depth to Top	0.20	0.20	0.10	0.50	0.70	3.00	6.00	5.45		
Depth To Bottom				0.80	0.90					
Date Sampled										
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6AE	6AE	6AE	6AE	5	5	5	5		
PAH 16										
Acenapthene$_A^{M\#}$	0.07	0.05	0.14	<0.01	-	-	-	-	mg/kg	A-T-019s
Acenapthylene$_A^{M\#}$	0.09	0.06	0.06	<0.01	-	-	-	-	mg/kg	A-T-019s
Anthracene$_A^{M\#}$	0.73	0.25	0.37	0.04	-	-	-	-	mg/kg	A-T-019s
Benzo(a)anthracene$_A^{\#}$	2.27	0.59	0.92	0.03	-	-	-	-	mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	4.41	1.45	2.18	0.15	-	-	-	-	mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	2.38	0.62	1.34	0.08	-	-	-	-	mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	3.01	1.27	1.64	0.13	-	-	-	-	mg/kg	A-T-019s
Benzo(k)fluoranthene$_A$	2.19	0.72	1.23	0.10	-	-	-	-	mg/kg	A-T-019s
Chrysene$_A^{M\#}$	4.71	1.63	2.20	0.16	-	-	-	-	mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{\#}$	0.88	0.37	0.22	<0.01	-	-	-	-	mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	8.10	2.12	3.67	0.18	-	-	-	-	mg/kg	A-T-019s
Fluorene$_A^{M\#}$	0.03	<0.01	0.05	<0.01	-	-	-	-	mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{\#}$	3.18	1.32	1.94	0.06	-	-	-	-	mg/kg	A-T-019s
Napthalene$_A^{M\#}$	0.07	0.07	0.14	0.10	-	-	-	-	mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	1.70	0.65	1.17	0.11	-	-	-	-	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	7.78	1.93	3.20	0.15	-	-	-	-	mg/kg	A-T-019s
Total PAH$_A^{\#}$	41.6	13.1	20.5	1.28	-	-	-	-	mg/kg	A-T-019s

Envirolab Job Number: 10/04186

Client Project Name: The Waterhouse

Client Project Ref: 241830

Lab Sample ID	10/04186/9	10/04186/10	10/04186/11						Units	Method ref
Client Sample No										
Client Sample ID	BH1	WS1	WS4							
Depth to Top	8.45	1.20	2.50							
Depth To Bottom			3.00							
Date Sampled										
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	3	5	3							
$pH_D^{M\#}$	8.3	8.0	8.0						pH	A-T-031s
Sulphate (water sol 2:1)$_D^{M\#}$	0.72	0.41	2.18						g/l	A-T-026s

GEA Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Generic Risk-Based Soil Screening Values

Site	The Water House, Millfield Lane, London, N6 6HQ	**Job Number** J17146
Client	Leonard & Ingrid Lewis	**Sheet** 1 / 2
Engineer	Price & Myers	

Proposed End Use Residential with plant uptake

Soil pH 7

Soil Organic Matter content % 6.0

Contaminant	Screening Value mg/kg	Data Source
Metals		
Arsenic	37	C4SL
Cadmium	26	C4SL
Chromium (III)	3000	LQM/CIEH
Chromium (VI)	21	C4SL
Copper	2,330	LQM/CIEH
Lead	200	C4SL
Elemental Mercury	1	SGV
Inorganic Mercury	170	SGV
Nickel	97	LQM/CIEH
Selenium	350	SGV
Zinc	3,750	LQM/CIEH
Hydrocarbons		
Benzene	0.87	C4SL
Toluene	610	SGV
Ethyl Benzene	350	SGV
Xylene	230	SGV
Aliphatic C5-C6	110	LQM/CIEH
Aliphatic C6-C8	370	LQM/CIEH
Aliphatic C8-C10	110	LQM/CIEH
Aliphatic C10-C12	540	LQM/CIEH
Aliphatic C12-C16	3000	LQM/CIEH
Aliphatic C16-C35	76,000	LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH
Aromatic C8-C10	151	LQM/CIEH
Aromatic C10-C12	346	LQM/CIEH
Aromatic C12-C16	593	LQM/CIEH
Aromatic C16-C21	770	LQM/CIEH
Aromatic C21-C35	1230	LQM/CIEH
PRO (C_5 –C_{10})	1352	Calc
DRO (C_{12} –C_{28})	80,363	Calc
Lube Oil (C_{28} –C_{44})	77,230	Calc
TPH	**1000**	Trigger for speciated testing

Contaminant	Screening Value mg/kg	Data Source
Anions		
Soluble Sulphate	500 mg/l	Structures
Sulphide	50	Structures
Chloride	400	Structures
Others		
Organic Carbon (%)	6	Methanogenic potential
Total Cyanide	140	WRAS
Total Mono Phenols	420	SGV
PAH		
Naphthalene	12.40	C4SL exp & LQM/CIEH
Acenaphthylene	850	LQM/CIEH
Acenaphthene	1,000	LQM/CIEH
Fluorene	780	LQM/CIEH
Phenanthrene	380	LQM/CIEH
Anthracene	9,200	LQM/CIEH
Fluoranthene	670	LQM/CIEH
Pyrene	1,600	LQM/CIEH
Benzo(a) Anthracene	8.7	C4SL exp & LQM/CIEH
Chrysene	14	C4SL exp & LQM/CIEH
Benzo(b) Fluoranthene	10.5	C4SL exp & LQM/CIEH
Benzo(k) Fluoranthene	15.0	C4SL exp & LQM/CIEH
Benzo(a) pyrene	5.00	C4SL
Indeno(1 2 3 cd) Pyrene	6.2	C4SL exp & LQM/CIEH
Dibenzo(a h) Anthracene	1.35	C4SL exp & LQM/CIEH
Benzo (g h i) Perylene	71	C4SL exp & LQM/CIEH
Screening value for PAH	**71.4**	B(a)P / 0.15
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	53.1	LQM/CIEH
tetrachloroethane (PCA)	2.4	LQM/CIEH
tetrachloroethene (PCE)	4.5	LQM/CIEH
trichloroethene (TCE)	0.598	LQM/CIEH
1,2-dichloroethane (DCA)	0.014	LQM/CIEH
vinyl chloride (Chloroethene)	0.00329	LQM/CIEH
tetrachloromethane (Carbon tetra	0.089	LQM/CIEH
trichloromethane (Chloroform)	3.86	LQM/CIEH

Notes

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

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

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

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

C4SL exp & LQM/CIEH calculated using C4SL revisions to exposure assessment but LQM/CIEH health criteria values

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

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

GEA Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Generic Risk-Based Soil Screening Values

Site	The Water House, Millfield Lane, London, N6 6HQ	**Job Number** J17146
Client	Leonard & Ingrid Lewis	**Sheet** 2 / 2
Engineer	Price & Myers	

Proposed End Use **Residential with plant uptake**

The key generic assumptions for this end use are as follows;

- ❑ that groundwater will not be a critical risk receptor;
- ❑ that the critical receptor for human health will be a young female aged 0 to 6 years old;
- ❑ that the exposure duration will be six years;
- ❑ that the building type equates to a terraced house.
- ❑ that the critical exposure pathways will be direct soil and indoor dust ingestion, consumption of home grown produce, consumption of soil adhering to home grown produce, skin contact with soils and dust, and inhalation of dust and vapours

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

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

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
126583522_1_1

Customer Reference:
J17146

National Grid Reference:
527740, 186990

Slice:
A

Site Area (Ha):
0.01

Search Buffer (m):
1000

Site Details:

The Waterhouse, Millfield Lane
LONDON
N6 6HQ

Client Details:

Mr S Branch
GEA Ltd
Widbury Barn
Widbury Hill
Ware
Herts
SG12 7QE

Contents

Introduction

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

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

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Ove Arup Copyright Notice

Peter Brett Associates Copyright Notice

Radon Potential dataset Copyright Notice

Report Version v53.0

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1		Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1				1
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 1				2
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 1		Yes		
Pollution Incidents to Controlled Waters	pg 1			2	
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 2			1	
Water Abstractions					
Water Industry Act Referrals					
Groundwater Vulnerability	pg 2	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 2	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 2		15	26	31

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 11	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)	pg 11				1
Potentially Infilled Land (Water)	pg 11				3
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 12	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry					
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 12		Yes	Yes	Yes
BGS Urban Soil Chemistry Averages	pg 15	Yes			
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 15	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 16	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 16		Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 16	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 17			3	29
Fuel Station Entries	pg 19				1
Points of Interest - Commercial Services	pg 19				4
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 20				3
Points of Interest - Public Infrastructure	pg 20		1	1	19
Points of Interest - Recreational and Environmental					
Gas Pipelines					
Underground Electrical Cables					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland	pg 23			1	
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest	pg 23			1	
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (N)	56	1	527745 187050
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (NW)	320	1	527500 187200
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SW (NW)	405	1	527550 187350
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12NE (W)	472	1	527300 187150
1	**Discharge Consents** Operator: Thames Water Utilities Ltd Property Type: WTW/WATER COLLECTION/TREATMENT/SUPPLY Location: Highgate Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.0148 Permit Version: 1 Effective Date: 15th September 1989 Issued Date: 15th September 1989 Revocation Date: 5th October 2000 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: River Thames **Status: Authorisation revokedRevoked** Positional Accuracy: Located by supplier to within 100m	A14NW (NE)	634	2	528300 187300
2	**Local Authority Pollution Prevention and Controls** Name: John Nichol Service Station Location: 31-33 North Road, LONDON, N6 4BE Authority: London Borough of Haringey, Planning and Environmental Health Permit Reference: PV-11 Dated: 17th April 2001 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station **Status: Authorised** Positional Accuracy: Manually positioned to the address or location	A19SW (NE)	827	3	528296 187611
3	**Local Authority Pollution Prevention and Controls** Name: First Choice Location: 5 Highgate High Street, London, N6 5jr Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC3 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A19SE (E)	898	4	528575 187336
	Nearest Surface Water Feature	A13SE (SE)	19	-	527754 186979
4	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 28th October 1993 Incident Reference: NE930729 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A13NE (N)	291	2	527800 187280

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Regents Canal, Camden Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 20th February 1997 Incident Reference: THN11997031084 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (W)	445	2	527300 187000
6	**Substantiated Pollution Incident Register** Authority: Environment Agency - Thames Region, North East Area Incident Date: 22nd July 2004 Incident Reference: 252851 Water Impact: Category 2 - Significant Incident Air Impact: Category 4 - No Impact Land Impact: Category 4 - No Impact Positional Accuracy: Located by supplier to within 10m Pollutant: General Biodegradable Materials and WastesAlgae	A8NE (S)	455	2	527851 186553
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 39 West London Scale: 1:100,000	A13NE (NE)	0	2	527745 186995
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A13NE (NE)	0	1	527745 186995
	Superficial Aquifer Designations No Data Available				
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
7	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 312.9 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (W)	30	5	527716 186998
8	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 36.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (S)	115	5	527702 186888
9	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 30.2 Watercourse Level: Underground Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13SW (SW)	130	5	527636 186924

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
10	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 137.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13SW (SW)	130	5	527636 186924
11	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 43.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13SW (SW)	134	5	527652 186899
12	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 70.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13SW (SW)	147	5	527679 186864
13	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 60.4 Watercourse Level: Underground Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13NW (W)	181	5	527571 187041
14	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 98.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Number 4 Pond Catchment Name: Thames Primacy: 1	A13SW (S)	199	5	527706 186800
15	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 27.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13SW (S)	199	5	527706 186800
16	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 47.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (N)	204	5	527740 187199
17	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 12.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13SW (S)	212	5	527729 186784
18	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 157.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A13SW (S)	222	5	527736 186773

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 109.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Number 6 Pond Catchment Name: Thames Primacy: 1	A13NW (NW)	226	5	527543 187095
20	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 22.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (N)	246	5	527765 187240
21	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 64.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (SW)	249	5	527609 186787
22	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (N)	267	5	527772 187260
23	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 9.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (N)	272	5	527775 187264
24	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 29.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (N)	272	5	527775 187264
25	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 12.5 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (SW)	280	5	527546 186799
26	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 1.4 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (N)	280	5	527774 187273
27	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 192.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (N)	281	5	527773 187274

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: London Borough of Camden - Has no landfill data to supply		0	6	527745 186995
	Local Authority Landfill Coverage Name: London Borough of Haringey - Has supplied landfill data		523	7	527769 187517
79	**Potentially Infilled Land (Non-Water)** Bearing Ref: SW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1996	A7NE (SW)	791	-	527232 186393
80	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A18NE (NE)	758	-	528057 187685
81	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1896	A18NW (N)	822	-	527618 187807
82	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1896	A14NE (E)	988	-	528716 187169

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Thames Group	A13NE (NE)	0	1	527745 186995
	BGS Estimated Soil Chemistry No data available				
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527676, 186759 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 15.30 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 93.70 mg/kg Lead Measured Concentration: 232.10 mg/kg Nickel Measured Concentration: 19.50 mg/kg	A13SW (S)	246	1	527676 186759
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527639, 187232 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 13.40 mg/kg Cadmium Measured Concentration: 0.50 mg/kg Chromium Measured Concentration: 110.70 mg/kg Lead Measured Concentration: 147.10 mg/kg Nickel Measured Concentration: 13.80 mg/kg	A13NW (NW)	260	1	527639 187232
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527271, 186735 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 13.50 mg/kg Cadmium Measured Concentration: 0.40 mg/kg Chromium Measured Concentration: 104.50 mg/kg Lead Measured Concentration: 217.30 mg/kg Nickel Measured Concentration: 12.30 mg/kg	A12SE (SW)	541	1	527271 186735
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528213, 187266 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 22.40 mg/kg Cadmium Measured Concentration: 0.50 mg/kg Chromium Measured Concentration: 84.50 mg/kg Lead Measured Concentration: 382.20 mg/kg Nickel Measured Concentration: 21.90 mg/kg	A14NW (NE)	542	1	528213 187266

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528316, 187756 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 18.10 mg/kg Cadmium Measured Concentration: 0.80 mg/kg Chromium Measured Concentration: 79.60 mg/kg Lead Measured Concentration: 761.60 mg/kg Nickel Measured Concentration: 31.00 mg/kg	A19NW (NE)	952	1	528316 187756
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526771, 186829 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 23.40 mg/kg Cadmium Measured Concentration: 0.80 mg/kg Chromium Measured Concentration: 74.50 mg/kg Lead Measured Concentration: 586.60 mg/kg Nickel Measured Concentration: 44.00 mg/kg	A12SW (W)	988	1	526771 186829
	BGS Urban Soil Chemistry Averages Source: British Geological Survey, National Geoscience Information Service Sample Area: London Count Id: 7209 Arsenic Minimum Concentration: 1.00 mg/kg Arsenic Average Concentration: 17.00 mg/kg Arsenic Maximum Concentration: 161.00 mg/kg Cadmium Minimum Concentration: 0.10 mg/kg Cadmium Average Concentration: 0.90 mg/kg Cadmium Maximum Concentration: 165.20 mg/kg Chromium Minimum Concentration: 13.00 mg/kg Chromium Average Concentration: 79.00 mg/kg Chromium Maximum Concentration: 2094.00 mg/kg Lead Minimum Concentration: 11.00 mg/kg Lead Average Concentration: 280.00 mg/kg Lead Maximum Concentration: 10000.00 mg/kg Nickel Minimum Concentration: 2.00 mg/kg Nickel Average Concentration: 28.00 mg/kg Nickel Maximum Concentration: 506.00 mg/kg	A13NE (NE)	0	1	527745 186995
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	221	1	527525 186997
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	48	1	527750 187042
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	527745 186995

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
97	**Contemporary Trade Directory Entries** Name: First Choice Dry Cleaners Location: 5, Highgate High Street, London, N6 5JR Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A19SE (E)	897	-	528574 187337
97	**Contemporary Trade Directory Entries** Name: Petroleum Development Consultants Location: Stanhope House 4-8, Highgate High Street, London, N6 5JL Classification: Oil & Gas Exploration Supplies & Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A19SE (NE)	945	-	528617 187358
98	**Contemporary Trade Directory Entries** Name: Vagabond Bags Ltd Location: 7, Broadbent Close, London, N6 5JW Classification: Bags, Belts & Accessories - Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19SE (NE)	904	-	528551 187402
98	**Contemporary Trade Directory Entries** Name: Sally Poppy Location: 4, Broadbent Close, London, N6 5JW Classification: Lingerie Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19SE (NE)	921	-	528569 187406
98	**Contemporary Trade Directory Entries** Name: Radiant Architectural Lighting Ltd Location: 10, Broadbent Close, London, N6 5JW Classification: Lighting Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19SE (NE)	939	-	528587 187410
98	**Contemporary Trade Directory Entries** Name: Highgate Autos Ltd Location: 9, Broadbent Close, London, N6 5JW Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A19SE (NE)	939	-	528587 187410
99	**Contemporary Trade Directory Entries** Name: Kemet Creatives Location: 12a, St. Albans Road, London, NW5 1RD Classification: Clothing & Fabrics - Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A9NW (SE)	921	-	528418 186368
100	**Contemporary Trade Directory Entries** Name: Pack Line (Uk) Ltd Location: Flat 1, Hylda Court, 3-5, St. Albans Road, London, NW5 1RE Classification: Packaging & Wrapping Equipment & Supplies **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9SE (SE)	984	-	528429 186288
101	**Fuel Station Entries** Name: John Nichol Cars Location: 31-33 North Road, Highgate, London, Greater London, N6 4BE Brand: Unbranded Premises Type: Petrol Station **Status: Open** Positional Accuracy: Manually positioned to the address or location	A19SW (NE)	837	-	528305 187616
102	**Points of Interest - Commercial Services** Name: Lyras Maritime Ltd Location: 17 Sheldon Avenue, London, N6 4JS Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A17NE (NW)	923	8	527385 187845
103	**Points of Interest - Commercial Services** Name: Highgate Autos Ltd Location: 9 Broadbent Close, London, N6 5JW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SE (NE)	935	8	528580 187414
103	**Points of Interest - Commercial Services** Name: Highgate Motors Location: 9 Broadbent Close, London, N6 5JW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SE (NE)	936	8	528581 187415

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
103	**Points of Interest - Commercial Services** Name: Highgate Motors Location: 9 Broadbent Close, London, N6 5JW Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SE (NE)	939	8	528587 187410
104	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	664	8	528305 187350
105	**Points of Interest - Manufacturing and Production** Name: West Hill House Business Centre Location: 6 Swains Lane, London, N6 6QS Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to address or location	A9NW (SE)	865	8	528328 186358
105	**Points of Interest - Manufacturing and Production** Name: West Hill House Location: 6a Swains Lane, London, N6 6QS Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to address or location	A9NW (SE)	865	8	528328 186357
106	**Points of Interest - Public Infrastructure** Name: Sluice Location: N6 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	232	8	527536 187095
107	**Points of Interest - Public Infrastructure** Name: Sluice Location: NW3 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A12NE (NW)	477	8	527307 187183
108	**Points of Interest - Public Infrastructure** Name: Sluice Location: NW3 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A12NE (W)	556	8	527209 187141
109	**Points of Interest - Public Infrastructure** Name: Sluice Location: N6 Category: Water Class Code: Weirs, Sluices and Dams Positional Accuracy: Positioned to an adjacent address or location	A8NE (S)	577	8	527877 186434
110	**Points of Interest - Public Infrastructure** Name: Mausoleum Location: Not Supplied Category: Infrastructure and Facilities Class Code: Cemeteries and Crematoria Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	601	8	528325 187149
110	**Points of Interest - Public Infrastructure** Name: Mausoleum Location: Not Supplied Category: Infrastructure and Facilities Class Code: Cemeteries and Crematoria Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	639	8	528362 187159
110	**Points of Interest - Public Infrastructure** Name: Mausoleum Location: Not Supplied Category: Infrastructure and Facilities Class Code: Cemeteries and Crematoria Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	640	8	528375 187104
110	**Points of Interest - Public Infrastructure** Name: Highgate Cemetery Location: N6 Category: Infrastructure and Facilities Class Code: Cemeteries and Crematoria Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	663	8	528401 187086

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
119	**Ancient Woodland** Name: Ken Wood Reference: 1495724 Area(m²): 94873.72 Type: Ancient and Semi-Natural Woodland	A13NW (W)	325	9	527421 187024
120	**Sites of Special Scientific Interest** Name: Hampstead Heath Woods Multiple Areas: Y Total Area (m2): 161715.26 Source: Natural England Reference: 1003451 Designation Details: Site Of Special Scientific Interest Designation Date: 18th April 1990 Date Type: Notified	A13NW (W)	325	9	527421 187024

Data Suppliers

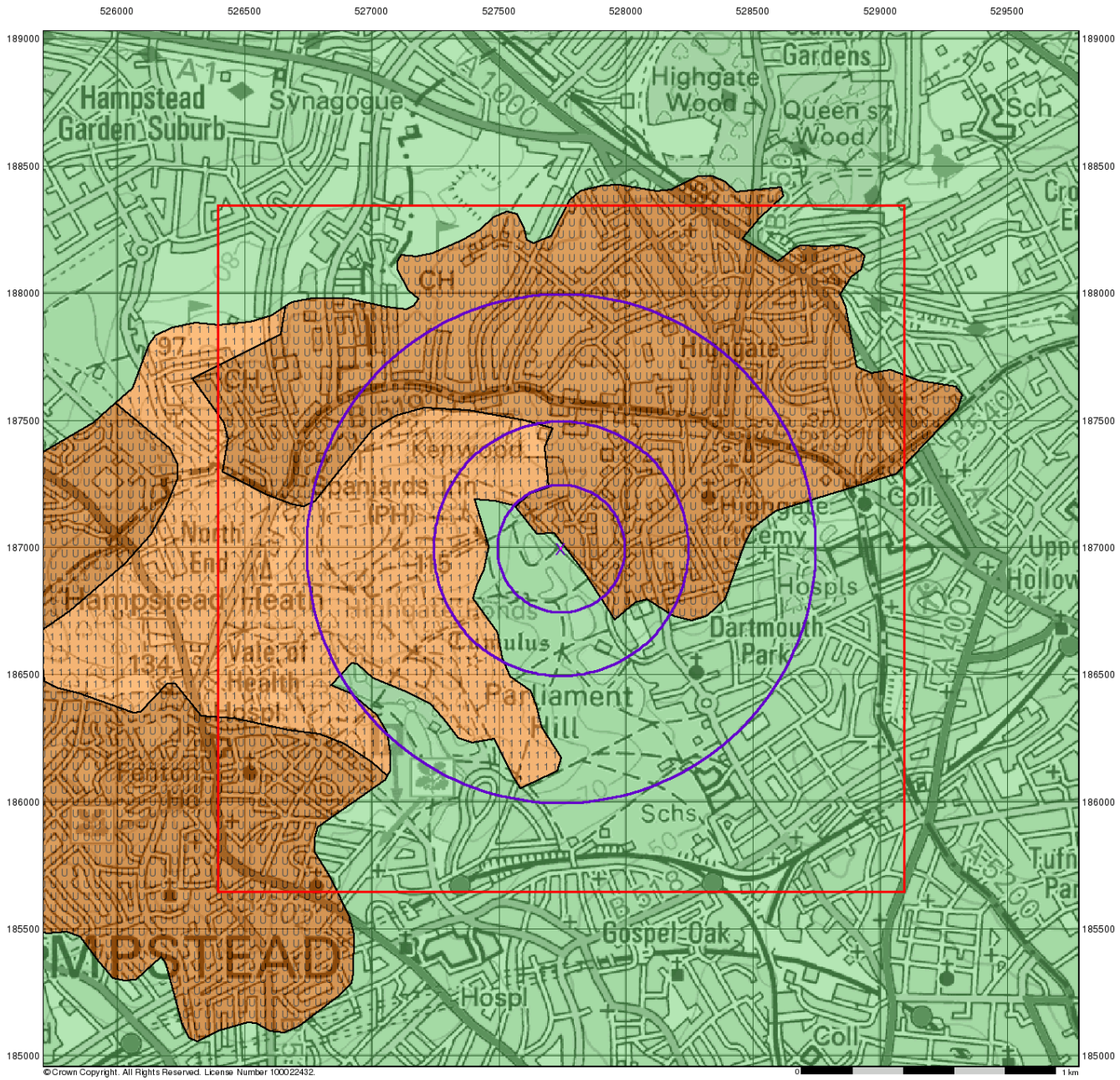
A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	**London Borough of Haringey - Planning and Environmental Health** 639 High Road, Tottenham, London, N17 8BD	Telephone: 0208 489 5183 Fax: 0208 489 5117 Website: www.haringey.gov.uk
4	**London Borough of Camden - Pollution Projects Team** Seventh Floor, Town Hall Extension, Argyle Street, London, WC1H 8EQ	Telephone: 020 7278 4444 Fax: 020 7860 5713 Website: www.camden.gov.uk
5	**Ordnance Survey** Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 023 8079 2000 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
6	**London Borough of Camden** Town Hall, Judd Street, London, WC1H 9JE	Telephone: 020 7974 4444 Fax: 020 7974 6866 Email: info@camden.gov.uk Website: www.camden.gov.uk
7	**London Borough of Haringey - Planning Department** Civic Centre, 639 High Road, Tottenham, London, N17 8BD	Website: www.haringey.gov.uk
8	**PointX** 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
9	**Natural England** County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
10	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

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



GEA Geotechnical & Environmental Associates

Groundwater Vulnerability

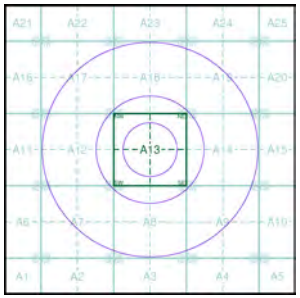
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes	Soil Classes
Major Aquifer (Highly Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Minor Aquifer (Variably Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Non Aquifer (Negligibly Permeable)	
Water or Sea	
Drift Deposit	

Site Sensitivity Context Map - Slice A



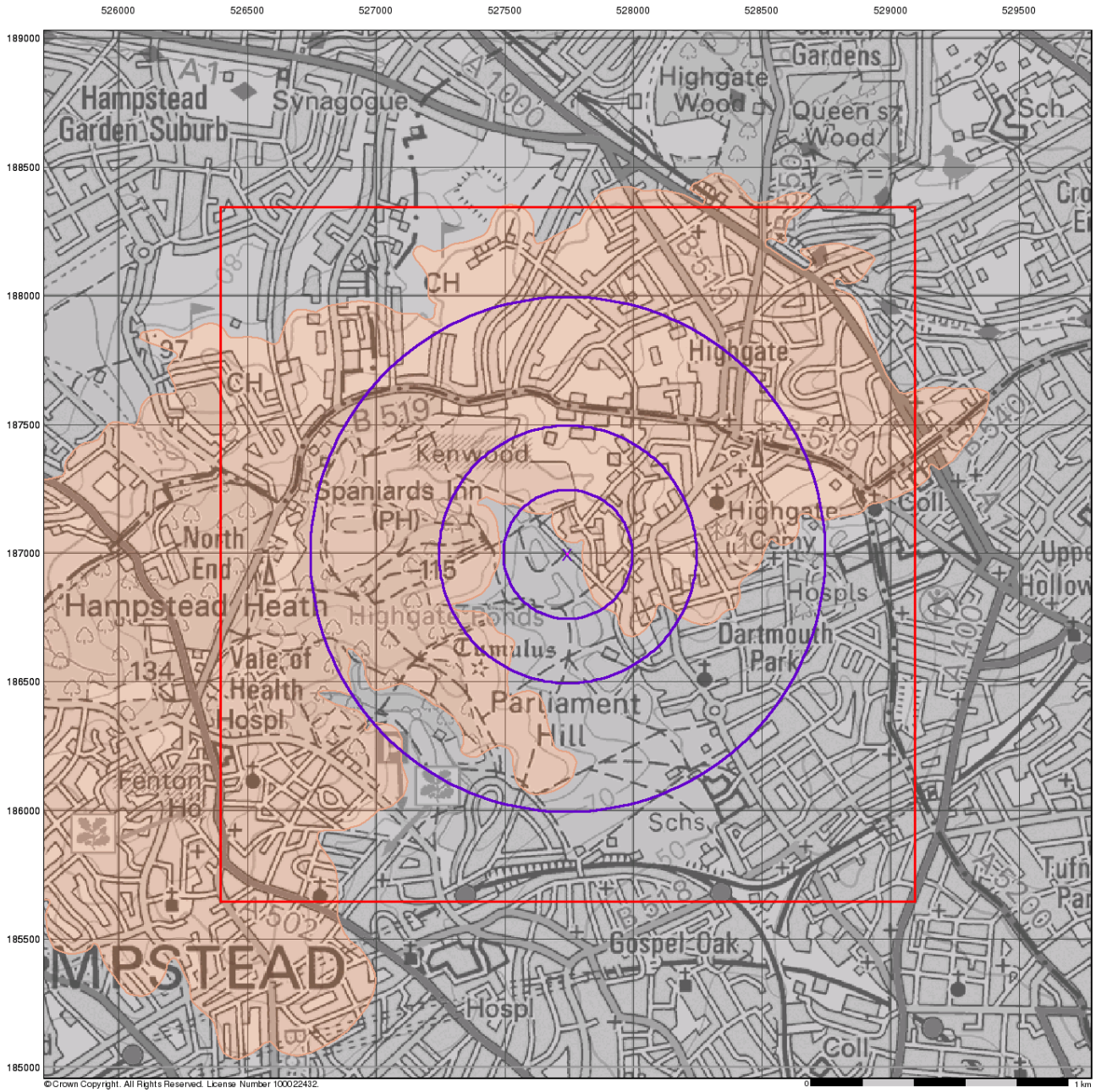
Order Details

Order Number:	126583522_1_1
Customer Ref:	J17146
National Grid Reference:	527740, 186990
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

The Waterhouse, Millfield Lane, LONDON, N6 6HQ

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



GEA Geotechnical & Environmental Associates

Bedrock Aquifer Designation

General

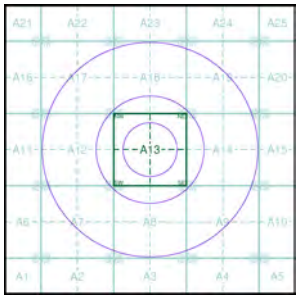
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



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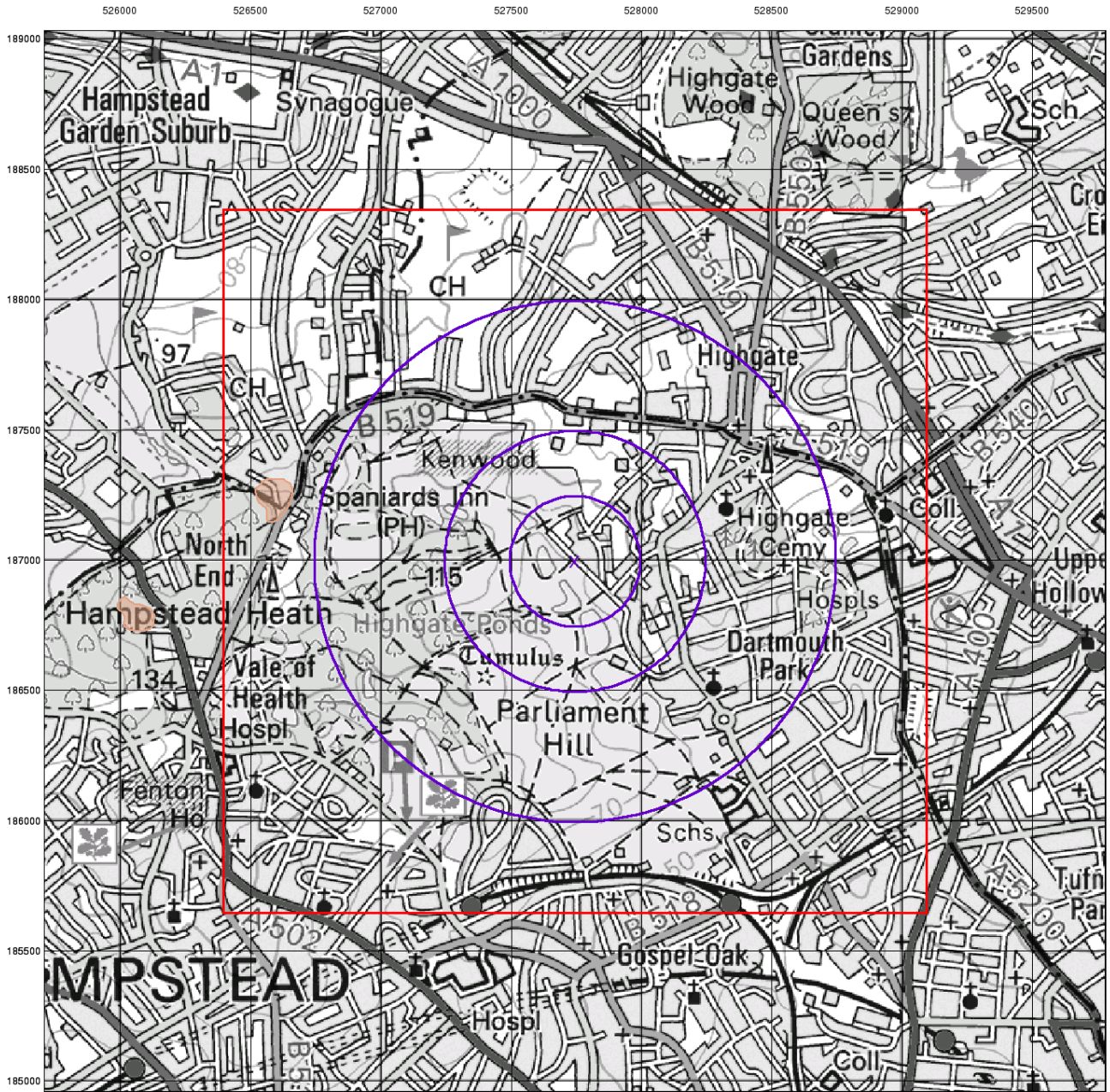


GEA Geotechnical & Environmental Associates

Superficial Aquifer Designation

General

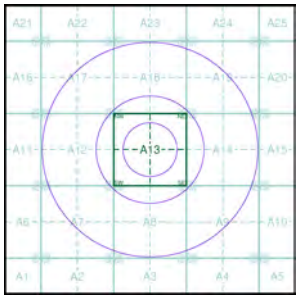
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



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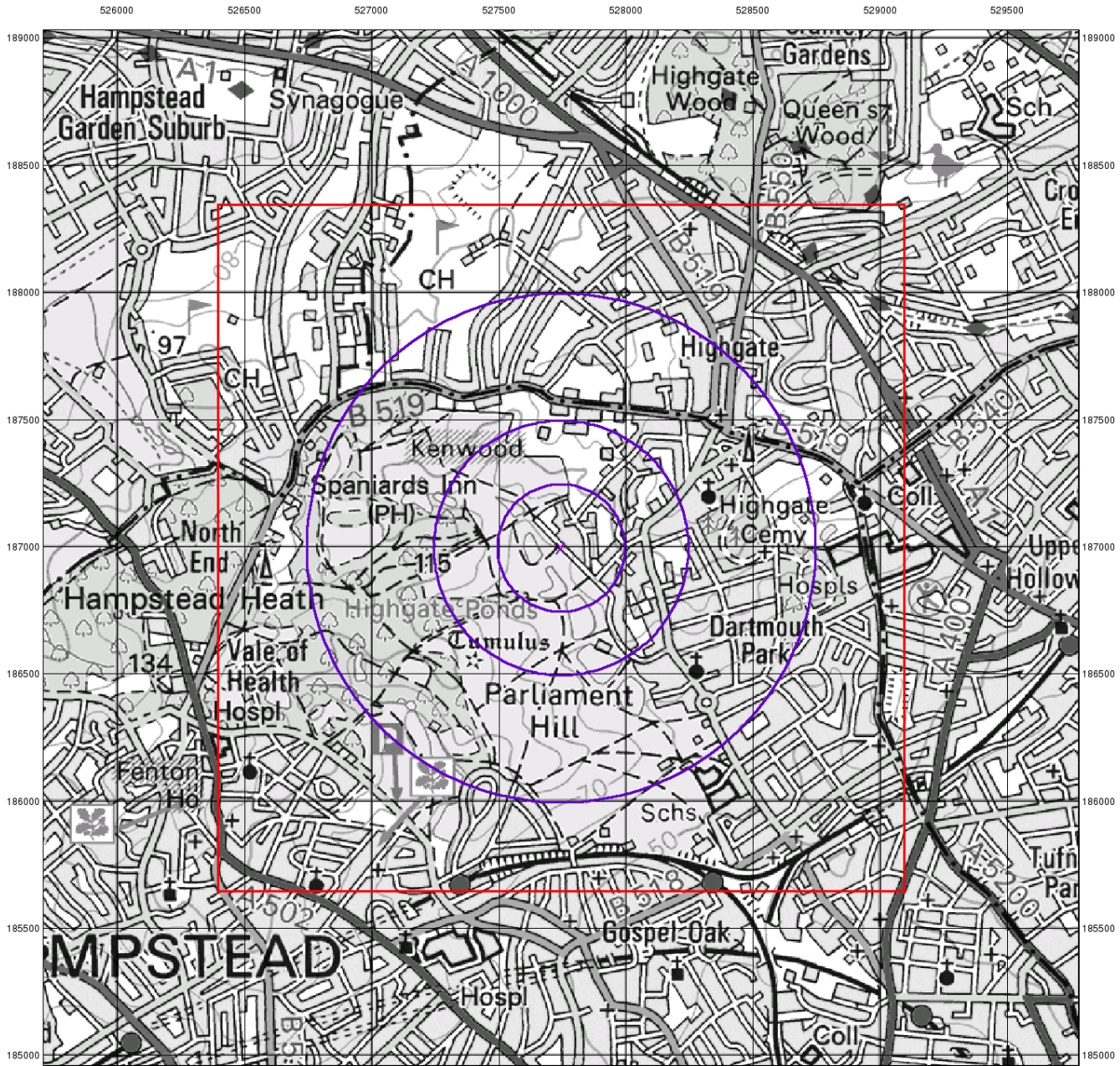


GEA Geotechnical & Environmental Associates

Source Protection Zones

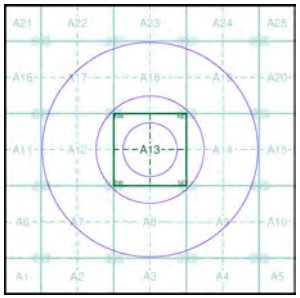
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A



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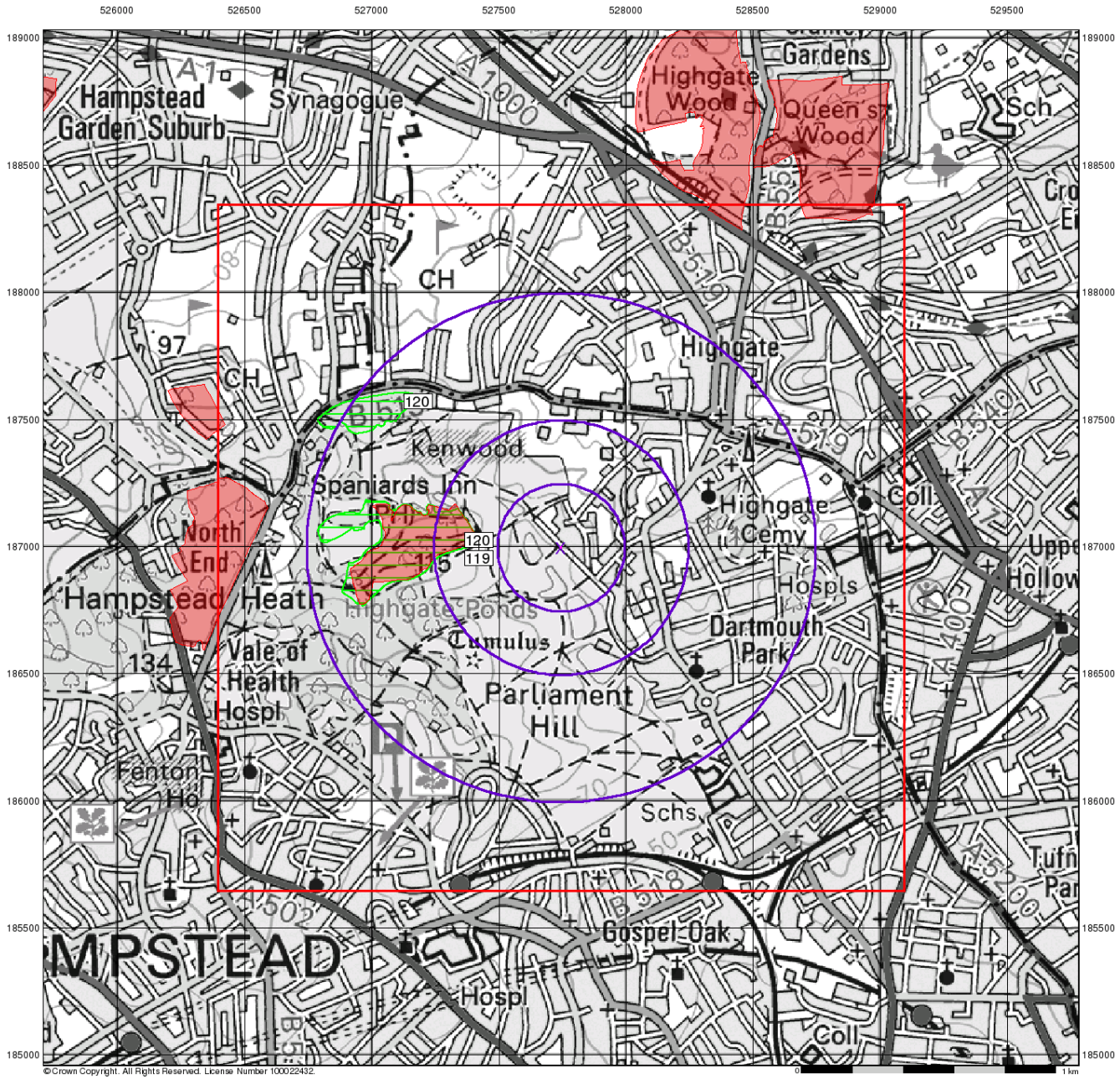


GEA Geotechnical & Environmental Associates

Sensitive Land Uses

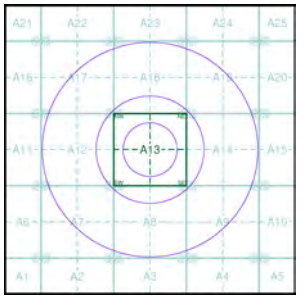
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Sensitive Land Uses

- Ancient Woodland
- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area
- World Heritage Sites

Site Sensitivity Context Map - Slice A



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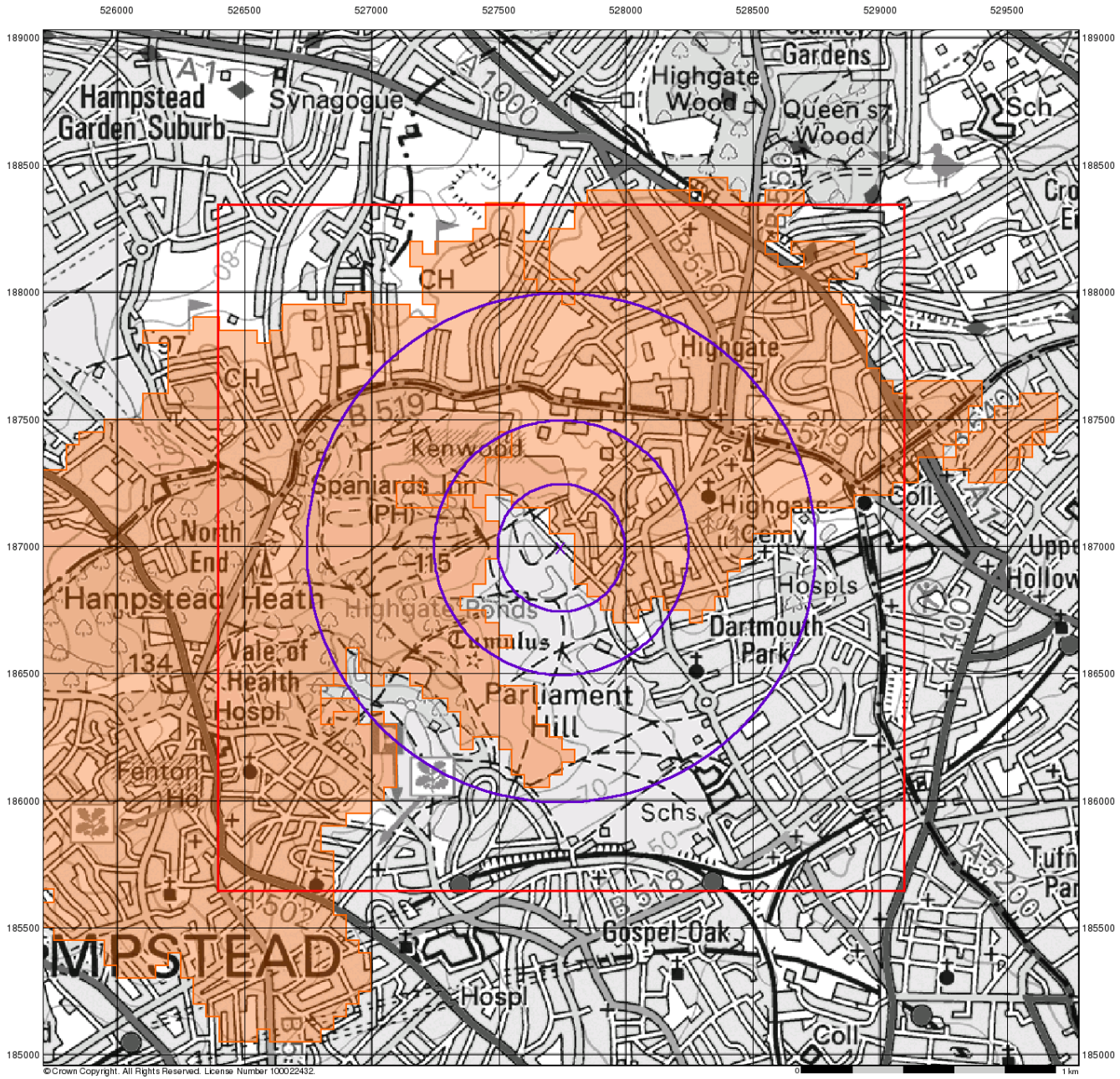


GEA Geotechnical & Environmental Associates

BGS Flood GFS Data

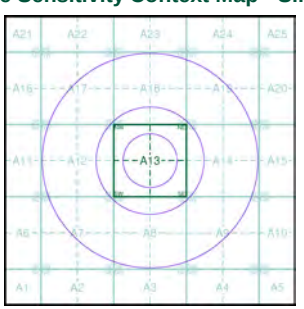
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



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