



**41 Sheldon Avenue
London
N6 4PJ**

Desk Study & Ground Investigation

Mark Tognolini & Eva Stengaard

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Ground investigation | Geotechnical consultancy | Contaminated land assessment



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

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Executive summary

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

Brief

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Symmetrys, on behalf of Mark Tognolini & Eva Stengaard, with respect to the construction of a single level basement beneath the existing property, as well as a new rear extension and swimming pool. 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, to assess the extent of any contamination and to provide information to assist with the design of retaining walls and foundations.

Site history

Reference to the earliest available OS map, dated 1864, shows the site within an area of open fields. A small stream is shown just to the east, and the irregular western boundary of the field within which the site is shown is also considered likely to comprise a small stream or ditch. Between 1870 and 1896, several small buildings were established around 100 m to the northwest, at the current sight of Highgate Golf Club, and residential development occurred further to the southeast. Between 1896 and 1915, further residential development occurred, and more of the existing road network was established, including Denewood Road to the east. Allotment gardens were also established to the east, and Highgate Golf Course had been established to the northwest.

By 1936, Sheldon Avenue had been established, and the site and surrounding area had been developed broadly as existing. A covered reservoir had also been built around 200 m to the northwest of the site, within the grounds of Highgate Golf Course. Between 1936 and 1946, Sheldon Avenue was extended north-eastwards into the allotment gardens, and a small number of houses were developed, and between 1958 and 1962, the rest of the road was developed with residential properties, with only a small section of allotment gardens remaining to the east. No significant changes have subsequently been made within the site and immediately surrounding area.

Ground conditions

The investigation has generally confirmed the expected ground conditions in that, below a limited to locally moderate thickness of made ground, the Claygate Member was encountered over the London Clay Formation, which was proved to the maximum depth investigated. The made ground generally comprised brown locally organic sandy silty clay locally with frequent roots and variable quantities of fine to coarse gravel sized fragments of flint, brick, concrete, ceramic, charcoal and clinker. In the boreholes it extended to a maximum depth of 0.50 m, but in the trial pits it was

locally recorded to depths of greater than 1.40 m. The Claygate Member generally comprised firm orange-brown mottled brown and grey slightly sandy to sandy silty clay with occasional pockets and partings of silt and fine sand, and occasional roots, and was recorded to depths of between 2.50 m (96.75 m OD) and 3.50 m (95.76 m OD). The London Clay generally comprised firm becoming stiff with depth fissured brown silty clay with occasional to locally frequent coarse sand sized selenite crystals, claystone and partings of orange brown clayey sand, to depths of around 4.90 m (94.35 m OD) to 5.10 m (94.16 m OD), whereupon stiff becoming very stiff with depth fissured dark brownish grey to grey silty clay with occasional to locally frequent partings of clayey sand was encountered, and recorded to the maximum depth investigated, of 20.00 m.

Groundwater was encountered at a depth of around 4.00 m during drilling in Borehole No 2 only, but was measured at a shallowest depth of 0.34 m (98.98 m OD) during the limited groundwater monitoring period.

The contamination testing revealed elevated concentrations of lead and PAH within the made ground.

Recommendations

Excavations for the proposed basement structure will require temporary support to maintain stability of the excavation and surrounding structures. Foundations for the proposed basement are anticipated to bypass the made ground and Claygate Member and bear onto the stiff London Clay. Moderate width spread foundations bearing below basement level, within the stiff London Clay, may be designed to apply a net allowable bearing pressure of around 150 kN/m².

Based on the fieldwork, groundwater is likely to be encountered within the basement excavation. The Claygate Member includes layers and pockets of sand and the occurrence of groundwater into the basement will to a large extent be determined by the presence of these more highly permeable materials. Shallow inflows of perched water may also be encountered from within the made ground, particularly within the vicinity of existing foundations. It would therefore be prudent 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 ground water conditions.

Consideration should be given to additional testing for lead and PAH to determine the total and leachable concentrations within areas of soft landscaping. Pending the results of this additional testing, remediation measures may be required, to protect end users from the shallow contaminated soils.

The ground movement analysis has concluded that the damage to the neighbouring properties should be 'Negligible' to 'Very Slight'.



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, and an assessment of the ground movements associated with the basement excavation is included in Part 3.

1.0 Introduction

Geotechnical and Environmental Associates Limited (GEA) has been commissioned by Symmetrys, on behalf of Mark Tognolini & Eva Stengaard, to carry out a desk study and ground investigation at 41 Sheldon Avenue, London N6 4PJ.

1.1 Proposed Development

The proposals are understood to comprise the construction of a single level basement beneath the existing property, as well as a new rear extension and swimming pool within the rear garden. Formation level for the proposed basement is understood to be at a depth of around 4.40 m below ground floor level, but the proposed depth of the pool is currently unknown.

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

1.2 Purpose of Work

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

- to check the history of the site with respect to previous contaminative uses;
- to provide an assessment of the risk of encountering unexploded ordnance (UXO);
- to determine the ground conditions and their engineering properties;
- to use the above information to provide recommendations for suitable foundations;
- 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 historical Ordnance Survey (OS) maps and environmental searches sourced from the Envirocheck database;
- commissioning of a preliminary UXO report (report ref PA18617-00, dated 6th September 2023) by 1st Line Defence, a specialist in this field;
- a review of readily available geology maps; and
- a walkover survey of the site carried out in conjunction with the fieldwork.

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

- a 20 m deep borehole advanced using a cable percussion rig within the front parking area;
- two boreholes advanced within the rear garden using an opendrive sampling rig to depths of 8.00 m;
- a total of eight hand dug foundation inspection trial pits;
- 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.



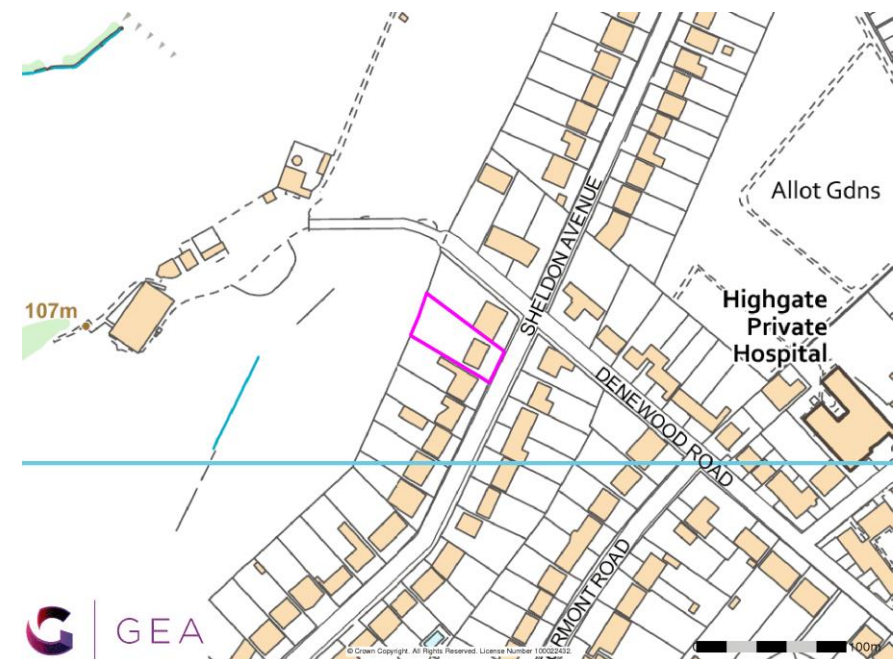
This report includes a contaminated land assessment which has been undertaken by a suitably qualified and competent professional in accordance with the methodology presented by the Environment Agency in their Land contamination risk assessment (LCRM)¹ published 19 April 2021. This involves identifying, 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. Risk management is divided into three stages; Risk Assessment, Options Appraisal and Remediation, and each stage comprises three tiers. The Risk Assessment stage includes preliminary risk assessment (PRA), generic quantitative risk assessment (GQRA) and detailed quantitative risk assessment (DQRA) and this report includes the PRA and GQRA.

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

2.0 The Site

2.1 Site Description

The site is located in Highgate, around 1 km west of Highgate London Underground Station. It fronts onto Sheldon Avenue to the southeast, and is bounded by Nos 43 and 39 Sheldon Avenue to the northeast and southwest respectively, and by the grounds of Highgate Golf Club to the northwest. The site may be additionally located by National Grid Reference 527540, 188080 and is shown on the map extract below.



A walkover of the site was carried out by a geotechnical engineer from GEA at the time of the fieldwork. The site is broadly rectangular in shape and measures approximately 65 m southeast-northwest by 30 m northeast-southwest. The site is occupied by 41 Sheldon

¹ <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>



Avenue, a substantial three storey detached house located in the eastern part of the site, with a predominantly brick paved front parking / amenity area, and a large soft landscaped rear garden, which includes various shrubs, mature and semi-mature trees.

2.2 Site History

Reference to the earliest available OS map, dated 1864, shows the site within an area of open fields. A small stream is shown just to the east, and the irregular western boundary of the field within which the site is shown is also considered likely to comprise a small stream or ditch. Between 1870 and 1896, several small buildings were established around 100 m to the northwest, at the current sight of Highgate Golf Club, and residential development occurred further to the southeast. Between 1896 and 1915, further residential development occurred, and more of the existing road network was established, including Denewood Road to the east. Allotment gardens were also established to the east, and Highgate Golf Course had been established to the northwest.

By 1936, Sheldon Avenue had been established, and the site and surrounding area had been developed broadly as existing. A covered reservoir had also been built around 200 m to the northwest of the site, within the grounds of Highgate Golf Course. Between 1936 and 1946, Sheldon Avenue was extended north-eastwards into the allotment gardens, and a small number of houses were developed, and between 1958 and 1962, the rest of the road was developed with residential properties, with only a small section of allotment gardens remaining to the east. No significant changes have subsequently been made within the site and immediately surrounding area.

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 search has revealed that there are no recorded current or historical landfill sites, and no waste management facilities or waste transfer sites, within 1 km of the site.

According to the Envirocheck report, the nearest area of potentially infilled land (water or non-water) comprises a pond located around 254 m to the south of the site, which was infilled between 1896 and 1915, but based on historic mapping evidence, it appears a small stream previously located around 65 m to the east of the site may have also been infilled between 1896 and 1915.

The search has indicated that the site is in an area where less than 1% of homes are affected by radon emissions; which is the lowest classification given by the Health Protection Agency (HPA).

There are no local authority pollution prevention and control points, or discharge consents within 250 m of the site. The nearest pollution incident to controlled waters occurred in May 1992, 241 m to the east of the site, and was classified as a category 3 - minor incident, with the pollutant comprising 'oils - unknown'.

There are no contemporary trade directory entries located within 250 m of the site. The closest 'point of interest – manufacturing and production' is located 162 m to the west of the site, and relates to 'tanks'. There are no fuel station entries within 500 m of the site.

The site is not located within any areas of sensitive land use.

2.4 Preliminary UXO Risk Assessment

A Preliminary UXO Risk Assessment has been completed by 1st Line Defence (report ref PA18617-00, dated 6th September 2023), and the report is included in the appendix. The risk assessment has been carried out in accordance with the guidelines provided by CIRIA², which state that the likelihood of encountering and detonating UXO below a site should be assessed along with establishing the consequences that may arise. The first phase comprises a preliminary risk assessment, which should be undertaken at an early stage of the development planning. If such an assessment identifies a high level of risk then a detailed risk assessment should be carried out by a UXO specialist, which will identify an appropriate course of action with regard to risk mitigation.

The report indicates that, during World War II (WWII), the site was located within the Municipal Borough of Hornsey, which sustained an overall high density of bombing. No bomb strikes are recorded to have fallen within the site boundary on the London bomb census mapping records, and the consulted damage mapping does not indicate that the property was damaged. It is considered likely that the site would have been subject to regular access during the war, thus a low / minimal risk of encountering unexploded ordnance has been identified for the site and no further action is recommended in this respect.

2 CIRIA C681 (2009) *Unexploded ordnance (UXO) A guide for the construction industry*



2.5 Geology

The British Geological Survey (BGS) map of the area indicates that the site is underlain by the Claygate Member, over the London Clay Formation. According to the BGS memoir, the Claygate Member comprises alternating beds of clayey silt, very silty clay, sandy silt and glauconitic silty fine sand. The lower part of the Claygate Member is generally more bioturbated. A bed of calcareous concretions is present near the base in many places. The underlying 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. The boundary between the Claygate Member and London Clay is transitional, and often difficult to distinguish.

The geology in this area is generally horizontally bedded such that the boundary between the geological formations roughly follows the ground surface contour lines. A borehole drilled by the BGS on Hampstead Lane to the southwest of the site, generally referred to as the 'Hampstead Heath borehole', was advanced to a depth of 66.74 m (61.97 m OD) at National Grid Reference 526455, 186890. The borehole record indicates that the Bagshot Formation extended to a depth of 19.00 m (109.71 m OD) and penetrated the full thickness of the Claygate Member, which was found to extend to a depth of 35.00 m (93.71 m OD), below which the London Clay Formation was encountered.

A previous GEA investigation, carried out approximately 200 m to the southwest of the site, generally confirmed the expected ground conditions in that, below a moderate thickness of made ground / topsoil, the Claygate Member was encountered over the London Clay Formation, which was recorded to the maximum depth investigated of 20.00 m (85.90 m OD). The Claygate Member initially comprised firm orange-brown mottled greenish grey and yellowish brown silty sandy clay becoming brownish grey, extending to depths of between 4.00 m and 4.60 m (102.88 m OD and 101.40 m OD). Below this depth, stiff grey silty sandy clay with rare shell fragments was encountered, and extended to a depth of 15.00 m (90.90 m OD). The London Clay generally comprised stiff becoming very stiff grey silty fissured clay with a layer of soft grey silt encountered at 16.50 m (89.40 m OD) to 18.50 m (87.40 m OD). Rootlets were observed to a maximum depth of 2.50 m, although desiccation was not noted during the investigation.

2.6 Hydrology and Hydrogeology

The Claygate Member is classified by the Environment Agency as a Secondary 'A' Aquifer, defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The Claygate Member is predominantly cohesive in nature and therefore groundwater flow is

likely to be relatively slow, although horizons of sandier soils do occur in this stratum, resulting in the permeability ranging from "very low" to "high". The Claygate Member is only designated as a Secondary Aquifer because it contains sand horizons, which provide more permeable layers for the storage of groundwater. Where saturated and continuous sand beds are not present, the Claygate Member behaves hydraulically more like the underlying London Clay, exhibiting poor aquifer properties which accounts for the variable permeability described above. In this case it is not capable of storing and transmitting water in usable amounts and receives very low levels of annual recharge due to very low permeability.

Under the same classification system, the London Clay is designated as Unproductive Strata, which refers to deposits that have low permeability and negligible significance for water supply or river base flow. The London Clay is not capable of supporting a groundwater table, although pockets of perched groundwater do occur within fissures and silt and sand partings. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1×10^{-10} m/s and 1×10^{-8} m/s, with an even lower vertical permeability.

According to the Envirocheck report, the nearest surface water feature is located 104 m to the west of the site, which is understood to be a stream or ditch within Highgate Golf Course. Based on the historical OS mapping, a small stream was located around 65 m to the east of the site, which appears to have been infilled or culverted between 1896 and 1915.

During the aforementioned GEA investigation, groundwater strikes were noted at depths of between 14.0 m and 1.50 m within the Claygate Member, and groundwater was measured in the standpipes at depths of between 1.22 m and 3.12 m (105.41 m OD and 102.78 m OD) during the subsequent period of monitoring.

The site is not within an area shown by the Environment Agency (EA) to be at risk from flooding from rivers or the sea, and it is not within a Groundwater Source Protection Zone as defined by the EA, but areas at a low to medium risk of flooding from surface water are present within the rear garden of the property, based on the EA's surface water flood maps.

According to the BGS, the site is located within an area of limited potential for groundwater flooding to occur.

Much of the site is covered by the existing buildings and adjoining hard surfaced areas, but extensive soft landscaping areas are present within the rear garden. As a result, the infiltration of rainwater is likely to be restricted to the soft landscaped areas, with much of



the surface runoff currently draining into combined sewers in the road. Although the new basement level will be beneath the footprint of the existing property, the new pool will result in a slight increase in the proportion of hard surfaced area, as it will replace areas of existing soft landscaping within the rear garden.

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 findings indicate that the site does not have a potentially contaminative history as it has apparently been developed with the existing house since some time between 1915 and 1936. No significant on-site or off-site potential sources of contamination have been identified, including existing or historical landfill sites, thus the site is not considered to have had a particularly contaminative history.

There are no historical or existing landfill sites within 1 km of the site and the nearest record of any infilled land is a former pond located 254 m to the south of the site, which is understood to have been infilled over 100 years ago, such that a risk of soil gas migrating onto the site has not been identified.

2.7.2 Receptor

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

As the site is underlain by the Claygate Member of the London Clay, classified as a Secondary A Aquifer, groundwater is also considered to be a sensitive receptor, as are neighbouring sites.

2.7.3 Pathway

Within the site, end users will be isolated from direct contact with any contaminants present within the made ground by the building and surrounding hard surfacing, thus only

in areas of soft landscaping will end users potentially come into contact with contaminants, although such pathways are already in existence.

There will be a potential for contaminants to move onto or off the site horizontally within the made ground, and potential within the more granular parts of the underlying Claygate member, although these pathways are already in existence. A pathway for ground workers to come into contact with any contamination will exist during construction work and services will come into contact with any contamination within the soils in which they are laid.

The London Clay Formation is classed as Unproductive Strata, thus will protect the underlying chalk principal aquifer at depth from downward percolation of contaminants in groundwater.

Notwithstanding the risk to site workers and buried services, there is therefore considered to be a low potential for a significant 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 risk of there being a significant contaminant linkage at this site, which would result in a requirement for major remediation work.



3.0 Exploratory Work

In order to meet the objectives described in Section 1.2, and in view of the access restrictions, a 20 m deep borehole was advanced using a cable percussion rig within the front parking area. The deep borehole was supplemented by two boreholes advanced within the rear garden using an opendrive sampling rig to depths of 8.00 m, and a total of eight hand dug foundation inspection trial pits.

During boring, disturbed and undisturbed samples were recovered for subsequent laboratory examination and testing. A selection of the samples recovered from the boreholes was submitted to a soil mechanics laboratory for a programme of geotechnical testing and an analytical laboratory for a programme of contamination testing.

All of the above work was carried out under the supervision of a geotechnical engineer from GEA. The borehole and trial pit records are appended, together with a site plan indicating the exploratory positions. The Ordnance Datum (OD) levels have been taken from Symmetrys' 'Site investigation mark-up' (Ref 23135-SYM-XX-XX-SK-S-0002-Rev P1, dated August 2023).

3.1 Sampling Strategy

The trial pit and borehole locations were specified by the structural engineers, Symmetrys, and revised where necessary by GEA, based on site conditions and to avoid underground services.

Ten samples of the made ground have been tested for the presence of contamination. The analytical suite of testing was selected to identify a range of typical industrial contaminants for the purposes of general coverage and included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. Five samples were also screened for the presence of asbestos. The contamination analyses were carried out at an MCERTS accredited laboratory with the majority of the testing suite accredited to MCERTS standards. A summary of the MCERTS accreditation and test methods are included with the attached results and further details are available upon request.

A selection of suitable samples was also scheduled for a programme of geotechnical testing, which included moisture contents and Atterberg limits, undrained triaxial compression tests and soluble sulphate and pH analysis.

4.0 Ground Conditions

The investigation has generally confirmed the expected ground conditions in that, below a limited to locally moderate thickness of made ground, the Claygate Member was encountered over the London Clay Formation, which was proved to the maximum depth investigated.

4.1 Made Ground

The made ground generally comprised brown locally organic sandy silty clay locally with frequent roots and variable quantities of fine to coarse gravel sized fragments of flint, brick, concrete, ceramic, charcoal and clinker. In the boreholes it extended to a maximum depth of 0.50 m., but in the trial pits it was locally recorded to depths of greater than 1.40 m.

Apart from the presence of fragments of extraneous material noted above, no other visual or olfactory evidence of contamination was observed in the made ground during the fieldwork. Ten samples of the made ground have however been analysed for a range of contaminants as a precautionary measure and the results are detailed within Section 4.5.

4.2 Claygate Member

The Claygate Member generally comprised firm orange-brown mottled brown and grey slightly sandy to sandy silty clay with occasional pockets and partings of silt and fine sand, and occasional roots, and was recorded to depths of between 2.50 m (96.75 m OD) and 3.50 m (95.76 m OD).

Rare to occasional flint gravel was recorded to a depth of 1.50 m in the Claygate Member at the front of the property, and to a depth of 1.20 m at the rear, indicating that the underlying shallow soils have been naturally reworked.

The depth of the base of the Claygate Member has largely been inferred based on the presence or lack of significant sand partings, but due to variability of this stratum, and the presence of sand horizons in the underlying upper parts of the London Clay, the boundary between the two can be somewhat gradational. During the aforementioned previous GEA investigation, a greater depth of sandy clays of the Claygate Member was encountered.



The results of laboratory plasticity index tests indicate the clay to generally be of intermediate plasticity and medium volume change potential, and the results of the undrained triaxial compression testing indicate the clay to be of medium strength.

4.3 London Clay

The London Clay generally comprised firm becoming stiff with depth fissured brown silty clay with occasional to locally frequent coarse sand sized selenite crystals, claystone and partings of orange brown clayey sand, to depths of around 4.90 m (94.35 m OD) to 5.10 m (94.16 m OD), whereupon stiff becoming very stiff with depth fissured dark brownish grey to grey silty clay with occasional to locally frequent partings of clayey sand was encountered, and recorded to the maximum depth investigated, of 20.00 m.

Bluish grey veining associated with fibrous roots was also recorded, to a maximum depth of 4.90 m. The results of laboratory plasticity index tests indicate the clay to generally be of high plasticity and medium volume change potential, becoming very high plasticity and high volume change potential with depth. The results of the undrained triaxial compression tests indicate the clay to be of high becoming very high strength with depth.

4.4 Groundwater

Groundwater was only encountered in Borehole No 2 during drilling, at a depth of around 4.00 m, but was measured close to ground level at a shallowest depth of around 0.20 m (99.12 m OD) below the level of the rear garden during the limited groundwater monitoring period. Monitoring of the standpipes should be continued to determine the groundwater equilibrium level and to establish any seasonal fluctuations.

Borehole No	Standpipe Depth (m)	Date	Depth to water (m) [Level (m OD)]
1	4.66	8/11/2023	1.07 [98.19]
	4.66	27/02/2024	1.12 [98.14]
2	5.14	8/11/2023	0.34 [98.98]
	5.14	27/02/2024	0.20 [99.12]
3	5.13	8/11/2023	1.03 [98.22]y
	5.13	27/02/2024	0.20 [99.05]

4.5 Soil Contamination

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

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit	Normalised upper bound US ₉₅
pH	9.5	6.2	None	8.4
Arsenic	14	10	None	12.5
Cadmium	0.6	< 0.2	9	0.3
Chromium	42	23	None	31.0
Lead	430	15	None	241.3
Mercury	0.6	< 0.3	6	0.4
Selenium	< 1.0	< 1.0	10	< 1.0
Copper	72	29	None	45.8
Nickel	29	11	None	18.7
Zinc	220	47	None	130
Total Cyanide	< 1.0	< 1.0	10	< 1.0
Total Phenols	< 1.0	< 1.0	10	< 1.0
Total PAH	115	1.85	None	28.7
Sulphide	21	< 1.0	5	5.5
Benzo(a)pyrene	7.4	0.2	None	2.0
Naphthalene	1.9	< 0.05	8	0.4
TPH	250	< 10	2	80.1
Total Organic Carbon %	2.4	0.3	None	1.5

Note: The use of the normalised upper bound for 95th percentile confidence aims to remove some of the uncertainty associated with calculation of an arithmetic sample mean of a relatively small number of samples. The US₉₅ value is the upper bound of the range within which it can be stated with 95% confidence that the true mean concentration of the data set will fall. Figure in bold indicates concentration in excess of risk-based soil guideline values, as discussed in Part 2 of this report

In addition, five samples of made ground have been screened for the presence of asbestos, and none was detected.



4.5.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. Contaminants of concern are those that have values in excess of generic human health risk-based guideline values, which are either the CLEA³ Soil Guideline Values where available, the Suitable 4 Use Values⁴ (S4UL) produced by LQM/CIEH calculated using the CLEA UK Version 1.07⁵ software, or the DEFRA Category 4 Screening values⁶, assuming a residential end use with plant uptake. The key generic assumptions for this end use are as follows:

- that groundwater will not be a critical risk receptor;
- that the critical receptor for human health will be young female children aged less than six years old;
- 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 home grown produce, skin contact with soils and dust, and inhalation of dust and vapours; and
- that the building type equates to a two-storey terraced house.

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

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

- additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;

- site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

Elevated concentrations of lead were recorded in five of the samples of made ground tested, and a single sample was found to contain an elevated concentration of total PAH and speciated PAHs. All of the other contaminants tested were found to be below their respective generic guideline values for a residential with plant uptake end use.

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

4.6 Existing Foundations

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

Trial Pit No	Structure	Foundation detail	Bearing Stratum
1	Front wall of house	Brickwork with seven corbels over mass concrete strip / trench fill Top: 0.94 m Base 1.10 m Lateral projection 0.40 m	Orange brown mottled light grey dry silty sandy CLAY with pockets and partings of fine sand / silt and occasional roots.
2	Front wall of house	Brickwork with two corbels over mass concrete strip / trench fill Top: 1.11 m Base 1.30 m Lateral projection 0.24 m	Orange brown mottled light grey dry silty sandy CLAY with pockets and partings of fine sand / silt and occasional roots.
3	NE Flank wall of house	Brickwork with two corbels over mass concrete strip / trench fill Top: 0.86 m Base UNKNOWN Lateral projection 0.18 m	Base of footing not proved due to pipe obstruction

3 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.
4 LQM/CIEH S4ULs for Human Health Risk Assessment S4UL3065 November 2014
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



Trial Pit No	Structure	Foundation detail	Bearing Stratum
4A	Rear wall of garage	Brickwork over mass concrete strip / trench fill Top: 0.15 m Base: 0.70 m Lateral projection 0.10 m	MADE GROUND
4B	SW Flank wall of garage	Brickwork over mass concrete strip / trench fill Top: 0.15 m Base: 0.70 m Lateral projection 0.13 m	
5	Boundary fence with 39 Sheldon Avenue	Insufficient access to proposed location, and wooden fence deemed unlikely to have foundations to investigate. Trial pit aborted.	
6A	Boundary wall with 43 Sheldon Avenue	Brickwork over mass concrete strip / trench fill Top: 1.10 m Base: 1.32 m Projection: 0.35 m	MADE GROUND
6B	Garden wall	Brickwork over brick rubble concrete strip / trench fill Top: 0.05 m Base: 0.28 m Projection: 0.07 m	
7	Boundary wall with 43 Sheldon Avenue	mass concrete strip / trench fill Top: 0.0 m Base: > 1.40 m Lateral projection > 0.10 m	Trial pit aborted at 1.40 m. Base of footing not proved.
8	Boundary wall with 43 Sheldon Avenue	Insufficient access to proposed location due to vegetation. Trial pit aborted.	
9	Boundary wall with 43 Sheldon Avenue	Brickwork over mass concrete strip / trench fill Top: 0.55 m Base: 0.78 m Lateral projection 0.16 m	Orange brown mottled light grey dry silty sandy CLAY with pockets and partings of fine sand / silt and occasional roots.
10	Boundary wall with 43 Sheldon Avenue	Brickwork over mass concrete strip / trench fill Top: 0.42 m Base: 0.75 m Lateral projection 0.20 m	MADE GROUND



Part 2: Design Basis Report

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to the proposed development.

5.0 Introduction

The proposals are understood to comprise the construction of a single level basement beneath the existing property, as well as a new rear extension and swimming pool within the rear garden. Formation level for the proposed basement is understood to be at a depth of around 4.40 m below ground floor level (94.90 m OD).



Extract from Marek Wojciechowski Architects 'Proposed Section AA' (Drg No SHA-MWA-A-ZZ-DR-A-A2200, dated September 2023)

The desk study has indicated that the site has apparently been developed with the existing house since some time between 1915 and 1936, and on the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- below a limited to locally moderate thickness of made ground, the Claygate Member was encountered over the London Clay Formation, which was proved to the maximum depth investigated;
- the made ground generally comprises brown locally organic sandy silty clay locally with frequent roots and variable quantities of fine to coarse gravel sized fragments of flint, brick, concrete, ceramic, charcoal and clinker. It generally extends to a maximum depth of 0.50 m., but locally extends to a depth greater than 1.40 m;
- the Claygate Member generally comprises firm orange brown mottled brown and grey slightly sandy to sandy silty clay with occasional pockets and partings of silt and fine sand, to depths of between 2.50 m (96.75 m OD) and 3.50 m (95.76 m OD);
- rare to occasional flint gravel was recorded to a depth of 1.20 m to 1.50 m in the Claygate, indicating that the underlying shallow soils have been naturally reworked.
- the London Clay initially comprises firm becoming stiff with depth fissured brown silty clay with occasional to locally frequent coarse sand sized selenite crystals, claystone and partings of orange brown clayey sand, to depths of around 4.90 m (94.35 m OD) to 5.10 m (94.16 m OD),
- the London Clay then comprises stiff becoming very stiff with depth fissured dark brownish grey to grey silty clay with occasional to locally frequent partings of clayey sand, to the maximum depth investigated, of 20.00 m.
- bluish grey veining associated with fibrous roots was recorded in the London Clay, to a maximum depth of 4.90 m;
- groundwater was encountered at a depth of around 4.00 m during drilling in Borehole No 2 only, and has been measured at a shallowest depth of 0.20 m (99.12 m OD) during the limited groundwater monitoring period; and
- contamination testing has revealed elevated concentrations of lead in five of the samples of made ground tested, and a single sample was found to contain an elevated concentration of total PAH and speciated PAHs.



6.0 Advice & Recommendations

Excavations for the proposed basement structure will require temporary support to prevent any excessive ground movements and it is unlikely to be feasible to construct the new basement without some level of groundwater control. 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.

Formation level for the proposed basement is likely to be within the stiff clay of the London Clay, which should provide an eminently suitable bearing stratum for spread foundations. However, if significant groundwater inflows are encountered, such that spread foundations become impractical or uneconomic, piled foundations would provide a suitable solution.

6.1 Basement Construction

The formation level of the proposed basement is anticipated to be at a depth of approximately 4.40 m below existing ground level (around 94.90 m OD), which includes an allowance of 0.50 m for the basement slab, insulation and floor finishes. Formation level is therefore expected to be within the stiff London Clay.

A groundwater seepage was noted during the drilling of Borehole No 2, and groundwater has subsequently been monitored at depths of between 0.20 m and 1.12 m. On this basis groundwater is likely to be encountered within the basement excavation, although further monitoring should be carried out to establish equilibrium levels and the extent of any seasonal fluctuations.

Whilst monitoring should be continued, it is not possible to draw entirely meaningful conclusions from the measurements made in the standpipes, as the level of the water table is not necessarily as significant as the volume of water that may flow into the excavation. The Claygate Member includes layers and pockets of sand and the occurrence of groundwater into the basement will to a large extent be determined by the presence of these more highly permeable materials. Shallow inflows of perched water may also be encountered from within the made ground, particularly within the vicinity of existing foundations. It would therefore be prudent 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 ground water conditions.

The design of basement support in the temporary and permanent conditions needs to take account of the need to maintain the stability of the excavation and nearby structures, namely

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

For the ground conditions at this site a bored pile wall could be utilised to support the basement excavation and could be incorporated into the permanent works to provide support for structural loads. A secant wall may be required to provide the necessary watertightness; however, it may be possible to adopt a contiguous bored pile wall, or even reinforced concrete retaining walls to form the proposed basement, if further monitoring or trial excavations confirm that inflows are unlikely to be significant. It is important to bear in mind that higher inflows may result from the presence of larger and / or inter-connected pockets of water, which may be present within the basement excavation; however, once the piled wall is in place, it may be possible to deal with any areas of higher inflow through localised grouting.

A secant wall may have the advantage of maximising usable space in the basement as it would not require a secondary waterproofing inside the wall, which would not be the case with a contiguous bored pile wall.

The proposed construction is anticipated to result in foundation depths locally being significantly increased relative to the neighbouring properties. Careful workmanship will be required to ensure that movement of the surrounding structures does not arise. The contractor should also be required to provide details of how they intend to control groundwater and instability of excavations, should it arise.

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 retaining walls will need to be designed to support the loads from these foundations unless they are underpinned. A Ground Movement Analysis has been carried out and is presented in Part 3 of this report.



6.1.1 Basement 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	1800	Zero	27
Claygate Member	1900	Zero	24
London Clay	1950	Zero	24

The investigation has indicated that groundwater is likely to be present within the basement excavation. Consideration will need to be given to the risk of surface water building up behind the retaining walls and unless adequate drainage can be incorporated to prevent such build-up, it is recommended that the basement is designed with a water level assumed to be 1.0 m below ground level. Reference should be made to BS8102:2009⁷ with regard to requirements for waterproofing.

6.1.2 Basement Heave

The 4.40 m deep excavation of the proposed basement will result in a net unloading of around 85 kN/m², which will result in heave of the underlying London Clay. This will comprise immediate elastic movement, which will account for approximately 40 % of the total movement and be expected to be complete during the construction period, and long term movements, which will theoretically take many years to complete.

The movements should be mitigated to some extent by the presence of the new structure. The ground movements associated with the proposed basement excavation and construction have been considered in more detail in Part 3 of this report.

6.2 Spread Foundations

Spread foundations bearing beneath basement formation level in the stiff silty clay of the London Clay may be designed to apply a net allowable bearing pressure of 150 kN/m². This value incorporates an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits.

The depth of the basement excavation is such that foundations will be placed below the likely depth of any potential desiccation.

6.3 Piled Foundations

For the ground conditions at this site some form of bored pile could be considered. In view of the limited thickness of made ground and underlying clay soils, conventional rotary bored piles could be adopted with relatively short lengths of casing or consideration could be given to the use of bored piles installed using continuous flight auger (cfa) techniques, which would negate the requirement for temporary casing.

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

Stratum	Depths m [level m OD]	kN / m ²
Ultimate Skin Friction		
Basement Excavation	GL to 4.40	Ignore
London Clay	4.40 to 15.00	Increasing linearly from 30 to 82
Ultimate End Bearing		
London Clay	8.00 to 15.00	Increasing linearly from 860 to 1485

BS EN 1997-1:2004; Eurocode 7: Geotechnical Design Part 1 (Eurocode 7) provides factors to be applied to the ultimate skin friction and ultimate end bearing capacity in calculating pile resistance ($R_{d,GEO}$). For bored piles, in the absence of either working load tests or combined working load tests and preliminary pile tests, a model factor of 1.4 should be

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



combined with a factor of 1.6 to be applied to the skin friction, and combined with a factor of 2.0 to be applied to the end bearing.

On the basis of the above, the table below shows the estimated pile resistance for 300 mm, 450 mm and 600 mm diameter piles at various depths. An adhesion factor of 0.5 has been adopted, in accordance with guidance from the London District Surveyors Association (LDSA)⁸.

Pile diameter mm	Toe Depth (m) [Level m OD)	Pile length (m)	$R_{d,GEO}$ (kN)
300	8	3.6	75
	10	5.6	135
	15	10.6	215
450	8	3.6	110
	10	5.6	200
	15	10.6	310
600	8	3.6	235
	10	5.6	395
	15	10.6	585

In order to determine the required pile lengths, the above outline pile resistances need to be compared with structural loads (actions) that have been factored to determine the design effect, in accordance with Eurocode 7.

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 the presence of potential groundwater inflows within the Claygate Member, and claystones within the London Clay.

Higher pile resistances may be achieved for piled foundations advanced from ground level, although consideration will need to be given to a reduction in the skin friction on piles in close proximity of the basement retaining walls.

In the design of piled foundations, the effect of potential future shrinkage and swelling of the clay should be taken into account.

6.4 Hydrogeological Assessment

The desk study and ground investigation have confirmed that the site is underlain by the Claygate Member, over the London Clay Formation, and groundwater has been measured at depths of between 0.34 m and 1.07 m during the limited period of monitoring.

The basement construction will only act as a partial barrier to any groundwater flow, because there will still be space between this and the neighbouring structures to the northeast and southwest. As such, the potential cut-off of the new basement is unlikely to cause any significant increases in the water level on the upstream side.

In conclusion, the basement and any other construction beneath the groundwater level could theoretically locally deviate groundwater flows, but given the arrangement of the buildings, it is not considered that this would have any significant influence on the local hydrogeology.

6.5 Shallow Excavations

On the basis of the borehole findings it is considered that shallow excavations for foundations and services that extend through the made ground should remain generally stable in the short term, although some instability 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 groundwater may be encountered from localised perched water tables within the topsoil, made ground or sand horizons within the Claygate and London Clay, although such inflows should be suitably controlled by sump pumping.

8 LDSA (2017) *Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA



6.6 Basement Floor Slab

Following the excavation of the basement, the proposed basement floor slab is likely to need to be suspended over a void or layer of compressible material to accommodate the anticipated heave, unless the slab can be suitably reinforced to cope with these movements. Further consideration will be given to heave movements in the ground movement assessment, in Part 3.

6.7 Effect of Sulphates

Chemical analyses have revealed concentrations of soluble sulphate and pH in accordance with Class DS-1 to DS-2 conditions of Table C2 of BRE Special Digest 1:SD Third Edition (2005). The measured pH values of the samples show that an ACEC class of AC-2 would be appropriate for the site. This assumes a mobile water condition at the site. The guidelines contained in the digest should be followed in the design of foundation concrete.

6.8 Contamination Risk Assessment

The desk study findings indicate that the site does not have a potentially contaminative history as it has apparently been developed with the existing house since some time between 1915 and 1936. No on-site or off-site potential sources of contamination have been identified, including existing or historical landfill sites, thus the site is not considered to have had a particularly contaminative history. However, the results of the chemical analyses have indicated elevated concentrations of lead with respect to the assumed generic screening values of a residential end use with plant uptake, within five of the samples of the made ground tested, and elevated concentrations of PAH have been recorded in one of the samples.

The source of the lead contamination is unknown but the made ground was noted as containing fragments of extraneous material, including charcoal and clinker, and it is possible that fragments of such material could account for the elevated concentration. Information on Urban Soil Chemistry provided by the BGS also indicates that background concentrations for lead in the vicinity of the site are between 150 mg/kg and 300 mg/kg, such that some of the measured concentrations could be the result of residual airborne sources, particularly from historical use of leaded petrol.

Lead compounds are relatively immobile and unlikely to be in a soluble form and are considered to be non-volatile or of a low volatility. The lead contamination does not therefore present a significant vapour risk or a risk to adjacent sites, groundwater or buried services.

The source of the PAH contamination is also unknown, however it is also likely to be associated with extraneous material in the made ground, such as ash, clinker and charcoal. As a result, the PAH contamination is also not likely to be in a soluble state and should not, therefore, pose a vapour risk, or a risk to adjacent sites, groundwater or buried services.

The contamination will, however, potentially pose a risk to end users, and to the site workers during the ground works. These risks are further assessed below.

6.8.1 End Users

End users will be effectively isolated from any potential contamination within the extent of the existing and proposed structures, as well as the extent of any hardstanding. It is currently assumed that the existing soft landscaped areas will be retained, and only in these areas could end users conceivably come into direct contact with the contaminated soils, although this pathway is already in existence.

Consideration should be given to additional testing for lead and PAH to determine the total and leachable concentrations within these areas. Pending the results of this additional testing, remediation measures may be required, to protect end users and groundwater from the shallow contaminated soils.

6.8.2 Site Workers

Site workers should be made aware of the contamination and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE⁹ and CIRIA¹⁰ and the requirements of the Local Authority Environmental Health Officer.

It is recommended that a watching brief be maintained during ground works by the contractor and any suspected contamination, especially in areas not covered by the investigation, should be brought to the attention of a geoenvironmental engineer.

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



6.9 Waste Disposal

Under the Waste Framework 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 WM3¹¹ 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:AIRE¹² 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 £102.10 per tonne (about £190.00 per m³) or at the lower rate of £3.25 per tonne (roughly £6.00 per m³). 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 on the technical guidance provided by the EA it is considered likely that the soils encountered during this ground investigation, as represented by the chemical analyses carried out, would be generally classified as follows.

Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Current applicable rate of Landfill Tax
Made ground	Non-hazardous (17 05 04)	No	£102.10/tonne (Standard rate)
Natural Soil	Inert non-hazardous (17 05 04)	Should not be required but confirm with receiving landfill	£3.25 / tonne (Reduced rate for uncontaminated naturally occurring rocks and soils)

Under the requirements of the 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 paper¹³ which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite 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.

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*



Part 3: Ground Movement Analysis

This section of the report comprises an analysis of the ground movements arising from the proposed basement and foundation scheme discussed in Part 2 and the information obtained from the investigation, presented in Part 1 of the report.

7.0 Introduction

The sides of an excavation will move to some extent regardless of how they are supported. The movement will typically be both horizontal and vertical and will be influenced by the engineering properties of the ground, groundwater level and flow, the efficiency of the various support systems employed and the efficiency or stiffness of any support structures used. An analysis has been carried out of the likely movements arising from the proposed basement excavation and the results of this analysis have been used to predict the effect of these movements on surrounding structures.

7.1 Nearby Sensitive Structures

Nearby sensitive structures comprise the adjacent Nos 39 and 43 Sheldon Avenue, as shown on the plan below.



The heights of the buildings have been estimated from observations, and from drawings provided by the consulting engineers, Symmertys. The depth of the underside of the foundations of the adjoining houses on Sheldon Avenue have generally been based on the findings of the trial pitting described in the previous section, and drawings obtained from the search of planning applications on Haringey council's website.

Planning applications indicate that No.39 has a rear extension and swimming pool, at lower ground floor level, planning permission for which was granted in February 2007, in conjunction with other alterations to the property. With the exception of the pool structure at No.39, neither of the adjacent properties are understood to have existing lower ground floor levels. The estimated heights and depths to the underside of the foundations are summarised on the table below.

Sensitive structure	Height of building above foundation level (m)	Underside of foundation, depth below ground level (m) [m OD] }
39 Sheldon Avenue	4.60 to 6.50	1.00 to 3.50 [97.17 to 99.67]
43 Sheldon Avenue	3.60 to 6.10	1.00 [32.05]

The locations of the neighbouring buildings have been input into the model based on dimensions calculated from scaled drawings.

7.2 Construction Sequence

It is currently proposed to form the new basement by means of a perimeter contiguous bored pile wall, combined with a reinforced concrete box formed inside the perimeter wall. A new rear extension is also proposed, which will be supported on piled foundations, and a swimming pool will be formed in the rear garden using cast in-situ reinforced concrete retaining walls. Based on information provided by the consulting engineer, Symmertys, loads of between around 50 kN to 100 kN are anticipated on each of the perimeter piles, and loads of up to 200 kN are anticipated on the internal piles within the footprint of the basement.



The following sequence of operations has been derived to enable analysis of the ground movements around the basement, both during and after construction.

1. installation of contiguous bored pile walls and bearing piles;
2. install props and excavation of basement to formation level;
3. install basement slabs and lining walls;
4. casting of ground floor slab and removal of temporary props once concrete has sufficiently cured; and
5. completion of above superstructure

The individual panel widths of the liner wall will need to be adequately laterally propped and sufficiently dowelled together, and the concrete will need to be cast and adequately cured prior to excavation of the sub-basement and removal of the formwork and supports. It is assumed that the corners of the excavation will be locally stiffened by cross-bracing or similar and that the new retaining walls will not be cantilevered at any stage during the construction process. It is assumed that adequate temporary propping of the new retaining walls, particularly at the top level, will occur at all times prior to the construction of permanent concrete floor slabs.

8.0 Ground Movements

An assessment of ground movements within and surrounding the excavation has been undertaken using the P-Disp and X-Disp computer programs licensed from the OASYS suite of geotechnical modelling software from Arup. These programs are commonly used within the ground engineering industry and are considered to be appropriate tools for this analysis.

The X-Disp and P-Disp programs have been used to predict ground movements likely to arise from the excavation and construction of the proposed basement. This includes the heave / settlement of the ground (vertical movement) and the lateral movement of soil behind the proposed retaining walls (horizontal movement).

The basement has been modelled based on scaled dimensions from plan drawings provided by the consulting engineers and the corners of the basement are defined by x and y coordinates. As such, for the purpose of these analyses, the x direction is orientated approximately northeast-southwest, roughly parallel with Sheldon Avenue, and the y direction is orientated approximately northwest-southeast. Vertical movement is in the z-direction.

The basement structure has been modelled as a simplified polygon with maximum dimensions of around 19.94 m by 21.18 m, and a founding depth of 4.30 m below the existing ground level [94.90 m OD]. The proposed basement will be formed through the installation of a perimeter contiguous bored pile wall and a reinforced concrete box formed inside the perimeter wall.

It is assumed that suitable propping will be provided during the construction of the basement and in the permanent condition, such that the walls can be considered to be stiff for the purpose of the ground movement modelling.

The full outputs of all the analyses can be provided on request but samples of the output movement contour plots are included within the appendix.



8.1 Ground Movements – Surrounding the Basement

8.1.1 Model Used

For the X-Disp analysis, the soil movement relationships used for embedded retaining walls are the default values within CIRIA report C760¹⁴, which were derived from a number of historic case studies.

Bored Pile Wall Installation

The predicted soil movements from the installation of the proposed contiguous bored pile walls which will be used to form the basement have been based on the values in Table 6.1 of CIRIA C760. This indicates the normalised horizontal movement for a contiguous wall to be 0.04% of the installed pile length. However, monitoring of wall movements reported by Ball, Langdon and Creighton¹⁵ of a contiguous bored pile wall in central London that represents, in scale and currency of data, a reasonable representation of this site, indicated measured wall installation movements normalised to between 0.006% and 0.012% of pile length. The paper then suggests that a normalised relationship of 0.02%, i.e. half of the C760 movements, could be appropriate for a contiguous wall whilst remaining relatively conservative and subject to careful control of installation. On the understanding that equally tight controls of pile installation are maintained, and that this reduction in movement has been accepted previously for other similar sites, it follows that there is no reason why a similar relationship cannot be adopted for this site.

Further justification for the adoption of this movement relationship has also been demonstrated in a recent paper by Langdon, Ball and Giles¹⁶, which concludes that installations in stiff clays can be reduced during well executed construction, enabling a significant decrease to be made for the predicted ground wall movements of the currently standardised 0.04 % upper bound limit for CFA pile installations published in Ciria C580 and C760.

An amended ground movement curve for the ‘installation of a contiguous pile wall’, with a normalised relationship of 0.02% has therefore been adopted to represent the effects of the installation of the piled walls that will form the proposed basement structure.

In the analyses, a pile length of 10 m has been adopted for the basement perimeter contiguous bored pile wall.

Installation of swimming pool retaining walls

Predictions of the vertical and horizontal ground movements behind the swimming pool retaining walls can be based on case study information within CIRIA C760¹⁷ for a planar diaphragm wall installed into stiff clay, which is considered to be a conservative approach. The magnitude of the any movement will also be controlled to a large extent by the quality of workmanship

Excavation Phase:

Suitable propping will be provided during the construction of the basement and in the permanent condition, such that the basement walls can be considered to be stiff for the purpose of the ground movement modelling. Thus, the ground movement curves for ‘excavations in front of high stiffness wall in stiff clay’ have been adopted for the subsequent excavation required to form the proposed basement and swimming pool within the rear garden.

For the XDisp analysis, an excavation depth of 4.30 m has been adopted for the proposed basement, and a depth of 2.45 m has been adopted for the proposed swimming pool within the rear garden.

8.1.2 Results

The movements predicted by X-Disp surrounding the basement are summarised in the table below; the results are presented below and in subsequent tables to the degree of accuracy required to allow predicted variations in ground movements around the structure to be illustrated but may not reflect the anticipated accuracy of the predictions.

.Phase of Works	Wall Movement (mm)	
	Vertical Settlement	Horizontal Movement
Installation of contiguous pile walls	< 3	< 3
Combined installation and excavation movements	4 to 8	7 to 12

The analysis has indicated that the vertical settlements that will result from wall installation are generally anticipated to be up to around 2 mm, with movements increasing to up to

14 Gaba, A, Hardy, S, Powrie, W, Doughty, L and Selemetas, D (2017) *Embedded retaining walls – guidance for economic design* CIRIA Report C760

15 Ball, R, Langdon, N, and Creighton, M (2014) Prediction of party wall movements using Ciria report C580. *GE Technical Paper*

16 Langdon, N, Ball, R, and Giles, D (2021) Ground movement prediction for a piled basement: A case study from Garlickhythe, City of London, UK. *GE Technical Paper*

17 Gaba, A, Hardy, S, Powrie, W, Doughty, L and Selemetas, D (2017) *Embedded retaining walls – guidance for economic design* CIRIA Report C760.



around 5 mm from the combined wall installation and excavation phases. A localised area of up to 8 mm of settlement is predicted just to the northeast of the proposed basement, adjacent to the re-entrant corner, but this is considered to be an over prediction due to the way the software models re-entrant corners.

The analysis also indicates that maximum horizontal movements that will result from wall installation are also anticipated to be up to around 2 mm, with movements increasing to up to around 8 mm as a result of the combined wall installation and excavation phases. A localised area of up to 12 mm of horizontal movement is adjacent to the re-entrant corner, but as per the above, this is considered to be an over prediction due to the way the software models re-entrant corners

The movements set out in the table and discussed above are the maximum movements and the analysis has indicated that they occur immediately or just outside the line of the retaining walls, and also account for the likely overprediction of movements within re-entrant corners included within the model.

published data, more conservative values of $500 \times C_u$ for E_u and a ratio of E' to C_u of 0.60 have been adopted at this stage.

The soil parameters used in this analysis and tabulated below have been primarily derived from the onsite investigation and extrapolation of data for the London Clay at depth. A rigid boundary for the analysis has been set at a depth of around 30.00 m below the proposed basement, as below this depth the soils of the London Clay and underlying Lambeth Group are considered to be essentially incompressible. An initial strength of 40 kN/m^2 and a subsequent increase in cohesion of 7.5 kN/m^2 for each metre of depth has been adopted to provide a conservative estimate of the likely strength profile within the Claygate Member and London Clay beneath the site.

Stratum	Depth Range (m)	Bulk Density (kg/m ³)	E_u (kN/m ²)	E' (kN/m ²)
Made Ground	GL to 1.00	1700	10,000	10,000
Claygate Member and London Clay	1.00 to 30.0	1950	20,000 to 128,750	12,000 to 77,250

Based on information provided by the consulting engineer, loads of between around 50 kN to 100 kN are anticipated on each of the perimeter piles, and loads of up to 200 kN are anticipated on the internal piles within the footprint of the basement. It is understood that pile lengths of 10 m are proposed for the perimeter contiguous piled wall, and that 15 m are proposed for the bearing piles, and these pile lengths have been adopted for the analyses.

8.2 Ground Movements – Resulting from Excavation

8.2.1 Model Used

Unloading of the underlying London Clay will take place as a result of the construction of the proposed basement and the reduction in vertical stress will cause settlement to take place. Undrained soil parameters have been used to estimate the potential short-term movements, which include the “immediate” or elastic movements as a result of the sub-basement construction. Drained parameters have been used to provide an estimate of the total long-term movement.

The elastic analysis requires values of soil stiffness at various levels to calculate displacements. Values of stiffness for the soils at this site are readily available from published data and we have used a well-established method to provide our estimates. This relates values of E_u and E' , the undrained and drained stiffness respectively, to values of undrained cohesion, as described by Padfield and Sharrock¹⁸ and Butler¹⁹ and more recently by O’Brien and Sharp²⁰. Whilst values of E_u can be taken as $750 \times C_u$ for the London Clay and a ratio of E' to C_u of 0.75 considered appropriate and in line with more recent

8.2.2 Results

The predicted movements are summarised in the table below; the results are presented below and in subsequent tables to the degree of accuracy required to allow predicted variations in ground movements around the structure(s) to be illustrated, but may not reflect the anticipated accuracy of the predictions. In the table below, heave movements are shown as negative, and settlement movements are shown as positive.

¹⁸ Padfield, CJ and Sharrock, MJ (1983) *Settlement of structures on clay soils*. CIRIA Special Publication 27

¹⁹ Butler FG (1974) *Heavily overconsolidated clays: a state of the art review*. Proc Conf Settlement of Structures, Cambridge, 531-578, Pentech Press, Lond

²⁰ O’Brien AS and Sharp P (2001) *Settlement and heave of overconsolidated clays - a simplified non-linear method*. Part Two, Ground Engineering, Nov 2001, 48-53



Location	Excavation of basement and swimming pool Short term movement (mm)	Completion of construction Short term movement (mm)	Completion of construction Total movement (mm)
Maximum movement - towards the centre of proposed basement	-10 to -12	-8 to -10	-20 to -24
Along basement walls	-2 to -7	2 to 10	2 to 18
Maximum movement - towards the centre of proposed swimming pool	-4 to -6	-4 to -6	-10 to -13

Note: -ve values denote heave, and +ve values denote settlement

The P-Disp analysis indicates that following the excavation of the basement, up to around 12 mm of heave is anticipated to occur within the centre of the basement in the short term, and by the time the basement construction is complete, up to 10 mm of settlement is anticipated along the perimeter walls.

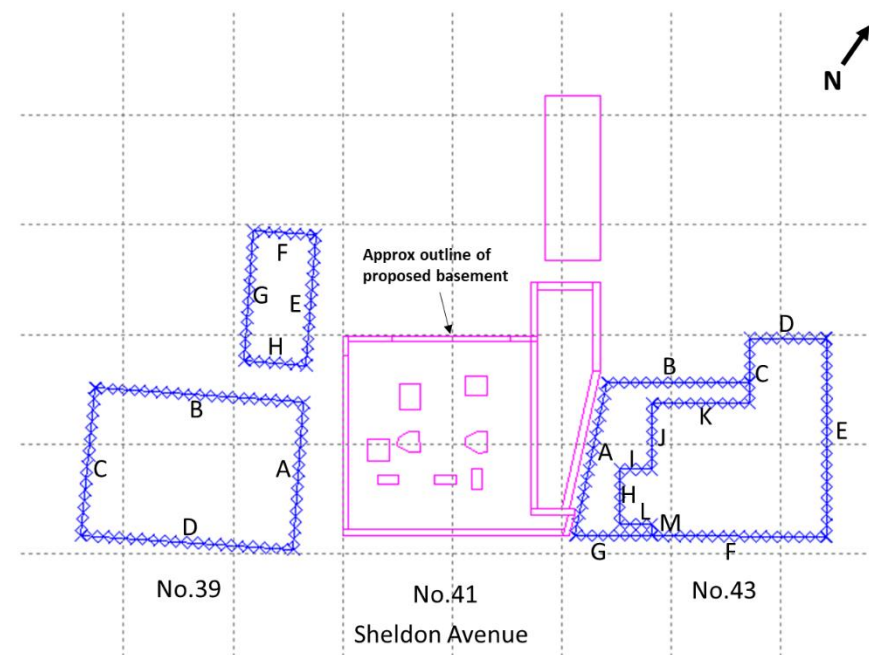
The analysis using drained parameters has indicated that total heave at the centre of the excavation can be expected to increase by around 12 mm to a maximum of around 24 mm, with up to around 18 mm of settlement predicted along the perimeter walls of the basement. The analysis has indicated that immediately outside of the excavation, settlement movements of less than 8 mm can generally be expected.

The piles have been modelled as polygonal zones, acting at a depth equivalent to two thirds of the pile length. The above settlement movements are likely to be an over prediction, as the software does not allow for the shaft adhesion acting on the piles, thus the interaction between the piles and the underlying soil has been simplified in the model.

9.0 Damage Assessment

In addition to the above assessment of the likely movements that will result from the proposed development, any neighbouring buildings within the zone of influence of the excavations are considered to be sensitive structures, requiring Building Damage Assessments, on the basis of the classification given in Table 6.4 of CIRIA report C760²¹.

The sensitive structures outlined previously have been modelled as displacement lines in the analysis along which the damage assessment has been undertaken. The labelling adopted is shown on the diagram below.



Plan view of neighbouring structures and the labelling of each wall

21 Gaba, A, Hardy, S, Powrie, W, Doughty, L and Selemetas, D (2017) *Embedded retaining walls – guidance for economic design* CIRIA Report C760



9.1 Damage to Neighbouring Structures

The ground movements resulting from the underpinning and sub-basement excavation phases have been calculated using X-Disp modelling software to carry out an assessment of the likely damage to adjacent properties and the results are discussed below. The building damage reports for sensitive structures highlighted above are included in the appendix, and a summary of the structures indicated as affected is included below.

Structure	Elevation Reference	Category of Damage*
39 Sheldon Avenue	Walls B, D & H	Very Slight (1)
	Walls A, E, F & G	Negligible (0)
	Wall C	Below limit of sensitivity
43 Sheldon Avenue	Walls B, G, H, I & L	Very Slight (1)
	Walls A, C, F, J, K & M	Negligible (0)
	Walls D & E	Below limit of sensitivity

*From Table 6.4 of C760: Classification of visible damage to walls.

The analysis has predicted that the proposed installation of the retaining walls and excavation of the proposed basement will result in a building damage category for sensitive structures of Category 0 (Negligible) to Category 1 (Very Slight).

Building damage categories Negligible to Very Slight are widely considered to cause only aesthetic damage to buildings such that structural instability is highly unlikely to occur. All of the sensitive structures have been assessed to have a damage category of 'Negligible' to 'Very Slight', such that these structures are considered to fall within acceptable limits.

The results discussed above are based on individual building lines, or walls, that in some instances, have been further divided up within the analysis into a series of segments that are assumed to be able to move independently of one another, with the most critical segment determining the result for the entire wall. In reality, this is unlikely to be the case as the walls will behave as single stiff elements that are also joined continuously with the rest of the structure.

The results therefore provide a conservative estimate of the behaviour of each of the sensitive structures and overestimate the degree of damage, although they provide a useful indication of the most critical structures within the adjoining properties that may require further assessment, as detailed below.

9.2 Monitoring of Ground Movements

The predictions of ground movement based on the ground movement analysis should be checked by monitoring of the adjacent properties and structures. The structures to be monitored during the construction stages should include the existing property and the neighbouring structure assessed above. Condition surveys of the above existing structures should be carried out before and after the proposed works.

The precise monitoring strategy will be developed at a later stage, and it will be subject to discussions and agreements with the owners of the adjacent properties and structures. Contingency measures will be implemented if movements of the adjacent structures exceed predefined trigger levels. Both contingency measures and trigger levels will need to be developed within a future monitoring specification for the works.



10.0 GMA Conclusions

The ground movement analysis has concluded that the predicted damage to the neighbouring properties would be 'Negligible' to 'Very Slight'. On this basis, the damage that has been predicted to occur as a result of the construction of the proposed development falls within the acceptable limits.

In practice, installation of the contiguous bored pile walls, and the subsequent excavation of the proposed basement, will be staged processes and will take place over a number of weeks. This will provide an opportunity for the ground movements during and immediately after the installation of the retaining walls to be measured and the data acquired can be fed back into the design and compared with the predicted values. Such a comparison will allow the ground model to be reviewed and the predicted wall movements to be reassessed prior to the main excavation taking place, so that propping arrangements can be adjusted if required.

Whilst it is recommended that movement monitoring is carried out on all structures prior to and during the proposed excavation and construction, it is unlikely that specification of these works will be required as part of the planning conditions but may be required in order to satisfy party wall awards.

11.0 Outstanding Risks & 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.

11.1 Site-Specific Risks

Monitoring of the standpipes should be continued to determine the groundwater equilibrium and to establish any seasonal fluctuations.

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

The ground movement analysis has concluded that the predicted damage to the neighbouring properties would be 'Negligible' to 'Very Slight'. On this basis, the damage that has been predicted to occur as a result of the construction of the proposed development falls within the limits acceptable to the London Borough of Haringey.

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.

11.2 General Risks

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 general ground conditions based on the discrete points at which the ground was sampled, but there may be ground conditions (including soil, rock, gas and groundwater) elsewhere on site that have not been revealed by this investigation and therefore could not have been taken into account in this report. The ground conditions should be subject to review as the development proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.



The comments made regarding groundwater are based on observations made during the period the work has been carried out. Conditions may vary as a result of seasonal or other effects.

Where any conclusions and recommendations contained in this report have been based upon information provided by others, it has been assumed that all relevant information has been provided by those parties and that such information is accurate. Any such information has not been independently verified by GEA, unless otherwise stated in the report. GEA accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to GEA from others.



Appendix

a. Field Work

Site Plan
Borehole Records
Trial Pit Records
Penetrometer/Depth Graph

b. Lab Testing

Geotechnical Test Results
SPT & Cohesion/Depth Graph
Chemical Test Results
Generic Risk Based Screening Values

c. Desk Study

Risk Assessment Tables
Envirocheck Extracts
Historical Maps
UXO Preliminary Risk Assessment

d. Ground Movement Analysis

PDisp Analysis – Contour output - Short Term Movements – Excavation
PDisp Analysis – Contour output - Short Term Movements – Completion of construction
PDisp Analysis – Contour output - Total Movements

XDisp Analysis – Vertical movements - Installation
XDisp Analysis – Horizontal movements - Installation
XDisp Analysis – Vertical movements - Installation and Excavation
XDisp Analysis – Horizontal movements - Installation and Excavation
XDisp Analysis – Tabular output - Installation
XDisp Analysis – Tabular output - Installation and Excavation



appendix a

Field Work

Site Plan
Borehole Records
Trial Pit Records
Penetrometer/Depth Graph



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Site Plan

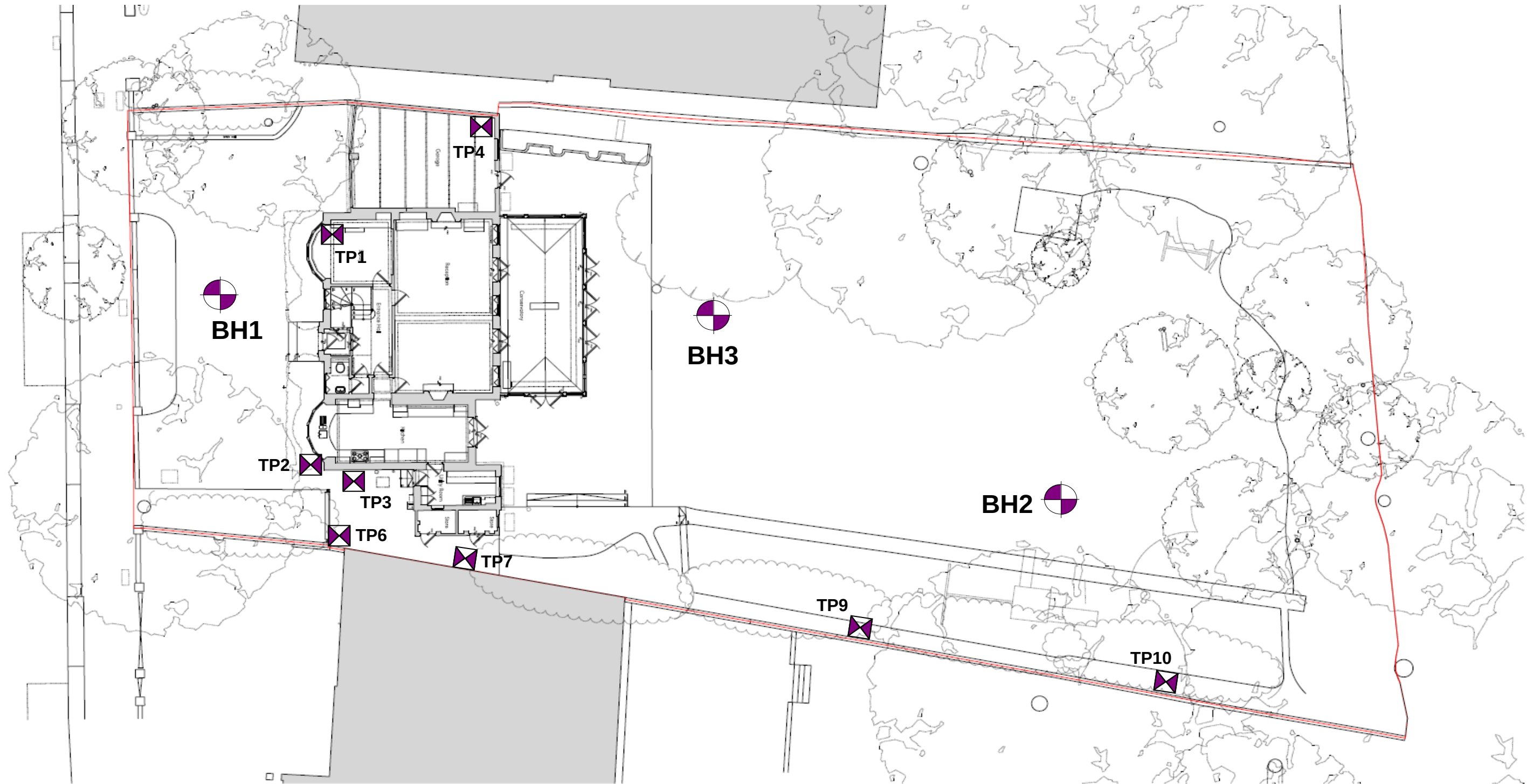
Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number
J23243

Sheet
1 / 1





Project 41 Sheldon Avenue, London W9 1PS				BOREHOLE No BH1	
Job No J23243	Date 13-09-23 13-09-23	Ground Level (m OD) 99.26	Co-Ordinates ()		
Client Mark Tognolini & Eva Stengaard		Engineer Symmetrys		Sheet 1 of 2	

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.20-0.40	B	1,1/2,2,2,3 N60 = 10		99.06		0.20	BRICK PAVING over sand bedding	
0.40-0.80	B			98.86		0.40	SUB-BASE	
1.00-1.20	B			98.26		(0.60) 1.00	MADE GROUND (Orange brown mottled grey slightly gravelly slightly sandy silty clay, with occasional roots and rare brick fragments. Gravel comprises flint)	
1.20-1.65	SPT			97.76		(0.50) 1.50	Firm light brown mottled orange brown and grey slightly sandy silty CLAY, with occasional roots and flint gravel	
2.00-2.45	D	1,1/1,1,2,2 N60 = 7				(2.00)	Firm brown with blue grey veining fissured silty CLAY with occasional to locally frequent pockets/ partings of orange brown clayey sand and light grey fine sand /silt. Occasional roots.	
2.45-2.50	U100							
3.00-3.45	SPT			95.76		3.50	Stiff brown fissured silty CLAY with occasional to locally frequent partings of clayey sand and selenite crystals.	
3.50	D							
4.00-4.45	U100	2,3/3,4,4,5 N60 = 18				(1.60)	Stiff becoming very stiff with depth dark brownish grey fissured silty CLAY with occasional to locally frequent partings of clayey sand.	
4.45-4.50	D							
5.00-5.45	SPT			94.16		5.10		
5.45-5.50	D							
5.50	D	7,5/3,3,5,5 N60 = 18						
6.50-6.95	U100							
8.00-8.45	SPT							
9.00	D						9.00 Fine crystals and rare shell fragments from 9.00 m	
9.50-9.95	U100							
9.95-10.00	D						10.00 Clay is locally sandy with frequent partings and laminations of sand / silt below 10.00 m	

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Depth	Casing Dia. mm	Water Depth	
						Hand dug services pit to 1.00 m Groundwater not encountered Standpipe installed to 5.00 m on completion

All dimensions in metres Scale 1:65.625	Method/ Plant Used Cable percussion rig	Logged By Preliminary
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Project 41 Sheldon Avenue, London W9 1PS				BOREHOLE No BH1
Job No J23243	Date 13-09-23 13-09-23	Ground Level (m OD) 99.26	Co-Ordinates ()	
Client Mark Tognolini & Eva Stengaard		Engineer Symmetrys		Sheet 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
11.00-11.45	SPT	3,3/5,6,7,7 N60 = 28					Stiff becoming very stiff with depth dark brownish grey fissured silty CLAY with occasional to locally frequent partings of clayey sand.(continued)	
12.00	D							
12.50-12.95	U							
12.95-13.00	D					(15.35)		
14.00-14.45	SPT	3,3/5,6,7,8 N60 = 29						
15.00	D							
15.50-15.95	U100							
15.95-16.00	D							
17.00-17.45	SPT	3,4/5,6,7,9 N60 = 31						
18.00	D							
18.50-18.95	U100							
18.95-19.00	D							
20.00-20.45	SPT	3,3/5,6,8,9 N60 = 32		78.81		20.45		

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
						Hand dug services pit to 1.00 m Groundwater not encountered Standpipe installed to 5.00 m on completion

All dimensions in metres Scale 1:65.625	Method/ Plant Used Cable percussion rig	Logged By Preliminary
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Project 41 Sheldon Avenue, London W9 1PS				BOREHOLE No BH2	
Job No J23243	Date 14-09-23 14-09-23	Ground Level (m OD) 99.32	Co-Ordinates ()		
Client Mark Tognolini & Eva Stengaard		Engineer Symmetrys		Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.30	ES			98.82		(0.50) 0.50	TURF over MADE GROUND (brown dry organic sandy silty clay with frequent roots and occasional medium gravel sized fragments of flint, brick and occasional clinker)	
0.70	D							
1.20	D	1,1/1,1,1,2 N60 = 8						
1.80	D					(2.50)	Stiff weakly fissured desiccated orange brown mottled brown and grey slightly sandy to sandy silty CLAY with occasional pockets / partings of silt / fine sand, and rare fine to medium flint gravel. Occasional becoming rare roots	
2.40	D	1,2/1,1,2,2 N60 = 10					1.20 No flint below 1.20 m 1.60 Brown locally mottled orange brown and grey below 1.60 m 2.40 5 mm horizons of orange clayey fine sand at 2.40 m and 2.55 m	
3.00	D	2,1/1,2,2,2 N60 = 11		96.32		3.00		
3.60	D						Stiff fissured brown locally mottled orange brown and grey silty CLAY with occasional pockets / partings of sand, fine to coarse gravel sized claystone and coarse sand sized selenite crystals. Occasional becoming rare roots	
		2,2/2,2,2,3 N60 = 14				(1.90)	3.00 Occasional fine to coarse sand sized selenite crystals and fine to coarse gravel sized claystone below 3.00 m	
4.95	D	2,3/2,2,3,3 N60 = 16		94.42		4.90		
5.50	D						Very stiff grey fissured silty CLAY with frequent fine crystals and rare pockets of orange brown clayey fine sand	
6.50	D	1,3/2,3,3,4 N60 = 19						
		2,3/3,3,3,4 N60 = 21				(3.55)		
7.50	D	3,3/3,4,4,4 N60 = 24		90.87		8.45		

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Hand dug services pit to 1.00 m
Groundwater seepage encountered at 4.00 m
Standpipe installed to 7.00 m on completion

All dimensions in metres
Scale 1:65.625

Method/
Plant Used Terrier rig

Logged By
AG



Project 41 Sheldon Avenue, London W9 1PS				BOREHOLE No BH3	
Job No J23243	Date 14-09-23 14-09-23	Ground Level (m OD) 99.25	Co-Ordinates ()		
Client Mark Tognolini & Eva Stengaard		Engineer Symmetrys		Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.20	ES			98.75		(0.50) 0.50	TURF over MADE GROUND (brown dry organic sandy silty clay with frequent roots and occasional medium gravel sized fragments of flint, brick and occasional clinker)	
1.00	ES	1,1/1,1,1,1 N60 = 6				(2.00)	Firm orange brown mottled brown and grey slightly sandy to sandy very silty CLAY with occasional pockets / partings of silt / fine sand, and occasional fine to medium flint gravel. Occasional becoming rare roots 1.20 No flint below 1.20 m	
1.40	D							
2.00	D	1,1/1,1,2,2 N60 = 10		96.75		2.50		
2.50	D							
2.90	D	2,1/1,2,2,2 N60 = 11				(2.40)	Firm becoming stiff with depth brown with blue grey veining fissured silty CLAY, with occasional roots, and occasional to rare pockets / partings of orange brown fine sand 2.50 Horizon of flint gravel at 2.50 m	
3.50	D							
4.10	D	1,2/2,2,2,2 N60 = 13						
4.70	D			94.35		4.90		
5.30	D	2,2/2,3,3,3 N60 = 17					Very stiff grey fissured silty CLAY with frequent fine crystals, rare white shell fragments and rare pockets of orange brown clayey fine sand	
5.90	D	2,3/3,3,3,4 N60 = 21				(3.55)		
6.50	D	3,2/2,3,4,4 N60 = 21						
7.70	D	3,3/3,3,4,4 N60 = 22		90.80		8.45		

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
						Hand dug services pit to 1.00 m Groundwater not encountered Standpipe installed to 5.00 m on completion

All dimensions in metres Scale 1:65.625	Method/ Plant Used Terrier rig	Logged By AG
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Trial Pit No

1

Site 41 Sheldon Avenue, London N6 4PJ

Job Number

J23243

Client Mark Tognolini & Eva Stengaard

Sheet

1/10

Engineer Symmetrys

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

see plan

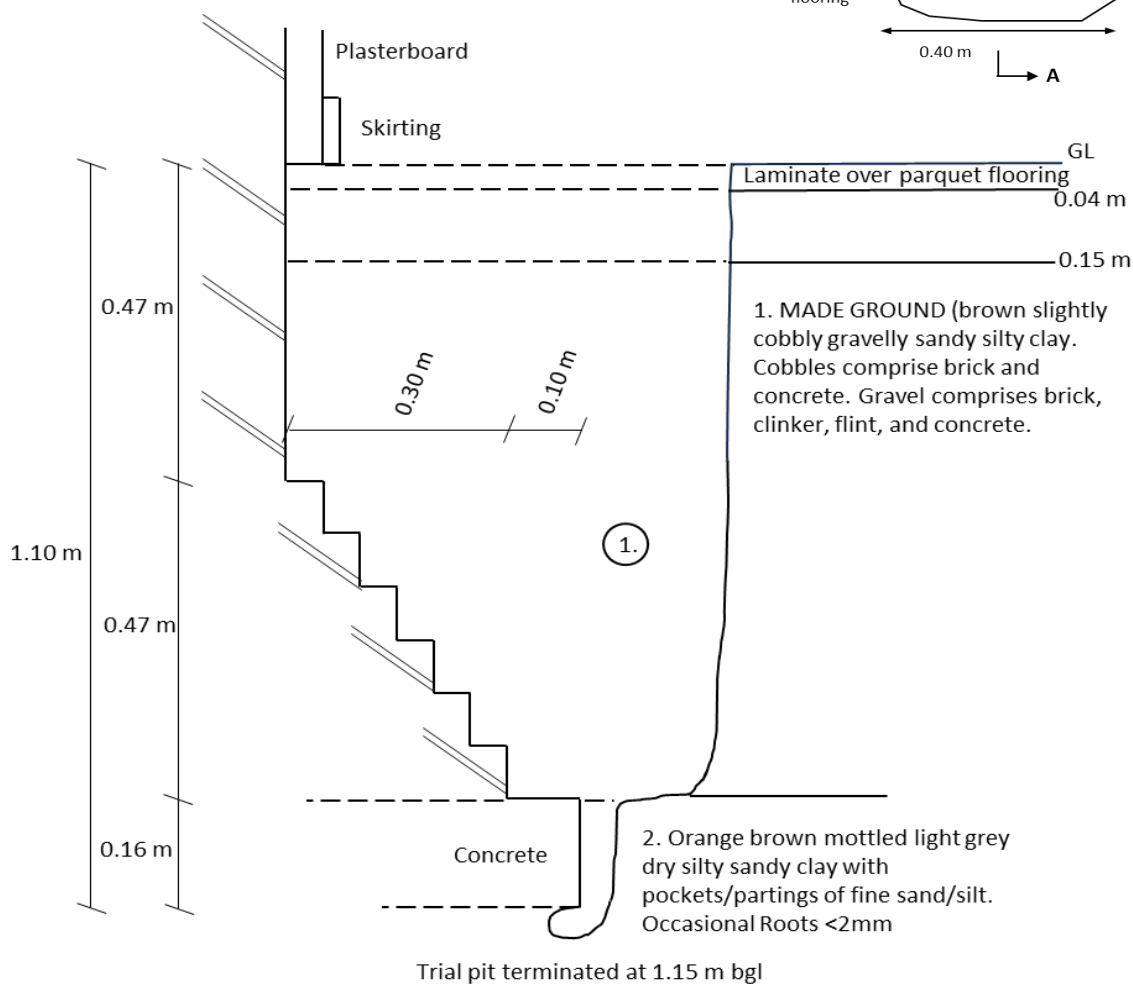
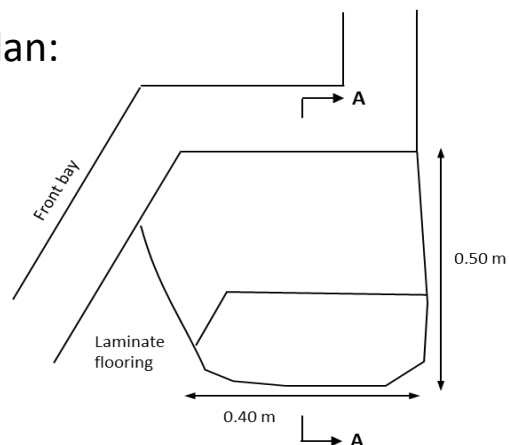
Ground Level (m ASD)

Location

see plan

TP1: Section A-A

Plan:



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 1.00 m. Environmental sample taken @ 0.30 m

Scale:

NTS

Logged by:

AG



Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number

J23243

Sheet

2/10

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

see plan

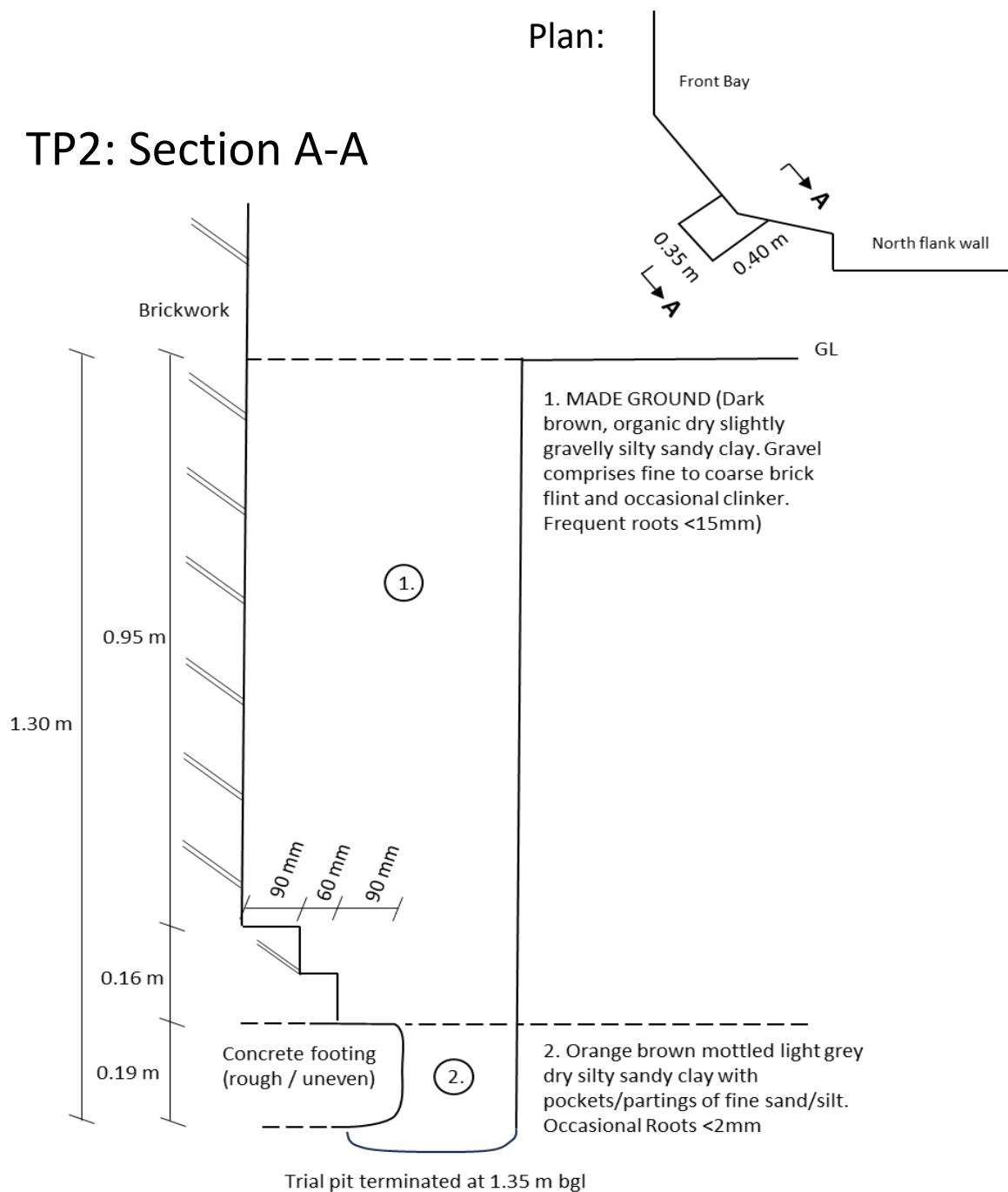
Ground Level (m ASD)

Location

see plan

Plan:

TP2: Section A-A



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical samples taken @ 1.20 m. Environmental sample taken @ 0.40 m

Scale:

NTS

Logged by:

AG



Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number

J23243

Sheet

3/10

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

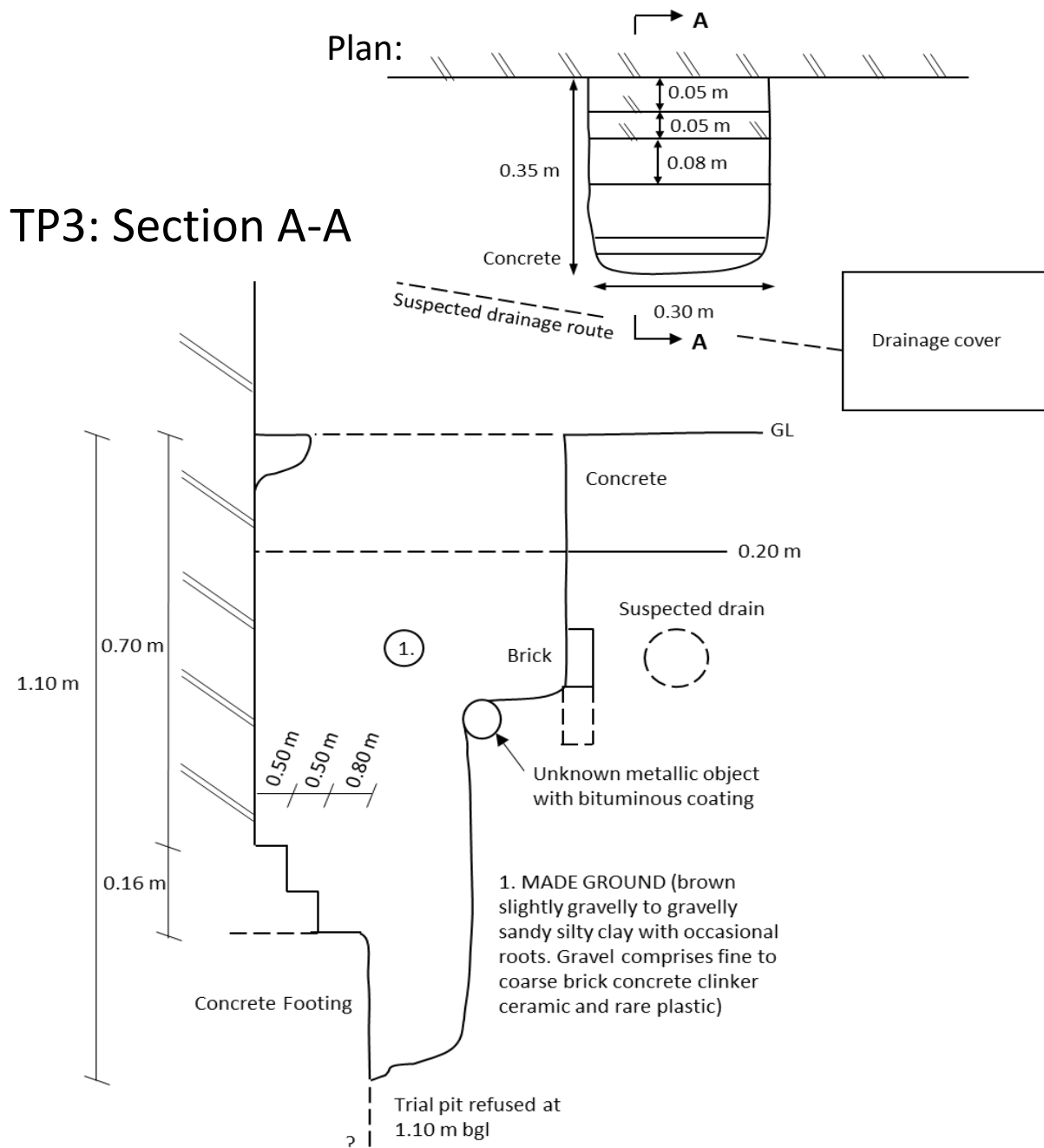
see plan

Ground Level (m ASD)

Location

see plan

TP3: Section A-A



Remarks:

All dimensions in metres

Groundwater not encountered

Environmental sample taken @ 0.30 m and 0.60 m

Scale:

NTS

Logged by:

AG



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Trial Pit No

4

Site 41 Sheldon Avenue, London N6 4PJ

Job Number

J23243

Client Mark Tognolini & Eva Stengaard

Sheet

4/10

Engineer Symmetrys

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

see plan

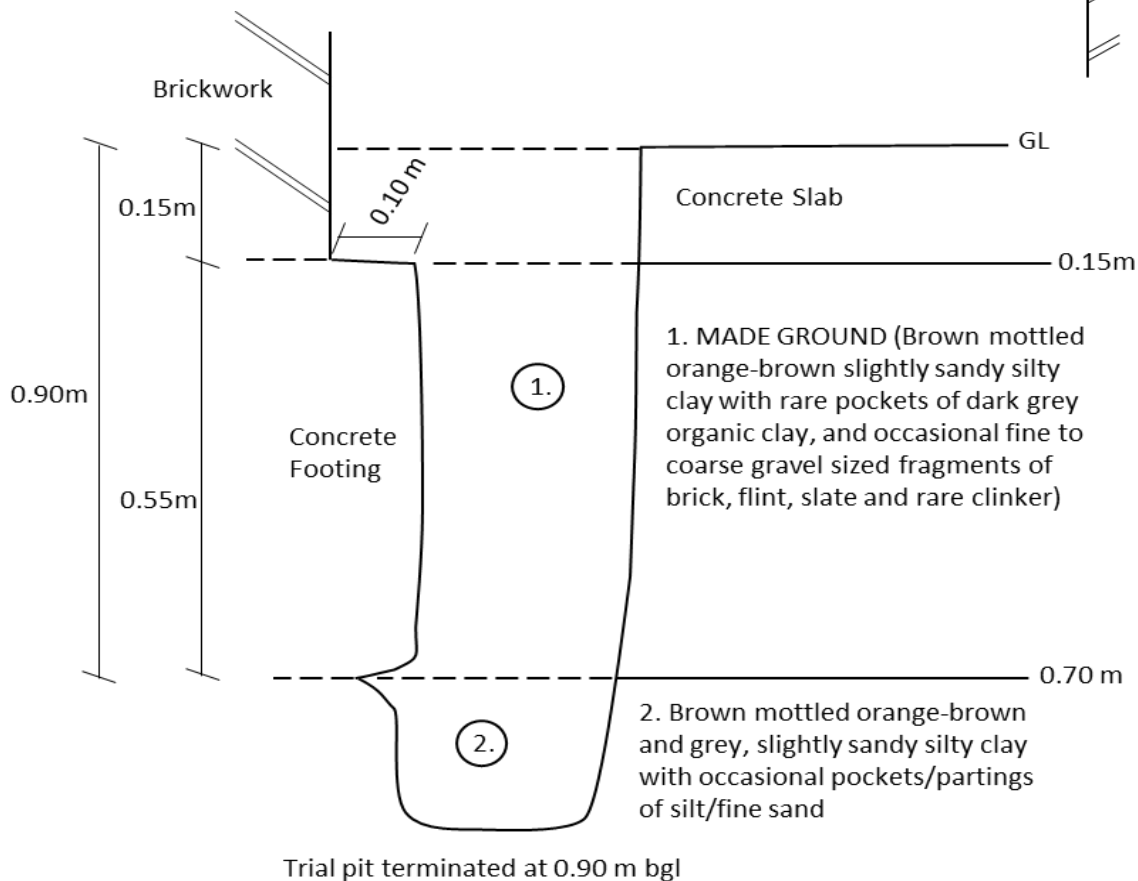
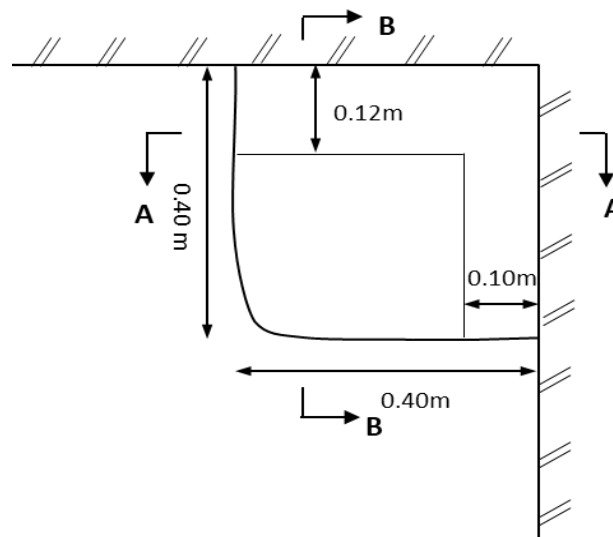
Ground Level (m ASD)

Location

see plan

TP4: Section A-A

Plan:



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 0.30 m and 0.80 m. Environmental sample taken @ 0.40 m

Scale:

NTS

Logged by:

AG



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Trial Pit No

4

Site 41 Sheldon Avenue, London N6 4PJ

Job Number

J23243

Client Mark Tognolini & Eva Stengaard

Sheet

5/10

Engineer Symmetrys

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

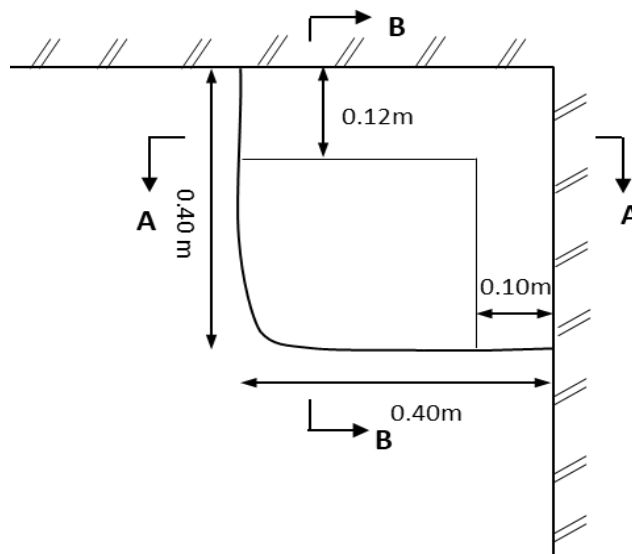
see plan

Ground Level (m ASD)

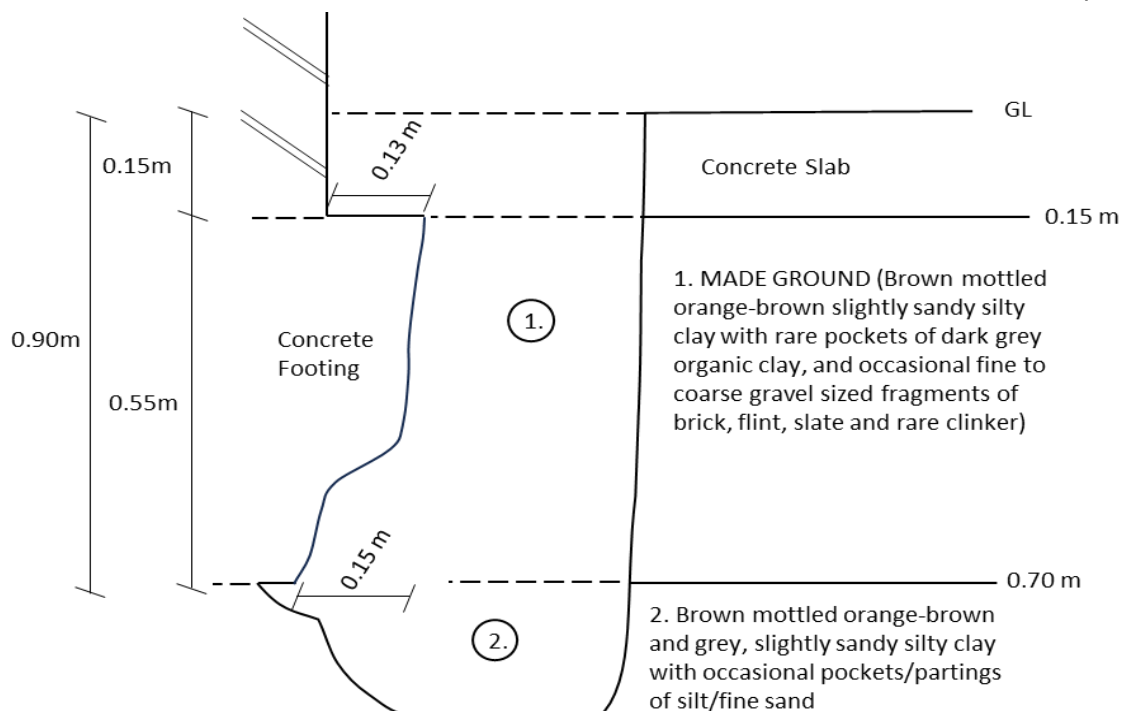
Location

see plan

Plan:



TP4: Section B-B



Trial pit terminated at 0.90 m bgl

Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 0.30 m and 0.80 m. Environmental sample taken @ 0.40 m

Scale:

NTS

Logged by:

AG

Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number	
------------	--

J23243

Sheet

6/10

Dates	Notes
1/1/2020	Initial assessment
1/15/2020	First follow-up
2/1/2020	Second follow-up
2/15/2020	Third follow-up
3/1/2020	Fourth follow-up
3/15/2020	Fifth follow-up
4/1/2020	Sixth follow-up
4/15/2020	Seventh follow-up
5/1/2020	Eighth follow-up
5/15/2020	Ninth follow-up
6/1/2020	Tenth follow-up
6/15/2020	Eleventh follow-up
7/1/2020	Twelfth follow-up
7/15/2020	Thirteenth follow-up
8/1/2020	Fourteenth follow-up
8/15/2020	Fifteenth follow-up
9/1/2020	Sixteenth follow-up
9/15/2020	Seventeenth follow-up
10/1/2020	Eighteenth follow-up
10/15/2020	Nineteenth follow-up
11/1/2020	Twentieth follow-up
11/15/2020	Twenty-first follow-up
12/1/2020	Twenty-second follow-up
12/15/2020	Twenty-third follow-up
1/1/2021	Twenty-fourth follow-up
1/15/2021	Twenty-fifth follow-up
2/1/2021	Twenty-sixth follow-up
2/15/2021	Twenty-seventh follow-up
3/1/2021	Twenty-eighth follow-up
3/15/2021	Twenty-ninth follow-up
4/1/2021	Thirtieth follow-up
4/15/2021	Thirty-first follow-up
5/1/2021	Thirty-second follow-up
5/15/2021	Thirty-third follow-up
6/1/2021	Thirty-fourth follow-up
6/15/2021	Thirty-fifth follow-up
7/1/2021	Thirty-sixth follow-up
7/15/2021	Thirty-seventh follow-up
8/1/2021	Thirty-eighth follow-up
8/15/2021	Thirty-ninth follow-up
9/1/2021	Fortieth follow-up
9/15/2021	Forty-first follow-up
10/1/2021	Forty-second follow-up
10/15/2021	Forty-third follow-up
11/1/2021	Forty-fourth follow-up
11/15/2021	Forty-fifth follow-up
12/1/2021	Forty-sixth follow-up
12/15/2021	Forty-seventh follow-up
1/1/2022	Forty-eighth follow-up
1/15/2022	Forty-ninth follow-up
2/1/2022	Fiftieth follow-up
2/15/2022	Fifty-first follow-up
3/1/2022	Fifty-second follow-up
3/15/2022	Fifty-third follow-up
4/1/2022	Fifty-fourth follow-up
4/15/2022	Fifty-fifth follow-up
5/1/2022	Fifty-sixth follow-up
5/15/2022	Fifty-seventh follow-up
6/1/2022	Fifty-eighth follow-up
6/15/2022	Fifty-ninth follow-up
7/1/2022	Sixtieth follow-up
7/15/2022	Sixty-first follow-up
8/1/2022	Sixty-second follow-up
8/15/2022	Sixty-third follow-up
9/1/2022	Sixty-fourth follow-up
9/15/2022	Sixty-fifth follow-up
10/1/2022	Sixty-sixth follow-up
10/15/2022	Sixty-seventh follow-up
11/1/2022	Sixty-eighth follow-up
11/15/2022	Sixty-ninth follow-up
12/1/2022	Seventieth follow-up
12/15/2022	Seventy-first follow-up
1/1/2023	Seventy-second follow-up
1/15/2023	Seventy-third follow-up
2/1/2023	Seventy-fourth follow-up
2/15/2023	Seventy-fifth follow-up
3/1/2023	Seventy-sixth follow-up
3/15/2023	Seventy-seventh follow-up
4/1/2023	Seventy-eighth follow-up
4/15/2023	Seventy-ninth follow-up
5/1/2023	Eightieth follow-up
5/15/2023	Eighty-first follow-up
6/1/2023	Eighty-second follow-up
6/15/2023	Eighty-third follow-up
7/1/2023	Eighty-fourth follow-up
7/15/2023	Eighty-fifth follow-up
8/1/2023	Eighty-sixth follow-up
8/15/2023	Eighty-seventh follow-up
9/1/2023	Eighty-eighth follow-up
9/15/2023	Eighty-ninth follow-up
10/1/2023	Ninety follow-up
10/15/2023	Ninety-first follow-up
11/1/2023	Ninety-second follow-up
11/15/2023	Ninety-third follow-up
12/1/2023	Ninety-fourth follow-up
12/15/2023	Ninety-fifth follow-up
1/1/2024	Ninety-sixth follow-up
1/15/2024	Ninety-seventh follow-up
2/1/2024	Ninety-eighth follow-up
2/15/2024	Ninety-ninth follow-up
3/1/2024	Hundredth follow-up

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

see plan

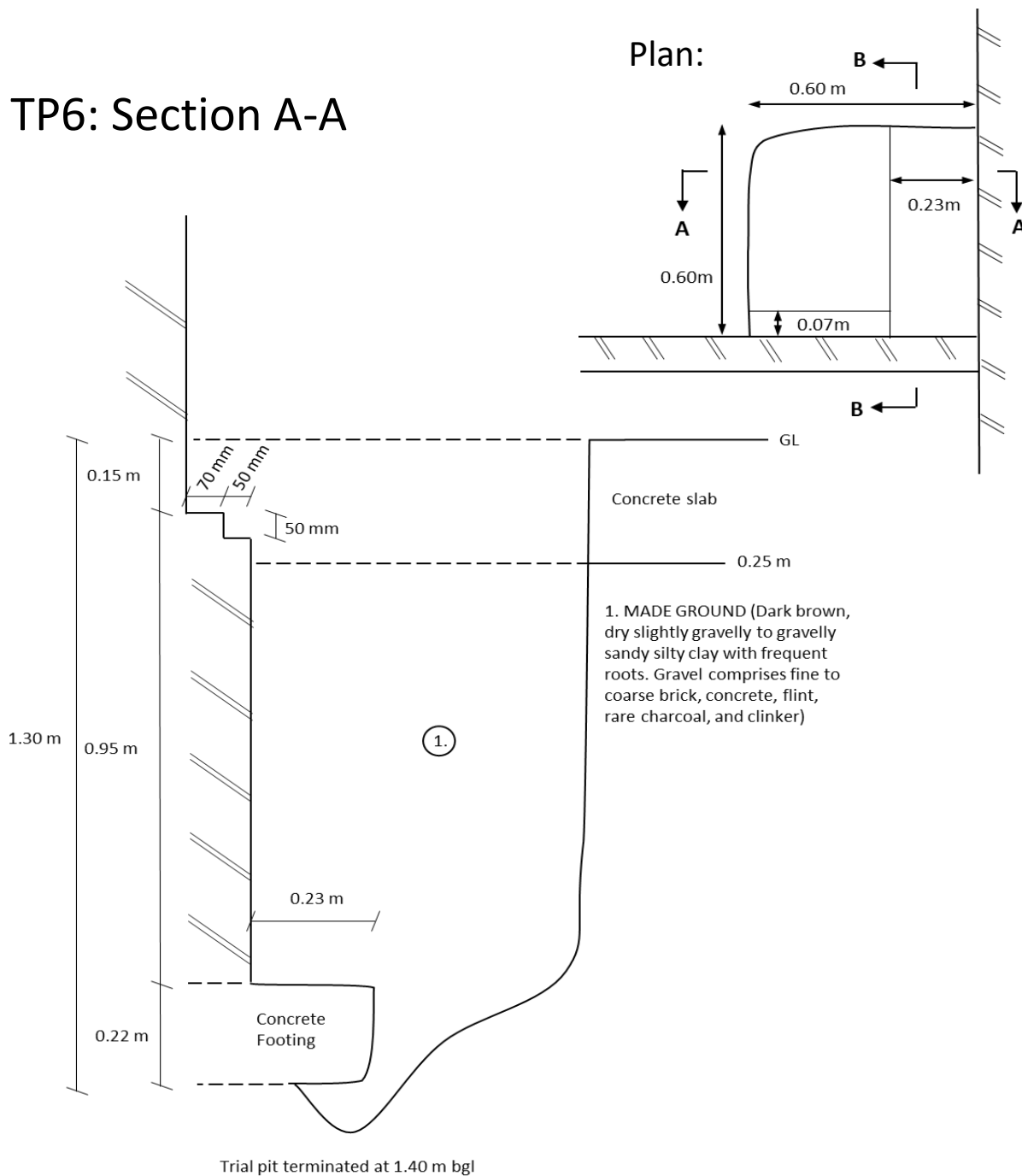
Ground Level (m ASD)

Location

see plan

TP6: Section A-A

Plan:



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 0.80 m. Environmental sample taken @ 0.50 m

Scale:

NTS

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Trial Pit No

6

Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number

J23243

Sheet

7/10

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

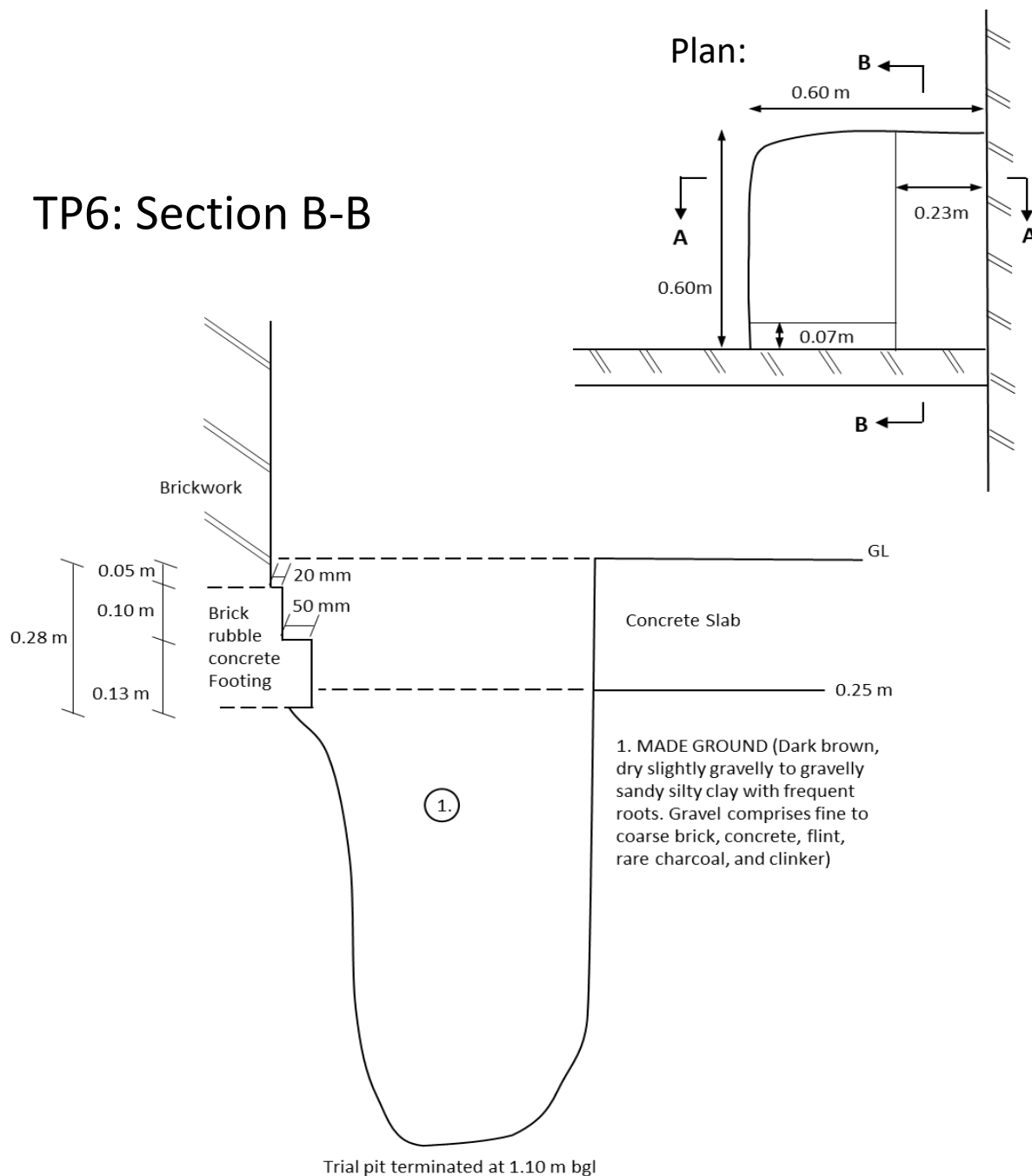
see plan

Ground Level (m ASD)

Location

see plan

TP6: Section B-B



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 0.80 m. Environmental sample taken @ 0.50 m

Scale:

NTS

Logged by:

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Trial Pit No

7

Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number

J23243

Sheet

8/10

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

see plan

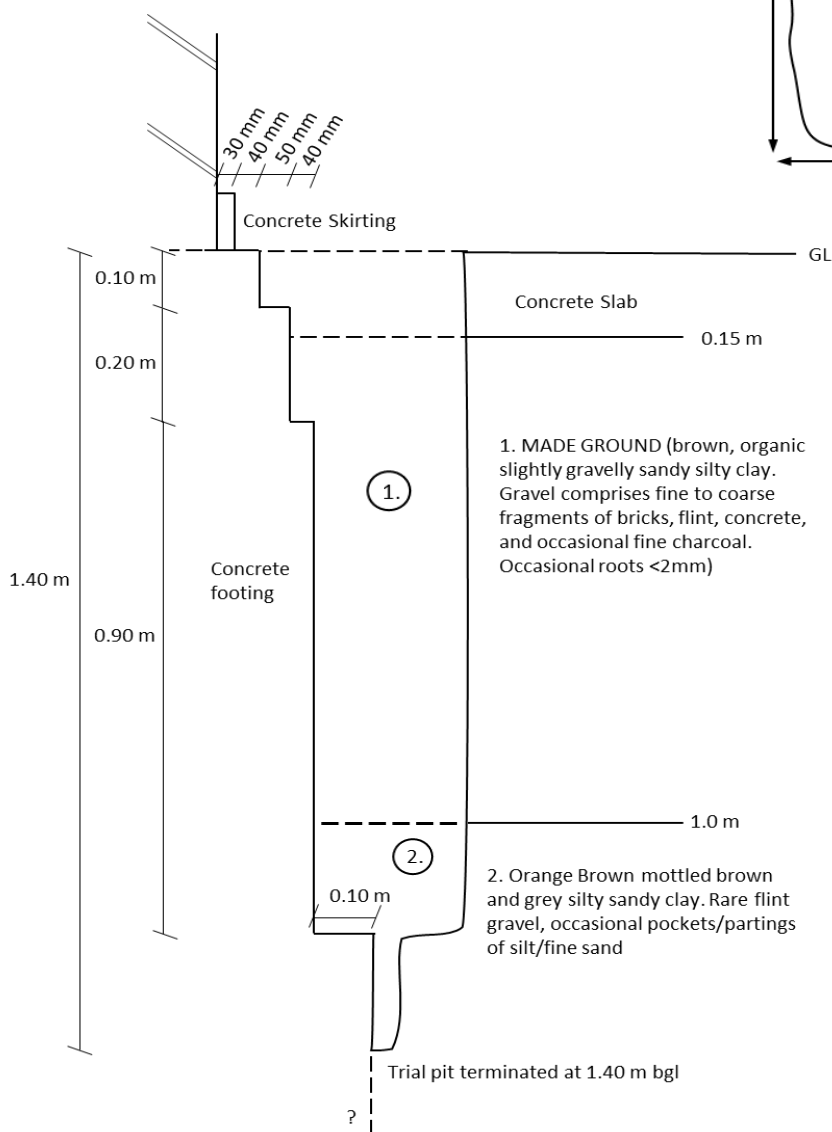
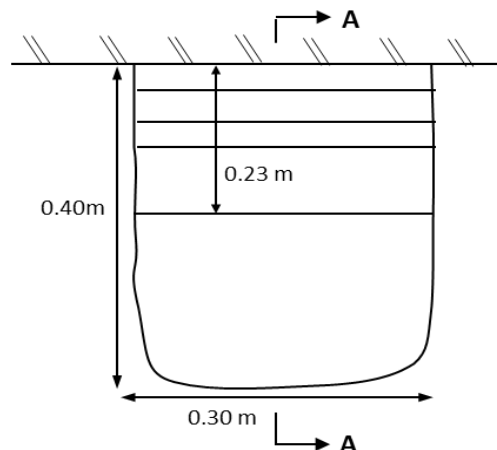
Ground Level (m ASD)

Location

see plan

TP7: Section A-A

Plan:



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 1.10 m. Environmental sample taken @ 0.50 m

Scale:

NTS

Logged by:

AG



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Herts | 01727 824666 Notts | 01509 674888

Trial Pit No

9

Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number

J23243

Sheet

9/10

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

see plan

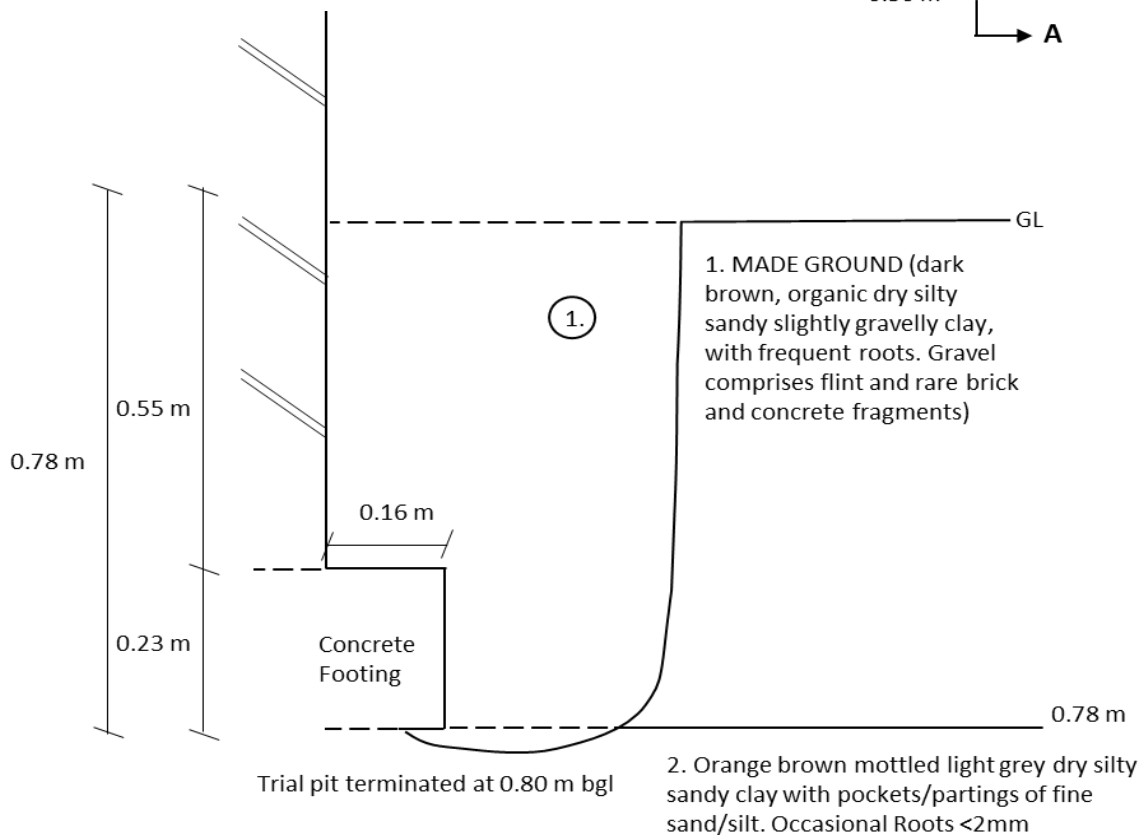
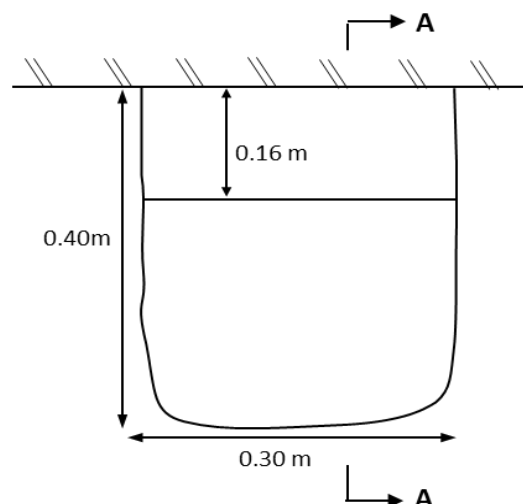
Ground Level (m ASD)

Location

see plan

TP9: Section A-A

Plan:



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 0.40 m. Environmental sample taken @ 0.20 m

Scale:

NTS

Logged by:

AG



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Trial Pit No

10

Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number

J23243

Sheet

10/10

Dates

14/09/2023

Excavation Method

Hand dug

Dimensions (m)

see plan

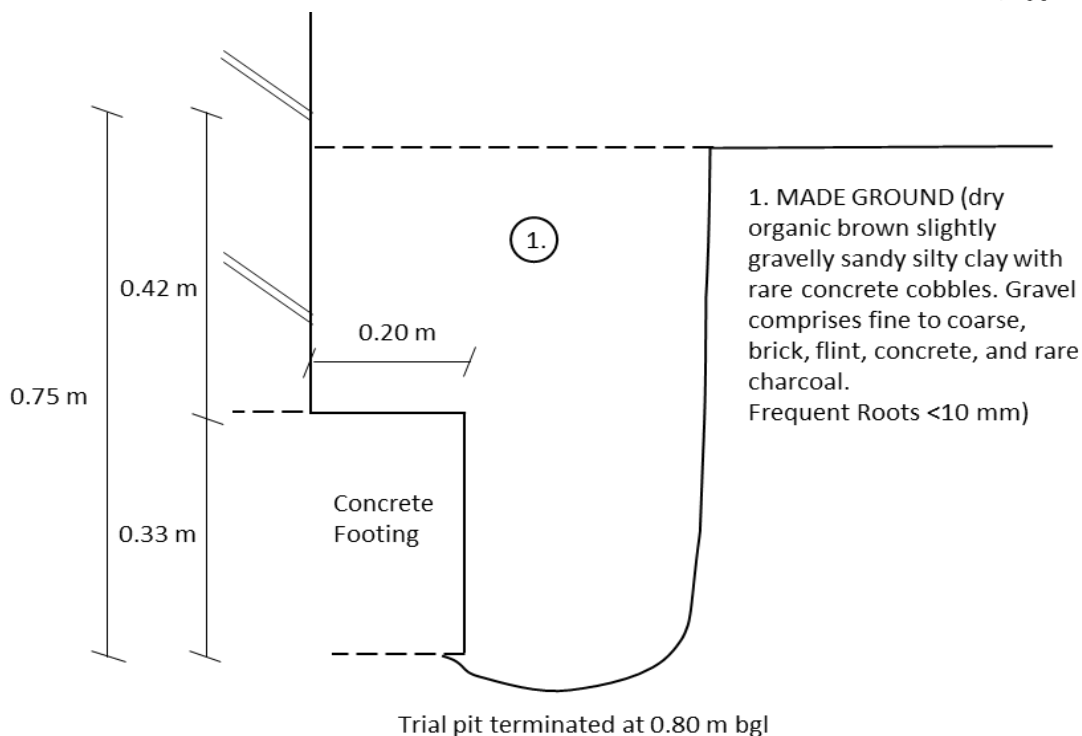
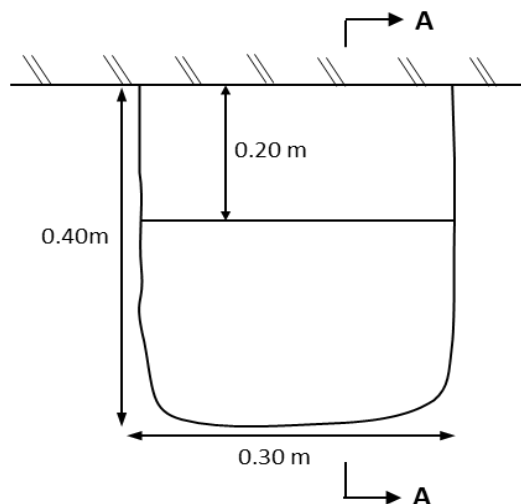
Ground Level (m ASD)

Location

see plan

TP10: Section A-A

Plan:



Remarks:

All dimensions in metres

Groundwater not encountered

Geotechnical sample taken @ 0.60 m. Environmental sample taken @ 0.10 m

Scale:

NTS

Logged by:

AG



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Herts | 01727 824666 Notts | 01509 674888

Penetrometer / Depth Graph

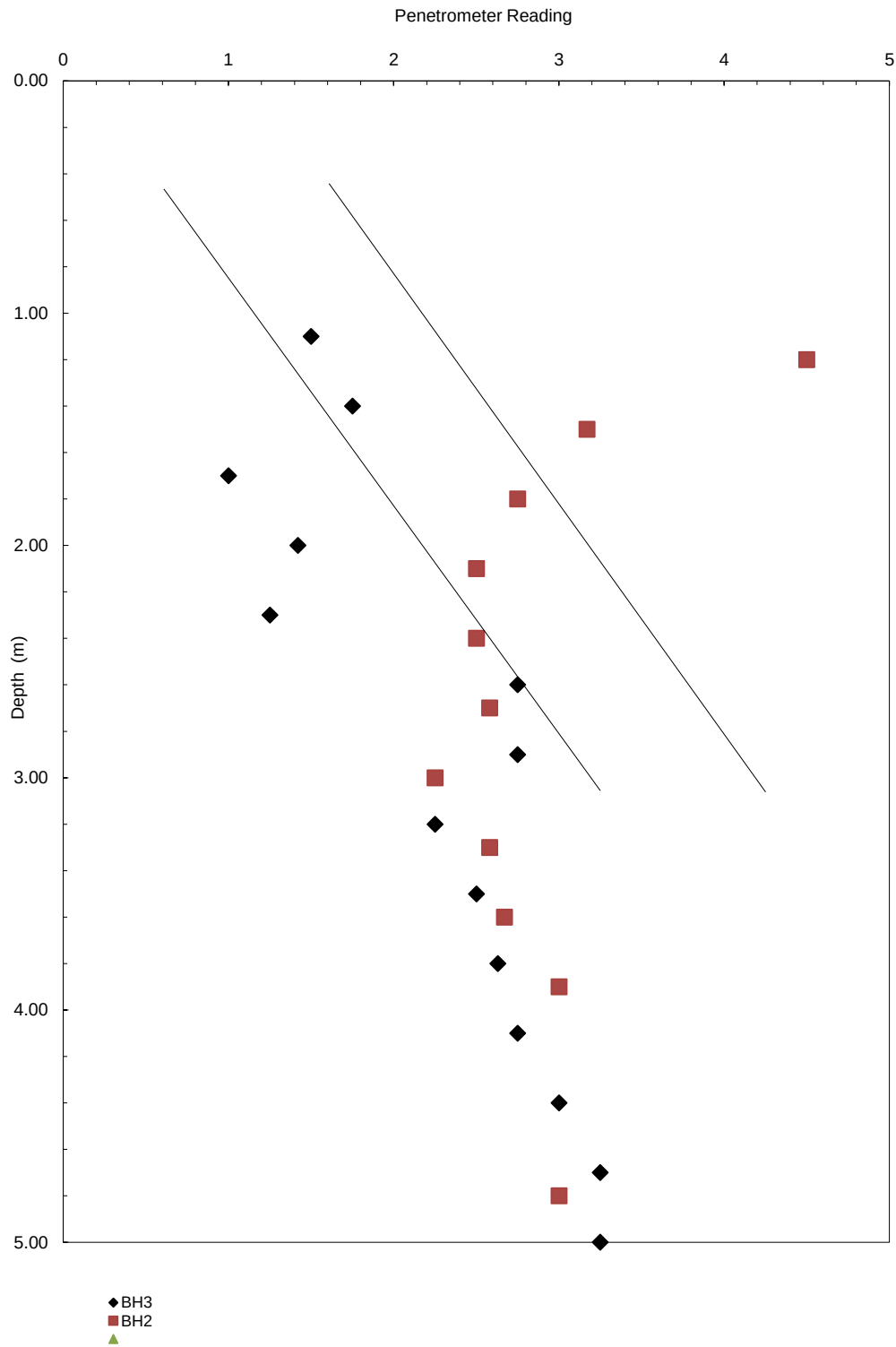
Site 41 Sheldon Avenue

Client Mark Tognolini & Eva Stengaard

Engineer Symmetrys

Job Number
J23243

Sheet
1 / 1





appendix b

Lab Testing

Geotechnical Test Results

Chemical Test Results

Generic Risk Based Screening Values



Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type							
BH1	-	1.00	-	D	Orangish brown slightly mottled bluish grey slightly gravelly slightly sandy silty CLAY (gravel is fm and sub-angular to rounded)	21	95	46	22	24	
BH1	-	1.20	1.60	D	Orangish brown slightly mottled grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	29	94	52	27	25	
BH1	-	2.00	2.45	U	Medium strength brown slightly mottled orangish brown mottled grey silty CLAY with occasional rootlets and black flecks	31					
BH1	-	2.45	2.50	D	Greyish brown silty CLAY with rare yellowish brown mottling and light bluish grey weathering along fissures	30					
BH1	-	3.00	3.45	D	Orangish brown slightly mottled grey silty CLAY	34	100	70	32	38	
BH1	-	4.00	4.45	U	High strength brown silty CLAY with occasional selenite deposits and rare pockets of orangish brown silt/fine sand	29					
BH1	-	4.45	4.50	D	Greyish brown silty CLAY with rare yellowish brown silt deposits and traces of 1 mm selenite crystals	29					
BH1	-	5.50	-	D	Brownish grey silty CLAY with brown weathering	28					
BH1	-	6.50	6.95	U	High strength dark grey silty CLAY	31					
BH1	-	8.00	-	D	Brownish grey silty CLAY with brown weathering and rare fm sub-angular gravel	37					
BH1	-	9.50	9.95	U	High strength dark grey silty CLAY	28					
BH1	-	11.00	-	D	Dark grey silty CLAY	30	100	78	33	45	



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

MSF-5-R1

					Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results											
Job No. 34074		Project Name 41 Sheldon Avenue						Programme								
								Samples received		19/09/2023						
								Schedule received		15/09/2023						
Project No. J23243		Client GEA						Project started		20/09/2023						
								Testing Started		04/10/2023						
Hole No.	Sample				Soil Description	NMC %	Passing 425µm %	LL %	PL %	PI %	Remarks					
	Ref	Top m	Base m	Type												
BH1	-	12.50	12.95	U	Very high strength dark grey slightly fine sandy silty CLAY	23										
BH1	-	15.50	15.95	U	Very high strength dark grey slightly fine sandy silty CLAY	23										
BH1	-	18.50	18.95	U	Very high strength dark grey slightly fine sandy silty CLAY	26										
BH2	-	0.70	-	D	Greyish brown, grey and yellowish brown mottled slightly sandy silty CLAY with rare fine sub-angular flint gravel	18										
BH2	-	1.20	-	D	Orangish brown slightly mottled bluish grey and dark grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	19	91	49	21	28						
BH2	-	1.80	-	D	Brown silty CLAY with rare grey weathering along fissured	24										
BH2	-	2.40	-	D	Brown silty CLAY with rare yellowish brown silt deposits	27										
BH2	-	3.00	-	D	Dark greyish brown silty CLAY with rare yellowish brown silt deposits and rare bluish grey weathering along fissures	33										
BH2	-	3.60	-	D	Brown and occasional grey slightly gravelly silty CLAY with traces of selenite crystals (gravel is fm and sub-angular to rounded)	32	96	66	31	35						
BH2	-	4.95	-	D	Dark grey silty CLAY with rare yellowish brown silt deposits	28										
BH2	-	5.50	-	D	Dark grey silty CLAY with rare yellowish brown silt deposits	29										
BH2	-	6.50	-	D	Dark grey silty CLAY with rare yellowish brown silt deposits	30										
 2519					Test Methods: BS1377: Part 2: 1990: Natural Moisture Content : clause 3.2 Atterberg Limits: clause 4.3, 4.4 and 5.0 <i>These results only apply to the items tested</i> NOTE: The report shall not be reproduced except in full without authority of the laboratory						Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com				Checked and Approved Initials J.P Date: 06/10/2023	
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)											MSF-5-R1					

[illegible]



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH1

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

1.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown slightly mottled bluish grey slightly gravelly slightly sandy silty CLAY (gravel is fm and sub-angular to rounded)

Samples received

19/09/2023

Schedules received

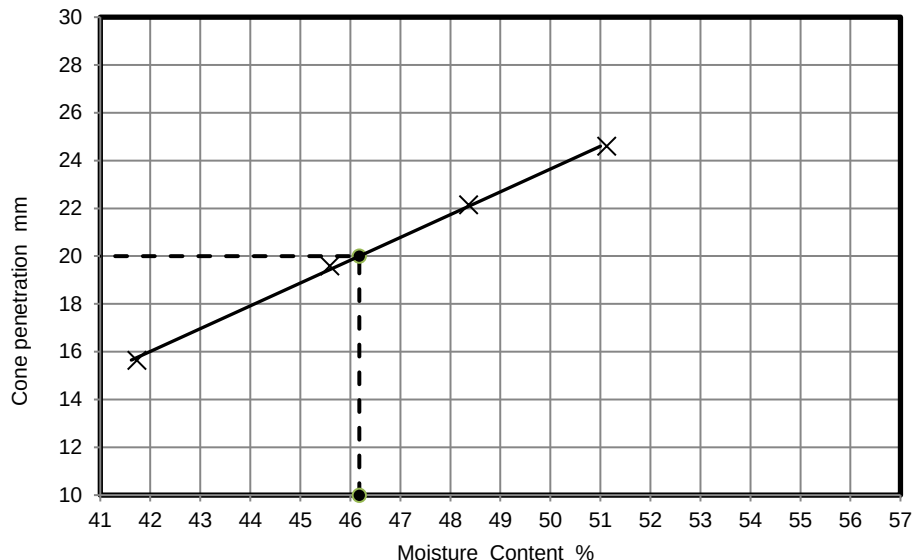
15/09/2023

Project Started

20/09/2023

Date Tested

04/10/2023



NATURAL MOISTURE CONTENT

21

%

% PASSING 425µm SIEVE

95

%

LIQUID LIMIT

46

%

PLASTIC LIMIT

22

%

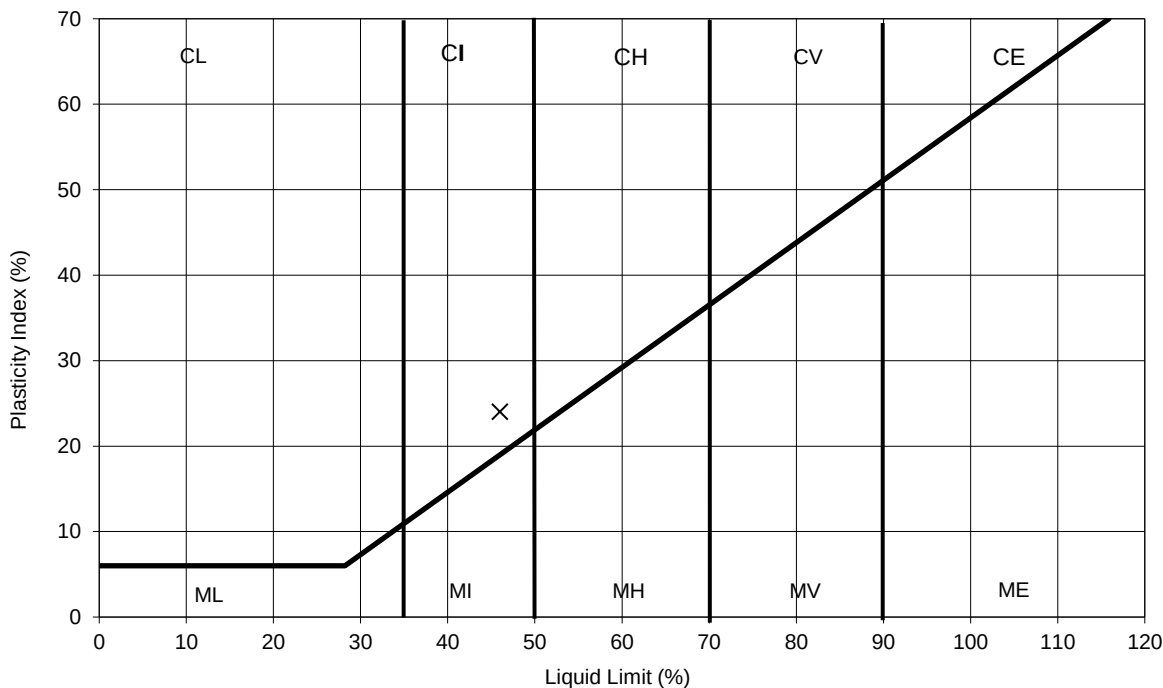
PLASTICITY INDEX

24

%

Remarks

PLASTICITY INDEX



These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 06/10/2023

2519

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

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH1

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

1.20

m

Depth Base

1.60

m

Sample Type

D

Samples received

19/09/2023

Schedules received

15/09/2023

Project Started

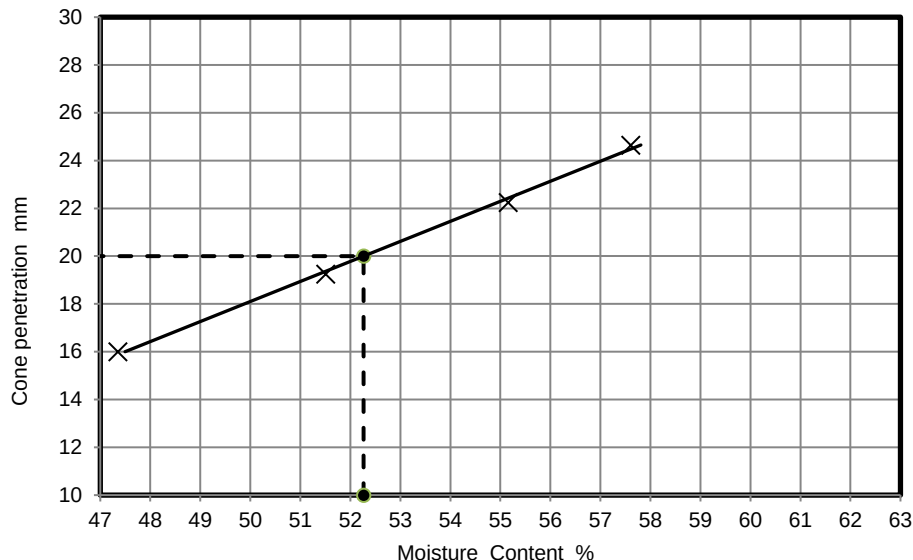
20/09/2023

Date Tested

04/10/2023

Soil Description

Orangish brown slightly mottled grey slightly gravelly silty CLAY
(gravel is fm and sub-angular to rounded)



NATURAL MOISTURE CONTENT

29

%

% PASSING 425µm SIEVE

94

%

LIQUID LIMIT

52

%

PLASTIC LIMIT

27

%

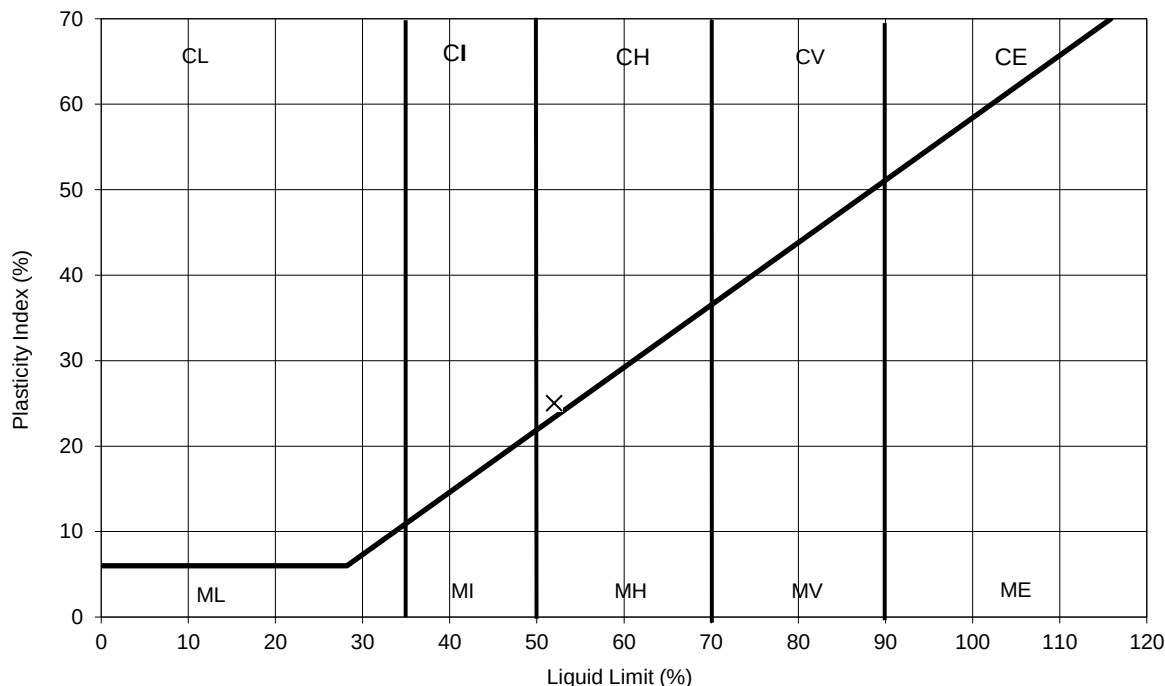
PLASTICITY INDEX

25

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 06/10/2023

2519

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

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH1

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

3.00

m

Depth Base

3.45

m

Sample Type

D

Samples received

19/09/2023

Schedules received

15/09/2023

Project Started

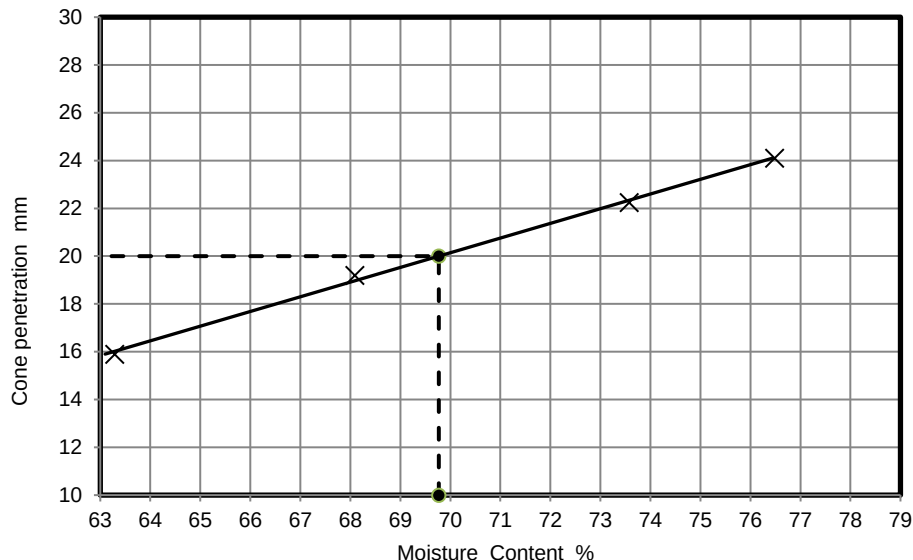
20/09/2023

Date Tested

04/10/2023

Soil Description

Orangish brown slightly mottled grey silty CLAY



NATURAL MOISTURE CONTENT

34

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

70

%

PLASTIC LIMIT

32

%

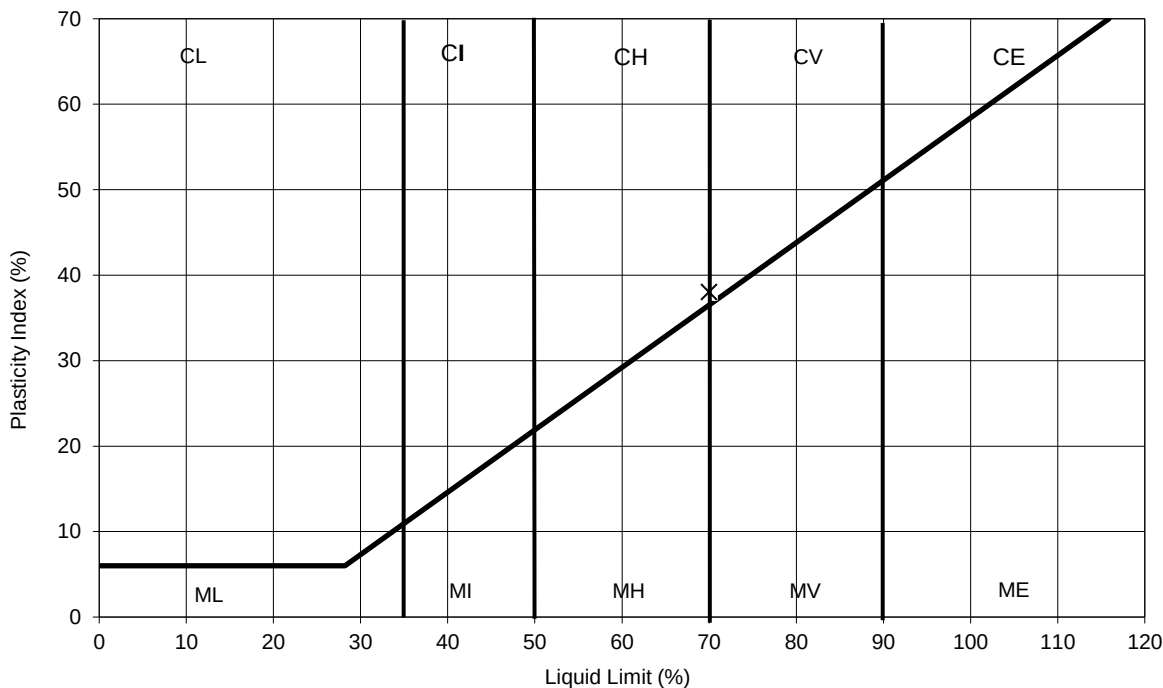
PLASTICITY INDEX

38

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 06/10/2023

2519

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

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH1

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

11.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Dark grey silty CLAY

Samples received

19/09/2023

Schedules received

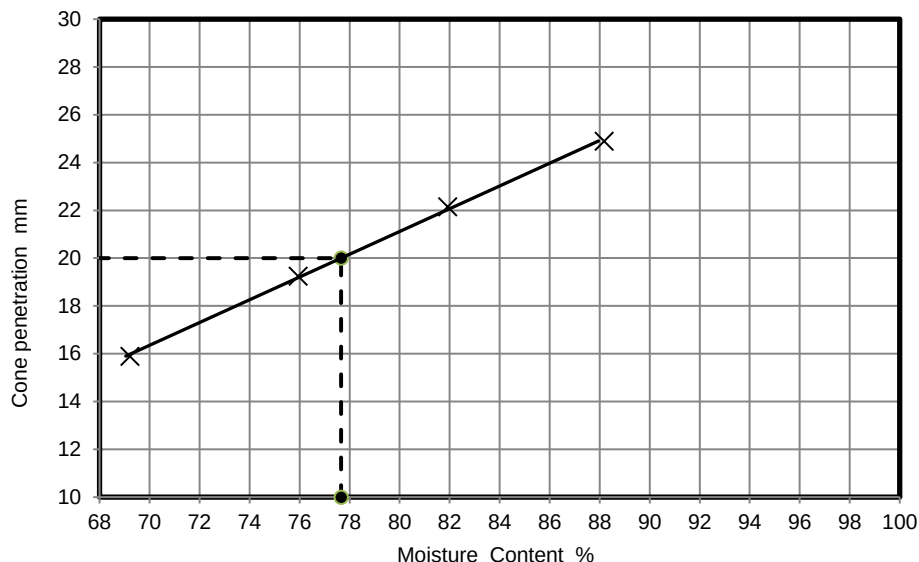
15/09/2023

Project Started

20/09/2023

Date Tested

04/10/2023



NATURAL MOISTURE CONTENT

30

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

78

%

PLASTIC LIMIT

33

%

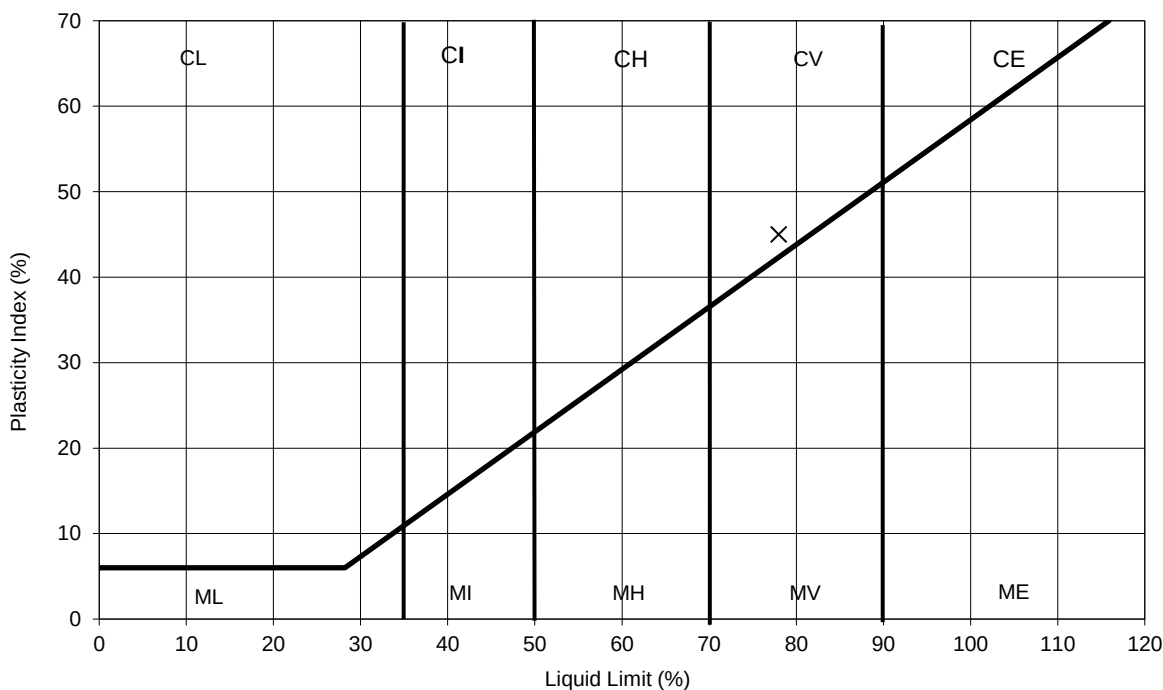
PLASTICITY INDEX

45

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 06/10/2023

2519

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

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH2

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

1.20

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown slightly mottled bluish grey and dark grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)

Samples received

19/09/2023

Schedules received

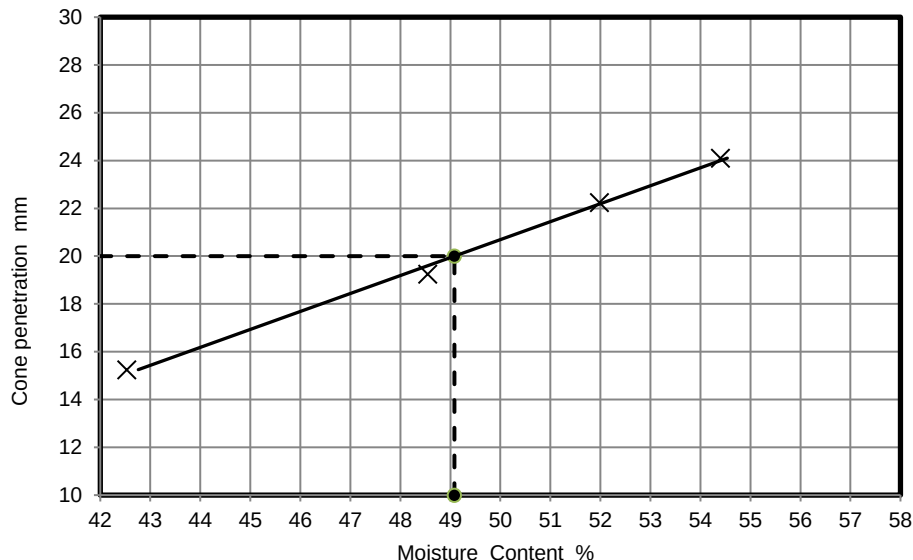
15/09/2023

Project Started

20/09/2023

Date Tested

04/10/2023



NATURAL MOISTURE CONTENT

19

%

% PASSING 425µm SIEVE

91

%

LIQUID LIMIT

49

%

PLASTIC LIMIT

21

%

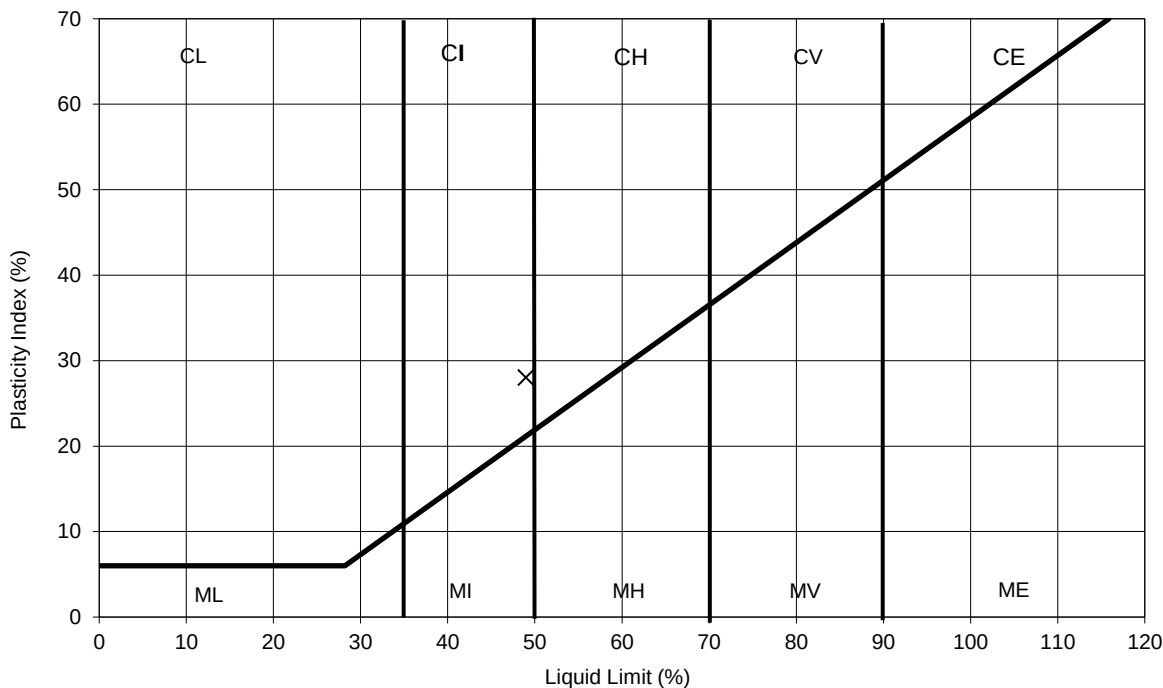
PLASTICITY INDEX

28

%

Remarks

PLASTICITY INDEX



These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 06/10/2023

2519

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

MSF-5 R2





LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH2

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

3.60

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown and occasional grey slightly gravelly silty CLAY with traces of selenite crystals (gravel is fm and sub-angular to rounded)

Samples received

19/09/2023

Schedules received

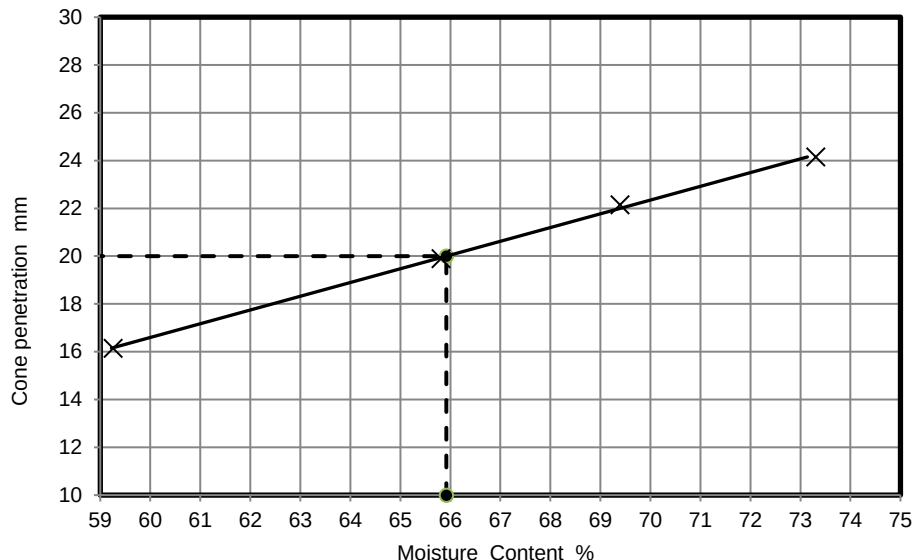
15/09/2023

Project Started

20/09/2023

Date Tested

05/10/2023



NATURAL MOISTURE CONTENT

32

%

% PASSING 425µm SIEVE

96

%

LIQUID LIMIT

66

%

PLASTIC LIMIT

31

%

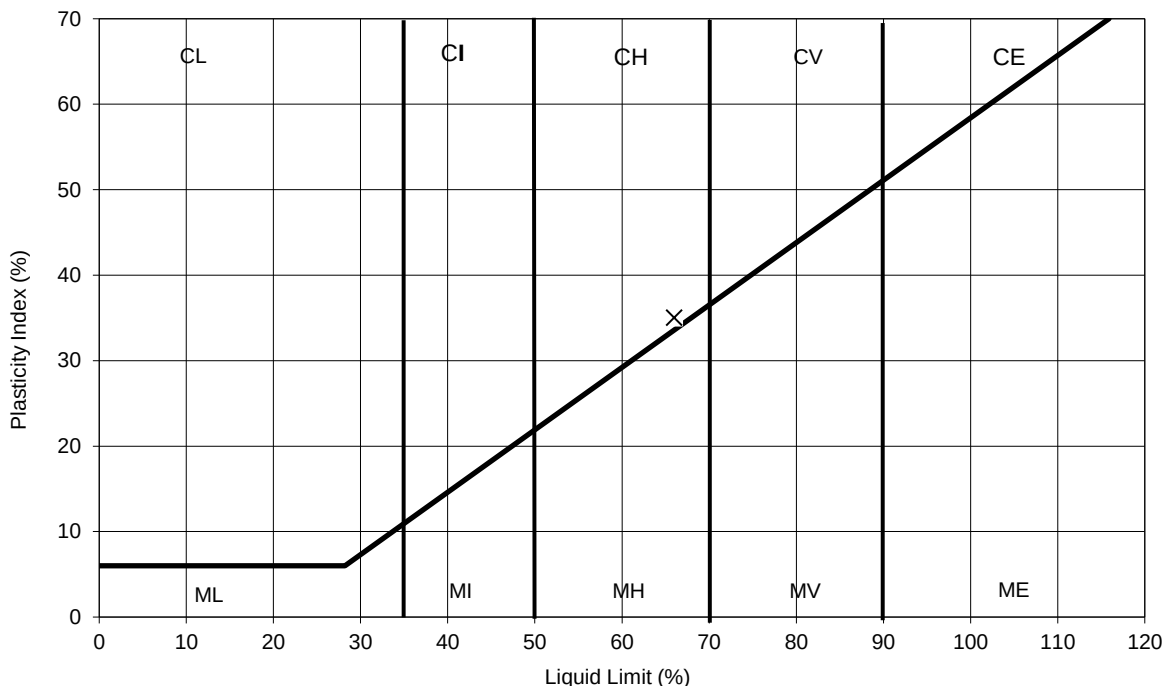
PLASTICITY INDEX

35

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 06/10/2023

2519

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

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH3

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

2.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown slightly mottled bluish grey sandy silty CLAY with silt inclusions and black flecks

Samples received

19/09/2023

Schedules received

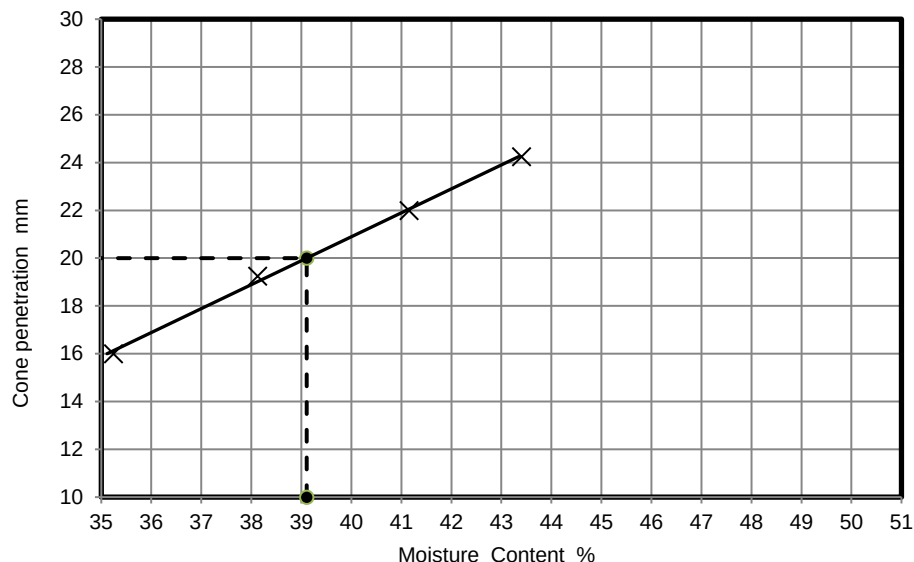
15/09/2023

Project Started

20/09/2023

Date Tested

04/10/2023



NATURAL MOISTURE CONTENT

21

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

39

%

PLASTIC LIMIT

19

%

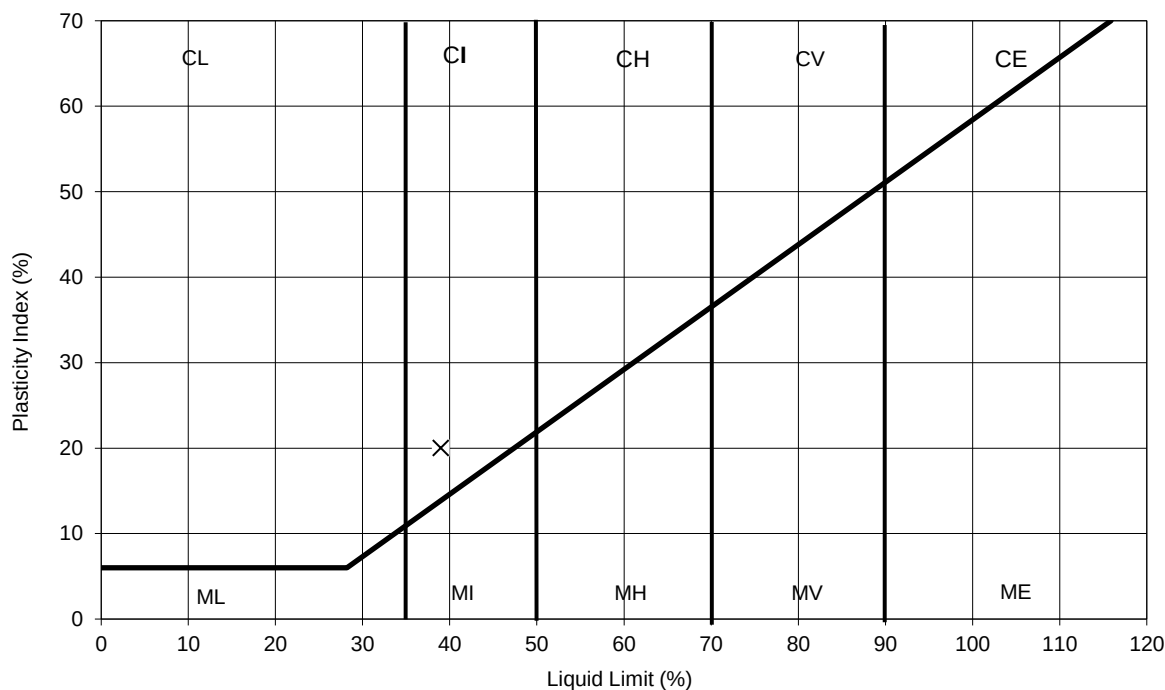
PLASTICITY INDEX

20

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Initials: J.P

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MSF-5 R2

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

34074

Borehole/Pit No.

BH3

Site Name

41 Sheldon Avenue

Sample No.

-

Project No.

J23243

Client

GEA

Depth Top

4.10

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown and occasional grey silty CLAY

Samples received

19/09/2023

Schedules received

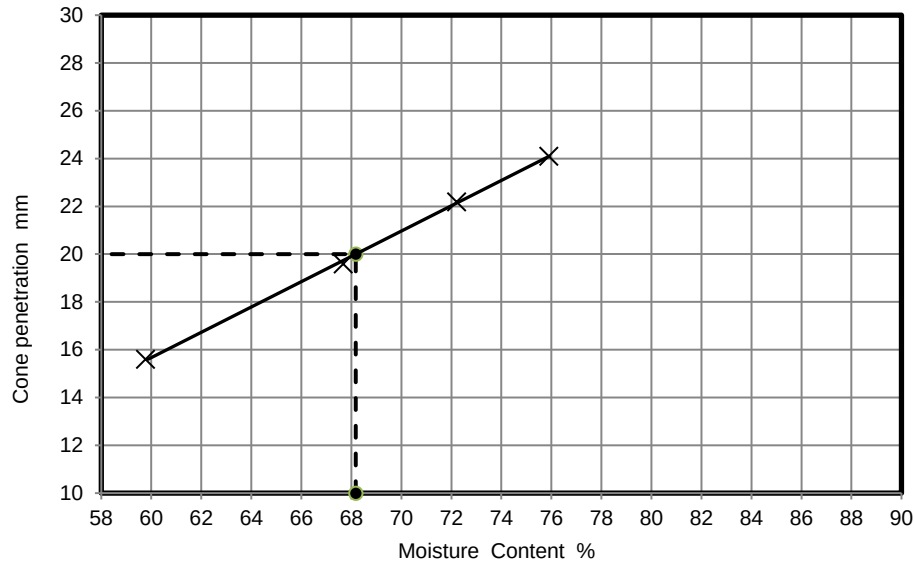
15/09/2023

Project Started

20/09/2023

Date Tested

05/10/2023



NATURAL MOISTURE CONTENT

32

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

68

%

PLASTIC LIMIT

31

%

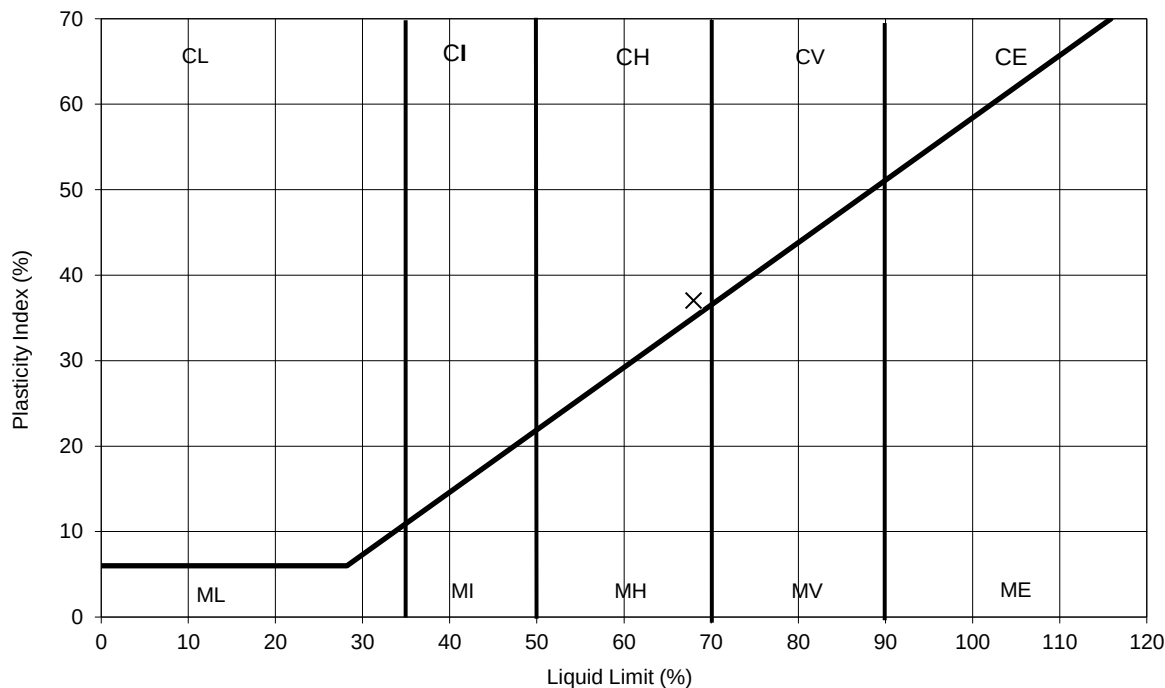
PLASTICITY INDEX

37

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Checked and Approved

Initials: J.P

Date: 06/10/2023

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 34074

Borehole/Pit No. TP2

Site Name 41 Sheldon Avenue

Sample No. -

Project No. J23243 Client GEA

Depth Top 1.20 m

Depth Base - m

Sample Type D

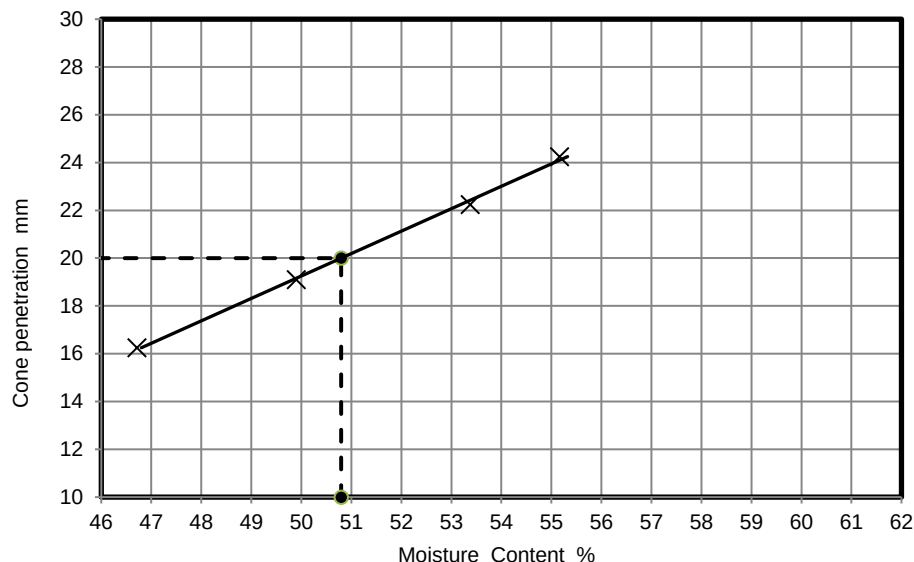
Soil Description Orangish brown slightly mottled grey slightly gravelly silty CLAY with traces of fine rootlets (gravel is fm and sub-angular to rounded)

Samples received 19/09/2023

Schedules received 15/09/2023

Project Started 20/09/2023

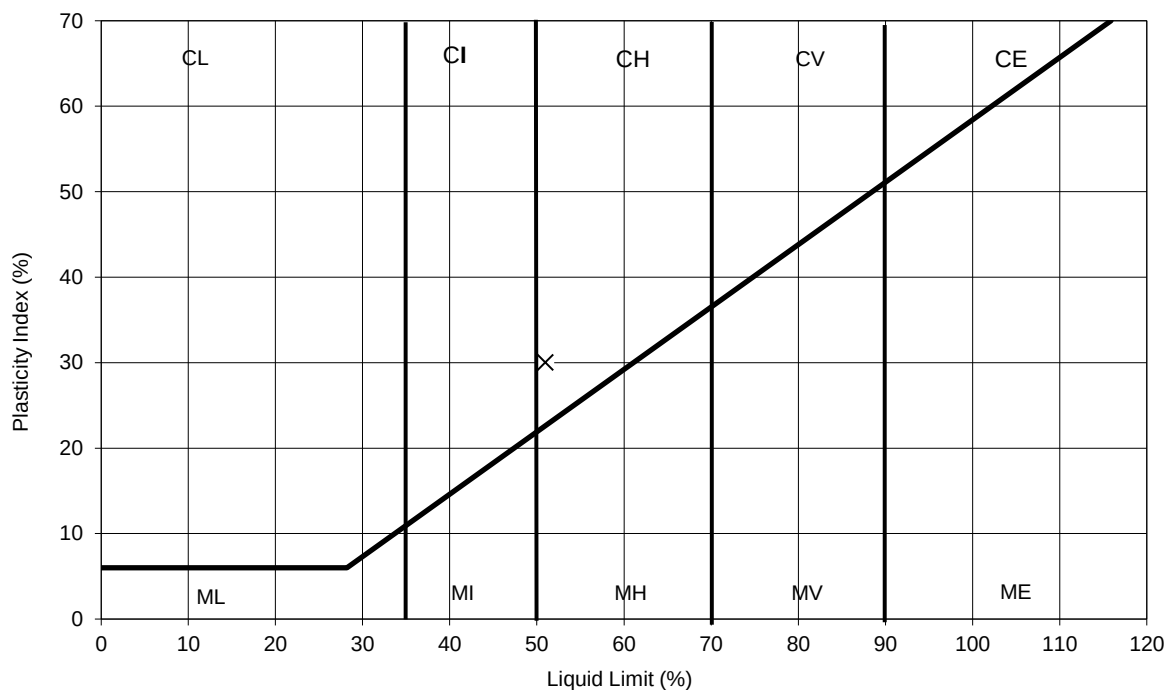
Date Tested 04/10/2023



NATURAL MOISTURE CONTENT	19	%
% PASSING 425µm SIEVE	94	%
LIQUID LIMIT	51	%
PLASTIC LIMIT	21	%
PLASTICITY INDEX	30	%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

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Date: 06/10/2023

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 34074

Borehole/Pit No. TP4

Site Name 41 Sheldon Avenue

Sample No. -

Project No. J23243

Client

GEA

Depth Top 0.85 m

Depth Base - m

Sample Type D

Soil Description

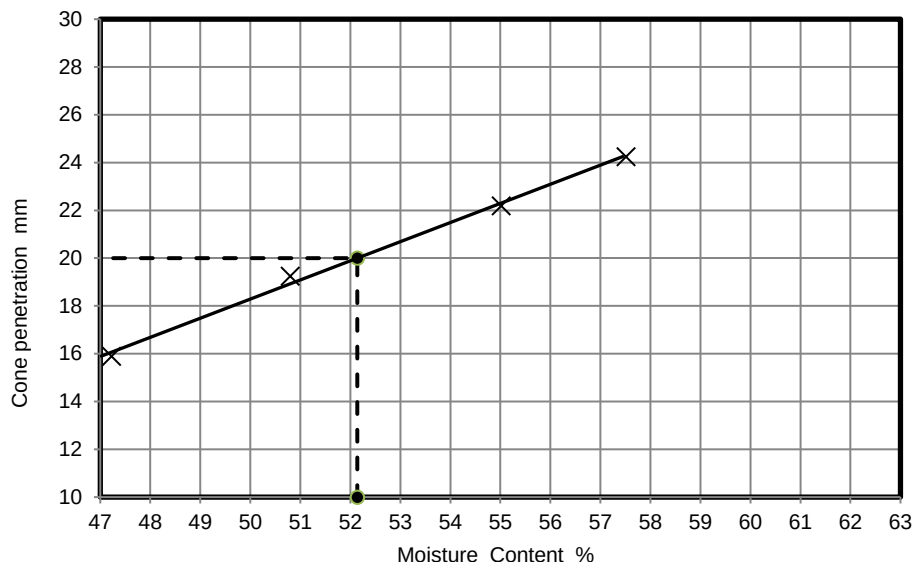
Orangish brown slightly mottled grey slightly sandy slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)

Samples received 19/09/2023

Schedules received 15/09/2023

Project Started 20/09/2023

Date Tested 05/10/2023



NATURAL MOISTURE CONTENT

23

%

% PASSING 425µm SIEVE

96

%

LIQUID LIMIT

52

%

PLASTIC LIMIT

21

%

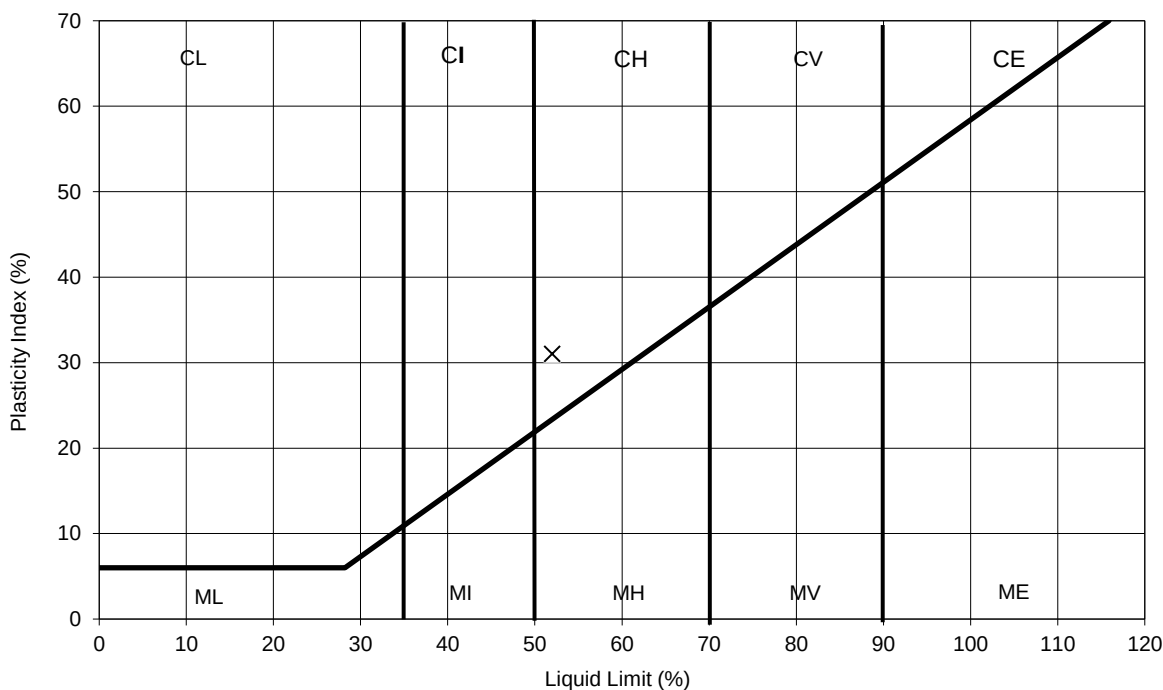
PLASTICITY INDEX

31

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

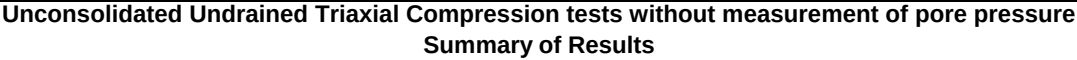
Initials: J.P

Date: 06/10/2023

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MSF-5 R2



Job No.	Project Name	Programme	
		Samples received	19/09/2023
34074	41 Sheldon Avenue	Schedule received	15/09/2023
Project No.	Client	Project started	20/09/2023
J23243	GEA	Testing Started	21/09/2023

Legend	UU - single stage test (single and multiple specimens)	σ_3	Cell pressure	Mode of failure ;	B - Brittle
	UUM - Multistage test on a single specimen	$\sigma_1 - \sigma_3$	Maximum corrected deviator stress		P - Plastic
	suffix R - remoulded or recompacted	cu	Undrained shear strength, $\frac{1}{2} (\sigma_1 - \sigma_3)$		C - Compound

	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: james@k4soils.com Email: james@k4soils.com	Checked and Approved
	<i>These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory</i>	Initials: J.P Date: 06/10/2023
	2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

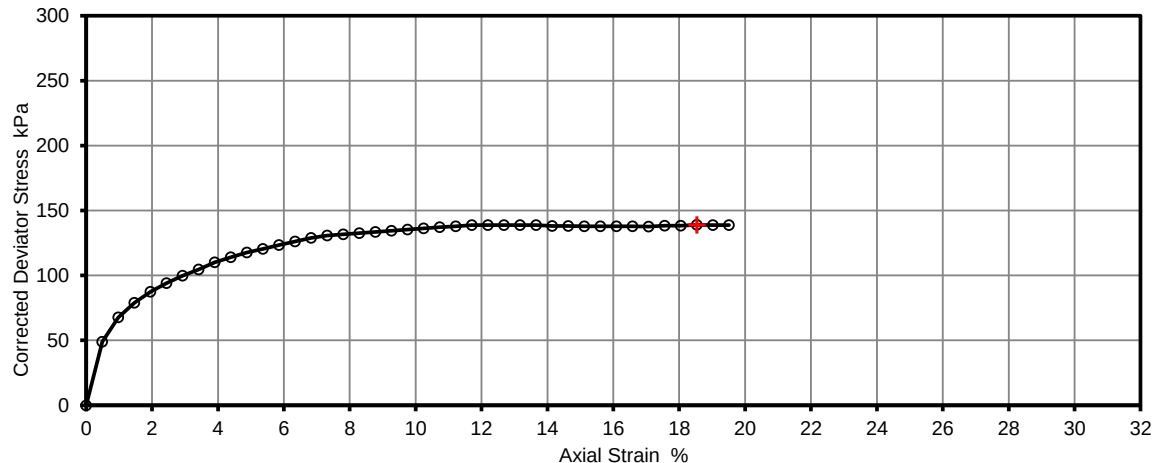
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	34074
				Borehole/Pit No.	BH1
Site Name	41 Sheldon Avenue			Sample No.	-
Project No.	J23243	Client	GEA	Depth Top	2.00 m
Soil Description	Medium strength brown slightly mottled orangish brown mottled grey silty CLAY with occasional rootlets and black flecks			Depth Base	2.45 m
				Sample Type	U
				Samples received	19/09/2023
				Schedules received	15/09/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/09/2023

Remarks

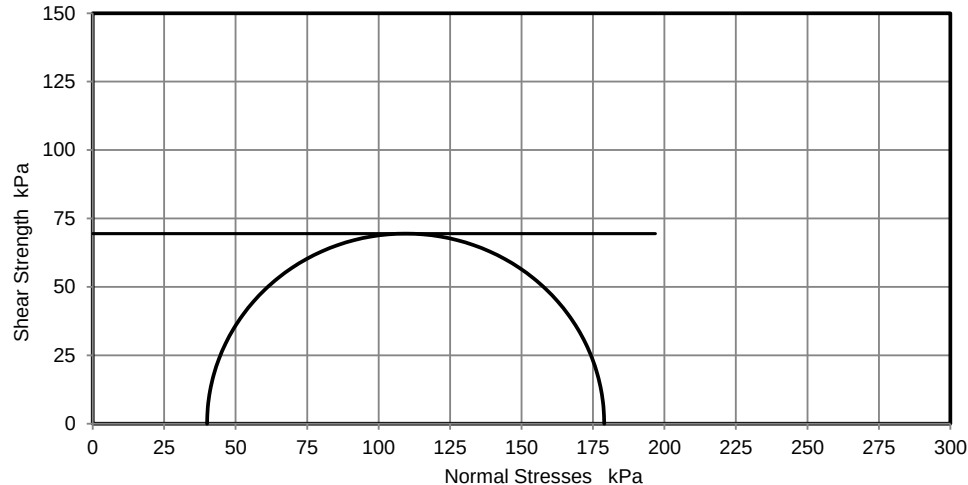
Position within sample

Test Number	1
Length	205.0 mm
Diameter	105.0 mm
Bulk Density	1.94 Mg/m ³
Moisture Content	31 %
Dry Density	1.48 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	40 kPa
Axial Strain	19 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	139 kPa
Undrained Shear Strength, cu	69 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound

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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Checked and Approved
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Date 06/10/2023

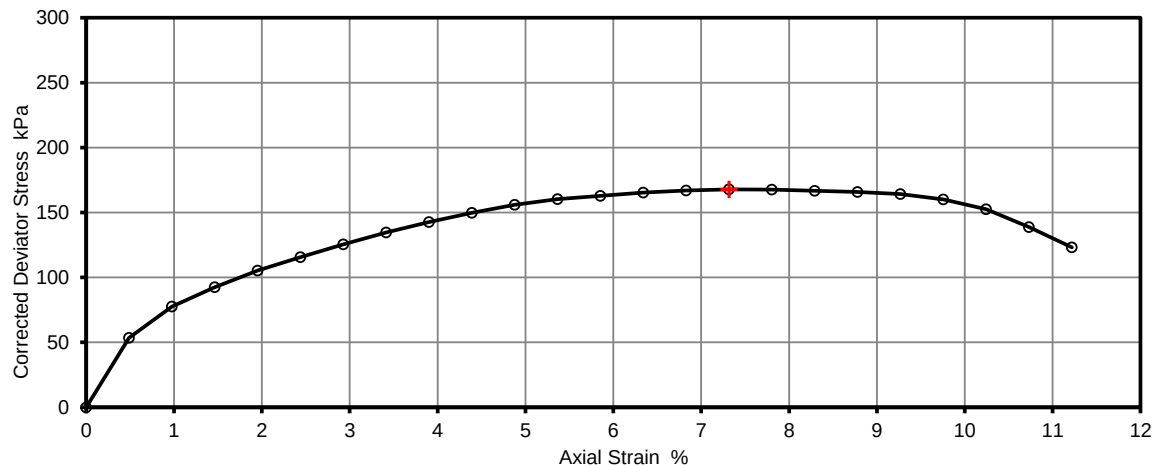
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	34074
				Borehole/Pit No.	BH1
Site Name	41 Sheldon Avenue			Sample No.	-
Project No.	J23243	Client	GEA	Depth Top	4.00 m
Soil Description	High strength brown silty CLAY with occasional selenite deposits and rare pockets of orangish brown silt/fine sand			Depth Base	4.45 m
				Sample Type	U
				Samples received	19/09/2023
				Schedules received	15/09/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/09/2023

Remarks

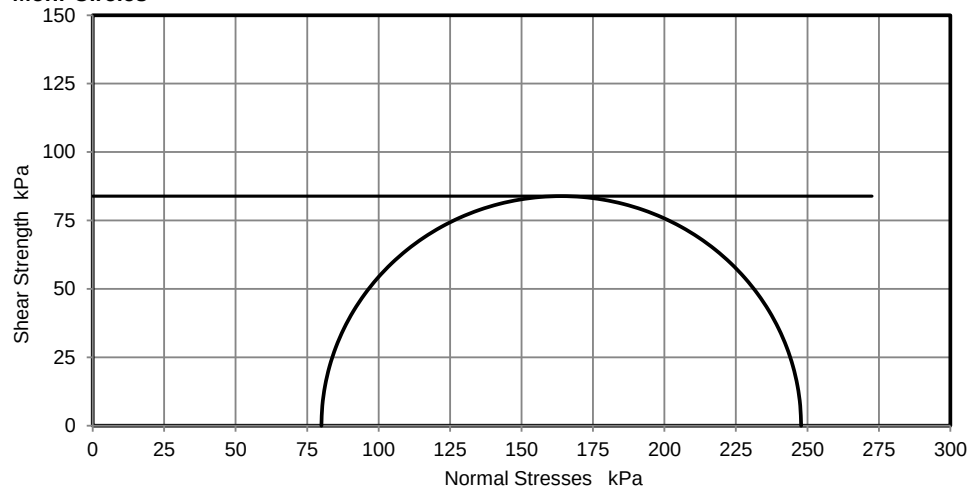
Position within sample

Test Number	1
Length	205.0 mm
Diameter	105.0 mm
Bulk Density	1.95 Mg/m3
Moisture Content	29 %
Dry Density	1.51 Mg/m3
Rate of Strain	1.5 %/min
Cell Pressure	80 kPa
Axial Strain	7.3 %
Deviator Stress, $(\sigma_1 - \sigma_3) f$	168 kPa
Undrained Shear Strength, c_u	84 kPa $\frac{1}{2}(\sigma_1 - \sigma_3) f$
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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MSF-5 R7

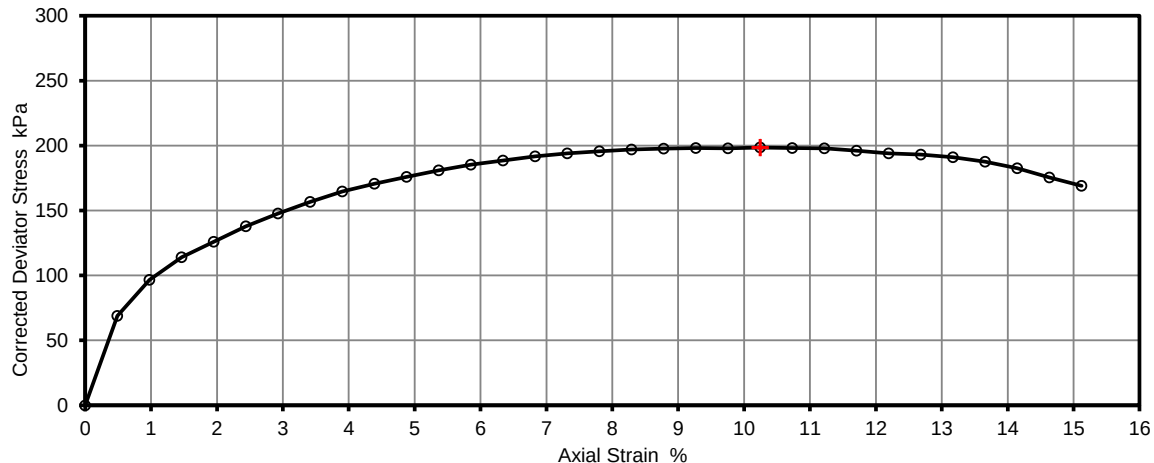
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	34074
				Borehole/Pit No.	BH1
Site Name	41 Sheldon Avenue			Sample No.	-
Project No.	J23243	Client	GEA	Depth Top	6.50 m
Soil Description	High strength dark grey silty CLAY			Depth Base	6.95 m
				Sample Type	U
				Samples received	19/09/2023
				Schedules received	15/09/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/09/2023

Remarks

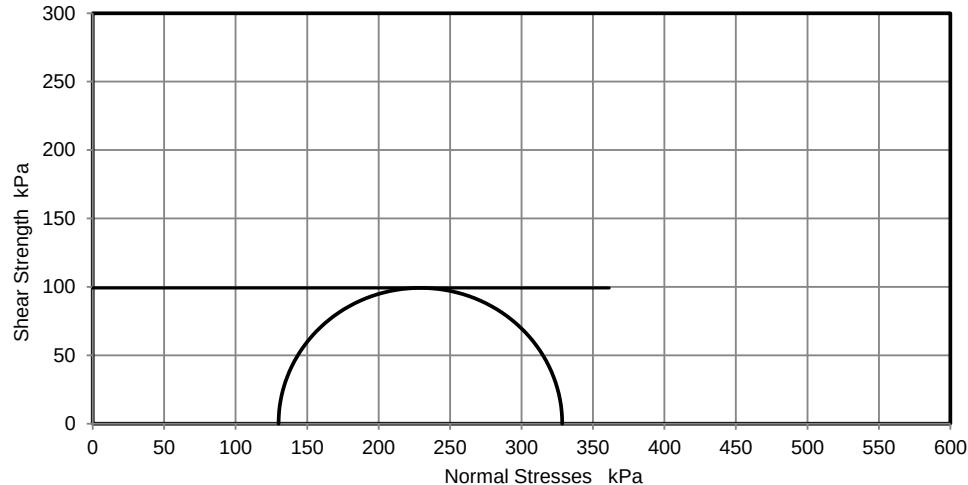
Position within sample

Test Number	1
Length	205.0 mm
Diameter	105.0 mm
Bulk Density	2.00 Mg/m3
Moisture Content	31 %
Dry Density	1.53 Mg/m3
Rate of Strain	1.5 %/min
Cell Pressure	130 kPa
Axial Strain	10 %
Deviator Stress, $(\sigma_1 - \sigma_3) f$	198 kPa
Undrained Shear Strength, c_u	99 kPa $\frac{1}{2}(\sigma_1 - \sigma_3) f$
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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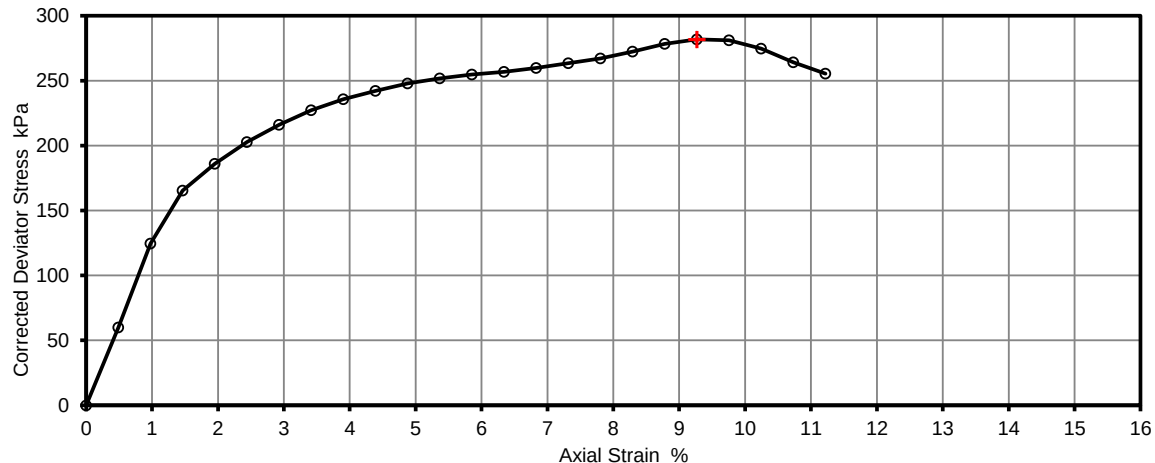
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	34074
				Borehole/Pit No.	BH1
Site Name	41 Sheldon Avenue			Sample No.	-
Project No.	J23243	Client	GEA	Depth Top	9.50 m
Soil Description	High strength dark grey silty CLAY			Depth Base	9.95 m
				Sample Type	U
				Samples received	19/09/2023
				Schedules received	15/09/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/09/2023

Remarks

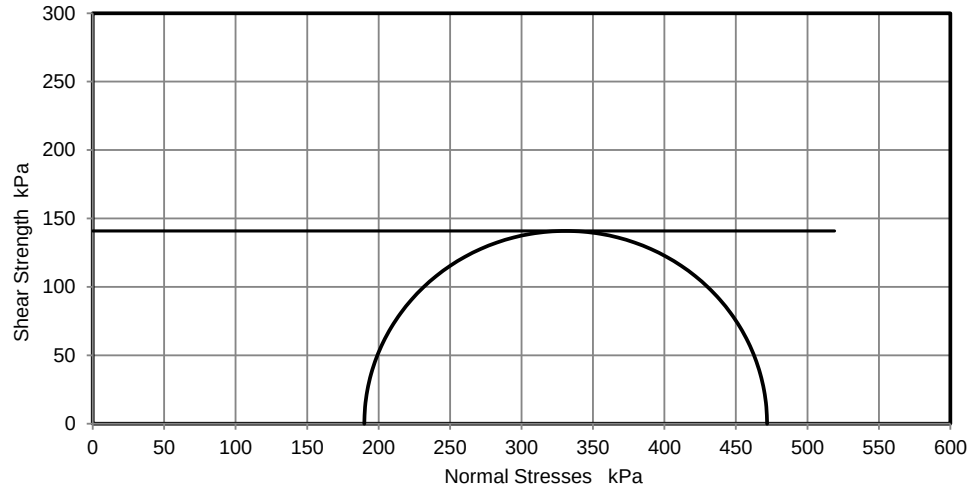
Position within sample

Test Number	1
Length	205.0 mm
Diameter	105.0 mm
Bulk Density	1.98 Mg/m3
Moisture Content	28 %
Dry Density	1.55 Mg/m3
Rate of Strain	1.5 %/min
Cell Pressure	190 kPa
Axial Strain	9.3 %
Deviator Stress, $(\sigma_1 - \sigma_3) f$	282 kPa
Undrained Shear Strength, c_u	141 kPa $\frac{1}{2}(\sigma_1 - \sigma_3) f$
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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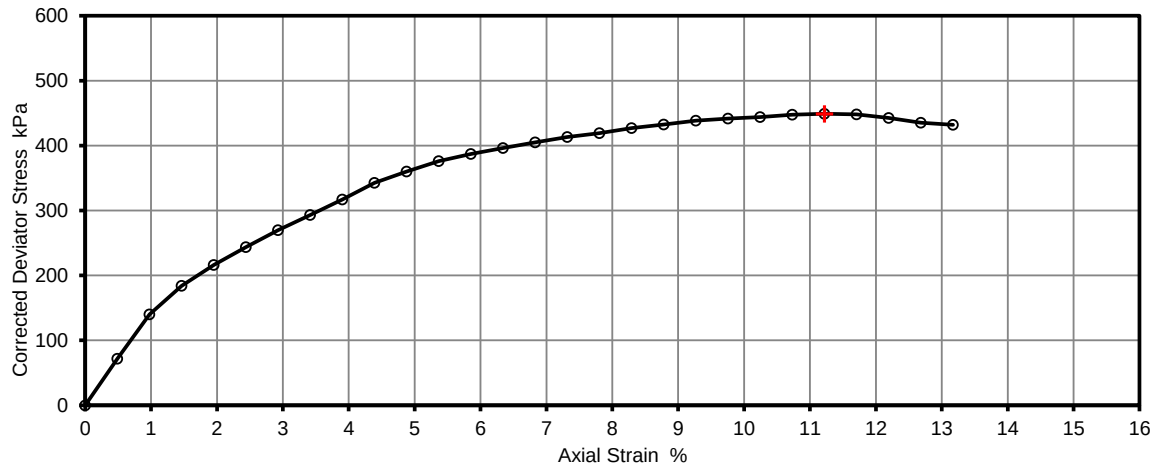
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	34074
				Borehole/Pit No.	BH1
Site Name	41 Sheldon Avenue			Sample No.	-
Project No.	J23243	Client	GEA	Depth Top	12.50 m
Soil Description	Very high strength dark grey slightly fine sandy silty CLAY			Depth Base	12.95 m
				Sample Type	U
				Samples received	19/09/2023
				Schedules received	15/09/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/09/2023

Remarks

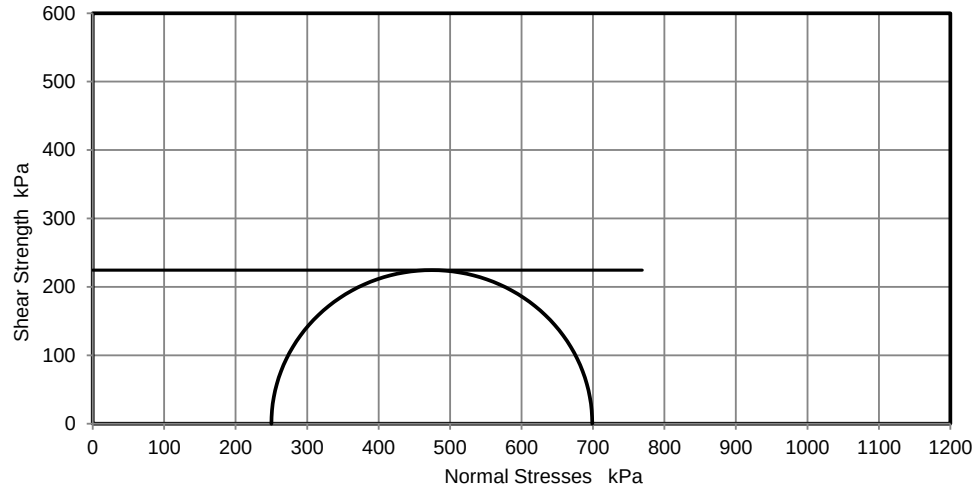
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	2.07	Mg/m3
Moisture Content	23	%
Dry Density	1.69	Mg/m3
Rate of Strain	1.5	%/min
Cell Pressure	250	kPa
Axial Strain	11	%
Deviator Stress, $(\sigma_1 - \sigma_3) f$	449	kPa
Undrained Shear Strength, c_u	225	kPa $\frac{1}{2}(\sigma_1 - \sigma_3) f$
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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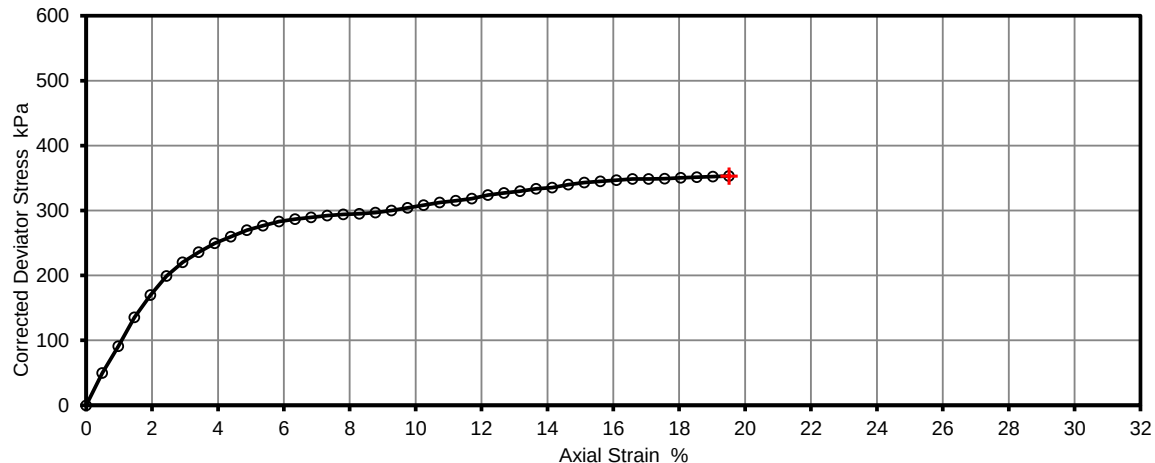
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	34074
				Borehole/Pit No.	BH1
Site Name	41 Sheldon Avenue			Sample No.	-
Project No.	J23243	Client	GEA	Depth Top	15.50 m
Soil Description	Very high strength dark grey slightly fine sandy silty CLAY			Depth Base	15.95 m
				Sample Type	U
				Samples received	19/09/2023
				Schedules received	15/09/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/09/2023

Remarks

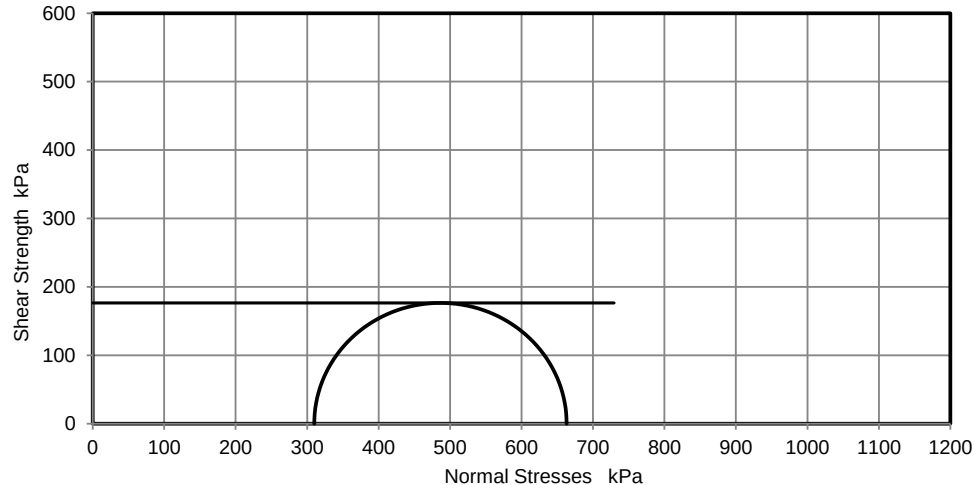
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	2.06	Mg/m3
Moisture Content	23	%
Dry Density	1.68	Mg/m3
Rate of Strain	1.5	%/min
Cell Pressure	310	kPa
Axial Strain	20	%
Deviator Stress, ($\sigma_1 - \sigma_3$)f	353	kPa
Undrained Shear Strength, cu	177	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Initials: J.P
Date 06/10/2023

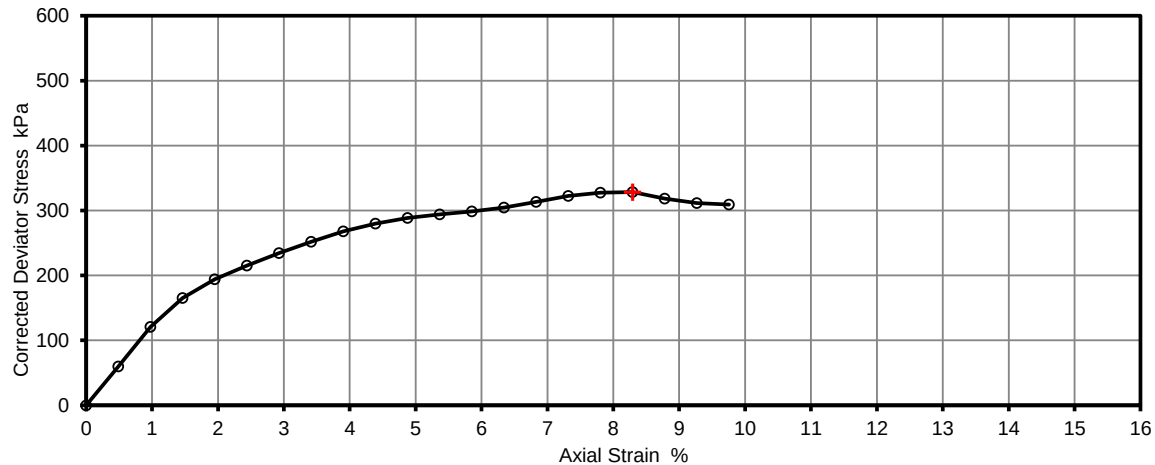
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	34074
				Borehole/Pit No.	BH1
Site Name	41 Sheldon Avenue			Sample No.	-
Project No.	J23243	Client	GEA	Depth Top	18.50 m
Soil Description	Very high strength dark grey slightly fine sandy silty CLAY			Depth Base	18.95 m
				Sample Type	U
				Samples received	19/09/2023
				Schedules received	15/09/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/09/2023

Remarks

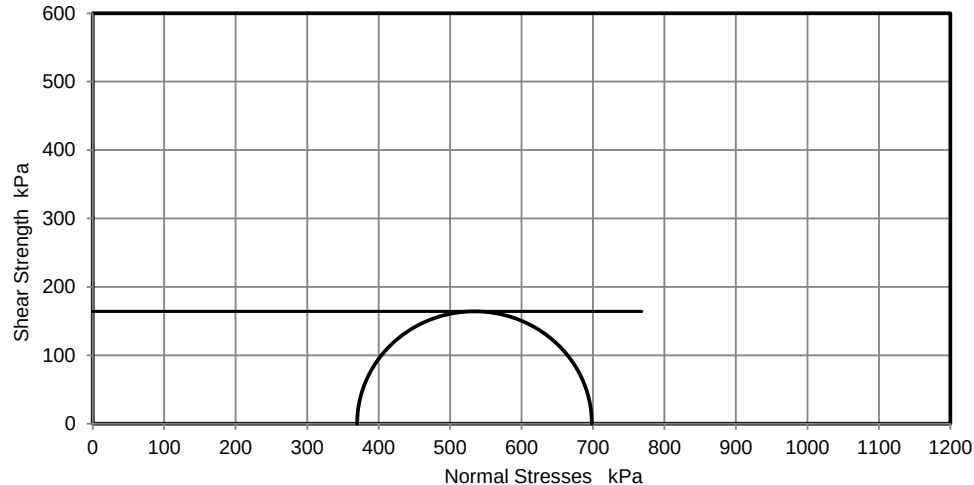
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	2.02	Mg/m ³
Moisture Content	26	%
Dry Density	1.60	Mg/m ³
Rate of Strain	1.5	%/min
Cell Pressure	370	kPa
Axial Strain	8.3	%
Deviator Stress, ($\sigma_1 - \sigma_3$)f	328	kPa
Undrained Shear Strength, cu	164	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound	

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

Checked and Approved
Initials: J.P
Date 06/10/2023

		Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results Tested in accordance with BS1377 : Part 3 : 2018, Clause 7.6 & Clause 12							
		Job No. 34074						Project Name 41 Sheldon Avenue	
Project No. J23243		Client GEA						Project started 20/09/2023 Testing Started 22/09/2023	
Hole No.	Sample				Soil description	Dry Mass passing 2mm %	SO4 Content mg/l	pH	Remarks
	Ref	Top m	Base m	Type					
BH1	-	0.20	0.40	B	Reddish brown mottled black slightly sandy slightly clayey GRAVEL (gravel is fmc and sub-angular)	23	350	7.5	
BH1	-	3.50	-	D	Orangish brown, brown and grey mottled slightly fine sandy silty CLAY	100	350	7.5	
BH1	-	12.95	13.00	D	Dark grey slightly fine sandy silty CLAY	100	430	7.5	
BH2	-	3.00	-	D	Dark greyish brown silty CLAY with rare yellowish brown silt deposits and rare bluish grey weathering along fissures	98	350	7.6	
BH3	-	1.40	-	D	Brown slightly mottled orangish brown and grey slightly fine sandy silty CLAY with occasional fm selenite crystals	100	1380	7.4	
TP10	-	0.60	-	D	Brown sandy silty CLAY with occasional rootlets	100	260	7.4	
 Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com These results only apply to the items tested NOTE: The report shall not be reproduced except in full without authority of the laboratory Checked and Approved Initials J.P Date: 06/10/2023									
2519		Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)						MSF-5-R29	



GEA

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SPT & Cohesion / Depth Graph

Site 41 Sheldon Avenue, London N6 4PJ

Client Mark Tognolini & Eva Stengaard

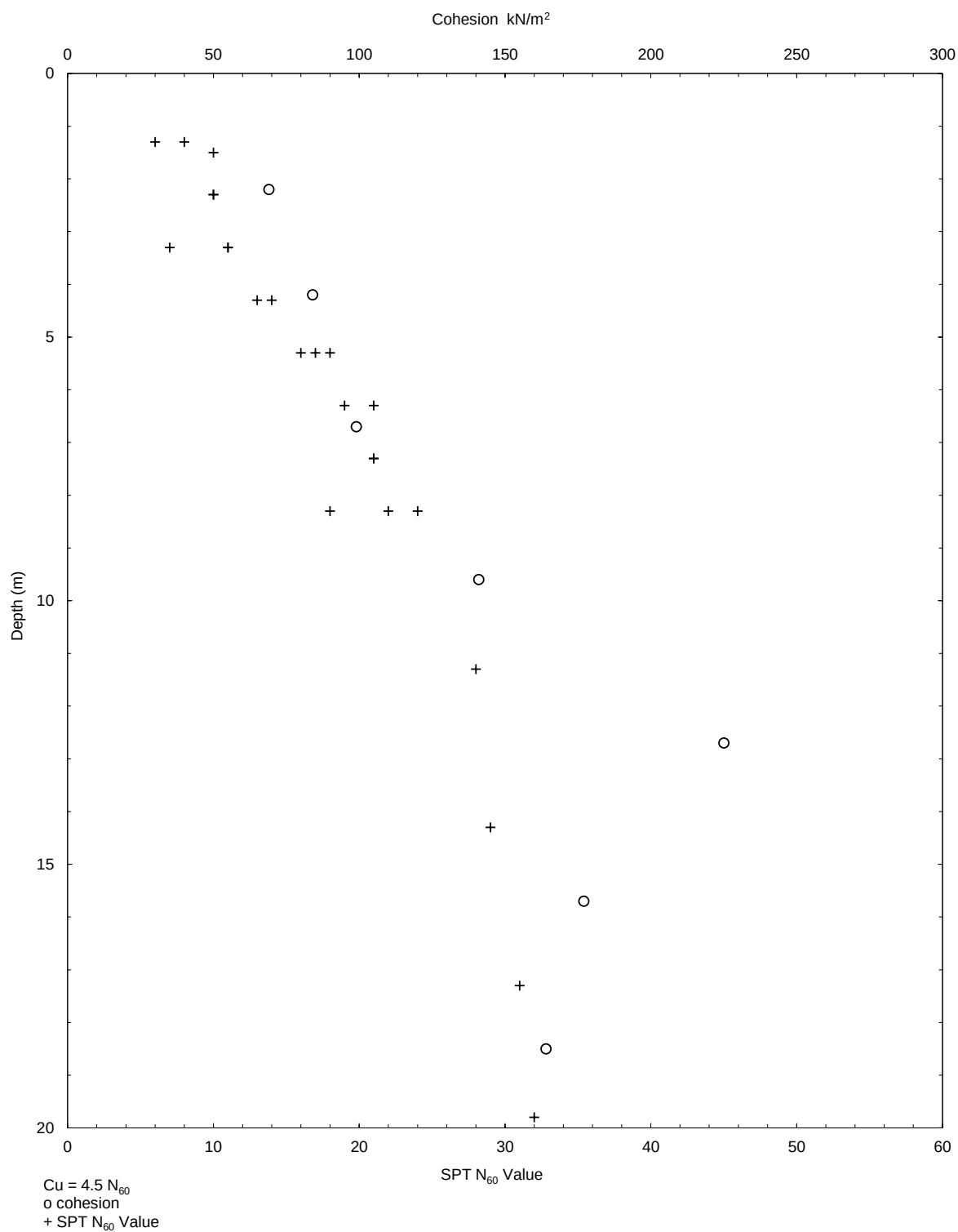
Engineer Symmetrys

Job Number

J23243

Sheet

1 / 1





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Analytical Report Number : 23-56896

Project / Site name: 41 Sheldon Avenue

Samples received on: 15/09/2023

Your job number:

**Samples instructed on/
Analysis started on:** 15/09/2023

Your order number:

Analysis completed by: 26/09/2023

Report Issue Number: 1

Report issued on: 30/10/2023

Samples Analysed: 9 soil samples

Signed:

Joanna Szwagrzak
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-56896
Project / Site name: 41 Sheldon Avenue

Lab Sample Number				2813489	2813490	2813491	2813492	2813493
Sample Reference				BH1	BH2	BH3	TP2	TP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.30	0.20	0.40	0.30
Date Sampled				14/09/2023	14/09/2023	14/09/2023	13/09/2023	14/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	9.3	7.9	8.8	8
Total mass of sample received	kg	0.001	NONE	1.4	1.5	0.8	0.7	0.8

Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	N/A	DSO	DSO	N/A	DSO

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6	7.4	6.2	7.7	9.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	280	460	610	1200	2200
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0271	0.0088	0.0129	0.402	0.682
Sulphide	mg/kg	1	MCERTS	2.4	< 1.0	< 1.0	< 1.0	21
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	32	4.7	5.9	85	140
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.7	2.2	2.4	1.7	0.7

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.05	1.9
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.1	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.06	2.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.05	2.1
Phenanthrene	mg/kg	0.05	MCERTS	0.22	0.11	0.37	0.99	21
Anthracene	mg/kg	0.05	MCERTS	0.05	< 0.05	0.08	0.24	5.8
Fluoranthene	mg/kg	0.05	MCERTS	0.56	0.3	1.1	2.7	20
Pyrene	mg/kg	0.05	MCERTS	0.53	0.28	1	2.5	17
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.29	0.16	0.54	1.4	8.5
Chrysene	mg/kg	0.05	MCERTS	0.37	0.21	0.67	1.7	8.7
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.43	0.24	0.79	2	8.4
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.15	0.1	0.27	0.8	3.8
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.33	0.2	0.61	1.6	7.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.19	0.11	0.36	0.97	3.7
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.09	0.2	0.73
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.23	0.14	0.43	1.1	3.7

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	3.35	1.85	6.27	16.5	115
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Analytical Report Number: 23-56896
Project / Site name: 41 Sheldon Avenue

Lab Sample Number				2813489	2813490	2813491	2813492	2813493
Sample Reference				BH1	BH2	BH3	TP2	TP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.30	0.20	0.40	0.30
Date Sampled				14/09/2023	14/09/2023	14/09/2023	13/09/2023	14/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	10	12	14	13
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	24	23	25	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	38	72	41	54
Lead (aqua regia extractable)	mg/kg	1	MCERTS	70	290	190	430	280
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.4	0.6	0.4	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	11	11	15	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	64	78	73	110	220

Petroleum Hydrocarbons

TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	250	17	39	110
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TPH (C8 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	4.1
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	5.6	< 4.0	< 4.0	7
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	37	< 10	13	40
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	160	12	25	51
TPH Total C8 - C35 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	< 10	200	12	38	100

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-56896
Project / Site name: 41 Sheldon Avenue

Lab Sample Number				2813494	2813495	2813496	2813497
Sample Reference				TP4	TP6	TP7	TP10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.50	0.50	0.10
Date Sampled				13/09/2023	13/09/2023	14/09/2023	13/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	7.4	12	8.2
Total mass of sample received	kg	0.001	NONE	0.7	0.8	0.8	0.9

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	DSO	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.4	8.4	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	230	1700	400	510
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0604	0.582	0.0229	0.0251
Sulphide	mg/kg	1	MCERTS	1.1	< 1.0	1.7	< 1.0
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	11	230	28	15
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.3	1.4	1.1	1.8

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.13	< 0.05	< 0.05	0.12
Acenaphthene	mg/kg	0.05	MCERTS	0.16	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.08	< 0.05	< 0.05	0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.31	0.25	0.17	0.45
Anthracene	mg/kg	0.05	MCERTS	2.1	0.07	< 0.05	0.11
Fluoranthene	mg/kg	0.05	MCERTS	1.1	0.64	0.46	1.1
Pyrene	mg/kg	0.05	MCERTS	1.3	0.61	0.41	1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.33	0.47	0.24	0.67
Chrysene	mg/kg	0.05	MCERTS	0.4	0.44	0.26	0.65
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.68	0.63	0.34	0.98
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.24	0.22	0.11	0.33
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.5	0.48	0.23	0.73
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.22	0.26	0.15	0.36
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.09	< 0.05	0.09
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.27	0.3	0.16	0.42

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	7.75	4.46	2.53	7.1
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Analytical Report Number: 23-56896
Project / Site name: 41 Sheldon Avenue

Lab Sample Number				2813494	2813495	2813496	2813497
Sample Reference				TP4	TP6	TP7	TP10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.50	0.50	0.10
Date Sampled				13/09/2023	13/09/2023	14/09/2023	13/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	12	11	12
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.6
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	42	27	32	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	34	31	49
Lead (aqua regia extractable)	mg/kg	1	MCERTS	15	320	130	370
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	29	14	16	16
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47	83	93	210
Petroleum Hydrocarbons							
TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	10	MCERTS	20	15	< 10	15
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	11	< 10	< 10
TPH Total C8 - C35 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	< 10	11	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number : 23-56896
Project / Site name: 41 Sheldon Avenue

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2813489	BH1	None Supplied	0.5	Brown clay and sand with gravel and vegetation.
2813490	BH2	None Supplied	0.3	Brown loam with gravel and vegetation.
2813491	BH3	None Supplied	0.2	Brown loam and sand with gravel and vegetation.
2813492	TP2	None Supplied	0.4	Brown loam and sand with gravel and vegetation.
2813493	TP3	None Supplied	0.3	Brown loam and sand with gravel and vegetation.
2813494	TP4	None Supplied	0.4	Brown clay and sand with gravel.
2813495	TP6	None Supplied	0.5	Brown loam and sand with gravel and vegetation.
2813496	TP7	None Supplied	0.5	Brown loam and sand with gravel and vegetation.
2813497	TP10	None Supplied	0.1	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-56896
Project / Site name: 41 Sheldon Avenue

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. Refer to CoA for analyte specific accreditation.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE



Analytical Report Number : 23-56896
Project / Site name: 41 Sheldon Avenue

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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Analytical Report Number : 23-56898

Project / Site name: 41 Sheldon Avenue

Samples received on: 15/09/2023

Your job number:

**Samples instructed on/
Analysis started on:** 15/09/2023

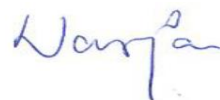
Your order number:

Analysis completed by: 27/09/2023

Report Issue Number: 1

Report issued on: 27/09/2023

Samples Analysed: 4 10:1 WAC samples



Signed:

Dominika Warjan
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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Waste Acceptance Criteria Analytical Results

Report No:	23-56898						
					Client: GEA		
Location	41 Sheldon Avenue						
Lab Reference (Sample Number)	2813499 / 2813500				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	14/09/2023				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH1						
Depth (m)	0.50						
Solid Waste Analysis							
TOC (%)**	0.7				3%	5%	6%
Loss on Ignition (%) **	3.5				--	--	10%
BTEX (µg/kg)**	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH, ID, CU, AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	3.59				100	--	--
pH (units)**	7.6				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	1.8				--	To be evaluated	To be evaluated
Eluate Analysis					Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
	mg/l			mg/kg			
Arsenic *	0.0027			0.0270	0.5	2	25
Barium *	0.0249			0.249	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0033			0.033	0.5	10	70
Copper *	0.027			0.27	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0014			0.0138	0.5	10	30
Nickel *	0.0026			0.026	0.4	10	40
Lead *	0.011			0.11	0.5	10	50
Antimony *	0.0033			0.033	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.019			0.18	4	50	200
Chloride *	3.0			30	800	15000	25000
Fluoride*	0.63			6.3	10	150	500
Sulphate *	4.5			45	1000	20000	50000
TDS*	52			520	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	9.98			99.8	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.4						
Dry Matter (%)	85						
Moisture (%)	15						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCERTS accredited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
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Waste Acceptance Criteria Analytical Results

Waste Acceptance Criteria Analytical Results							
Report No:	23-56898						
					Client: GEA		
Location	41 Sheldon Avenue						
Lab Reference (Sample Number)	2813501 / 2813502				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	14/09/2023				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH2						
Depth (m)	0.30						
Solid Waste Analysis							
TOC (%)**	2.2				3%	5%	6%
Loss on Ignition (%) **	6.2				--	--	10%
BTEX (µg/kg)**	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH, ID, CU, AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	1.99				100	--	--
pH (units)**	7.0				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	0.00				--	To be evaluated	To be evaluated
Eluate Analysis							
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test		
	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0024			0.0236	0.5	2	25
Barium *	0.0146			0.146	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0029			0.029	0.5	10	70
Copper *	0.032			0.32	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0004			0.0043	0.5	10	30
Nickel *	0.0019			0.019	0.4	10	40
Lead *	0.023			0.23	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.016			0.15	4	50	200
Chloride *	0.42			4.2	800	15000	25000
Fluoride*	0.32			3.2	10	150	500
Sulphate *	1.2			12	1000	20000	50000
TDS*	8.2			82	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	9.33			93.3	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.5						
Dry Matter (%)	91						
Moisture (%)	9.3						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCERTS accredited		

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Waste Acceptance Criteria Analytical Results

Report No:	23-56898						
					Client: GEA		
Location	41 Sheldon Avenue						
Lab Reference (Sample Number)	2813503 / 2813504				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	14/09/2023				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH3						
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	0.4				3%	5%	6%
Loss on Ignition (%) **	3.3				--	--	10%
BTEX (µg/kg)#	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	7.5				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	1.3				--	To be evaluated	To be evaluated
Eluate Analysis					Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
	mg/l			mg/kg			
Arsenic *	0.0012			0.0119	0.5	2	25
Barium *	0.0120			0.120	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0024			0.024	0.5	10	70
Copper *	0.0084			0.084	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	< 0.0004			< 0.0040	0.5	10	30
Nickel *	0.0025			0.025	0.4	10	40
Lead *	0.0016			0.017	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0096			0.096	4	50	200
Chloride *	1.0			10	800	15000	25000
Fluoride*	0.36			3.6	10	150	500
Sulphate *	4.9			49	1000	20000	50000
TDS*	17			170	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	4.95			49.5	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.70						
Dry Matter (%)	84						
Moisture (%)	16						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCERTS accredited		

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Waste Acceptance Criteria Analytical Results

Report No:	23-56898						
					Client: GEA		
Location	41 Sheldon Avenue						
Lab Reference (Sample Number)	2813505 / 2813506				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	13/09/2023				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP3						
Depth (m)	0.60						
Solid Waste Analysis							
TOC (%)**	0.9				3%	5%	6%
Loss on Ignition (%) **	3.7				--	--	10%
BTEX (µg/kg)**	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH, ID, CU, AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	89.8				100	--	--
pH (units)**	7.6				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	2.7				--	To be evaluated	To be evaluated
Eluate Analysis					Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
	mg/l			mg/kg			
Arsenic *	0.0033			0.0329	0.5	2	25
Barium *	0.0199			0.199	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0041			0.041	0.5	10	70
Copper *	0.020			0.20	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0173			0.173	0.5	10	30
Nickel *	0.0030			0.030	0.4	10	40
Lead *	0.017			0.17	0.5	10	50
Antimony *	0.0029			0.030	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.021			0.21	4	50	200
Chloride *	5.2			52	800	15000	25000
Fluoride*	0.64			6.4	10	150	500
Sulphate *	23			230	1000	20000	50000
TDS*	83			830	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.49			74.9	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.80						
Dry Matter (%)	83						
Moisture (%)	17						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)		
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Analytical Report Number : 23-56898
Project / Site name: 41 Sheldon Avenue

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2813499	BH1	None Supplied	0.5	Brown clay and sand with gravel and vegetation.
2813501	BH2	None Supplied	0.3	Brown loam with gravel and vegetation.
2813503	BH3	None Supplied	1	Brown clay with vegetation.
2813505	TP3	None Supplied	0.6	Brown clay and sand with gravel and vegetation.

Analytical Report Number : 23-56898
Project / Site name: 41 Sheldon Avenue

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270.	L064-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025

Analytical Report Number : 23-56898
Project / Site name: 41 Sheldon Avenue

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-PL	W	ISO 17025
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

- Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

Matthew Penfold

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e: matt@gea-ltd.co.uk

Analytical Report Number : 23-57647

Project / Site name: 41 Sheldon Avenue

Samples received on: 20/09/2023

Your job number:

**Samples instructed on/
Analysis started on:** 20/09/2023

Your order number:

Analysis completed by: 27/09/2023

Report Issue Number: 1

Report issued on: 27/09/2023

Samples Analysed: 1 soil sample



Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-57647
Project / Site name: 41 Sheldon Avenue

Lab Sample Number				2818379
Sample Reference				TP1
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				14/09/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	15
Total mass of sample received	kg	0.001	NONE	0.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MJN

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1100
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.547
Sulphide	mg/kg	1	MCERTS	< 1.0
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	33
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.4

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.78
Anthracene	mg/kg	0.05	MCERTS	0.12
Fluoranthene	mg/kg	0.05	MCERTS	1.7
Pyrene	mg/kg	0.05	MCERTS	1.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.88
Chrysene	mg/kg	0.05	MCERTS	0.96
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.87
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.36
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.66
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.29
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.09
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.37

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	8.45
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23
Lead (aqua regia extractable)	mg/kg	1	MCERTS	66
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	68

Analytical Report Number: 23-57647
Project / Site name: 41 Sheldon Avenue

Lab Sample Number				2818379
Sample Reference				TP1
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				14/09/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Petroleum Hydrocarbons

TPH C10 - C40 _{EH, CU, 1D, TOTAL}	mg/kg	10	MCERTS	35
TPH (C8 - C10) _{HS, 1D, TOTAL}	mg/kg	0.1	NONE	< 0.1
TPH (C10 - C12) _{EH, CU, 1D, TOTAL}	mg/kg	2	MCERTS	< 2.0
TPH (C12 - C16) _{EH, CU, 1D, TOTAL}	mg/kg	4	MCERTS	< 4.0
TPH (C16 - C21) _{EH, CU, 1D, TOTAL}	mg/kg	10	MCERTS	14
TPH (C21 - C35) _{EH, CU, 1D, TOTAL}	mg/kg	10	MCERTS	21
TPH Total C8 - C35 _{EH, CU+HS, 1D, TOTAL}	mg/kg	10	NONE	35

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-57647
Project / Site name: 41 Sheldon Avenue

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2818379	TP1	None Supplied	0.3	Brown clay and sand with gravel.

Analytical Report Number : 23-57647
Project / Site name: 41 Sheldon Avenue

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. Refer to CoA for analyte specific accreditation.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS

Analytical Report Number : 23-57647
Project / Site name: 41 Sheldon Avenue

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

		Widbury Barn Widbury Hill Ware SG12 7QE	Generic Risk-Based Soil Screening Values																																																																																																																																																																																																																																					
Site	41 Sheldon Avenue, London W9 1PS			Job Number J23243																																																																																																																																																																																																																																				
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(%)</td><td>6</td><td>Methanogenic potential</td></tr><tr><td>Total Cyanide</td><td>140</td><td>WRAS</td></tr><tr><td>Total Mono Phenols</td><td>184</td><td>SGV</td></tr><tr><td colspan="3">PAH</td></tr><tr><td>Naphthalene</td><td>2.30</td><td>S4UL</td></tr><tr><td>Acenaphthylene</td><td>170</td><td>S4UL</td></tr><tr><td>Acenaphthene</td><td>210</td><td>S4UL</td></tr><tr><td>Fluorene</td><td>170</td><td>S4UL</td></tr><tr><td>Phenanthrene</td><td>95</td><td>S4UL</td></tr><tr><td>Anthracene</td><td>2,400</td><td>S4UL</td></tr><tr><td>Fluoranthene</td><td>280</td><td>S4UL</td></tr><tr><td>Pyrene</td><td>620</td><td>S4UL</td></tr><tr><td>Benzo(a)anthracene</td><td>7.2</td><td>S4UL</td></tr><tr><td>Chrysene</td><td>15</td><td>S4UL</td></tr><tr><td>Benzo(b)fluoranthene</td><td>2.6</td><td>S4UL</td></tr><tr><td>Benzo(k)fluoranthene</td><td>77.0</td><td>S4UL</td></tr><tr><td>Benzo(a)pyrene</td><td>4.35</td><td>C4SL</td></tr><tr><td>Indeno(1 2 3 cd)pyrene</td><td>27.0</td><td>S4UL</td></tr><tr><td>Dibenz(a h)anthracene</td><td>0.24</td><td>S4UL</td></tr><tr><td>Benzo (g h i)perylene</td><td>320</td><td>S4UL</td></tr><tr><td>Total PAH Screen</td><td>62.1</td><td>B(a)P / 0.15</td></tr></table>			Contaminant	Screening Value mg/kg	Data Source	Metals			Arsenic	37	C4SL	Cadmium	22	C4SL	Chromium (III)	910	S4UL	Chromium (VI)	21	C4SL	Copper	2,400	S4UL	Lead	200	C4SL	Elemental Mercury	1.2	S4UL	Inorganic Mercury	40	S4UL	Nickel	130	S4UL	Selenium	350	SGV	Zinc	3,700	S4UL	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	2.30	S4UL	Acenaphthylene	170	S4UL	Acenaphthene	210	S4UL	Fluorene	170	S4UL	Phenanthrene	95	S4UL	Anthracene	2,400	S4UL	Fluoranthene	280	S4UL	Pyrene	620	S4UL	Benzo(a)anthracene	7.2	S4UL	Chrysene	15	S4UL	Benzo(b)fluoranthene	2.6	S4UL	Benzo(k)fluoranthene	77.0	S4UL	Benzo(a)pyrene	4.35	C4SL	Indeno(1 2 3 cd)pyrene	27.0	S4UL	Dibenz(a h)anthracene	0.24	S4UL	Benzo (g h i)perylene	320	S4UL	Total PAH Screen	62.1	B(a)P / 0.15	<table><tr><th>Contaminant</th><th>Screening Value mg/kg</th><th>Data Source</th></tr><tr><td colspan="3">Hydrocarbons</td></tr><tr><td>Banded TPH (8-10)</td><td>52</td><td>Calc1</td></tr><tr><td>Banded TPH (10-12)</td><td>114</td><td>Calc1</td></tr><tr><td>Banded TPH (12-16)</td><td>215</td><td>Calc1</td></tr><tr><td>Banded TPH (16-21)</td><td>400</td><td>Calc1</td></tr><tr><td>Banded TPH (21-35)</td><td>1692</td><td>Calc1</td></tr><tr><td>Benzene</td><td>0.2</td><td>C4SL</td></tr><tr><td>Toluene</td><td>120</td><td>SGV</td></tr><tr><td>Ethyl 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Oil (C₂₈ –C₄₄)</td><td>66,100</td><td>Calc2</td></tr><tr><td>TPH</td><td>750</td><td>Trigger to consider speciated testing</td></tr><tr><td colspan="3">Chlorinated Solvents</td></tr><tr><td>1,1,1 trichloroethane (TCA)</td><td>8.8</td><td>S4UL</td></tr><tr><td>tetrachloroethane (PCA)</td><td>1.2</td><td>S4UL</td></tr><tr><td>tetrachloroethene (PCE)</td><td>0.18</td><td>S4UL</td></tr><tr><td>trichloroethene (TCE)</td><td>0.016</td><td>S4UL</td></tr><tr><td>1,2-dichloroethane (DCA)</td><td>0.0071</td><td>S4UL</td></tr><tr><td>vinyl chloride (Chloroethene)</td><td>0.00064</td><td>S4UL</td></tr><tr><td>tetrachloromethane (Carbon tetra</td><td>0.026</td><td>S4UL</td></tr><tr><td>trichloromethane (Chloroform)</td><td>0.91</td><td>S4UL</td></tr></table>		Contaminant	Screening Value mg/kg	Data Source	Hydrocarbons			Banded TPH (8-10)	52	Calc1	Banded TPH (10-12)	114	Calc1	Banded TPH (12-16)	215	Calc1	Banded TPH (16-21)	400	Calc1	Banded TPH (21-35)	1692	Calc1	Benzene	0.2	C4SL	Toluene	120	SGV	Ethyl Benzene	65	SGV	Xylene	42	SGV	Aliphatic C5-C6	42	S4UL	Aliphatic C6-C8	100	S4UL	Aliphatic C8-C10	27	S4UL	Aliphatic C10-C12	130	S4UL	Aliphatic C12-C16	1100	S4UL	Aliphatic C16-C35	65,000	S4UL	Aromatic C6-C7	See Benzene	S4UL	Aromatic C7-C8	See Toluene	S4UL	Aromatic C8-C10	34	S4UL	Aromatic C10-C12	74	S4UL	Aromatic C12-C16	140	S4UL	Aromatic C16-C21	260	S4UL	Aromatic C21-C35	1100	S4UL	PRO (C ₅ –C ₁₀)	323	Calc2	DRO (C ₁₂ –C ₂₈)	66,500	Calc2	Lube Oil (C ₂₈ –C ₄₄)	66,100	Calc2	TPH	750	Trigger to consider speciated testing	Chlorinated Solvents			1,1,1 trichloroethane (TCA)	8.8	S4UL	tetrachloroethane (PCA)	1.2	S4UL	tetrachloroethene (PCE)	0.18	S4UL	trichloroethene (TCE)	0.016	S4UL	1,2-dichloroethane (DCA)	0.0071	S4UL	vinyl chloride (Chloroethene)	0.00064	S4UL	tetrachloromethane (Carbon tetra	0.026	S4UL	trichloromethane (Chloroform)	0.91	S4UL
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Aliphatic C8-C10	27	S4UL																																																																																																																																																																																																																																						
Aliphatic C10-C12	130	S4UL																																																																																																																																																																																																																																						
Aliphatic C12-C16	1100	S4UL																																																																																																																																																																																																																																						
Aliphatic C16-C35	65,000	S4UL																																																																																																																																																																																																																																						
Aromatic C6-C7	See Benzene	S4UL																																																																																																																																																																																																																																						
Aromatic C7-C8	See Toluene	S4UL																																																																																																																																																																																																																																						
Aromatic C8-C10	34	S4UL																																																																																																																																																																																																																																						
Aromatic C10-C12	74	S4UL																																																																																																																																																																																																																																						
Aromatic C12-C16	140	S4UL																																																																																																																																																																																																																																						
Aromatic C16-C21	260	S4UL																																																																																																																																																																																																																																						
Aromatic C21-C35	1100	S4UL																																																																																																																																																																																																																																						
PRO (C ₅ –C ₁₀)	323	Calc2																																																																																																																																																																																																																																						
DRO (C ₁₂ –C ₂₈)	66,500	Calc2																																																																																																																																																																																																																																						
Lube Oil (C ₂₈ –C ₄₄)	66,100	Calc2																																																																																																																																																																																																																																						
TPH	750	Trigger to consider speciated testing																																																																																																																																																																																																																																						
Chlorinated Solvents																																																																																																																																																																																																																																								
1,1,1 trichloroethane (TCA)	8.8	S4UL																																																																																																																																																																																																																																						
tetrachloroethane (PCA)	1.2	S4UL																																																																																																																																																																																																																																						
tetrachloroethene (PCE)	0.18	S4UL																																																																																																																																																																																																																																						
trichloroethene (TCE)	0.016	S4UL																																																																																																																																																																																																																																						
1,2-dichloroethane (DCA)	0.0071	S4UL																																																																																																																																																																																																																																						
vinyl chloride (Chloroethene)	0.00064	S4UL																																																																																																																																																																																																																																						
tetrachloromethane (Carbon tetra	0.026	S4UL																																																																																																																																																																																																																																						
trichloromethane (Chloroform)	0.91	S4UL																																																																																																																																																																																																																																						
Notes : Concentrations measured below these screening values may be considered to represent 'uncontaminated conditions' which pose a 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment.																																																																																																																																																																																																																																								
C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk																																																																																																																																																																																																																																								
SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009 - where not superseded by C4SL																																																																																																																																																																																																																																								
S4UL - LQM/CIEH Suitable for use Level (2015) based on 'minimal' level of risk																																																																																																																																																																																																																																								
Calc1 - sum of thresholds for Ali & Aro fractions - assuming a 35% Aro:65% Ali ratio as is commonly encountered in the soil																																																																																																																																																																																																																																								
Calc2 - sum of nearest available carbon range specified including BTEX for PRO fraction																																																																																																																																																																																																																																								
Total PAH based on B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene rarely exceeds 15% of the total PAH concentration																																																																																																																																																																																																																																								

**Site** 41 Sheldon Avenue, London W9 1PS**Client** Mark Tognolini & Eva Stengaard**Engineer** Symmetrys**Job Number**
J23243**Sheet**
2 / 2**Proposed End Use** **Residential with plant uptake****The key generic assumptions for this end use are as follows;**

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

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

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



appendix c

Desk Study

Risk Assessment Tables
Envirocheck Extracts
Historical Maps
UXO Preliminary Risk Assessment

Classification of Consequence		
Classification	Definition	Examples
Severe	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings / property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular of Contaminated Land, DETR, 2000). Damage to sensitive buildings / structures / services or the environment.	Pollution of non-classified groundwater Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

Classification of Probability	
Classification	Probability
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

**Risk Assessment Matrix**

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High likelihood	Very high risk	High risk	Moderate risk	Moderate / low risk
	Likely	High risk	Moderate risk	Moderate / low risk	Low risk
	Low likelihood	Moderate risk	Moderate / low risk	Low risk	Very low risk
	Unlikely	Moderate / low risk	Low risk	Very low risk	Very low risk

Description of the assessed risks and likely action required

Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

316763849_1_1

Customer Reference:

J23243

National Grid Reference:

527540, 188080

Slice:

A

Site Area (Ha):

0.17

Search Buffer (m):

1000

Site Details:

41, Sheldon Avenue

LONDON

N6 4JP

Client Details:

Mr S Branch

GEA Ltd

Widbury Barn

Widbury Hill

Ware

Herts

SG12 7QE



Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	16
Hazardous Substances	-
Geological	17
Industrial Land Use	21
Sensitive Land Use	32
Data Currency	33
Data Suppliers	40
Useful Contacts	41

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

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Report Version v53.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes		n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1			1	2
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 1				3
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 2		Yes		
Pollution Incidents to Controlled Waters	pg 2		1	1	9
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions					
Water Industry Act Referrals					
Groundwater Vulnerability Map	pg 4	Yes	n/a	n/a	n/a
Groundwater Vulnerability - Soluble Rock Risk			n/a	n/a	n/a
Groundwater Vulnerability - Local Information			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 4	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 4		1	34	66

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage		1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)	pg 16			2	5
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 17	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry					
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 17			Yes	Yes
BGS Urban Soil Chemistry Averages	pg 20	Yes			
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 20	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 20	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 20	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 20	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 21			4	39
Fuel Station Entries	pg 24				4
Points of Interest - Commercial Services	pg 25			1	9
Points of Interest - Education and Health	pg 25		1	3	1
Points of Interest - Manufacturing and Production	pg 26		3	1	7
Points of Interest - Public Infrastructure	pg 27			5	17
Points of Interest - Recreational and Environmental	pg 29				5
Gas Pipelines					
Underground Electrical Cables	pg 29			4	22

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland	pg 32				2
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest	pg 32				1
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SW (SW)	0	1	527540 188083
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SE (E)	29	1	527600 188083
1	Discharge Consents Operator: Thames Water Utilities Ltd Property Type: WTW/WATER COLLECTION/TREATMENT/SUPPLY Location: Bishops Wood Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.0030 Permit Version: 1 Effective Date: 15th September 1989 Issued Date: 15th September 1989 Revocation Date: 5th October 2000 Discharge Type: Trade Effluent Discharge: Freshwater Stream/River Environment: Receiving Water: River Thames Status: Authorisation revoked Positional Accuracy: Located by supplier to within 100m	A13NW (NW)	289	2	527300 188300
2	Discharge Consents Operator: London Underground Ltd. Property Type: LAND TRANSPORT + VIA PIPELINES/FREIGHT Location: Highgate Railway Depot, Woodside Avenue, London N6 Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Ctwc.2296 Permit Version: 2 Effective Date: 9th December 2005 Issued Date: 9th December 2005 Revocation Date: 9th December 2017 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge: Land/Soakaway Environment: Receiving Water: Made Ground/London Clay Status: Transferred from COPA 1974 Positional Accuracy: Located by supplier to within 10m	A19SW (NE)	728	2	527990 188670
2	Discharge Consents Operator: London Underground Ltd. Property Type: LAND TRANSPORT + VIA PIPELINES/FREIGHT Location: Highgate Railway Depot, Woodside Avenue, London N6 Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CTWC.2296 Permit Version: 1 Effective Date: 21st March 1988 Issued Date: 21st March 1988 Revocation Date: 8th December 2005 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge: Onto Land Environment: Receiving Water: Made Ground/London Clay Status: Transferred from COPA 1974 Positional Accuracy: Located by supplier to within 100m	A19SW (NE)	728	2	527990 188670
3	Local Authority Pollution Prevention and Controls Name: Wellington Service Station Location: 513 Archway Road, LONDON, N6 4HX Authority: London Borough of Haringey, Planning and Environmental Health Permit Reference: PV-02/v1 Dated: 17th April 2001 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station Status: Authorised Positional Accuracy: Manually positioned to the address or location	A19SW (NE)	556	3	527908 188517
4	Local Authority Pollution Prevention and Controls Name: John Nichol Service Station Location: 31-33 North Road, LONDON, N6 4BE Authority: London Borough of Haringey, Planning and Environmental Health Permit Reference: PV-11 Dated: 17th April 2001 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station Status: Authorised Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	858	3	528296 187611

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	Local Authority Pollution Prevention and Controls Name: Cherry Tree Hill Service Station Location: Cherry Tree Hill, 411 Great North Road, LONDON, N2 0NR Authority: London Borough of Barnet, Environmental Health Department Permit Reference: PPC45 Dated: 13th January 1999 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station Status: Authorisation revoked Positional Accuracy: Automatically positioned to the address	A18NW (N)	913	4	527324 189005
	Nearest Surface Water Feature	A13SW (W)	104	-	527407 188071
6	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Highgate View Road Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 19th May 1992 Incident Reference: N1920289 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	A13SE (E)	241	2	527800 188000
7	Pollution Incidents to Controlled Waters Property Type: Not Given Location: HAMPSTEAD Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 10th August 1990 Incident Reference: N1900464 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (NW)	460	2	527100 188300
8	Pollution Incidents to Controlled Waters Property Type: Not Given Location: White Lodge Close Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 16th January 1990 Incident Reference: N1900017 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (W)	510	2	527000 188100
9	Pollution Incidents to Controlled Waters Property Type: Not Given Location: 7 White Lodge Close Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 1st September 1989 Incident Reference: N1890461 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	A12SE (W)	517	2	527000 188000
10	Pollution Incidents to Controlled Waters Property Type: Not Given Location: White Lodge Close, HIGHGATE Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 16th May 1996 Incident Reference: N1960262 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A12NE (W)	553	2	527000 188300

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
11	Pollution Incidents to Controlled Waters Property Type: Not Given Location: FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 28th October 1993 Incident Reference: NE930729 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A8SE (S)	810	2	527800 187280
12	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Belvedere Court, FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 18th May 1997 Incident Reference: THN11997032177 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	A17NE (NW)	902	2	527000 188850
12	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Belvedere Co, EAST FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 29th May 1996 Incident Reference: N1960278 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	A17NE (NW)	939	2	527000 188895
13	Pollution Incidents to Controlled Waters Property Type: Not Given Location: FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Miscellaneous - Unknown Note: Confirmed As A Pollution Incident Incident Date: 31st August 1995 Incident Reference: N1950490 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	A17NE (NW)	943	2	527000 188900
13	Pollution Incidents to Controlled Waters Property Type: Not Given Location: FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 16th May 1990 Incident Reference: N1900240 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A17NE (NW)	972	2	526950 188900
14	Pollution Incidents to Controlled Waters Property Type: Not Given Location: FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Unknown Sewage Note: Confirmed As A Pollution Incident Incident Date: 14th March 1995 Incident Reference: N1950121 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	A17NE (NW)	985	2	527000 188950

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Groundwater Vulnerability Map Combined Classification: Secondary Bedrock Aquifer - Medium Vulnerability Combined Vulnerability: Medium Combined Aquifer: Productive Bedrock Aquifer, No Superficial Aquifer Pollutant Speed: Low Bedrock Flow: Mixed Dilution: 300-550 mm/year Baseflow Index: 40-70% Superficial Patchiness: <90% Superficial Thickness: <3m Superficial Recharge: No Data	A13SW (SW)	0	5	527540 188083
	Groundwater Vulnerability - Soluble Rock Risk None				
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A13SW (SW)	0	5	527540 188083
	Superficial Aquifer Designations No Data Available				
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
15	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 68.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (W)	104	6	527407 188071
16	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 17.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	271	6	527315 188290
17	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 39.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	274	6	527302 188279
18	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 18.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	296	6	527265 188263

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 28.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	309	6	527246 188255
20	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	309	6	527246 188255
21	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 32.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (W)	313	6	527220 187965
22	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (W)	314	6	527222 187960
23	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (W)	314	6	527221 187962
24	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 19.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (W)	315	6	527223 187955
25	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (W)	315	6	527222 187958
26	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 41.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (SW)	319	6	527227 187936
27	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 26.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (SW)	331	6	527238 187896

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
28	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 17.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12SE (W)	337	6	527193 187972
29	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 10.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (SW)	339	6	527261 187856
30	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 12.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13SW (SW)	341	6	527252 187862
31	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 175.3 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12SE (W)	347	6	527179 187981
32	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 8.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	386	6	527210 188343
33	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	390	6	527212 188353
34	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 57.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NW (NW)	402	6	527220 188381
35	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 169.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (N)	409	6	527530 188522
36	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A18SW (NW)	431	6	527240 188441

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
37	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A18SW (NW)	436	6	527231 188439
38	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 12.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A18SW (NW)	437	6	527228 188439
39	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 89.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (NW)	445	6	527216 188437
40	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 110.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (NW)	456	6	527315 188520
41	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 63.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12SE (W)	458	6	527052 188071
42	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 35.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	460	6	527179 188422
43	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 10.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	465	6	527045 188094
44	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 15.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	476	6	527034 188094
45	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.5 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	478	6	527032 188109

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
46	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 51.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	479	6	527032 188110
47	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (N)	487	6	527370 188576
48	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 172.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (N)	488	6	527369 188577
49	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	500	6	527014 188152
50	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	501	6	527012 188149
51	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 77.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	503	6	527012 188162
52	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	521	6	527189 188516
53	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 37.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	522	6	527189 188517
54	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 42.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8NE (S)	543	6	527543 187512

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
55	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 56.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	556	6	527089 188464
56	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 25.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	559	6	526969 188227
57	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 54.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8NW (S)	561	6	527500 187496
58	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	569	6	527103 188499
59	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 23.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	572	6	527181 188574
60	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 64.8 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	575	6	526959 188249
61	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 8.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	578	6	527098 188508
62	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 13.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8NW (S)	581	6	527536 187474
63	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 11.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	585	6	527199 188602

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
64	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	585	6	527199 188602
65	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 11.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	586	6	527201 188605
66	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	586	6	527095 188516
67	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	587	6	527189 188598
68	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	588	6	527185 188596
69	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	588	6	527187 188597
70	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A18SW (NW)	590	6	527208 188614
71	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 10.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	590	6	527092 188520
72	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	590	6	527185 188600

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
73	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 35.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	591	6	527186 188601
74	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A18SW (NW)	592	6	527210 188618
75	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 61.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (NW)	592	6	527214 188620
76	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	617	6	527154 188610
77	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 44.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	619	6	527151 188610
78	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 39.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	619	6	527151 188610
79	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 80.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	628	6	526919 188300
80	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 5.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	655	6	527121 188633
81	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 20.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	660	6	527120 188639

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
82	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 11.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	680	6	527112 188657
83	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 191.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8NE (S)	689	6	527810 187412
84	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 11.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 2	A17SE (NW)	691	6	527108 188667
85	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 106.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A19SW (NE)	692	6	528097 188523
86	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 57.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NE (W)	694	6	526870 188354
87	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NW (NW)	725	6	526852 188397
88	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A19SW (NE)	731	6	528046 188630
89	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 46.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NW (NW)	735	6	526840 188392
90	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 532.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NW (NW)	735	6	526840 188392

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
91	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 218.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A19SW (NE)	742	6	528059 188633
92	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.4 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	809	6	527773 187274
93	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 8.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	810	6	527774 187273
94	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 152.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	814	6	527270 187294
95	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 29.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	818	6	527803 187273
96	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	819	6	527775 187264
97	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	824	6	527773 187258
98	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 40.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	824	6	527259 187288
99	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 17.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	827	6	527773 187255

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
100	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 18.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	837	6	527290 187262
101	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 47.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	840	6	527765 187240
102	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 23.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	843	6	527443 187220
103	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 33.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	848	6	527301 187247
104	OS Water Network Lines Watercourse Form: Marsh Watercourse Length: 51.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	863	6	527428 187202
105	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 312.9 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SE (S)	874	6	527740 187199
106	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 93.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	881	6	527414 187186
107	OS Water Network Lines Watercourse Form: Marsh Watercourse Length: 53.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	881	6	527414 187186
108	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 109.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Stock Pond Catchment Name: Thames Primacy: 1	A8SW (S)	891	6	527463 187169

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
109	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 23.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	898	6	527336 187185
110	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 87.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Wood Pond Catchment Name: Thames Primacy: 1	A8SW (S)	906	6	527313 187183
111	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 23.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	952	6	527227 187163
112	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 60.4 Watercourse Level: Underground Permanent: True Watercourse Name: Highgate Ponds Catchment Name: Thames Primacy: 1	A8SE (S)	960	6	527543 187095
113	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 251.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Mutton Brook Catchment Name: Thames Primacy: 1	A17NE (NW)	967	6	526970 188908
114	OS Water Network Lines Watercourse Form: Marsh Watercourse Length: 23.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A8SW (S)	975	6	527216 187143
115	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 132.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Wood Pond Catchment Name: Thames Primacy: 1	A7SE (SW)	977	6	527154 187166

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: London Borough of Haringey - Has supplied landfill data		0	7	527540 188083
	Local Authority Landfill Coverage Name: London Borough of Barnet - Has supplied landfill data		416	8	527121 188234
	Local Authority Landfill Coverage Name: London Borough of Camden - Has no landfill data to supply		462	9	527577 187593
116	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1896	A13SE (S)	254	11	527618 187807
117	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1896	A14NW (NE)	429	11	527955 188265
118	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A14SW (E)	590	11	528148 187951
119	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A9NW (SE)	619	11	528057 187685
120	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A14NE (E)	731	11	528285 188233
121	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1946	A14SE (E)	947	11	528517 188016
122	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1946	A9NE (SE)	987	11	528481 187693

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Thames Group	A13SW (SW)	0	1	527540 188083
	BGS Estimated Soil Chemistry No data available				
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527690, 188310 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 22.40 mg/kg Concentration: Cadmium Measured 0.50 mg/kg Concentration: Chromium Measured 130.80 mg/kg Concentration: Lead Measured 300.50 mg/kg Concentration: Nickel Measured 29.00 mg/kg Concentration:	A13NE (NE)	260	1	527690 188310
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527100, 188303 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 16.90 mg/kg Concentration: Cadmium Measured 0.60 mg/kg Concentration: Chromium Measured 64.60 mg/kg Concentration: Lead Measured 206.30 mg/kg Concentration: Nickel Measured 23.50 mg/kg Concentration:	A12NE (NW)	461	1	527100 188303
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527819, 187616 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 12.50 mg/kg Concentration: Cadmium Measured 0.40 mg/kg Concentration: Chromium Measured 94.70 mg/kg Concentration: Lead Measured 201.10 mg/kg Concentration: Nickel Measured 14.10 mg/kg Concentration:	A8NE (SE)	508	1	527819 187616
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527238, 187609 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 19.50 mg/kg Concentration: Cadmium Measured 0.50 mg/kg Concentration: Chromium Measured 85.10 mg/kg Concentration: Lead Measured 395.80 mg/kg Concentration: Nickel Measured 44.00 mg/kg Concentration:	A8NW (SW)	548	1	527238 187609

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527647, 188728 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 20.50 mg/kg Concentration: Cadmium Measured 0.50 mg/kg Concentration: Chromium Measured 220.50 mg/kg Concentration: Lead Measured 359.00 mg/kg Concentration: Nickel Measured 24.00 mg/kg Concentration:	A18SE (N)	628	1	527647 188728
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526877, 188187 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 17.40 mg/kg Concentration: Cadmium Measured 0.60 mg/kg Concentration: Chromium Measured 76.80 mg/kg Concentration: Lead Measured 260.10 mg/kg Concentration: Nickel Measured 31.10 mg/kg Concentration:	A12NE (W)	641	1	526877 188187
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528226, 188231 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 26.20 mg/kg Concentration: Cadmium Measured 0.50 mg/kg Concentration: Chromium Measured 107.20 mg/kg Concentration: Lead Measured 206.60 mg/kg Concentration: Nickel Measured 17.10 mg/kg Concentration:	A14NE (E)	673	1	528226 188231
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526822, 187735 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 17.90 mg/kg Concentration: Cadmium Measured 0.80 mg/kg Concentration: Chromium Measured 76.10 mg/kg Concentration: Lead Measured 305.30 mg/kg Concentration: Nickel Measured 23.30 mg/kg Concentration:	A7NW (SW)	772	1	526822 187735
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528316, 187756 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 18.10 mg/kg Concentration: Cadmium Measured 0.80 mg/kg Concentration: Chromium Measured 79.60 mg/kg Concentration: Lead Measured 761.60 mg/kg Concentration: Nickel Measured 31.00 mg/kg Concentration:	A14SE (SE)	810	1	528316 187756

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527208, 188876 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 96.20 mg/kg Concentration: Cadmium Measured 0.90 mg/kg Concentration: Chromium Measured 71.60 mg/kg Concentration: Lead Measured 500.00 mg/kg Concentration: Nickel Measured 40.90 mg/kg Concentration:	A18NW (NW)	824	1	527208 188876
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527639, 187232 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 13.40 mg/kg Concentration: Cadmium Measured 0.50 mg/kg Concentration: Chromium Measured 110.70 mg/kg Concentration: Lead Measured 147.10 mg/kg Concentration: Nickel Measured 13.80 mg/kg Concentration:	A8SE (S)	826	1	527639 187232
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527233, 187207 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 12.20 mg/kg Concentration: Cadmium Measured 0.30 mg/kg Concentration: Chromium Measured 101.50 mg/kg Concentration: Lead Measured 188.80 mg/kg Concentration: Nickel Measured 13.10 mg/kg Concentration:	A8SW (S)	909	1	527233 187207
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 526870, 188762 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 14.50 mg/kg Concentration: Cadmium Measured 1.00 mg/kg Concentration: Chromium Measured 72.00 mg/kg Concentration: Lead Measured 382.50 mg/kg Concentration: Nickel Measured 24.80 mg/kg Concentration:	A17NE (NW)	918	1	526870 188762
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528245, 188752 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured 16.10 mg/kg Concentration: Cadmium Measured 0.30 mg/kg Concentration: Chromium Measured 110.70 mg/kg Concentration: Lead Measured 76.30 mg/kg Concentration: Nickel Measured 12.70 mg/kg Concentration:	A19SE (NE)	956	1	528245 188752

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: 7209 Arsenic Minimum Concentration: 1.00 mg/kg Arsenic Average Concentration: 17.00 mg/kg Arsenic Maximum Concentration: 161.00 mg/kg Cadmium Minimum Concentration: 0.10 mg/kg Cadmium Average Concentration: 0.90 mg/kg Cadmium Maximum Concentration: 165.20 mg/kg Chromium Minimum Concentration: 13.00 mg/kg Chromium Average Concentration: 79.00 mg/kg Chromium Maximum Concentration: 2094.00 mg/kg Lead Minimum Concentration: 11.00 mg/kg Lead Average Concentration: 280.00 mg/kg Lead Maximum Concentration: 10000.00 mg/kg Nickel Minimum Concentration: 2.00 mg/kg Nickel Average Concentration: 28.00 mg/kg Nickel Maximum Concentration: 506.00 mg/kg	A13SW (SW)	0	1	527540 188083
	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 (SW)	0	1	527540 188083
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	527540 188083
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	527540 188083
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	527540 188083
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	527540 188083
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	527540 188083
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	527540 188083
	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 (SW)	0	1	527540 188083

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
145	Contemporary Trade Directory Entries Name: Chambers Engineering Location: 312, Archway Road, London, N6 5AT Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned in the proximity of the address	A14NE (E)	956	-	528523 188160
146	Contemporary Trade Directory Entries Name: Naomi Alexander Location: 6, THE BISHOPS AVENUE, EAST FINCHLEY, LONDON, N2 0AN Classification: Picture & Picture Frame Renovating & Restoring Status: Active Positional Accuracy: Automatically positioned to the address	A18NW (N)	984	-	527207 189046
146	Contemporary Trade Directory Entries Name: Picture Restorer & Copier Location: 6, The Bishops Avenue, London, N2 0AN Classification: Picture & Picture Frame Renovating & Restoring Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	984	-	527207 189046
147	Contemporary Trade Directory Entries Name: The Crawford Group Location: 56, Woodside Avenue, London, N6 4ST Classification: Children & Babywear - Manufacturers & Wholesalers Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (NE)	990	-	527956 189002
148	Contemporary Trade Directory Entries Name: British Spirals & Casting Location: 305, Archway Road, LONDON, N6 5AA Classification: Ornamental Metalwork Status: Inactive Positional Accuracy: Automatically positioned to the address	A15NW (E)	991	-	528562 188088
148	Contemporary Trade Directory Entries Name: Tilleys London Castings Location: 305, Archway Road, London, N6 5AA Classification: Metal Workers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A15NW (E)	991	-	528562 188088
149	Contemporary Trade Directory Entries Name: Bonsucro Location: 20, Pond Square, London, N6 6BA Classification: Sugar Refiners & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	993	-	528324 187419
150	Fuel Station Entries Name: Mfg Wellington Location: 513, Archway Road North Hill, Highgate , London, Inner London, N6 4HX Brand: ESSO Premises Type: Petrol Station Status: Open Positional Accuracy: Manually positioned to the address or location	A19SW (NE)	557	-	527905 188520
151	Fuel Station Entries Name: Hexagon Location: 98, Great North Road , East Finchley , London, Inner London, N2 0NL Brand: OBSOLETE Premises Type: Not Applicable Status: Obsolete Positional Accuracy: Located by supplier to within 100m	A18NW (N)	797	-	527476 188909
152	Fuel Station Entries Name: John Nichol Cars Location: 31-33, North Road , Highgate , London, Inner London, N6 4BE Brand: Gulf Premises Type: Petrol Station Status: Open Positional Accuracy: Automatically positioned to the address	A9NE (SE)	853	-	528290 187611
153	Fuel Station Entries Name: Cherry Tree Hill Service Station Location: 411, Great North Road , East Finchley , London, Outer London, N2 0NR Brand: Obsolete Premises Type: Not Applicable Status: Obsolete Positional Accuracy: Automatically positioned to the address	A18NW (N)	913	-	527324 189005

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
154	Points of Interest - Commercial Services Name: Lyras Maritime Ltd Location: 17 Sheldon Avenue, London, N6 4JS Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SW (SW)	271	10	527385 187845
155	Points of Interest - Commercial Services Name: Maple Surveys Location: Flat 1 Highcroft, North Hill, London, N6 4RD Category: Recycling Services Class Code: Recycling, Reclamation and Disposal Positional Accuracy: Positioned to address or location	A14NW (E)	527	10	528078 188218
156	Points of Interest - Commercial Services Name: Mfg Wellington Location: 513 Archway Road, London, N6 4HX Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A19SW (NE)	557	10	527905 188520
156	Points of Interest - Commercial Services Name: Car Wash Location: 513 Archway Road, London, N6 4HX Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A19SW (NE)	557	10	527905 188520
156	Points of Interest - Commercial Services Name: American Carwash Location: Depot 505-511, Archway Road, Hornsey, London, N6 4HX Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A19SW (NE)	566	10	527955 188490
156	Points of Interest - Commercial Services Name: The Coffee Car Wash Company Location: 505-511 Archway Road, London, N6 4HX Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SW (NE)	566	10	527956 188489
157	Points of Interest - Commercial Services Name: Just Jeeps Location: 440 Archway Road, London, N6 4JH Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A14NE (E)	809	10	528357 188264
158	Points of Interest - Commercial Services Name: Hexagon Classics Location: 82-92 Great North Road, East Finchley, London, N2 0NL Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A18NW (N)	858	10	527428 188966
159	Points of Interest - Commercial Services Name: Tilleys London Castings Location: 305 Archway Road, London, N6 5AA Category: Construction Services Class Code: Metalworkers Including Blacksmiths Positional Accuracy: Positioned to address or location	A15NW (E)	991	10	528562 188088
159	Points of Interest - Commercial Services Name: British Spirals & Casting Location: 305 Archway Road, London, N6 5AA Category: Construction Services Class Code: Metalworkers Including Blacksmiths Positional Accuracy: Positioned to address or location	A15NW (E)	991	10	528562 188088
160	Points of Interest - Education and Health Name: Highgate Hospital Location: 17-19 View Road, Hornsey, London, N6 4DJ Category: Health Practitioners and Establishments Class Code: Hospitals Positional Accuracy: Positioned to address or location	A13SE (E)	244	10	527809 188020
160	Points of Interest - Education and Health Name: London Female & Male Fertility Centre Location: 17 View Road, London, N6 4DJ Category: Health Practitioners and Establishments Class Code: Hospitals Positional Accuracy: Positioned to address or location	A13SE (E)	259	10	527824 188021

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
160	Points of Interest - Education and Health Name: Highgate Hospital Location: 17 View Road, London, N6 4DJ Category: Health Practitioners and Establishments Class Code: Hospitals Positional Accuracy: Positioned to address or location	A13SE (E)	259	10	527824 188021
160	Points of Interest - Education and Health Name: Highgate Private Hospital Location: 17 View Road, London, N6 4DJ Category: Health Practitioners and Establishments Class Code: Hospitals Positional Accuracy: Positioned to address or location	A13SE (E)	259	10	527824 188021
161	Points of Interest - Education and Health Name: Southwood Hospital Location: Southwood Lane, London, N6 5SP Category: Health Practitioners and Establishments Class Code: Hospitals Positional Accuracy: Positioned to address or location	A14SE (E)	896	10	528418 187782
162	Points of Interest - Manufacturing and Production Name: Tanks Location: N6 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A13NW (W)	162	10	527348 188090
162	Points of Interest - Manufacturing and Production Name: Tank Location: N6 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A13NW (W)	170	10	527340 188089
162	Points of Interest - Manufacturing and Production Name: Tank Location: N6 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A13NW (W)	171	10	527339 188086
163	Points of Interest - Manufacturing and Production Name: Shaft Location: N2 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	341	10	527319 188389
164	Points of Interest - Manufacturing and Production Name: Tank Location: N6 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	552	10	528103 188220
165	Points of Interest - Manufacturing and Production Name: Tank Location: N6 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A14NW (E)	626	10	528195 188124
166	Points of Interest - Manufacturing and Production Name: Shaft Location: N6 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to an adjacent address or location	A19SW (NE)	636	10	528062 188478
167	Points of Interest - Manufacturing and Production Name: Tank Location: N2 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A17SE (NW)	784	10	526870 188551
168	Points of Interest - Manufacturing and Production Name: Bizspace Plc Location: 94-96 Great North Road, London, N2 0NL Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to address or location	A18NW (N)	890	10	527392 188994

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
206	Ancient Woodland Name: Queens Wood Reference: 1495755 Area(m ²): 245788.97 Type: Ancient and Semi-Natural Woodland	A19SW (NE)	688	12	528106 188507
207	Ancient Woodland Name: Ken Wood Reference: 1495724 Area(m ²): 94873.71 Type: Ancient and Semi-Natural Woodland	A8SW (S)	918	12	527332 187165
208	Sites of Special Scientific Interest Name: Hampstead Heath Woods Multiple Areas: Y Total Area (m2): 161715.26 Source: Natural England Reference: 1003451 Designation Details: Site Of Special Scientific Interest Designation Date: 18th April 1990 Date Type: Notified	A7NE (SW)	592	12	527181 187593

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
Centre for Ecology and Hydrology	 Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Stantec UK Ltd	



Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	London Borough of Haringey - Planning and Environmental Health 639 High Road, Tottenham, London, N17 8BD	Telephone: 0208 489 5183 Fax: 0208 489 5117 Website: www.haringey.gov.uk
4	London Borough of Barnet - Environmental Health Department Building 4, North London Business Park, Oakleigh Road South, London, N11 1NP	Telephone: 020 8359 2000 Fax: 020 8359 4999 Website: www.barnet.gov.uk
5	Environment Agency - Head Office Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
6	Ordnance Survey Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
7	London Borough of Haringey - Planning Department Civic Centre, 639 High Road, Tottenham, London, N17 8BD	Website: www.haringey.gov.uk
8	London Borough of Barnet - Land Charges The Town Hall, The Burroughs, Hendon, LONDON, NW4 4BQ	Telephone: 0208 3592482 Fax: 0208 3592493 Website: www.barnet.gov.uk
9	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
10	PointX 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
11	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9966 Fax: 0844 844 9951 Email: helpdesk@landmark.co.uk Website: www.landmark.co.uk
12	Natural England County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.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.

Geology 1:50,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	WGR	Worked Ground (Undivided)	Void	Not Supplied - Holocene
	MGR	Made Ground (Undivided)	Artificial Deposit	Not Supplied - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	LOFT	Lowestoft Formation	Diamicton	Not Supplied - Anglian
	DHGR	Dollis Hill Gravel Member	Sand and Gravel	Not Supplied - Cromerian
	STGR	Stanmore Gravel Formation	Sand and Gravel	Not Supplied - Pleistocene

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	CLGB	Claygate Member	Clay, Silt and Sand	Not Supplied - Ypresian
	LC	London Clay Formation	Clay, Silt and Sand	Not Supplied - Ypresian
	BGS	Bagshot Formation	Sand	Not Supplied - Ypresian



GEA

Geology 1:50,000 Maps

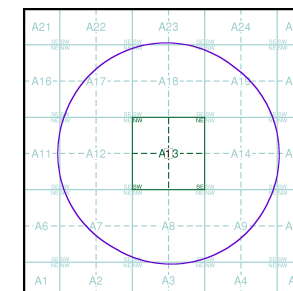
This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.

The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	1
Map Sheet No:	256
Map Name:	North London
Map Date:	2006
Bedrock Geology:	Available
Superficial Geology:	Available
Artificial Geology:	Available
Faults:	Not Supplied
Landslip:	Available
Rock Segments:	Not Supplied

Geology 1:50,000 Maps - Slice A

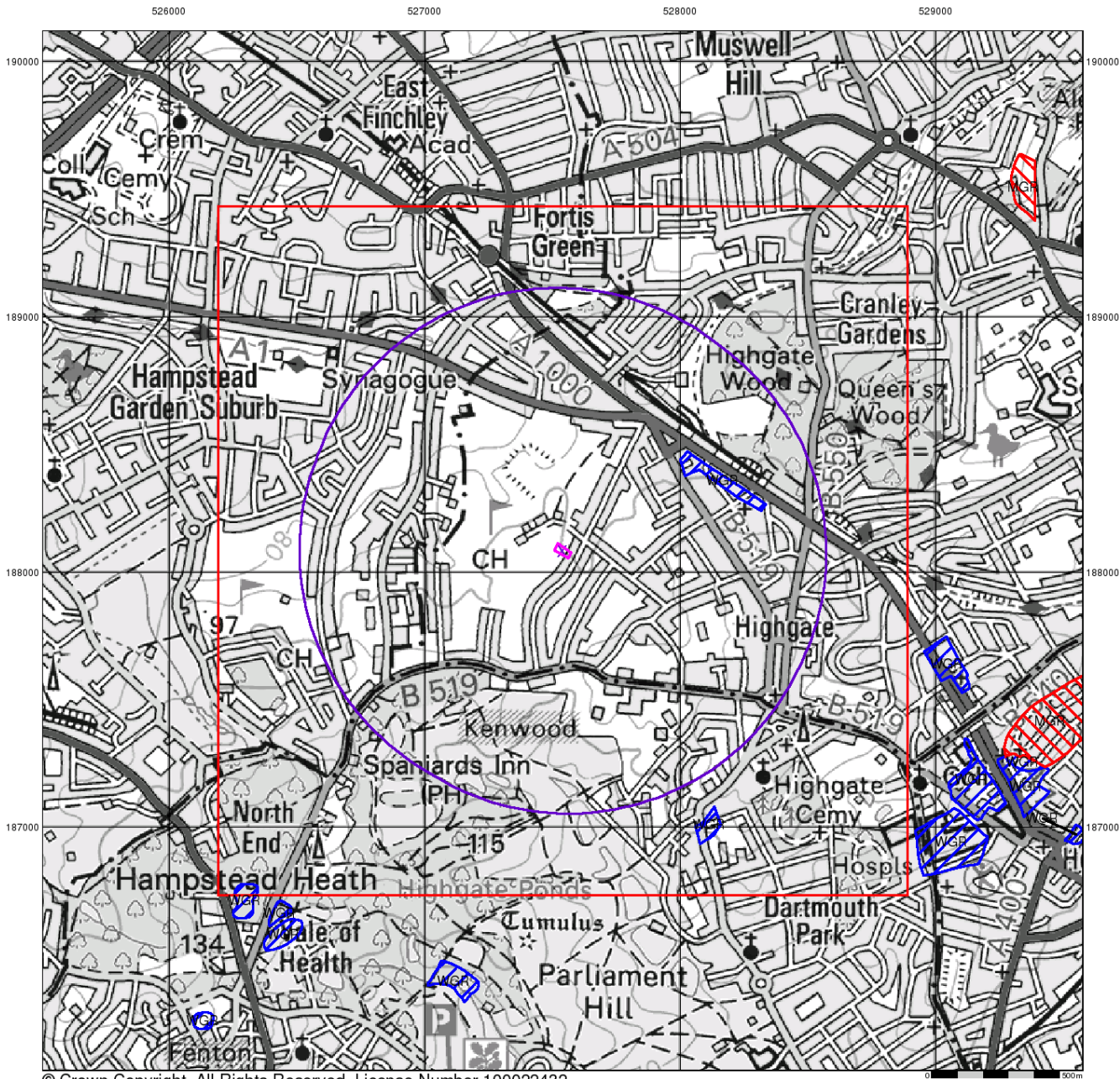


Order Details:

Order Number:	316763849_1_1
Customer Reference:	J23243
National Grid Reference:	527540, 188080
Slice:	A
Site Area (Ha):	0.17
Search Buffer (m):	1000

Site Details:

41, Sheldon Avenue, LONDON, N6 4JP



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Artificial Ground and Landslip

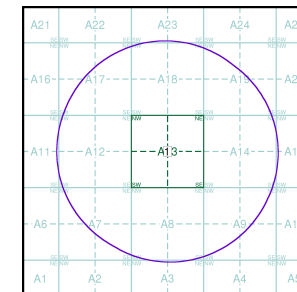
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



Order Details:

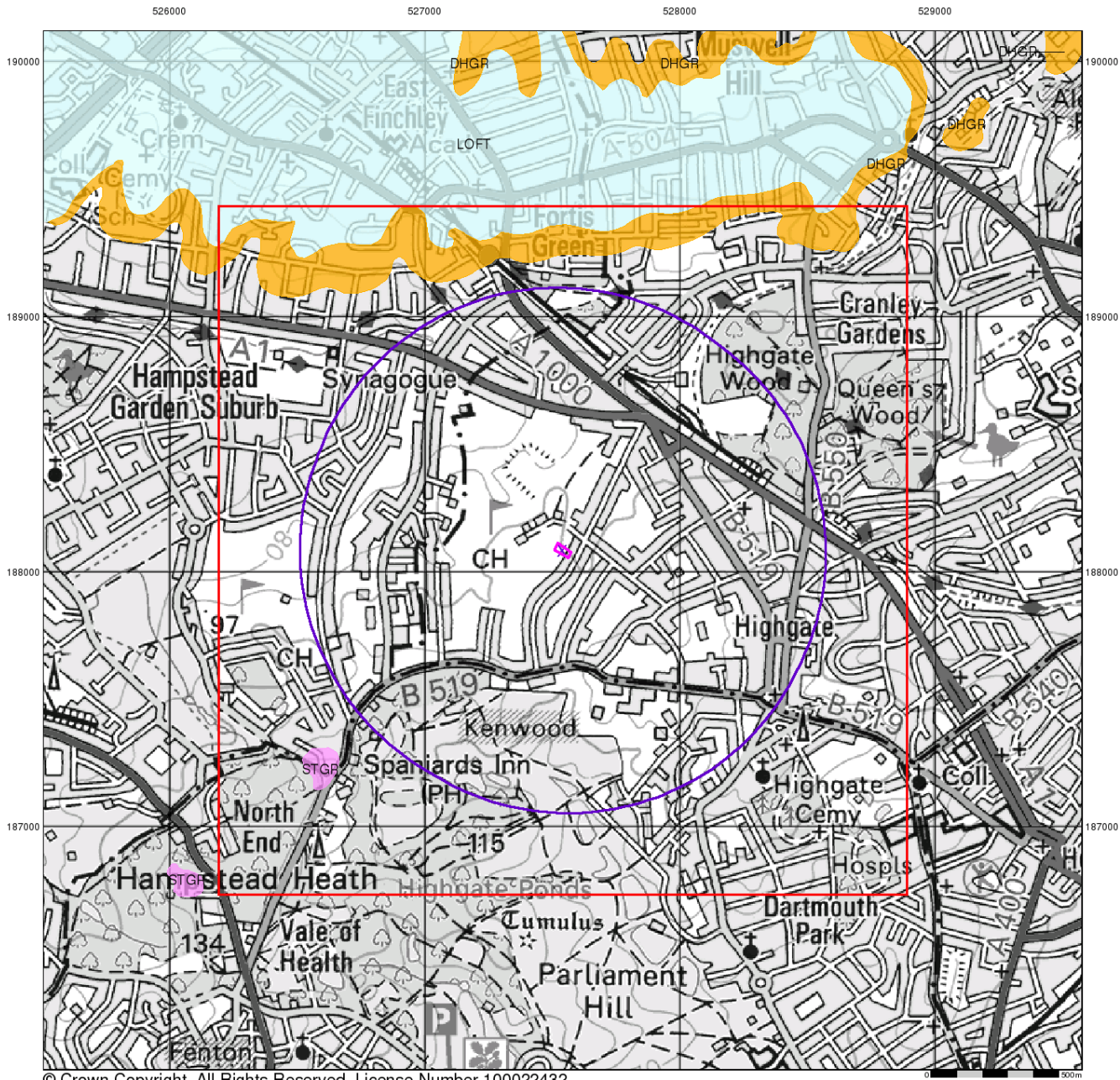
Order Number: 316763849_1_1
 Customer Reference: J23243
 National Grid Reference: 527540, 188080
 Slice: A
 Site Area (Ha): 0.17
 Search Buffer (m): 1000

Site Details:

41, Sheldon Avenue, LONDON, N6 4JP

Landmark
 INFORMATION GROUP

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



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GEA

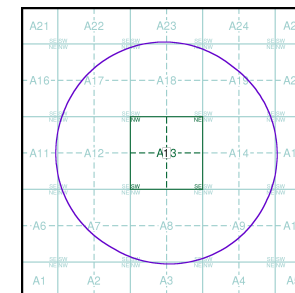
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



Order Details:

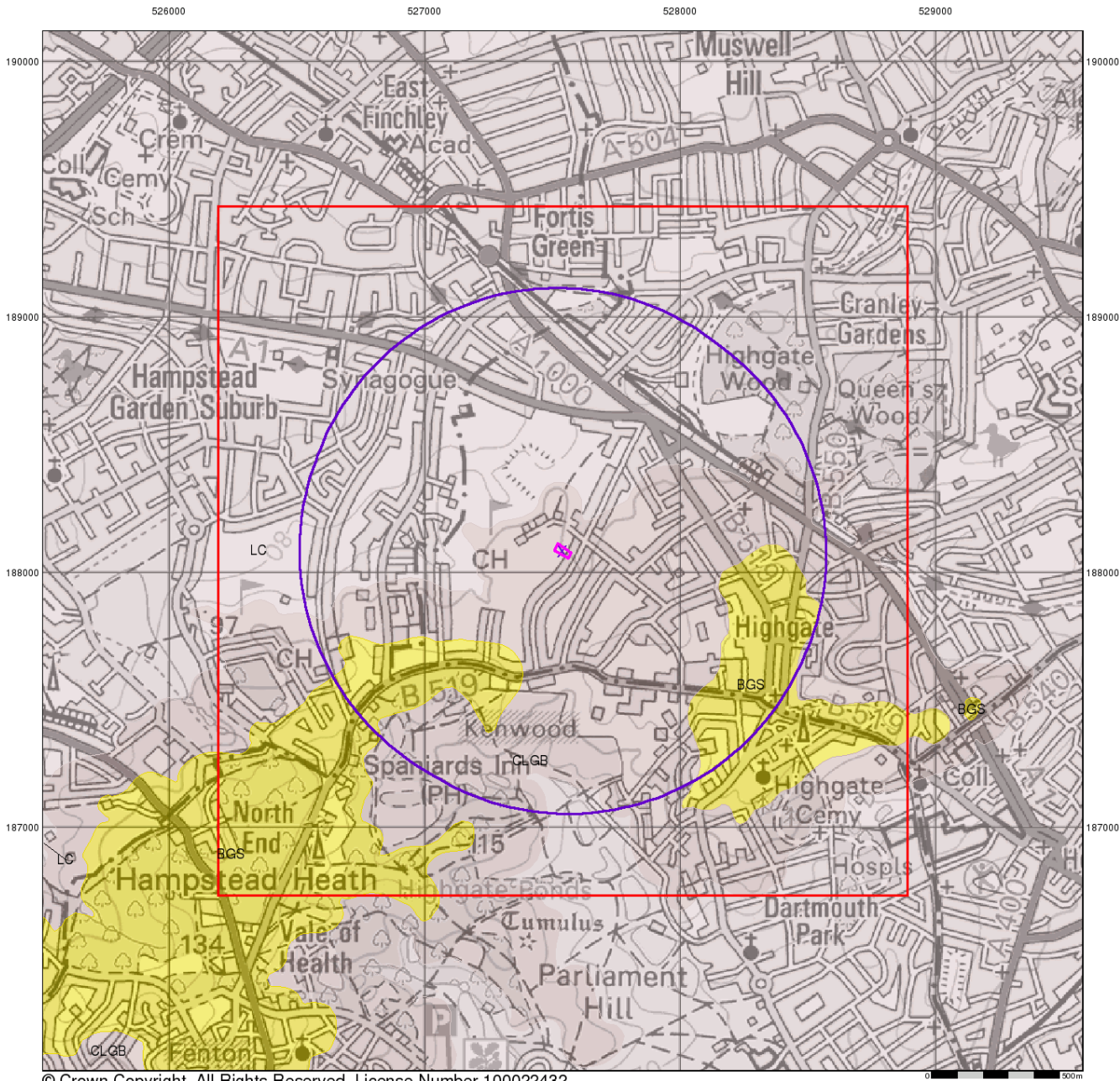
Order Number: 316763849_1_1
Customer Reference: J23243
National Grid Reference: 527540, 188080
Slice: A
Site Area (Ha): 0.17
Search Buffer (m): 1000

Site Details:

41, Sheldon Avenue, LONDON, N6 4JP

Landmark
INFORMATION GROUP

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Bedrock and Faults

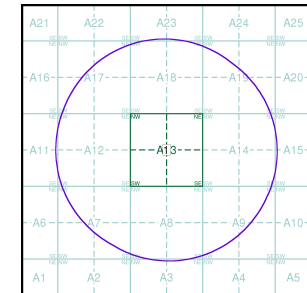
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



Order Details:

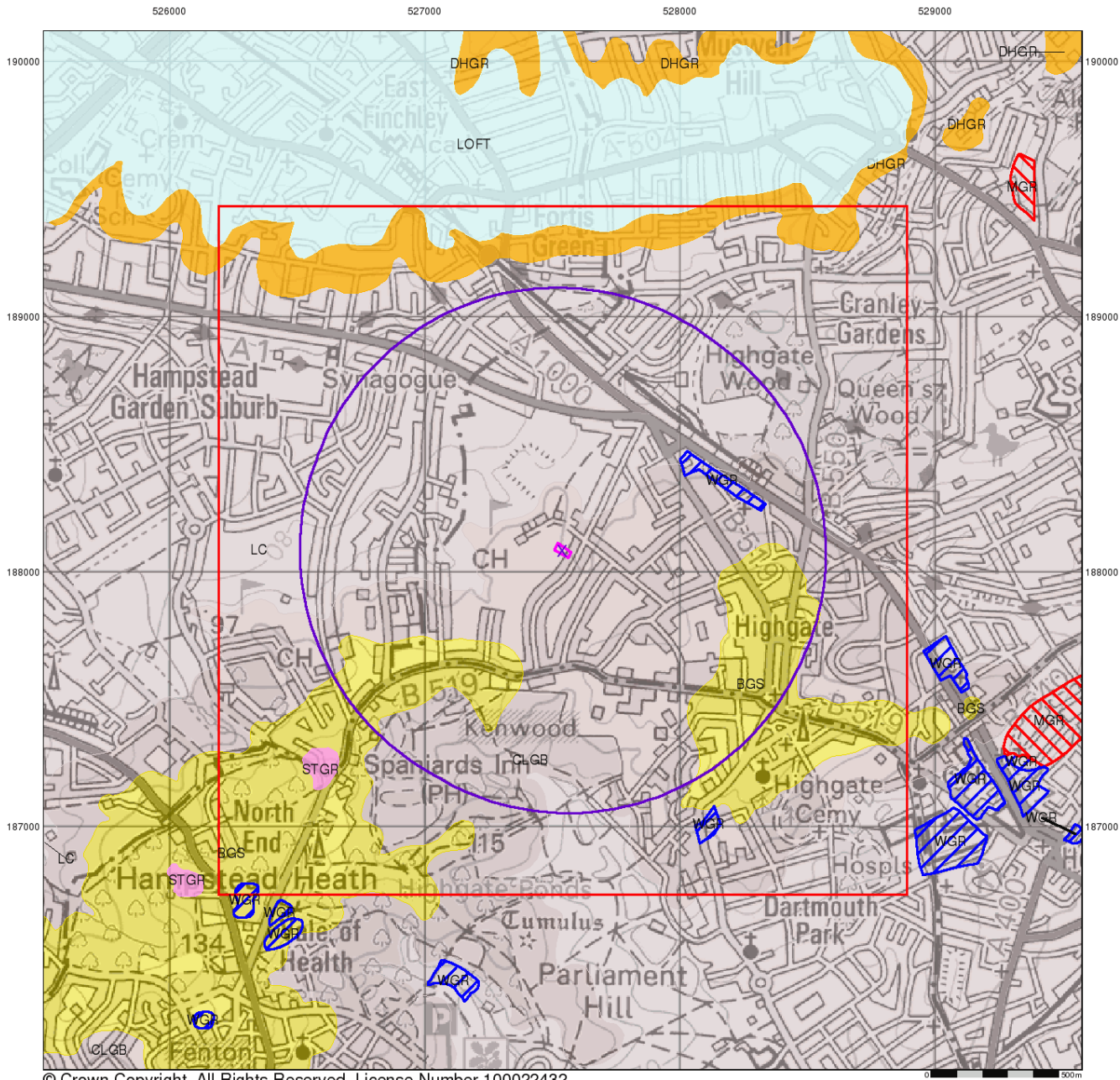
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Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

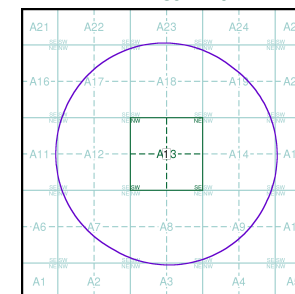
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



Order Details:

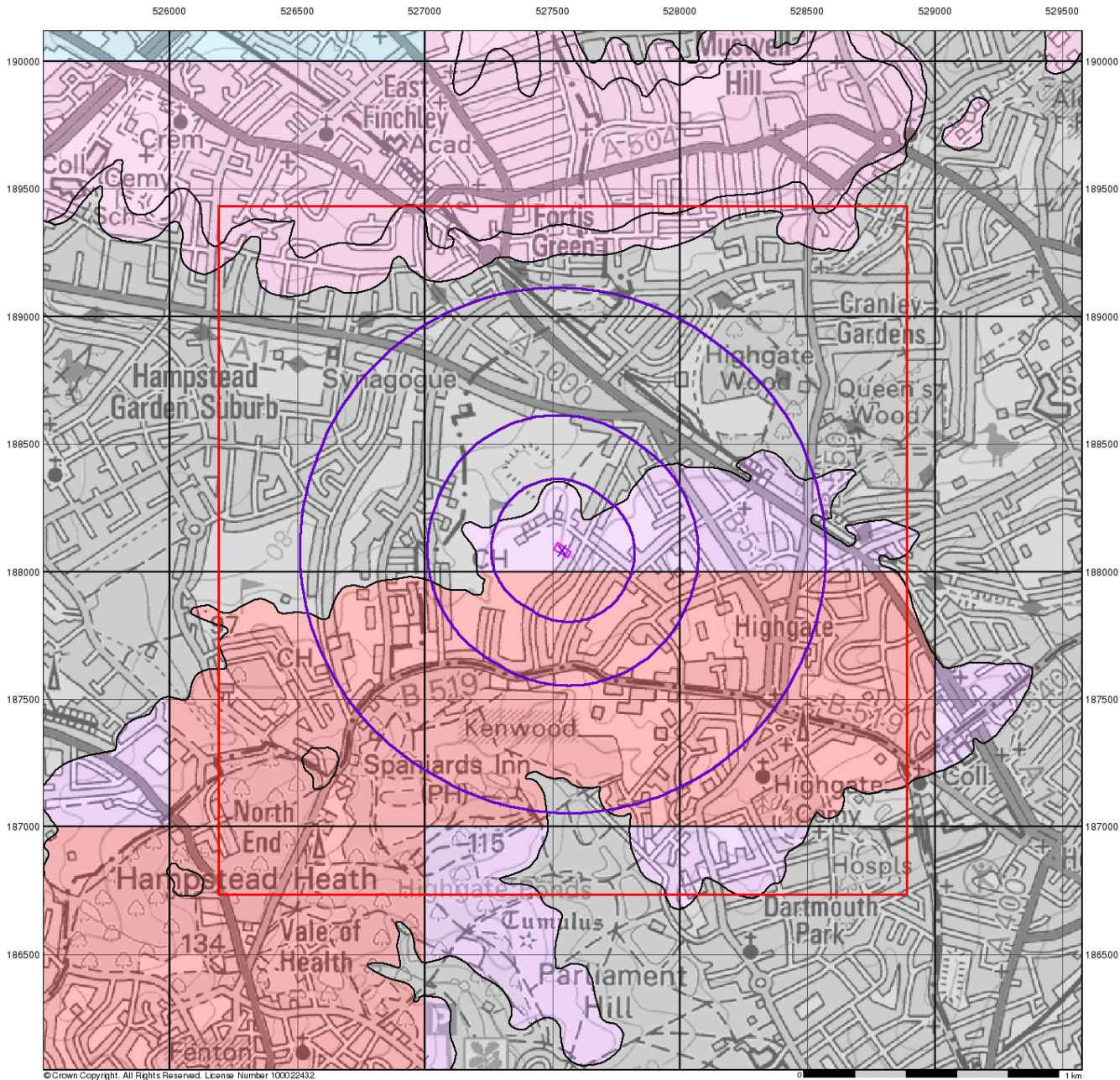
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Groundwater Vulnerability

General

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

Agency and Hydrological

Bedrock Aquifers

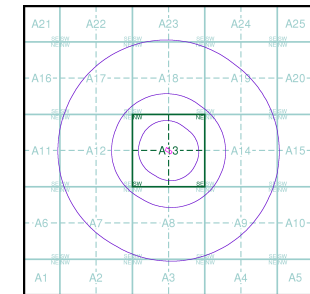
- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

Superficial Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

- Unproductive Aquifer
- Soluble Rock

Site Sensitivity Context Map - Slice A



Order Details

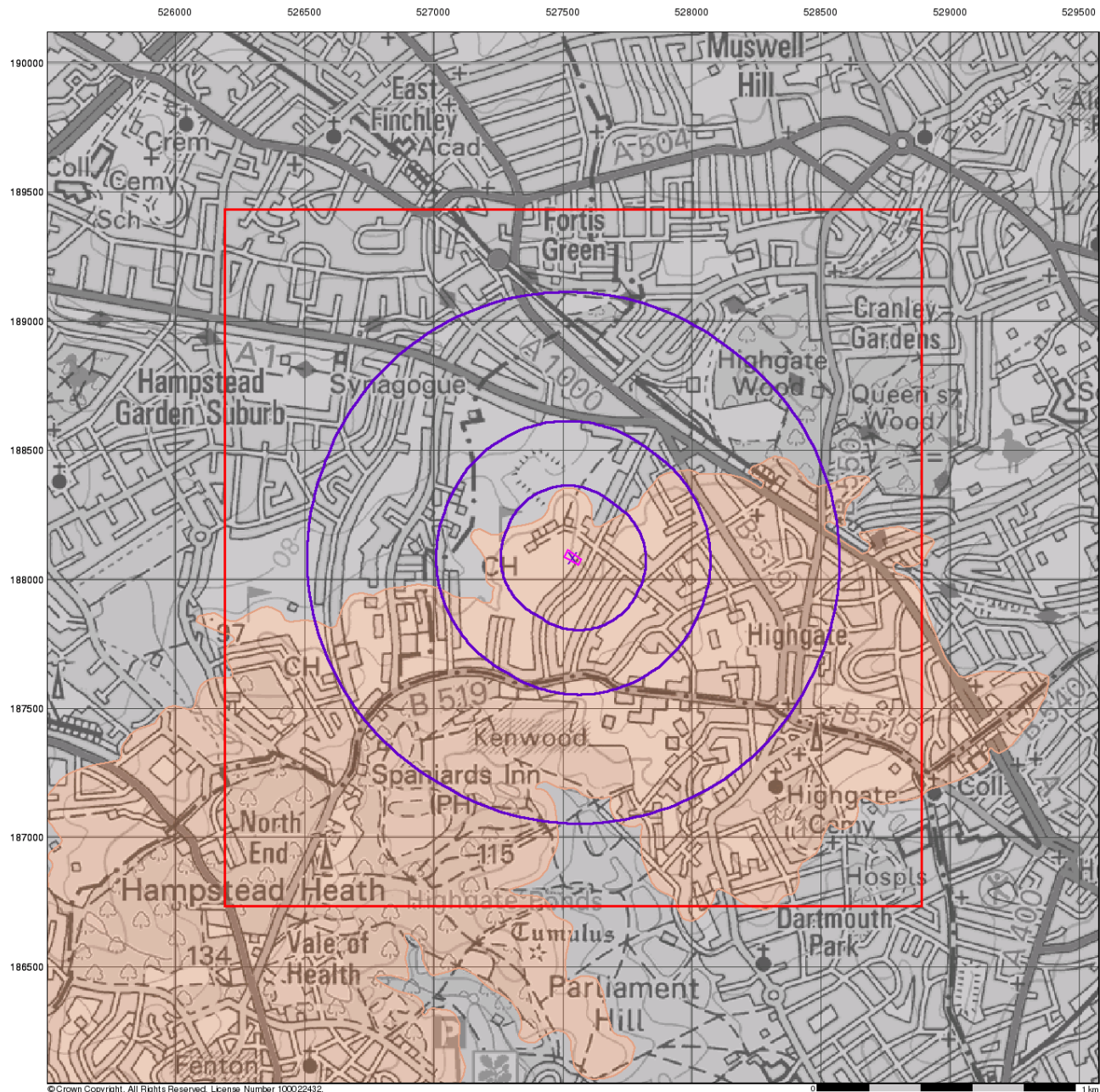
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0 1 km



Bedrock Aquifer Designation

General

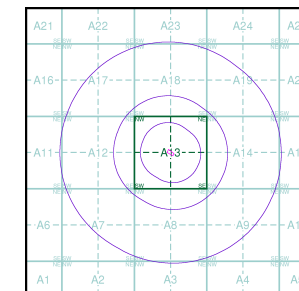
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

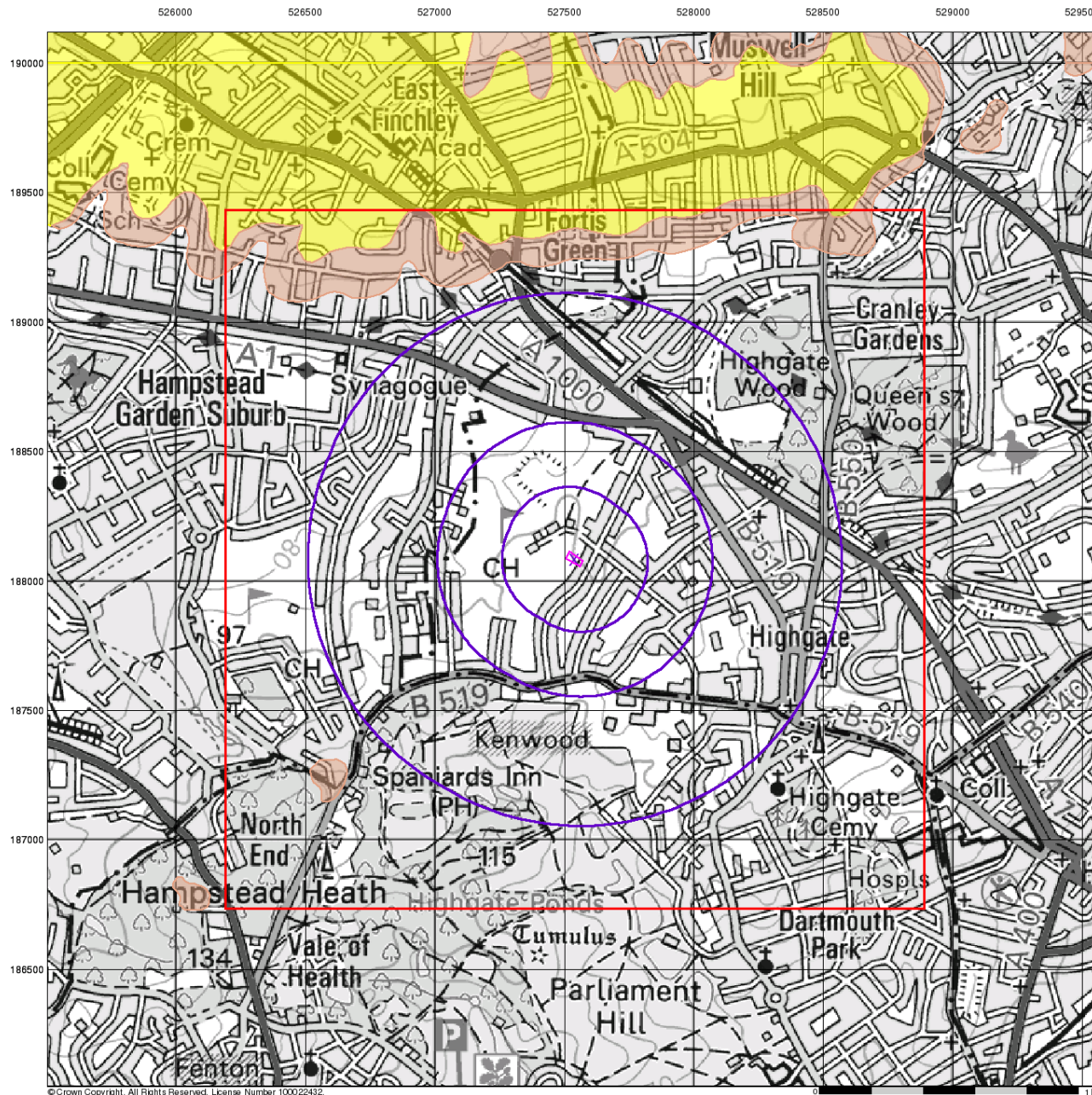
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Superficial Aquifer Designation

General

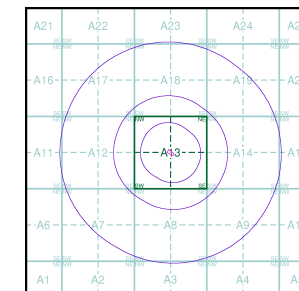
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

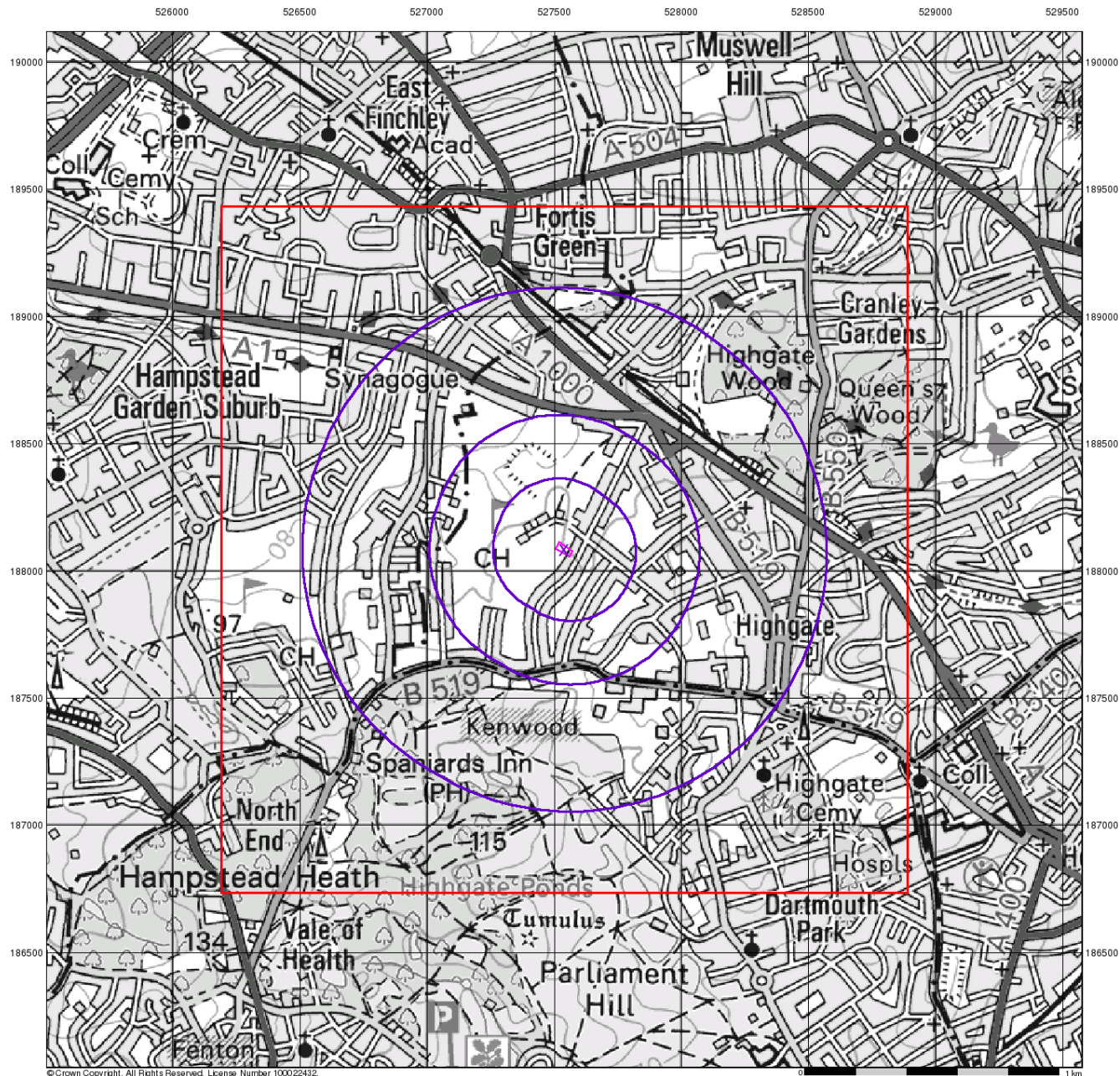
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Source Protection Zones

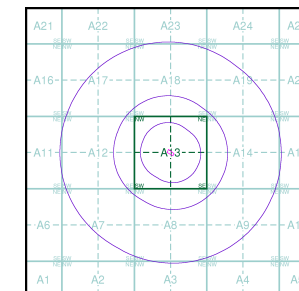
General

- 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)

Site Sensitivity Context Map - Slice A



Order Details

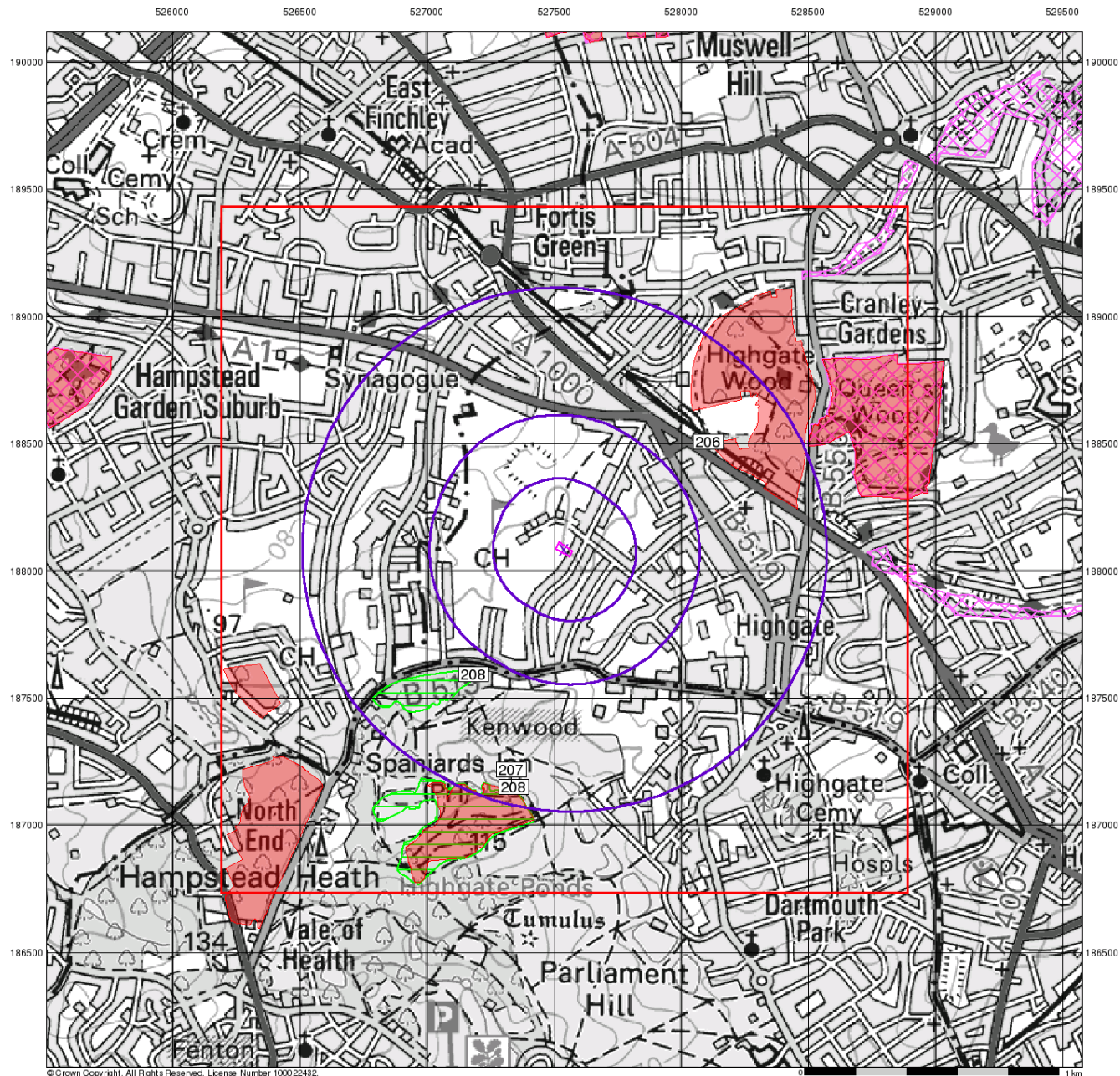
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Sensitive Land Uses

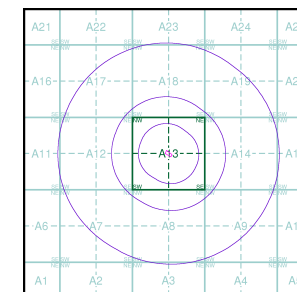
General

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

Sensitive Land Uses

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

Site Sensitivity Context Map - Slice A

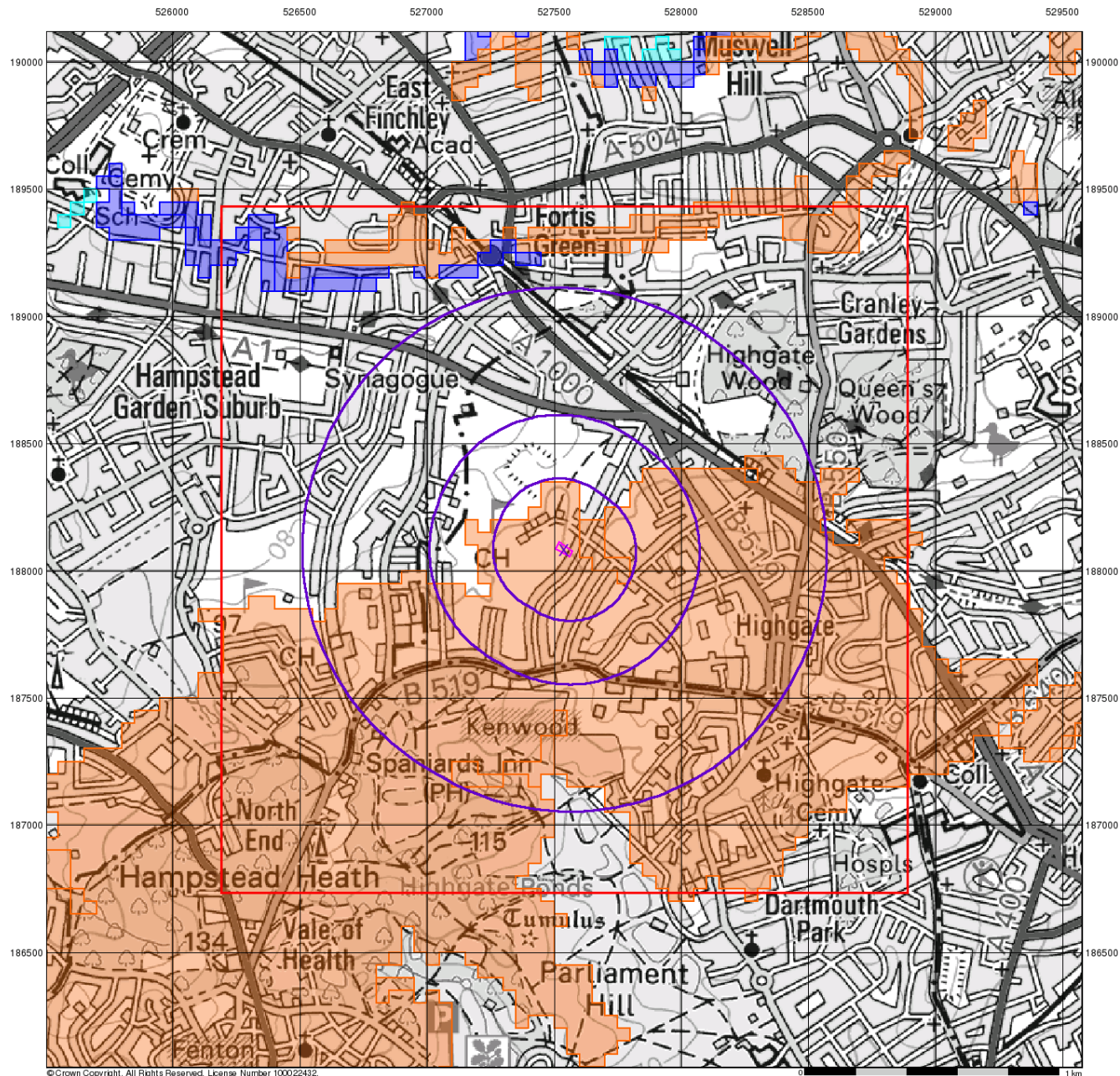


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BGS Flood GFS Data

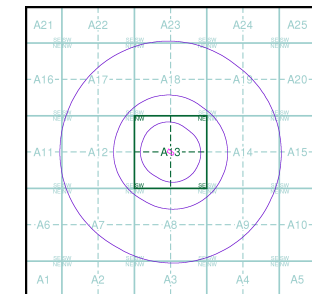
General

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

Agency and Hydrological (Flood)

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

Site Sensitivity Context Map - Slice A



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