Appendix F

Desk Study and Ground Investigation

DESK STUDY & GROUND INVESTIGATION REPORT

5-17 Haverstock Hill
London NW3

Client: Mark Steinberg

Engineer: Conisbee

J15316

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GEA Geotechnical & Environmental Associates

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EXECUTIVE SUMMARY

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

BRIEF

This report describes the findings of a site investigation by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Conisbee, on behalf of Mark Steinberg, with respect to the proposed redevelopment of the site, which is understood will comprise a new ten-storey building with single level basement. The purpose of the investigation has been to research the history of the site with respect to possible contaminative uses, to determine the ground conditions and hydrogeology, to assess the extent of any contamination and to provide information to assist with the design of the basement structure and suitable foundations for the proposed development. A Basement Impact Assessment in accordance with London Borough of Camden (LBC) Planning Guidance CPG4 is currently being prepared and will be included in the final report. A ground movement assessment is also being undertaken and the findings will be presented in a separate report.

DESK STUDY FINDINGS

The desk study research indicates that the site and immediate surrounding area were developed prior to 1875 with housing and gardens. At some time between 1916 and 1954 the site was redeveloped with the existing six-storey building. Anecdotal information indicates that redevelopment took place in the late 1930s and the site was occupied by a garage used for parking of 300 cars over ten levels, a motor showroom for 60 cars and offices. On the Adelaide Road frontage there was a petrol station, workshop, washing bays, store, battery charging rooms and six shops. By 1966 the garage was used as a depot and was until recently occupied by the Metropolitan Police, but is now vacant. An enquiry has been made to the local petroleum officer with regard the presence of buried fuel tanks, but no information is held and it is not known if tanks have been decommissioned or removed. The immediate surrounding area has not had a particularly contaminative history. A risk of soil gas has not been identified.

GROUND CONDITIONS

The investigation generally encountered the expected ground conditions in that, beneath a moderate to significant thickness of made ground, London Clay was encountered and proved to the maximum depth investigated of 24.70 m. The made ground extended to depths of between 0.80 m to 2.60 m, below ground level and generally comprised brown clay with flint gravel and sand partings, fragments of concrete and brick and rootlets. Natural soils were generally encountered directly beneath the existing basement slab which was between 0.15 m and 0.19 m in thickness. At a single location a layer of soft dark grey mottled black silty sandy clay with wood was noted to extend from 0.15 m to 0.45 m below basement level. The London Clay initially comprised firm becoming stiff fissured high strength and very high strength brown mottled grey silty clay with occasional partings of orange-brown fine sand and silt and selenite crystals, which extended to depths of 9.60 m and 9.80 m from ground level and to a depth of 8.30 m below existing basement level. Below this depth, stiff becoming very stiff fissured high strength to extremely high strength grey silty clay with rare grey burrows was encountered. Claystones were encountered at various depths within the London Clay. The clay was noted to be desiccated to a depth of 2.30 m below ground level, in close proximity to an existing tree. Seepages were encountered from the made ground locally and perched water was encountered around claystones. Monitoring has measured groundwater at depths of between 1.87 m and 3.72 m.

No vapours were detected during the soil vapour survey or during headspace analysis on recovered soils. Contamination testing has revealed elevated concentrations of lead and arsenic within samples of made ground and elevated lead was measured within a single sample of London Clay, near the top of this stratum.

RECOMMENDATIONS

Excavations for the proposed basement structure will require temporary support to maintain stability of the excavation and surrounding structures at all times. Shallow groundwater has been measured within the standpipes and this probably reflects the presence of perched water that has become trapped by the low permeability clay and a contiguous bored pile wall should be appropriate, subject to further testing and trial excavations.

End users will be isolated from direct contact with the identified contaminants by the extent of the new building and areas of external hardstanding and no new pathways will be created during redevelopment of the site, apart from to site workers in the short term. Suitable precautions should be undertaken to protect site workers and a watching brief should be maintained during groundworks. If any odorous, discoloured or suspicious material is encountered, or evidence of any buried tanks, works should be suspended in that area until an experienced geoenvironmental engineer has attended site to provide further advice.

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 Limited (GEA) has been commissioned by Conisbee, on behalf of Mark Steinberg, to carry out a desk study and ground investigation at 5-17 Haverstock Hill, London, NW3 2BL.

In addition, a Basement Impact Assessment in accordance with London Borough of Camden (LBC) Planning Guidance CPG4 is currently being prepared and will be included in the final report. A ground movement assessment is also being undertaken and the findings will be presented in a separate report.

1.1 Proposed Development

There are two options being considered for the redevelopment of the site; the first option is to demolish the existing six-storey building and the second option is to demolish part of the existing building, whilst retaining the existing retail units that front onto Adelaide Road. Following full or partial demolition it is proposed to construct a new ten-storey building, with retail units at ground level and residential accommodation on the upper floors. A single level basement car park will be included within the scheme.

This report is specific to the proposed development and the advice herein should be reviewed once the development proposals have been finalised.

1.2 Purpose of Work

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

- to determine the history of the site and surrounding area, particularly with respect to any previous or present potentially contaminative uses;
- to determine the ground conditions and their engineering properties;
- to investigate the configuration of existing foundations;
- to provide advice and information with respect to the design of suitable foundations and retaining walls;
- to provide an indication of the degree of soil contamination present; and
- to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

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

- a review of available historical Ordnance Survey (OS) maps;
- a preliminary UXO risk assessment, carried out by First Line Defence;
- to check records of data on groundwater, surface water and other publicly available environmental data;
- a review of readily available geology maps;
- a review of planning records;
- an enquiry to the contaminated land department at the local authority;
- an enquiry to the petroleum officer with respect to records of underground storage tanks (USTs); and
- a walkover survey of the site carried out prior to the fieldwork.

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

- two boreholes advanced to depths of 15.00 m and 24.70 m from ground level by means of a standard cable percussion drilling rig;
- a total of five open-drive sampler boreholes advanced to depths of 4.00 m and 5.20 m below ground level and to depths of 3.00 m and 10.00 m below the existing lower car park level;
- standard penetration tests (SPTs), carried out at regular intervals in the cable percussion boreholes and a single open-drive sampler borehole, to provide quantitative data on the strength of the soils;
- a soil vapour survey carried out at 32 locations within the existing lower level car park and three locations from internal ground level, using a Photo-Ionisation Detector (PID);
- headspace testing on all samples of recovered soils from the open-drive sampler boreholes;
- installation of three groundwater monitoring standpipes to depths of 6.00 m and two subsequent monitoring visits, roughly two weeks and six weeks after installation;
- a single hand-dug trial pit excavated to a depth of 1.20 m to expose the footings shared with Chalk Farm LUL station;
- testing of selected soil samples for contamination and geotechnical purposes; and
- provision of a report presenting and interpreting the above data, together with our

advice and recommendations with respect to the proposed development.

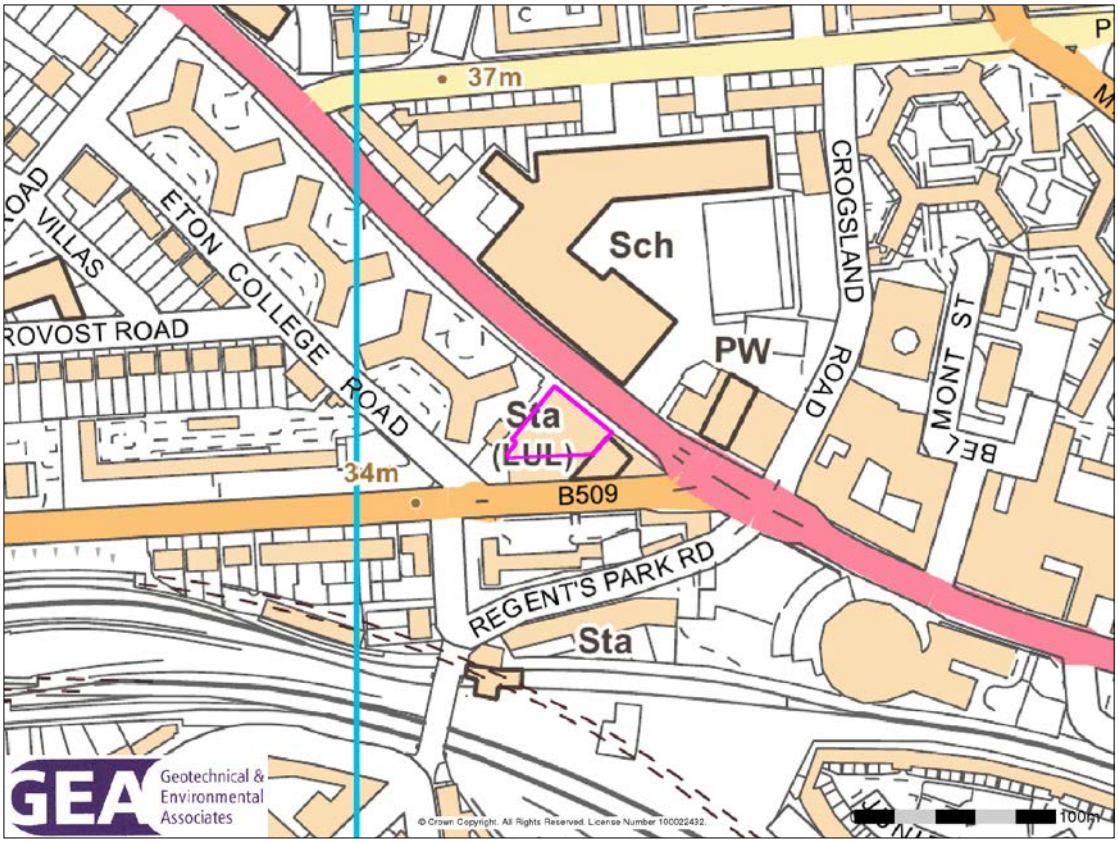
The report includes a contaminated land assessment which has been undertaken in accordance with the methodology presented in Contaminated Land Report (CLR) 11[1] and involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with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

1.4 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, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

2.1 Site Description



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

The site is located in the London Borough of Camden, in a mixed residential and commercial area. It fronts onto Haverstock Hill to the northeast and Adelaide Road to the south. It is adjoined to the southeast by Chalk Farm London Underground station, a two-storey building and is bordered to the northwest by Eton Place, a six-storey apartment block, which fronts onto Eton College Road to the southwest. The site may be additionally located by National Grid Reference 528100, 184430 and is shown on the map extract on the previous page.

A walkover survey of the site was carried out by an engineer from GEA on 10 November 2015 and selected photographs are included below.

The local topography slopes down towards the southeast, although the site is sensibly level at a level of about 32 m OD. It is roughly triangular in shape, measuring approximately 60 m by 40 m in maximum dimensions. The central and southern part of the site is occupied by a brick building comprised of up to six-storeys with a partial basement extending to a depth of roughly 1.20 m below existing ground level, which comprises the lowest level of car park.

A shutter door is present along the northwestern elevation of the six-storey building, which leads to the ground floor, with a ramp that leads down to the basement, and another ramp that leads up to the first floor. It is understood that in total there are 10 levels of car parking. Three chambers were noted within the floor, to the north of a column. The covers of the chambers were lifted and the chambers were full of sludge and a sewage odour was noted; it is understood that these are interceptors. A compressor was noted in the corner of the room and the floor was noted to be gently sloping down towards the south. A storage room was noted in the southeastern corner, with spare car parts left in the room and storage containers of chemicals.

On the Haverstock Hill frontage, a two-storey building is present, which is currently vacant and is understood to have been a showroom on the ground floor. Along the Adelaide Road frontage a two-storey building comprises retail units on the ground floor, currently in use and occupied by a newsagents, wine shop, dry cleaners, café and estate agents. It is understood that the upper floors were used as offices. The main building is tenanted for security purposes by VPS.

An area of hardstanding is present in the northwest of the site which can be accessed from Haverstock Hill via two sets of double gates or from Adelaide Road via a double gate. This area is currently used as a car park by the tenants and contains numerous services, evident from surface scarring and shown on the service plans. In this area, a vent was noted along with a manhole cover, which was lifted and found to have be infilled. A further three chambers were noted in this area and are understood to have been interceptors.

In the central northern part of the car park, a single storey detached building is present and along the northern boundary is a brick wall. Cracks were noted in both of these structures, up to 40 mm in width and monitoring points were observed.

Mature trees, up to 20 m in height are present in the grounds of Eton Place along the northern perimeter of the site. Semi-mature trees, ranging from 6 m to 8 m in height, are present along on the pavement along the Haverstock Hill frontage. The site is essentially devoid of vegetation.

During heavy rainfall it is understood that part of the lower ground floor is flooded, but it is not known how this water enters the building.


Adelaide Road frontage


Haverstock Hill frontage


Adelaide Road frontage


Manhole covers in lower car park level


Manhole covers in external car park


Store room at lower car park


Single storey outbuilding


Northern part of site, looking east towards Haverstock Hill

2.2 Site History

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

The earliest map studied, dated 1875, indicates the site and surrounding area had been developed with what appears to be housing with front and rear gardens. The site fronted onto Haverstock Hill to the northeast and Adelaide Road was in its current layout to the south. A railway track was present 120 m to the south of the site with associated goods shed and goods depot and Chalk Farm Station is shown 100 m to the south of the site. A timber yard was present 240 m to the southwest of the site and a watercourse was shown issuing 200 m to the southwest of the site, which appeared to be flowing in a roughly southwesterly direction. A pond like feature was present 400 m to the southwest of the site.

By the time of the next map, studied, dated 1896, the site and immediate surrounding area appear to have remained unchanged. The goods shed had been renamed as a warehouse and a coal depot was present 80 m to the southeast of the site. The watercourse and pond are no longer shown.

On the 1916 map, there were relatively few changes to the site and surrounding area. The housing directly to the northeast of the site, located on the opposite side of Haverstock Hill, had been demolished and replaced by a school.

Between 1916 and 1954, significant changes occurred to the site and surrounding area. The houses on the site and to the northwest and west were replaced with what appears to be the existing buildings. A garage is shown on the site, along with Chalk Farm parade along the Adelaide Road frontage. Chalk Farm Station had been renamed Primrose Hill Station and Chalk Farm Station was relocated immediately to the southeast of the site, on a corner plot, fronting onto both Adelaide Road and Haverstock Hill. To the northwest of the site, three apartment blocks had been constructed, fronting onto Eton College Road to the southwest. The school also appears to have been extended.

Anecdotal information provided by the consulting engineer indicates that the site was built for Messrs Bell Property Trust Ltd in 1939. The three apartment blocks to the northwest of the site were to be constructed as part of the same development. The article appears to have been written following construction of the garage on site but not the apartment blocks.

It is understood that part of the building was to provide garaging facilities for the tenants of the site and other residential developments in the immediate neighbourhood. Space was provided for 300 cars over ten levels, a motor showroom for 60 cars and offices. On the Adelaide Road frontage there was a petrol station, workshop, washing bays, store, battery charging rooms and six shops.

Bomb damage maps indicate that the school to the north of the site was completely destroyed and damage was recorded to the southeastern wing of Eton Place.

By the time of the 1966 map the garage is shown as a depot and it is understood that it has most recently been used by the Metropolitan Police. The site and immediate surrounding area appear to have remained unchanged to the present day.

2.3 Other Information

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

The Envirocheck report has indicated no landfill sites, waste management or waste transfer sites located within 500 m of the site. In addition, there are no pollution incidents to controlled waters within 250 m of the site and there are no discharge consents within 500 m of the site.

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

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

A fuel station was recorded within 250 m of the site at a distance of 72 m northeast of the site, which is now recorded as obsolete.

An enquiry was made to the London Fire and Emergency Planning Authority, given the former petrol station on the Adelaide Road frontage. No information was held on any tanks present on site and it is therefore not known if tanks have been filled or removed.

Contact was also made with the contaminated land department at Camden but no information was held on the site.

The LUL Northern Line Tunnel is located to the north of the site, beneath Haverstock Hill, with the crown levels at a depth of roughly 10 m (21.90 m OD) below ground level. Contact has been made with London Underground Limited (LUL) regarding their assets beneath the site and their response is included in the appendix, regarding permission to undertake site investigation. Further liaisons will need to be made with LUL to ensure that the development proposals do not impact upon their assets.

A tunnel correlation survey was instructed by the client and has been undertaken by LUL. A copy of the correlation survey for the site with the Northbound Northern Line has been provided by LUL (drawing reference NO46-00000-01, dated 19 November 2015).

2.4 Preliminary UXO Risk Assessment

A preliminary UXO risk assessment has been carried out by 1st Line Defence (ref OPN2876, dated 5 November 2015) and the report 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 unexploded ordnance (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 identified a minimal risk of encountering unexploded ordnance at the site and therefore no further action is required.

2.5 Geology

The British Geological Survey (BGS) map of the area[2], and the BGS 1:50,000 Bedrock and Superficial Geological Map Sheet 256 indicate that the site is directly underlain by the London Clay Formation.

According to the British Geological Society memoir, the London Clay Formation is homogenous, slightly calcareous silty clay to very silty clay, with some beds of clayey silt grading to silty fine grained sand.

A search of archive BGS borehole records indicate that a borehole has been undertaken to the east of the site at Chalk Farm station (reference TQ28SE299). The borehole found made ground to a depth of 0.61 m, overlying London Clay, proved to a depth of 10.36 m.

Two boreholes were drilled to the north of the site, at the school (references TQ28SE217 and TQ28SE217/A-B). Made ground was found to extend to depths of 0.61 m and 1.22 m, overlying brown clay, proved to depths of 5.03 m.

[2] www.bgs.ac.uk/geoindex

2.6 Hydrology and Hydrogeology

The London Clay is classified by the Environment Agency as unproductive strata, which refers to deposits that have low permeability and negligible significance for water supply or river base flow.

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

The nearest surface water feature is Regents Canal, located 529 m southeast of the site.

The site lies outside the catchment of the Hampstead Heath chain of ponds.

Due to the predominantly cohesive nature of the soils, the groundwater flow rate is likely to be negligible. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10^{-10} m/s and 1 x 10^{-8} m/s, with an even lower vertical permeability.

The site is not at risk of flooding from rivers or sea, as defined by the Environment Agency; Haverstock Hill and Adelaide Road have not been identified as a street at risk of surface water flooding, specified in the London Borough of Camden (LBC) Planning Guidance CPG4.

Historically a tributary of the River Fleet flowed in a roughly southeasterly direction, about 150 m to the east of the site. It is understood that the River Fleet is now covered and culverted and forms part of the surface water sewerage system.

The site is largely covered by the existing building and hardstanding and therefore infiltration of rain water into the ground beneath the site is limited and therefore the majority of surface runoff is likely to drain into combined sewers in the road.

2.7 Preliminary Risk Assessment

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

2.7.1 Source

The desk study research indicates that the site and immediate surrounding area were developed prior to 1875 with housing and gardens. At some time between the 1916 map and 1954 map the site was redeveloped with the existing six-storey building, apartment blocks to the northwest and Chalk Farm station to the southeast. Anecdotal information indicates that redevelopment took place in the 1930s. It is understood that the six-storey building was occupied by a garage used for parking of 300 cars over ten levels, a motor showroom for 60 cars and offices. On Adelaide Road frontage there was a petrol station, workshop, washing bays, store, battery charging rooms and six shops. By 1966, the garage was used as a depot, and it is understood that this was used by the Metropolitan Police.

It is not known if any buried tanks, associated with the former fuel station, have been decommissioned or removed. There is a risk of contamination at the site as a result of leakage of any buried fuel tanks.

The former use of the site as filling station and a garage / depot may have involved storage, garaging and maintenance of motor vehicles has involved the storage of a range of potentially hazardous materials or potential contaminants. Reference to the relevant DoE Industry Profile[3] indicates the main following potential contaminants:

- petrol and diesel fuels;
- lead from fuels;
- car wash detergents;
- engine and lubricating oils;
- lighter oils from machining operations;
- fuel oils;
- copper from engine bearings and other metals from engine parts;
- ethylene glycol and methanol from anti-freeze;
- glycols and ethers from brake fluids;
- asbestos from brake linings; and
- a range of solvents used in degreasers, thinners, fillers, adhesives, strippers and paints.

A fuel station was present 72 m northeast of the site, but was located downslope of the site so does not present a risk of migration of contaminants to the site.

The site is directly underlain by low permeability London Clay and there is a limited pathway for the migration of potential contaminants on or off-site, except through made ground.

There are no historical or existing landfill sites within 250 m of the site, such that no potential sources of soil gas have therefore been identified.

2.7.2 Receptor

The site is to be redeveloped for residential purposes, with some retail units at ground floor. The residential end use is considered a high sensitivity end-use. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are likely to come into direct contact with any contaminants present in the soil and through inhalation of vapours during demolition and construction. Being underlain by unproductive strata, groundwater is not considered to be a receptor.

[3] Department of the Environment Industry Profile (1996) *Road vehicle fuelling, services and repair: garages and filling stations.* HMSO

2.7.3 Pathway

Upon completion of the development the site will be entirely hard covered. There will thus be a very limited potential for direct contact with contaminants in the ground or for dusting to occur from such contaminated soils.

The presence of negligibly permeable London Clay beneath the site will limit the potential for groundwater percolation into the underlying chalk, and thus a pathway is not considered likely to exist to the principal aquifer. There will be limited potential for contaminants to move on or off the site, except horizontally within any made ground in association with perched groundwater movements, although this pathway is also already in existence. A pathway for ground workers to come into contact with any contamination will exist during demolition and construction work and services will come into contact with any contamination within the soils in which they are laid.

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

2.7.4 Preliminary Risk Appraisal

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

3.0 EXPLORATORY WORK

The locations of the boreholes were governed by the 15 m exclusion zone of the Northern Line tunnel, located to the north of the site below Haverstock Hill.

In order to meet the objectives described in Section 1.2, a soil vapour survey using a Photo-Ionisation Detector (PID) was initially undertaken on a grid pattern at a total of 32 probe locations from lower car park level and three probe locations from internal ground level to investigate the potential risk of hydrocarbon vapours. At ground level the external car park area contained numerous services, so it was not possible to drill any probe holes within the hardstanding, without the risk of damaging potentially buried services and therefore four hand-dug services inspection pits were undertaken in the area, closest to the Adelaide Road frontage to provide shallow samples for subsequent headspace analysis.

Two cable percussion boreholes were drilled externally within the hardstanding area in the northern part of the site, to depths of 15.00 m and 24.70 m. Disturbed and undisturbed samples were recovered for subsequent laboratory examination and testing. In addition, a 10.00 m deep borehole was drilled from lower car park level, using a tracked open-drive sampler rig. Standard Penetration Tests (SPTs) were carried out at regular intervals in the boreholes to provide quantitative data on the strength of soils encountered.

To supplement the deep boreholes, three further boreholes were drilled at ground level to depths of 4.00 m and 5.20 m and an additional borehole drilled at lower car park level to a depth of 3.00 m to provide additional coverage of the site with respect to contamination, using the open-drive tracked sampler rig.

In addition, a single hand-dug trial pit was excavated to a depth of 1.20 m against the eastern boundary wall, adjoining Chalk Farm Station.

Head space testing was undertaken on samples recovered from the open-drive sampler boreholes and trial pits using a Photo-Ionisation Detector (PID) to detect any hydrocarbon vapours within the soil.

Groundwater monitoring standpipes were installed in three boreholes to depths of 6.00 m from ground level and lower car park level and have been monitored on two occasions to date, following the fieldwork, roughly two weeks and six weeks after installation.

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

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

The borehole and trial pit records and results of the laboratory testing are enclosed, together with a site plan indicating the exploratory positions. The Ordnance Datum (OD) levels shown on the borehole records have been interpolated from spot heights shown on a drawing by Conisbee (reference SSK104 rev P3, dated November 2015), which was provided by the consulting engineer. Internal floor levels have not been provided to date.

3.1 Sampling Strategy

The initial scope of the works and locations of the cable percussion boreholes and trial pits was specified by Conisbee, with input from GEA, and was finalised following a site visit to check access and following a review of the desk study findings and service plans. The proposed locations of the trial pits and boreholes, along with our Method Statements and Risk Assessments were approved in writing by LUL on 19 November 2015.

The boreholes and trial pit were positioned on site in accessible locations by GEA to avoid areas of known services.

A total of 15 samples from across the site were analysed for a range of common industrial contaminants and contamination indicative parameters. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. The soil samples were selected to provide a general view of the chemical conditions of the soils that are likely to be involved in a human exposure or groundwater pathway and to provide advice in respect of re-use or for waste disposal classification. In addition three samples of made ground were screened for asbestos as a precautionary measure.

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

A number of samples recovered from the boreholes were submitted to a geotechnical laboratory for a programme of testing that included moisture content and Atterberg limit tests, undrained triaxial compression tests and soluble sulphate and pH level analysis.

4.0 GROUND CONDITIONS

The investigation has confirmed the expected ground conditions in that, below a moderate to significant thickness of made ground, London Clay was encountered to the full depth investigated.

4.1 Made Ground

The made ground varied in thickness and generally comprised brown clay with flint gravel and sand partings, fragments of concrete and brick and rootlets. At ground level the made ground was found to extend to depths of between 0.80 m to 2.60 m. The thickness of made ground appeared to be greatest in the northern part of the site, towards Eton Place, which may be associated with the removal of former fuel tanks, or the former buildings on site.

In the car park area, tarmac was encountered overlying concrete, which extended to depths of between 0.20 m and 0.35 m. Beneath the covering of concrete a layer of metal square mesh was noted.

The internal ground floor slab extended to a depth of 0.16 m.

In Borehole No 2, a layer of concrete was noted from 2.50 m to 2.60 m, which may possibly represent an old basement slab from the former houses.

The base of the made ground was not proved in Borehole Nos 3 and 3A. In Borehole No 3, metal was encountered at a depth of 0.14 m, along one edge of the service pit, so the borehole was relocated 1.00 m to the northeast. At a depth of 0.56 m rusty metal was noted across the entire base of the service pit and the borehole location was relocated 3 m to the northeast. It is possible that the metal encountered within Borehole No 3A, located close to the chambers within the external car park, may be a buried fuel tank from the former fuel station.

At lower car park level, the floor slab comprised screed over concrete, extending to depths of 0.15 m and 0.19 m, with no reinforcement noted in the recovered cores. In Borehole No 6, a layer of cobbly gravel with brick fragments was noted beneath the slab, which was in turn underlain by soft dark grey mottled black silty sandy clay with decayed wood and an organic odour, extending to a depth of 0.45 m.

No vapours were detected with the PID during headspace analysis on recovered samples.

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

4.2 London Clay

The London Clay initially comprised firm becoming stiff brown mottled grey silty fissured clay with occasional partings of orange-brown fine sand and silt and selenite crystals, which extended to depths of 9.60 m and 9.80 m from ground level and to a depth of 8.30 m below existing basement level. Below this depth, unweathered London Clay comprised of stiff becoming very stiff grey silty fissured clay with rare grey burrows was encountered and proved to the maximum depth investigated of 24.70 m.

Claystones were encountered at various depths within the London Clay and Borehole No 1 was terminated on a claystone at a depth of 24.70 m.

In Borehole No 2 a pyrite nodule was encountered at a depth of 14.50 m.

Live rootlets were noted to depths of 2.10 m and 2.60 m and dead rootlets to a maximum depth of 4.80 m below ground level. Below existing lower car park level dead rootlets were noted to a depth of 2.60 m. In Borehole No 3B the clay was noted to be 'stiff' and desiccated to a depth of about 2.30 m, in close proximity to existing mature trees and it is possible the clay was also potentially desiccated in Borehole No 5 to a similar depth.

Atterberg limit tests indicate the clay to be of high volume change potential. The results of the undrained triaxial tests generally indicate an increase in strength with depth. The results indicate the clay to be of high strength to extremely high strength.

No evidence of contamination was noted in these soils, although a total of 11 samples of natural soil were sent for contamination testing as a precautionary measure and the results are discussed in Section 4.5 below.

4.3 Groundwater

A seepage was noted from within the base of the made ground at a depth of 2.50 m in Borehole No 2. Perched water was encountered around a claystone in Borehole No 3B at a depth of 3.43 m. Perched water was also encountered at the base of the trial pit excavated to expose the footings of Chalk Farm London Underground Station and water was measured at a depth of 0.98 m below floor level on completion of the trial pit.

Three standpipes were installed to a depth of 6.00 m and have been monitored on two occasions to date, roughly two weeks and six weeks after installation. The results of the monitoring visit are shown in the table below. The second monitoring visit was undertaken after a period of heavy sustained rainfall.

Date	Borehole No	Depth to water (m)
18/12/2015	1	2.08
	2	1.88
	6	DRY
13/01/2016	1	2.05
	2	1.87
	6	3.72

4.4 Soil Contamination

Initially a soil vapour survey (SVS) was undertaken on a grid pattern, in the existing lower level car park in the area of the manhole covers, understood to have been interceptor tanks. The SVS comprised 32 probe holes at lower car park level and three positions at internal ground level, drilled with a 'Hilti' drill to a depth of 1.00 m. A plan showing the locations of the probe holes are included in the appendix. No vapours were detected during the soil vapour survey (SVS).

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

Determinant	BH3A: 0.40 m	BH3B: 0.80 m	BH4: 0.60 m	BH5: 0.60 m
pH	10.8	11.4	9.9	8.4
Arsenic	31	26	**70**	16
Cadmium	0.10	0.10	<0.10	<0.10
Chromium	32	34	33	47
Copper	34	42	29	30
Mercury	0.18	0.35	0.20	<0.10
Nickel	26	32	22	45
Lead	**210**	**1100**	60	**390**
Selenium	<0.20	<0.20	<0.20	<0.20
Zinc	130	200	58	110
Total Cyanide	<0.50	<0.50	<0.50	<0.50
Total Phenols	<0.30	<0.30	<0.30	<0.30
Sulphide	95	11	1.5	2.6
Total PAH	13	6.1	14	2.6
Benzo(a)pyrene	1.5	0.74	1.1	0.26
Naphthalene	<0.10	<0.10	2.3	<0.10
TPH	38	27	32	<10
Total organic carbon %	0.47	0.71	1.2	0.31

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

4.4.1 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[4] Soil Guideline Value where available, or is a Generic Screening Value calculated using the CLEA UK Version 1.06[5] software assuming a residential end use, or is based on the DEFRA Category 4 Screening values[6]. 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 six years old;

[4] *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.
[5] Contaminated Land Exposure Assessment (CL|EA) Software Version 1.06 Environment Agency 2009
[6] CL:AIRE (2013) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Final Project Report SP1010 and DEFRA (2014) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Policy Companion Document SP1010

- that 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, consumption of homegrown produce, consumption of soil adhering to homegrown produce, 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

It is considered that these assumptions are acceptable for this generic assessment of this site, albeit conservative as the site is to be covered entirely covered by hard surfaces.

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.

The results of the contamination testing have revealed elevated arsenic and lead within some samples of the made ground. In addition, 11 samples of natural soils were tested and generally no elevated concentrations of contaminants were measured, although a slightly elevated concentration of lead was noted in Borehole No 3B at a depth of 2.10 m.

No asbestos was detected within the three samples of made ground screened.

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

4.5 Existing Foundations

The findings of the trial pit are summarised in the table below. Sketches and photographs of the pit are included in the Appendix.

Trial Pit No	Structure	Foundation detail	Bearing Stratum
1	Chalk Farm London Underground station	Concrete Top 0.16 m Base of footing not proved, extends at least to a depth of 1.20 m Lateral projection 0.16 m	Not proved

Perched water was encountered at the base of the trial pit and was at a depth of 0.98 m below floor level on completion of the trial pit.

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 foundation options and contamination issues.

5.0 INTRODUCTION

There are two options being considered for the redevelopment of the site; the first option is to demolish the existing six-storey building and the second option is to demolish part of the existing building, whilst retaining the existing retail units that front onto Adelaide Road. Following full or partial demolition it is proposed to construct a new ten-storey building, with retail units at ground level and residential accommodation on the upper floors. The proposal will also include a single level basement car park.

6.0 GROUND MODEL

The desk study has revealed that the site has had a potentially contaminative history, given that it was used a filling station and garage, and on the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- below a moderate to significant thickness of made ground below ground level or nominal thickness below existing lower car park level, the London Clay was encountered and proved to the maximum depth investigated of 24.70 m;
- the concrete hardstanding in the external car park extends to depths of between 0.20 m and 0.35 m, over a layer of metal square mesh and the existing ground floor slab and lower ground floor slab were between 0.15 m and 0.19 m in thickness;
- the made ground extends to depths of 0.80 m and 2.60 m below ground level and generally comprises brown clay with flint gravel and sand partings, fragments of concrete and brick and rootlets, with the greatest thickness in the north of the site;
- metal was encountered at a depth of 0.56 m across the entire base of the services inspection pit located close to the chambers within the external car park may be a buried fuel tank from the former fuel station;
- a layer of concrete was encountered from 2.50 m to 2.60 m below ground level at a single location, and may represent a former basement slab with a backfilled basement;
- at existing lower car park level the slab is generally directly underlain by natural soils;
- soft dark grey mottled black silty sandy clay with decayed wood was noted at a single location extending to a depth of 0.45 m below existing lower car park level;
- the London Clay initially comprises firm becoming stiff fissured high strength and very high strength brown mottled grey silty clay with occasional partings of orange-brown fine sand and silt and selenite crystals, which extends to depths of 9.60 m and 9.80 m from ground level and to a depth of 8.30 m below existing lower level car park;

- below this depth, stiff becoming very stiff fissured high strength to extremely high strength grey silty clay with rare grey burrows was encountered and proved to the maximum depth investigated of 24.70 m;
- claystones were encountered at various depths across the site within the London Clay;
- the clay was noted to be desiccated to a depth of 2.30 m below ground level;
- seepages were encountered during made ground locally and perched water was encountered around claystones. Subsequent monitoring has measured groundwater at depths of between 1.87 m and 3.72 m; and
- contamination testing has revealed elevated concentrations of lead and arsenic within the made ground and a slightly elevated concentration of lead within a single sample of London Clay.

7.0 ADVICE AND RECOMMENDATIONS

All new foundations should bypass the made ground and potentially desiccated clay soil. If spread foundations become uneconomic or proposed loads are high, piled foundations would be a suitable solution for the proposed development.

Formation level for the single basement is likely to be within the London Clay and the results of the groundwater monitoring to date indicate that it will not be possible to construct the basement without some form of groundwater control, although significant groundwater inflows are not anticipated.

Excavations for the proposed basement structure will require temporary support to prevent any excessive ground movements and the stability of neighbouring structures will need to be ensured at all times.

7.1 Basement Excavation

7.1.1 Basement Construction

It is understood that it is proposed to form a single level basement, which will extend to a depth of approximately 4.00 m below existing ground level and formation level is likely to be within the stiff weathered London Clay.

Groundwater seepages were noted during the fieldwork, perched near the base of the made ground and around claystones in the London Clay. Subsequent groundwater monitoring has measured groundwater at depths of between 1.87 m and 3.72 m. Whilst groundwater monitoring should be continued, it is not possible to draw entirely meaningful conclusions from the measurements made in the standpipes, as the level of the water is not necessarily as significant as the volume of water that may flow into the excavation. For example, a high level of water measured in a standpipe may not be significant if this represents only a small volume of water. The London Clay includes thin partings of fine sand and silt and the occurrence of groundwater into the basement will to a large extent be determined by the presence of these more permeable materials. Shallow inflows of perched water may also be encountered from within the made ground, particularly within the vicinity of existing foundations, although such inflows are unlikely to be significant and should be adequately dealt with through sump pumping.

It would therefore be prudent, once access is available, to carry out a number of trial excavations, to depths as close to the full basement depth as possible, to provide an indication of the likely groundwater conditions.

At this stage it is recommended that simple permeability tests are undertaken within the standpipes installed provide preliminary information on likely groundwater inflow rates into the proposed basement excavation.

There are a number of methods by which the sides of the basement excavation could be supported in the temporary and permanent conditions. The choice of wall may be governed to a large extent by whether it is to be incorporated into the permanent works and have a load bearing function. The final choice will depend to a large extent on the need to protect nearby structures from movements, the required overall stiffness of the support system, and the need to control groundwater movement through the wall in the temporary condition. Consultation with LUL will also need to be undertaken at the earliest opportunity to ensure the safety of the Northern Line tunnel and Chalk Farm London Underground station, once the proposals have been finalised.

The noise and vibrations associated with sheet piling is likely to make it unacceptable. A bored pile wall is likely to be the most appropriate method of supporting the basement excavation in the temporary and permanent conditions and could have the advantage of being incorporated into the permanent works and will be able to provide support for structural loads.

On the basis of the monitoring to date, it should be possible to adopt a contiguous bored pile wall, with the use of localised grouting and / or pumping if necessary in order to deal with groundwater inflows, subject to the results of the further testing and investigation to assess the rate of groundwater inflow as noted above.

The ground movements associated with the basement excavation will depend on the method of excavation and support and the overall stiffness of the basement structure in the temporary condition. Thus, a suitable amount of propping will be required to provide the necessary rigidity. In this respect the timing of the provision of support to the wall will have an important effect on movements. The stability of the adjacent foundations will need to be ensured at all times and the existing foundations will need to be underpinned prior to construction of the proposed new basement or will need to be supported by new retaining walls.

7.1.2 Retaining Walls

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

Stratum	Bulk Density (kg/m^3)	Effective Cohesion ($c' - kN/m^2$)	Effective Friction Angle (Φ' – degrees)
Made Ground	1700	Zero	20
London Clay	1950	Zero	24

Groundwater has been measured at depths of between 1.87 m and 3.72 m and groundwater may be encountered during basement excavation. Further groundwater monitoring and trial excavations should be undertaken as detailed in Section 8.1.1. Reference should be made to BS8102:2009[7] with regard to requirements for waterproofing and design with respect to groundwater pressures.

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

7.1.3 Basement Heave

Formation level of the approximately 4.00 m deep basement is likely to be within the stiff weathered London Clay and will result in a net unloading of up to approximately 80 kN/m². The proposed excavations will result in elastic heave and long term swelling of the London Clay. The effects of the longer term swelling movement will be mitigated to some extent by the load applied by the new foundations.

Consideration will need to be given to the effects of differential movement that will occur beneath the new basement and existing lower ground floor level.

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

7.2 Spread Foundations

Where new buildings are proposed with no basement, spread foundations bearing in the firm London Clay may be designed to apply a net allowable bearing pressure of 120 kN/m² at a minimum depth of 1.0 m, assuming that restrictions are applied on planting of shrubs in the vicinity of foundations, or at a depth of 1.5 m if there is unrestricted planting of shrubs in the new development, subject also to the further restrictions on new tree planting as detailed in the NHBC guidelines. Foundations, will however, need to be extended to depths greater than 2.60 m, to bypass the made ground and potentially desiccated clay soils. On this basis, it is unlikely to be economic to construct spread foundations for any new buildings without basements.

The excavation of the proposed 4.00 m deep basement is likely to result in formation level within the London Clay and it should be possible to adopt moderate width pad or strip foundations in the stiff clay, designed to apply a net allowable bearing pressure of 150 kN/m^2 below the level of the proposed basement floor, provided that a dry excavation can be maintained.

The depth of the basement 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.

If the proposed loads are high or the required founding depths become uneconomic piled foundations would provide a suitable foundation option.

7.3 Piled Foundations

For the ground conditions at this site some form of bored pile is likely to be the most appropriate. A conventional rotary augered pile may be appropriate but consideration will need to be given to the possible instability and water ingress in the made ground and within any silty or sandy zones within the London Clay. The use of bored piles installed using continuous flight auger (cfa) techniques may therefore be the most appropriate.

The following table of ultimate coefficients may be used for the preliminary design of bored piles, based on the SPT depth graph in the appendix.

Stratum	Depth (m)	kN / m^2
Ultimate Skin Friction		
Made Ground / London Clay	All soil above 4.00	Ignore – basement excavation
London Clay	4.00 to 24.00	Increasing linearly from 40 to 145
Ultimate End Bearing		
London Clay	4.00 to 24.00	Increasing linearly from 720 to 2610

In the absence of pile tests, guidance from the London District Surveyors Association (LDSA)[8] suggests that a factor of safety of 2.6 should be applied to the above coefficients in the computation of safe theoretical working loads. On the basis of the above coefficients, the following pile capacities have been estimated.

Pile Diameter mm	Pile length m	Safe Working Load kN)
450	19.00 from basement slab	1050
600	15.00 from basement slab	1065

The above examples are not intended to constitute any form of recommendation with regard to pile size or type, but merely serve to illustrate the use of the above coefficients. Specialist piling contractors should be consulted with regard to the design of an appropriate piling scheme and their attention should be drawn to potential groundwater inflows within the made ground and silt and sand partings and claystones within the London Clay.

In the design of piled foundations the effect of potential future shrinkage and swelling of the clay should be taken into account. In designing for compressive loads it should be assumed that further desiccation, and hence shrinkage of the clay, could continue where trees are to remain. Pile shaft adhesion within the theoretical maximum future desiccated thickness should therefore be ignored.

Consideration will also need to be given to the effects of heave as a result of the basement excavation.

7.4 Ground and Basement Floor Slabs

Following the excavation of the basement, it is likely that the floor slab for the proposed basement will need to be suspended over a void to accommodate the anticipated heave and any potential uplift forces from groundwater pressures unless the slab can be suitably reinforced to cope with these movements. This should be reviewed once the levels and loads are known.

[8] LDSA (2009) *Foundations No 1 – Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA Publications

Where the new buildings do not include a basement, the ground floor slab will need to be suspended over a void in in accordance with NHBC guidelines within the zone of influence of any existing or proposed trees. Outside the zone of influence of trees and following the removal of the made ground and a proof rolling exercise it should be possible to adopt a ground bearing floor slab bearing on the natural soils.

7.5 Shallow Excavations

On the basis of the borehole and trial pit findings it is considered likely that it will be feasible to form relatively shallow excavations terminating within the made ground and London Clay 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.

Significant inflows of groundwater into shallow excavations are not generally anticipated, although seepages may be encountered from perched water tables within the made ground or from within more silty and sandy horizons or around claystones from within the London Clay, although such inflows should be suitably controlled by sump pumping. However, if deeper excavations are considered or if excavations are to remain open for prolonged periods it is recommended that provision be made for battered side slopes or lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

7.6 Effect of Sulphates

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

7.7 Site Specific Risk Assessment

The desk study research has indicated that the site was developed prior to 1875 with housing and gardens and redeveloped in the 1930s with the existing building. The site has had a potentially contaminative history, having previously been developed with a filling station in the northwest part of the site. There are no records relating to any fuel tanks and it is not known if the tanks have been decommissioned or removed. The existing building has been used a garage for parking and maintenance of police vehicles at lower ground floor level. The site is currently vacant and occupied by live-in security.

The results of the contamination testing have revealed elevated arsenic and lead within some samples of the made ground. Arsenic was measured to be elevated within a single sample of made ground, at 70 mg/kg, above the screening value of 40 g/kg. Lead was noted to be elevated within two of the four samples of made ground tested, above the screening value of 310 mg/kg at 390 mg/kg from Borehole No 5 at a depth of 0.60 m and 1100 mg/kg from Borehole No 3B at a depth of 0.80 m.

The source of the metal contamination is likely to be extraneous fragments such as metal or ash. The lead and arsenic is likely to be non-volatile or of a low volatility and does not thus present a significant vapour risk. In addition the compounds are considered likely to be of low solubility and a risk to groundwater has not been identified. The contamination could, however, pose an unacceptable risk to human health through direct contact, accidental ingestion or inhalation of soil or soil derived dust.

No elevated concentrations of Total TPH were measured. In Borehole Nos 3A, 3B and 4 at depths of 0.40 m, 0.80 m and 0.60 m respectively, carbon chain lengths 16-35, which represent diesel and heavy heating oil were measured marginally above the detection limits.

In addition, 11 samples of natural soils were screened and generally no elevated concentrations of contaminants were measured, although a slightly elevated concentration of lead was noted in Borehole No 3B at a depth of 2.10 m at 230 mg/kg. This sample of London Clay was taken near the top of this stratum, directly beneath made ground, where elevated lead concentrations were measured and is likely to be the result of leaching from the made ground above.

Currently end users are isolated from direct contact with the identified contaminants by the extent of buildings and areas of external hardstanding. No new pathways will be created through the redevelopment of the site, with the exception of site workers.

7.7.1 Protection of Site Workers

Site workers should be made aware of the metal contamination and potential hydrocarbon contamination within the soils and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE[9] and CIRIA[10] and the requirements of the Local Authority Environmental Health Officer.

A watching brief should also be maintained during the groundwork, and if suspicious soils are encountered then a suitably qualified geoenvironmental engineer should inspect the soils and further testing carried out if required.

A Discovery Strategy should be in place during the construction phase, the purpose of which is to define the procedures to be followed on site in the event that previously unidentified contamination or suspicious objects are discovered. It is intended to be understood and followed by all on-site workers and for all new site workers to be made aware of the procedure.

7.7.2 Protection of Buried Services

Consideration may need to be given to the protection of buried plastic services laid. Details of the proposed protection measures for buried plastic services will in any case need to be approved by the EHO and local water authority prior to the adoption of any scheme. It is possible that barrier pipe will be required or additional testing will need to be carried out.

9 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land* HMSO

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

7.8 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[11] 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[12] 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 £82.60 per tonne (about £150 per m^3) or at the lower rate of £2.60 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 15 chemical analyses carried out, would be generally classified as follows;

Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Comments
Made ground	Non-hazardous (17 05 04)	No	Any soils saturated with hydrocarbons would be classified as a hazardous waste, so on site screening may be required
London Clay	Non-hazardous (17 05 04)	Yes	

As the site has previously been used as a fuel station / garage and depot for the maintenance of cars it is possible that WAC leaching tests may be required by the receiving landfill to confirm that these natural soils could be disposed of to landfill as an inert waste.

Any soils saturated it would be prudent to assume that they would be classified as a hazardous waste under the waste code 17 05 03 (soils and stones containing dangerous substances) and would be taxable at the standard rate.

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[13] which states that in certain circumstances,

11 Environment Agency 2015. *Guidance on the classification and assessment of waste.* Technical Guidance WM3 First Edition
12 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2
13 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.

9.0 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 may 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 groundwater monitoring should be carried out to establish equilibrium levels and the extent of any seasonal fluctuations. It would be prudent to carry out a number of trial excavations, to depths as close to the full basement depth once access becomes available, to provide an indication of the likely groundwater conditions. It would be prudent to undertake trial excavation around the three chambers once services have been disconnected to investigate the metal obstruction encountered in Borehole No 3A at a depth of 0.56 m. Buried fuel tanks may still be present.

Heave movements will be checked by further analysis along with the impact of the proposed redevelopment on the nearby Northern Line tunnel.

All new foundations should extend beyond the zone of desiccation. In this respect it would be prudent to have all foundation excavations inspected by a suitably experienced engineer.

It is understood that part of the site was occupied by a fuel station built in the late 1930s, but no further details are known. It is possible that buried fuel tanks are still present beneath the site and trace concentrations of hydrocarbon contamination was identified in the external car park, near three chambers, understood to have been interceptor tanks but no concentrations were noted to be elevated at the locations investigated.

Ground workers should be made aware of the potential for contamination at this site, given the history of the site and should any odorous, discoloured or suspicious material be encountered, or evidence of buried tanks, are encountered during groundworks the works should be suspended in that area and an experienced geoenvironmental engineer should be contacted to attend site to inspect and provide further advice in this regard, with regards to remedial measures.

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

APPENDIX

Borehole Records

SPT Summary Sheet

Trial Pit Records

Results of Soil Vapour Survey

Geotechnical Laboratory Test Results

SPT & Cohesion / Depth Graph

Chemical Analyses (Soil)

Generic Risk Based Screening Values

Envirocheck Report Summary

Historical Maps

Findings of Petroleum Search

Camden Contaminated Land Department correspondence

Preliminary UXO Risk Assessment by First Line Defence

LUL correspondence

Tunnel correlation survey

Site Plan

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 1**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 02/12/2015	**Engineer** Conisbee	**Sheet** 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.05)	Tarmac		
						0.05			
						(0.15)	Reinforced concrete		
						0.20			
0.60	D						MADE GROUND (brown clay with rare orange-brown partings of sand and silt, half bricks, charcoal, concrete and roots. Rare medium to coarse subangular flint gravel noted from a depth of 2.00 m)		
1.20-1.65 1.20-1.65	CPT N=7 B	1.20	DRY	1,1/2,1,2,2		(2.40)			
1.80	D								
2.00-2.45 2.00-2.45	CPT N=15 B	2.00	DRY	2,3/5,5,3,2					
						2.60			
2.70	D						Firm becoming stiff fissured high strength brown mottled grey silty CLAY with abundant selenite crystals, rare occasional partings of orange-brown fine sand and silt. Dead rootlets noted to a depth of 3.00 m. Claystone encountered at a depth of 3.50 m. Rare carbonaceous material noted from a depth of 5.00 m		
3.00-3.45	U								
3.50	D								
3.80	D								
4.00-4.45 4.00-4.45	SPT N=15 D	3.00	DRY	2,3/3,3,4,5					
4.70	D								
5.00-5.45	U								
5.50	D								
6.00-6.45 6.00	SPT N=18 D	3.00	DRY	3,3/4,4,5,5		(7.00)			
7.50-7.95	U								
8.00	D								
9.00-9.45 9.00	SPT N=21 D	3.00	DRY	4,5/5,5,5,6					
						9.60			
9.90	D						Stiff becoming very stiff fissured high strength becoming extremely high strength grey silty CLAY with rare grey burrows, specklings of mica and black specks. Claystones		

Remarks
Hand-dug service pit to a depth of 1.20 m (60 minutes)
Chiselling from 10.20 m and 10.30 m (30 minutes) and 17.60 m to 17.80 m (30 minutes)
Standpipe installed to a depth of 6.0 m
Groundwater measured at a depth of 2..08 m on 18/12/2015 and 2.05 m on 13/01/2016

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

Figure No.
J15316.BH 1

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 1**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 02/12/2015	**Engineer** Conisbee	**Sheet** 2/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							encountered at depths of 10.20 m, 17.60 m and 24.60 m		
10.30	D								
10.50-10.95	U								
11.00	D								
12.00-12.45 12.00	SPT N=23 D	3.00	DRY	5,5/5,5,6,7					
13.50-13.95	U								
14.00	D								
15.00-15.45 15.00	SPT N=26 D	3.00	DRY	6,6/6,6,7,7					
16.50-16.95	U								
17.00	D					(15.10)			
17.80	D								
18.00-18.45 18.00	SPT N=35 D	3.00	DRY	6,7/8,8,9,10					
19.50-19.95	U								

Remarks

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

Figure No.
J15316.BH 1

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 1**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 02/12/2015	**Engineer** Conisbee	**Sheet** 3/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
20.00	D								
21.00-21.45 21.00	SPT N=45 D	3.00	DRY	7,8/9,11,12,13					
						(15.10)			
22.50-22.95	U								
23.00	D								
24.50-24.73 24.50	SPT 32/75 D	3.00	DRY	9,10/32		24.70	Complete at 24.70m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No.	
	J15316.BH 1	

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 2**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 03/12/2015	**Engineer** Conisbee	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.05) 0.05	Tarmac		
						(0.20) 0.25	Reinforced concrete		
0.60	D1						MADE GROUND (brown mottled greyish brown silty sandy clay with fine to coarse subangular to rounded flint, brick, ash, coal and rootlets. Concrete encountered between 2.50 m and 2.60 m)		
1.20-1.65 1.20-1.65	CPT N=5 B2	1.20	DRY	1,0/1,1,2,2,1		(2.35)			
2.00-2.45 2.00-2.45	CPT N=3 B3	2.00	DRY	1,0/0,1,1,1,1					
				Seepage(1) at 2.50m, sealed at 3.00m.		2.60			▽1
2.80	D4						Firm becoming stiff fissured high strength and very high strength brown mottled grey silty CLAY with rare partings of orange-brown fine sand and silt, selenite crystals. Rare carbonaceous material noted from a depth of 4.00 m. Claystone encountered at a depth of 3.80 m. Dead rootlets noted at a depth of 4.80 m		
3.00-3.45 3.00	SPT N=8 D5	3.00	DRY	1,1/1,2,2,3					
3.60 3.80	D6 D7								
4.00-4.45	U8								
4.50	D9								
4.80	D10								
5.00-5.45 5.00	SPT N=14 D11	3.00	DRY	2,3/3,3,4,4					
6.00-6.45	U12					(7.20)			
6.50	D13								
7.50-7.95 7.50	SPT N=16 D14	3.00	DRY	3,3/3,4,4,5					
9.00-9.45	U15								
9.50	D16								
						9.80	Stiff becoming very stiff fissured high strength and very high		

Remarks
Hand-dug service pit to a depth of 1.20 m
Standpipe installed to a depth of 6.00 m
Groundwater measured at depths of 1.88 m on 18/12/2015 and 1.87 m on 13/01/2016

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

Figure No.
J15316.BH 2

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 2**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 03/12/2015	**Engineer** Conisbee	**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	D17						strength silty CLAY with rare shell fragments. Rare partings of grey fine sand and silt. Pyrite nodule noted at a depth of 14.50 m		
10.50-10.95 10.50	SPT N=23 D18	3.00	DRY	4,4/5,5,6,7					
12.00-12.45	U19								
12.50	D20					(5.20)			
13.50-13.95 13.50	SPT N=26 D21	3.00	DRY	5,5/6,6,7,7					
14.50-14.95	U22								
15.00	D23					15.00	Complete at 15.00m		

Remarks

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

Figure No.
J15316.BH 2

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH 3**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Hand-dug service pit			Mark Steinberg	J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.08) 0.08	Tarmac		
					(0.08) 0.16	Concrete. At a depth of 0.08 m, exposed 50 mm of metal on side of pit. Borehole terminated and relocated 1 m		
						Complete at 0.14m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No.	
	J15316.BH 3	

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH 3A**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Hand-dug service pit			Mark Steinberg	J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40	D1				(0.06) 0.06	Tarmac		
					(0.13) 0.19	Concrete		
					(0.07) 0.26	Concrete		
					(0.08) 0.34	Concrete with metal mesh on underside of concrete at a depth of 0.34 m		
					(0.22) 0.56	MADE GROUND (orange-brown sand with fragments of brick, metal and charcoal. At a depth of 0.56 m rusty metal encountered at base of pit)		
						Complete at 0.56m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No.	
	J15316.BH 3A	

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH3B**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open-drive sampler			Mark Steinberg	J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.07)	Tarmac		
					0.07			
					(0.53)	Reinforced concrete (rebar at a depth of 0.35 m)		
					0.60			
					(0.30)	MADE GROUND (brown sand with fragments of concrete and brick. Rootlets at a depth of 0.60 m)		
0.80	D1				0.90			
						MADE GROUND (no recovery - concrete pushed down in core barrel)		
					(1.10)			
					2.00			
2.00	D2		(PP) over 4.50		(0.30)	'Stiff' brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and rare selenite crystals. Fine rootlet at 2.20 m - desiccated soil		
2.10	D3				2.30			
2.30	D4		(PP) 3.25			Firm brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and rare selenite crystals		
2.60	D5		(PP) 2.75		(0.70)			
2.90	D6		(PP) 3.00		3.00			
3.00	D7					Stiff brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and rare selenite crystals. Claystone encountered at a depth of 3.43 m to 3.50 m		▽1
3.20	D8		(PP) 3.00 Seepage(1) at 3.43m.		(1.00)			
3.50	D9		(PP) 3.00					
3.80	D10		(PP) 3.00					
4.00	D11		(PP) 3.00		4.00			
						Complete at 4.00m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No.	J15316.BH3B

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH 4**
Excavation Method Open-drive sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.09)	Tarmac		
					0.09			
					(0.12)	Reinforced concrete with rebar at a depth of 0.20 m (5 mm diameter)		
					0.21			
					(0.12)	Concrete		
0.60	D1				0.33			
					(0.67)	MADE GROUND (orange-brown silty sandy clay with medium rounded flint gravel and brick fragments)		
					1.00			
					(0.50)	Soft brown mottled grey silty fissured CLAY. Claystones encountered between 1.20 m and 1.60 m		
1.50	D2		(PP) 1.50		1.50			
1.60	D3					Firm brown mottled grey silty fissured CLAY. Rootlets noted to a depth of 2.10 m and dead rootlets noted at a depth of 2.60 m. Claystone encountered at a depth of 4.00 m		
1.80	D4		(PP) 2.00					
2.10	D5		(PP) 2.50					
2.40	D6		(PP) 2.50					
2.60	D7				(2.50)			
2.70	D8		(PP) 2.50					
3.00	D9		(PP) 3.50					
3.30	D10		(PP) 2.25					
3.60	D11		(PP) 2.50					
3.90	D12		(PP) 3.75					
4.00	D13				4.00	Stiff brown mottled grey silty fissured CLAY.		
			(PP) 2.50					
4.50	D14		(PP) 3.00		(1.20)			
			(PP) 3.25					
5.00	D15				5.20			
			(PP) 3.75			Complete at 5.20m		

Remarks

Scale (approx)	Logged By
1:50	HD

Figure No.
J15316.BH 4

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH 5**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open-drive sampler			Mark Steinberg	J15316
	Location	**Dates** 25/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.04)	Screed		
					0.04			
					(0.12)	Concrete		
					0.16			
					(0.34)	MADE GROUND (brick with sand and gravel)		
0.60	D1				0.50			
0.80	D2				(0.30)	MADE GROUND (brown silty sandy clay with rare medium well rounded flint, concrete fragments, fine rootlets and decayed wood. Brick fragments encountered at a depth of 0.80 m)		
1.00	D3		(PP) 1.50		0.80			
1.30	D4		(PP) 3.00			Stiff brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and selenite crystals. Root fibres noted to a depth of 2.10 m - possibly desiccated soil?		
					(1.50)			
1.60	D5		(PP) 3.50					
1.80	D6							
1.90	D7		(PP) 3.00					
2.20	D8		(PP) 2.25		2.30			
2.50	D9		(PP) 2.50			Firm brown mottled grey silty fissured CLAY		
2.60	D10							
2.80	D11		(PP) 2.50		(1.00)			
3.00	D12							
			(PP) 3.00					
			(PP) 3.50		3.30			
					(0.20)	Stiff brown mottled grey silty fissured CLAY		
3.60	D13				3.50			
			(PP) 3.50			Stiff brownish grey silty fissured CLAY		
3.90	D14				(0.50)			
4.00	D15		(PP) 3.75		4.00			
						Complete at 4.00m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No.	
	J15316.BH 5	

GEA Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL		**Number** **BH 6**
Excavation Method Open-drive sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location	**Dates** 25/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.05)	Screed		
					0.05			
0.30	D1				(0.10)	Concrete overlying cobbly gravel with brick fragments		
					0.15			
					(0.30)	Soft dark grey mottled black silty sandy CLAY with decayed wood - organic odour		
0.60	D2		(PP) 1.50		0.45			
			(PP) 1.50			Firm brown mottled grey silty fissured CLAY with abundant selenite crystals		
1.00	D3		(PP) 1.75					
1.00-1.45	SPT N=9		1,1/2,2,2,3					
1.30	D4		(PP) 2.50		(1.75)			
1.60	D5		(PP) 2.50					
			(PP) 2.25					
2.00-2.45	SPT N=22		2,9/10,5,4,3					
2.00	D6		(PP) 2.50		2.20			
2.30	D7					Stiff brown mottled grey silty fissured CLAY with abundant selenite crystals		
			(PP) 2.75					
2.50	D8							
2.60	D9							
			(PP) 3.00					
2.90	D10							
			(PP) 3.25					
3.00-3.45	SPT N=16		2,2/3,4,4,5					
3.20	D11		(PP) 3.50					
3.50	D12				(2.80)			
			(PP) 3.50					
3.90	D13							
4.00-4.45	SPT N=18		3,3/3,4,5,6					
4.00	D14							
			(PP) over 4.50					
4.50	D15							
					5.00			
5.00-5.45	SPT N=19		3,3/4,4,5,6			Stiff brownish grey silty fissured CLAY. Dead roolets at 4.00 m		
5.00	D16							
5.50	D17							
6.00-6.45	SPT N=19		3,3/4,4,5,6					
6.00	D18							
					(3.30)			
7.00-7.45	SPT N=21		3,4/4,5,6,6					
8.00-8.45	SPT N=24		3,5/5,5,7,7					
					8.30			
						Stiff grey silty fissured CLAY with rare orange-brown silt and fine sand		
9.00-9.45	SPT N=25		4,5/5,6,6,8					
					(1.70)			
					10.00			

Remarks
Standpipe installed to a depth of 6.00 m
Standpipe recorded to be dry on 18/12/2015 and groundwater measured at a depth of 3.72 m on 13/01/2016

Scale (approx)	Logged By
1:50	HD

Figure No.
J15316.BH 6

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH 7**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open-drive sampler			Mark Steinberg	J15316
	Location	**Dates** 26/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.04)	Screed		
					0.04			
					(0.15)	Concrete		
0.40	D1		(PP) 0.75		0.19			
0.50	D2		(PP) 1.00			Soft becoming firm brown mottled grey silty CLAY		
0.80	D3		(PP) 2.50					
					(1.81)			
1.10	D4		(PP) 2.25					
1.40	D5							
1.50	D6		(PP) 2.25					
1.70	D7		(PP) 2.75					
2.00	D8		(PP) 3.00		2.00			
2.30	D9		(PP) 3.50			Stiff brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and selenite crystals. Decayed rootlets noted to a depth of 2.60 m		
2.60	D10		(PP) 3.50		(1.00)			
2.90	D11							
3.00	D12		(PP) 3.50		3.00			
						Complete at 3.00m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No.	J15316.BH 7

GEA Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Standard Penetration Test Results

Site : 5 - 17 Haverstock Hill, London NW3 2BL

Client : Mark Steinberg

Engineer : Conisbee

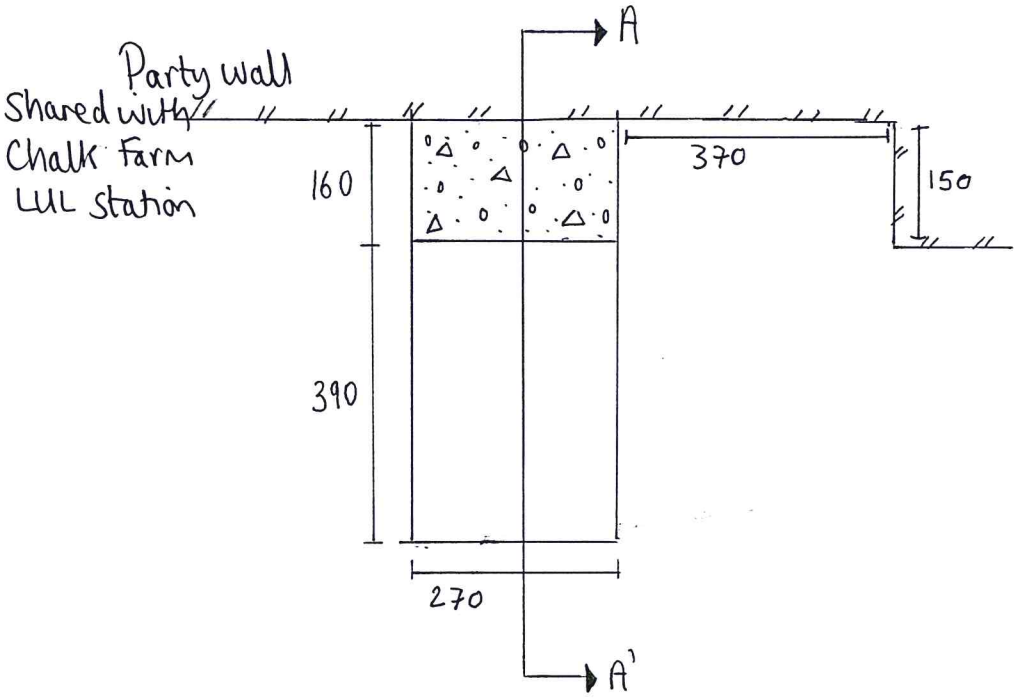
Job Number J15316

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		
BH 1	1.20	1.35	1.65	CPT	1	1	2	1	2	2	N=7	
BH 1	2.00	2.15	2.45	CPT	2	3	5	5	3	2	N=15	
BH 1	4.00	4.15	4.45	SPT	2	3	3	3	4	5	N=15	
BH 1	6.00	6.15	6.45	SPT	3	3	4	4	5	5	N=18	
BH 1	9.00	9.15	9.45	SPT	4	5	5	5	5	6	N=21	
BH 1	12.00	12.15	12.45	SPT	5	5	5	5	6	7	N=23	
BH 1	15.00	15.15	15.45	SPT	6	6	6	6	7	7	N=26	
BH 1	18.00	18.15	18.45	SPT	6	7	8	8	9	10	N=35	
BH 1	21.00	21.15	21.45	SPT	7	8	9	11	12	13	N=45	
BH 1	24.50	24.65	24.73	SPT	9	10	32				32/75mm	
BH 2	1.20	1.35	1.65	CPT	1	0	1	1	2	1	N=5	
BH 2	2.00	2.15	2.45	CPT	1	0	0	1	1	1	N=3	
BH 2	3.00	3.15	3.45	SPT	1	1	1	2	2	3	N=8	
BH 2	5.00	5.15	5.45	SPT	2	3	3	3	4	4	N=14	
BH 2	7.50	7.65	7.95	SPT	3	3	3	4	4	5	N=16	
BH 2	10.50	10.65	10.95	SPT	4	4	5	5	6	7	N=23	
BH 2	13.50	13.65	13.95	SPT	5	5	6	6	7	7	N=26	
BH 6	1.00	1.15	1.45	SPT	1	1	2	2	2	3	N=9	
BH 6	2.00	2.15	2.45	SPT	2	9	10	5	4	3	N=22	
BH 6	3.00	3.15	3.45	SPT	2	2	3	4	4	5	N=16	
BH 6	4.00	4.15	4.45	SPT	3	3	3	4	5	6	N=18	
BH 6	5.00	5.15	5.45	SPT	3	3	4	4	5	6	N=19	
BH 6	6.00	6.15	6.45	SPT	3	3	4	4	5	6	N=19	
BH 6	7.00	7.15	7.45	SPT	3	4	4	5	6	6	N=21	
BH 6	8.00	8.15	8.45	SPT	3	5	5	5	7	7	N=24	
BH 6	9.00	9.15	9.45	SPT	4	5	5	6	6	8	N=25	

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**Site** 5-17 Haverstock Hill, London, NW3 2BL	**Trial Pit Number** 1
Excavation Method Manual	**Dimensions** 270 x 550 x 1200 (mm)	**Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location Room G12	**Dates** 26/11/2015	**Engineer** Conisbee	**Sheet** 1 / 3

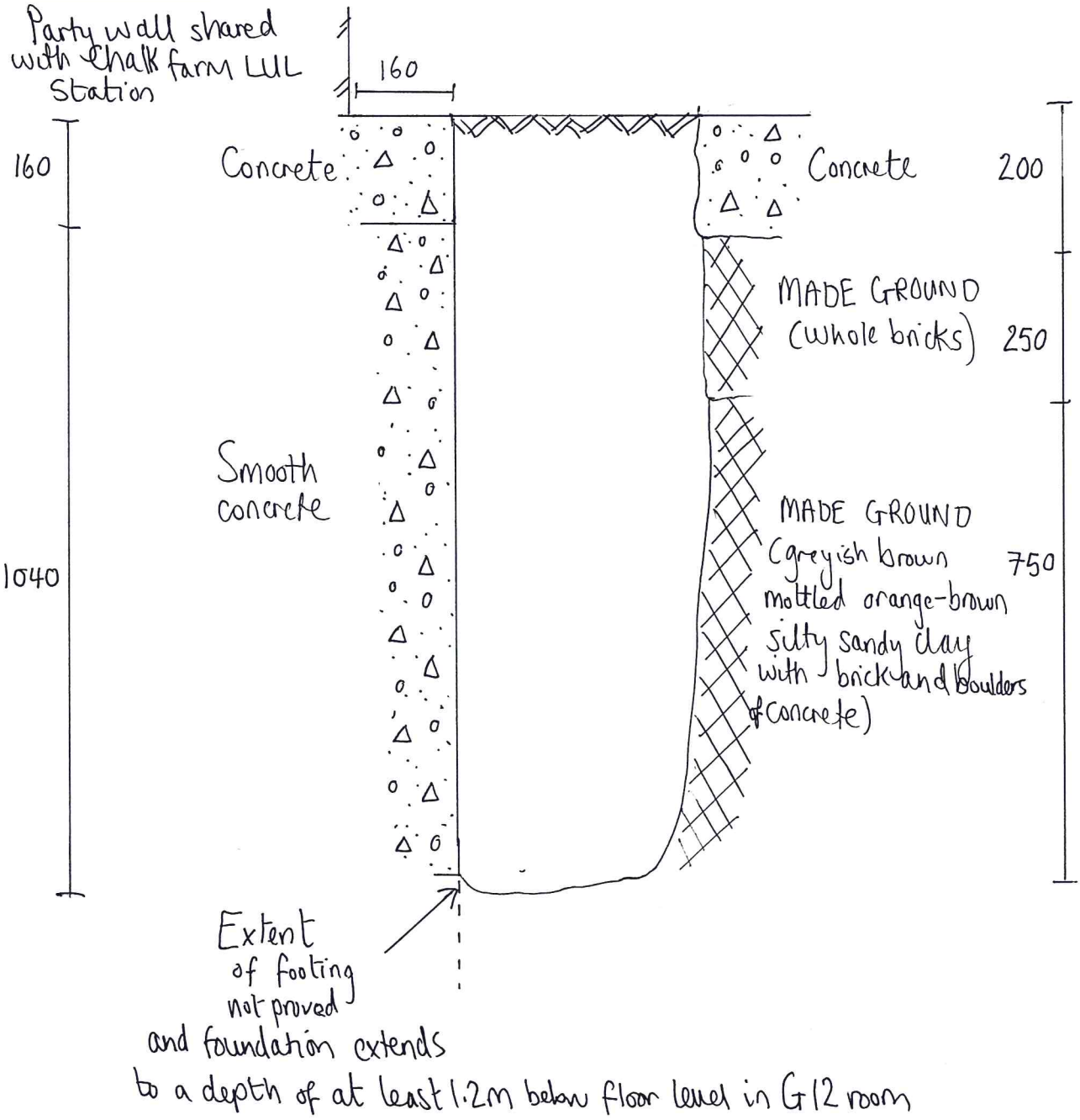
PLAN



Remarks:	Scale:
All dimensions in millimetres	1:10
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: Perched water enocuntered at the base of the pit, standing at a depth of 0.98 m on completion	HD

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**Site** 5-17 Haverstock Hill, London, NW3 2BL	**Trial Pit Number** 1
Excavation Method Manual	**Dimensions** 270 x 550 x 1200 (mm)	**Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location Room G12	**Dates** 26/11/2015	**Engineer** Conisbee	**Sheet** 2 / 3

SECTION A - A'



Remarks:	Scale:
All dimensions in millimetres	1:10
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: Perched water enocuntered at the base of the pit, standing at a depth of 0.98 m on completion	HD

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Trial Pit No 1

Site	5-17 Haverstock Hill, London, NW3 2BL
Client	Mark Steinberg
Engineer	Conisbee

Job Number J15316

Sheet 3/3

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

Soil Vapour Survey

Site 5-17 Haverstock Hill, NW3 2BL

Client Mark Steinberg

Engineer Conisbee

Job Number J15316

Sheet 1/1

SOIL VAPOUR SURVEY

Survey Position	1	2	3	4	5	6	7	8	9
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Survey Position	10	11	12	13	14	15	16	17	18
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Survey Position	19	20	21	22	23	24	25	26	27
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Survey Position	28	29	30	31	32	33	34	35	
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Equipment Photo-ionistation detector (PID) fitted with a 10.6 eV lamp

Summary of Classification Test Results

Job No.	Project Name	Programme	
20073	5-15 Haverstock Hill, London NW3 2BL	Samples received	08/12/2015
		Schedule received	15/12/2015
Project No.	Client	Project started	16/12/2015
J15316	GEA	Testing Started	06/01/2016

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top	Base	Type		%	%	%	%	%	
BH 1	-	3.00		U	High strength fissured brown mottled blue silty CLAY with occasional selenite crystals	33	100	81	30	51	
BH 2	5	3.00		D	Brown CLAY with blue grey veins	34	100	76	30	46	
BH 6	10	2.90		D	Brown CLAY with blue grey veins	33	100	79	31	48	
BH3B	2	2.00		D	Brown CLAY with blue grey veins, orange brown sandy patches and scattered selenite crystals	30	100	75	30	45	
BH3B	4	2.30		D	Brown CLAY with blue grey veins and orange brown sandy patches	31					
BH3B	5	2.60		D	Brown CLAY with blue grey veins and scattered selenite crystals	33					
BH3B	6	2.90		D	Brown CLAY with blue grey veins and scattered selenite	34	100	77	31	46	
BH3B	8	3.20		D	Brown CLAY with blue grey veins	33					
BH3B	9	3.50		D	Brown CLAY with orange brown sandy patches and scattered selenite crystals	31					
BH3B	10	3.80		D	Brown CLAY with scattered selenite crystals	32					

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0

Test Report by K4 SOILS LABORATORY
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Checked and Approved

Initials **J.P**

Date: 08/01/2016

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results

Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No.	Project Name	Programme	
20073	5-15 Haverstock Hill, London NW3 2BL	Samples received	08/12/2015
		Schedule received	15/12/2015
Project No.	Client	Project started	16/12/2015
J15316	GEA	Testing Started	08/01/2016

Hole No.	Sample				Soil description	Dry Mass passing 2mm	SO3 Content	SO4 Content	pH	Remarks
	Ref	Top	Base	Type		%	g/l	g/l		
BH 1	-	2.00		B	Brown slightly mottled bluish grey silty CLAY	100	0.44	0.52	7.83	
BH 1	-	3.80		D	Brown slightly mottled bluish grey silty CLAY with scattered traces of selenite crystals	100	0.74	0.88	7.82	
BH 1	-	14.00		D	Dark grey silty CLAY	100	0.79	0.95	7.92	
BH 6	1	0.30		D	Dark grey and greyish brown slightly gravelly CLAY (gravel is fm and sub-angular to sub-rounded)	97	0.62	0.74	7.83	

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Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
20073	5-15 Haverstock Hill, London NW3 2BL	Samples received	08/12/2015
		Schedule received	15/12/2015
Project No.	Client	Project started	16/12/2015
J15316	GEA	Testing Started	18/12/2015

Hole No.	Sample Ref	Sample Top	Sample Base	Sample Type	Soil Description	Test Type	Density bulk Mg/m3	Density dry Mg/m3	w %	Length mm	Diameter mm	σ3 kPa	At failure: Axial strain %	At failure: σ1 - σ3 kPa	At failure: cu kPa	At failure: Mode	Remarks
BH 1	-	3.00		U	High strength fissured brown mottled blue silty CLAY with occasional selenite crystals	UU	1.92	1.46	31	198	102	60	4.0	178	89	B	
BH 1	-	5.00		U	High strength fissured brown silty CLAY with occasional selenite crystals	UU	1.94	1.49	30	198	102	100	9.1	247	124	B	Sample slightly disturbed
BH 1	-	7.50		U	High strength fissured brown silty CLAY with occsional selenite crystals	UU	1.91	1.46	31	198	102	150	10	261	131	B	
BH 1	-	10.50		U	Very high strength slightly fissured dark grey silty CLAY	UU	2.00	1.58	27	198	102	210	4.5	348	174	B	
BH 1	-	13.50		U	High strength fissured dark grey silty CLAY	UU	2.05	1.64	25	198	102	270	3.0	261	131	B	
BH 1	-	16.50		U	Very high strength fissured dark grey silty CLAY	UU	2.00	1.56	28	198	102	330	3.5	479	239	B	Sample slightly disturbed
BH 1	-	19.50		U	Very high strength fissured dark grey silty CLAY	UU	1.94	1.54	26	198	102	390	9.6	576	288	B	Sample very disturbed
BH 1	-	22.50		U	Extremely high strength fissured dark grey silty CLAY	UU	1.91	1.51	26	198	102	450	8.1	708	354	B	
BH 2	8	4.00		U	High strength fissured brown silty CLAY with occasional selenite crystals	UU	1.97	1.51	31	198	102	80	7.6	204	102	B	
BH 2	12	6.00		U	High strength fissured brown silty CLAY with occasional selenite crystals	UU	1.95	1.48	32	198	102	120	5.1	232	116	B	
BH 2	15	9.00		U	Very high strength fissured brown silty CLAY	UU	1.96	1.52	29	198	102	180	6.6	327	163	B	
BH 2	19	12.00		U	Very high strength slightly fissured dark grey silty CLAY	UU	2.03	1.60	27	198	102	240	5.6	373	186	B	Sample slightly disturbed
BH 2	22	14.50		U	High strength fissured dark grey silty CLAY	UU	1.98	1.58	25	198	102	290	3.5	239	120	B	Sample very disturbed

Legend
- UU - single stage test (single and multiple specimens)
- UUM - Multistage test on a single specimen
- suffix R - remoulded or recompacted
- σ3 Cell pressure
- σ1 - σ3 Maximum corrected deviator stress
- cu Undrained shear strength, ½ (σ1 - σ3)
- Mode of failure ; B - Brittle; P - Plastic; C - Compound

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

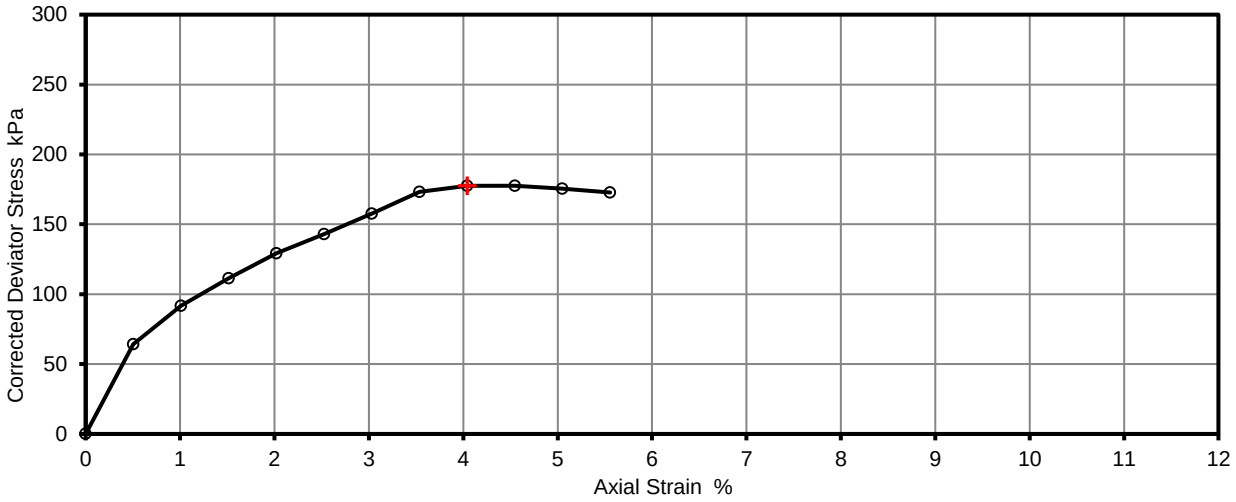
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	3.00	m
Soil Description	High strength fissured brown mottled blue silty CLAY with occasional selenite crystals			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

Remarks

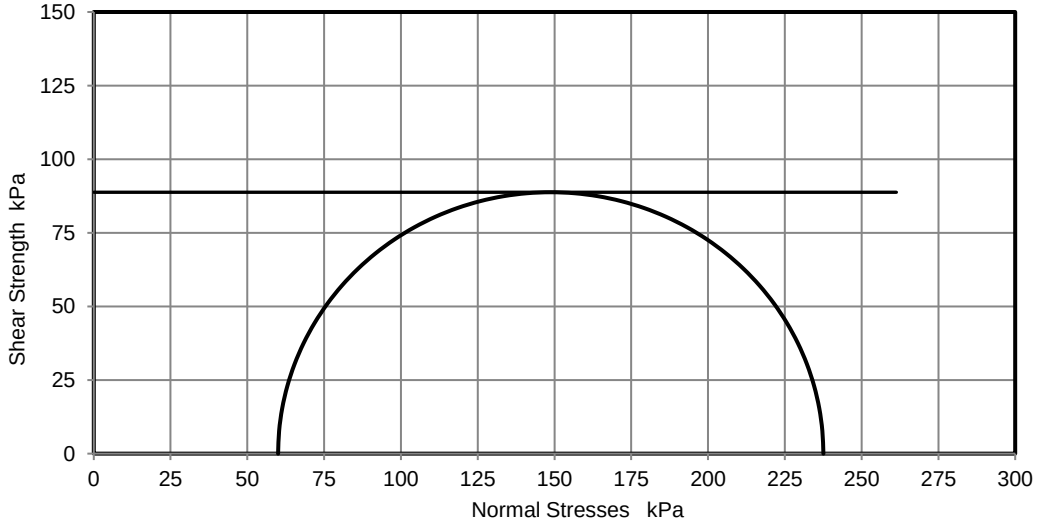
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.92	Mg/m3
Moisture Content	31	%
Dry Density	1.46	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	60	kPa
Axial Strain	4.0	%
Deviator Stress, (σ1 - σ3)f	178	kPa
Undrained Shear Strength, cu	89	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

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	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-
Project No.	J15316	Client	GEA	Depth	5.00 m
Soil Description	High strength fissured brown silty CLAY with occasional selenite crystals			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

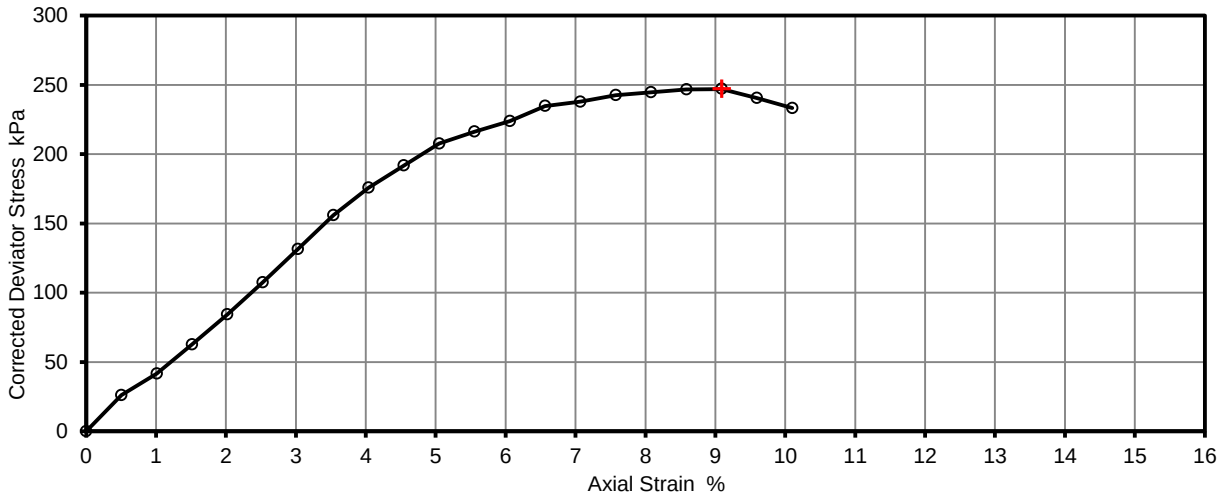
Remarks

Sample slightly disturbed

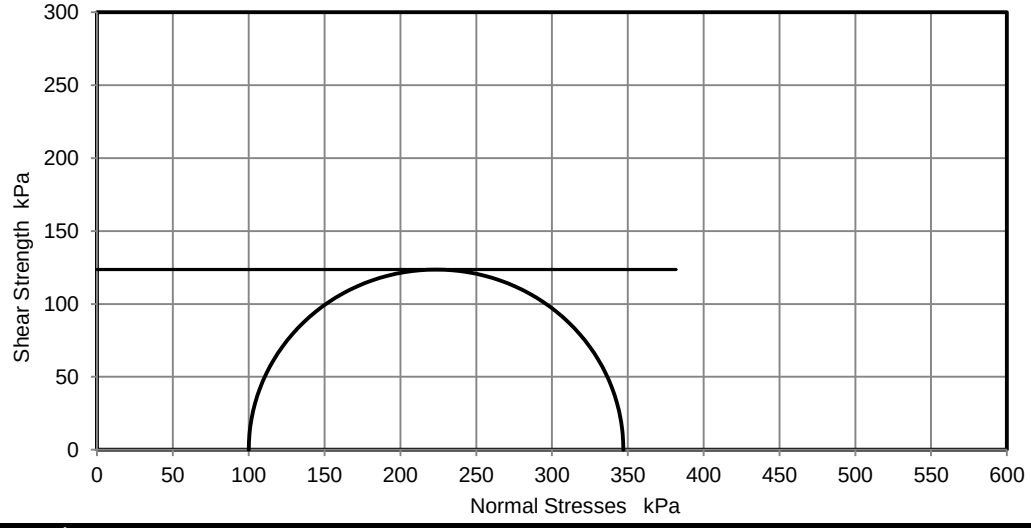
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.94	Mg/m3
Moisture Content	30	%
Dry Density	1.49	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	100	kPa
Axial Strain	9.1	%
Deviator Stress, (σ1 - σ3)f	247	kPa
Undrained Shear Strength, cu	124	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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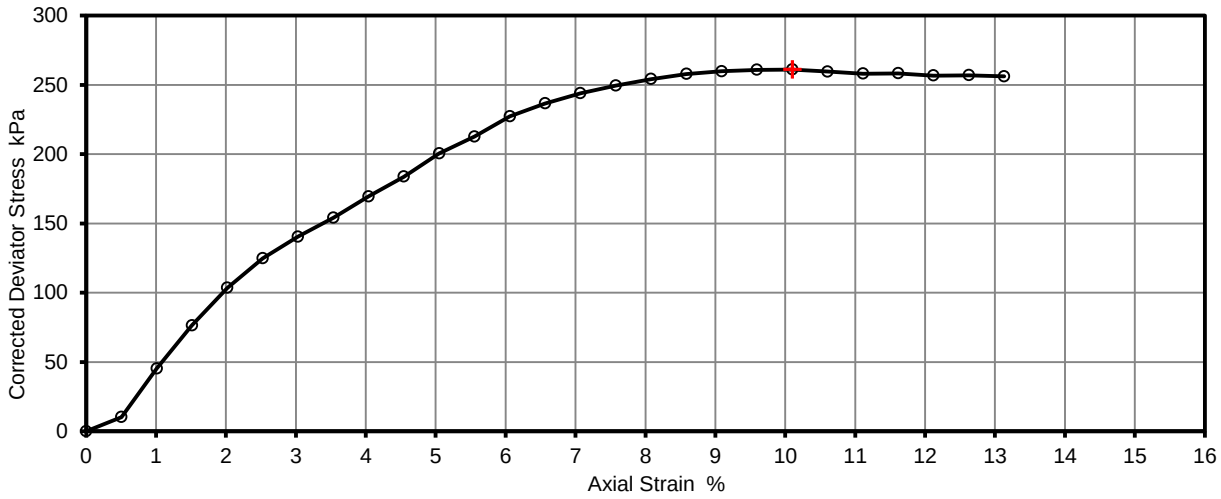
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-
Project No.	J15316	Client	GEA	Depth	7.50 m
Soil Description	High strength fissured brown silty CLAY with occsional selenite crystals			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

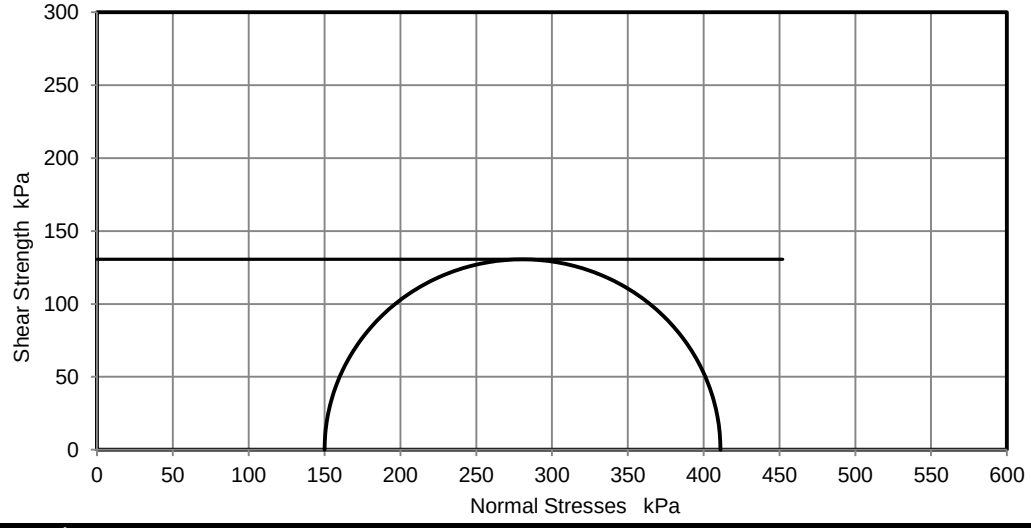
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.91	Mg/m3
Moisture Content	31	%
Dry Density	1.46	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	150	kPa
Axial Strain	10.1	%
Deviator Stress, (σ1 - σ3)f	261	kPa
Undrained Shear Strength, cu	131	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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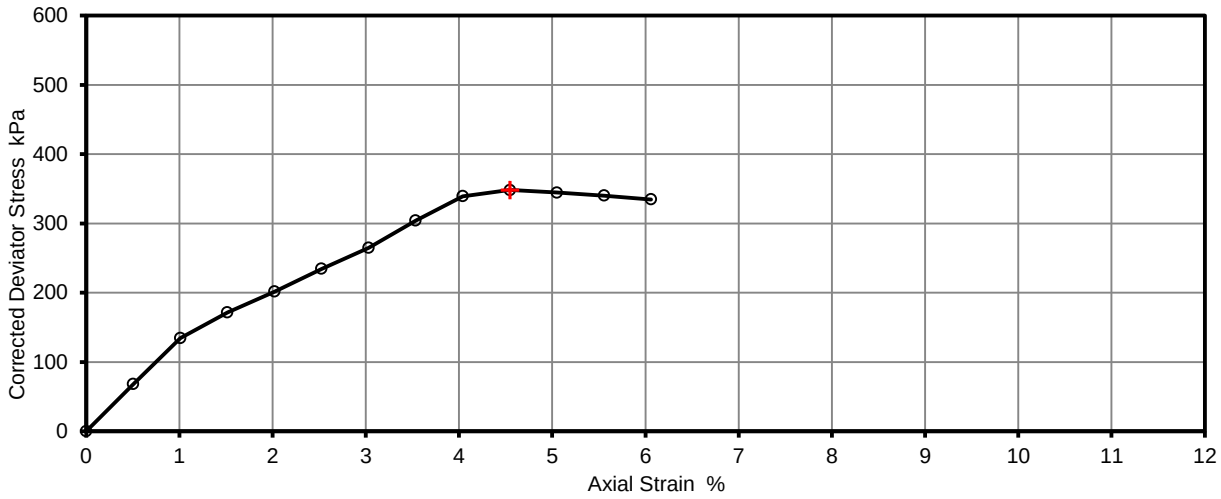
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-
Project No.	J15316	Client	GEA	Depth	10.50 m
Soil Description	Very high strength slightly fissured dark grey silty CLAY			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.00	Mg/m3
Moisture Content	27	%
Dry Density	1.58	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	210	kPa
Axial Strain	4.5	%
Deviator Stress, (σ1 - σ3)f	348	kPa
Undrained Shear Strength, cu	174	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



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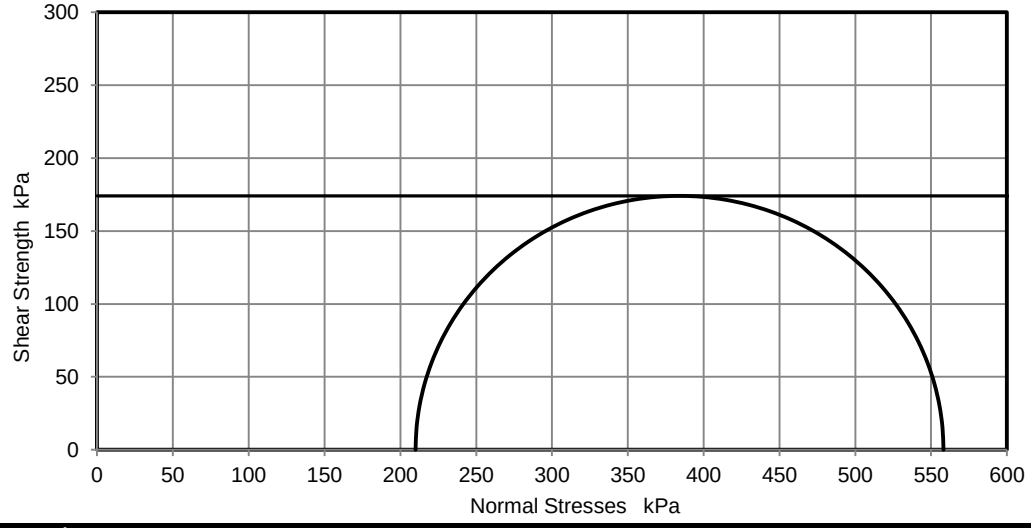

Deviator stress corrected for area change and membrane effects

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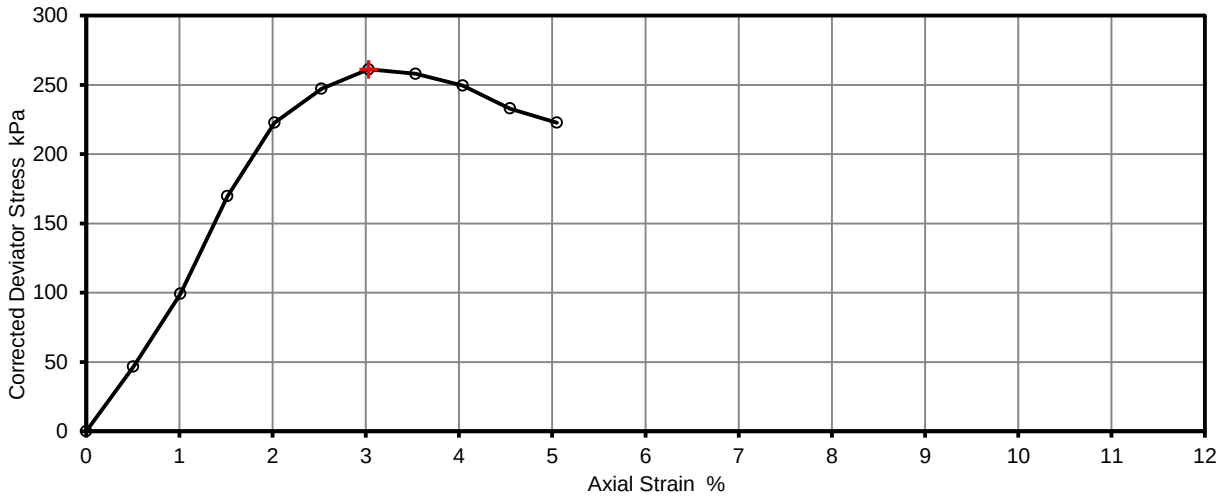
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-
Project No.	J15316	Client	GEA	Depth	13.50 m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

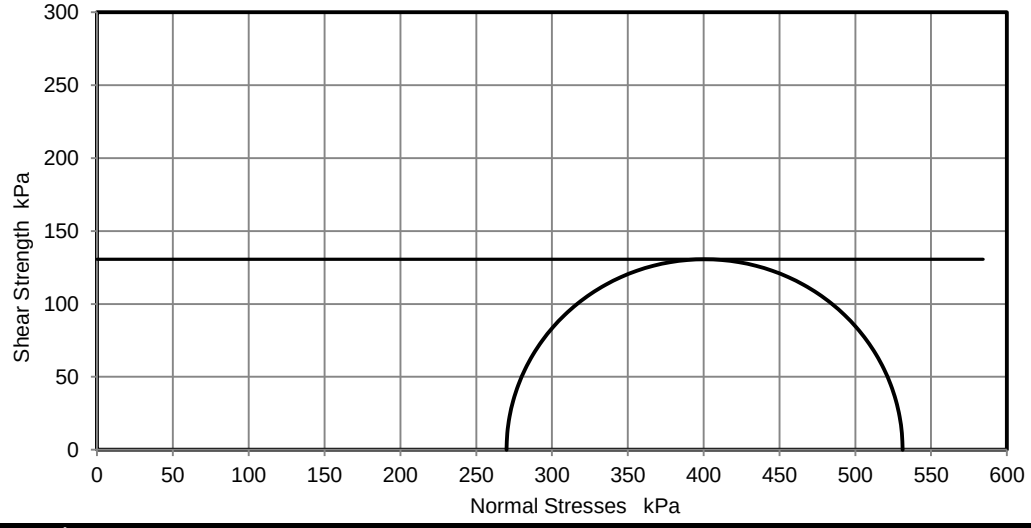
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.05	Mg/m3
Moisture Content	25	%
Dry Density	1.64	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	270	kPa
Axial Strain	3.0	%
Deviator Stress, (σ1 - σ3)f	261	kPa
Undrained Shear Strength, cu	131	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	16.50	m
Soil Description	Very high strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test		

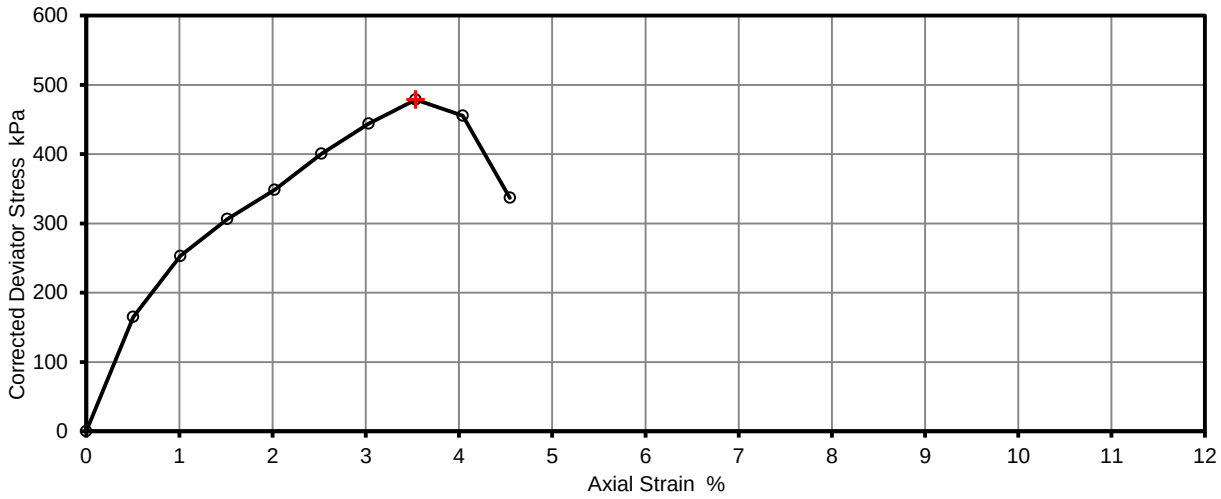
Remarks

Sample slightly disturbed

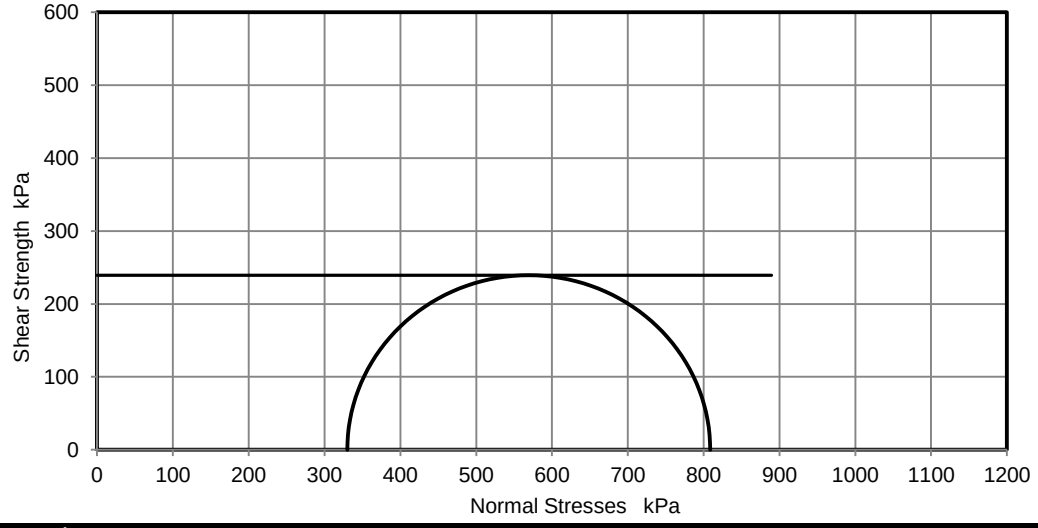
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.00	Mg/m3
Moisture Content	28	%
Dry Density	1.56	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	330	kPa
Axial Strain	3.5	%
Deviator Stress, (σ1 - σ3)f	479	kPa
Undrained Shear Strength, cu	239	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved
Initials: J.P
Date 08/01/2016

	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	19.50	m
Soil Description	Very high strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

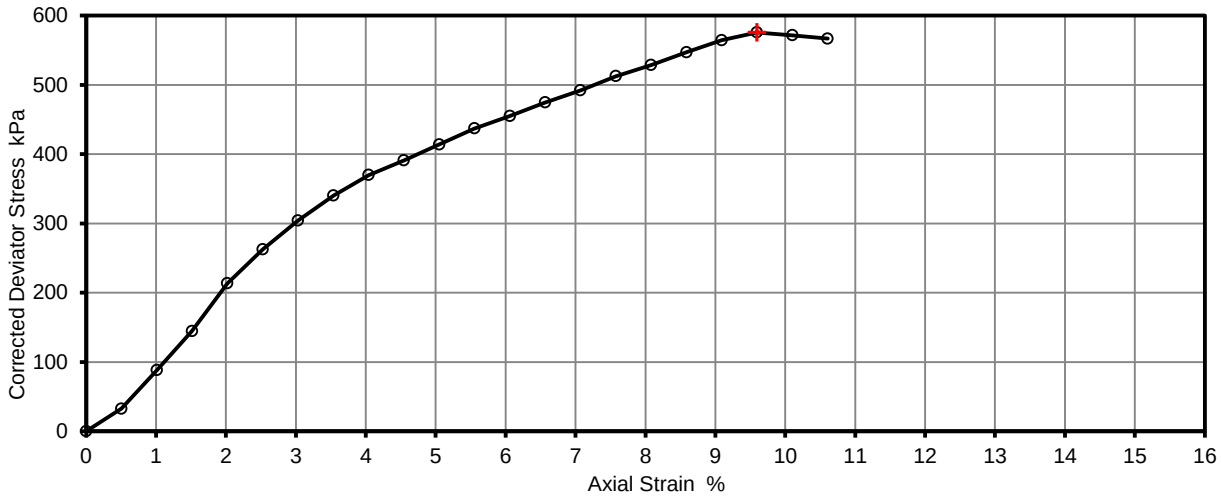
Remarks

Sample very disturbed

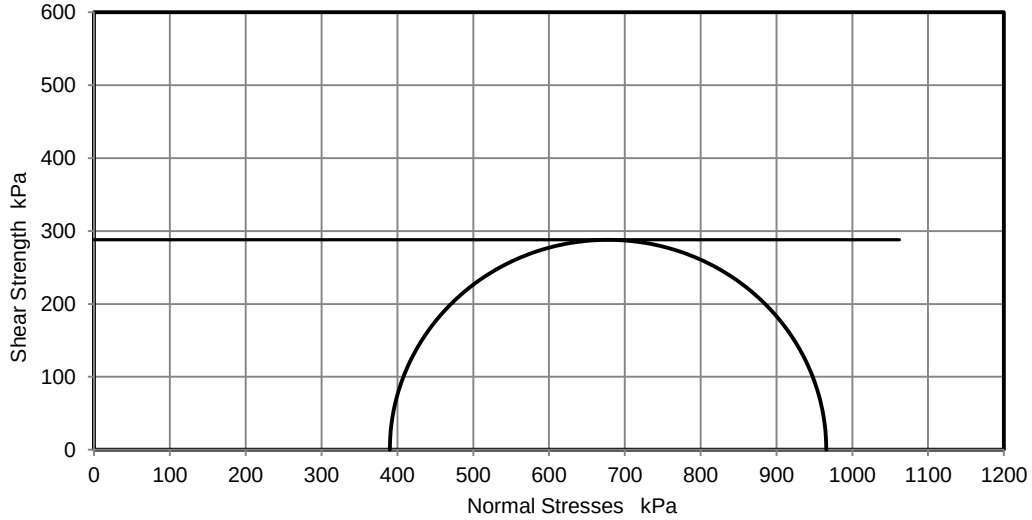
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.94	Mg/m3
Moisture Content	26	%
Dry Density	1.54	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	390	kPa
Axial Strain	9.6	%
Deviator Stress, (σ1 - σ3)f	576	kPa
Undrained Shear Strength, cu	288	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

UKAS TESTING 2519

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Checked and Approved
Initials: J.P
Date 08/01/2016

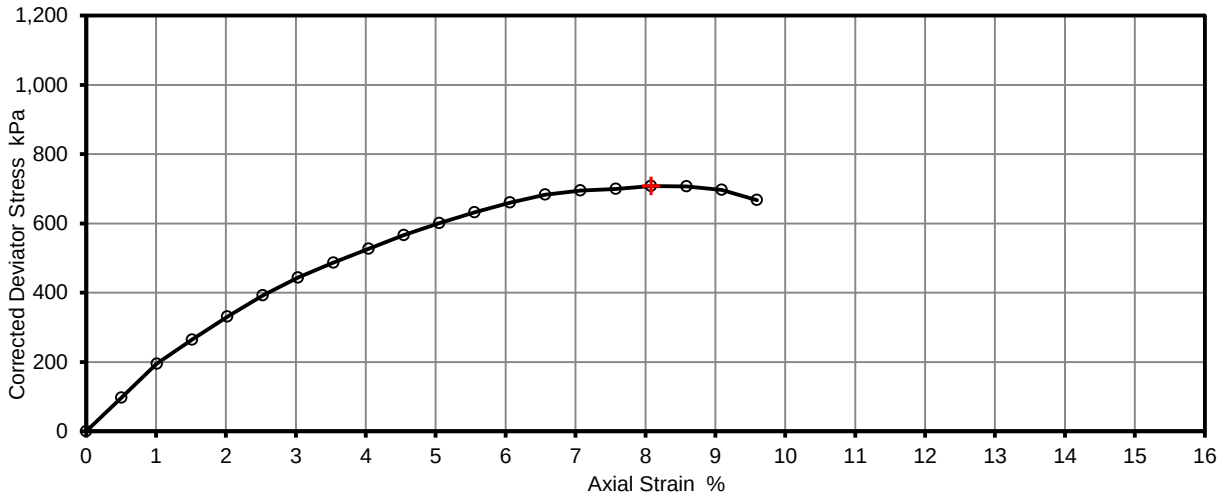
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-
Project No.	J15316	Client	GEA	Depth	22.50 m
Soil Description	Extremely high strength fissured dark grey silty CLAY			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

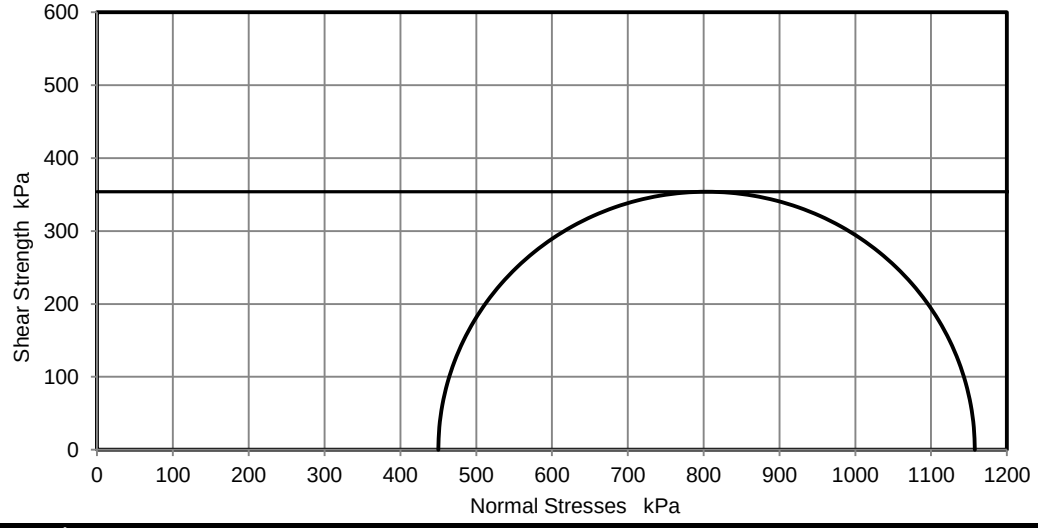
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.91	Mg/m3
Moisture Content	26	%
Dry Density	1.51	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	450	kPa
Axial Strain	8.1	%
Deviator Stress, (σ1 - σ3)f	708	kPa
Undrained Shear Strength, cu	354	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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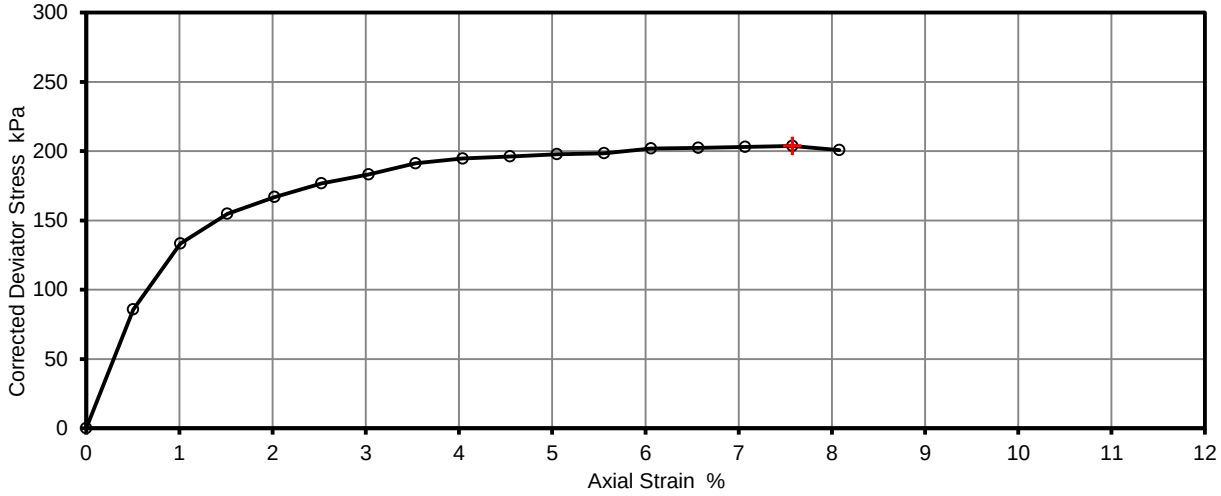
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 2
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	8
Project No.	J15316	Client	GEA	Depth	4.00 m
Soil Description	High strength fissured brown silty CLAY with occasional selenite crystals			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

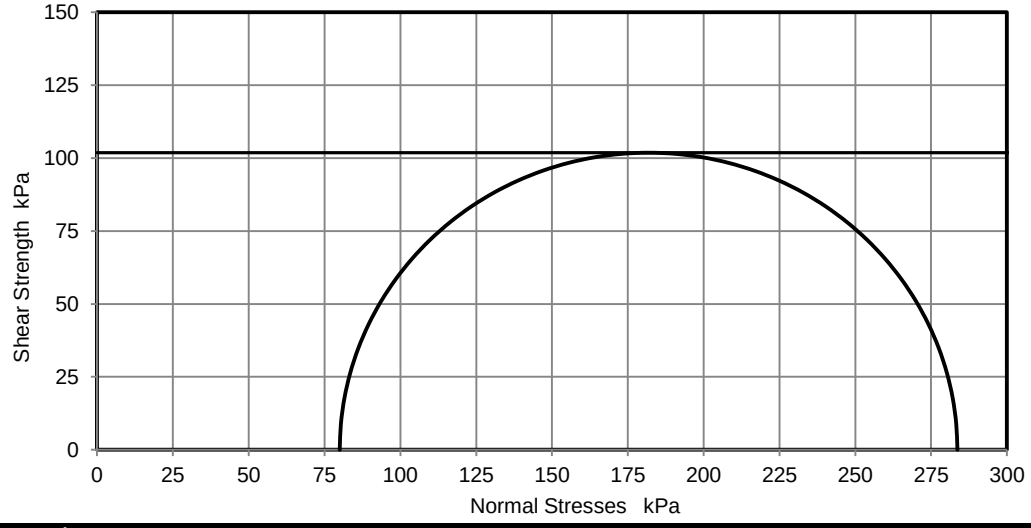
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.97	Mg/m3
Moisture Content	31	%
Dry Density	1.51	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	80	kPa
Axial Strain	7.6	%
Deviator Stress, (σ1 - σ3)f	204	kPa
Undrained Shear Strength, cu	102	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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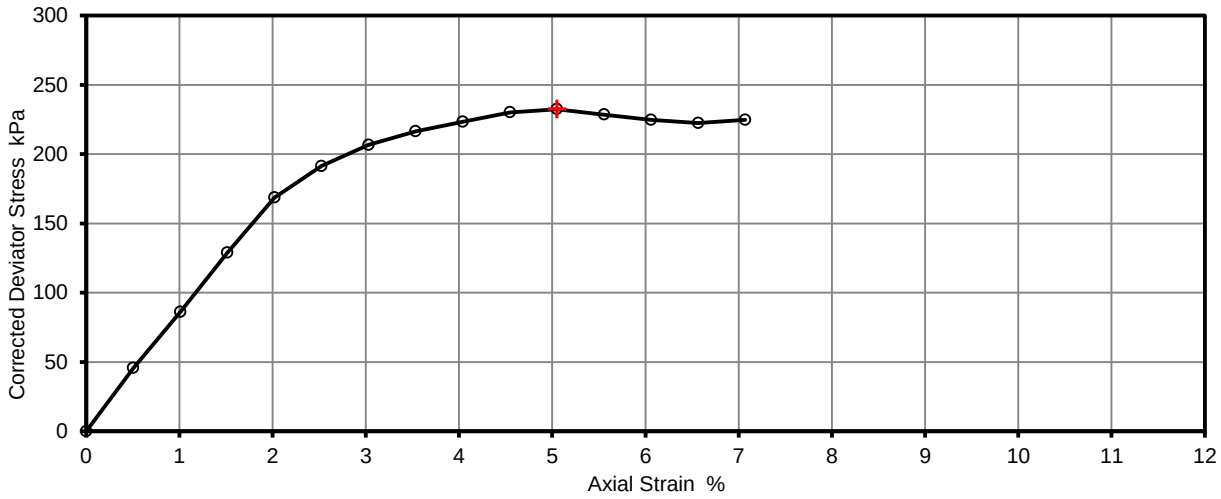
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 2
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	12
Project No.	J15316	Client	GEA	Depth	6.00 m
Soil Description	High strength fissured brown silty CLAY with occasional selenite crystals			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

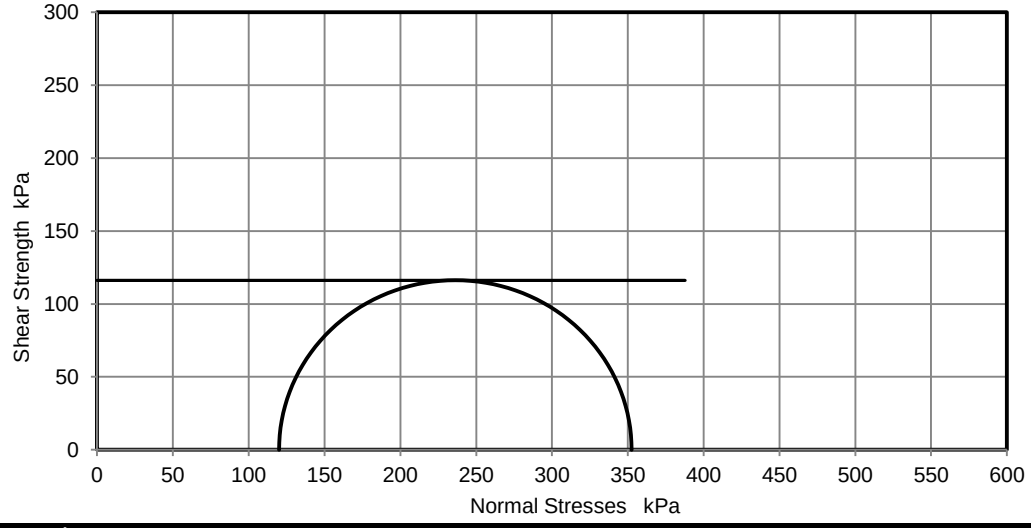
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.95	Mg/m3
Moisture Content	32	%
Dry Density	1.48	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	120	kPa
Axial Strain	5.1	%
Deviator Stress, (σ1 - σ3)f	232	kPa
Undrained Shear Strength, cu	116	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Date 08/01/2016

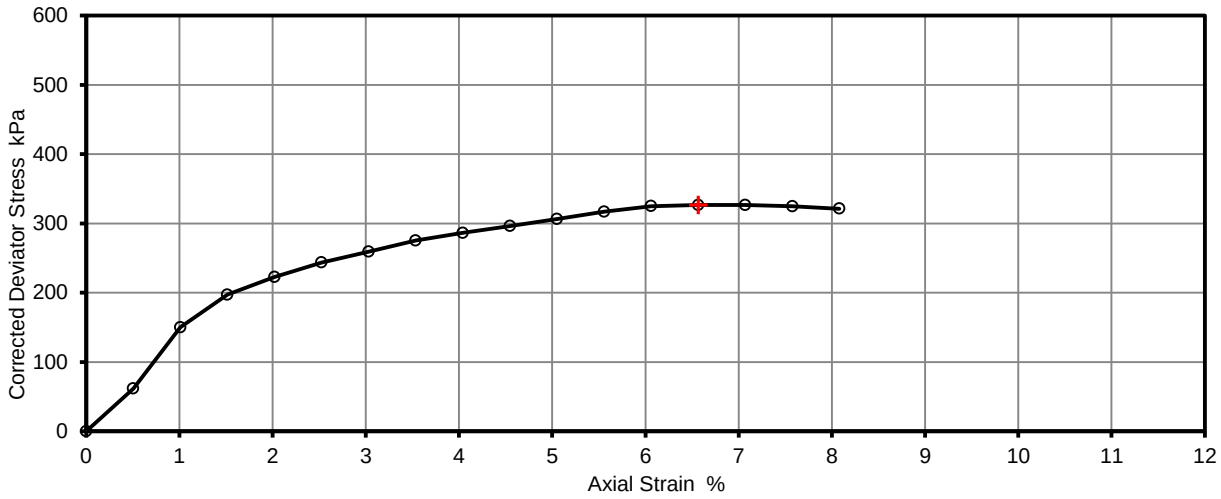
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 2
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	15
Project No.	J15316	Client	GEA	Depth	9.00 m
Soil Description	Very high strength fissured brown silty CLAY			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

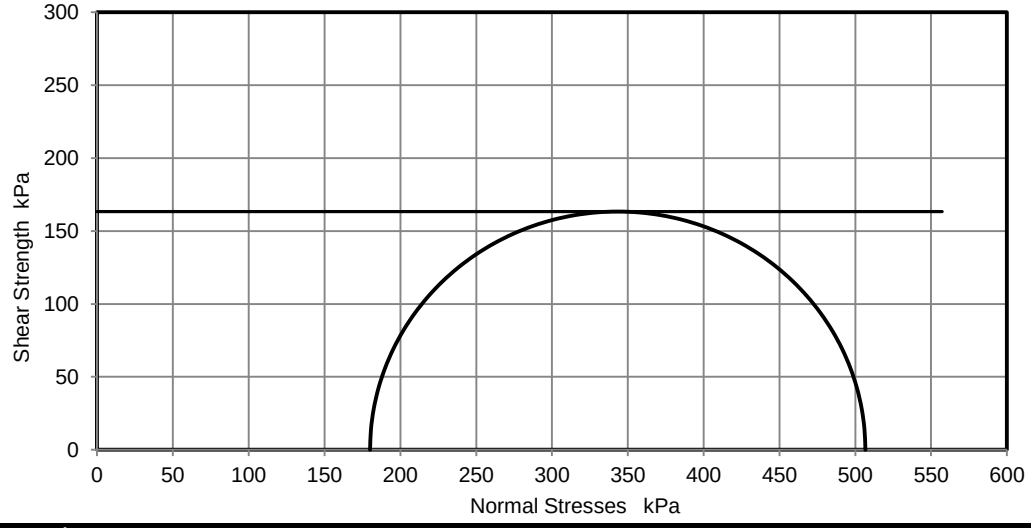
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.96	Mg/m3
Moisture Content	29	%
Dry Density	1.52	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	180	kPa
Axial Strain	6.6	%
Deviator Stress, (σ1 - σ3)f	327	kPa
Undrained Shear Strength, cu	163	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 2	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	19	
Project No.	J15316	Client	GEA	Depth	12.00	m
Soil Description	Very high strength slightly fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	10/12/2015	

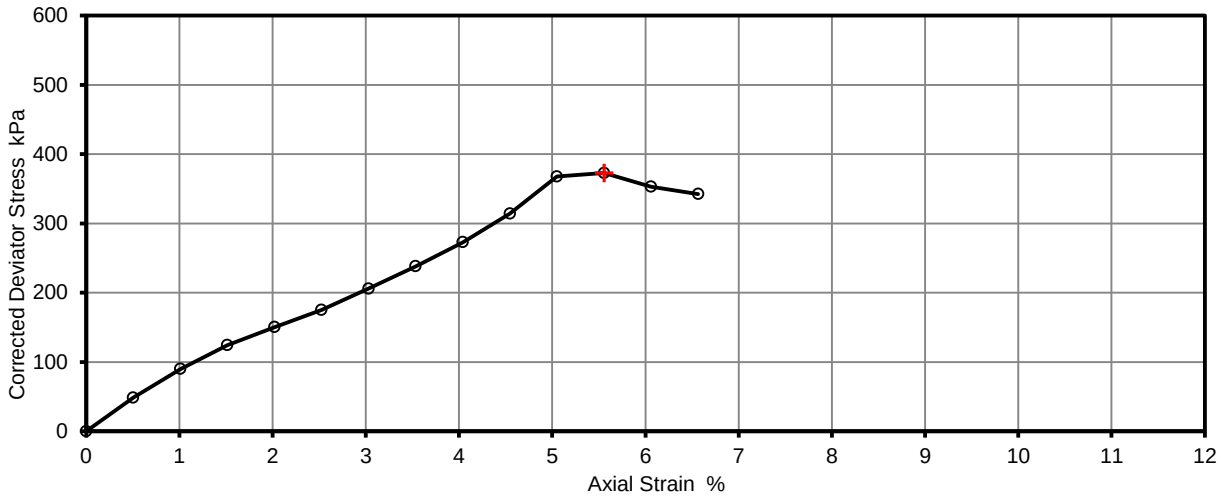
Remarks

Sample slightly disturbed

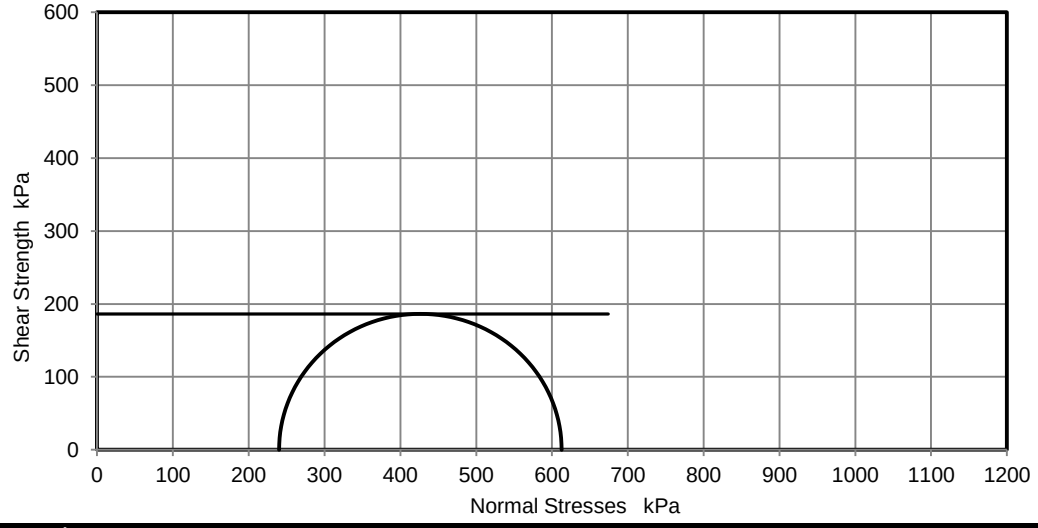
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.03	Mg/m3
Moisture Content	27	%
Dry Density	1.60	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	240	kPa
Axial Strain	5.6	%
Deviator Stress, (σ1 - σ3)f	373	kPa
Undrained Shear Strength, cu	186	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 2	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	22	
Project No.	J15316	Client	GEA	Depth	14.50	m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

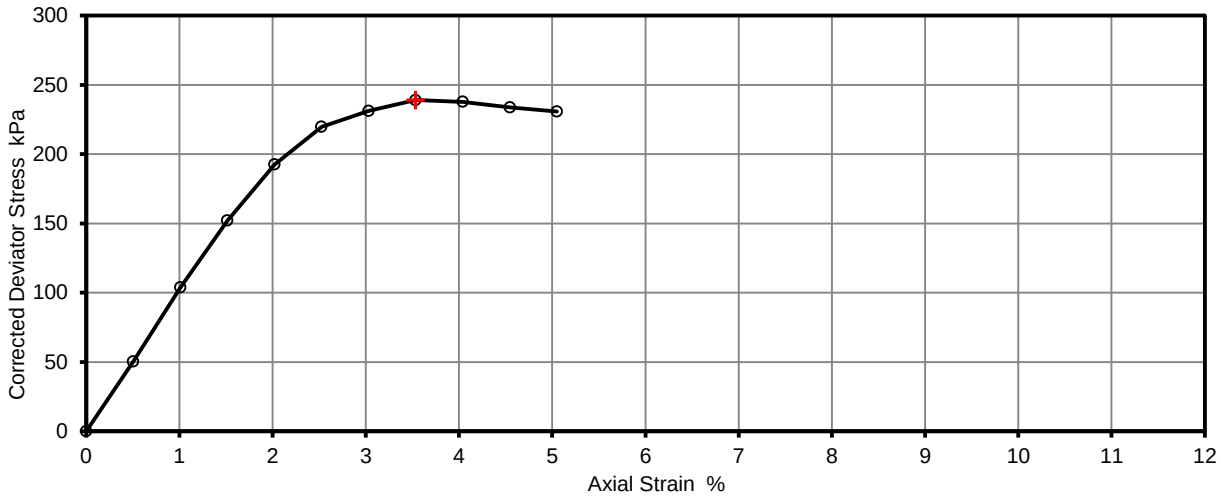
Remarks

Sample very disturbed

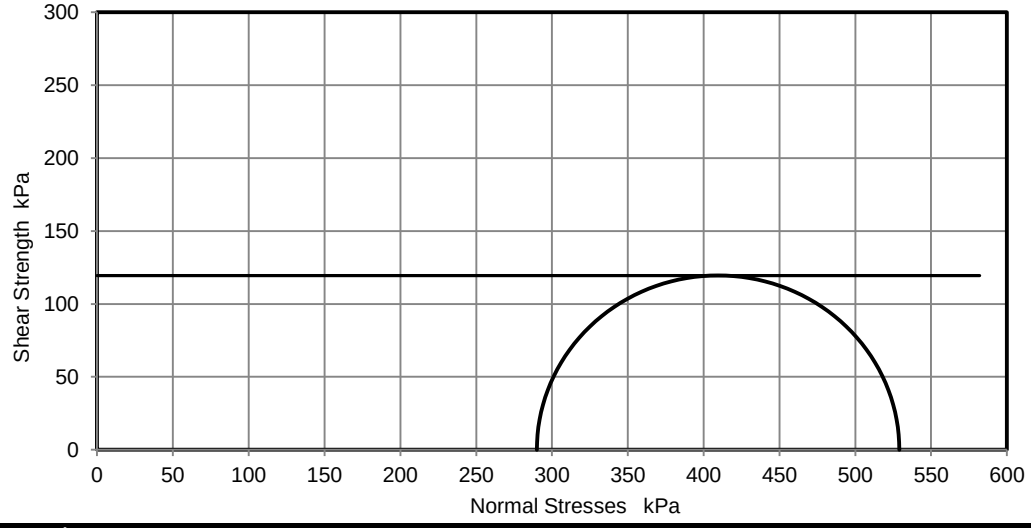
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.98	Mg/m3
Moisture Content	25	%
Dry Density	1.58	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	290	kPa
Axial Strain	3.5	%
Deviator Stress, (σ1 - σ3)f	239	kPa
Undrained Shear Strength, cu	120	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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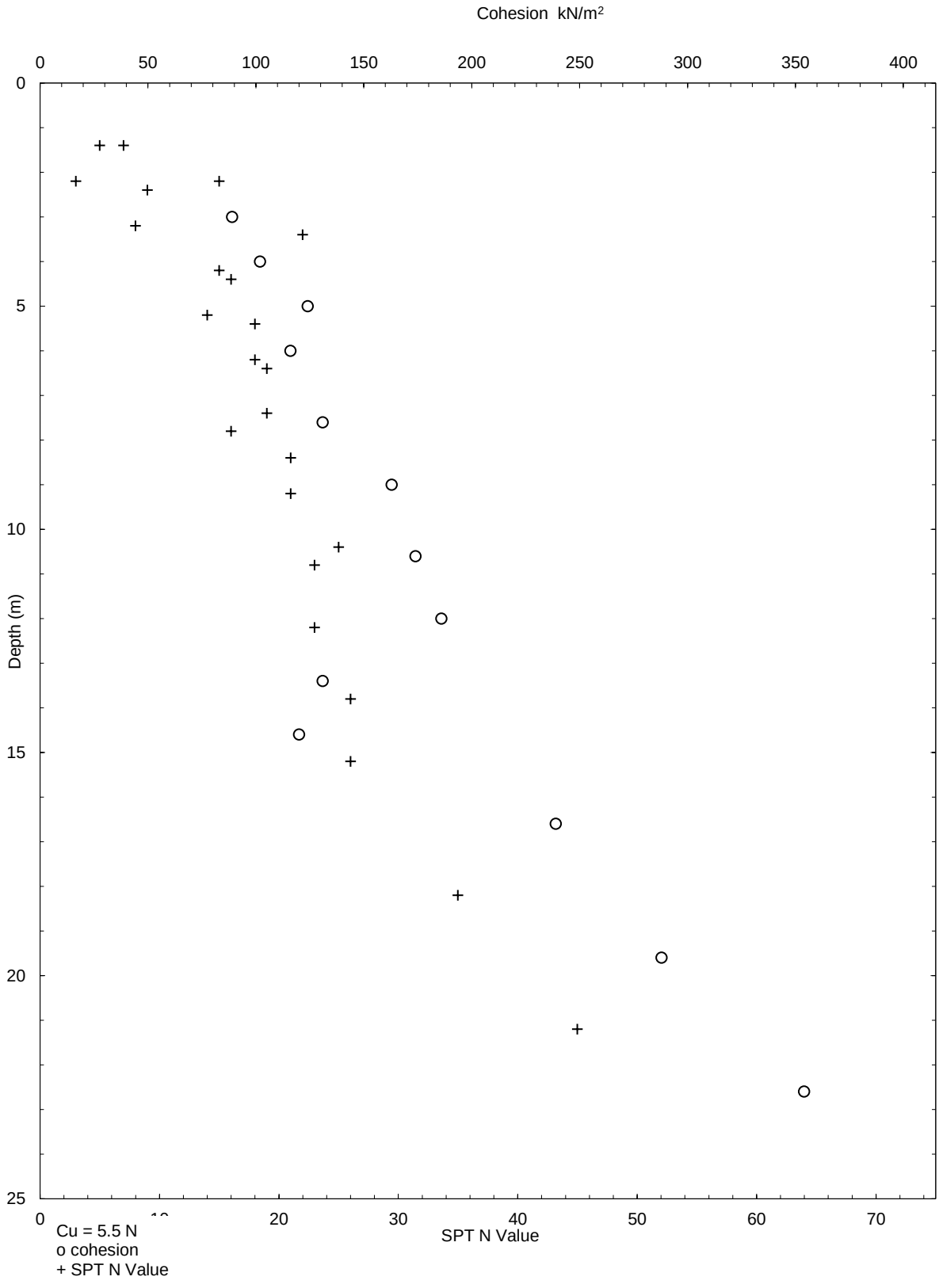
GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**SPT & Cohesion / Depth Graph**	
Site	5-17 Haverstock Hill, London, NW3 2BL	**Job Number**	J15316
Client	Mark Steinberg	**Sheet**	1 / 1
Engineer	Conisbee		



Chemtest
The right chemistry to deliver results

Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA				Chemtest Job No.:	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
Quotation No.:				Chemtest Sample ID.:	225952	225953	225954	225955	225956	225957	225958	225960	225961
				Client Sample ID.:	BH3A	BH3B	BH3B	BH3B	BH3B	BH4	BH4	BH4	BH5
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.4	0.8	2.1	3.0	4.0	0.6	1.6	3.6	0.6
				Date Sampled:	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	25-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A		-				-			-
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected				No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020	7.1	9.3	17	20	20	16	20	19	22
Stones	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones, NONE	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Clay	Clay	Clay	Clay	Clay	Clay	Clay
pH	M	2010		N/A	10.8	11.4	8.5	8.2	8.4	9.9	8.3	8.3	8.4
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.13	0.26	1.5	1.6	0.95	0.43	0.052	0.88	0.21
Chloride (Extractable)	M	2220	g/l	0.010	0.058	0.038	0.039	0.038	0.065	0.048	0.087	0.071	0.19
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.50	95	11	3.3	2.9	2.5	1.5	1.9	1.6	2.6
Sulphate (Total)	M	2430	mg/kg	100	1300	2700	15000	12000	5100	3200	530	4400	1500
Arsenic	M	2450	mg/kg	1.0	31	26	15	14	18	70	14	16	16
Cadmium	M	2450	mg/kg	0.10	0.10	0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10	0.11	< 0.10
Chromium	M	2450	mg/kg	1.0	32	34	59	46	53	33	59	58	47
Copper	M	2450	mg/kg	0.50	34	42	38	31	39	29	29	31	30
Mercury	M	2450	mg/kg	0.10	0.18	0.35	< 0.10	< 0.10	< 0.10	0.20	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	26	32	53	50	57	22	49	53	45
Lead	M	2450	mg/kg	0.50	210	1100	230	34	20	60	17	16	390
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.21	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	M	2450	mg/kg	0.50	130	200	94	87	88	58	82	76	110
Total Organic Carbon	M	2625	%	0.20	0.47	0.71	0.27	0.31	0.33	1.2	0.27	0.31	0.31
TPH >C5-C6	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C7	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C7-C8	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C16-C21	N	2670	mg/kg	1.0	9.6	4.4	< 1.0	< 1.0	< 1.0	7.7	< 1.0	< 1.0	< 1.0
TPH >C21-C35	N	2670	mg/kg	1.0	28	23	< 1.0	< 1.0	< 1.0	25	< 1.0	< 1.0	< 1.0
Total TPH >C5-C35	N	2670	mg/kg	10	38	27	< 10	< 10	< 10	32	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.3	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.14	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.20	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	0.63	< 0.10	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	0.35
Anthracene	M	2700	mg/kg	0.10	0.21	< 0.10	< 0.10	< 0.10	< 0.10	0.34	< 0.10	< 0.10	0.12
Fluoranthene	M	2700	mg/kg	0.10	1.8	0.67	< 0.10	< 0.10	< 0.10	1.6	< 0.10	< 0.10	0.50

Chemtest
The right chemistry to deliver results

Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA		**Chemtest Job No.:**			15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
Quotation No.:		**Chemtest Sample ID.:**			225952	225953	225954	225955	225956	225957	225958	225960	225961
		Client Sample ID.:			BH3A	BH3B	BH3B	BH3B	BH3B	BH4	BH4	BH4	BH5
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.4	0.8	2.1	3.0	4.0	0.6	1.6	3.6	0.6
		Date Sampled:			24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	25-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Pyrene	M	2700	mg/kg	0.10	2.0	0.88	< 0.10	< 0.10	< 0.10	1.9	< 0.10	< 0.10	0.56
Benzo[a]anthracene	M	2700	mg/kg	0.10	1.0	0.53	< 0.10	< 0.10	< 0.10	0.88	< 0.10	< 0.10	0.19
Chrysene	M	2700	mg/kg	0.10	1.2	0.67	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	0.24
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	1.8	0.98	< 0.10	< 0.10	< 0.10	1.6	< 0.10	< 0.10	0.30
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.84	0.42	< 0.10	< 0.10	< 0.10	0.68	< 0.10	< 0.10	0.11
Benzo[a]pyrene	M	2700	mg/kg	0.10	1.5	0.74	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	0.26
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	0.83	0.44	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.29	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	0.78	0.65	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	13	6.1	< 2.0	< 2.0	< 2.0	13	< 2.0	< 2.0	2.6
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

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Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA			**Chemtest Job No.:**		15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
Quotation No.:			**Chemtest Sample ID.:**		225962	225964	225965	225969	225971	225972
			Client Sample ID.:		BH5	BH5	BH6	BH6	BH7	BH7
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.8	4.0	0.3	4.0	0.4	1.5
			Date Sampled:		25-Nov-2015	25-Nov-2015	25-Nov-2015	25-Nov-2015	26-Nov-2015	26-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
ACM Type	U	2192		N/A						
Asbestos Identification	U	2192	%	0.001						
Moisture	N	2030	%	0.020	17	21	22	20	21	19
Stones	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Clay	Clay	Clay	Clay	Clay	Clay
pH	M	2010		N/A	8.5	8.2	8.9	8.3	8.5	8.0
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.34	1.6	0.25	1.3	0.17	0.97
Chloride (Extractable)	M	2220	g/l	0.010	0.064	0.071	0.078	0.17	0.021	0.053
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.50	1.6	1.5	83	3.8	15	2.0
Sulphate (Total)	M	2430	mg/kg	100	1200	16000	8900	12000	990	8500
Arsenic	M	2450	mg/kg	1.0	11	21	18	17	16	16
Cadmium	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10
Chromium	M	2450	mg/kg	1.0	44	55	33	53	57	61
Copper	M	2450	mg/kg	0.50	27	37	49	32	28	37
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	0.51	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	43	57	28	49	51	54
Lead	M	2450	mg/kg	0.50	39	18	160	19	17	17
Selenium	M	2450	mg/kg	0.20	< 0.20	0.36	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	M	2450	mg/kg	0.50	69	90	64	82	90	89
Total Organic Carbon	M	2625	%	0.20	0.20	0.64	1.4	0.22	0.25	0.21
TPH >C5-C6	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C7	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C7-C8	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C16-C21	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C21-C35	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total TPH >C5-C35	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10

Chemtest
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Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA			**Chemtest Job No.:**		15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
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			Client Sample ID.:		BH5	BH5	BH6	BH6	BH7	BH7
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.8	4.0	0.3	4.0	0.4	1.5
			Date Sampled:		25-Nov-2015	25-Nov-2015	25-Nov-2015	25-Nov-2015	26-Nov-2015	26-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

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Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Generic Risk-Based Soil Screening Values

Site	5-17 Haverstock Hill, London, NW3 2BL
Client	Mark Steinberg
Engineer	Conisbee

Job Number J15316

Sheet 1 / 2

Proposed End Use Residential with plant uptake

Soil pH 8

Soil Organic Matter content % 1.0

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	0.2	C4SL
Toluene	120	SGV
Ethyl Benzene	65	SGV
Xylene	42	SGV
Aliphatic C5-C6	30	LQM/CIEH
Aliphatic C6-C8	73	LQM/CIEH
Aliphatic C8-C10	19	LQM/CIEH
Aliphatic C10-C12	93	LQM/CIEH
Aliphatic C12-C16	740	LQM/CIEH
Aliphatic C16-C35	45,000	LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH
Aromatic C8-C10	27	LQM/CIEH
Aromatic C10-C12	69	LQM/CIEH
Aromatic C12-C16	140	LQM/CIEH
Aromatic C16-C21	250	LQM/CIEH
Aromatic C21-C35	890	LQM/CIEH
PRO (C_5 –C_{10})	269	Calc
DRO (C_{12} –C_{28})	46,130	Calc
Lube Oil (C_{28} –C_{44})	45,890	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	184	SGV
PAH		
Naphthalene	2.20	C4SL exp & LQM/CIEH
Acenaphthylene	170	LQM/CIEH
Acenaphthene	210	LQM/CIEH
Fluorene	160	LQM/CIEH
Phenanthrene	92	LQM/CIEH
Anthracene	2,300	LQM/CIEH
Fluoranthene	260	LQM/CIEH
Pyrene	560	LQM/CIEH
Benzo(a) Anthracene	4.3	C4SL exp & LQM/CIEH
Chrysene	8	C4SL exp & LQM/CIEH
Benzo(b) Fluoranthene	7.7	C4SL exp & LQM/CIEH
Benzo(k) Fluoranthene	12.1	C4SL exp & LQM/CIEH
Benzo(a) pyrene	4.35	C4SL
Indeno(1 2 3 cd) Pyrene	4.4	C4SL exp & LQM/CIEH
Dibenzo(a h) Anthracene	1.10	C4SL exp & LQM/CIEH
Benzo (g h i) Perylene	65	C4SL exp & LQM/CIEH
Screening value for PAH	**62.1**	B(a)P / 0.15
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	11.7	LQM/CIEH
tetrachloroethane (PCA)	0.56	LQM/CIEH
tetrachloroethene (PCE)	1.01	LQM/CIEH
trichloroethene (TCE)	0.134	LQM/CIEH
1,2-dichloroethane (DCA)	0.0054	LQM/CIEH
vinyl chloride (Chloroethene)	0.000953	LQM/CIEH
tetrachloromethane (Carbon tetra	0.018	LQM/CIEH
trichloromethane (Chloroform)	0.888	LQM/CIEH

Notes

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

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

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

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

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

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

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

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
74513917_1_1

Customer Reference:
J15316

National Grid Reference:
528100, 184430

Slice:
A

Site Area (Ha):
0.11

Search Buffer (m):
1000

Site Details:

5-17 Haverstock Hill
LONDON
NW3 2BP

Client Details:

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

Geotechnical & Environmental Associates

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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Natural England Copyright Notice

Ove Arup Copyright Notice

Peter Brett Associates Copyright Notice

Radon Potential dataset Copyright Notice

Report Version v50.0

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1				4
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 1		1	6	17
Local Authority Pollution Prevention and Control Enforcements	pg 5				1
Nearest Surface Water Feature	pg 5				Yes
Pollution Incidents to Controlled Waters	pg 5			1	2
Prosecutions Relating to Authorised Processes	pg 6				1
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances	pg 6				7
River Quality	pg 7				1
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 7				1
Water Abstractions	pg 7				13 (*11)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 13	Yes	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 13	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones	pg 13			1	2
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Detailed River Network Lines					n/a
Detailed River Network Offline Drainage					n/a

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 15				2
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites	pg 15				3
Registered Waste Treatment or Disposal Sites	pg 16				1
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS 1:625,000 Solid Geology	pg 17	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 17	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 18		Yes	Yes	Yes
BGS Urban Soil Chemistry Averages	pg 21	Yes			
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 21	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 21	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards				n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 21	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

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Industrial Land Use					
Contemporary Trade Directory Entries	pg 22		13	71	207
Fuel Station Entries	pg 46		1	2	2
Sensitive Land Use					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves	pg 47				1
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Discharge Consents** Operator: National Grid Company Plc. Property Type: Production & Distribution Of Electricity Location: Fitzroy Bridge Outlet, Primrosehill, Camden, London Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CTMR.0387 Permit Version: 1 Effective Date: 28th March 1980 Issued Date: 28th March 1980 Revocation Date: Not Supplied Discharge Type: Trade Discharges - Cooling Water Discharge Environment: Canal Receiving Water: Grand Unioncanal **Status: Transferred from Rivers (Prevention of Pollution) Act 1951-1961** Positional Accuracy: Located by supplier to within 100m	A8NE (SE)	553	3	528360 183920
2	**Discharge Consents** Operator: The Jim Henson Studio Property Type: Recreational & Cultural Location: 30 Oval Road, Camden Town, London, Nw1 7de Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CATM.2853 Permit Version: 1 Effective Date: 1st April 1997 Issued Date: 1st April 1997 Revocation Date: 30th September 2005 Discharge Type: Trade Discharges - Cooling Water Discharge Environment: Canal Receiving Water: Guc - Paddington Arm **Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A9NW (SE)	606	3	528600 184050
2	**Discharge Consents** Operator: Rushes Motion Control Property Type: Recreational & Cultural Location: 30 Oval Road, Camden Town, London, Nw1 7de Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: Cntm.1566 Permit Version: 1 Effective Date: 1st September 1994 Issued Date: 1st September 1994 Revocation Date: 1st October 1996 Discharge Type: Trade Discharges - Cooling Water Discharge Environment: Freshwater Stream/River Receiving Water: Guc - Paddington Arm **Status: Lapsed (under Environment Act 1995, Schedule 23)** Positional Accuracy: Located by supplier to within 100m	A9NW (SE)	606	3	528600 184050
3	**Discharge Consents** Operator: Thames Water Utilities Ltd Property Type: Reservoir/Borehole Site Location: Barrow Hill Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.0018 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	A7SE (SW)	943	3	527600 183600
4	**Local Authority Pollution Prevention and Controls** Name: Texaco Location: 81-85 Chalk Farm Road, LONDON, NW1 8AR Authority: London Borough of Camden, Pollution Projects Team Permit Reference: NOT GIVEN Dated: 24th December 1998 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station **Status: Site Closed** Positional Accuracy: Manually positioned to the address or location	A13SE (E)	150	4	528269 184381

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	**Local Authority Pollution Prevention and Controls** Name: Lex Volvo Location: 1 Dumpton Place, Gloucester Avenue, Chalk Farm, LONDON, NW1 8JB Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 7th January 1994 Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles **Status:** **Authorised** Positional Accuracy: Manually positioned to the address or location	A13SE (S)	283	4	528165 184138
6	**Local Authority Pollution Prevention and Controls** Name: Primrose Valet Location: 91 Regent'S Park Road, London, Nw1 8ur Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC53 Dated: 28th January 2009 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Manually positioned to the address or location	A13SW (SW)	304	4	527917 184155
7	**Local Authority Pollution Prevention and Controls** Name: The Dry Cleaners Of Hampstead Location: 80 Haverstock Hill, London, Nw3 2be Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC41 Dated: 25th June 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	324	4	527875 184684
8	**Local Authority Pollution Prevention and Controls** Name: Wm Morrisons Supermarkets Plc Location: Chalk Farm Road, London, Nw1 8aa Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC1 Dated: 26th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A14SW (SE)	421	4	528439 184146
8	**Local Authority Pollution Prevention and Controls** Name: Wm Morrisons Supermarkets Plc Location: Chalk Farm Road, LONDON, NW1 8AA Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC19 Dated: 22nd December 1998 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A14SW (SE)	421	4	528439 184146
9	**Local Authority Pollution Prevention and Controls** Name: Esso Location: 29 Chalk Farm Road, LONDON, NW1 8AG Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC15 Dated: 24th December 1998 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status:** **Permitted** Positional Accuracy: Manually positioned to the address or location	A14SW (E)	461	4	528567 184291
10	**Local Authority Pollution Prevention and Controls** Name: J T Coachworks Location: 52A Prince Wales Road, LONDON, NW5 3LR Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 30th April 1993 Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles **Status:** **Authorisation revokedRevoked** Positional Accuracy: Automatically positioned to the address	A14NW (NE)	541	4	528594 184700

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
22	**Local Authority Pollution Prevention and Controls** Name: London Zoo Location: Regents Park, LONDON, NW1 4RY Authority: Westminster City Council, Environmental Health Department Permit Reference: Not Given Dated: 1st November 1992 Process Type: Local Authority Air Pollution Control Description: PG5/1Clinical waste incineration processes under 1 tonne an hour **Status: Authorisation has expiredExpired** Positional Accuracy: Automatically positioned to the address	A8SW (S)	937	5	528016 183480
23	**Local Authority Pollution Prevention and Controls** Name: Royal Mail Property Holdings Ltd Location: 1 Regis Road, LONDON, NW5 3EW Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: Not Supplied Process Type: Local Authority Air Pollution Control Description: PG6/10 Coating manufacturing **Status: Authorisation revokedRevoked** Positional Accuracy: Manually positioned to the road within the address or location	A19SE (NE)	996	4	528875 185083
24	**Local Authority Pollution Prevention and Control Enforcements** Location: 3 - 6 Spring Place, London, Nw5 3ba Type: Air Pollution Control Enforcement Notice Reference: Not Given Date Issued: 16th November 2001 Enforcement Date: Not Supplied Details: Failure To Maintain Proper Paperwork For Organic Compounds Positional Accuracy: Manually positioned to the address or location	A19SW (NE)	728	4	528569 185005
	Nearest Surface Water Feature	A8NE (SE)	529	-	528430 183990
25	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Hampstead Road Lock, CAMDEN TOWN Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 17th December 1998 Incident Reference: THNE1998041401 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	A8NW (S)	422	3	528000 184000
26	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Prince Albert Road Authority: Environment Agency, Thames Region Pollutant: Not Given Note: Confirmed incident Incident Date: 4th April 1999 Incident Reference: THNE1999043097 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Approximate location provided by supplier	A8SE (S)	740	3	528300 183700
27	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: LONDON Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 15th January 1996 Incident Reference: SE960036 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	A14SE (E)	990	3	529100 184250

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Abbey Lodge Rtm Company Limited Licence Number: 28/39/39/0115 Permit Version: 101 Location: Abbey Lodge, Park Road, London Nw8-Two Boreholes Authority: Environment Agency, Thames Region Abstraction: Household Water Supply: Drinking; Cooking; Sanitary; Washing; (Small Garden) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Abbey Lodge, Park Road, London Nw8 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st June 2006 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1911	3	527420 182620
	Water Abstractions Operator: Wood Management Trustees Ltd Licence Number: 28/39/39/0115 Permit Version: 100 Location: Two Boreholes At Abbey Lodge, Park Road, London Nw8 Authority: Environment Agency, Thames Region Abstraction: Household Water Supply: Drinking; Cooking; Sanitary; Washing; (Small Garden) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 100 Yearly Rate (m3): 28640 Details: Abbey Lodge, Park Road, London Nw8 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 28th November 1991 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(S)	1911	3	527420 182620
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 39 West London Scale: 1:100,000	A13SW (NW)	0	3	528100 184427
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A13SW (NW)	0	2	528100 184427
	Superficial Aquifer Designations No Data Available				
35	**Source Protection Zones** Name: Barrow Hill Source: Environment Agency, Head Office Reference: Th405 Type: Zone II (Outer Protection Zone): Either 25% of the source area or a 400 day travel time whichever is greater.	A12SE (SW)	407	3	527741 184182
36	**Source Protection Zones** Name: Barrow Hill Source: Environment Agency, Head Office Reference: Th405 Type: Zone I (Inner Protection Zone): Travel time of 50 days or less to the groundwater source.	A7NE (SW)	612	3	527723 183914
37	**Source Protection Zones** Name: Barrow Hill Source: Environment Agency, Head Office Reference: Th405 Type: Groundwater Source	A7SE (SW)	846	3	527640 183690
	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				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Flood Defences None				
	Detailed River Network Lines None				
	Detailed River Network Offline Drainage None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
38	**Licensed Waste Management Facilities (Locations)** Licence Number: 80482 Location: 28 Jamestown Road , London, NW1 7BY Operator Name: Camden London Borough Council Operator Location: Not Supplied Authority: Environment Agency - Thames Region, North East Area Site Category: Household Waste Amenity Sites **Licence Status: Surrendered** Issued: 15th October 1994 Last Modified: Not Supplied Expires: Not Supplied Suspended: Not Supplied Revoked: Not Supplied Surrendered: 25th July 1997 IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A9NW (SE)	668	3	528667 184035
39	**Licensed Waste Management Facilities (Locations)** Licence Number: 80349 Location: Recycling Centre, Regis Road, Kentish Town, London, NW5 3EP Operator Name: LondonWaste Ltd Operator Location: Not Supplied Authority: Environment Agency - Thames Region, North East Area Site Category: Household Waste Amenity Sites **Licence Status: Transferred** Issued: 10th December 1996 Last Modified: 25th January 2002 Expires: Not Supplied Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A19NW (NE)	939	3	528740 185138
	Local Authority Landfill Coverage Name: London Borough of Camden - Has no landfill data to supply		0	8	528100 184427
	Local Authority Landfill Coverage Name: Westminster City Council - Has supplied landfill data		739	5	528216 183684
40	**Registered Waste Transfer Sites** Licence Holder: L.B. of Camden Licence Reference: DL251 Site Location: Jamestown Road Recycling Centre, 28 Jamestown Road, CAMDEN, London, NW1 Operator Location: Old Town Hall, Haverstock Hill, CAMDEN, London, NW3 4QP Authority: Environment Agency - Thames Region, North East Area Site Category: Transfer Max Input Rate: Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Licence has completion certificateSurrendered Dated: 5th October 1994 Preceded By Licence: DL251 Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Lead/Acid Batteries Lwra Cat. A = Inert Wastes Lwra Cat. Bi Gen.Non-Putresc Mineral Oils Mostlwra Cat. C 'Putresc' Some Lwra Cat Bii Gen. Scrap Metal W. W.For Recyling (Cats A, Bi, C) Prohibited Waste: Clinical - As In Coll/Disp.Regs Of '88 Special Wastes N.O.S. Waste N.O.S.	A9NW (SE)	696	3	528690 184020

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Thames Group	A13SW (NW)	0	2	528100 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SW (NW)	0	2	528100 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SW (W)	75	2	528000 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NW (S)	415	2	528100 184000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NW (S)	422	2	528000 184000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SW (N)	551	2	528100 185000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SW (N)	559	2	528000 185000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A14SE (E)	874	2	529000 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A9NE (SE)	973	2	529000 184000
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528324, 184426 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 14.00 mg/kg Cadmium Measured Concentration: 1.00 mg/kg Chromium Measured Concentration: 71.00 mg/kg Lead Measured Concentration: 1103.00 mg/kg Nickel Measured Concentration: 29.00 mg/kg	A13SE (E)	198	2	528324 184426
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528240, 184781 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 17.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 74.00 mg/kg Lead Measured Concentration: 994.00 mg/kg Nickel Measured Concentration: 26.00 mg/kg	A18SE (N)	361	2	528240 184781
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527717, 184227 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 21.00 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 77.00 mg/kg Lead Measured Concentration: 2046.00 mg/kg Nickel Measured Concentration: 34.00 mg/kg	A12SE (SW)	405	2	527717 184227

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Urban Soil Chemistry Averages Source: British Geological Survey, National Geoscience Information Service Sample Area: London Count Id: 7189 Arsenic Minimum Concentration: 1.00 mg/kg Arsenic Average Concentration: 17.00 mg/kg Arsenic Maximum Concentration: 161.00 mg/kg Cadmium Minimum Concentration: 0.30 mg/kg Cadmium Average Concentration: 0.90 mg/kg Cadmium Maximum Concentration: 165.20 mg/kg Chromium Minimum Concentration: 13.00 mg/kg Chromium Average Concentration: 79.00 mg/kg Chromium Maximum Concentration: 2094.00 mg/kg Lead Minimum Concentration: 11.00 mg/kg Lead Average Concentration: 280.00 mg/kg Lead Maximum Concentration: 10000.00 mg/kg Nickel Minimum Concentration: 2.00 mg/kg Nickel Average Concentration: 28.00 mg/kg Nickel Maximum Concentration: 506.00 mg/kg	A13SW (NW)	0	2	528100 184427
	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	A13SW (NW)	0	2	528100 184427
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	197	2	527922 184290
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	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	A13SW (NW)	0	2	528100 184427
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
43	**Contemporary Trade Directory Entries** Name: American Dry Cleaners Location: 4, Chalk Farm Parade, Adelaide Road, LONDON, NW3 2BN Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	5	-	528085 184411
44	**Contemporary Trade Directory Entries** Name: Cleaners Chalk Farm Location: 8, Haverstock Hill, London, NW3 2BL Classification: Cleaning Services - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	71	-	528197 184426
44	**Contemporary Trade Directory Entries** Name: Marine Ices Location: 8, Haverstock Hill, London, NW3 2BL Classification: Ice Cream Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	71	-	528197 184426
44	**Contemporary Trade Directory Entries** Name: Marine Ices Location: 8, Haverstock Hill, London, NW3 2BL Classification: Ice Cream Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	71	-	528197 184426
45	**Contemporary Trade Directory Entries** Name: 1 A Pest Control Location: Call Centre,Regents Pk Rd, London, NW1 8BB Classification: Pest & Vermin Control **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (SE)	72	-	528166 184364
46	**Contemporary Trade Directory Entries** Name: Chalk Farm Ford Location: 74-77, Chalk Farm Road, London, NW1 8AN Classification: Car Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	200	-	528314 184358
46	**Contemporary Trade Directory Entries** Name: Chalk Farm Tyres Location: 66, Chalk Farm Road, London, NW1 8AN Classification: Tyre Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	245	-	528359 184350
47	**Contemporary Trade Directory Entries** Name: Mercantile Radio Services Ltd Location: 134a, Gloucester Avenue, London, NW1 8JA Classification: Telecommunications Equipment & Systems **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	217	-	528056 184199
47	**Contemporary Trade Directory Entries** Name: London Communications Plc Location: 134-136, Gloucester Avenue, London, NW1 8JA Classification: Radio Communication Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	217	-	528056 184199
47	**Contemporary Trade Directory Entries** Name: London Communications Plc Location: 134-136, Gloucester Avenue, London, NW1 8JA Classification: Radio Communication Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	217	-	528056 184199
48	**Contemporary Trade Directory Entries** Name: S B Z Foods Location: 10a Belmont St, London, NW1 8HH Classification: Food Products - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SE (E)	220	-	528344 184399
48	**Contemporary Trade Directory Entries** Name: Austrian Sausage Centre Location: 10a, Belmont Street, London, NW1 8HH Classification: Meat Product Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	220	-	528344 184399

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
48	**Contemporary Trade Directory Entries** Name: Infectious Distribution Location: 25, Ferdinand Street, London, NW1 8EU Classification: Distribution Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	262	-	528387 184403
49	**Contemporary Trade Directory Entries** Name: Stonegate Cleaning Location: Flat 4, Stonegate, St. Silas Place, London, NW5 3QP Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	249	-	528235 184657
50	**Contemporary Trade Directory Entries** Name: Ariel Medical Ltd Location: 4, Maitland Park Road, London, NW3 2ES Classification: Medical Equipment Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	251	-	527991 184676
51	**Contemporary Trade Directory Entries** Name: Ireson Associates Location: 110, Gloucester Avenue, London, NW1 8HX Classification: Stained Glass Designers & Producers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (S)	258	-	528106 184158
52	**Contemporary Trade Directory Entries** Name: Marine Ices Location: 61, Chalk Farm Road, London, NW1 8AN Classification: Ice Cream Manufacturers & Suppliers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	274	-	528386 184337
52	**Contemporary Trade Directory Entries** Name: Select Canvas Location: The Stables Market,Chalk Farm Rd, London, NW1 8AH Classification: Printers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (E)	289	-	528392 184314
52	**Contemporary Trade Directory Entries** Name: Reject Pot Shop Location: 56, Chalk Farm Road, London, NW1 8AN Classification: Catering Equipment **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	298	-	528408 184330
52	**Contemporary Trade Directory Entries** Name: Reject Pot Shop Location: 56, Chalk Farm Road, London, NW1 8AN Classification: Tableware **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	298	-	528408 184330
53	**Contemporary Trade Directory Entries** Name: Volvo Cars Regents Park Location: 1, Dumpton Place, London, NW1 8JB Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (S)	282	-	528166 184138
53	**Contemporary Trade Directory Entries** Name: Oven Cleaning Primrose Hill Location: 90, Gloucester Avenue, London, NW1 8HX Classification: Oven cleaning **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (S)	292	-	528158 184128
54	**Contemporary Trade Directory Entries** Name: P H Factor Location: 172, Regents Park Road, London, NW1 8XN Classification: Toiletries **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	298	-	527949 184145
54	**Contemporary Trade Directory Entries** Name: The Studio Location: 170, Regents Park Road, London, NW1 8XN Classification: Perfume Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	303	-	527946 184141

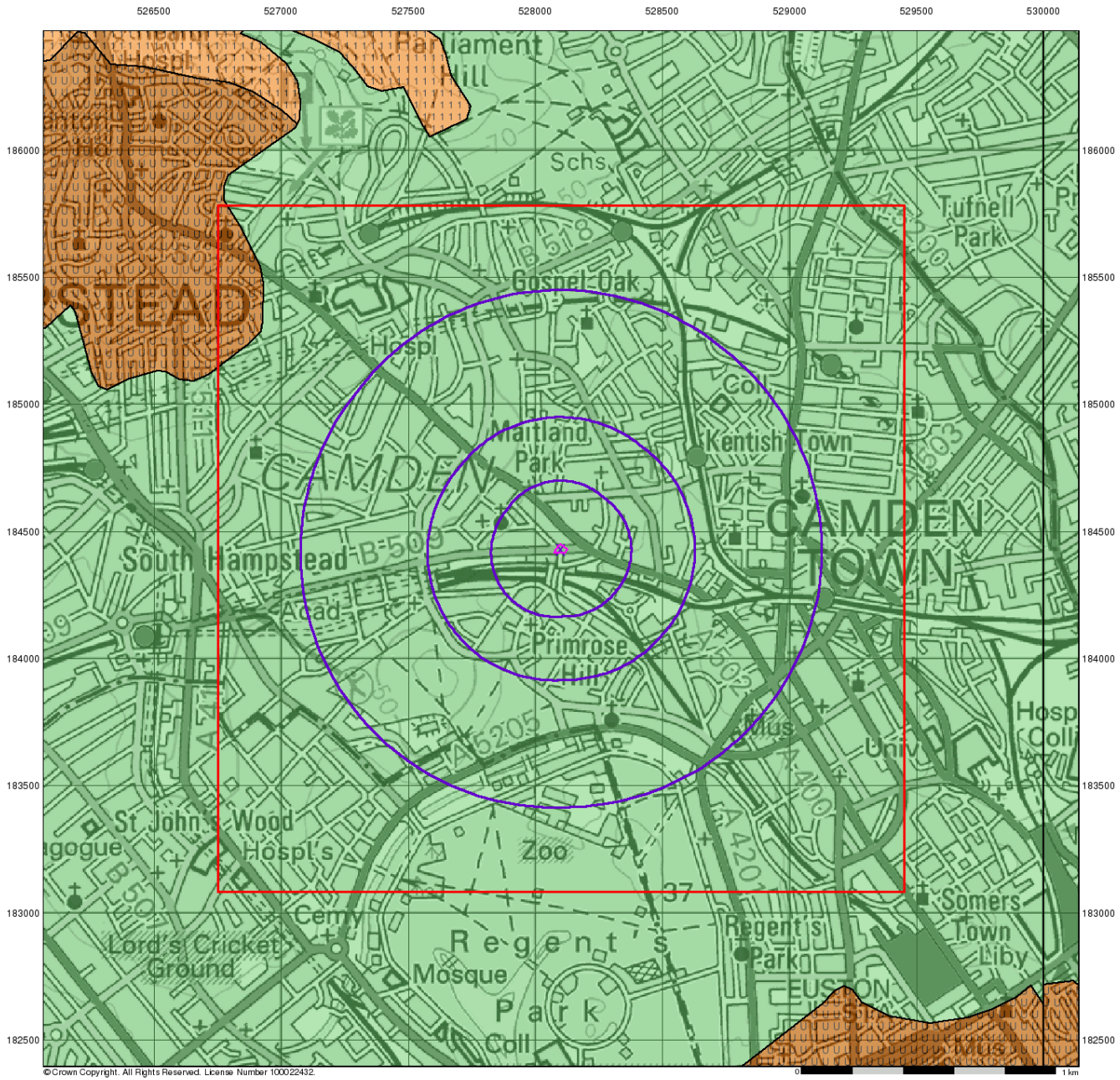
Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
172	**Contemporary Trade Directory Entries** Name: Belsize Park Cleaners Location: 192, Haverstock Hill, London, NW3 2AJ Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17NW (NW)	997	-	527358 185118
172	**Contemporary Trade Directory Entries** Name: Belsize Park Cleaners Location: 192, Haverstock Hill, London, NW3 2AJ Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17NW (NW)	997	-	527358 185118
173	**Contemporary Trade Directory Entries** Name: National Tyres And Autocare Location: 107, Parkway, London, NW1 7PP Classification: Tyre Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9SW (SE)	999	-	528714 183615
174	**Fuel Station Entries** Name: Star Chalk Farm Location: 81-85 Chalk Farm Road, Chalk Farm, LONDON, NW1 8AR Brand: Texaco Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Approximate location provided by supplier	A13NE (NE)	72	-	528174 184481
175	**Fuel Station Entries** Name: Morrisons Camden Location: Chalk Farm Road, Chalk Farm, London, Greater London, NW1 8AA Brand: Morrisons Premises Type: Hypermarket **Status: Open** Positional Accuracy: Manually positioned to the address or location	A13SE (SE)	328	-	528420 184281
176	**Fuel Station Entries** Name: Chalk Farm Service Station Location: 32-33, Chalk Farm Road, London, NW1 8AJ Brand: ESSO Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Manually positioned to the address or location	A14SW (E)	461	-	528567 184291
177	**Fuel Station Entries** Name: Parkway Filling Station Location: 120 Parkway, Camden Town, LONDON, NW1 7AN Brand: Obsolete Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Approximate location provided by supplier	A9NW (SE)	703	-	528582 183889
178	**Fuel Station Entries** Name: Court Service Station Location: 160a Malden Road, Kentish Town, LONDON, NW5 4BT Brand: Obsolete Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Located by supplier to within 100m	A18NW (N)	753	-	528033 185200

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
179	**Local Nature Reserves** Name: Belsize Wood Multiple Area: N Area (m2): 2722.99 Source: Natural England Designation Date: 28th March 2012	A17NE (NW)	967	6	527528 185230

Useful Contacts

Contact	Name and Address	Contact Details
2	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
3	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.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	**Westminster City Council - Environmental Health Department** Council House, Marylebone Road, London, NW1 5PT	Telephone: 020 7641 1317 Fax: 020 7641 1142 Website: www.westminster.gov.uk
6	**Natural England** Suite D, Unex House, Bourges Boulevard, Peterborough, Cambridgeshire, PE1 1NG	Telephone: 0845 600 3078 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
7	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
8	**London Borough of Camden** Town Hall, Judd Street, London, WC1H 9JE	Telephone: 020 7974 4444 Fax: 020 7974 6866 Email: info@camden.gov.uk Website: www.camden.gov.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

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



GEA Geotechnical & Environmental Associates

Groundwater Vulnerability

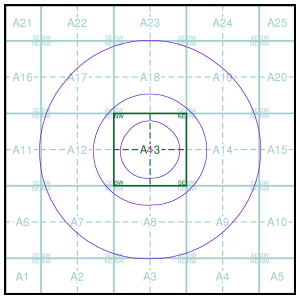
General

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

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National Grid Reference:	528100, 184430
Slice:	A
Site Area (Ha):	0.11
Search Buffer (m):	1000

Site Details

5-17 Haverstock Hill, LONDON, NW3 2BP

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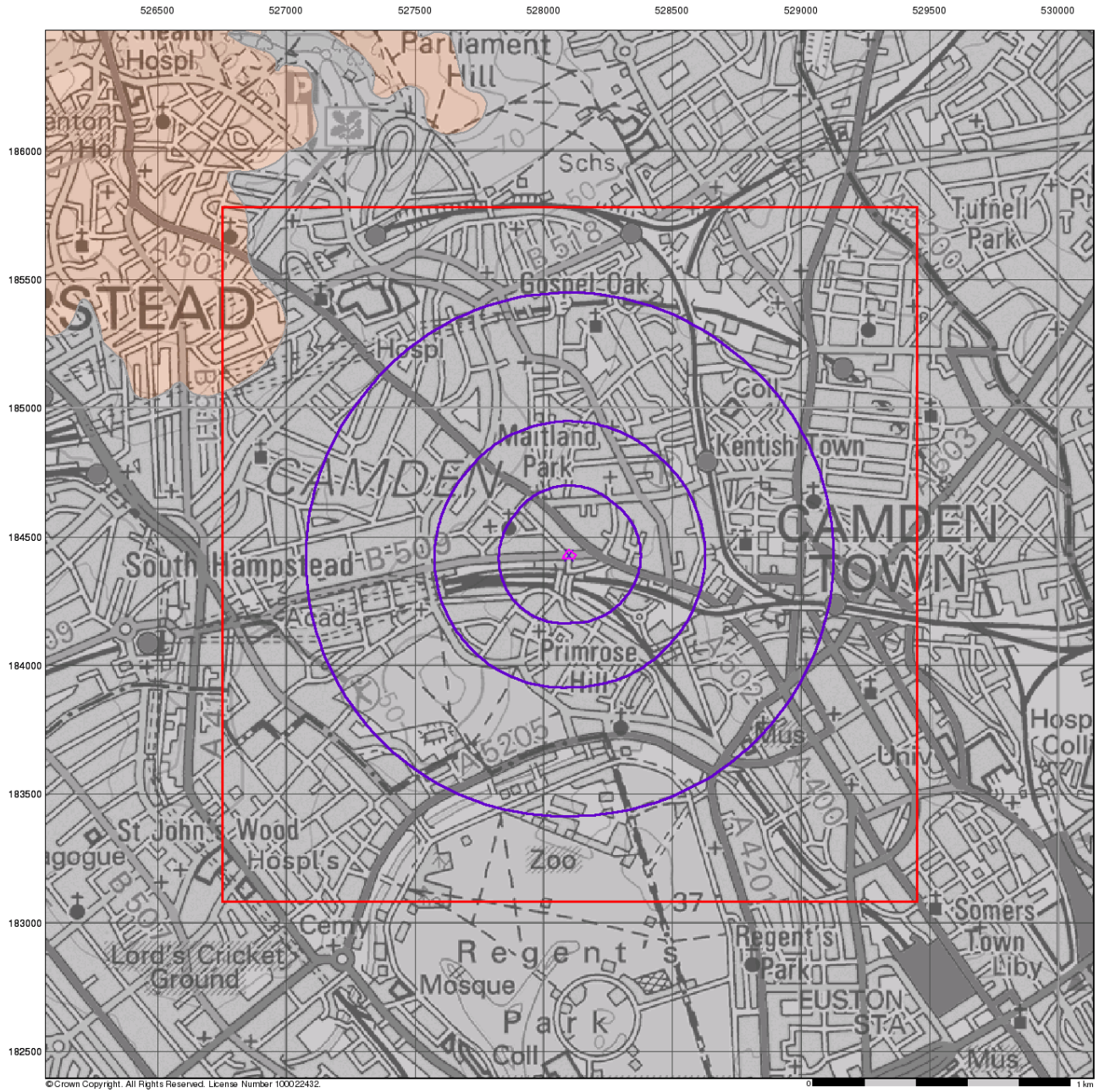


GEA Geotechnical & Environmental Associates

Bedrock Aquifer Designation

General

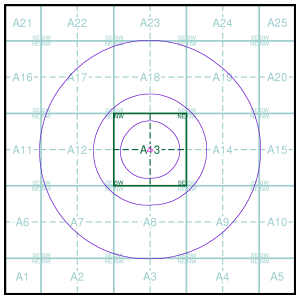
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



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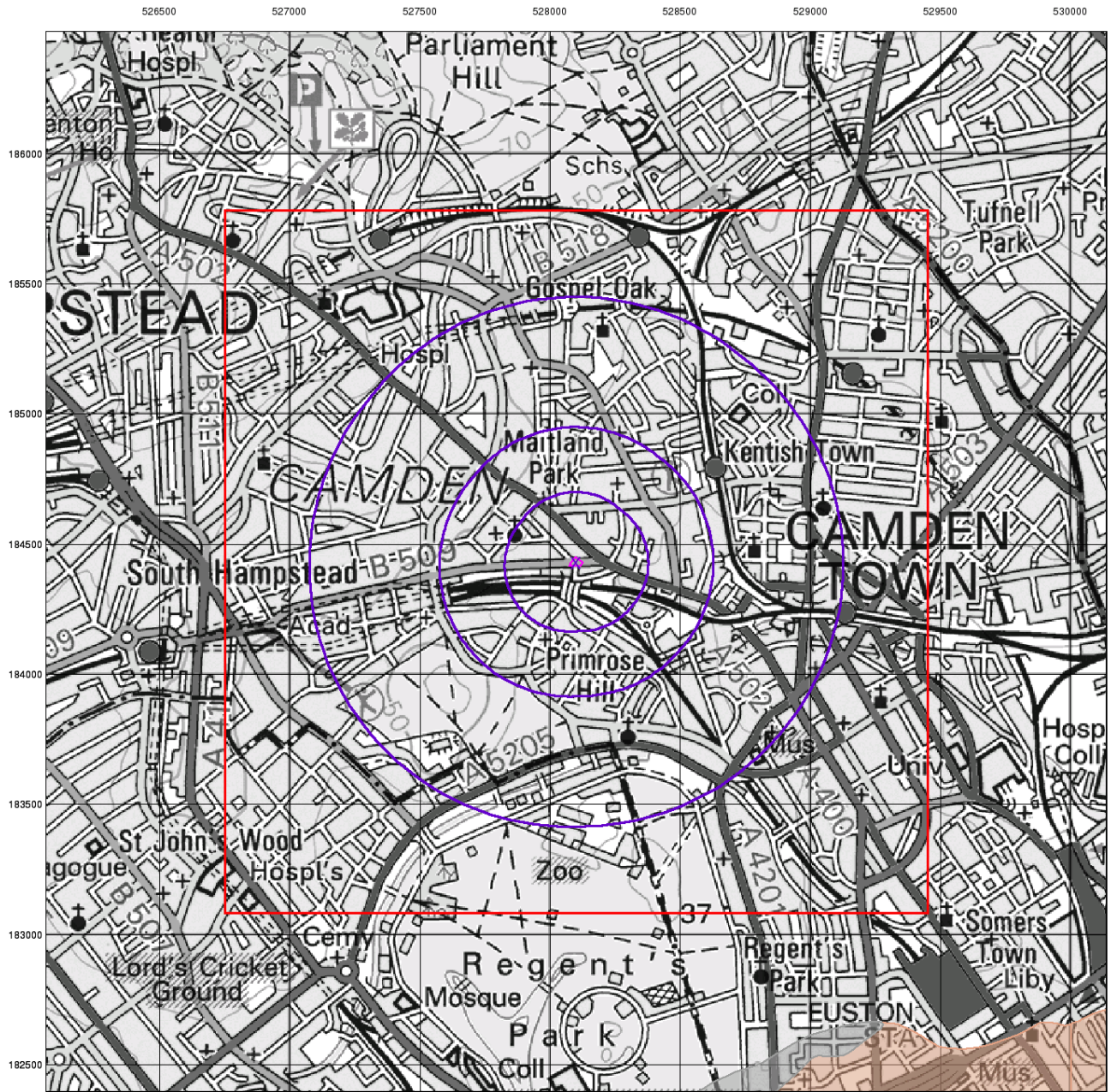


GEA Geotechnical & Environmental Associates

Superficial Aquifer Designation

General

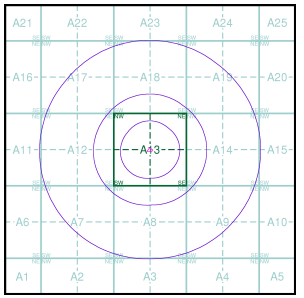
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



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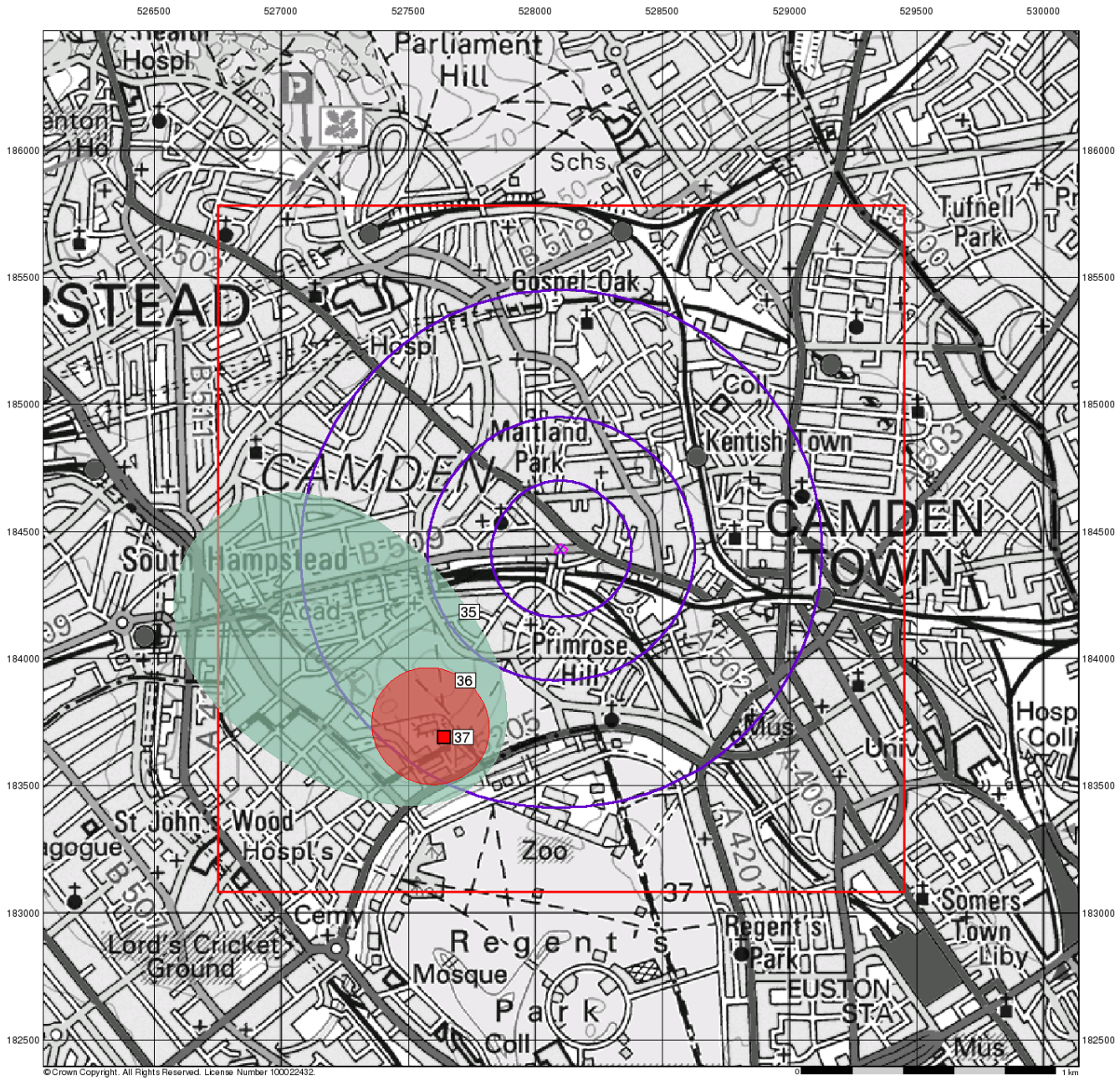


GEA Geotechnical & Environmental Associates

Source Protection Zones

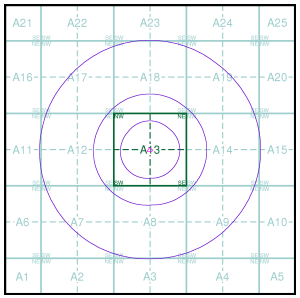
General

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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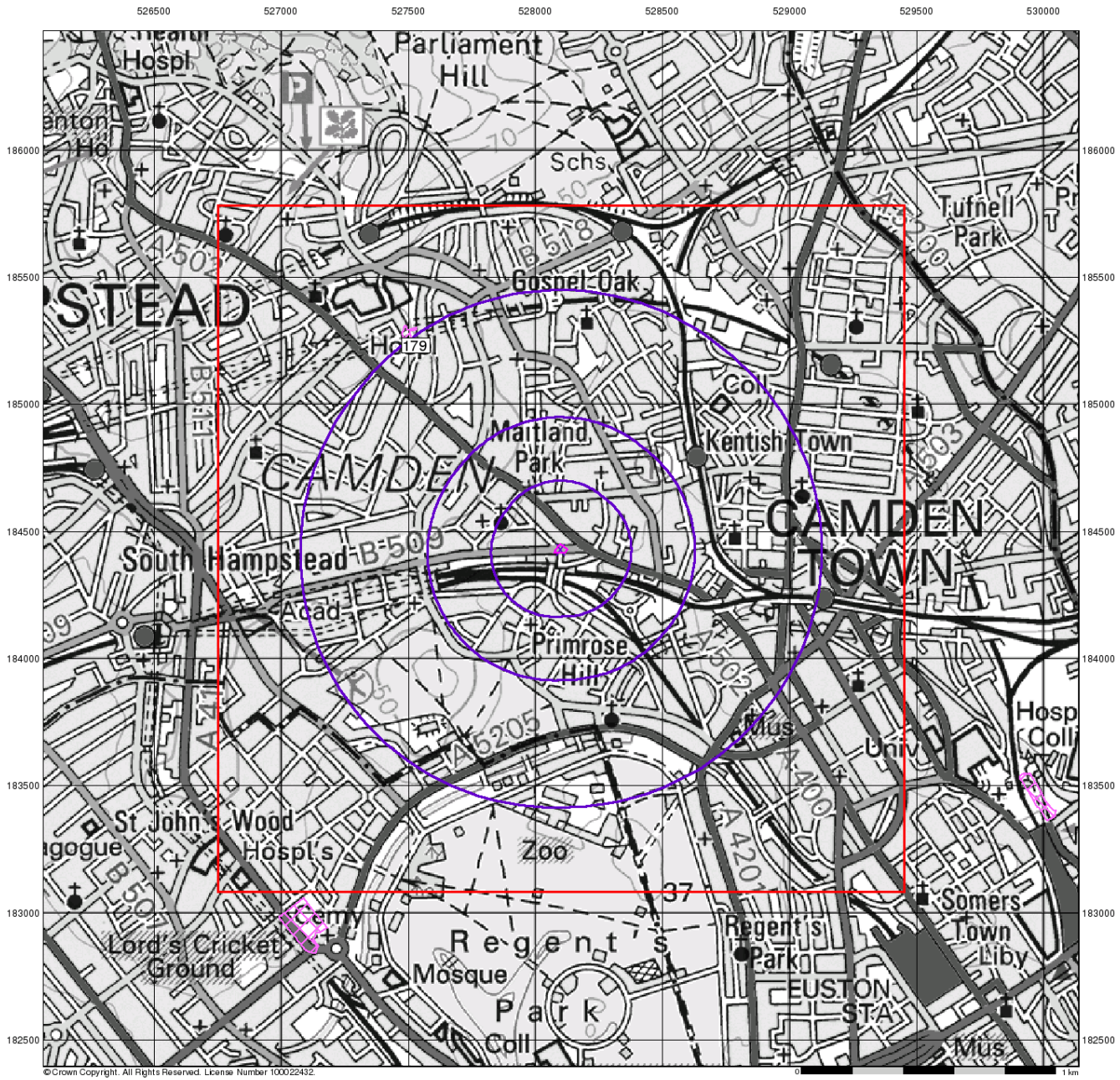


GEA Geotechnical & Environmental Associates

Sensitive Land Uses

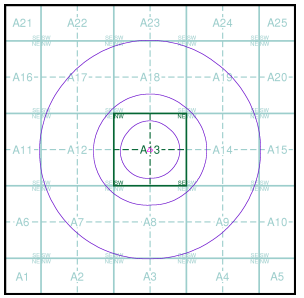
General

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

Sensitive Land Uses

- 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

Site Sensitivity Context Map - Slice A



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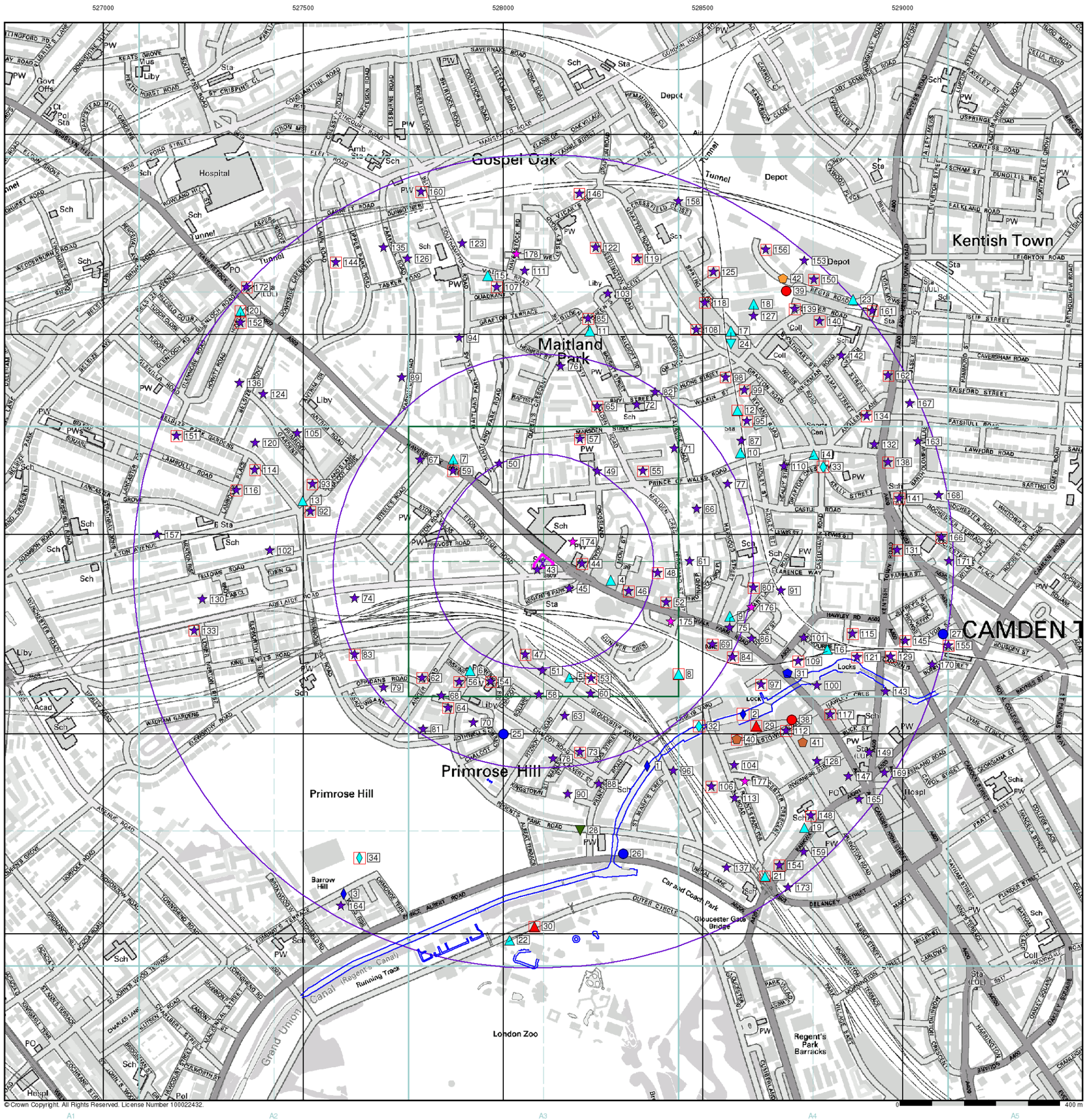


GEA Geotechnical & Environmental Associates

General

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

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

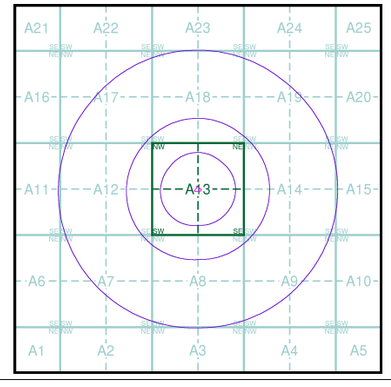
Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Site Sensitivity Map - Slice A



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GEA Geotechnical & Environmental Associates

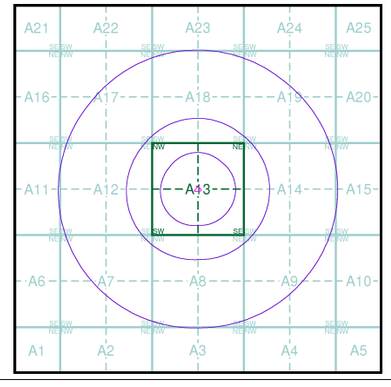
General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Agency and Hydrological (Flood)

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

Flood Map - Slice A



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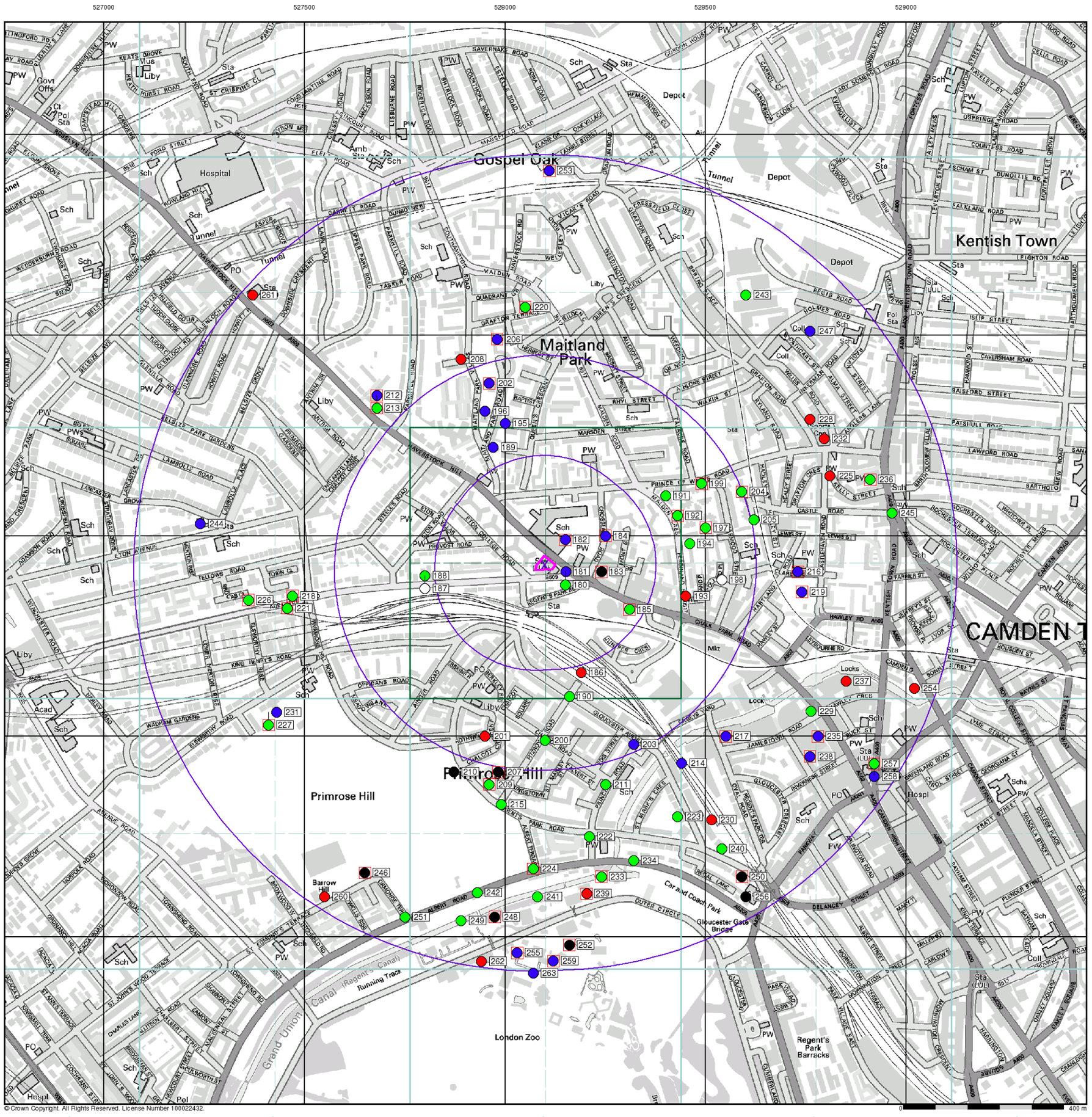


GEA Geotechnical & Environmental Associates

General

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

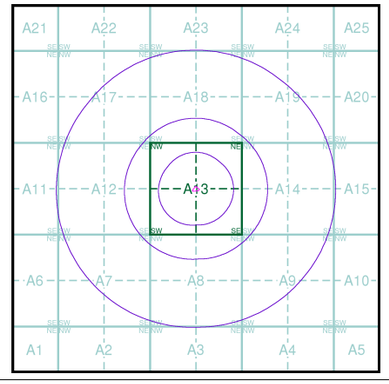
Agency and Hydrological (Boreholes)

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

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

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

Borehole Map - Slice A



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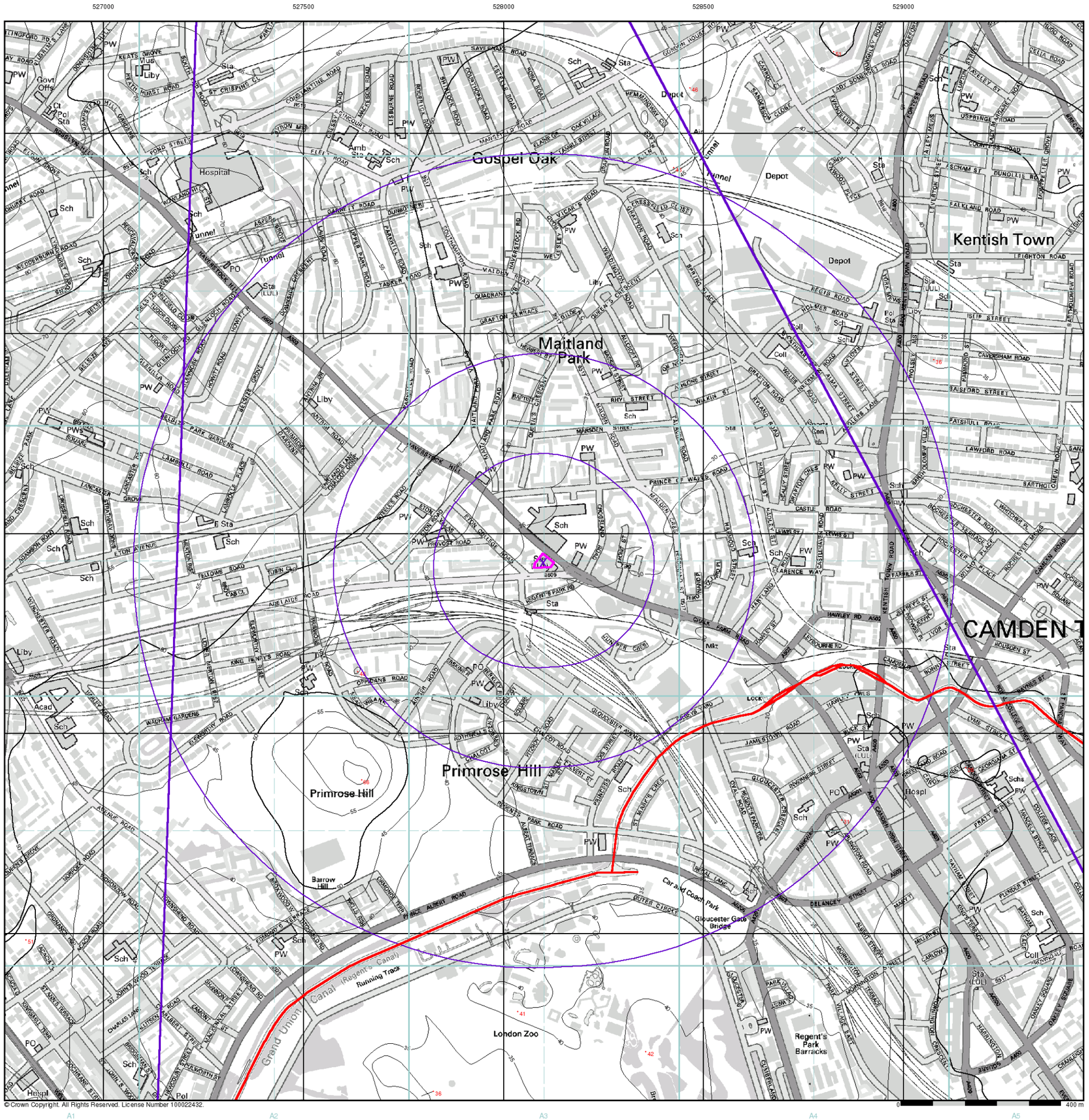


GEA Geotechnical & Environmental Associates

General

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

Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Contours (height in metres)

Standard Contour — 105 — 100 — 95

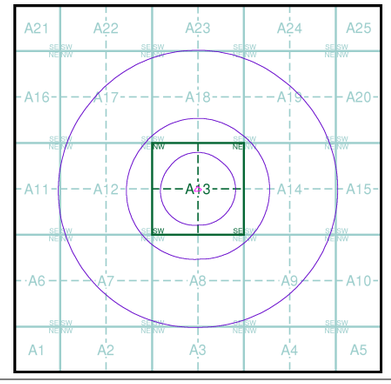
Master Contour

Spot Height *167.3

MLW Mean Low Water

MHW Mean High Water

EA/NRW Detailed River Network Map - Slice A



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