19–37 Highgate Road
London
NW5 1NT

Ground Investigation, Basement Impact Assessment & Ground Movement Analysis Report

GM Developments

September 2022

J21343B
Rev 3

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0	Final		27 May 2022	
1	Final	Additional gas monitoring included	6 July 2022	
2	Final	Incorporating highway assessment	1 August 2022	
3	Final	Alterations to scheme	15 September 2022	

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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 ground investigation, basement impact assessment and ground movement analysis carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Engineeria, on behalf of GM Developments, with respect to the redevelopment of the site through demolition of the existing building and subsequent construction of a part five-storey and part seven-storey mixed use building with a single level basement beneath the part of the site. Formation level for the proposed basement is understood to be approximately 3.50 m below existing ground level, at approximately 33.50 m OD. GEA have previously carried out a preliminary basement impact assessment (BIA) for the site (report ref J21343, dated December 2021) to comply with London Borough of Camden Planning Guidance: Basements (CPG, 2021). A Site Investigation Proposal was also completed in conjunction with the BIA to inform the council of the planned investigation (report ref J21343A Rev 1, dated January 2022). Both reports are referred to where appropriate. This report has been revised to incorporate an analysis of the surrounding highways, Highgate Road and Greenwood Place, into the ground movement analysis in accordance with Council requirements.

Previous Desk Study & BIA Findings

The desk study indicates that the site does not have a significantly contaminative history as it has been developed with terraced houses and later with the existing community centre. However, a number of historical potential off-site sources of contamination have been identified, including a timber yard and chemical works, in addition to numerous other industrial buildings, such that a low to moderate risk of contamination has been assessed. The BIA did not indicate any significant concerns with regard to the effects of the proposed basement on the site and surrounding area and it has been concluded that the impacts identified can be mitigated by appropriate design and standard construction practice. A ground movement analysis including building damage assessment has been completed as part of this investigation and is included in Part 3 of this report.

Ground conditions

The expected ground conditions were encountered in that, beneath a variable thickness of made ground, Alluvium is present over the London Clay, which extended to the full depth of the investigation, of 30.00 m (6.70 m OD). The made ground typically comprised brown sandy clay to clayey sand with variable amounts of gravel, roots, rootlets and fragments of extraneous material and extended to depths of between 0.80 m (35.90 m OD) and 1.20 m (35.77 m OD) on the lower level to the northwest, and to depths of between 1.50 m (36.00 m OD) and 2.50 m (35.00 m OD) from the upper level to the southeast. The underlying soil, interpreted as Alluvium, consisted of soft becoming firm low strength brown mottled grey sandy gravelly clay with roots and rootlets and extended to depths of between 2.50 m (34.47 m OD) and 3.60 m (33.10 m OD). In Borehole No 3, advanced close to trees, the Alluvium was observed to be desiccated to a depth of 2.50 m (34.47 m OD). The London Clay comprised an initial weathered horizon of firm becoming stiff fissured brown mottled grey silty clay with claystones, sandy partings and fine mica to a depth of 6.00 m (30.70 m OD). This was underlain by stiff fissured dark brownish grey silty clay with claystones and sandy partings which extended to the full depth of the investigation, of 30.00 m (6.70 m OD).

Groundwater was encountered as seepages within the made ground at depths of between 1.10 m (35.60 m OD) and 1.30 m (36.20 m OD), within the Alluvium at depths of between 2.00 m (35.50 m OD) and 3.50 m (33.20 m OD) and within the London Clay at depths of 3.90 m (32.80 m OD) and 4.30 m (32.40 m OD) during drilling. Ten standpipes were installed to depths of between 0.90 m (35.86 m OD) and 5.00 m (31.70 m OD), mostly targeting the made ground or Alluvium as detailed on the logs appended, and groundwater has been measured at depths of between 1.07 m (35.63 m OD) and 1.77 m (35.73 m OD) over a period of six months. The groundwater measured is likely to be associated with perched water within the made ground, Alluvium or silty or sandy portions of the London Clay draining into the standpipes and trapped by the surrounding lower permeability soils, rather than a continuous water table.

Asbestos fibres and fragments of asbestos-containing material (ACM) have been identified in the made ground in six locations across the northwestern part of the site. Elevated concentrations of lead have been measured in eight samples of made ground and elevated concentrations of PAH compounds were recorded in three samples of made ground. Seven rounds of gas monitoring carried out over a period of six months has not measured any elevated concentrations of ground gas or hydrocarbon vapour.

Recommendations

Formation level of the proposed basement will be within the soft gravelly clay of the Alluvium or the stiff London Clay. Excavations for the proposed basement structure will require temporary support to maintain stability and to prevent any excessive ground movements. A contiguous piled wall is understood to be the preferred method of retaining the basement excavation whilst piled foundations will be used to support the superstructure. The contiguous piled walls will not be propped in the temporary condition and will therefore be cantilevered. Significant groundwater flows are not anticipated within the excavation, although localised inflows are likely to be encountered within the made ground and granular horizons within the Alluvium. Suspended floor slabs will be required to account for heave from the underlying cohesive soils and as a result of the removal of a number of trees within the zone of influence. The proposed use of piles extending into the London Clay to support the new building will also be suitable. Site workers should adopt suitable precautions when handling soil and areas of new soft landscaping will need to be formed with a clean cover system, or raised planters filled with imported soils certified as clean. Ground gas or vapour protection measures are not considered to be required.

Basement Impact Assessment

The BIA has not indicated any concerns with regard to the effects of the proposed basement on the site and surrounding area. It has been concluded that the impacts identified can be mitigated by appropriate design and standard construction practice.

Ground Movement Analysis Conclusions

The analysis has concluded that the predicted damage to the neighbouring properties from the construction of the proposed basements would be 'Negligible'. Negligible movements of less than 5 mm are also anticipated for the surrounding highways. On this basis, the damage that has been predicted to occur as a result of the construction the proposed basement falls within the limits acceptable to the London Borough of Camden assuming that the careful control is taken during construction of the proposed excavations, and monitoring will be required to ensure that no excessive movements occur that would lead to damage in excess of these limits. The basement floor slabs will need to be suspended, unless they can be suitably reinforced to cope with anticipated heave movements.

Part 1: Investigation Report

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

1.0 Introduction

Geotechnical and Environmental Associates Limited (GEA) has been commissioned by Engineeria, on behalf of GM Developments, to carry out a desk study, ground investigation and ground movement analysis at 19-37 Highgate Road, London NW5 1NT. This report also forms part of a Basement Impact Assessment (BIA), which has been carried out in accordance with guidelines from the London Borough of Camden (LBC) in support of a planning application.

The following reports have previously been prepared for the site by GEA;

- Desk Study for a wider area incorporating the proposal site, Report ref J10098 Issue 2, dated June 2010;
- Desk Study and Basement Impact Assessment (BIA) Report ref J21343 Rev 1, dated 21 March 2022; and
- Site Investigation Proposals Report ref J21343A Rev 1, dated 31 January 2022.

Additionally, a preliminary land quality statement report, including the findings of a ground investigation carried out by Ground Engineering Ltd, has also been completed for the same wider site by Campbell Reith (report ref EJBsrm-11167-230813-LQS-F2, dated September 2013). This report is referred to where appropriate.

This report includes an analysis of the highway, Highgate Road, into the ground movement analysis in accordance with Council requirements.

A Thames Water sewer is known to be present adjacent to the north of the site and the client contacted Thames Water to discuss requirements. Thames Water have applied an exclusion zone to the asset and the consulting engineers have issued drawings demonstrating how piling works will remain outside of the exclusion zone, and Thames Water subsequently issued a Permission to Start letter (ref DS4113572, dated 25 July 2022). A requirement for a Thames Water assessment analysing the impact of the proposed development on the sewer was not specified and is not therefore required.

1.1 Proposed Development

It is understood that it is proposed to demolish the existing building and to subsequently construct a part five-storey and part seven-storey mixed use building with a single level basement in the centre of the site. Formation level for the proposed basement is understood to be approximately 3 m below existing ground level (at roughly 33.50 m OD).

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

Above: cross section through the proposed development.(drawing ref HR-AHR-B1-ZZ-DR-A-20-311/C1/S1, dated March 2022)

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 UXO;

- to determine the ground conditions and their engineering properties;
- to use the above information to provide recommendations with respect to the design of suitable foundations and retaining walls;
- to assess the impact of the proposed basement on the local hydrogeology, hydrology and stability of the surrounding natural and build environment;
- 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, the previous desk study was reviewed, 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;
- a review of readily available geology maps;
- a preliminary UXO risk assessment;
- a walkover survey of the site carried out in conjunction with the fieldwork; and
- a review of the previous GEA basement impact assessment and ground investigation report of the nearby site.

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

- a single borehole advanced to a depth of 30.00 m by a cable percussion rig;
- a total of 15 opendrive and window sampler boreholes advanced to depths of between 2.00 m and 5.45 m over two separate phases;
- standard penetration tests (SPTs) carried out at regular intervals within the boreholes to provide quantitative data on the strength of the soils;
- installation of ten gas and groundwater monitoring standpipes and a monitoring programme comprising seven visits over a period of six months;
- 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 8 October 2020. 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.

1.3.1 Basement Impact Assessment

The work carried out includes a Hydrological and Hydrogeological Assessment and Land Stability Assessment (also referred to as Slope Stability Assessment). These assessments form part of the BIA procedure specified in the London Borough of Camden (LBC) Planning Guidance CPG[2] and their Guidance for Subterranean Development[3] prepared by Arup (the

1 https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
2 London Borough of Camden Planning Guidance CPG (January 2021) *Basements*
3 Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development.* For London Borough of Camden November 2010

"Arup report") in accordance with Policy A5 of the Camden Local Plan 2017. The aim of the work is to provide information on surface water, groundwater and land stability and in particular to assess whether the development will affect neighbouring properties or groundwater movements and whether any identified impacts can be appropriately mitigated by the design of the development.

1.3.2 Qualifications

The land stability element of the Basement Impact Assessment (BIA) has been carried out by Martin Cooper, a BEng in Civil Engineering, a chartered engineer (CEng), member of the Institution of Civil Engineers (MICE), and Fellow of the Geological Society (FGS) who has over 20 years' specialist experience in ground engineering. The subterranean (groundwater) flow assessment has been carried out by John Evans, MSc in Hydrogeology, Chartered Geologist (CGeol) and Fellow of the Geological Society of London (FGS). The surface water and flooding assessment has been carried out by Rupert Evans, a hydrologist with more than ten years consultancy experience in flood risk assessment, surface water drainage schemes and hydrology / hydraulic modelling. Rupert Evans is a Chartered Environmentalist, Chartered Water and Environmental Manager and a Member of CIWEM.

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

All assessors meet the qualification requirements of the Council guidance.

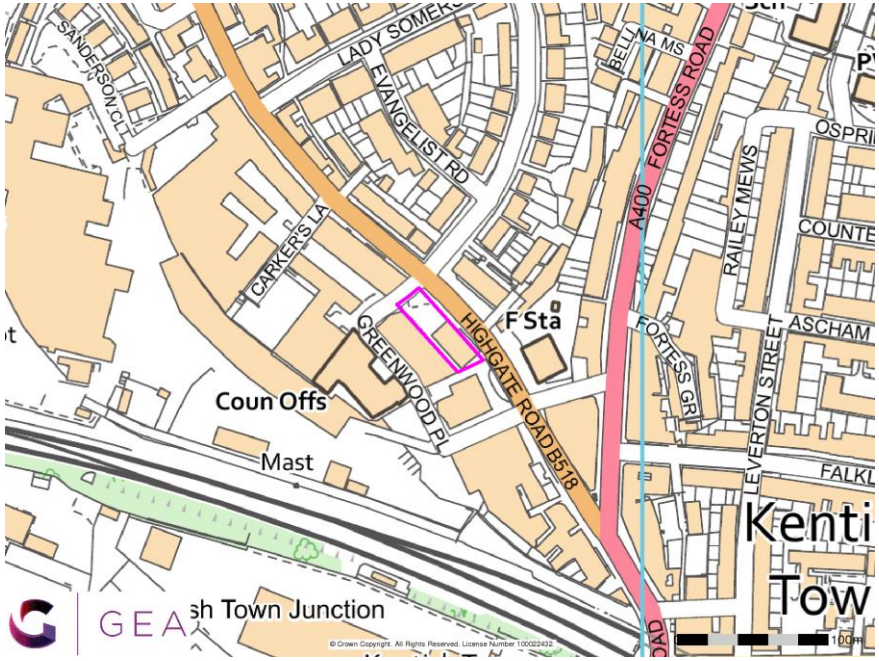
1.4 Limitations

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

2.0 The Site

2.1 Site Description

The site is located in the London Borough of Camden, approximately 200 m to the northwest of Kentish Town railway and London Underground station. It is accessed off Greenwood Place to the northwest and is bounded by Highgate Road to the northeast, by the Christ Apostolic Church to the southeast and by a part single-storey, part two-storey self-storage warehouse to the southwest (No 19 Greenwood Place). The site may additionally be located by National Grid Reference 528871, 185418 and is shown on the map extract below.



A walkover of the site was carried out by a geotechnical engineer from GEA on 24th November 2021 and again during the various phases of site work. It is approximately rectangular in shape, measuring roughly 60 m northwest to southeast by 20 m northeast to southwest. The site is occupied by a two-storey community centre in the southeastern

portion, with a tarmac parking area and small soft landscaped area in the northwest. The car park is roughly 1 m lower than the surrounding roads, suggesting the levels on site have been reduced at some time, and the northeastern boundary is supported by a brick retaining wall. A narrow paved courtyard is located at the rear of the building in the southeastern end of the site, which is at an elevation of approximately 1 m above the rest of the site, such that the community centre stretches across both levels. At the time of a second phase of site work, carried out in March 2022, the site was vacant. The building was being demolished at the time of the most recent return monitoring visit carried out in May 2022.

Trees are located in the northern corner and along the northeastern boundary of the site and, according to an arboricultural development statement (ref CBA11577 v1, dated November 2021, created by CBA Trees and provided by the client), species including maple, laurel, eucalyptus, cotoneaster, laburnum and cherry that range in height between 4 m and 9 m high.

2.2 Previous Desk Study Findings

2.2.1 Site History

The earliest map studied, dated 1871, shows the site to be developed with terraced housing fronting onto Highgate Road; the remainder of the site appeared to comprise gardens associated with these houses. The church that adjoins the site to the southeast and Greenwood Place had both been established by this time. A number of railway lines and associated sidings had been built as close as 70 m to the south and southwest of the site, with a large structure comprising the 'Kentish Town Sheds' located approximately 175 m to the west of the site. At some time between 1873 and 1879, two factory buildings, referred to as bottling stores, were constructed 50 m to the west and 90 m northwest of the site. A coal shed was located approximately 100 m to the southwest of the site on railway land.

The site and surrounding area remained essentially unaltered until sometime between 1896 and 1915, when the bottling store had been extended to within 30 m of the southwest of the site. The terraced houses fronting onto Highgate Road were still present, although a large rectangular warehouse had been constructed adjacent to the southwest of the site, on the garden area of a number of the houses. The terraced housing, formerly present adjacent to the northwest of the site, had also been demolished over the same period, with this area now occupied by two long rectangular buildings understood to have been used as a warehouse and depository respectively. Further works buildings were also present approximately 90 m to the northwest of the site.

Kentish Town Sheds expanded over the period between 1896 and 1915 to cover a large area of previously undeveloped land to the northwest of the site, situated between the railway and properties fronting onto Highgate Road. These storage and maintenance sheds, along with the associated sidings, remained essentially unaltered until some time between 1954 and 1968 when the railway sidings were removed, and the former railway sheds were shown as being used as a civil engineering depot. The depot remains in use to the present day and is currently occupied by the Murphy Group.

Goad insurance plans dated 1930 show that the bottling stores, which occupied much of the area to the southwest, were owned and operated by Read Bros Ltd and used as an ale store. The rectangular warehouse immediately to the southeast of the site is labelled as a timber store, including timber yard, saw mill and a fuel store, later labelled as a coke store. These buildings were owned by Maple & Co Ltd, who also owned the warehouse building fronting onto Highgate Road and the adjacent depository building immediately to the northwest of the site. At that time, the buildings were used as a cabinet and joinery works and furniture store respectively. A builder's yard, office and stores were also located 60 m to the south of the site, and further industrial buildings were located to the north including a paint shop, garages and oil fuel tanks.

World War II bomb damage maps do not indicate the site to have been damaged, but the warehouse and depository buildings immediately to the northwest of the site were seriously damaged. Both buildings were subsequently repaired. A terraced house to the northwest of the site also suffered general blast damage. Further information is included in the following Section 2.3 and associated Preliminary UXO Risk Assessment appended.

Subsequent plans from 1957 show that the bottling stores to the southwest were owned by Imperial Chemical Industries (ICI) Ltd. Whilst the exact use of these buildings is not known, ICI was involved in the production of chemicals, explosives, fertilisers, insecticides, dyestuffs, non-ferrous metals, fabrics and paints, as well as the development and production of pharmaceuticals. However, the former bottling stores remained listed throughout this period as warehouses and are therefore unlikely to have been involved in any form of production. A small garage was constructed during this time in the loading area of the ICI compound, approximately 35 m to the southwest, although it is not known if this comprised a vehicle servicing and maintenance garage or a lock up garage.

The site remained essentially unaltered until some time between 1974 and 1979, when the terraced houses fronting onto Highgate Road were demolished and replaced with the existing irregular shaped building, later referred to as a day centre, with the adjoining car park in the northwest. The site has since remained unchanged. The rectangular warehouse

building adjacent to the southwest of the site had been extended in a southeasterly direction over the same period, and the former bottling store building was redeveloped with the existing Greenwood Centre, now also in use as a day centre.

2.2.2 Other Information

The previous desk study indicated that there are no active or historical landfill sites located within 1 km of the site. There are waste management and waste treatment or disposal sites located 260 m and 300 m to the southwest respectively. However, these sites are unlikely to have any adverse effect on the site given the relative distances from the site.

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

There are a number of Local Authority Pollution Prevention and Control (LAPPC) authorisations within 250 m of the site, the closet of which relates to a dry cleaners located approximately 110 m to the east of the site. The dry cleaners is unlikely to have affected the site at this distance. The report also indicates that there are no pollution incidents to controlled waters within 1 km of the site.

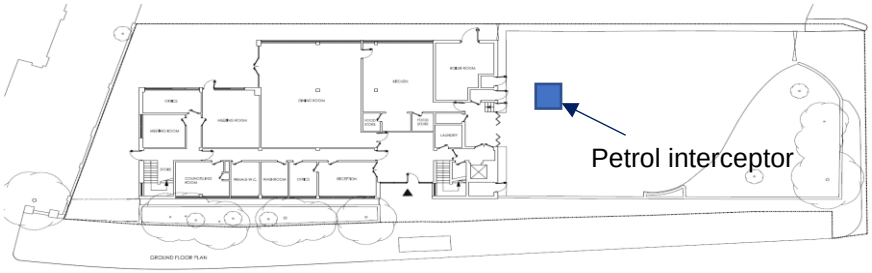
The site is not located in an area liable to flooding from rivers or the sea without defence, as defined by the Environment Agency.

A Preliminary UXO Risk Assessment has previously been completed by 1st Line Defence (report ref PA14695-00, dated November 2021), and a copy of the report is included in the appendix. During World War II (WWII) the site was located within the Metropolitan Borough of St Pancras which sustained a very high bombing density according to official statistics. London Bomb Census mapping recorded a bomb on the southwestern boundary of the site, while an incendiary shower was recorded over the entire area. However, only a single property recorded general blast damage and no other signs of damage were noted. Given the limited damage recorded, it is likely the majority of the properties would have remained occupied, increasing the likelihood of UXO being noticed and reported. On this basis, the report concludes that the risk of encountering UXO is not thought to be elevated higher than background levels for the region and as such, no further work was recommended in this respect.

2.2.3 Petrol Interceptor

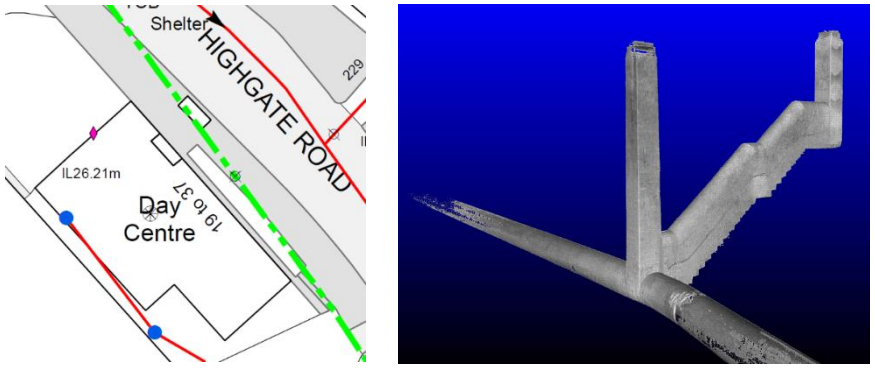
A search of information held by the local petroleum officer was previously undertaken as part of the aforementioned Campbell Reith investigation, but no records were found. A CCTV survey (report ref 29903, dated 17 November 2021, created by Amber Group and provided by the consulting engineers) identified the presence of a petrol interceptor within the car park close to the north-western elevation of the building. The report indicates the chamber to be 2 m deep. The interceptor has subsequently been opened, revealing it to be of masonry construction and to be partially filled with an unknown liquid, possibly petrol, as shown in the adjacent photograph. The client has indicated that the tank will be removed from site and it is proposed to provide site supervision, including sampling and testing for the presence of contamination, to verify removal.

(Left) interceptor cover to rear of building and (right) liquid inside interceptor. (Below) site plan indicating the approximate location of the petrol interceptor on site.



2.2.4 Thames Water Assets

A Thames Water asset runs beneath the footpath adjacent to the northeast side of the site. A line and level survey of the sewer has been carried out by Infotec and the plan has been provided by the consulting engineers (drawing ref INF-5247-D01, dated 12 May 2022). The plan refers to the sewer as the Fleet Storm Water Relief Sewer (main line) suggesting that it represents the culverted River Fleet. The survey indicates the sewer to be of brick construction and to be 1219 mm in diameter, with an invert level of 26.35 m OD in the north and sloping down to 25.67 m OD in the south, which correlates to a depth of approximately 11 m below ground level at the closest point on site. Two vent / access shafts are present beneath manholes on either side of Highgate Road to the north of the site and are connected by a brick stepped tunnel. The approximate alignment of the main is shown in green on the extract from the Thames Water plan included below and the line and level survey is appended. An analysis of the effects of the proposed development on the asset was not required by Thames Water who have instead applied an exclusion zone, which the consulting engineers have confirmed will be adhered to via their drawings.



(Left) *Extract from the Thames Water utility plan showing the approximate location of the Thames Water sewer adjacent to the north of the site. (Right) Extract from the Infotec plan showing the Lidar image of the sewer and two shafts either side of Highgate road to the north of the site.*

2.2.5 Geology

The Geological Survey map of the area (BGS sheet 256) indicates that the site is underlain by the London Clay Formation. Areas of Head Propensity, defined as areas most likely to be covered by Quaternary head deposits, are present approximately to the northeast. Additionally, as the site is understood to be over the approximate route of a former tributary of the Fleet River, Alluvium and an increased thickness of made ground may also be present beneath the site. The map also indicates the presence of areas of worked ground less than 60 m to the west.

According to the BGS memoir, the London Clay is homogenous, slightly calcareous silty clay to very silty clay, with some beds of clayey silt grading to silty fine-grained sand. If Alluvium is present on the site, the BGS memoir suggests it is likely to comprise a combination of clay, silt, sand and gravel.

The aforementioned Campbell Reith investigation found that, beneath a moderate to significant thickness of made ground and a localised layer of Alluvium, London Clay was encountered and proved to the full depth of the investigation. The made ground comprised brown clayey gravelly sand to sandy gravelly clay with fragments of extraneous material, roots and rootlets, and extended to depths of between 1.10 m (36.40 m OD) and 2.40 m (34.50 m OD). The Alluvium was only encountered in a single borehole at the northern end of the site and comprised firm becoming stiff brown gravelly clay to a depth of 3.15 m (33.75 m OD). The made ground is also noted as being alluvial in nature and it is likely that Alluvium has been reworked into made ground. The underlying London Clay was noted to initially be reworked to depths of between 2.10 m (32.40 m OD) and 4.15 m (34.60 m OD), beneath which it comprised medium to extremely high strength firm becoming stiff and very stiff fissured brown becoming greyish brown silty clay with selenite crystals and silt partings to the full depth investigated, of 35.00 m (1.90 m OD). Desiccation was observed within the shallow soils to a maximum depth of 1.20 m (36.30 m OD).

GEA has previously carried out a ground investigation on the other side of Highgate Road to the northeast of the site, where the ground conditions encountered comprised a generally moderate, but apparently locally significant, thickness of made ground over London Clay, which extended to the full depth investigated, of 15.00 m. The made ground extended to depths of between 0.30 m and 1.40 m, with the exception of Borehole No 2, where it extended to 3.90 m and was presumably associated with a 4 m deep sewer that passed through the site. The underlying London Clay initially comprised soft orange-brown mottled grey sandy occasionally gravelly clay in the trial pits and became firm and stiff fissured high strength brown mottled grey, then grey fissured high strength silty clay with occasional selenite crystals and sandy silt partings to the maximum depth investigated of 15.00 m. It is possible that shallow head deposits were encountered, particularly where gravel was found within the London Clay

2.2.6 Hydrology and Hydrogeology

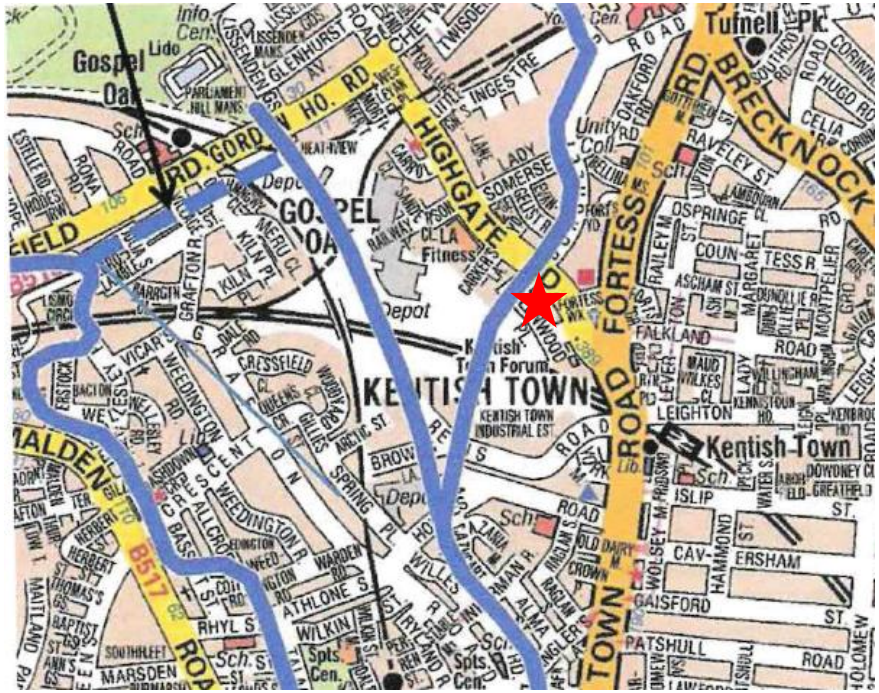
The London Clay is classified by the Environment Agency (EA) as Unproductive Strata, referring to rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. The London Clay is not capable of supporting a groundwater table, although pockets 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 x 10^{-11} m/s and 1 x 10^{-9} m/s, with an even lower vertical permeability.

Alluvium is generally classified as Secondary Undifferentiated strata, which applies to cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the strata type. Perched water may be encountered where more granular alluvial soils or Head Deposits are present.

Figure 11 of the Arup report and reference to The Lost Rivers of London[4] indicates that a tributary of the "lost" River Fleet flowed through the site, as shown on the extract opposite. The source of the River Fleet is the sand of the Bagshot Formation, which outcrops on Hampstead Heath, from which point it flowed in a generally south-easterly direction through the Hampstead Ponds. It is believed to have crossed Highgate Road at the junction with College Lane, approximately 50 m to the north of the site, and flowed beneath the site before heading in a south-westerly direction parallel with Kentish Town Road towards the junction with Camden High Street, where it merged with the western tributary. The Fleet then turned to flow in a south-easterly direction through Camden Town and through the Kings Cross / St Pancras area before turning south, along the present route of Farringdon Road, to flow into the River Thames, next to Blackfriars Bridge. The records indicate that where the Fleet crossed Highgate Road, it was up to 4 m wide. It has subsequently been culverted and online records[5] suggest that the culvert was deepened in 1845, which explains the depth of the Fleet Storm Water Relief Sewer at around 11 m below the site.

The site is not indicated as being at risk from flooding, nor is it located within a Groundwater Source Protection Zone as defined by the Environment Agency. It is shown on Figure 15 of the Arup report[6] and the London Borough of Camden report[7] as having suffered from surface water flooding in the 1975 flooding event, but not the subsequent 2002 event. Additionally, it is not shown on the EA surface water flood maps, as being in an area with a potential risk from surface water flooding. The nearest listed surface water feature is an open-air swimming pool, located approximately 400 m to the northwest of the site.



Extract from The Lost Rivers of London (2016), with the approximate location of the site highlighted by the red star and showing the tributary to have passed beneath the site.

The Environment Agency surface water flooding map indicates that flooding occurs on the existing site within the car park during medium (3.3% annual exceedance probability (AEP)) and low risk (1% AEP) rainfall events. A flood risk assessment (FRA) has been completed by Engineeria (report ref E0751-EEE-00-XX-RP-C-0001, dated May 2022), which indicates that the topography of the site has led to the aforementioned risk levels. Greenwood Place is the road to the north and is set at a level of 36.76 m OD at the access point. The car park level then drops to a level of 36.66 m OD which means in the current scenario, should flooding occur in Greenwood Place, surface water will fall into the car park.

This risk of surface water flooding on the site will be mitigated by providing attenuation to ensure flooding does not occur for all rainfall events up to the 1% AEP event + 40% climate

4 Barton, N, & Meyers, S (2016) *The Lost Rivers of London* (revised and extended edition with colour maps). Historical Publications Ltd.
5 https://www.ianvisits.co.uk/articles/pictures-of-the-digging-of-the-fleet-sewer-2368/
6 Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development.* For London Borough of Camden November 2010
7 London Borough of Camden (2003) *Floods in Camden, Report of the Floods Scrutiny Panel*

change allowance. In addition, the ground floor level will be set to a level of 37.41 m OD, which is above the level of adjacent roads and will ensure there is no low point on the site, meaning flooding from the adjacent roads does not fall onto the site. The basement will be accessed from within the building at ground-floor level, and therefore will be protected from surface water flooding for rainfall events up to the 1% AEP event + 40% climate change allowance.

The risk of surface water flooding to off-site areas as a result of the development will be mitigated by implementation of a sustainable drainage strategy which will provide source control for rainfall landing on the site and reduce the run-off rate from the site into off-site drainage networks. The basement will be located beneath the building footprint, so will not contribute additionally to surface water run-off from the site.

Apart from a small area of soft landscaping, the site is entirely covered by the existing building and surrounding hardstanding. As such, infiltration of rainwater is therefore generally restricted to surface water drains, with the majority of surface runoff draining into combined sewers in the road.

The proposed development will result in the loss of the existing area of soft landscaping in the northern corner, but other areas of soft landscaping will be created across the site. As the development will not result in a significant change to the present conditions, there will not be an increase in runoff rate or volume into the existing sewer system that could have a potentially adverse impact on the surrounding area. There should not, therefore, be any requirement for any mitigation measures.

2.2.7 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. As part of the new regime local authorities are required to carry out inspections of their area to identify sites that may be contaminated. 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 establishing one or more "pollution linkages"; a pollution linkage requires a source of contamination, a sensitive target or receptor that is at risk from the contamination and a pathway by which the contamination can travel from the source to the target.

A risk assessment should be carried out for consideration by the Local Planning Authority (LPA) before the planning application is determined. Where unacceptable risks are identified proposals will need to be made to address these risks as part of the development process. The guidance recognises the benefits of a phased approach, and the desk study is the first phase in the process of investigating and identifying contamination to assist in the determination of a planning application.

Source

On-site sources

The previous desk study has indicated that the site was developed with houses and later with the existing community centre. It is not therefore considered to have a contaminative history. There is the potential for a thickness of made ground to be present from the demolition of the previous buildings, possibly including asbestos, and the previous Campbell Reith investigation identified elevated concentrations of lead, PAHs and fibres of asbestos within the soil on the site.

Investigations of the petrol interceptor present on site are ongoing but it appears to contain a small quantity of free phase hydrocarbons, probably petrol, and therefore represents an on-site source of contamination if it has leaked in the past. The proposals include removal of the interceptor and so, following development, this source will be removed.

Elevated concentrations of chromium and selenium were measured in samples of groundwater when compared to drinking water standards in 2013 as part of the previous investigation. Elevated chromium and selenium were not however detected in the samples of made ground from site and so the source of the groundwater contamination is likely to be off site or associated with a leaking drain or sewer nearby.

No sources of landfill gas that are likely to affect the site have been identified. The Campbell Reith report suggests that a significant thickness of made ground or worked ground may be present, and therefore represents a potential source of soil gas. This is only considered to be significant if high quantities of organic or putrescible material are present within the soils, and gas monitoring as part of the previous investigation measured low concentrations of carbon dioxide and negligible flow rates, and no methane was recorded, such that the shallow soils do not appear to represent a source of ground gas. A repeat assessment is to be completed.

Off-site sources

A number of potential off-site sources of contamination were identified within the previous desk study. This includes a timber store including yard and saw mill located immediately to the south of the site. The former timber yard represent sources of potential contaminants.

Reference to the DoE Industry Profile[8] for timber treatment works indicates the main following potential contaminants:

- resins / adhesives, including polyvinyl acetate and formaldehydes;
- pyrethroids, creosote and metal carboxylates;
- organochlorides, phenolics and organotin compounds;
- organic solvents and additives;
- preservatives;
- polychlorinated biphenyls (PCBs) if the site included an electricity substation, although none have been identified on maps;
- asbestos; and
- leakage of hydrocarbon fuels from storage tanks and associated vehicles.

It is, however, unlikely that any manufacturing or treatment of timber products took place on the site and whilst the above need to be considered as potential contaminants, the size of the works indicates that any such activities would have been on a relatively small scale and relatively unlikely to migrate onto this site.

Additionally, works / warehouse building, operated by Read Bros Ltd and used as an ale store and then by Imperial Chemical Industries (ICI) Ltd, was located from 50 m to the west, although this was presumably used for the storage for products rather than manufacture. The historical maps also indicate that a number of other works buildings, including a cabinet manufacturer, a wallpaper factory, a garage, builders yard, paint shop and oil fuel tanks were also present within the immediate vicinity of the site. Railway land has been present to the southwest since the establishment of the railways in the 19th Century, although this is not considered to be significantly contaminative itself and more significant sources have been identified at distances closer to the site. The contaminants including in the above list of are also likely to be associated with the other industrial sources identified in the site surroundings, in addition to TPH, PAH and other heavy metal contamination.

Receptor

The proposed mixed commercial / residential end use means that end users are high sensitivity receptors. Groundwater and adjacent sites represent moderately sensitive receptors, and the deep Principal Aquifer within the Chalk at depth is also considered to be a receptor. Buried services and structures and site workers are also receptors. There are no significant ecological receptors in close proximity to the site.

Pathway

Within the site, end users will be isolated from direct contact with any contaminants present within the made ground by the new building and surrounding hard surfacing, such that a pathway whereby end users could come into direct contact with potentially contaminated soils will not exist in these areas. Only in areas of soft landscaping will end users potentially come into contact with contaminants.

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.

There will be a potential for contaminants to move onto or off the site horizontally within the made ground or Alluvium, although these pathways are already in existence.

The presence of cohesive London Clay will prevent a pathway existing to the Principal Aquifer at depth.

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

Preliminary Risk Appraisal

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

8 Department of the Environment Industry Profile (1996) *Timber Products Manufacturing Works / Timber Treatment Works.* HMSO

3.0 Screening Assessment

The Camden guidance suggests that any development proposal that includes a basement should be screened to determine whether a full BIA is required. A number of screening tools are included in the Arup report and for the purposes of this report reference has been made to Appendices E1, E2 and E3 which include a series of questions within screening flowcharts for surface flow and flooding, subterranean (groundwater) flow and land stability. The flowchart questions and responses to these questions are tabulated below.

3.1 Subterranean (Groundwater) Screening Assessment

Question	Response for 19-37 Highgate Road
1a. Is the site located directly above an aquifer?	No. The site is directly underlain by the London Clay, which is classified as an Unproductive stratum.
1b. Will the proposed basement extend beneath the water table surface?	No. The site is underlain by the unproductive London Clay which cannot support groundwater flow or therefore a water table. Groundwater may be encountered within the Alluvium but this is expected to be perched and is unlikely to form a continuous water table beneath the site.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	*Yes. Figure 11 of the Arup report and reference to the Lost Rivers of London indicate that a tributary of the "lost" River Fleet, flowed through the site. It has since been culverted.*
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No. Figure 14 of the Arup report confirms that the site is not located within this catchment area.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes. An area of soft landscaping in the northern corner of the site is to be removed but new areas are to be created as part of the development, such that the proportion of hard surfaced areas will not change significantly.*
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No. The majority of run-off from hardstanding will drain to the sewer system, as it does currently. Low permeability ground conditions would not allow any meaningful discharge to the ground.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than, the mean water level in any local pond or spring line?	No. There are no local ponds or spring lines.

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

Q2 The site is within 100 m of a tributary of the River Fleet.
Q4 There will be a change in the hard surfaced areas of the site.

3.2 Land Stability Screening Assessment

Question	Response for 19-37 Highgate Road
1. Does the existing site include slopes, natural or manmade, greater than 7°?	No.
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No. The site will not be significantly re-profiled as part of the development.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No. As indicated on the Slope Angle Map Fig 16 of the Arup report.
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	No. Reference to Figure 16 of the Arup report indicates that the site is not in an area where slopes are generally greater than 7˚.
5. Is the London Clay the shallowest strata at the site?	*Yes. As indicated on the geological map and Figures 3 and 5 of the Arup report, although previous investigation on site has indicated Alluvium to be present above the London Clay in the northern of the site.*
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	*Yes. A number of trees will be felled as part of the development.*
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	*Yes. The area is prone to these effects as a result of the presence of shrinkable London Clay.*
8. Is the site within 100 m of a watercourse or potential spring line?	*Yes. Figure 11 of the Arup report and reference to the Lost Rivers of London (2016) indicate that a tributary of the "lost" River Fleet flowed through the site. It has since been culverted.*
9. Is the site within an area of previously worked ground?	No. Not according to Figure 3 of the Arup report. The nearest area of worked ground is located more than 60 m to the southwest.

Question	Response for 19-37 Highgate Road
10a. Is the site within an aquifer?	No. The site is directly underlain by the London Clay, which is classified as an Unproductive stratum.
10b. Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	No. The site is underlain by the unproductive London Clay which cannot support groundwater flow or therefore a water table. Groundwater may be encountered within the Alluvium but this is expected to be perched and is unlikely to form a continuous water table beneath the site. It is therefore considered that significant inflows are unlikely to be encountered, although this does not eliminate a requirement for potential mitigation measures during basement construction.
11. Is the site within 50 m of Hampstead Heath ponds?	No. Figure 14 of the Arup report confirms that the site is not located within this catchment area.
12. Is the site within 5 m of a highway or pedestrian right of way?	*Yes. The development is bounded to the northeast by Highgate Road and to the northwest by Greenwood Place.*
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	*Yes. The proposed basement will require deeper foundations, such that the development will increase the foundation depths relative to the neighbouring properties.*
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	*Yes. A Thames Water sewer is known to extend close to the southeastern corner of the site. No LUL lines extend beneath the site according to Figure 18 of the Arup report.*

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

Q5. The London Clay is the shallowest strata across much of the site.
Q6. A number of trees will be felled as part of the development.
Q7. The site is in an area likely to be affected by seasonal shrink-swell.
Q8. A tributary of the River Fleet flowed through the site.
Q12. The development is within 5 m of both Highgate Road and Greenwood Place.
Q13. The basement will increase the foundation depths relative to the neighbouring properties.
Q14. A Thames Water sewer extends close to the southeastern corner of the site.

3.3 Surface Flow and Flooding Screening Assessment

Question	Response for 19-37 Highgate Road
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No. Figure 14 of Arup report confirms that the site is not located within this catchment area.
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No. Any additional surface water from the increase in hardstanding area will be attenuated and discharged into the Thames Water sewers to ensure the surface water flow regime will be unchanged. The basement will be beneath the footprint of the new building/existing hardstanding areas/footprint, therefore the 1 m distance between the roof of the basement and ground surface as recommended by the Arup report and para 3.2 of the CPG (2021) does not apply across these areas.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes. An area of soft landscaping in the northern corner of the site is to be removed but new areas are to be created as part of the development, such that the proportion of hard surfaced areas will not change significantly.*
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	No. Any additional surface water from the increase in hardstanding area will be attenuated and discharged into the Thames Water sewers to ensure the surface water flow regime will be unchanged. The basement will be beneath the footprint of the new building/existing hardstanding areas/footprint, therefore the 1 m distance between the roof of the basement and ground surface as recommended by the Arup report and para 3.2 of the CPG (2021) does not apply across these areas.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No. The proposed basement is very unlikely to result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses as the surface water drainage regime will be unchanged and the land uses will remain the same.
6. Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk of flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	*Yes. The Camden Flood Risk Management Strategy dated 2013, together with Figures 4e, 5a and 5b of the SFRA dated 2014, and Environment Agency online flood maps show that the site has a very low flooding risk from sewers, reservoirs (and other artificial sources), groundwater and fluvial/tidal watercourses.* *The Environment Agency online flood maps and Figure 3iii and 3viii of the SFRA show that the site has a low to medium flooding risk from surface water.*

Question	Response for 19-37 Highgate Road
	It is possible that the basement will be constructed within pockets of perched water and the recommendations outlined in the BIA with regards to water-proofing and tanking of the basement will reduce the risk to acceptable levels. *In accordance with paragraph 5.11 of the CPG, a positive pumped device will be installed in the basement in order to further protect the site from sewer flooding.* *The site is located within the Critical Drainage Area number GROUP3-003, but not within a Local Flood Risk Zone as identified in the Updated SFRA Figure 6/Rev 2.*

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

Q3. There will be a change in the hard surfaced areas of the site.
Q6. The site has a very low flooding risk and a low to medium risk of surface water flooding.

4.0 Scoping and Site Investigation

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

4.1 Potential Impacts

The following potential impacts have been identified by the screening process.

Potential Impact	Consequence
The proposed basement extends beneath the water table surface.	The site is underlain by the unproductive London Clay which cannot support groundwater flow or therefore a water table. Groundwater may be encountered within the Alluvium, but this is expected to be perched and is unlikely to form a continuous water table beneath the site. It is therefore considered that significant inflows are unlikely to be encountered, although this does not eliminate a requirement for potential mitigation measures during basement construction.
A tributary of the River Fleet flowed through the site.	The River Fleet has been culverted so will not be affected by the proposed basement development.
London Clay is the shallowest strata at the site.	The London Clay is prone to seasonal shrink-swell (subsidence and heave).
A number of trees will be felled as part of the development.	It is likely that a number of trees will be felled during the proposed development. However, whilst shrinkable soils are present at shallow depth, there are no critical slope angles that are dependent on the presence of the existing trees to aid long term stability.
Seasonal shrink-swell can result in foundation movements.	Multiple potential impacts depending on the specific setting of the basement development. For example, the implications of a deepened basement/foundation system on neighbouring properties should be considered.
The development is located within 5 m of both Highgate Road and Greenwood Place	Should the design of retaining walls and foundations not take into account the presence of nearby infrastructure, it may lead to the structural damage of footways, highways and associated buried services.

Potential Impact	Consequence
The basement will increase the foundation depths relative to the neighbouring properties.	The stability of neighbouring structures will need to be ensured throughout the development. A ground movement analysis and building damage assessment is proposed to predict the likely movements as a result of the excavation.
A Thames Water sewer is known to extend beneath the southeastern corner of the site.	The stability of the sewer will need to be ensured throughout the development. A ground movement analysis including a preliminary Thames Water sewer analysis has been carried out to predict the likely movements as a result of the excavation and impact on the Thames Water asset.
The proposed development will result in an increase in differential depth relative to neighbouring properties.	The stability of all surrounding structures will need to be ensured at all times. An analysis of the predicted ground movements will be completed once the scheme is finalised, to assess the impact on neighbouring buildings.
The site is located in an area where a low to medium risk of surface water flooding exists.	According to the FRA, the risk of surface water flooding on the site will be mitigated by providing attenuation to ensure flooding does not occur for all rainfall events up to the 1% AEP event + 40% climate change allowance. In addition, the ground floor level will be set to a level of 37.41 m OD, which is above the level of adjacent roads and will ensure there is no low point on the site, meaning flooding from the adjacent roads does not fall onto the site. The basement will be accessed from within the building at ground-floor level, and therefore will be protected from surface water flooding for rainfall events up to the 1% AEP event + 40% climate change allowance.

These potential impacts have been investigated through the site investigation, as detailed in Section 13.0.

4.2 Exploratory Work

In order to meet the objectives described in Section 1.2, a single borehole was advanced to a depth of 30.00 m using a cable percussion rig. Additionally, six boreholes were advanced to depths of between 0.50 m and 5.45 m using an opendrive sampling rig to provide general coverage of the site. Six trial pits were also manually excavated to provide access to the foundations of the existing structures on or adjacent to the site.

Following comments from the local council, nine additional boreholes were advanced to depths of between 0.40 m and 5.45 m using opendrive and window sampling equipment.

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

Gas and groundwater monitoring standpipes were installed in ten of the boreholes, to a maximum depth of 5.00 m, which have been subsequently monitored on seven occasions over a period of six months.

A selection of disturbed and undisturbed 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.

The majority of the above work was carried out under the supervision of a geotechnical engineer from GEA. The borehole records are appended, together with the results of the laboratory testing and a site plan indicating the borehole locations. The Ordnance Datum (OD) levels on the borehole records have been interpolated from spot heights shown on a drawing provided by the consulting engineers (drawing ref B7542_TOPO_rev3, dated May 2010).

4.3 Sampling Strategy

The general borehole and trial pit positions were agreed with the client and consulting engineers and positioned on site by GEA with due regard to the proposed development, whilst avoiding areas of known services.

A total of 14 samples of the shallow soil were subjected for analysis for a range of common industrial contaminants and contamination indicative parameters. For this investigation, the analytical suite for the soil included a range of metals, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. A number of samples were also screened for asbestos, including additional samples of suspected 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. Two samples were also scheduled for waste acceptance criterion (WAC) testing as specified by the structural engineers.

5.0 Ground Conditions

The investigation encountered the expected ground conditions, in that beneath a variable thickness of made ground, Alluvium was present over the London Clay, which extended to the full depth of the investigation, of 30.00 m (6.70 m OD).

5.1 Made Ground

The made ground typically comprised brown sandy clay to clayey sand with variable amounts of gravel and fragments of brick, concrete, clinker, clay tile, metal, charcoal and tarmac with roots and rootlets and extended to depths of between 0.80 m (35.90 m OD) and 1.20 m (35.77 m OD) in the lower level to the northwest, and to depths of between 1.50 m (36.00 m OD) and 2.50 m (35.00 m OD) from the upper level in the southeast.

Black staining of the soil was noted within Borehole Nos 6 and 10, advanced in close proximity to the petrol interceptor, and samples were therefore scheduled for chemical analyses.

Fragments of asbestos containing material (ACM) were observed within the made ground in Borehole Nos 5 and 5A and Trial Pit No 1 and were subsequently scheduled for confirmatory analysis.

Additionally, 12 samples of the made ground across the rest of the site have been tested for the presence of contamination and the results are presented in Section 5.5.

Samples from a selection of boreholes and trial pits, mainly surrounding the interceptor, were screened for the presence of vapours using a photoionization device (PID). No elevated concentrations of Volatile Organic Compounds (VOCs) in excess of 0.2 ppm were recorded.

5.2 Alluvium

The underlying soil, interpreted as Alluvium, consisted of soft becoming firm brown mottled grey sandy gravelly clay with roots and rootlets and extended to depths of between 2.50 m (34.47 m OD) and 3.60 m (33.10 m OD). In Borehole No 3, advanced close to trees, the Alluvium was observed to be desiccated to a depth of 2.50 m (34.47 m OD), as indicated by pocket penetrometer readings.

Laboratory plasticity index tests indicate this layer to be of low to moderate volume change potential. The results of laboratory undrained triaxial tests indicate the clay to be of low strength.

5.3 London Clay

The underlying London Clay comprised an initial weather horizon of firm becoming stiff fissured brown mottled grey silty clay with claystones, sandy partings and fine mica to a depth of 6.00 m (30.70 m OD). This was underlain by stiff fissured dark brownish grey silty clay with claystones and sandy partings which extended to the full depth of the investigation, of 30.00 m (6.70 m OD).

Laboratory plasticity index tests indicate this layer to be of high volume change potential. The results of quick undrained triaxial tests indicate the clay to be of high becoming very high strength.

5.4 Groundwater

Groundwater was encountered as slow inflows or seepages within the made ground at depths of between 1.10 m (35.60 m OD) and 1.30 m (36.20 m OD), within the Alluvium at depths of between 2.00 m (35.50 m OD) and 3.50 m (33.20 m OD) and within the London Clay at depths of 3.90 m (32.80 m OD) and 4.30 m (32.40 m OD) during drilling.

Standpipes were installed into Borehole Nos 1 to 8, 9B and 10 to depths of between 0.90 m (35.86 m OD) and 5.00 m (31.70 m OD), and include six standpipes installed within the made ground only and three standpipes installed within the Alluvium only as detailed on the logs appended. During a programme of monitoring over a period of six months, groundwater has been measured at depths of between 1.07 m (35.63 m OD) and 1.77 m (35.73 m OD). The groundwater measured is likely to be associated with perched water within the made ground, Alluvium and around silty or sandy portions of the London Clay draining into the standpipes and trapped by surrounding lower permeability soils, rather than a continuous water table.

The full findings of the monitoring programme are tabulated in the appendix.

5.5 Soil Contamination

The table below sets out the values measured within the 14 samples analysed and the generic risk based screening values for a residential end use without plant uptake; all concentrations are in mg/kg unless otherwise stated.

Determinant	Minimum concentration	Maximum concentration	Generic risk-based screening value	Number of samples above screening value
pH	7.2	10.7	-	-
Arsenic	13	26	40	-
Cadmium	< 0.2	2.0	149	-
Chromium	23	45	910	-
Lead	190	**2400**	310	8
Mercury	< 0.3	3.0	56	-
Selenium	< 1.0	< 1.0	595	-
Copper	22	250	7100	-
Nickel	13	53	180	-
Zinc	60	730	40000	-
Total Cyanide	< 1.0	20	140	-
Total Phenols	< 1.0	< 1.0	420	-
Total PAH	< 0.80	**104**	67.1	1
Benzo(a)pyrene	< 0.05	**7.7**	4.7	2
Benzo(a)anthracene	< 0.05	9.8	14.0	-
Benzo(b)fluoranthene	< 0.05	**8.2**	4.0	2
Dibenz(a,h)anthracene	< 0.05	**0.87**	0.32	3
TPH	< 10	430	1000	-
Total Organic Carbon %	0.4	3.3	6	-
Note: Figures in bold indicate values in excess of the generic guideline screening values.				

In addition, all samples of the made ground have been screened for the presence of asbestos and asbestos in the form of loose fibres or debris have been identified in five samples, as detailed below.

5.5.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. Contaminants of concern are those that have values in excess of generic human health risk-based guideline values, which are either the CLEA[9] Soil Guideline Values where available, the Suitable 4 Use Values[10] (S4UL) produced by LQM/CIEH calculated using the CLEA UK Version 1.07[11] software, or the DEFRA Category 4 Screening values[12], assuming a residential end use without 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 home grown 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 terraced house.

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

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

9 *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.
10 *The LQM/CIEH S4ULs for Human Health Risk Assessment* S4UL3065 November 2014
11 Contaminated Land Exposure Assessment (CL|EA) Software Version 1.071 Environment Agency 2015
12 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

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

The table below indicates contaminants of concern and the locations of the samples where the elevated concentrations were measured.

Contaminant of Concern	Maximum concentration recorded (mg/kg)	Generic Risk-Based Screening Value	Location of elevated concentrations
Lead	2400	310	BH2, 3, 4, 9, 10 & 11 and
Total PAH	104	67.1	BH8
Benzo(b)fluoranthene	8.2	4.0	BH7 & 8
Benzo(a)pyrene	7.7	4.7	BH7 & 8
Dibenz(ah) anthracene	0.87	0.32	BH3, 7 & 8

In addition, all samples of the made ground have been screened for the presence of asbestos and the positive identifications are shown in the table below.

BH ref	Sample depth (m)	Asbestos detected	Quantification; total asbestos in sample (%)
BH2	0.40	Chrysotile – Loose fibres	< 0.001
BH3	0.50	Chrysotile & Amosite – Loose fibres	< 0.001
BH5	0.10	Chrysotile – Hard / Cement Fragment	N/A
BH5A	0.10	Chrysotile – Hard / Cement Fragment	N/A
TP1	0.10	Chrysotile – Hard / Cement Fragment	N/A
BH9	0.50	Amosite – Sheeting / Board Debris	0.002

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

5.6 Soil Gas

Ten standpipes have been installed in Borehole Nos 1 to 8, 9B and 10, with response zones generally localised to either the made ground or Alluvium, two of which were positioned in close proximity to the interceptor while the remainder were spread across the site. Gas monitoring has been carried out on a total of seven occasions over a period of six months.

The monitoring results indicate barometric pressures ranging from 1000 mb to 1031 mb with no hydrogen sulphide and negligible carbon monoxide detected. Negligible concentrations of less than 1 ppm Volatile Organic Compounds (VOCs) were detected using a Photo-Ionisation Detector (PID).

In determining the significance of soil gas concentrations both the gas concentrations and borehole flow rates are used to define a characteristic situation for a site based on the limiting borehole gas volume flow, renamed as the Gas Screening Value (GSV) for methane and carbon dioxide. In this case the following GSVs have been determined, in accordance with guidance provided by CIRIA[13].

Response Zone	BH Nos	Gas	Max concentration % vol.	Max flow rate l/hr	GSV
Made Ground	4, 5, 6, 8, 9B, 10	Methane	0.0	< 0.1	0.0001
		Carbon Dioxide	2.3		0.0023
Alluvium	2, 3, 7	Methane	0.0	< 0.1	0.0001
		Carbon Dioxide	1.6		0.0016
Combined	1	Methane	0.0	< 0.1	0.0001
		Carbon Dioxide	1.6		0.0016

On the basis of the gas monitoring carried out, the gas screening value of less than 0.07 l/hr indicates Characteristic Situation 1 (CS1); very low risk. In accordance with BS 8485:2015 the proposed development is likely to be classified as a Type B building. This is categorised as a private or commercial building with small to medium rooms, and with some central building management controls on alterations to the building and its uses.

13 Wilson, S, Oliver, S, Mallett, H, Hutchings, H and Card, G (2006) *Assessing risks posed by hazardous ground gases to buildings CIRIA Report C659*

Table 4 of BS 8485:2015 indicates the minimum gas protection score (points) for each type of building (A-D) using the CS level (1-6) previously determined. A Type B building with CS1 requires zero points in reference to gas protection measures and on the NHBC "traffic light" system the site may be considered to be Green.

The qualitative risk assessment did not identify a significant source of ground gas beneath the site, and no landfill sites or areas of infilled land have been identified beneath or in proximity to the site. The previous report considered a significant thickness of made ground, if present, to represent a source of ground gas but such a thickness has not been identified. Additionally, it considered Alluvium to represent a source of ground gas, but this is incorrect as Alluvium is only considered to represent a source of ground gas if it contains significant quantities of organic or putrescible materials. No such materials were identified within the alluvial soil recovered as part of the ground investigation. Additionally, a programme of gas monitoring over a period of six months has been carried out on standpipes installed across various strata on the site and no elevated concentrations of ground gas have been identified. A risk of ground gas is not therefore considered to exist beneath the site. No elevated concentrations of hydrocarbon vapours have been detected and so, following removal of the petrol interceptor and any contaminated surrounding soils and verification of such works, hydrocarbon vapour protection measures are not considered to be required.

5.7 Existing Foundations

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

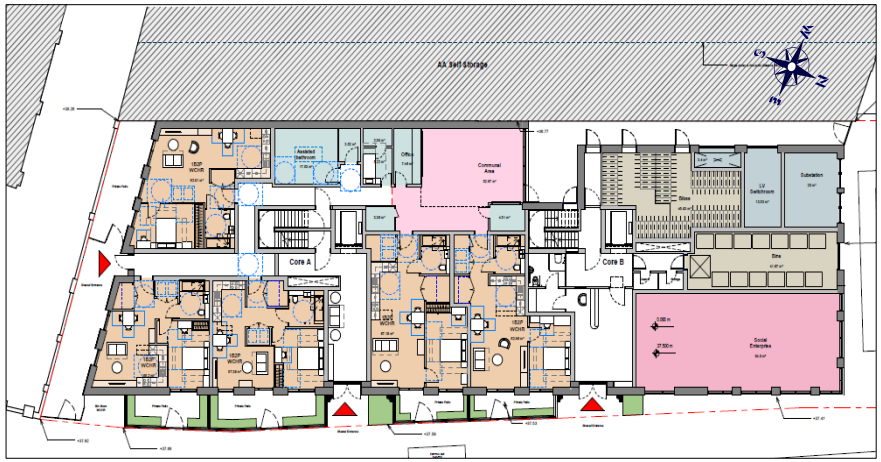
Trial Pit No	Structure	Foundation detail	Bearing Stratum
1	SW boundary wall with adjoining building	Concrete strip Top 0.32 m Base Not determined Suspected lateral projection 500 mm	Not determined
2	SE elevation of existing building	No observed footing Base of wall 0.54 m	MADE GROUND
3	SW boundary wall with adjoining building	Concrete strip Top 0.35 m Base 0.80 m Lateral projection 500 mm	MADE GROUND
4	NW elevation of existing building	Concrete strip Top 0.50 m Base not determined Lateral projection 300 mm	Not determined
5	Retaining wall along NE boundary of site	Concrete strip Top 0.60 m Base 0.87 m Lateral projection 400 mm	MADE GROUND
6	SW elevation of existing building	Concrete strip Top 0.40 m Base 0.65 m Lateral projection 300 mm	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.

6.0 Introduction

It is understood that it is proposed to demolish the existing building and to subsequently construct a part five-storey and part seven-storey mixed use building with a single level basement in the centre of the site. Formation level for the proposed basement is understood to be approximately 3.5 m below existing ground level (at roughly 33.5 m OD). Dead loads for the proposed piles are understood to range from 150 kN to 800 kN, while imposed pile loads range from 75 kN to 325 kN.



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7.0 Ground Model

The desk study has revealed that the site does not have a potentially contaminative history as it has been developed with residential buildings and later a community centre for its entire developed history. A petrol interceptor was however identified on-site and a number of potential off-site sources have been identified. On the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- that beneath a variable thickness of made ground, Alluvium was present over the London Clay which extends to the full depth of the investigation, of 30.00 m (6.70 m OD);
- the made ground typically comprises brown sandy clay to clayey sand with variable amounts of gravel and fragments of brick, concrete, clinker, clay tile, metal, charcoal and tarmac and extends to depths of between 0.80 m (35.90 m OD) and 1.20 m (35.77 m OD) on the lower level to the northwest, and to depths of between 1.50 m (36.00 m OD) and 2.50 m (35.00 m OD) from the upper level to the southeast;
- the Alluvium comprises soft becoming firm low strength brown mottled grey sandy gravelly clay with roots and rootlets and extended to depths of between 2.50 m (34.47 m OD) and 3.60 m (33.10 m OD);
- the London Clay consists of firm becoming stiff fissured high becoming very high strength brown mottled grey becoming dark brownish grey silty clay with sandy lenses, claystones and fine mica and extends to the full depth of the investigation of 30.00 m (6.70 m OD);
- perched groundwater is present within the made ground and alluvium and has been measured depths of between 1.07 m (35.63 m OD) and 4.30 m (32.40 m OD);
- contamination testing has revealed the presence of elevated concentrations of lead, PAH compounds and asbestos contamination within the made ground; and
- gas monitoring has recorded very low concentrations of carbon dioxide and no methane or flow, such that Characteristic Situation 1 would be appropriate for the site and gas protection measures are not considered to be required.

8.0 Advice & Recommendations

Excavations for the proposed basement structure will require temporary support to maintain stability and to prevent any excessive ground movements.

Formation level for the basement will be within the Alluvium or London Clay at a depth of around 3.50 m below existing ground level, at an elevated of roughly 33.50 m OD.

A contiguous piled wall is understood to be the preferred foundation which should be suitable to support the excavation in the temporary and permanent conditions. The wall will not be propped in the temporary condition and will therefore be cantilevered. Perched water is likely be encountered towards the base of the made ground and within the Alluvium, but significant groundwater inflows during the excavation are not anticipated.

The proposed use of piles extending into the London Clay to support the new building will also be suitable.

8.1 Basement Construction

Formation level for the basement is likely to be within the soft sandy gravelly clay of the Alluvium or the stiff clay of the London Clay at a depth of about 3.50 m. Inflows of perched water should be anticipated from within the made ground and Alluvium. However, any such inflows are likely to be relatively minor in nature and should be adequately dealt with through sump pumping, although it would be prudent for the chosen contractor to have a contingency plan in place to deal with more significant or prolonged inflows as a precautionary measure.

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

It is understood that it is likely that a contiguous pile wall is to be adopted to support the majority of the proposed basement excavations, which will have the advantage of being incorporated into the permanent works and being able to provide support for structural loads. It would have the advantage of providing some level of groundwater control, although will not fully prevent groundwater flows into the excavation from the base.

The ground movements associated with the basement excavation will depend on the method of excavation and support and the overall stiffness of the basement structure in the temporary condition. Thus, a suitable amount of propping will be required to provide the necessary rigidity. In this respect the timing of the provision of support to the wall will have an important effect on movements. An assessment of the movements has been carried out and is discussed in Part 3.

8.1.1 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	1700	Zero	27
Alluvium	1950	Zero	24
London Clay	1950	Zero	23

Significant groundwater inflows are not anticipated within the basement, although monitoring of the standpipes should be continued to confirm this view, along with trial excavations.

Provided that a fully effective drainage system can be ensured in order to prevent the build-up of groundwater behind the retaining walls, it should be possible to design the basement on the basis that water will not collect behind the walls. If an effective drainage system cannot be ensured, then a water level of two-thirds of the basement depth, subject to a minimum depth of 1.00 m, should be assumed. The advice in BS8102:2009[14] should be followed in this respect and with regard to the provision of suitable waterproofing.

8.1.2 Basement Heave

The 3.50 m deep excavation of the basement will result in a differential net unloading of around 66 kN/m^2, which will result in differential heave of the underlying Alluvium and 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. These movements will, to some extent, be mitigated by the loads applied by the proposed development, and are considered in more detail in Part 3 of this report.

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

8.2 Piled Foundations

For the ground conditions at this site a bored pile could be adopted. A conventional rotary augered pile could be utilised but consideration will need to be given to the possible instability and water ingress within the made ground. The use of bored piles installed using continuous flight auger (cfa) techniques may therefore be the most appropriate.

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

Stratum	Depths m	kN / m²
Ultimate Skin Friction		
Basement Excavation	GL to 3.50	Ignore (Basement excavation)
London Clay	3.50 to 30.00	Increasing linearly from 35 to 120
Ultimate End Bearing		
London Clay	15.00 to 30.00	Increasing linearly from 1260 to 2160

In the absence of pile tests, guidance from the London District Surveyors Association (LDSA)[15] suggests that a factor of safety of 2.6 should be applied to the above coefficients in the computation of safe theoretical working loads. On the basis of the above coefficients, the following pile capacities have been estimated.

Pile diameter mm	Depth Below Ground Level	Pile Length m	Safe Working Load kN
300	15	11.5	250
	20	16.5	395
	25	21.5	590
450	15	11.5	400
	20	16.5	630
	25	21.5	930

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 a suitable piling scheme and their attention should be drawn to potential groundwater inflows and instability within the made ground and Alluvium and claystones present within the London Clay.

8.3 Shallow Excavations

On the basis of the borehole findings, it is considered that it will be generally feasible to form relatively shallow excavations terminating within the made ground or Alluvium without the requirement for lateral support, although localised instabilities are likely to occur below a depth of around 1 m where more granular material or groundwater is encountered.

Significant inflows of groundwater into shallow excavations above depths of approximately 1 m are not generally anticipated, although seepages are likely be encountered from perched water tables within the made ground, particularly within the vicinity of existing foundations, and from the Alluvium, although such inflows should be suitably controlled by sump pumping. Rising head tests could be carried out on the existing standpipes to provide an indication of the rates of inflow that could be expected. Ideally, trial excavations extending to as close to proposed formation level as possible should be carried out to provide an indication of the likely stability and presence of inflows.

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

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

8.4 Floor Slab

8.4.1 Ground Floor Slab

In view of the number of trees to be removed around the development and one to remain, outside of the footprint of the basement and within the zone of influence of trees the ground floor slab should be suspended, unless it can be suitably reinforced to cope with seasonal shrink swell movements.

8.4.2 Basement Floor Slab

Following excavation of the basement, the floor slab will need to be suspended over a void or a layer of compressible material to accommodate the anticipated heave and any potential uplift forces from groundwater pressures, unless the slab can be suitably reinforced to cope with these movements.

8.5 Effect of Sulphates

Chemical analyses of samples from the made ground have revealed relatively moderate to high concentrations of soluble sulphate and near-neutral pH in accordance with Class DS-3 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-2s would be appropriate for the site. This assumes a static water condition at the site.

Chemical analyses of samples from the natural soils have revealed relatively low concentrations of soluble sulphate and near-neutral pH in accordance with Class 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-1s would be appropriate for the site. The guidelines contained in the digest should be followed in the design of foundation concrete.

8.6 Contamination Risk Assessment

The desk study findings indicate that the site does not have a potentially contaminative history as it has only been developed with houses and a community centre for its entire developed history. However, a petrol interceptor was identified on site. A number of off-site sources were also identified, including a former timber store with yard and saw mill located immediately to the south of the site.

The results of the contamination testing have identified elevated concentrations of lead within eight samples of made ground. One sample of made ground from Borehole No 8 contains an elevated concentration of total PAH, whilst the sample of made ground from Borehole No 7 contains elevated concentrations of dibenz(a,h)anthracene, benzo(b)fluoranthene and benzo(a)pyrene and a single sample of made ground from Borehole No 3 contains an elevated concentration of dibenz(a,h)anthracene, although total PAH is not elevated. Additionally, fibres of chrysotile and amosite asbestos have been identified in samples of made ground from Borehole Nos 2 and 3 at concentrations of < 0.001 %, while fragments of cement and / or debris of boards / sheets were identified in Borehole Nos 5, 5A, TP1 and BH9.

The source of the lead contamination not known but the made ground was noted as containing variable amounts of extraneous material, including clinker, and it is therefore likely that a fragment of such material was present within the samples tested, accounting for the elevated concentrations. Information on Urban Soil Chemistry provided by the BGS also indicates that background concentrations for lead in the vicinity of the site are between 320.30 mg/kg and 625.40 mg/kg, such that some of the measured concentrations are within the background readings for the area. Lead compounds are relatively immobile, 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 significant risk of leaching and migration within any perched groundwater within the made ground. As the site is underlain by Alluvium and London Clay, neither of which cannot support a continuous groundwater table, a risk to groundwater is also not identified.

Statistical analysis of the specific PAH species identified in the elevated samples has found the concentration found in Borehole No 8 to be coal tar / tarmac based, i.e. originating from partially burnt hydrocarbons. The concentration found in Borehole No 3 is also of pyrogenic origin, while the concentrations found in Borehole No 7 are of petrogenic origin although the specific source of each is unknown. Fragments of tarmac and other extraneous material were noted within the made ground, so it is likely that this has resulted in the elevated concentration of total PAH in Borehole No 8. As such, the contamination is not considered likely to be soluble and should not, therefore pose a risk of vapours or to adjacent sites or groundwater. The PAH contamination will however pose a risk to site workers and could be considered as posing a risk to buried services, as further assessed below.

As asbestos is insoluble, it is not considered to pose any meaningful risk to groundwater or to neighbouring sites. It is however potentially hazardous to human health as airborne fibres and could thus pose a risk through inhalation during construction works and to end users in any areas of soft landscaping. All work being carried out within asbestos containing soils should be carried out in accordance with the Control of Asbestos Regulations, including toolbox talks for all workers and having the correct PPE in place. During the

excavation and movement of any soils, all soils should be dampened down as a minimum and air monitoring may be required. A clean cover system will need to be installed if any areas of soft landscaping are included in the proposals to protect end users. An asbestos specialist should be consulted with respect to this risk.

A basement is proposed beneath the part of the site and as such, all of the made ground in this area will be removed and will not therefore represent an ongoing source of contamination. The made ground will remain in the areas surrounding the basement.

The soil was observed to be stained in the vicinity of the petrol interceptor on site. However, the chemical analyses of this soil did not identify any elevated concentrations of contamination within the samples tested. It is therefore considered likely that the soil has been impacted by historic leakage of the interceptor but it is likely to be limited in area. It is understood that the interceptor is going to be removed and it would be prudent to excavate any associated impacted soil in order to avoid requirements for nuisance odour protection.

The ground gas risk assessment has not indicated a requirement for ground gas protection measures.

8.6.1 End Users

End users will be effectively isolated from any potential contamination within the extent of the building and surrounding hardstanding, such that, only in proposed soft landscaping areas could end users conceivably come into direct contact with the contaminated soils. It is understood that a number of limited areas of soft landscaping are proposed adjacent to the eastern boundary of the site and end users will need to be protected in these areas, The soft landscaping is however likely to comprise managed communal space as opposed to private gardens or allotments, such that the potential for end users to come into direct contact with contaminated made ground is low.

At this stage it is recommended that a cover thickness of imported subsoil and topsoil of 600 mm in thickness should be specified for any areas of new landscaping in accordance with recommendations from BRE[16]. It is likely to be possible to reduce the final thickness of cover required, but this will need to be determined once final levels have been established and the concentrations of potential contaminants within the imported material and in the soils at formation level are known.

8.6.2 Protection of Site Workers

Site workers should be made aware of the potential contamination and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE[17] and CIRIA[18] and the requirements of the Local Authority Environmental Health Officer.

A watching brief should be maintained during the site works and if any suspicious soil is encountered, it should be inspected by a suitably qualified engineer and further testing carried out if required.

An asbestos specialist should be consulted with respect to this risk and as a minimum all soil should be dampened down, and air monitoring may be required.

8.6.3 Services

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

8.6.4 Petrol interceptor

In respect to the underground interceptor currently underlying the car park area, some staining was noted at the expected depths, particularly within Borehole No 10 to the west of the interceptor. However, the laboratory results did not indicate any elevated concentrations of contaminants associated with the interceptor that warrant remediation. On this basis it seems that the extent of contaminated soil may be limited to the soils beneath and immediately around the buried tanks.

It is understood that the underground interceptor will be excavated and removed from site, and ideally any grossly contaminated or visually impacted surrounding soils should be excavated along with it. The removal will need to be verified though visual inspection, on site screening of samples with a PID and collection and subsequent analysis of samples, and it is likely that a remediation method statement will be required to this effect. The results will need to be incorporated into a verification report. Following verification of removal of the interceptor and any surrounding impacted soils, it should not be necessary to install hydrocarbon vapour protection measures.

16 BRE (2004) *Cover systems for land regeneration. Thickness of cover systems for contaminated land.* BRE pub 465
17 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land* HMSO
18 CIRIA (1996) *A guide for safe working on contaminated sites.* Report 132, Construction Industry. Research and Information Association

8.7 Waste Disposal

Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process, and this investigation represents the preliminary sampling exercise of that process. Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should however be noted that the Environment Agency guidance WM3[19] states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes.

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE[20] 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 £98.60 per tonne (about £185 per m^3) or at the lower rate of £3.15 per tonne (roughly £5.85 per m^3). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the 'standard' rate and only naturally occurring soil and stones, which are accurately described as such in terms of the 2011 Order, would qualify for the 'lower rate' of landfill tax.

Based 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 (majority of site)	Non-hazardous (17 05 04)	Should not be required but confirm with receiving landfill	£98.60/tonne (Standard rate)
Made ground (Around BH5, 5A, 9 and TP1 and any other made ground including ACM)	Mixed waste and is Hazardous unless separated – due to asbestos (17 05 03)	Should not be required but confirm with receiving landfill	Discuss with receiving landfill
Alluvium	Assumed to be inert (17 05 04)	Should not be required but confirm with receiving landfill	£3.15 / tonne (Reduced rate for uncontaminated naturally occurring rocks and soils)
London Clay	Assumed to be Inert (17 05 04)	Should not be required but confirm with receiving landfill	£3.15 / tonne (Reduced rate for uncontaminated naturally occurring rocks and soils)

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment, but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper[21] 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 in-situ 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.

19 Environment Agency 2015. *Guidance on the classification and assessment of waste.* Technical Guidance WM3 First Edition
20 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2
21 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.

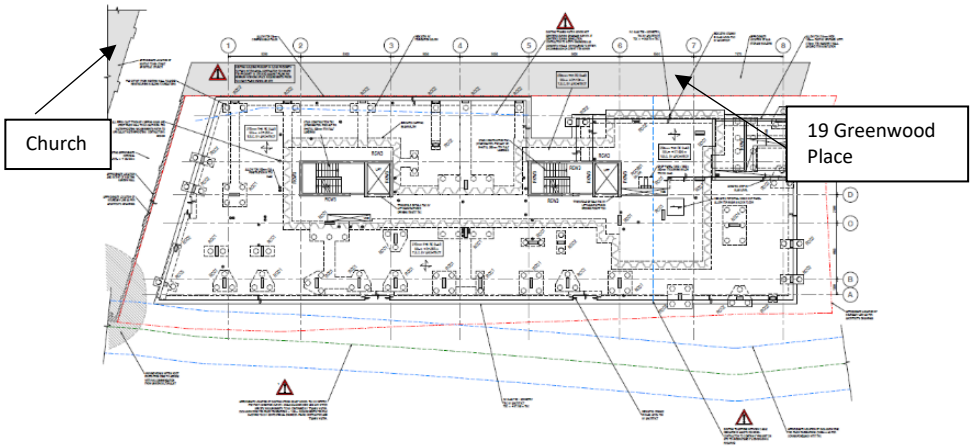
9.0 Introduction

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.

The development proposals also include an approximately 1.45 m deep excavation for the installation of a 15 m^2 attenuation tank in the northwest of the site, in between the proposed basement and the northwestern edge of the site adjacent to the pavement to Greenwood Place. The structural engineers have confirmed that temporary trench sheeting will be used in the short term to provide side support. Given the limited size and depth of the excavation, associated ground movements are expected to be minimal. Figure 6.16 of C760 for settlements due to excavations in front of a wall in sand, on the basis of excavations taking place within granular made ground, demonstrates that, on the basis of the distance of Greenwood Place and depth of the excavation, settlement can be expected to be less than 0.005 % of excavation depth. Consideration of the attenuation tank excavation is not therefore considered to be necessary in the assessment of ground movements.

9.1 Nearby Sensitive Structures

Nearby sensitive structures comprise 19 Greenwood Place to the west and Christ Apostolic Church to the south of the site, as shown on the plan opposite.



Proposed ground floor plan with 19 Greenwood Place to the north and the northern elevation of Christ Apostolic Church to the south (project ref E0751, Rev P02 created and provided by Engineeria)

The heights of the buildings have been estimated from observation. The underside of the foundations of 19 Greenwood Place have been determined based on the trial pitting described in the previous section and the foundations of the Church have been assumed. The heights and underside of foundations are summarised on the table below.

Sensitive structure	Height of building above foundation level (m)	Underside of foundation, depth (m) (elevation)
19 Greenwood Place	3.8 to 6.8 (over two levels)	0.80 (35.97)
Christ Apostolic Church	5.5	0.50 (37.00)

The locations of the neighbouring buildings have been input into the model based on dimensions calculated from scaled drawings and should ideally be updated with accurate grid references provided from a survey.

Thames Water have confirmed that they are satisfied with the development proposals and have provided the client with requirements for a condition survey after construction, to

compare against an existing pre-construction condition survey, and have not requested a specific ground movement analysis assessment the impact of the proposed development on their asset.

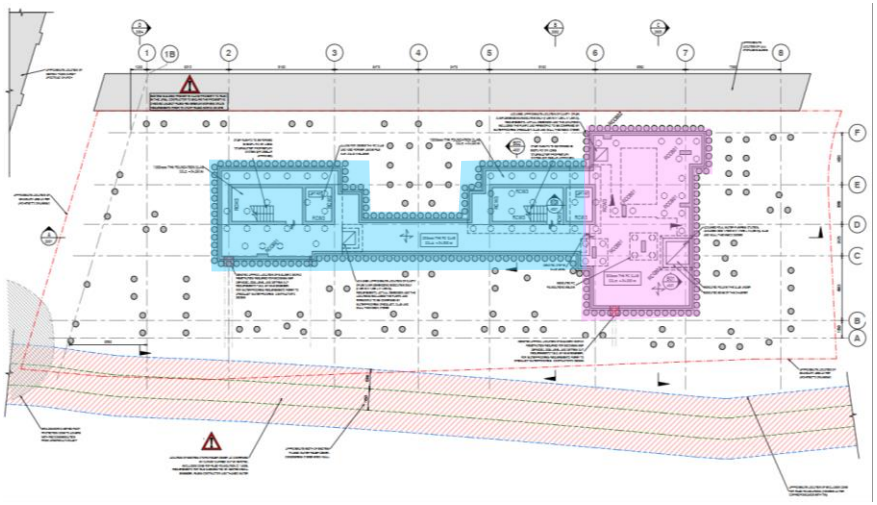
9.1.1 Highways

The development is located within 5 m of both Highgate Road to the north and Greenwood Place to the northwest. The proposed basement is, however, 7.3 m back from Highgate Road at the closest point in the north of the site and 11.2 m back from Greenwood Place at the closest point in the northwest of the site. An analysis is not therefore necessary, but has been incorporated into this assessment as specified by Campbell Reith, the Council's technical auditors.

9.2 Construction Sequence

It is proposed to form an irregularly shaped single level basement, as shown on the plan overleaf, which will be stepped and therefore span two slight changes in level. The southern portion will extend to a depth of 3.10 m (33.985 m OD), whilst the northern portion will extend to a depth of 3.50 m (33.575 m OD). Once formation level has been reached, localized excavations will be carried out around lift pits and sump chambers. It is understood that these excavations will be supported by trench sheeting and propping and that the potential for groundwater inflows is understood. The localised deeper excavations have been excluded from this analysis on the basis that the majority of the ground movements are likely to occur during bulk excavation and construction of the main basement.

Formation level is therefore expected to be within the Alluvium or London Clay. It is understood that the retaining walls will be formed by a contiguous bored pile wall. The wall will be cantilevered in the temporary condition. The main structure will be supported by permanent bearing piles. Excavation will proceed in stages and in broad terms the order of operations will be install capping beam props then excavate to formation level.



Proposed single level basement excavation beneath part of the proposed building, including the 3.10 m deep excavation in the southern portion (in blue) and 3.50 m deep excavation in the northern portion in pink (drawing ref E0751-EEE-00-B1-DR-S-1099, Rev T01, created and provided by Engineeria).

A construction sequence (drawing refs E0751-EEE-00-XX-DR-S-9150 Rev P02 and E0751-EEE-00-XX-DR-S-9151 Rev P03, dated July 2022 and dated August 2022 respectively) has been provided by the consulting engineers and has been used to enable analysis of the ground movements around the basement, both during and after construction of the basement walls. Essentially the sequence may be considered as two groups of activities, the first comprising the short-term temporary works, whilst the second represents the construction of the permanent works.

The original proposals included a sheet piled wall and this report has been updated to reflect the revised plans for a contiguous bored pile wall instead, and in the absence of detailed information, it is assumed that the contiguous piles will be incorporated into the following works as follows.

In general, the sequence of works for excavation and construction will comprise the following four main stages:

1. Demolition of existing building and installation of piling mat;

2. Installation of ground bearing piles and contiguous bored piled walls from ground level. Excavate around pile heads, cut off piles and install reinforced concrete capping beam on top of piled wall;

3. The wall will not be propped in the temporary condition. Excavation to take place to foundation level. Break down piles to suit cut off level and form reinforced concrete pile caps. Excavate lift pits and sump chambers, supporting the excavations by trench sheeting and propping. Construct basement slab. Construct liner walls to contiguous piled wall. Construct basement to ground floor columns and walls. Construct ground floor slab over basement. Cut off piles and install pile caps at ground floor level (outside of footprint of basement);

4. Install drainage at ground floor level. Backfill external areas to suit proposed external site levels. Construct ground floor slab and ground beams at ground floor (outside of footprint of basement). Construct ground floor upwards.

The detail of the support provided to adjacent walls is beyond the scope of this report and the structural engineer will be best placed to agree the methodology with the chosen contractor(s) once appointed.

The ground movement analysis has been carried out modelling the installation of the contiguous pile wall and excavation of the basement. Subsequent loading of the bearing piles is not considered to impact ground movements surrounding the basement as the load will be transferred to depth via the piles, and movements inside of the basement are expected to comprise settlement in the region of 1 % of pile diameter, such that it is not considered to be necessary to model the loading stage.

9.2.1 Temporary Support to Piled Walls

Following the installation of the contiguous piled wall and capping beams, the basement excavation will proceed. The detail of section sizes and spacings will be finalised by the contractor and the temporary works designer.

It is understood that the preferred method of construction is to cantilever the contiguous piled wall in the temporary condition, such that props will not therefore be installed. The excavation stage of this analysis is therefore based on a low stiffness wall.

It is recommended that the advice of an experienced temporary works engineer is sought in this respect in order to ensure that the excavation remains stable in the short term.

9.2.2 Permanent Works

When the final excavation depths have been reached, the permanent works will be formed. The basement is understood to comprise reinforced concrete liner walls with a drained cavity lining inside of the piled wall. Reinforced concrete will be used for floor slabs while reinforced concrete piles extending into the London Clay will support the new structure.

It has been assumed that the floor slabs will be constructed basement first followed by ground floor and then progressively up to roof height, as detailed in the construction sequence.

10.0 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). Both the P-Disp and X-Disp programs are commonly used within the ground engineering industry and are considered to be appropriate tools for the purpose of this analysis.

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 north-south, roughly parallel with the eastern elevation of the building and Highgate Road, and the y direction is orientated approximately east-west. Vertical movement is in the z-direction.

The basement structure has been modelled as a polygon with maximum dimensions of around 38.20 m by 10.70 m, which will be formed through the construction of a contiguous piled wall. It should be noted that the proposed basement footprint contains a number of re-entrant corners, which, due to limitations within the software, will cause a doubling up of movements that creates an issue for any analysis, as the opposite is likely to be the case in reality, with an overall reduction in ground movements more likely due to the increased stiffness of the structure at these points. Where possible, the shape of the proposed basement has therefore been simplified to remove these features to mitigate these effects and provide a more realistic model that can be used in the subsequent damage assessment.

The preferred method of construction is to cantilever the contiguous piled walls, such that the walls are considered to be of low stiffness for the purpose of the excavation stage 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.

10.1 Ground Movements – Surrounding the Basement

10.1.1 Model Used

For the X-Disp analysis, the soil movement relationships used for the embedded retaining walls are the default values within CIRIA report C760[22], which were derived from a number of historic case studies.

Installation of piled retaining walls:

The curve within the X-Disp programme for the 'installation of a contiguous bored pile wall in stiff clay' has been adopted to predict both the vertical and horizontal movements resulting from the contiguous wall installation for this site as it is considered the most appropriate.

For the purpose of the analysis, a pile length of 11 m has been conservatively assumed for the calculation of installation movements, giving a minimum embedment just over 7 m and in excess of 75 % of the retained height in the area of the deeper excavation, which is considered reasonable for a propped wall such as this.

Excavation Phase:

As it is assumed that the piles will be embedded into the clay and cantilevered, the ground movement curve for 'excavations in front of a low stiffness wall in stiff clay' has been adopted to provide an estimate of the likely movements from the subsequent excavation.

For the XDisp analysis, a maximum depth of 3.50 m has been adopted for the excavation based on a ground level of 37.50 m OD and a formation level of just below 34 m OD across the larger southern portion of the basement to simplify the model. The northern portion of the basement excavation will result in an excavation depth of around 3.10 m, but down to a slightly lower formation level of 33.60 m on the basis of the lower existing ground level of 36.70 m OD in that portion of the site.

10.1.2 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

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

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 piled wall	4 to 9	4 to 7
Combined Installation and Excavation Movements	16 to 32	18 to 26

The analysis has indicated that the vertical settlements that will result from wall installation are around 4 mm to 9 mm, with maximum movements concentrated at the re-entrant corner in the northwest of the basement, with movements increasing to between 16 mm and 32 mm of vertical settlement arising from the combined wall installation and excavation phases.

The analysis also indicates that maximum horizontal movements that will result from wall installation are around 4 mm to 7 mm, also concentrated in the northwest corner, with movements increasing to around 18 mm to 26 m as a result of combined wall installation and excavation phases.

Movements are expected to be relatively high for the combined phase as a result of the cantilevered excavation.

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.

10.2 Ground Movements – Resulting from Excavation

10.2.1 Model Used

Unloading of the London Clay will take place as a result of the excavation of the proposed basement and the reduction in vertical stress will cause heave 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 basement excavation. 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 Eu and E', the undrained and drained stiffness respectively, to values of undrained cohesion, as described by Padfield and Sharrock[23] and Butler[24] and more recently by O'Brien and Sharp[25]. Whilst values of Eu can be taken as 750 x Cu for the London Clay and a ratio of E' to Cu of 0.75 considered appropriate and in line with more recent published data, more conservative values of 500 x Cu for Eu and 300 x Cu for E' have been adopted at this stage.

The maximum 3.50 m deep excavation of the basement will result in a differential net unloading of around 65.7 kN/m^2, which will result in differential heave of the underlying London Clay.

The soil parameters used in this analysis and tabulated overleaf have been primarily derived from the onsite investigation and extrapolation of data for the London Clay at depth. BGS borehole records indicate the London Clay to extend to a level of around -19.50 m OD in this part of London, corresponding to a depth of about 57 m below ground level on site, where it is underlain by the clayey sands assumed to comprise part of the Lambeth Group or Thanet Sand. For this analysis the underlying strata has been considered as an essentially incompressible stratum and the rigid boundary has therefore been set at a depth of 57 m (-19.50 m OD) below existing ground level at this site. An increase in cohesion of 7.5 kN/m^2 per m increase in depth has been adopted for the London Clay to provide a conservative estimate of the likely strength profile below the depth of the investigation.

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

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

25 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

Stratum	Depth Range (m) (m OD)	Average Eu (MPa)	Average E '(MPa)
Made Ground	GL to 2.00 (37.50 to 35.50)	10.1	6.1
Alluvium	2.00 to 3.60 (35.50 to 33.90)	15.5	9.3
London Clay (weathered)	3.60 to 6.50 (33.90 to 31.00)	34.1	20.5
London Clay (unweathered)	6.50 to 27.00 (37.50 to -19.50)	132.9	79.7

10.2.2 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.

Location	Short term movement (mm)	Total movement (mm)
Maximum movement - towards the centre of proposed basement	-10	-22
Along basement walls	-2 to -5	-3 to -7
Note: -ve values denote heave		

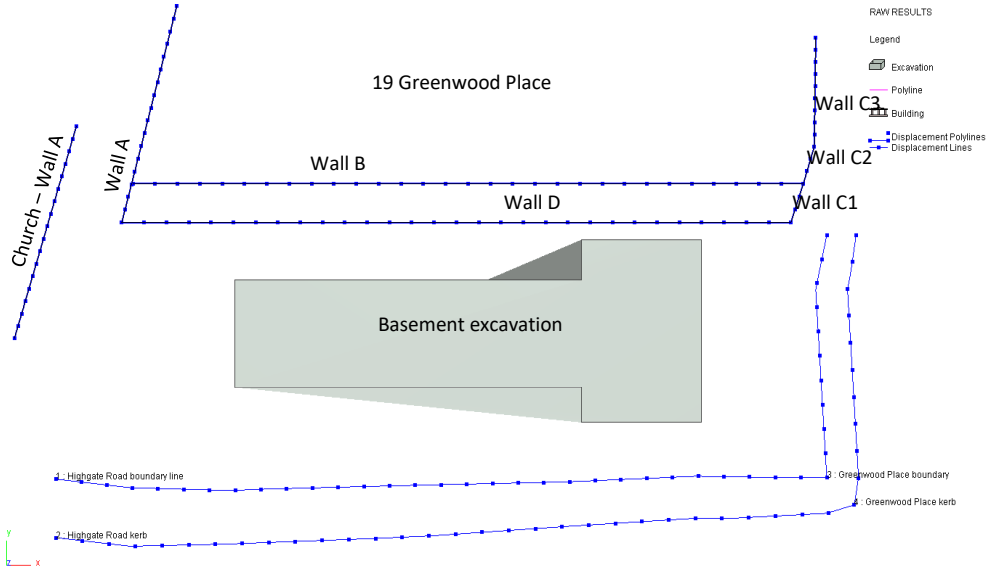
The P-Disp analysis indicates that, by the time the basement construction is complete, up to 22 mm of heave is likely to have taken place beneath the area of the basement. Given that no load is to be applied at formation level, instead taken down to depth through the piles, there will be limited force counteracting the heave of the clay, hence the relative high uplift forces.

If a compressible material is used beneath the slab, it will need to be designed to be able to resist the potential uplift forces generated by the ground movements. In this respect, potential heave pressures are typically taken to equate to around 40% of the total unloading pressure.

11.0 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 C760[26].

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

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

11.1 Damage to Neighbouring Structures

The ground movements resulting from the piling and 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 indicate that predominantly the damage to the adjoining and nearby structures due to basement construction are between damage categories 'Negligible (0)'. A summary of the structures indicated as affected is included below.

Structure	Elevation	Max tensile strain %	Category*
19 Greenwood Place	Wall A	0.003	Negligible (0)
	Wall B	0.016	Negligible (0)
	Wall C1	0.002	Negligible (0)
	Wall C2	0.004	Negligible (0)
	Wall C3	0.003	Negligible (0)
	Wall D	0.020	Negligible (0)
Church	Wall A	0.005	Negligible (0)

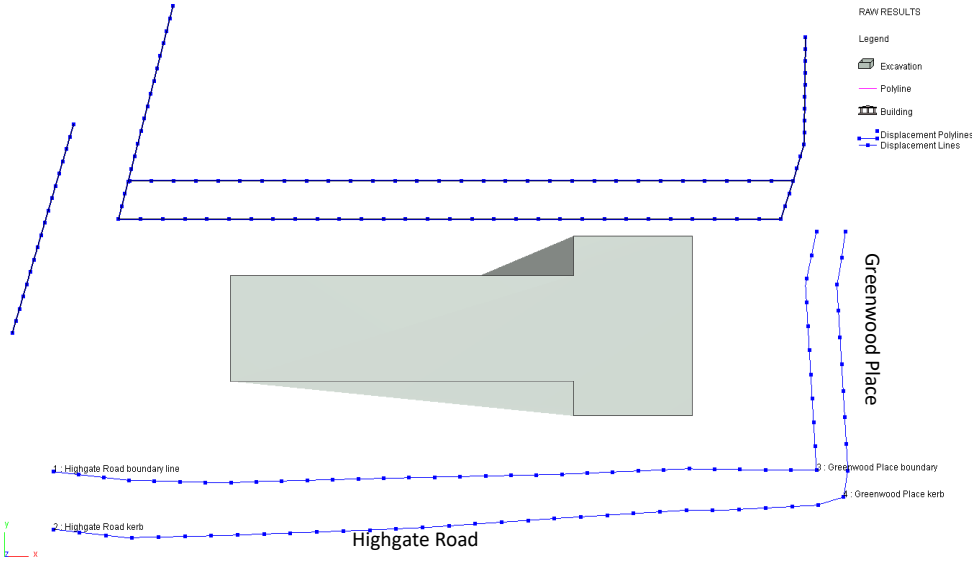
*From Table 6.4 of C760: Classification of visible damage to walls.

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.

11.2 Damage to Highways

In assessing the impact of the proposed basement construction on the surrounding highways, the basement shape has been modelled as an irregular polygon as shown below and the boundary line and kerb lines to the surrounding highways modelled as follows ;



The ground movements resulting from the piling and basement excavation phases have been calculated using X-Disp modelling software to carry out an assessment of the likely damage to the adjacent highways. The displacement graphs for each of the boundary lines and kerb lines to Greenwood Place to the northwest and Highgate Road to the north are appended and indicate precited movements of less than 5 mm, such that the proposed basement is not considered likely to impact on the surrounding highways.

11.3 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.

12.0 GMA Conclusions

The analysis has concluded that the predicted damage to the neighbouring properties from the construction of the proposed basements would be 'Negligible'. Negligible movements of predominantly less than 5 mm are also anticipated for the surrounding highways.

On this basis, the damage that has been predicted to occur as a result of the construction the proposed basement falls within the limits acceptable to the London Borough of Camden assuming that the careful control is taken during construction of the proposed excavations, and monitoring will be required to ensure that no excessive movements occur that would lead to damage in excess of these limits.

The separate phases of work, including piling and subsequent excavation of the proposed basement, will in practice be separated by a number of weeks. This will provide an opportunity for the ground movements during and immediately after 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.

Part 4: Basement Impact Assessment

This section of the report evaluates the direct and indirect implications of the proposed project, based on the findings of the previous screening and scoping, site investigation and ground movement assessment.

13.0 Introduction

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

13.1 Potential Impacts

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

Potential Impact	Consequence
The proposed basement extends beneath the water table surface.	A continuous groundwater table was not encountered during the investigation. Groundwater may be encountered within the Alluvium, but this is expected to be perched and is unlikely to form a continuous water table beneath the site. It is therefore considered that significant inflows are unlikely to be encountered, although this does not eliminate a requirement for potential mitigation measures during basement construction.
A tributary of the River Fleet flowed through the site.	The River Fleet has been culverted so will not be affected by the proposed basement development.
London Clay is the shallowest strata at the site.	The London Clay is prone to seasonal shrink-swell (subsidence and heave), but the investigation has confirmed that Alluvium is actually the shallowest strata. Alluvium has a low to moderate volume change potential and therefore seasonal shrink-swell will be less significant.
A number of trees will be felled as part of the development.	It is likely that a number of trees will be felled during the proposed development. However, whilst shrinkable soils are present at shallow depth, there are no critical slope angles that are dependent on the presence of the existing trees to aid long term stability.
Seasonal shrink-swell can result in foundation movements.	Multiple potential impacts depending on the specific setting of the basement development. For example, the implications of a deepened basement/foundation system on neighbouring properties should be considered.
The development is located within 5 m of both Highgate Road and Greenwood Place	Should the design of retaining walls and foundations not take into account the presence of nearby infrastructure, it may lead to the structural damage of footways, highways and associated buried services.
The basement will increase the foundation depths relative to the neighbouring properties.	The stability of neighbouring structures will need to be ensured throughout the development. A ground movement analysis and building damage assessment has been carried out and reported in Part 3 of this report.
A Thames Water sewer is known to extend beneath the southeastern corner of the site.	The stability of the sewer will need to be ensured throughout the development. A ground movement analysis including a preliminary Thames Water sewer analysis has been carried out to predict the likely movements as a result of the excavation and impact on the Thames Water asset.
The site is located within an area where low to medium risk of surface water flooding exists.	According to the FRA, the risk of surface water flooding on the site will be mitigated by providing attenuation to ensure flooding does not occur for all rainfall events up to the 1% AEP event + 40% climate change allowance. In addition, the ground floor level will be set to a level of 37.41 m OD, which is above the level of adjacent roads and will ensure there is no low point on the site, meaning flooding from the adjacent roads does not fall onto the site. The basement will be accessed from within the building at ground-floor level, and therefore will be protected from surface water flooding for rainfall events up to the 1% AEP event + 40% climate change allowance.

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

The proposed basement may extend beneath the water table surface

Alluvium is present directly beneath the made ground. This soil was found to be generally clayey in nature during the investigation, such that it is considered to have the hydraulic characteristics similar to that of Unproductive Strata. A continuous groundwater table is

therefore unlikely to be present within the shallow clay soils beneath the site, although perched groundwater may be present within the made ground and granular pockets within the Alluvium.

Given the above and the fact that there will be space around and beneath the proposed basement construction, it is not considered that it will have any significant influence on the local hydrogeology and will not therefore have any potential impact on any adjoining sites.

However, groundwater protection measures will be required as part of the proposed basement construction due to the potential for isolated inflows from the made ground and granular pockets within the underlying Alluvium. It is anticipated that a provision for sump pumping will be adequate with respect to this development although it would be prudent, as with any site, for the chosen contractor to have a contingency plan in place to deal with any short or long-term inflows that are more significant than expected.

The site is located within 100 m of a former river course

A tributary of the River Fleet flowed through the site. However, this feature was perched on the London Clay and historically developed over. It is understood to have been culverted.

With the former water course being captured within the existing sewer network, excavations will not alter the groundwater flow regime.

Where Alluvium is present, the predominantly clay nature of this soil is unlikely to store or transmit significant quantities of groundwater under normal hydraulic conditions and is therefore unlikely to support a continuous water table, such as would be found within a porous and permeable saturated stratum with a predominantly granular soil matrix. It is therefore considered that the proposed development in this area would not impact the groundwater regime.

The site is underlain by Alluvium over London Clay which would be subject to seasonal shrink-swell

Shrinkable clay is present within a depth that can be affected by tree roots. Numerous trees are present on the site, and desiccation was noted in one of the boreholes located in close proximity to an existing tree. However, the proposed basement and piled foundations will extend to a depth such that new foundations will bypass any desiccated soils.

Subject to inspection of excavations in the normal way to ensure that there is not significant unexpectedly deep root growth, it is not considered that the occurrence of shrink-swell issues in the local area has any bearing on the proposed development.

Location of public highway

The basement excavation will extend to within 5.00 m from the boundary and pavements of both Highgate Road and Greenwood Place and therefore the basement excavation may affect the highways. The analysis has however indicated negligible movements of predominantly less than 3 mm along the boundary edges and kerb lines, with movements of less than 5 mm predicted along the boundary line to Highgate Road closest to the northern point of the basement excavation.

The proposed development will include retaining walls that will be designed to maintain the stability of the surrounding ground, thus protecting the adjacent road and associated infrastructure beyond.

There is nothing unusual or exceptional in the proposed development or the findings of the previous investigation that give rise to any concerns with regard to stability over and above any development of this nature, although this will be confirmed through further site investigation.

Trees will be felled during the development

It is likely that a number of trees will be felled during the proposed development. However, whilst shrinkable soils are present at shallow depth, there are no critical slope angles that are dependent on the presence of the existing trees to aid long term stability.

Due to the distance of the neighbouring structures from the trees in question, it is considered that no nearby foundations are likely to be within the zone of influence of the trees to be removed, whilst the proposed basement beneath this structure will extend to sufficient depth to bypass any potentially desiccated soils.

An arboricultural development statement completed by CBA Trees (report ref CBA11577 v1, dated November 2021), indicates that the felling of these trees is not therefore expected to impact on the proposed development or any of the neighbouring properties.

Differential founding depths / Neighbouring structures

The proposed basement is expected to extend to a depth of approximately 3.0 m, such that ground movements as a result of the proposed excavations would be expected to reduce to zero at a distance of approximately 12 m, corresponding to four times the retained height,

based on the CIRIA ground movement curve for an 'excavation in front of a stiff wall in stiff clay' (Fig 6.15a of CIRIA C760). As the adjacent self-storage warehouse, No 19 Greenwood Place, and the Church to the south of the site are within this zone. The stability of the structures has been considered as part of a ground movement analysis and building damage assessment reported in Part 3. The analysis found that movements are anticipated to be negligible (Category 0) and as such, the proposed basement construction and excavation are unlikely to impact the adjacent structures.

A Thames Water Sewer is located in close proximity to the proposed new building and basement

A Thames Water storm relief main runs beneath the footpath adjacent to the northeast side of the site, as shown on the Thames Water map extract included in Section 2.2. A survey of the sewer has indicated it to be 1.22 m in diameter and to have an invert level of approximately 26 m OD, rough 11.5 m below ground level. It is thought that this could be associated with the culverted River Fleet.

The proposed development is likely to be supported on piled foundations, which would be designed to allow for the 1.50 m exclusion zone around the main. However, this will need to be agreed with Thames Water and will be subject to a build over agreement.

As movements associated with the installation and excavation in front of the proposed retaining structures will reduce with depth, it is unlikely that the sewer will be subject to any significant movement.

A survey of the sewer has been completed to determine its exact location and condition. An initial analysis of the impact on the sewer as a result of the proposed development is underway and will be reported separately.

The site is within an area where a low to medium risk of surface water flooding exists.

According to the FRA, the risk of surface water flooding on the site will be mitigated by providing attenuation to ensure flooding does not occur for all rainfall events up to the 1% AEP event + 40% climate change allowance. In addition, the ground floor level will be set to a level of 37.41 m OD, which is above the level of adjacent roads and will ensure there is no low point on the site, meaning flooding from the adjacent roads does not fall onto the site. The basement will be accessed from within the building at ground-floor level, and therefore will be protected from surface water flooding for rainfall events up to the 1% AEP event + 40% climate change allowance.

The risk of surface water flooding to off-site areas as a result of the development will be mitigated by implementation of a sustainable drainage strategy which will provide source control for rainfall landing on the site and reduce the run-off rate from the site into off-site drainage networks. The basement will be located beneath the building footprint, so will not contribute additionally to surface water run-off from the site.

In accordance with paragraph 5.11 of the CPG, a positive pumped device will need to be installed in the basement in order to further protect the site from sewer flooding.

13.2 BIA Conclusions

A Basement Impact Assessment has been carried out following the information and guidance published by the London Borough of Camden. It is concluded that the proposed development is unlikely to result in any specific land or slope stability issues.

13.3 Non-Technical Summary of Evidence

This section provides a short summary of the evidence acquired and used to form the conclusions made within the BIA.

13.3.1 Screening

The following table provides the evidence used to answer the subterranean (groundwater flow) screening questions.

The following table provides the evidence used to answer the slope stability screening questions.

Question	Evidence
1. Does the existing site include slopes, natural or manmade, greater than 7°?	Topographical maps and Figures 16 and 17 of the Arup report and confirmed during a site walkover
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	The details of the proposed development provided do not include the re-profiling of the site to create new slopes

Question	Evidence
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	Topographical maps and Figures 16 and 17 of the Arup report
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	
5. Is the London Clay the shallowest strata at the site?	Geological maps and Figures 3, 5 and 8 of the Arup report
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	The details of the proposed development and reference to a site specific arboricultural development statement completed by CBA trees.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	Knowledge on the ground conditions of the area and reference to NHBC guidelines were used to make an assessment of this, in addition to a visual inspection of the buildings carried out during the site walkover.
8. Is the site within 100 m of a watercourse or potential spring line?	Topographical maps acquired as part of the desk study and Figures 11 and 12 of the Arup report
9. Is the site within an area of previously worked ground?	Geological maps and Figures 3, 5 and 8 of the Arup report
10. Is the site within an aquifer?	Aquifer designation maps acquired from the Environment Agency as part of the desk study and Figures 3, 5 and 8 of the Arup report.
11. Is the site within 50 m of Hampstead Heath ponds?	Topographical maps acquired as part of the desk study and Figures 12 and 14 of the Arup report
12. Is the site within 5 m of a highway or pedestrian right of way?	Site plans and the site walkover.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Camden planning portal and the site walkover confirmed the position of the proposed basement relative the neighbouring properties.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	Maps and plans of infrastructure tunnels were reviewed.

The following table provides the evidence used to answer the surface water flow and flooding screening questions.

Question	Evidence
1. Is the site within the catchment of the pond chains on Hampstead Heath?	Topographical maps acquired as part of the desk study and Figures 12 and 14 of the Arup report
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	A site walkover confirmed the current site conditions and the details provided on the proposed development, including reference to the FRA for the site.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	
5. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	
6. Is the site in an area known to be at risk from surface water flooding such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding because the proposed basement is below the static water level of a nearby surface water feature?	Flood risk maps acquired from the Environment Agency as part of the desk study, Figure 15 of the Arup report, the Camden Flood Risk Management Strategy dated 2013 and the North London Strategic Flood Risk Assessment dated 2008, and reference to the site specific FRA completed by Engineeria.

13.3.2 Scoping and Site Investigation

The questions in the screening stage that there were answered ‘yes’, were taken forward to a scoping stage and the potential impacts discussed in Section 4.0 of this report, with reference to the possible impacts outlined in the Arup report.

A ground investigation has been carried out, which has allowed an assessment of the potential impacts of the basement development on the various receptors identified from the screening and scoping stages. Principally the investigation aimed to establish the ground conditions, including the groundwater level, the engineering properties of the underlying soils to enable suitable design of the basement development and the configuration of existing party wall foundations. The findings of the investigation are discussed in Section 5.0 of this report and summarized in both Section 7.0 and the Executive Summary.

13.3.3 Impact Assessment

Section 13.0 of this report summarises whether, on the basis of the findings of the investigation, the potential impacts still need to be given consideration and identifies ongoing risks that will require suitable engineering mitigation. Section 9.0 of this report also provides recommendations for the design of the proposed development.

A ground movement analysis and building damage assessment has been carried out and its findings are presented in Part 3.

14.0 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.

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

As discussed throughout the report, perched water is likely to be encountered during the basement excavation, although the findings of the investigation indicate that potential inflows are unlikely to be significant and should be adequately dealt with through sump pumping. However, groundwater monitoring should be continued for as long as possible prior to construction, and trial excavations should be considered to assess the extent of inflows to be expected within the proposed basement excavations.

The investigation has identified the presence of some discoloured soils and contamination in the vicinity of the petrol interceptor and across the site. The interceptor is due to be removed along with any discoloured soil surrounding it. Some of the made ground will also be removed from this site through the excavation of the proposed basement and large areas are covered by hardstanding such that, remedial measures should not be required, other than where areas of soft landscaping are to be formed. However, as with any site there is a potential for further areas of contamination to be present within the made ground beneath parts of the site not covered by the investigation it is recommended that a watching brief is maintained during any groundworks for the proposed new foundations and that if any suspicious soils are encountered that they are inspected by a geo-environmental engineer and further assessment may be required. There may be a requirement for a remediation proposals report to comply with planning requirements and a verification report will be required.

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

Appendix

a. Field Work

Site Plan
Borehole Records
Trial Pit Records
Monitoring Results

b. Lab Testing

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

c. Desk Study

Development Proposals
Envirocheck Extracts
Historical Maps
Risk Assessment Tables
UXO Preliminary Risk Assessment
Service Searches
CCTV Drainage Survey
Thames Water Sewer Survey

d. Ground Movement Analysis

XDisp Analysis – All Input Data
XDisp Analysis – Installation Movements
XDisp Analysis – Installation & Excavation Movements
XDisp Analysis – Building Damage Assessment Results
XDisp Analysis – Highways Assessment Results
PDisp Analysis – All Input Data
PDisp Analysis – Short Term Movements
PDisp Analysis – Total Movements

appendix a

Field Work

Site Plan
Borehole Records
Trial Pit Records
Gas Monitoring Results

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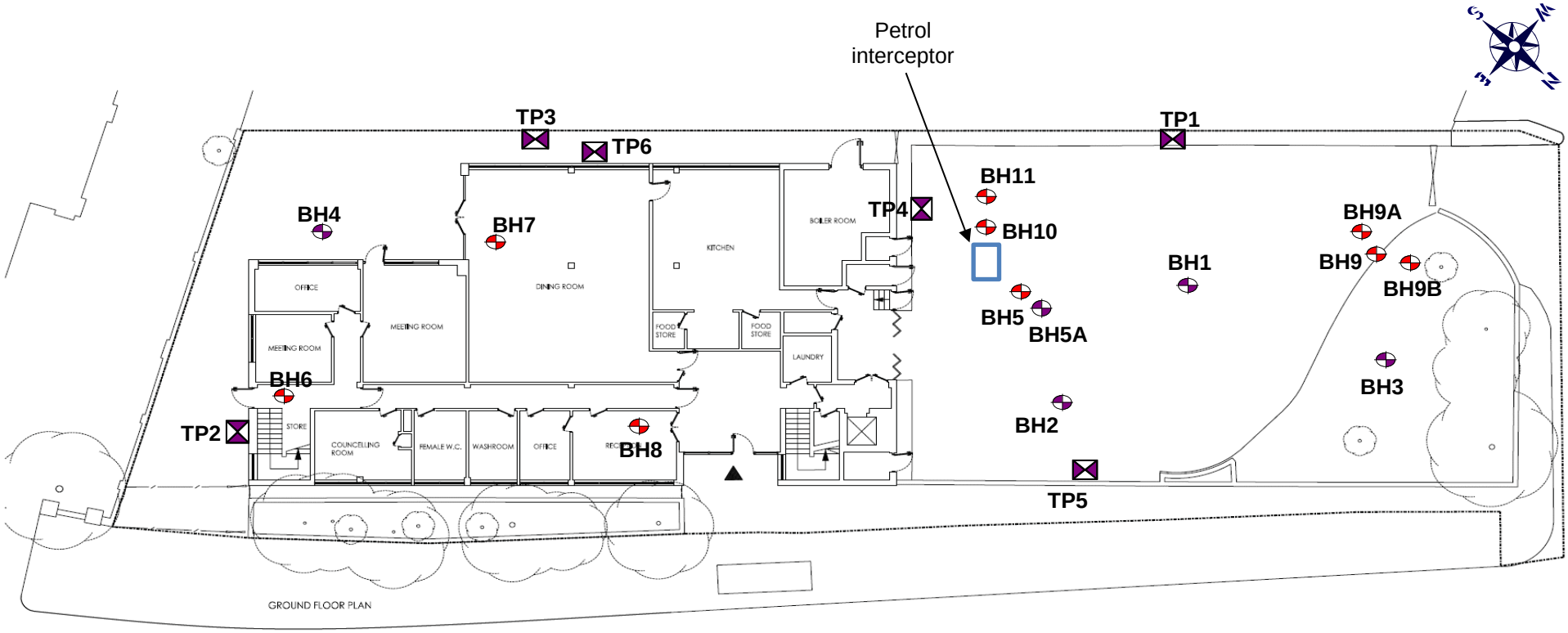
Site Plan

Site	19-37 Highgate Road, London NW5 1NT
Client	GM Developments London
Engineer	Engineeria

Job Number J21343

Sheet 1 / 1



Highgate Road

Position of borehole during preliminary phase of investigation

Position of trial pit during preliminary phase of investigation

Position of borehole during secondary phase of investigation

0 10 20

Approximate Scale in metres

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH1**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	13-12-21 15-12-21	36.70		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.60		0.10	Tarmac over concrete	
0.40	D					(0.70)	MADE GROUND (brick and concrete rubble)	
				35.90		0.80		
1.00	D						Soft becoming firm low strength brown mottled orange-brown silty sandy CLAY with sandy lenses, occasional pockets of gravel and carbonaceous material	
1.20-1.65	U							
1.70	D							
2.00	S	1,1/2,1,1,2 N60 = 6				(2.60)		
2.70	D						2.70 ... becoming soft	
3.00-3.45	U							
			1	33.30		3.40		
3.40	D			33.10		3.60	Soft brown mottled grey sandy gravelly CLAY	
3.80	D						Firm becoming stiff fissured high becoming very high strength brown mottled grey silty CLAY with occasional sandy lenses and fine mica	
4.00	S	9,10/11,6,5,5 N60 = 29	2				4.10 ... Claystone	
4.80	D							
5.00-5.45	U							
5.50	D							
6.00	S	3,3/3,4,4,5 N60 = 17					6.00 ... becoming dark brown	
7.50-7.95	U							
8.00	D							
9.00	S	3,3/4,5,5,6 N60 = 21						
9.80	D							

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth
3.50	13-12-21	10.00	3.00	150	3.5
4.30	13-12-21	11.00	4.00	150	4.3
6.50	13-12-21	16.00	6.00	150	DRY
6.50	14-12-21	08.30	6.00	150	DRY

GENERAL REMARKS

Inspection pit dug to 1.20 m
30 mins spent chiselling on claystone at 13.30 m
30 mins spent chiselling on claystone at 18.10 m
30 mins spent chiselling on claystone at 27.30 m
30 mins spent erecting and dismantling fencing

All dimensions in metres Scale 1:62.5	Method/ Plant Used Cable percussion rig	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH1**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	13-12-21 15-12-21	36.70		
Client		Engineer		Sheet
GM Developments London		Engineeria		2 of 3

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							Firm becoming stiff fissured high becoming very high strength brown mottled grey silty CLAY with occasional sandy lenses and fine mica(continued)	
10.50-10.95	U							
11.00	D						11.00 ... becoming dark brownish grey	
12.00	S	4,5/6,6,7,8 N60 = 29						
							13.30 ... Claystone	
13.70	D							
13.80-14.25	U							
14.30	D							
15.00	S	5,6/7,7,8,8 N60 = 32						
16.50-16.95	U					(26.40)		
17.00	D							
18.00	S	7,30/50 N = 50/0 mm						
							18.30 ... Claystone	
19.50-19.95	U							

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth
18.30	14-12-21	16.00	6.00	150	DRY
18.30	15-12-21	08.30	6.00	150	DRY

GENERAL REMARKS

Inspection pit dug to 1.20 m
30 mins spent chiselling on claystone at 13.30 m
30 mins spent chiselling on claystone at 18.10 m
30 mins spent chiselling on claystone at 27.30 m
30 mins spent erecting and dismantling fencing

All dimensions in metres Scale 1:62.5	Method/ Plant Used Cable percussion rig	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH1**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	13-12-21 15-12-21	36.70		
Client		Engineer		Sheet
GM Developments London		Engineeria		3 of 3

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
20.00	D						Firm becoming stiff fissured high becoming very high strength brown mottled grey silty CLAY with occasional sandy lenses and fine mica(continued)	
21.00	S	8,11/11,11,12,13 N60 = 50						
22.50-22.95	U							
23.00	D							
24.00	S	17,13/11,13,13,14 N60 = 54					24.00 ... Claystone	
25.50-25.95	U							
26.00	D							
27.00	S	12,13/16,32 N = 48/150 mm					27.30 ... Claystone	
28.50-28.95	U							
29.00	D							
29.50	S	12,14/16,16,17,18 N60 = 71		6.70		30.00		

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth
30.00	15-12-21	16.00	6.00	150	DRY

GENERAL REMARKS

Inspection pit dug to 1.20 m
30 mins spent chiselling on claystone at 13.30 m
30 mins spent chiselling on claystone at 18.10 m
30 mins spent chiselling on claystone at 27.30 m
30 mins spent erecting and dismantling fencing

All dimensions in metres Scale 1:62.5	Method/ Plant Used Cable percussion rig	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH2**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	02-12-21	36.70		
Client	Engineer			Sheet
GM Developments London	Engineeria			1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.58		0.12	Tarmac over concrete	
0.40	D			35.90		(0.68) 0.80	MADE GROUND (reddish brown brick and concrete rubble with fragments of clinker and clay tile)	
1.10	D	2,2/2,2,2,2 N60 = 9		35.20		(0.70) 1.50	Soft orange-brown mottled grey silty slightly sandy CLAY	
1.60	D			34.70		(0.50) 2.00	Stiff orange-brown mottled grey silty slightly sandy CLAY with rare rootlets	
2.20	D	2,2/2,3,3,3 N60 = 12		34.10		(0.60) 2.60	Soft brown silty sandy slightly gravelly CLAY with occasional charcoal	
2.80	D	3,3/3,3,3,3 N60 = 14					Firm becoming stiff brown mottled grey silty slightly sandy CLAY with occasional sandy lenses	
3.80	D	3,3/3,3,3,4 N60 = 15				(2.85)	3.90 ... Claystone	
4.80	D	4,4/4,5,4,5 N60 = 20		31.25		5.45		

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH3**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	02-12-21	36.97		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.50	D			35.77		(1.20) 1.20	MADE GROUND (dark brown clayey gravelly sand with fragments of brick, concrete and metal and occasional rootlets)	
		5,4/3,4,4,4 N60 = 17 PP = 4.5 PP = 4.5 PP = 4.5		34.97		(0.80) 2.00	Stiff brown mottled grey desiccated silty sandy CLAY with roots up to 10 mm and rootlets	
		2,2/2,2,2,3 N60 = 10 PP = 4.0 PP = 1.5 PP = 2.5 PP = 3.0		34.47		(0.50) 2.50	Firm becoming stiff orange-brown desiccated silty sandy gravelly CLAY	
		3,3/3,3,5,5 N60 = 18 PP = 2.5 PP = 2.0 3,3/3,4,4,5 N60 = 18				(2.95)	Firm becoming stiff fissured brown mottled grey silty CLAY	
		4,4/4,4,4,4 N60 = 18		31.52		5.45		

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH4**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	02-12-21	37.47		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.50	D	0,0/1,0,1,0 N60 = 2		35.47		(2.00) 2.00	Paving slabs over MADE GROUND (brown sandy gravelly CLAY with fragments of brick and concrete)	
		1/50 N = 50/0 mm						

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Inspection pit dug to 1.20 m
Borehole terminated at 2.00 m due to refusal on concrete obstruction
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH5**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	02-12-21 07-03-22	36.70		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.58		0.12	Tarmac over concrete	
0.50	D	PID = 0.1 ppm				(1.08)	MADE GROUND (dark brown sandy clay with sandy pockets, flint and fragments of brick, concrete, charcoal and possible asbestos)	
		1,2/1,2,1,2 N60 = 7	1	35.50		1.20		
		PID = 0.1 ppm					Firm orange-brown mottled grey silty sandy CLAY with rootlets and occasional carbonaceous material	
1.50	D	PID = 0 ppm					1.50 ... locally soft	
2.00	D	1,2/2,2,3,4 N60 = 12				(1.60)	1.90 ... becoming stiff 1.90 - 2.00 ... locally gravelly	
		PID = 0 ppm						
2.50	D			33.90		2.80		
3.00	D	2,2/3,4,4,4 N60 = 17					Stiff fissured brown mottled grey silty sandy CLAY with selenite crystals and sandy partings	
			2					
		8,4/3,3,4,4 N60 = 16				(2.65)	3.90 Claystone	
4.50	D							
		3,4/4,4,5,5 N60 = 20		31.25		5.45		

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth
1.20	07-03-22	09.30			Seepage
4.00	07-03-22	10.00			Seepage
5.00	07-03-22	10.30			DRY

GENERAL REMARKS

Inspection pit dug to 0.30 m, but terminated due to presence of suspected asbestos
Re-excavated and drilled with protection measures in place

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH5A**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	02-12-21	36.70		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.58		0.12	Tarmac over concrete	
0.20	D			36.40		0.30	MADE GROUND (brick rubble with asbestos)	

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Inspection pit dug to 0.30 m, but terminated due to presence of suspected asbestos
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

GEA

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH6**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	08-03-22	37.50		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				37.20		0.30	Concrete	
				37.00		0.50	MADE GROUND (brick and concrete rubble)	
			▼			(1.50)	MADE GROUND (brown sandy gravelly clay with flint and fragments of brick, concrete and clinker, roots up to 10 mm and rootlets) 1.00 - 1.50 Poor recovery	
1.80	D	PID = 0 ppm		35.50		2.00	1.80 - 2.00 ... locally dark grey discolouring with hydrocarbon odour	
				35.00		(0.50) 2.50	Soft becoming firm brown silty sandy slightly gravelly CLAY	

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Bitumen flooring removed prior to attendance
Concrete slab cored
Borehole terminated at 2.50 m due to refusal
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Window sampler	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH7**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	08-03-22	37.50		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				37.10		0.40	Concrete	
0.90	D			36.00		(1.10) 1.50	MADE GROUND (brown sandy gravelly clay with flint and fragments of brick, concrete and clinker and rootlets)	
			▼	35.00		(1.00) 2.50	Soft locally firm brown silty sandy gravelly CLAY with rootlets	

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Bitumen flooring removed prior to attendance
Concrete slab cored
Borehole terminated at 2.50 m due to refusal
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Window sampler	Logged By GC

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Geotechnical & Environmental Associates

Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH8**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	08-03-22	37.50		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				37.20		0.30	Reinforced concrete	
				37.00		0.50	MADE GROUND (brick and clinker rubble)	
0.80	D					(2.00)	MADE GROUND (brown sandy gravelly clay with fragments of brick and clinker) 1.30 - 2.50 Poor Recovery	
				35.00		2.50		
				34.50		(0.50) 3.00	Firm brown silty sandy CLAY with selenite crystals	

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Bitumen flooring removed prior to attendance
Concrete slab cored
Borehole terminated at 3.00 m due to refusal
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Window sampler	Logged By GC

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Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH9**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	07-03-22	36.76		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.64		0.12	Tarmac over concrete	
				36.36		0.40	MADE GROUND (brick rubble)	
0.50	D	PID = 0.4 ppm		36.26		0.50	Concrete containing a drain	

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Inspection pit dug to 0.50 m
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

Report ID: CABLE PERCUSSION || Project: J21343 - 19-37 HIGHGATE ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 19 May 2022

GEA

Geotechnical & Environmental Associates

Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH9A**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	07-03-22	36.76		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.64		0.12	Tarmac over concrete	
				36.36		0.40	MADE GROUND (brick rubble)	

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Inspection pit dug to 0.40 m
Borehole terminated at 0.40 m due to concrete obstruction
Groundwater not encountered

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

Report ID: CABLE PERCUSSION || Project: J21343 - 19-37 HIGHGATE ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 19 May 2022

GEA

Geotechnical & Environmental Associates

Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH9B**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	07-03-22	36.76		
Client		Engineer		Sheet
GM Developments London		Engineeria		1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.61		0.15	Reinforced concrete	
		PID = 0.1 ppm				(0.75)	MADE GROUND (brick rubble)	
		PID = 0.1 ppm 1,2/2,2,2,2 N60 = 9 PP = 1.0 PP = 1.5		35.86		0.90	Soft becoming firm brown mottled grey silty sandy CLAY with rootlets and occasional carbonaceous material	
		2,3/2,3,3,3 N60 = 12 PP = 2.0 PP = 2.0				(2.60)		
		2,2/2,3,2,3 N60 = 11 PP = 2.0 PP = 2.0		33.26		3.50	Stiff fissured silty CLAY with sandy lenses and selenite crystals	
		2,3/6,8,4,4 N60 = 25 PP = 3.0		32.31		(0.95) 4.45		

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS
Inspection pit dug to 1.20 m

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

Report ID: CABLE PERCUSSION || Project: J21343 - 19-37 HIGHGATE ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 19 May 2022

GEA

Geotechnical & Environmental Associates

Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH10**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	07-03-22	36.70		
Client	Engineer			Sheet
GM Developments London	Engineeria			1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.58		0.12	Tarmac over concrete	
0.50	D	PID = 0.2 ppm				(0.98)	MADE GROUND (brick rubble with fragments of concrete and tarmac)	
			1	35.60		1.10		
1.10	D	PID = 0.2 ppm		35.50		1.20	MADE GROUND (black sandy gravelly clay) - strong petrol odour	
		PID = 0.2 ppm				(1.80)	Soft becoming firm dark grey mottled brown sandy gravelly CLAY with rootlets and occasional carbonaceous material 1.60 ... becoming stiff 1.80 - 2.00 ... locally gravelly	
				33.70		3.00		
						(2.45)	Stiff fissured brown silty CLAY with sandy lenses	
				31.25		5.45		

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS
Inspection pit dug to 1.20 m

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

Report ID: CABLE PERCUSSION || Project: J21343 - 19-37 HIGHGATE ROAD.GPJ || Library: GEA LIBRARY.GLB || Date: 19 May 2022

GEA

Geotechnical & Environmental Associates

Project				BOREHOLE No
19-37 Highgate Road, London NW5 1NT				**BH11**
Job No	Date	Ground Level (m OD)	Co-Ordinates ()	
J21343B	07-03-22	36.70		
Client	Engineer			Sheet
GM Developments London	Engineeria			1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
				36.58		0.12	Tarmac over concrete	
				36.20		0.50	MADE GROUND (brck rubble)	
0.80	D	PID = 0.1 ppm		35.80		0.90	MADE GROUND (black sandy gravelly clay with brick and concrete rubble)	
			▼			(2.10)	Firm grey mottled dark brown sandy slightly gravelly CLAY with occasional carbonaceous material and rootlets 1.40 - 1.60 ... locally soft 1.70 ... becoming stiff 2.10 ... locally very gravelly	
				33.70		3.00		

Boring Progress and Water Observations

Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

GENERAL REMARKS

Inspection pit dug to 1.20 m

All dimensions in metres Scale 1:62.5	Method/ Plant Used Opendrive sampling rig	Logged By GC

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GEA

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Trial Pit No 1

Site	**19-37 Highgate Road, London, NW5 1NT**
Client	**GM Developments London**
Engineer	**Engineeria**

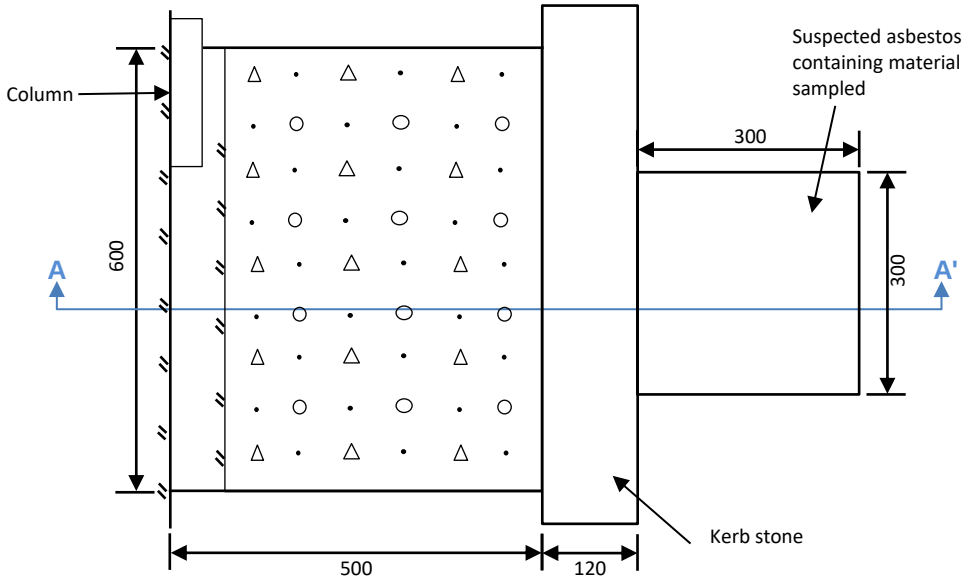
Job Number J21343B

Sheet 1/6

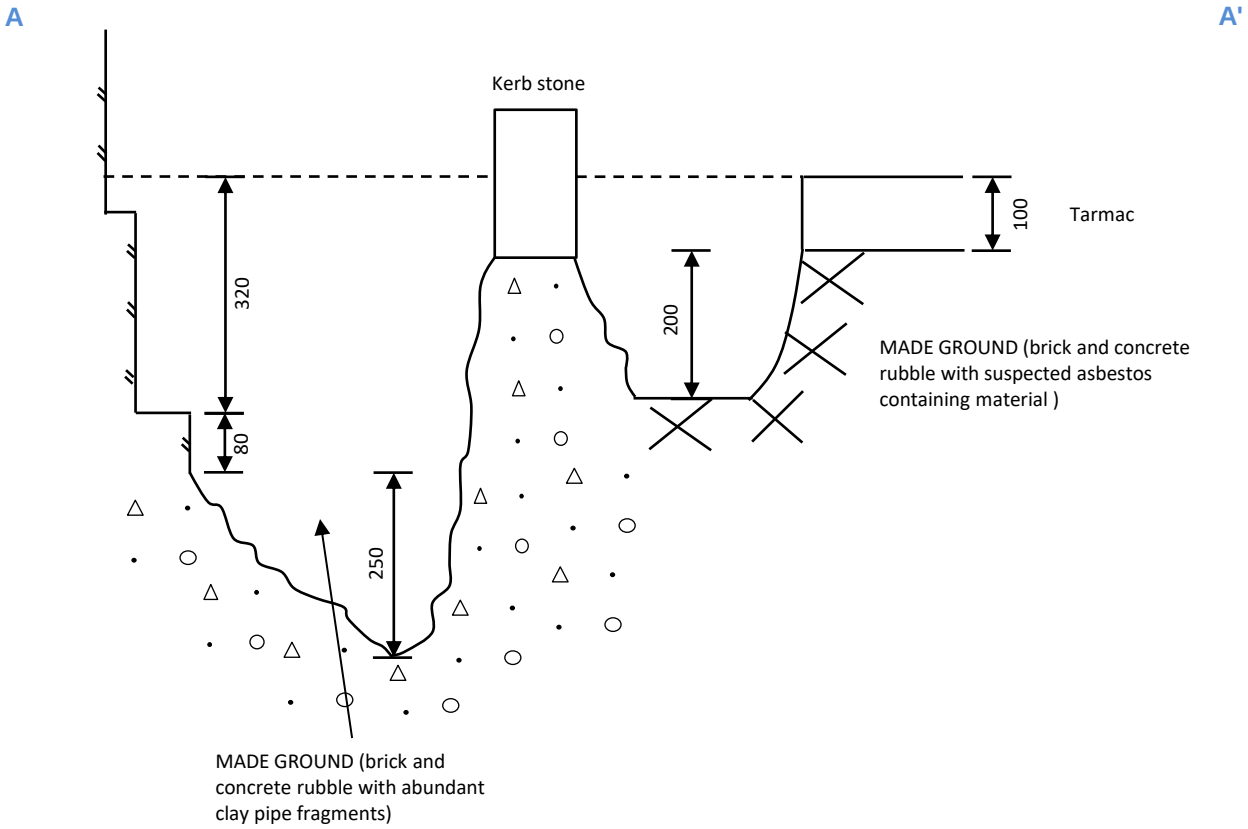
Dates 13/12/2021

Excavation Method	Dimensions	Ground Level (mOD)	Location
Manual	500 x 600 x 650	36.80	SW boundary of site with adjoining building

Plan: -



Section A - A': -



Remarks:

PID screening = 0 ppm

Trial pit backfiled upon completion

Scale: Approx 1:10

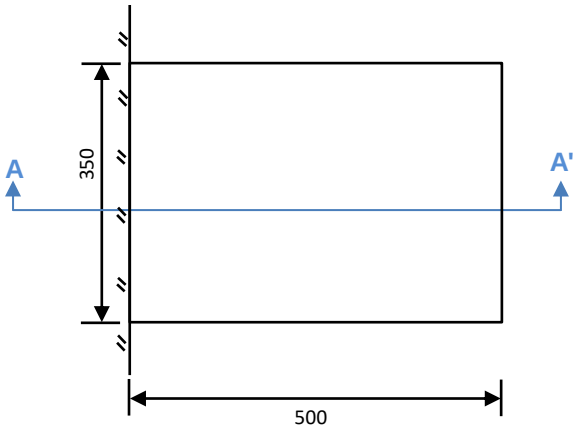
Logged by: GC

GEA	www.gea-ltd.co.uk Herts | 01727 824666 Notts | 01509 674888	**Trial Pit No** 2

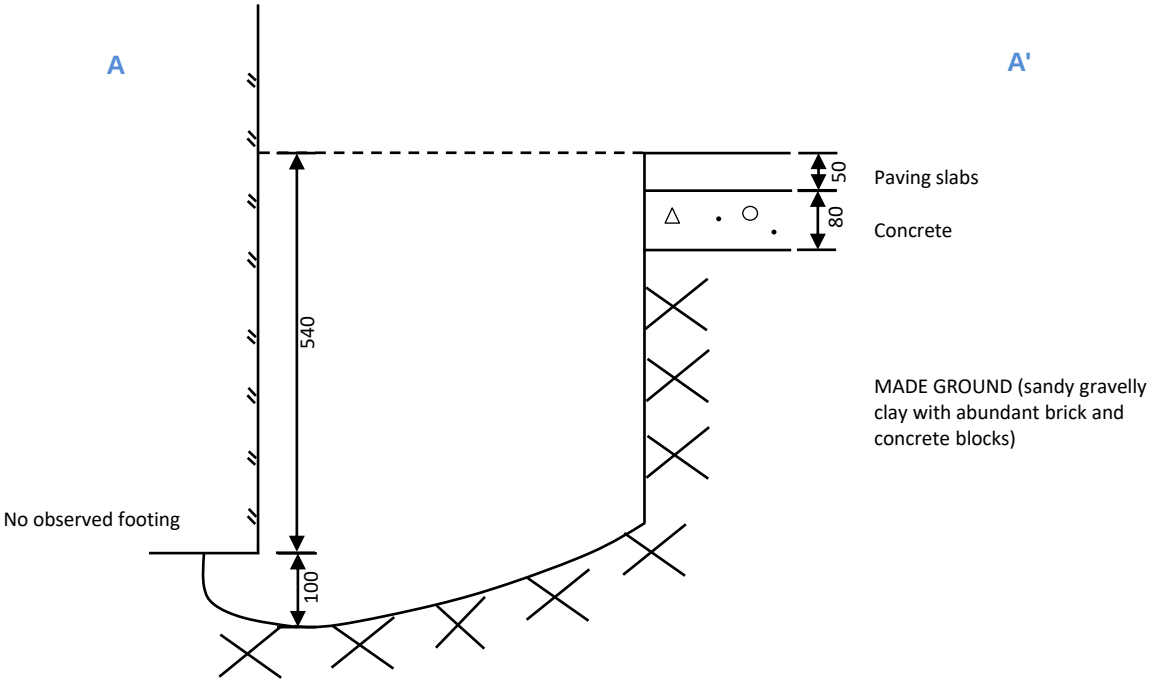
Site	**19-37 Highgate Road, London, NW5 1NT**	**Job Number** J21343B
Client	**GM Developments London**	**Sheet** 2/6
Engineer	**Engineeria**	**Dates** 13/12/2021

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Location**
Manual	500 x 350 x 640	37.47	SE elevation of existing building

Plan: -



Section A - A': -



Remarks:	Scale:
PID screening = 0 ppm Contamination sample at 0.3 m Trial pit backfiled upon completion	Approx 1:10
	Logged by: GC

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Trial Pit No 3

Site	**19-37 Highgate Road, London, NW5 1NT**
Client	**GM Developments London**
Engineer	**Engineeria**

Job Number J21343B

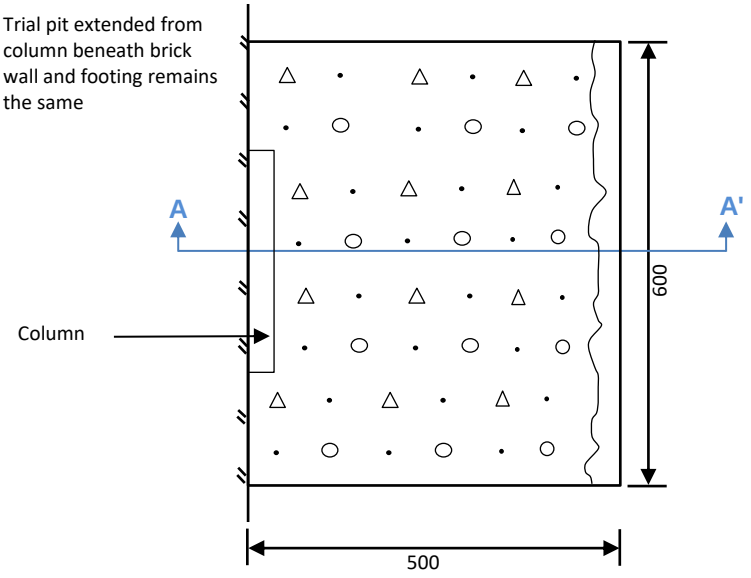
Sheet 3/6

Dates 13/12/2021

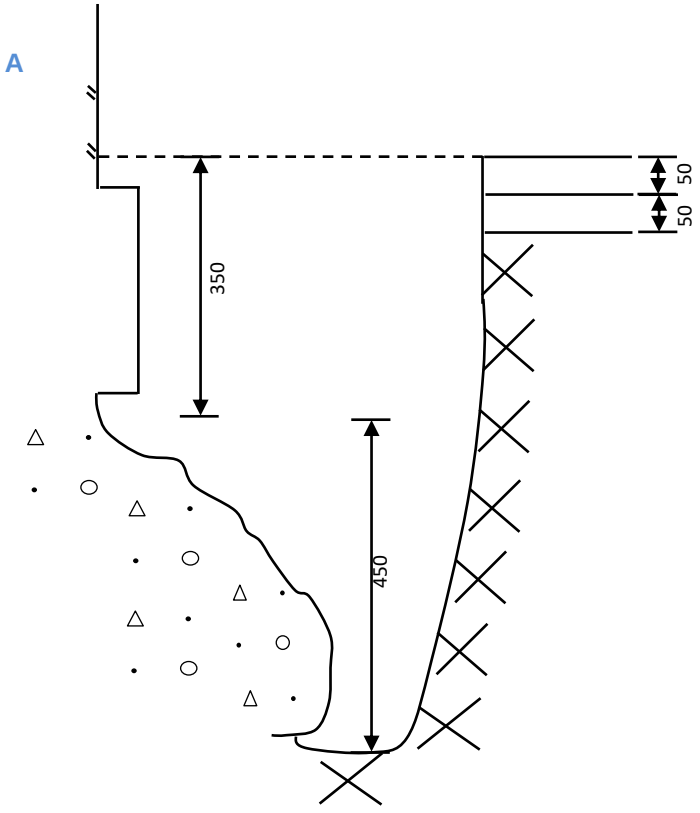
Excavation Method	Dimensions	Ground Level (mOD)	Location
Manual	500 x 600 x 800	36.77	SW boundary of site with adjoining building

Plan: -

Trial pit extended from column beneath brick wall and footing remains the same



Section A - A': -



Paving slabs

MADE GROUND (orange-brown sand)

MADE GROUND (brick and concrete rubble with roots and rootlets, roots up to 10 mm thick)

Remarks:

Contamination sample at 0.3 m

PID screening = 0 ppm

Trial pit backfiled upon completion

Scale: Approx 1:10

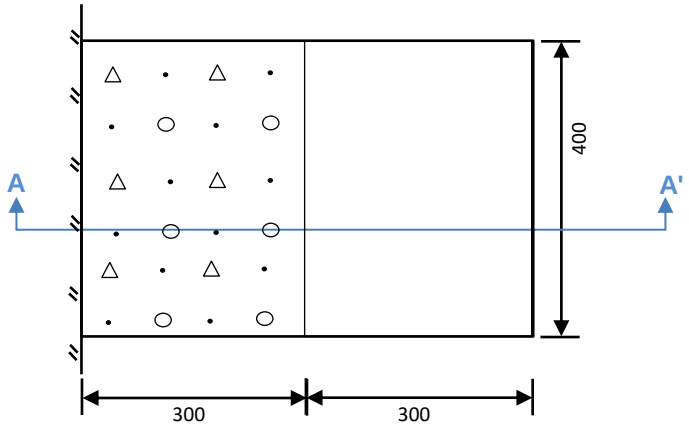
Logged by: GC

GEA	www.gea-ltd.co.uk Herts | 01727 824666 Notts | 01509 674888	**Trial Pit No** 4

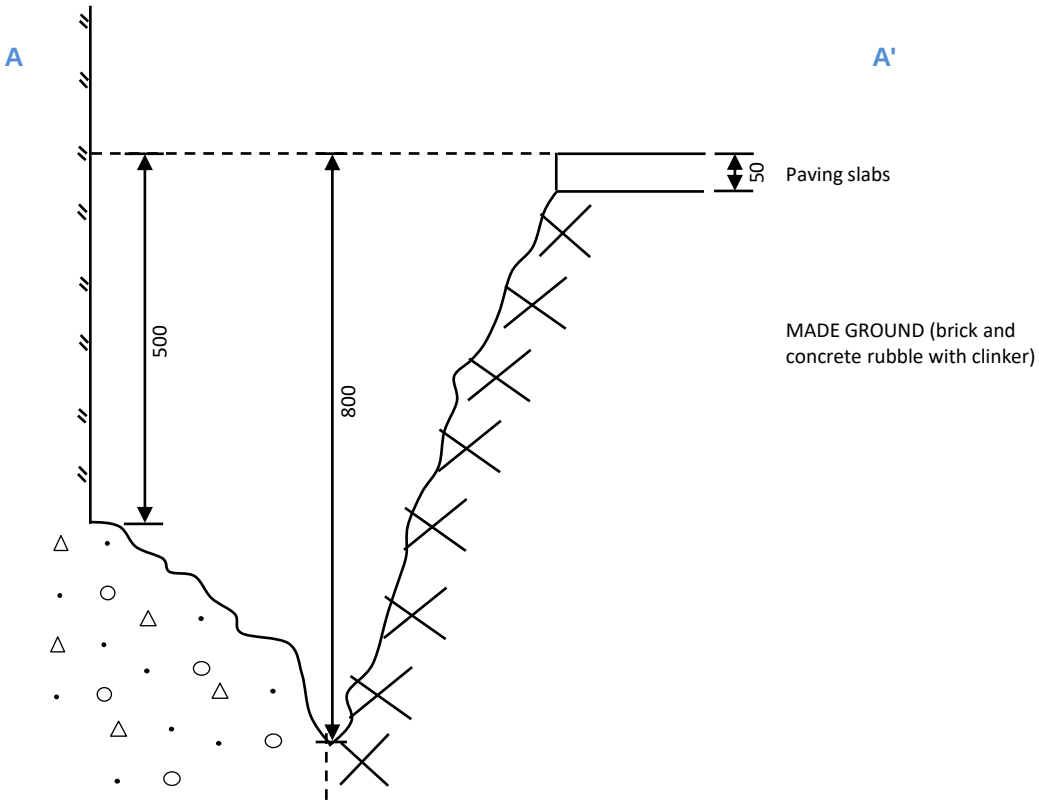
Site	**19-37 Highgate Road, London, NW5 1NT**	**Job Number** J21343B
Client	**GM Developments London**	**Sheet** 4/6
Engineer	**Engineeria**	**Dates** 13/12/2021

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Location**
Manual	600 x 400 x 800	36.75	NW elevation of existing building

Plan: -



Section A - A': -



Edge of footing tentatively - Not dug further due to hard ground and gas main known to be present

Remarks:	Scale:
Contamination sample at 0.2 m Trial pit backfiled upon completion	Approx 1:10 Logged by: GC

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Trial Pit No 5

Site	**19-37 Highgate Road, London, NW5 1NT**
Client	**GM Developments London**
Engineer	**Engineeria**

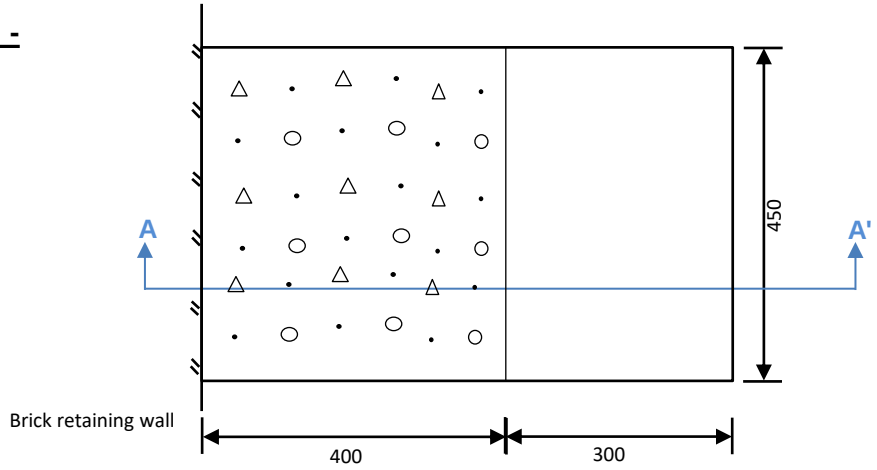
Job Number J21343B

Sheet 5/6

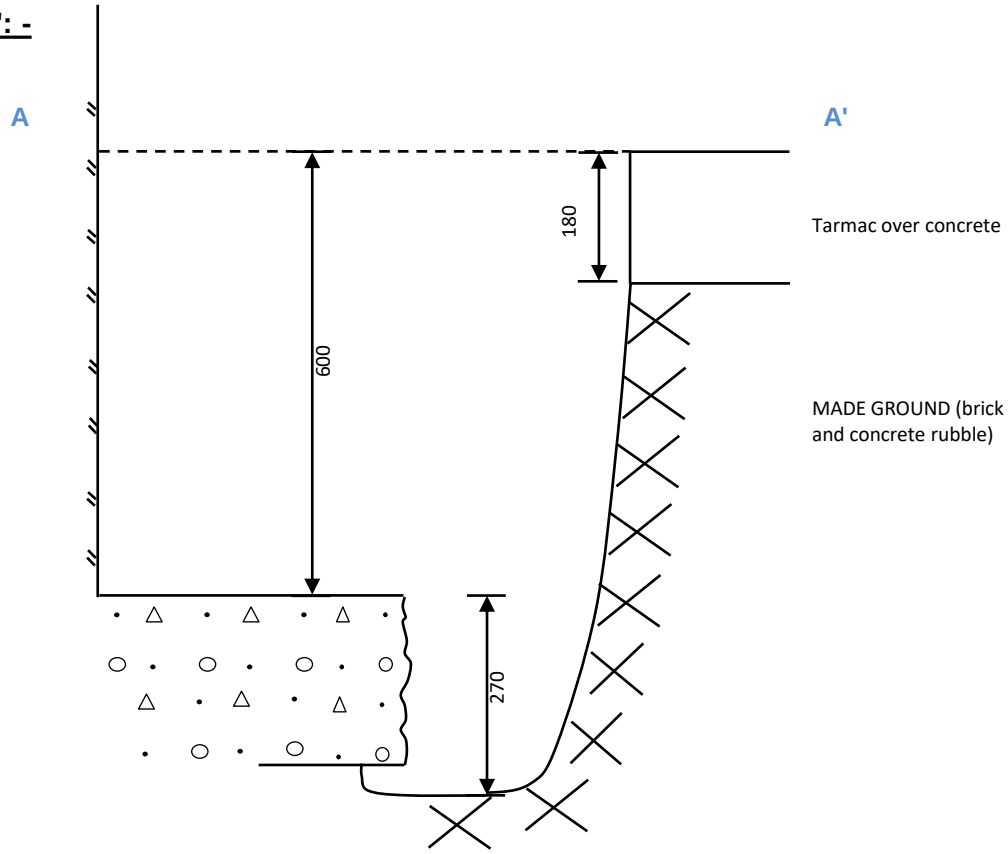
Dates 13/12/2021

Excavation Method	Dimensions	Ground Level (mOD)	Location
Manual	700 x 450 x 870	36.70	Retaining wall along NE boundary of site

Plan: -



Section A - A': -



Remarks:

Trial pit backfiled upon completion

Scale: Approx 1:10

Logged by: GC

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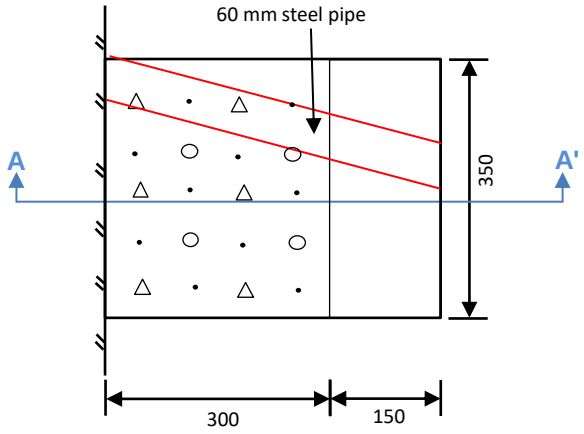
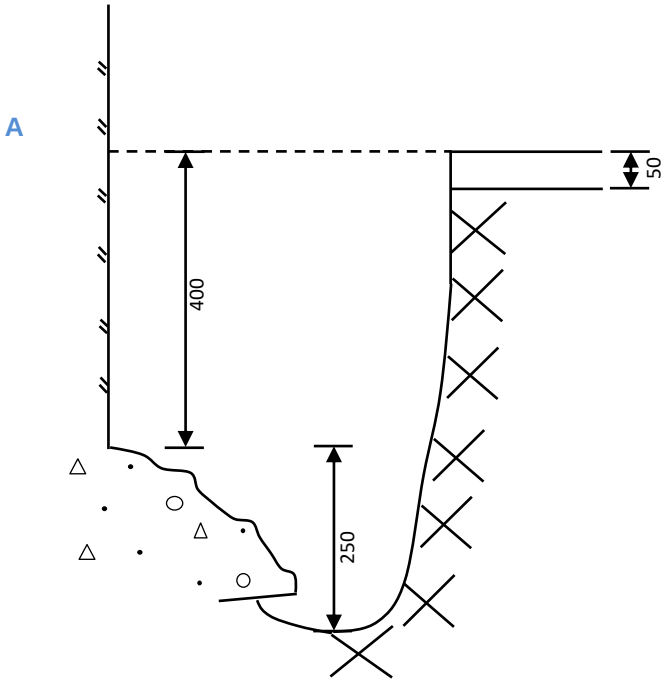
Site	**19-37 Highgate Road, London, NW5 1NT**	**Job Number** J21343B
Client	**GM Developments London**	**Sheet** 6/6
Engineer	**Engineeria**	**Dates** 13/12/2021

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Location**
Manual	450 x 350 x 650	36.77	SW elevation of existing building

Plan: -



Section A - A': -



Remarks:	Scale: Approx 1:10
Trial pit backfiled upon completion	Logged by: GC

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Gas Monitoring

Site address
19-37 Highgate Road

Job Number
J21343

Date	17/01/2022					
Time						
Air Temperature °C	8					
Barometric Pressure (mB)	1031					
Visit No	1					
Borehole No	1	2	3	4		
Standpipe Depth	1.58	4.94	2.13			
Condition of Standpipe	good	good	good	couldn't access		
Combustible gas (CH4) % LEL	0	0	0			
Combustible gas (CH4) % vol	0	0	0			
Carbon Dioxide (CO2) % vol	0.0	0.3	1.4			
Oxygen (O2) % vol	14.0	19.5	18.6-19.6			
Hexane % vol	0.018	0.015	0.014			
PID cf % vol	1.0	1.0	1.0			
Carbon Monoxide ppm	0	0	0			
Hydrogen Sulphide (H2S) ppm	0	0	0			
Flow Rate (max) l/hr	0.0	0.0	0.0			
Relative Downhole Pressure mb	0	0	0			
Downhole Temperature °C	3.0	3.0	13.0			
Water Level m	1.44	1.60	dry			
PID	0.0	0.0	0.0			

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Site address **19-37 Highgate Road**	**Job Number** J21343

Date	16/03/2022					
Time	13:00					
Air Temperature °C						
Barometric Pressure (mB)	1010					
Visit No	2					
Borehole No	1	2	3	4	5	6
Standpipe Depth	4.94	1.58		1.91	1.24	2.1
Condition of Standpipe	good	good	Couldn't access due to obstruction/rubbish	tap closed	tap closed	good
Combustible gas (CH4) % LEL	0	0		0	0	0
Combustible gas (CH4) % vol	0	0		0	0	0
Carbon Dioxide (CO2) % vol	0.1	0.1		0.1	0.1	0.1
Oxygen (O2) % vol	20.0	20.0		20.1	20.0	20.2
Hexane % vol	-	-		-	-	-
PID cf % vol	-	-		-	-	-
Carbon Monoxide ppm	0	0		0	0	0
Hydrogen Sulphide (H2S) ppm	0	0		0	0	0
Flow Rate (max) l/hr	0.0	0.0		0.0	0.0	0.0
Relative Downhole Pressure mb	0	0		0	0	0
Downhole Temperature °C	10.5	11		13	11	12.5
Water Level m	1.54	1.43		1.53	dry	1.47
PID	0.038	0.066		0.184	0.105	0.113

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Site address **19-37 Highgate Road**	**Job Number** J21343

Date	16/03/2022					
Time	13:00					
Air Temperature °C						
Barometric Pressure (mB)	1010					
Visit No	2					
Borehole No	7	8	9B	10		
Standpipe Depth	2.55	-		1.26		
Condition of Standpipe	good	Couldn't dip as bung stuck too deep to take out	Couldn't access due to obstruction/rubbish	good		
Combustible gas (CH4) % LEL	0	0		0		
Combustible gas (CH4) % vol	0	0		0		
Carbon Dioxide (CO2) % vol	0.1	0.1		0.1		
Oxygen (O2) % vol	20.2	20.1		20.0		
Hexane % vol	-	-		-		
PID cf % vol	-	-		-		
Carbon Monoxide ppm	0	0		0		
Hydrogen Sulphide (H2S) ppm	0	0		0		
Flow Rate (max) l/hr	0.0	0.0		0.0		
Relative Downhole Pressure mb	0	0		0		
Downhole Temperature °C	12.0	13.5		11.0		
Water Level m	1.53	-		1.07		
PID	0.159	0.000		0.225		

GEA	www.gea-ltd.co.uk Herts | 01727 824666 Notts | 01509 674888	**Gas Monitoring**

Site address **19-37 Highgate Road**	**Job Number** J21343

Date	12/04/2022					
Time	11:40					
Air Temperature °C						
Barometric Pressure (mB)	1000					
Visit No	3					
Borehole No	1	2	3	4	5	6
Standpipe Depth	4.95	1.58		1.91	1.21	2.1
Condition of Standpipe	good	good	Couldn't access due to obstruction	good	good	good
Combustible gas (CH4) % LEL	0	0		0	0	0
Combustible gas (CH4) % vol	0	0		0	0	0
Carbon Dioxide (CO2) % vol	0.5	0.1		0.5	0.5	0.1
Oxygen (O2) % vol	20.5	20.2		20.3	20.1	20.9
Hexane % vol	-	-		-	-	-
PID cf % vol	-	-		-	-	-
Carbon Monoxide ppm	0	0		0	0	0
Hydrogen Sulphide (H2S) ppm	0	0		0	0	0
Flow Rate (max) l/hr	0.0	0.0		0.0	0.0	0.0
Relative Downhole Pressure mb	0	0		0	0	0
Downhole Temperature °C	27.5	27		28.5	-	24.0
Water Level m	1.55	1.43		1.50	1.14	1.49
PID	0.0	0.0		0.0	0.1	0.0

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Herts | 01727 824666 Notts | 01509 674888

Gas Monitoring

Site address

19-37 Highgate Road

Job Number

J21343

Date	12/04/2022					
Time	11:40					
Air Temperature °C						
Barometric Pressure (mB)	1000					
Visit No	3					
Borehole No	7	8	9B	10		
Standpipe Depth	2.55	-	0.97			
Condition of Standpipe	good	Couldn't dip as bung stuck too deep to take out	good	Couldn't access due to JCB		
Combustible gas (CH4) % LEL	0	0	0			
Combustible gas (CH4) % vol	0	0	0			
Carbon Dioxide (CO2) % vol	0.1	0.1	0.2			
Oxygen (O2) % vol	20.5	20.0	19.5			
Hexane % vol	-	-	-			
PID cf % vol	-	-	-			
Carbon Monoxide ppm	0	0	0			
Hydrogen Sulphide (H2S) ppm	0	0	0			
Flow Rate (max) l/hr	0.0	0.0	0.0			
Relative Downhole Pressure mb	0	0	0			
Downhole Temperature °C	-	26.0	27.5			
Water Level m	1.70	-	dry			
PID	0.0	0.0	0.1			

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Site address **19-37 Highgate Road**	**Job Number** J21343

Date	04/05/2022
Time	10:00
Air Temperature °C	14
Barometric Pressure (mB)	1014
Visit No	4

Borehole No	1	2	3	4	5	6
Standpipe Depth	4.93	1.87		1.91		2.09
Condition of Standpipe	good	good	Couldn't access due to obstruction	good	No access - damaged cover,couldn't open	good
Combustible gas (CH4) % LEL	0	0		0		0
Combustible gas (CH4) % vol	0	0		0		0
Carbon Dioxide (CO2) % vol	0.6	0.3		0.2		0.1
Oxygen (O2) % vol	19.7	19.4		20.6		20.7
Hexane % vol	-	-		-		-
PID cf % vol	-	-		-		-
Carbon Monoxide ppm	0	0		0		0
Hydrogen Sulphide (H2S) ppm	0	0		0		0
Flow Rate (max) l/hr	0.0	0.0		0.0		0.0
Relative Downhole Pressure mb	0	0		0		0
Downhole Temperature °C	17.5	19.5		-		15.0
Water Level m	1.63	1.49		1.59		1.54
PID	0.0	0.0		0.0		0.0

GEA	www.gea-ltd.co.uk Herts | 01727 824666 Notts | 01509 674888	**Gas Monitoring**

Site address **19-37 Highgate Road**	**Job Number** J21343

Date	04/05/2022					
Time	10:00					
Air Temperature °C	14					
Barometric Pressure (mB)	1014					
Visit No	4					
Borehole No	7	8	9B	10		
Standpipe Depth	2.55	-		1.25		
Condition of Standpipe	good	Couldn't dip as bung stuck too deep to take out	No access due to obsruction	good		
Combustible gas (CH4) % LEL	0	0		0		
Combustible gas (CH4) % vol	0	0		0		
Carbon Dioxide (CO2) % vol	0.0	0.4		0.2		
Oxygen (O2) % vol	20.5	20.4		20.5		
Hexane % vol	-	-		-		
PID cf % vol	-	-		-		
Carbon Monoxide ppm	0	0		0		
Hydrogen Sulphide (H2S) ppm	0	0		0		
Flow Rate (max) l/hr	0.0	0.0		0.0		
Relative Downhole Pressure mb	0	0		0		
Downhole Temperature °C	15.0	15.5		20		
Water Level m	1.77	-		1.18		
PID	0.0	0.1		0.0		

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Site address **19-37 Highgate Road**	**Job Number** J21343

Date	12/05/2022					
Time	09:50					
Air Temperature °C	14					
Barometric Pressure (mB)	1013					
Visit No	5					
Borehole No	9B					
Standpipe Depth	0.94					
Condition of Standpipe	good	Unable to access BHs 1-8 and 10 due to active demolition				
Combustible gas (CH4) % LEL	0					
Combustible gas (CH4) % vol	0					
Carbon Dioxide (CO2) % vol	0.3					
Oxygen (O2) % vol	19.8					
Hexane % vol	-					
PID cf % vol	-					
Carbon Monoxide ppm	0					
Hydrogen Sulphide (H2S) ppm	0					
Flow Rate (max) l/hr	0.0					
Relative Downhole Pressure mb	0					
Downhole Temperature °C	15.5					
Water Level m	dry					
PID	0.1					

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Site address **19-37 Highgate Road**	**Job Number** J21343

Date	26/05/2022					
Time	09:30					
Air Temperature °C	21					
Barometric Pressure (mB)	1018					
Visit No	6					
Borehole No	1	2	3	4	5	6
Standpipe Depth	4.85	1.48	2	1.8	1.13	1.85
Condition of Standpipe	good	good	good	good	good	good
Combustible gas (CH4) % LEL	0	0	0	0	0	0
Combustible gas (CH4) % vol	0	0	0	0	0	0
Carbon Dioxide (CO2) % vol	1.6	0.5	1.6	0.3	1.0	0
Oxygen (O2) % vol	18.9	19.2	19.4	20.3	16.7	19.9
Hexane % vol	-	-	-	-	-	-
PID cf % vol	-	-	-	-	-	-
Carbon Monoxide ppm	0	0	0	0	0	0
Hydrogen Sulphide (H2S) ppm	0	0	0	0	0	0
Flow Rate (max) l/hr	0	0	0	0	0	0
Relative Downhole Pressure mb	0	0	0	0	0	0
Downhole Temperature °C	21	17	15.5	17	21	17
Water Level m	1.45	1.34	DRY	1.39	1.08	1.27
PID	0.1	0.0	0.0	0.0	0.0	0.0

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Site address **19-37 Highgate Road**	**Job Number** J21343

Date	26/05/2022					
Time	09:30					
Air Temperature °C	21					
Barometric Pressure (mB)	1018					
Visit No	6					
Borehole No	7	8	9B	10		
Standpipe Depth	2.35	2.4	0.9	1.15		
Condition of Standpipe	good	good	good	good		
Combustible gas (CH4) % LEL	0	0	0	0		
Combustible gas (CH4) % vol	0	0	0	0		
Carbon Dioxide (CO2) % vol	0	0.2	2.3	0.8		
Oxygen (O2) % vol	20.1	19.8	15.1	19		
Hexane % vol	-	-	-	-		
PID cf % vol	-	-	-	-		
Carbon Monoxide ppm	0	0	0	0		
Hydrogen Sulphide (H2S) ppm	0	0	0	0		
Flow Rate (max) l/hr	0	0	0	0		
Relative Downhole Pressure mb	0	0	0	0		
Downhole Temperature °C	18.5	17	16	17		
Water Level m	1.35	1.34	DRY	1.34		
PID	0.0	0.0	0.0	0.0		

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Site address **19-37 Highgate Road**	**Job Number** J21343

Date	08/06/2022					
Time						
Air Temperature °C	25					
Barometric Pressure (mB)	1000					
Visit No	7					
Borehole No	1	2	3	4	5	6
Standpipe Depth	4.85		1.98	1.8	1.13	1.8
Condition of Standpipe	good	Inaccessible	good	good	good	good
Combustible gas (CH4) % LEL	0		0	0	0	0
Combustible gas (CH4) % vol	0		0	0	0	0
Carbon Dioxide (CO2) % vol	1.1		1.4	0.1	0.8	0
Oxygen (O2) % vol	16.4		19.4	20.2	18.7	20.5
Hexane % vol	-		-	-	-	-
PID cf % vol	-		-	-	-	-
Carbon Monoxide ppm	0		0	0	0	0
Hydrogen Sulphide (H2S) ppm	0		0	0	0	0
Flow Rate (max) l/hr	0		0	0	0	0
Relative Downhole Pressure mb	0		0	0	0	0
Downhole Temperature °C	30		32	31	21	31
Water Level m	1.65		DRY	1.60	DRY	1.28
PID	0.0		0.0	0.0	0.0	0.0

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Gas Monitoring

Site address

19-37 Highgate Road

Job Number

J21343

Date	08/06/2022					
Time						
Air Temperature °C	25					
Barometric Pressure (mB)	1000					
Visit No	7					
Borehole No	7	8	9B	10		
Standpipe Depth	2.3		0.88	1.15		
Condition of Standpipe	good	Couldn't dip as bung stuck too deep to take out	good	good		
Combustible gas (CH4) % LEL	0	0	0	0		
Combustible gas (CH4) % vol	0	0	0	0		
Carbon Dioxide (CO2) % vol	0.9	0.1	1.6	0.8		
Oxygen (O2) % vol	11.4	20.3	17.9	15.9		
Hexane % vol	-	-	-	-		
PID cf % vol	-	-	-	-		
Carbon Monoxide ppm	0	0	0	0		
Hydrogen Sulphide (H2S) ppm	0	0	0	0		
Flow Rate (max) l/hr	0	0	0	0		
Relative Downhole Pressure mb	0	0	0	0		
Downhole Temperature °C	31	31.5	28.5	27		
Water Level m	1.72		DRY	1.14		
PID	0.0	0.0	0.0	0.0		

appendix b

Lab Testing

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

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Location	Depth (m)	Sample Ref	Type	Description	WC %	LL %	PL %	PI %	<425 µm %	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 g/L	W/S Mg mg/L	
BH1	1.00	D2	D	Greyish brown and brown mottled CLAY with rare fine to medium gravel.	25.7	41	18	23	99							7.1	0.049		
BH1	1.20	U1	U	Firm brown CLAY with rare fine gravel.	25.5					2.13	1.70	Undisturbed	24	66	33				
BH1	1.70	D3	D	Greyish brown mottled grey CLAY.	29.8														
BH1	2.00	S1	D	Greyish brown and grey mottled CLAY.	24.5														
BH1	2.70	D4	D	Greyish brown and grey mottled CLAY.	24.7														
BH1	3.00	U2	U	Soft orange brown mottled grey sine sandy CLAY.	22.6					2.13	1.74	Undisturbed	60	62	31				
BH1	3.40	D5	D	Brown and grey mottled sandy CLAY with flint gravel. Sand is fine.	13.0	33	18	15	61							7.8	0.025		
BH1	3.80	D6	D	Greyish brown mottled grey CLAY.	30.7														
BH1	5.00	U3	U	Very stiff fissured brown mottled grey silty CLAY.	32.2					1.96	1.48	Undisturbed	100	343	171				
BH1	5.50	D8	D	Greyish brown mottled grey CLAY.	31.1	70	28	42	100										

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

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SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Location	Depth (m)	Sample Ref	Type	Description	WC %	LL %	PL %	PI %	<425 µm %	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 g/L	W/S Mg mg/L	
BH1	7.50	U4	U	very stiff fissured brown silty CLAY with rare gypsum.	30.4					1.92	1.47	Undisturbed	150	278	139				
BH1	10.50	U5	U	Very stiff fissured dark brown silty CLAY.	29.1					1.91	1.48	Undisturbed	210	242	121				
BH1	13.80	U6	U	Very stiff fissured dark brown silty CLAY	27.5					1.95	1.53	Undisturbed	276	274	137				
BH1	14.30	D13	D	Brownish grey CLAY.	28.4	79	28	51	100							7.9	0.18		
BH1	16.50	U7	U	Very stiff fissured dark brown silty CLAY.	28.3					2.02	1.57	Undisturbed	330	451	225				
BH1	19.50	U8	U	Very stiff fissured dark brown silty CLAY.	26.2					1.98	1.57	Undisturbed	390	579	289				
BH1	22.50	U9	U	Very stiff fissured dark grey silty CLAY.	28.3					1.96	1.53	Undisturbed	450	585	293				
BH1	25.50	U10	U	Very stiff fissured dark brown silty CLAY.	26.8					1.99	1.57	Undisturbed	510	521	261				
BH1	28.50	U11	U	Very stiff fissured dark grey silty CLAY.	26.4					2.00	1.58	Undisturbed	570	352	176				
BH2	1.10		D	Brown mottled grey CLAY with rare flint gravel.	25.9	41	19	22	99										

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

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SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Location	Depth (m)	Sample Ref	Type	Description	WC %	LL %	PL %	PI %	<425 µm %	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 g/L	W/S Mg mg/L	
BH2	2.20		D	Brown and grey mottled CLAY with rare flint gravel.	19.8	38	17	21	99							7.8	0.077		

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

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U1
Depth (m)	1.20
Sample Type	U

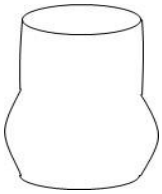
Description:

Firm brown CLAY with rare fine gravel.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	200.5
Diameter	(mm)	100.1
Moisture content	(%)	25.5
Bulk density	(Mg/m³)	2.13
Dry density	(Mg/m³)	1.70
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	200.5
Membrane correction	(kPa)	1.1
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	24
Strain at failure	(%)	19.0
Maximum deviator stress	(kPa)	66
Shear Stress Cu	(kPa)	33

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	72

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U2
Depth (m)	3.00
Sample Type	U

Description:

Soft orange brown mottled grey sine sandy CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.2
Diameter	(mm)	101.2
Moisture content	(%)	22.6
Bulk density	(Mg/m³)	2.13
Dry density	(Mg/m³)	1.74
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.2
Membrane correction	(kPa)	1.1
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	60
Strain at failure	(%)	19.8
Maximum deviator stress	(kPa)	62
Shear Stress Cu	(kPa)	31

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	70

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U3
Depth (m)	5.00
Sample Type	U

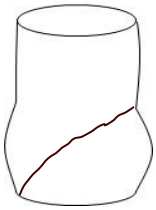
Description:

Very stiff fissured brown mottled grey silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.1
Diameter	(mm)	101.8
Moisture content	(%)	32.2
Bulk density	(Mg/m³)	1.96
Dry density	(Mg/m³)	1.48
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.1
Membrane correction	(kPa)	0.6
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	100
Strain at failure	(%)	8.4
Maximum deviator stress	(kPa)	343
Shear Stress Cu	(kPa)	171

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	50

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U4
Depth (m)	7.50
Sample Type	U

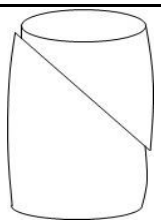
Description:

very stiff fissured brown silty CLAY with rare gypsum.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	203.1
Diameter	(mm)	102.5
Moisture content	(%)	30.4
Bulk density	(Mg/m³)	1.92
Dry density	(Mg/m³)	1.47
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	203.1
Membrane correction	(kPa)	0.3
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	150
Strain at failure	(%)	4.4
Maximum deviator stress	(kPa)	278
Shear Stress Cu	(kPa)	139

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	45

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U5
Depth (m)	10.50
Sample Type	U

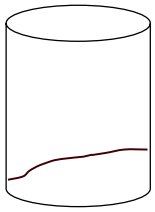
Description:

Very stiff fissured dark brown silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.0
Diameter	(mm)	103.1
Moisture content	(%)	29.1
Bulk density	(Mg/m³)	1.91
Dry density	(Mg/m³)	1.48
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.0
Membrane correction	(kPa)	0.3
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	210
Strain at failure	(%)	4.5
Maximum deviator stress	(kPa)	242
Shear Stress Cu	(kPa)	121

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	75

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U6
Depth (m)	13.80
Sample Type	U

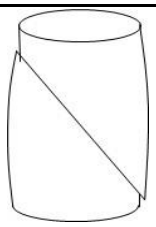
Description:

Very stiff fissured dark brown silty CLAY

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.7
Diameter	(mm)	102.9
Moisture content	(%)	27.5
Bulk density	(Mg/m³)	1.95
Dry density	(Mg/m³)	1.53
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.5
Membrane correction	(kPa)	0.2
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	276
Strain at failure	(%)	2.5
Maximum deviator stress	(kPa)	274
Shear Stress Cu	(kPa)	137

Mode of failure



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

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U7
Depth (m)	16.50
Sample Type	U

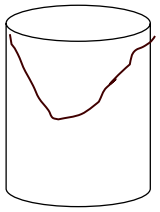
Description:

Very stiff fissured dark brown silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.6
Diameter	(mm)	101.8
Moisture content	(%)	28.3
Bulk density	(Mg/m³)	2.02
Dry density	(Mg/m³)	1.57
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.4
Membrane correction	(kPa)	0.2
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	330
Strain at failure	(%)	3.0
Maximum deviator stress	(kPa)	451
Shear Stress Cu	(kPa)	225

Mode of failure



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

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U8
Depth (m)	19.50
Sample Type	U

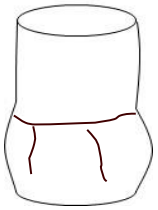
Description:

Very stiff fissured dark brown silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.7
Diameter	(mm)	101.7
Moisture content	(%)	26.2
Bulk density	(Mg/m³)	1.98
Dry density	(Mg/m³)	1.57
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.5
Membrane correction	(kPa)	0.7
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	390
Strain at failure	(%)	10.4
Maximum deviator stress	(kPa)	579
Shear Stress Cu	(kPa)	289

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	35

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U9
Depth (m)	22.50
Sample Type	U

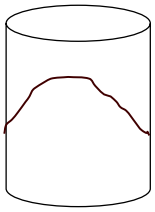
Description:

Very stiff fissured dark grey silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.9
Diameter	(mm)	102.5
Moisture content	(%)	28.3
Bulk density	(Mg/m³)	1.96
Dry density	(Mg/m³)	1.53
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.7
Membrane correction	(kPa)	0.5
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	450
Strain at failure	(%)	7.4
Maximum deviator stress	(kPa)	585
Shear Stress Cu	(kPa)	293

Mode of failure



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

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U10
Depth (m)	25.50
Sample Type	U

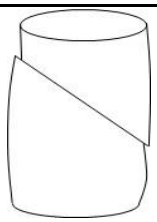
Description:

Very stiff fissured dark brown silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.1
Diameter	(mm)	103.6
Moisture content	(%)	26.8
Bulk density	(Mg/m³)	1.99
Dry density	(Mg/m³)	1.57
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	201.9
Membrane correction	(kPa)	0.4
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	510
Strain at failure	(%)	5.9
Maximum deviator stress	(kPa)	521
Shear Stress Cu	(kPa)	261

Mode of failure



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

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GEO / 34547

Project Name:

HIGHGATE ROAD
J21343

GEOLABS® UKAS TESTING 1982

BS EN ISO 17892-8 : 2018

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Location	BH1
Sample Ref	U11
Depth (m)	28.50
Sample Type	U

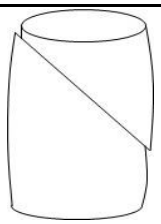
Description:

Very stiff fissured dark grey silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.7
Diameter	(mm)	102.7
Moisture content	(%)	26.4
Bulk density	(Mg/m³)	2.00
Dry density	(Mg/m³)	1.58
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	202.5
Membrane correction	(kPa)	0.5
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	570
Strain at failure	(%)	6.9
Maximum deviator stress	(kPa)	352
Shear Stress Cu	(kPa)	176

Mode of failure



Orientation of the sample	Vertical
Distance from top of tube mm	25

Tested by SB
Checked and Approved by

S Burke - Senior Technician
20/01/2022

Project Number:

GEO / 34547

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HIGHGATE ROAD
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GEOLABS®
UKAS TESTING
1982

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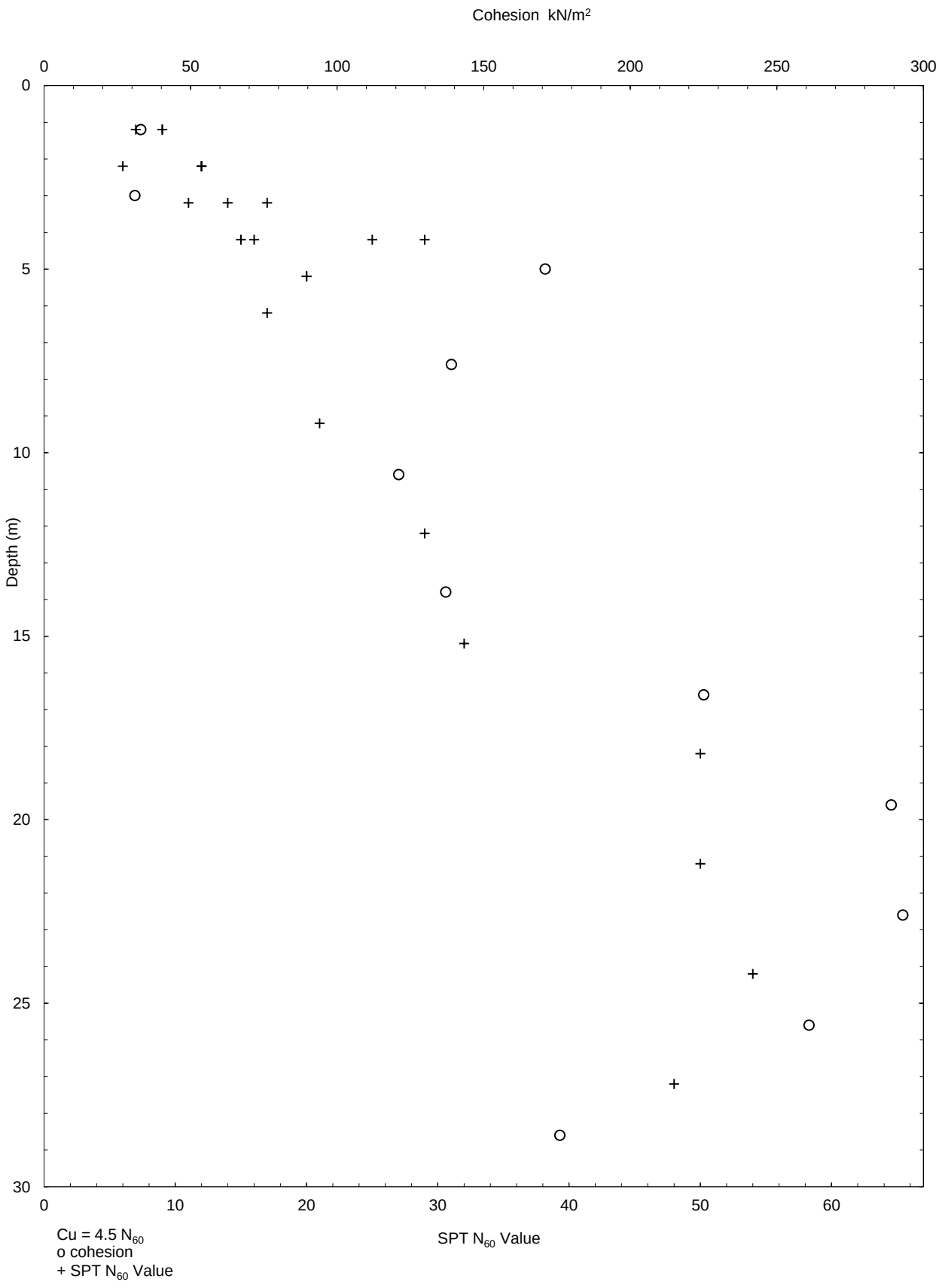
Herts | 01727 824666 Notts | 01509 674888

SPT & Cohesion / Depth Graph

Site	19-37 Highgate Road, London NW5 1NT
Client	GM London
Engineer	Engineeria

Job Number J21343B

Sheet 1 / 1



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Analytical Report Number : 21-27765

Project / Site name:	Highgate Road	**Samples received on:**	08/12/2021
Your job number:	J21343	**Samples instructed on/ Analysis started on:**	08/12/2021
Your order number:		**Analysis completed by:**	20/12/2021
Report Issue Number:	1	**Report issued on:**	20/12/2021
Samples Analysed:	2 bulk samples - 6 soil samples		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team
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: 21-27765
Project / Site name: Highgate Road

Lab Sample Number				2109393	2109394	2109395	2109398	2109399
Sample Reference				BH2	BH3	BH4	TP2	TP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.50	0.50	0.30	0.30
Date Sampled				02/12/2021	02/12/2021	02/12/2021	03/12/2021	03/12/2021
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	42
Moisture Content	%	0.01	NONE	20	15	16	21	12
Total mass of sample received	kg	0.001	NONE	0.80	0.80	0.80	1.0	0.80
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	Chrysotile & Amosite	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	< 0.001	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	< 0.001	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	MJN	MJN	MJN	MJN	MJN
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.7	7.2	9.6	9.0	10.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0	20	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	1900	6800	2000	810	2800
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.23	1.5	0.17	0.082	0.24
Sulphide	mg/kg	1	MCERTS	130	52	20	7.0	1.4
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	40	41	34	5.5	6.8
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.0	3.3	0.6	0.7	0.6
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	2.5	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.49	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.32	4.9	< 0.05	< 0.05	0.45
Pyrene	mg/kg	0.05	MCERTS	0.33	4.4	< 0.05	< 0.05	0.43
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.23	2.9	< 0.05	< 0.05	0.31
Chrysene	mg/kg	0.05	MCERTS	0.19	2.3	< 0.05	< 0.05	0.17
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	3.0	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.7	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	2.3	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.4	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.41	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	1.8	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1.07	28.1	< 0.80	< 0.80	1.36

Analytical Report Number: 21-27765
Project / Site name: Highgate Road

Lab Sample Number				2109393	2109394	2109395	2109398	2109399
Sample Reference				BH2	BH3	BH4	TP2	TP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.50	0.50	0.30	0.30
Date Sampled				02/12/2021	02/12/2021	02/12/2021	03/12/2021	03/12/2021
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	15	24	17	15	20
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	2.0	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	39	27	36	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35	250	33	32	28
Lead (aqua regia extractable)	mg/kg	1	MCERTS	440	2300	420	210	480
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.9	1.3	0.4	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	53	19	27	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	140	730	180	88	150
Petroleum Hydrocarbons								
TPH C10 - C40 $_{EH\_CU\_1D\_TOTAL}$	mg/kg	10	MCERTS	78	97	80	< 10	100
TPH (C8 - C10) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	MCERTS	< 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	< 2.0
TPH (C12 - C16) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	4	MCERTS	< 4.0	4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	7.3	17	14	< 1.0	17
TPH (C21 - C35) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	36	59	66	< 1.0	69
TPH Total C8 - C35 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	MCERTS	43	80	80	< 10	86

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-27765
Project / Site name: Highgate Road

Lab Sample Number				2109400
Sample Reference				TP4
Sample Number				None Supplied
Depth (m)				0.20
Date Sampled				03/12/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	34
Moisture Content	%	0.01	NONE	16
Total mass of sample received	kg	0.001	NONE	0.80

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-
Asbestos Quantification Total	%	0.001	ISO 17025	-
Asbestos Analyst ID	N/A	N/A	N/A	MJN

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	960
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.011
Sulphide	mg/kg	1	MCERTS	3.9
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	1.9
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.6

Total Phenols

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

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	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.54
Pyrene	mg/kg	0.05	MCERTS	0.52
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.37
Chrysene	mg/kg	0.05	MCERTS	0.34
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.42
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.21
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.37
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.77

Analytical Report Number: 21-27765
Project / Site name: Highgate Road

Lab Sample Number				2109400
Sample Reference				TP4
Sample Number				None Supplied
Depth (m)				0.20
Date Sampled				03/12/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	32
Lead (aqua regia extractable)	mg/kg	1	MCERTS	640
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	190
Petroleum Hydrocarbons				
TPH C10 - C40 $_{EH\_CU\_1D\_TOTAL}$	mg/kg	10	MCERTS	24
TPH (C8 - C10) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	MCERTS	< 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	1	MCERTS	5.5
TPH (C21 - C35) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	19
TPH Total C8 - C35 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	MCERTS	24

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-27765
Project / Site name: Highgate Road
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2109393	BH2	0.40	127	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**
2109394	BH3	0.50	128	Loose Fibres	**Chrysotile & Amosite**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number: 21-27765
Project / Site name: Highgate Road

Lab Sample Number				2109396	2109397
Sample Reference				BH5A	TP1
Sample Number				None Supplied	None Supplied
Depth (m)				0.10	0.10
Date Sampled				02/12/2021	03/12/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Bulk Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Asbestos Identification	Type	N/A	ISO 17025	Chrysotile-Hard/Cement Type Material	Chrysotile-Hard/Cement Type Material

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-27765
Project / Site name: Highgate Road

* 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 *
2109393	BH2	None Supplied	0.4	Brown clay and sand with gravel.
2109394	BH3	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2109395	BH4	None Supplied	0.5	Brown clay and sand with gravel.
2109398	TP2	None Supplied	0.3	Brown clay and sand with gravel.
2109399	TP3	None Supplied	0.3	Brown clay and sand with stones.
2109400	TP4	None Supplied	0.2	Brown clay and sand with stones.

Analytical Report Number : 21-27765
Project / Site name: Highgate Road

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 Bulks	Asbestos Identification in bulk material with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	W	ISO 17025
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion 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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	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.	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	W	MCERTS

Analytical Report Number : 21-27765
Project / Site name: Highgate Road

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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
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' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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 : 22-44316

Project / Site name:	Highgate Road	**Samples received on:**	09/03/2022
Your job number:	J21343	**Samples instructed on/ Analysis started on:**	09/03/2022
Your order number:		**Analysis completed by:**	16/03/2022
Report Issue Number:	1	**Report issued on:**	16/03/2022
Samples Analysed:	8 soil samples		

Signed:

Zina Abdul Razzak
#REF!
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: 22-44316
Project / Site name: Highgate Road

Lab Sample Number				2198508	2198509	2198510	2198511	2198512
Sample Reference				BH5	BH10	BH10	BH9	BH11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.50	1.10	0.50	0.80
Date Sampled				07/03/2022	07/03/2022	07/03/2022	07/03/2022	07/03/2022
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	59	< 0.1	25	< 0.1
Moisture Content	%	0.01	NONE	28	6.6	16	9.7	16
Total mass of sample received	kg	0.001	NONE	1.5	0.7	0.5	1	1
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Amosite	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	0.002	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	0.002	-
Asbestos Analyst ID	N/A	N/A	N/A	SZS	SZS	SZS	SZS	SZS
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.5	10.7	8.3	10.2	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	980	3200	830	3500	1200
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.18	0.41	0.091	0.23	0.13
Sulphide	mg/kg	1	MCERTS	7.7	4.4	9.4	17	14
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	8.3	30	20	52	15
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5	0.9	0.7	1.3	1.4
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.68	3.2	0.45
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	0.7	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.38	2.9	5.5	0.71
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.38	2.6	5	0.64
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.6	3	0.44
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.2	2.1	0.37
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.8	2.6	0.39
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.81	1.3	0.25
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.4	2.5	0.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.71	1.2	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.81	1.4	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	14.9	28.6	3.65

Analytical Report Number: 22-44316
Project / Site name: Highgate Road

Lab Sample Number				2198508	2198509	2198510	2198511	2198512
Sample Reference				BH5	BH10	BH10	BH9	BH11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.50	1.10	0.50	0.80
Date Sampled				07/03/2022	07/03/2022	07/03/2022	07/03/2022	07/03/2022
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	14	13	13	14	26
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	23	25	32	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	22	36	74	140
Lead (aqua regia extractable)	mg/kg	1	MCERTS	190	230	360	890	2400
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.0	< 0.3	< 0.3	< 0.3	3.0
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	13	17	21	23
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	60	77	130	240	210
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
Petroleum Hydrocarbons								
TPH C10 - C40 $_{EH\_CU\_1D\_TOTAL}$	mg/kg	10	MCERTS	< 10	180	21	430	< 10
TPH (C8 - C10) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	MCERTS	< 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	< 2.0
TPH (C12 - C16) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	7.3	< 4.0
TPH (C16 - C21) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	< 1.0	8.1	44	< 1.0
TPH (C21 - C35) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	61	10	160	< 1.0
TPH Total C8 - C35 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	MCERTS	< 10	61	18	210	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-44316
Project / Site name: Highgate Road

Lab Sample Number				2198513	2198514	2198515
Sample Reference				BH8	BH6	BH7
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.80	1.80	0.90
Date Sampled				07/03/2022	07/03/2022	07/03/2022
Time Taken				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
Moisture Content	%	0.01	NONE	16	24	20
Total mass of sample received	kg	0.001	NONE	1	1	1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	SZS	SZS	SZS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	9.4	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	2400	960	4200
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.2	0.13	2.5
Sulphide	mg/kg	1	MCERTS	3.8	< 1.0	3.5
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	110	35	62
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.4	0.5	0.6

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.67	< 0.05	0.43
Acenaphthylene	mg/kg	0.05	MCERTS	0.7	< 0.05	1
Acenaphthene	mg/kg	0.05	MCERTS	1.2	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	1.7	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	14	0.8	4.7
Anthracene	mg/kg	0.05	MCERTS	3.4	0.2	1.8
Fluoranthene	mg/kg	0.05	MCERTS	21	0.95	11
Pyrene	mg/kg	0.05	MCERTS	18	0.85	12
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.8	0.48	6.1
Chrysene	mg/kg	0.05	MCERTS	6.4	0.41	4.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	8.2	0.4	5.6
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.3	0.25	2.9
Benzo(a)pyrene	mg/kg	0.05	MCERTS	7.7	0.38	5.8
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.4	0.2	3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.87	< 0.05	0.73
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.8	0.21	3.9

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	104	5.13	63.7

Analytical Report Number: 22-44316
Project / Site name: Highgate Road

Lab Sample Number				2198513	2198514	2198515
Sample Reference				BH8	BH6	BH7
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.80	1.80	0.90
Date Sampled				07/03/2022	07/03/2022	07/03/2022
Time Taken				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	14	15	14
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	42	45	44
Copper (aqua regia extractable)	mg/kg	1	MCERTS	45	38	35
Lead (aqua regia extractable)	mg/kg	1	MCERTS	260	220	260
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	34	35
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	95	110	100
Monoaromatics & Oxygenates						
Benzene	µg/kg	1	MCERTS	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-
Petroleum Hydrocarbons						
TPH C10 - C40 $_{EH\_CU\_1D\_TOTAL}$	mg/kg	10	MCERTS	120	< 10	64
TPH (C8 - C10) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	2	MCERTS	6.1	< 2.0	< 2.0
TPH (C12 - C16) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	4	MCERTS	23	< 4.0	< 4.0
TPH (C16 - C21) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	44	< 1.0	27
TPH (C21 - C35) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	43	< 1.0	37
TPH Total C8 - C35 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	MCERTS	120	< 10	64

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-44316
Project / Site name: Highgate Road
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2198511	BH9	0.50	132	Sheeting/Board Debris	**Amosite**	0.002	**0.002**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 22-44316
Project / Site name: Highgate Road

* 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 *
2198508	BH5	None Supplied	0.5	Brown clay and sand with gravel.
2198509	BH10	None Supplied	0.5	Brown clay and sand with gravel and stones.
2198510	BH10	None Supplied	1.1	Brown clay and sand with gravel.
2198511	BH9	None Supplied	0.5	Brown gravelly sand with stones.
2198512	BH11	None Supplied	0.8	Brown loam with gravel and brick.
2198513	BH8	None Supplied	0.8	Light brown clay and sand with gravel and rubble.
2198514	BH6	None Supplied	1.8	Light brown clay and sand with gravel.
2198515	BH7	None Supplied	0.9	Light brown clay and sand with gravel and brick.

Analytical Report Number : 22-44316
Project / Site name: Highgate Road

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 disperion 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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
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.	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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

Analytical Report Number : 22-44316
Project / Site name: Highgate Road

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
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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
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' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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

GEA
Widbury Barn
Widbury Hill
Ware
SG12 7QE

Generic Risk-Based Soil Screening Values

Site	19-37 Highgate Road, London NW5 1NT
Client	GM Developments
Engineer	Engineeria

Job Number J21343B

Sheet 1 / 2

Proposed End Use Residential without plant uptake

Soil Organic Matter content % 2.5

Contaminant	Screening Value mg/kg	Data Source
Metals		
Arsenic	40	C4SL
Cadmium	149	C4SL
Chromium (III)	910	S4UL
Chromium (VI)	21	C4SL
Copper	7,100	S4UL
Lead	310	C4SL
Elemental Mercury	1.2	S4UL
Inorganic Mercury	56	S4UL
Nickel	180	S4UL
Selenium	595	SGV
Zinc	40,000	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	420	SGV
PAH		
Naphthalene	5.60	S4UL
Acenaphthylene	4,600	S4UL
Acenaphthene	4,700	S4UL
Fluorene	3,800	S4UL
Phenanthrene	1,500	S4UL
Anthracene	35,000	S4UL
Fluoranthene	1,600	S4UL
Pyrene	3,800	S4UL
Benzo(a)anthracene	14.0	S4UL
Chrysene	31	S4UL
Benzo(b)fluoranthene	4.0	S4UL
Benzo(k)fluoranthene	110.0	S4UL
Benzo(a)pyrene	4.70	C4SL
Indeno(1 2 3 cd)pyrene	46.0	S4UL
Dibenz(a h)anthracene	0.32	S4UL
Benzo (g h i)perylene	360	S4UL
Total PAH Screen	**67.1**	B(a)P / 0.15

Contaminant	Screening Value mg/kg	Data Source
Hydrocarbons		
Banded TPH (8-10)	169	Calc1
Banded TPH (10-12)	908	Calc1
Banded TPH (12-16)	3538	Calc1
Banded TPH (16-21)	2923	Calc1
Banded TPH (21-35)	2923	Calc1
Benzene	1.4	C4SL
Toluene	320	SGV
Ethyl Benzene	180	SGV
Xylene	120	SGV
Aliphatic C5-C6	78	S4UL
Aliphatic C6-C8	230	S4UL
Aliphatic C8-C10	65	S4UL
Aliphatic C10-C12	330	S4UL
Aliphatic C12-C16	2400	S4UL
Aliphatic C16-C35	92,000	S4UL
Aromatic C6-C7	See Benzene	S4UL
Aromatic C7-C8	See Toluene	S4UL
Aromatic C8-C10	110	S4UL
Aromatic C10-C12	590	S4UL
Aromatic C12-C16	2300	S4UL
Aromatic C16-C21	1900	S4UL
Aromatic C21-C35	1900	S4UL
PRO (C_5 –C_{10})	804	Calc2
DRO (C_{12} –C_{28})	98,600	Calc2
Lube Oil (C_{28} –C_{44})	93,900	Calc2
TPH	**500**	Trigger to consider speciated testing
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	18	S4UL
tetrachloroethane (PCA)	3.5	S4UL
tetrachloroethene (PCE)	0.4	S4UL
trichloroethene (TCE)	0.036	S4UL
1,2-dichloroethane (DCA)	0.013	S4UL
vinyl chloride (Chloroethene)	0.001	S4UL
tetrachloromethane (Carbon tetra	0.056	S4UL
trichloromethane (Chloroform)	2.1	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

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Analytical Report Number : 21-27769

Project / Site name:	Highgate Road	**Samples received on:**	08/12/2021
Your job number:	J211343	**Samples instructed on/ Analysis started on:**	08/12/2021
Your order number:		**Analysis completed by:**	21/12/2021
Report Issue Number:	1	**Report issued on:**	21/12/2021
Samples Analysed:	1 wac multi sample		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
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:	**21-27769**						
					Client: GEA		
Location	**Highgate Road**						
Lab Reference (Sample Number)	2109411				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	03/12/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP2						
Depth (m)	0.30						
Solid Waste Analysis							
TOC (%)**	0.6				3%	5%	6%
Loss on Ignition (%) **	3.8				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) $_{EH\_1D\_CU\_AL}$ #	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.9				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	30				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg	using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.014	0.012		0.12	0.5	2	25
Barium *	0.015	0.0092		0.096	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	0.0046	0.0018		0.020	0.5	10	70
Copper *	0.018	0.015		0.15	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.0044	< 0.0030		< 0.020	0.5	10	30
Nickel *	0.0046	0.0048		0.048	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.042	0.5	10	50
Antimony *	< 0.0050	< 0.0050		< 0.020	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.0093	0.0047		0.050	4	50	200
Chloride *	< 4.0	< 4.0		< 15	800	15000	25000
Fluoride	0.38	0.20		2.1	10	150	500
Sulphate *	23	5.6		66	1000	20000	50000
TDS*	82	51		530	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	10	5.7		60	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.80						
Dry Matter (%)	79						
Moisture (%)	21						
Stage 1							
Volume Eluate L2 (litres)	0.30						
Filtered Eluate VE1 (litres)	0.11						

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.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 21-27769
Project / Site name: Highgate Road

* 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 *
2109411	TP2	None Supplied	0.3	Brown clay and sand with gravel.

Analytical Report Number : 21-27769
Project / Site name: Highgate Road

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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
Preparation WAC leachate		In-house method	L043-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. MCERTS accredited except Coronene.	L064-PL	D	MCERTS
Chloride in WAC leachate (BS EN 12457-3 Prep)	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride in WAC leachate (BS EN 12457-3 Prep)	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L033-PL	W	ISO 17025
Phenol Index in WAC leachate (BS EN 12457-3 Prep)	Determination of monohydric phenols in leachate by continuous flow analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Sulphate in WAC leachate (BS EN 12457-3 Prep)	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
TDS in WAC leachate (BS EN 12457-3 Prep)	Determination of total dissolved solids in leachate by electrometric measurement.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L031-PL	W	NONE
DOC in WAC leachate (BS EN 12457-3 Prep)	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L037-PL	W	NONE
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
BTEX (Sum of BTEX compounds) in soil	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
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 in Soil C10 - C40	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method based on USEPA 8270	L076-PL	D	NONE
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS

Analytical Report Number : 21-27769
Project / Site name: Highgate Road

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 WAC leachate (BS EN 12457-3 Prep)	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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.

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Analytical Report Number : 22-44319

Project / Site name:	Highgate Road	**Samples received on:**	09/03/0222
Your job number:	J21343	**Samples instructed on/ Analysis started on:**	09/03/2022
Your order number:		**Analysis completed by:**	16/03/2022
Report Issue Number:	1	**Report issued on:**	16/03/2022
Samples Analysed:	1 wac multi sample		

Signed: CCStone

Claire Stone
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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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:	**22-44319**						
					Client:	**GEA**	
Location	**Highgate Road**						
Lab Reference (Sample Number)	2198528				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	07/03/2022				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH5						
Depth (m)	0.50						
Solid Waste Analysis							
TOC (%)**	0.6				3%	5%	6%
Loss on Ignition (%) **	3.1				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) $_{EH\_1D\_CU\_AL}$ #	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.2				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	31				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg	using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.010	< 0.010		< 0.050	0.5	2	25
Barium *	0.012	0.0069		0.074	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	0.0018	0.0013		0.014	0.5	10	70
Copper *	0.013	0.0064		0.071	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.025	0.015		0.16	0.5	10	30
Nickel *	0.014	0.0038		0.049	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.045	0.5	10	50
Antimony *	< 0.0050	< 0.0050		< 0.020	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.0047	0.0038		0.039	4	50	200
Chloride *	4.1	< 4.0		26	800	15000	25000
Fluoride	0.64	0.71		7.0	10	150	500
Sulphate *	120	18		280	1000	20000	50000
TDS*	240	86		1000	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	10	13		130	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.5						
Dry Matter (%)	72						
Moisture (%)	28						
Stage 1							
Volume Eluate L2 (litres)	0.30						
Filtered Eluate VE1 (litres)	0.18						

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

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Analytical Report Number : 22-44319
Project / Site name: Highgate Road

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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 *
2198528	BH5	None Supplied	0.5	Brown clay and sand with gravel.

Analytical Report Number : 22-44319
Project / Site name: Highgate Road

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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
Preparation WAC leachate		In-house method	L043-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. MCERTS accredited except Coronene.	L064-PL	D	MCERTS
Chloride in WAC leachate (BS EN 12457-3 Prep)	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride in WAC leachate (BS EN 12457-3 Prep)	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L033-PL	W	ISO 17025
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TDS in WAC leachate (BS EN 12457-3 Prep)	Determination of total dissolved solids in leachate by electrometric measurement.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L031-PL	W	NONE
DOC in WAC leachate (BS EN 12457-3 Prep)	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L037-PL	W	ISO 17025
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
BTEX (Sum of BTEX compounds) in soil	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
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 in Soil C10 - C40	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method based on USEPA 8270	L076-PL	D	NONE
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS

Analytical Report Number : 22-44319
Project / Site name: Highgate Road

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 WAC leachate (BS EN 12457-3 Prep)	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025

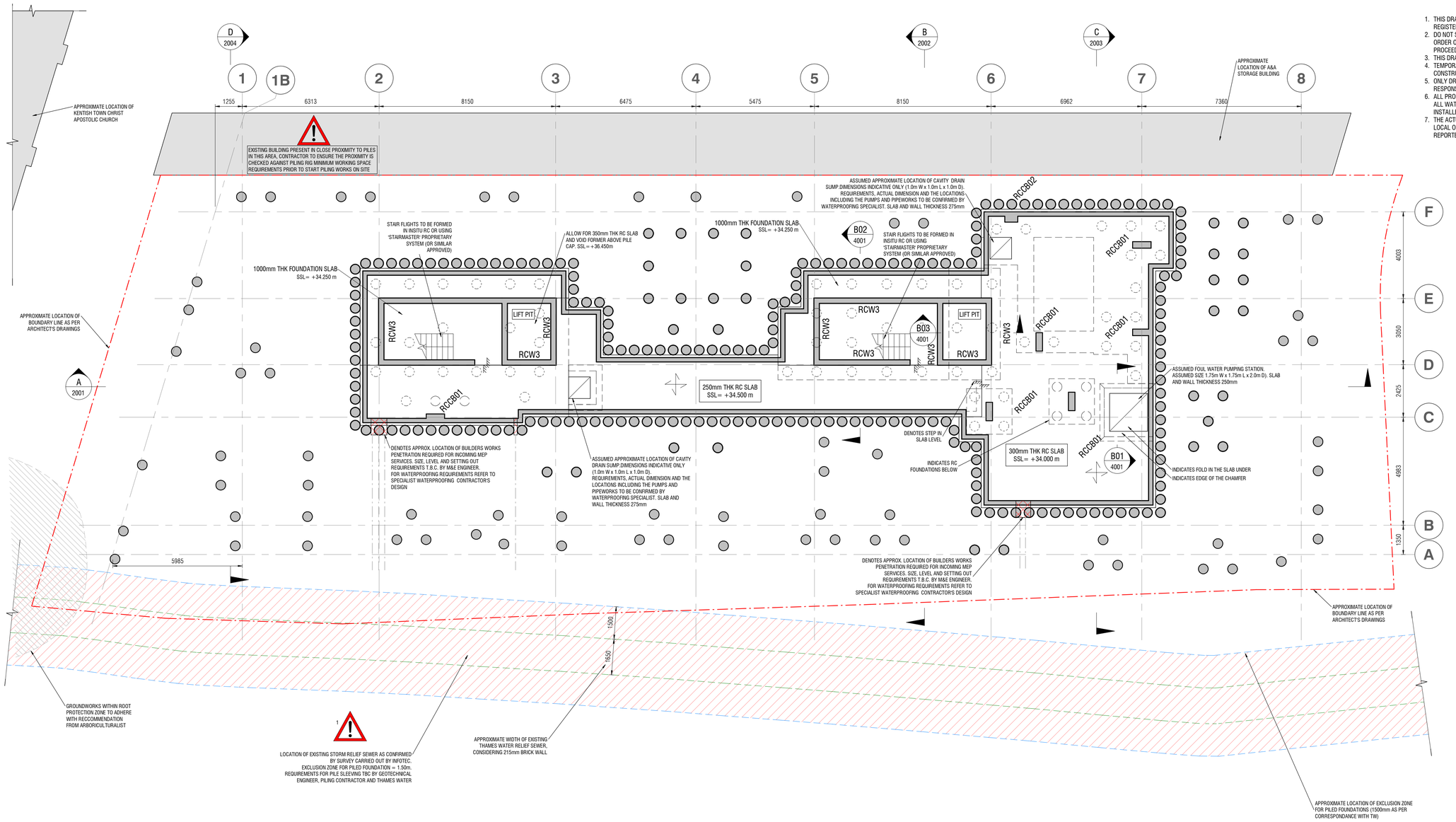
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received 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.

appendix c

Desk Study

Development Proposals
Envirocheck Extracts
Historical Maps
Risk Assessment Tables
UXO Preliminary Risk Assessment
Service Searches
CCTV Drainage Survey
Thames Water Sewer Survey



PROPOSED BASEMENT PLAN

SCALE 1 : 100

FINISHES, INSULATION AND WATERPROOFING
TO ARCHITECT'S DETAILS

0 1 2 3 5m

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEER'S AND ARCHITECT'S DRAWINGS, SPECIFICATIONS AND RISK REGISTERS.
2. DO NOT SCALE FROM THIS DRAWING. USE ONLY DIMENSIONS AS INDICATED. CHECK ALL SITE DIMENSIONS PRIOR TO PLACING ANY ORDER OR FABRICATION. WHERE A CONFLICT OF INFORMATION EXISTS SEEK CONFIRMATION FROM CONSULTANTS PRIOR TO PROCEEDING FURTHER WITH THE WORKS.
3. THIS DRAWING IS TO BE PRINTED IN COLOUR.
4. TEMPORARY STABILITY OF THE EXISTING STRUCTURE AND ANY NEWLY CONSTRUCTED ELEMENTS OF PERMANENT WORKS DURING CONSTRUCTION IS SOLELY CONTRACTOR'S RESPONSIBILITY.
5. ONLY DRAWINGS AND SPECIFICATIONS ISSUED FOR **CONSTRUCTION** CAN BE USED FOR THE WORKS. IT IS CONTRACTOR'S RESPONSIBILITY TO SEEK THE INFORMATION FROM CONSULTANTS.
6. ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS AND SPECIFICATIONS. ALL WATERPROOFING SUCH AS TANKING DETAILS, DAMP PROOF MEMBRANES, DAMP PROOF COURSES, CAVITY TRAYS ETC. ARE TO BE INSTALLED AS PER ARCHITECT'S DETAILS.
7. THE ACTUAL FORM, EXTENT AND CONDITION OF ANY ELEMENTS MARKED AS "TBC"; IS TO BE CONFIRMED BY THE CONTRACTOR VIA LOCAL OPENING/TRIAL PIT PRIOR TO COMMENCEMENT OF ANY WORKS. EXACT DETAILS OF FINDINGS ARE TO BE IMMEDIATELY REPORTED TO ENGINEER.

MATERIAL GRADES

RC U.O.N. GENERALLY	C32/40
FIRST FLOOR SLAB AND BEAMS	C40/50
RC SHEAR WALLS AND COLUMNS	C32/40
REINFORCEMENT	B500
STEEL GRADE	S355

RC WALL SCHEDULE

REF	THICKNESS [mm]	NOTES
RCW1	225	
RCW2	200	
RCW3	250	
RCW4	300	

RC COLUMN SCHEDULE - BASEMENT

REF	SIZE W x L [mm]	NOTES
RCCB01	300x850	
RCCB02	300x600	

REINFORCEMENT ESTIMATES - GROUND FLOOR

ELEMENT	NOTES
RC SLAB	175 kg/m³
RC COLUMNS	450 kg/m³
RC WALLS	170 kg/m³
RC LINER WALLS	150 kg/m³

NOTE:
PUNCHING SHEAR LINKS AND OVERLAP INCLUDED IN THE ABOVE VALUES
FINAL REINFORCEMENT QUANTITIES TO BE PROVIDED AT CONSTRUCTION STAGE

NOTES:
1. CAST-IN SERVICE PENETRATIONS TO BE PROVIDED BY AND COORDINATED WITH MEP ENGINEERS.
2.LIFT SUPPLIERS & ARCHITECTS TO CONFIRM LIFT CLEAR INTERNAL DIMENSIONS, DOOR OPENING DIMENSIONS, LIFT THRESHOLD REQUIREMENTS & LIFT PIT DEPTHS.
3. BELOW GROUND WATERPROOFING DESIGN BY SPECIALIST. DESIGN TO FOLLOW GUIDANCE OF BS8102:2009
TWO FORMS OF BASEMENT WATERPROOFING CURRENTLY ALLOWED - ASSUMED DRAINED CAVITY SYSTEM PLUS WATERPROOF CONCRETE. WATERPROOFING ADDITIVE TO BE ADDED TO THE CONCRETE AT BASEMENT LEVEL INCLUDING LINER WALLS, PART OF GROUND FLOOR SLAB ALONG PERIMETER AND CAPPING BEAMS TO SPECIALIST`S SPECIFICATION. WATERPROOFING INCLUDING CAVITY DRAIN SYSTEM DESIGN AND DETAILS TO SPECIALIST DESIGN. TBC BY WATERPROOFING SPECIALIST
4. ANY PENETRATIONS THROUGH CONTIGUOUS PILES OR CAPPING BEAM TO BE CONFIRMED BY MEP ENGINEER
5. ALLOWANCE TO BE MADE FOR EARTH PITS AS PER LIGHTNING PROTECTION DESIGN. LOCATION AND SIZES TBC BY M&E ENGINEER
6. NO DRAINAGE/PUMPS ALLOWED IN THE LIFTS; LIFT MANUFACTURER TO CONFIRM
7. 50mm THICK BLINDING TO BE ALLOWED FOR UNDER THE SLAB, GROUND BEAMS AND PILE CAP
8. UNLESS NOTED OTHERWISE, ALL BEAM AND PILE CAP DEPTHS ARE OVERALL DEPTHS FROM TOP OF STRUCTURAL SLAB LEVEL.
9. TEMPORARY WORKS TO CONTRACTORS DESIGN
10.TEMPORARY WORKS DESIGN FOR THE CONTIGUOUS PILES PILING AND TO ENABLE INSTALLATION OF GROUND BEAMS AND PILE CAPS TO CONTRACTOR DESIGN
11. BASED ON THE FINDINGS FROM THE SITE INVESTIGATION, A CONTIGUOUS GROUNDWATER INFLOW SHOULD BE CONSIDERED (GROUNDWATER DEPTH MEASURED AT DEPTHS OF 1.44m AND 1.60m b.g.l.).
CONTRACTOR TO ALLOW FOR DE-WATERING WORKS TO MANAGE POTENTIAL GROUND WATER DURING EXCAVATION ENSURING FINES ARE NOT REMOVED FROM THE SOIL.

NOTES:
1 EXCLUSION ZONE; INDICATED 1.5m FROM OUTER FACE OF THAMES WATER RELIEF SEWER. BASED ON FINAL CCTV SURVEY, THE SEWER IS 1219mm IN DIAMETER. THE WALL THICKNESS IS ASSUMED TO BE 215mm. INVERT LEVEL VARIES BETWEEN +26.350m AND +25.720m
BUILD OVER AGREEMENT REQUIRED FOR WORKS ADJACENT TO THAMES WATER SEWER.
THE FOLLOWING DOCUMENTS WILL NEED TO BE PREPARED BY OTHER CONSULTANTS:
-GROUND MOVEMENT ASSESSMENT BY GEOTECHNICAL ENGINEER
-PILING METHOD STATEMENT BY THE PILING CONTRACTOR
-FINAL LINE AND LEVEL SURVEY BY INFOTEC_INF-5247-D01

NOTE:

A. 250mm AND 300mm THICK FOUNDATION SLAB TO BE DOWELLED WITH 2No. H20 IN EVERY PILE WITH HILTI HIT-HY 200-A RESIN AS PER MANUFACTURER'S SPECIFICATIONS. MINIMUM EMBEDMENT 300mm
B. 1000mm THICK PILE CAPS TO BE DOWELLED WITH 3 No. H20 IN EVERY PILE WITH HILTI HIT-HY 200-A RESIN AS PER MANUFACTURER'S SPECIFICATIONS. MINIMUM EMBEDMENT 300mm

rev	date	description	by	checked
T01	2022.07.18	ISSUED FOR TENDER	AJ	TP
P02	2022.05.17	ISSUED FOR INFORMATION	AJ	TP
P01	2022.05.06	ISSUED FOR INFORMATION	AJ	TP

PROJECT TITLE: 19-37 HIGHGATE ROAD
CLIENT: GM LONDON
PROJECT No: E0751
DRAWN: AJ
CHECKED: TP
DRAWING TITLE: PROPOSED BASEMENT PLAN
DRAWING No: E0751-EEE-00-B1-DR-S-1099
STATUS DESCRIPTION: SUITABLE FOR TENDER
REV: T01
SCALE: 1:50@A1

engineeria structural and civil engineers
a: 7 Ridgmount Street, WC1E 7AE, London, United Kingdom
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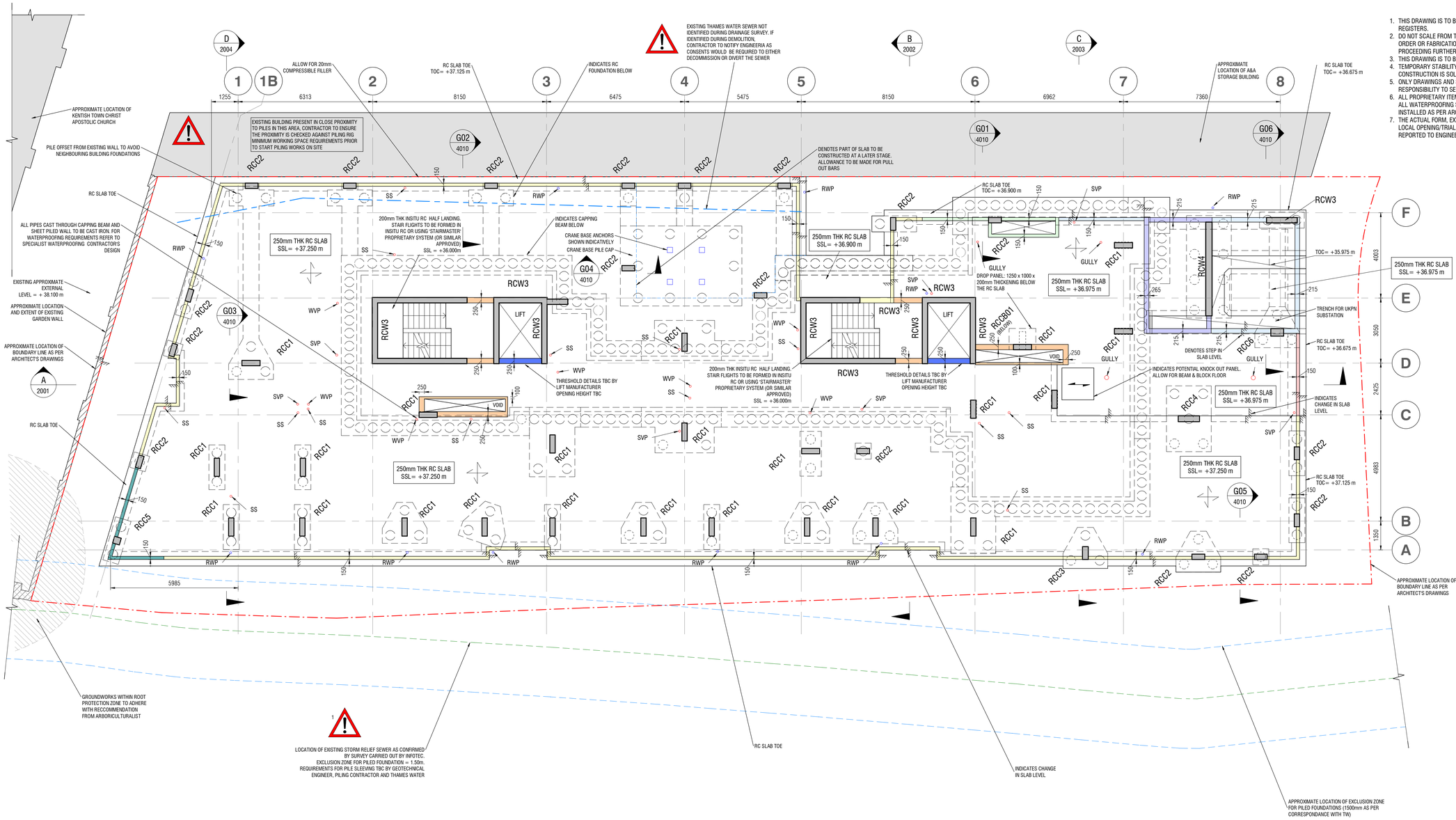
t: (+44)207 580 4588
w: www.engineeria.com



1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEER'S AND ARCHITECT'S DRAWINGS, SPECIFICATIONS AND RISK REGISTERS.
2. DO NOT SCALE FROM THIS DRAWING. USE ONLY DIMENSIONS AS INDICATED. CHECK ALL SITE DIMENSIONS PRIOR TO PLACING ANY ORDER OR FABRICATION. WHERE A CONFLICT OF INFORMATION EXISTS SEEK CONFIRMATION FROM CONSULTANTS PRIOR TO PROCEEDING FURTHER WITH THE WORKS.
3. THIS DRAWING IS TO BE PRINTED IN COLOUR.
4. TEMPORARY STABILITY OF THE EXISTING STRUCTURE AND ANY NEWLY CONSTRUCTED ELEMENTS OF PERMANENT WORKS DURING CONSTRUCTION IS SOLELY CONTRACTOR'S RESPONSIBILITY.
5. ONLY DRAWINGS AND SPECIFICATIONS ISSUED FOR **CONSTRUCTION** CAN BE USED FOR THE WORKS. IT IS CONTRACTOR'S RESPONSIBILITY TO SEEK THE INFORMATION FROM CONSULTANTS.
6. ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS AND SPECIFICATIONS. ALL WATERPROOFING SUCH AS TANKING DETAILS, DAMP PROOF MEMBRANES, DAMP PROOF COURSES, CAVITY TRAYS ETC. ARE TO BE INSTALLED AS PER ARCHITECT'S DETAILS.
7. THE ACTUAL FORM, EXTENT AND CONDITION OF ANY ELEMENTS MARKED AS "TBC", IS TO BE CONFIRMED BY THE CONTRACTOR VIA LOCAL OPENING/TRIAL PIT PRIOR TO COMMENCEMENT OF ANY WORKS. EXACT DETAILS OF FINDINGS ARE TO BE IMMEDIATELY REPORTED TO ENGINEER.

MATERIAL GRADES	
RC U.O.N. GENERALLY	C32/40
FIRST FLOOR SLAB AND BEAMS	C40/50
RC SHEAR WALLS AND COLUMNS	C32/40
REINFORCEMENT	B500
STEEL GRADE	S355

RC WALL SCHEDULE		
REF	THICKNESS [mm]	NOTES
RCW1	225	
RCW2	200	
RCW3	250	
RCW4	300	

RC COLUMN SCHEDULE - GROUND FLOOR		
REF	SIZE W x L [mm]	NOTES
RCC1	250x850	
RCC2	250x600	
RCC3	275x600	
RCC4	275x1000	
RCC5	325x325	
RCC6	350x600	

REINFORCEMENT ESTIMATES - GROUND FLOOR	
ELEMENT	NOTES
RC SLAB	150 kg/m³
RC COLUMNS	450 kg/m³
RC WALLS	170 kg/m³

NOTE:
PUNCHING SHEAR LINKS AND OVERLAP INCLUDED IN THE ABOVE VALUES
FINAL REINFORCEMENT QUANTITIES TO BE PROVIDED AT CONSTRUCTION STAGE

NOTES:
1.SERVICE PENETRATIONS TO BE PROVIDED BY AND COORDINATED WITH MEP ENGINEERS. CAST-IN SERVICE PENETRATIONS TO BE PROVIDED BY AND COORDINATED WITH MEP ENGINEERS.
2.LIFT SUPPLIERS & ARCHITECTS TO CONFIRM LIFT CLEAR INTERNAL DIMENSIONS, DOOR OPENING DIMENSIONS, LIFT THRESHOLD REQUIREMENTS & LIFT PIT DEPTHS.
3. WATERPROOFING DESIGN BY OTHERS.
ARCHITECT/WATERPROOFING SPECIALIST TO CONFIRM THE WATERPROOFING STRATEGY FOR THE STRUCTURE AT GROUND FLOOR LEVEL ALONG THE PERIMETER. EXTENT OF GROUND FLOOR SLAB AND CAPPING BEAM REQUIRING WATERPROOFING ADDITIVE TO BE CONFIRMED BY WATERPROOFING SPECIALIST.
4. CONTRACTOR /PILING CONTRACTOR TO CONSULT ARBORICULTURALIST AND THEIR REPORT PRIOR TO CARRYING OUR DEMOLITION AND BASEMENT CONSTRUCTION ACTIVITIES ON SITE.
5. ANY PENETRATIONS THROUGH CONTIGUOUS PILES OR CAPPING BEAM TO BE CONFIRMED BY MEP ENGINEER
6. 50mm THICK BLINDING TO BE ALLOWED FOR UNDER THE SLAB, GROUND BEAMS AND PILE CAP
7. UNLESS NOTED OTHERWISE, ALL BEAM AND PILE CAP DEPTHS ARE OVERALL DEPTHS FROM TOP OF STRUCTURAL SLAB LEVEL.
8. TEMPORARY WORKS TO CONTRACTORS DESIGN
9.TEMPORARY WORKS DESIGN TO ENABLE INSTALLATION OF GROUND BEAMS AND PILE CAPS TO CONTRACTOR DESIGN
10. LIGHTNING RODS FIXED TO REINFORCEMENT INSTALLED AS PER SERVICES ENGINEER'S REQUIREMENTS

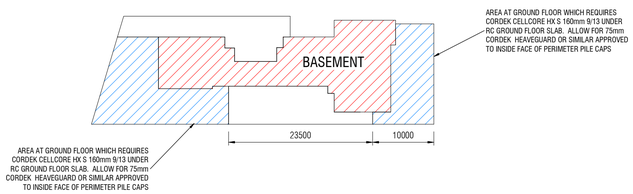
PROPOSED GROUND FLOOR PLAN

SCALE 1 : 100

FINISHES, INSULATION AND WATERPROOFING
TO ARCHITECT'S DETAILS

UPSTAND TOP OF CONCRETE	
	TOC = +37.425 m
	TOC = +37.350 m
	TOC = +37.275 m
	TOC = +37.125 m
	TOC = +37.050 m
	TOC = +37.400 m
	TOC = +37.725 m
	TOC = +37.375 m (TBC BY LIFT MANUFACTURER)

NOTES:
1 EXCLUSION ZONE; INDICATED 1.5m FROM OUTER FACE OF THAMES WATER RELIEF SEWER. BASED ON FINAL CCTV SURVEY, THE SEWER IS 1219mm IN DIAMETER. THE WALL THICKNESS IS ASSUMED TO BE 215mm. INVERT LEVEL VARIES BETWEEN +26.350m AND +25.720m
BUILD OVER AGREEMENT REQUIRED FOR WORKS ADJACENT TO THAMES WATER SEWER.
THE FOLLOWING DOCUMENTS WILL NEED TO BE PREPARED BY OTHER CONSULTANTS:
-GROUND MOVEMENT ASSESSMENT BY GEOTECHNICAL ENGINEER
-PILING METHOD STATEMENT BY THE PILING CONTRACTOR
-FINAL LINE AND LEVEL SURVEY BY INFOTEC_INF-5247-D01



HEAVE PROTECTION REQUIREMENTS

0 1 2 3 5 8 11 m

rev	date	description	by	checked
T01	2022.07.18	ISSUED FOR TENDER	AJ	TP
P02	2022.05.17	ISSUED FOR INFORMATION	AJ	TP
P01	2022.05.06	ISSUED FOR INFORMATION	AJ	TP

PROJECT TITLE:
19-37 HIGHGATE ROAD

CLIENT:
GM LONDON

PROJECT No: E0751
DRAWN: AJ
CHECKED: TP

DRAWING TITLE:
PROPOSED GROUND FLOOR PLAN

DRAWING No:
E0751-EEE-00-GF-DR-S-1100

STATUS DESCRIPTION:
SUITABLE FOR TENDER

REV: T01
SCALE: 1:100@A1

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e: contact@engineeria.com
t: (+44)207 580 4588
w: www.engineeria.com

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
289056008_1_1

Customer Reference:
J21343

National Grid Reference:
528870, 185410

Slice:
A

Site Area (Ha):
0.12

Search Buffer (m):
1000

Site Details:

The Highgate Centre, 19-37
Highgate Road
LONDON
NW5 1JY

Client Details:

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

GEA

Contents

Introduction

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

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					n/a
Contaminated Land Register Entries and Notices	pg 1		4	2	
Discharge Consents					
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		6	7	11
Local Authority Pollution Prevention and Control Enforcements	pg 5			1	
Nearest Surface Water Feature	pg 5			Yes	
Pollution Incidents to Controlled Waters					
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	pg 5				6 (*11)
Water Industry Act Referrals					
Groundwater Vulnerability Map	pg 9	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 9	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 10			2	1

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 11			1	
Local Authority Landfill Coverage		1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)	pg 11			1	
Potentially Infilled Land (Water)	pg 11			1	3
Registered Landfill Sites					
Registered Waste Transfer Sites	pg 11				1
Registered Waste Treatment or Disposal Sites	pg 12			1	
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 13	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry					
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 13		Yes	Yes	Yes
BGS Urban Soil Chemistry Averages	pg 15	Yes			
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 16	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 16	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 16	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 16	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 17		48	70	150
Fuel Station Entries	pg 39			1	3
Points of Interest - Commercial Services	pg 39		13	19	27
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 44		20	21	30
Points of Interest - Public Infrastructure	pg 50		3	5	6
Points of Interest - Recreational and Environmental	pg 51		2	13	79
Gas Pipelines					
Underground Electrical Cables	pg 59				52

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland					
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					
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Contaminated Land Register Entries and Notices** Location: Even Numbers 2-10 Ascham Street, Odd Numbers 15-31 Falkland Road And Even Numbers 34-48 Leverton Street, London, Nw5 Notice Type: Environmental Protection Act (1990) Section 78A(2) And 78(B) Determination That Land Is Contaminated Reference: Not Supplied Dated: 12th September 2005 Positional Accuracy: Positioned by the supplier Boundary Quality: Good	A13SE (E)	193	2	529085 185362
2	**Contaminated Land Register Entries and Notices** Location: 29 Falkland Road, London, Nw5 2pu Notice Type: Environmental Protection Act (1990) Section 78A(2) And 78(B) Determination That Land Is Contaminated Reference: Not Supplied Dated: 31st July 2005 Positional Accuracy: Positioned by the supplier Boundary Quality: Good	A13SE (E)	239	2	529131 185360
3	**Contaminated Land Register Entries and Notices** Location: 31 Falkland Road, London, Nw5 2pu Notice Type: Environmental Protection Act (1990) Section 78A(2) And 78(B) Determination That Land Is Contaminated Reference: Not Supplied Dated: 31st July 2005 Positional Accuracy: Positioned by the supplier Boundary Quality: Good	A13SE (E)	244	2	529136 185359
4	**Contaminated Land Register Entries and Notices** Location: 33 Falkland Road, London, Nw5 2pu Notice Type: Environmental Protection Act (1990) Section 78A(2) And 78(B) Determination That Land Is Contaminated Reference: Not Supplied Dated: 12th September 2005 Positional Accuracy: Positioned by the supplier Boundary Quality: Good	A13SE (E)	250	2	529142 185358
5	**Contaminated Land Register Entries and Notices** Location: Even Numbers 14-20 Ascham Street, Odd Numbers 15-33 Lady Margaret Road, And Odd Numbers 37-41 Falkland Road, London, Nw5 Notice Type: Environmental Protection Act (1990) Section 78A(2) And 78(B) Determination That Land Is Contaminated Reference: Not Supplied Dated: 12th September 2005 Positional Accuracy: Positioned by the supplier Boundary Quality: Good	A13SE (E)	256	2	529150 185385
6	**Contaminated Land Register Entries and Notices** Location: 35 Falkland Road, London, Nw5 2pu Notice Type: Update on Remediation Statement - Remediation Work Completed Reference: Not Supplied Dated: 31st July 2005 Positional Accuracy: Positioned by the supplier Boundary Quality: Good	A13SE (E)	257	2	529149 185357
7	**Local Authority Pollution Prevention and Controls** Name: Perk Clean Location: 20 Fortress Road, London, Nw5 2hb Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC21 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A13SE (E)	111	2	529004 185375
7	**Local Authority Pollution Prevention and Controls** Name: M & A Coachworks Location: Fortess Grove, London, Nw5 2HE Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC3 Dated: 15th May 1997 Process Type: Local Authority Pollution Prevention and Control Description: PG6/34 Respraying of road vehicles **Status: Permitted** Positional Accuracy: Manually positioned to the address or location	A13NE (E)	138	2	529031 185415

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
7	**Local Authority Pollution Prevention and Controls** Name: M & A Coachworks Location: 36/52 Fortress Road, LONDON, NW5 1AD Authority: London Borough of Camden, Pollution Projects Team Permit Reference: NOT GIVEN Dated: 15th May 1997 Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles **Status: Authorisation revoked** Positional Accuracy: Manually positioned to the address or location	A13NE (E)	149	2	529036 185443
8	**Local Authority Pollution Prevention and Controls** Name: Zappeo Dry Cleaners Location: 310 Kentish Town Road, London, Nw5 2th Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC2 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A13SE (SE)	180	2	529009 185256
9	**Local Authority Pollution Prevention and Controls** Name: Post Office Vehicle Services Location: Unit A Kentish Town Business Park, Regis Road, LONDON, NW5 3RR Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC2 Dated: 27th February 1996 Process Type: Local Authority Pollution Prevention and Control Description: PG6/34 Respraying of road vehicles **Status: Permitted** Positional Accuracy: Automatically positioned to the address	A13SW (S)	204	2	528820 185192
10	**Local Authority Pollution Prevention and Controls** Name: The Kleen Machine Location: 347 Kentish Town Road, London, Nw5 2tj Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC44 Dated: 26th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A13SE (SE)	246	2	528988 185167
11	**Local Authority Pollution Prevention and Controls** Name: J Murphy & Sons Ltd Location: 81 Highgate Road, London, Nw5 1ts Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC10 Dated: 1st March 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/34 Respraying of road vehicles **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	262	2	528642 185605
12	**Local Authority Pollution Prevention and Controls** Name: Royal Mail Property Holdings Ltd Location: 1 Regis Road, LONDON, NW5 3EW Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: Not Supplied Process Type: Local Authority Air Pollution Control Description: PG6/10 Coating manufacturing **Status: Authorisation revoked** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (S)	304	2	528875 185083
13	**Local Authority Pollution Prevention and Controls** Name: M & A Coachworks Location: 135 Highgate Road, CAMDEN, NW5 1LE Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC5 Dated: 6th September 1993 Process Type: Local Authority Pollution Prevention and Control Description: PG6/34 Respraying of road vehicles **Status: Permitted** Positional Accuracy: Manually positioned to the address or location	A13NW (NW)	356	2	528600 185695

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
14	**Local Authority Pollution Prevention and Controls** Name: Hexagon Of Highgate Ltd Location: 1 Browns Lane, Regis Road, LONDON, NW5 3EX Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC4 Dated: 30th April 1993 Process Type: Local Authority Pollution Prevention and Control Description: PG6/34 Respraying of road vehicles **Status:** **Permitted** Positional Accuracy: Automatically positioned to the address	A8NW (SW)	404	2	528626 185072
15	**Local Authority Pollution Prevention and Controls** Name: Asf Garage Ltd Location: 138 Highgate Road, London, NW5 1PB Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC22 Dated: 1st April 1999 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status:** **Permitted** Positional Accuracy: Automatically positioned to the address	A18SW (NW)	429	2	528633 185810
16	**Local Authority Pollution Prevention and Controls** Name: Perfect Dry Cleaners Location: 151 Highgate Road, London, Nw5 1lj Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC31 Dated: 24th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A18SW (NW)	435	2	528588 185787
17	**Local Authority Pollution Prevention and Controls** Name: Eventech Ltd Location: 3 - 6 Spring Place, LONDON, NW5 3BA Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC2 Dated: 30th April 1993 Process Type: Local Authority Pollution Prevention and Control Description: PG6/34 Respraying of road vehicles **Status:** **Permitted** Positional Accuracy: Manually positioned to the address or location	A8NW (SW)	492	2	528569 185005
18	**Local Authority Pollution Prevention and Controls** Name: Sun Dry Cleaners Location: 167 Fortress Road, London, Nw5 2hr Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC46 Dated: 28th December 2006 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A18SE (NE)	503	2	529132 185860
19	**Local Authority Pollution Prevention and Controls** Name: The Choice Dry Cleaners Location: 62 Chetwynd Road, London, Nw5 1dj Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC40 Dated: 24th December 2006 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A18SW (N)	552	2	528810 185992
20	**Local Authority Pollution Prevention and Controls** Name: L G Coachworks Location: 61-65 Wilkin Street Mews, Wilkin Street, London, NW5 3NN Authority: London Borough of Camden, Pollution Projects Team Permit Reference: NOT GIVEN Dated: 9th December 1997 Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles **Status:** **Authorised** Positional Accuracy: Manually positioned to the road within the address or location	A8NW (SW)	651	2	528586 184806

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
20	**Local Authority Pollution Prevention and Controls** Name: D P Enamellers Location: Imperial Works, Perren Street, London, NW5 3ED Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 27th July 1997 Process Type: Local Authority Air Pollution Control Description: PG6/23 Coating of metal and plastic **Status: Authorisation revoked** Positional Accuracy: Manually positioned to the address or location	A8NW (S)	660	2	528610 184784
21	**Local Authority Pollution Prevention and Controls** Name: Prince Of Wales Dry Cleaners Location: 17 Prince Of Wales Road, London, Nw5 3lh Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC12 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A8SW (S)	698	2	528777 184696
22	**Local Authority Pollution Prevention and Controls** Name: J T Coachworks Location: 52A Prince Wales Road, LONDON, NW5 3LR Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 30th April 1993 Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles **Status: Authorisation revoked** Positional Accuracy: Automatically positioned to the address	A8SW (S)	744	2	528594 184700
23	**Local Authority Pollution Prevention and Controls** Name: Moderna Dry Cleaners Location: 70 Queens Crescent, London, Nw5 4ee Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC16 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A7NE (SW)	755	2	528216 185005
24	**Local Authority Pollution Prevention and Controls** Name: Whittington Service Station (Esso) Location: 213-217 Junction Road, LONDON, N19 5QA Authority: London Borough of Islington, Environmental Health Department Permit Reference: Epa-Auth-020 Dated: 18th December 1998 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station **Status: Authorised** Positional Accuracy: Manually positioned to the address or location	A19NW (NE)	764	3	529214 186115
25	**Local Authority Pollution Prevention and Controls** Name: Visage Location: 171 Malden Road, London, Nw5 4ht Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC50 Dated: 1st February 2008 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Manually positioned to the address or location	A12SW (W)	924	2	527961 185143
26	**Local Authority Pollution Prevention and Controls** Name: Universal Dry Cleaners Location: 9-11 Brecknock Road, London, N7 0bl Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC30 Dated: 29th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status: Permitted** Positional Accuracy: Located by supplier to within 10m	A9NE (SE)	946	2	529761 185015

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
27	**Local Authority Pollution Prevention and Controls** Name: Fairways Camden Location: 135-143 Camden Road, LONDON, NW1 9HA Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 11th December 1998 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station **Status: Site Closed** Positional Accuracy: Manually positioned to the address or location	A9SW (SE)	973	2	529516 184646
28	**Local Authority Pollution Prevention and Control Enforcements** Location: 3 - 6 Spring Place, London, Nw5 3ba Type: Air Pollution Control Enforcement Notice Reference: Not Given Date Issued: 16th November 2001 Enforcement Date: Not Supplied Details: Failure To Maintain Proper Paperwork For Organic Compounds Positional Accuracy: Manually positioned to the address or location	A8NW (SW)	492	2	528569 185005
	Nearest Surface Water Feature	A18SW (N)	385	-	528831 185826
29	**Water Abstractions** Operator: Greenwich Leisure Limited Licence Number: 28/39/39/0091 Permit Version: 101 Location: Kentish Town Sports Centre, Prince Of Wales St Authority: Environment Agency, Thames Region Abstraction: Commercial/Industrial/Public Services: Drinking; Cooking; Sanitary; Washing; (Small Garden) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Kentish Town Sports Centre, Prince Of Wales Road, London Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 25th May 2012 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A8SW (S)	692	4	528800 184700
29	**Water Abstractions** Operator: Greenwich Leisure Limited Licence Number: 28/39/39/0091 Permit Version: 101 Location: Kentish Town Sports Centre, Prince Of Wales St Authority: Environment Agency, Thames Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: St. Pancras Public Baths, Prince Of Wales Road, London Nw1 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 25th May 2012 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A8SW (S)	692	4	528800 184700
29	**Water Abstractions** Operator: Greenwich Leisure Ltd Licence Number: 28/39/39/0091 Permit Version: 101 Location: Two Bores At Kentish Town Sports Centre, Prince Of Wales St Authority: Environment Agency, Thames Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: St. Pancras Public Baths, Prince Of Wales Road, London Nw1 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 5th April 2012 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A8SW (S)	692	4	528800 184700

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
29	**Water Abstractions** Operator: London Borough Of Camden Licence Number: 28/39/39/0091 Permit Version: 100 Location: Two Bores At Kentish Town Sports Centre, Prince Of Wales St Authority: Environment Agency, Thames Region Abstraction: Commercial/Industrial/Public Services: Drinking; Cooking; Sanitary; Washing; (Small Garden) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 605 Yearly Rate (m3): 76509 Details: Kentish Town Sports Centre, Prince Of Wales Road, London Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 13th June 1966 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A8SW (S)	692	4	528800 184700
29	**Water Abstractions** Operator: London Borough Of Camden Licence Number: 28/39/39/0091 Permit Version: 100 Location: Two Bores At Kentish Town Sports Centre, Prince Of Wales St Authority: Environment Agency, Thames Region Abstraction: Industrial; Commercial And Public Services: Laundry Use Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: St. Pancras Public Baths, Prince Of Wales Road, London Nw1 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 13th June 1966 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A8SW (S)	692	4	528800 184700
29	**Water Abstractions** Operator: London Borough Of Camden Licence Number: 28/39/39/0091 Permit Version: 100 Location: Two Bores At Kentish Town Sports Centre, Prince Of Wales St Authority: Environment Agency, Thames Region Abstraction: Other Industrial/Commercial/Public Services: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: St. Pancras Public Baths, Prince Of Wales Road, London Nw1 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 13th June 1966 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A8SW (S)	692	4	528800 184700
	Water Abstractions Operator: Canal And River Trust Licence Number: 28/39/39/0164 Permit Version: 101 Location: Southampton Bridge, London, Nw8 - Regents Canal Authority: Environment Agency, Thames Region Abstraction: Amenity: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Pipeline Alongside The Regents Canal, London Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 17th December 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A2SE (S)	1418	4	528500 184020

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: British Waterways Board Licence Number: 28/39/39/0164 Permit Version: 100 Location: Southampton Bridge, London, Nw8 - Regents Canal Authority: Environment Agency, Thames Region Abstraction: Amenity: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): 3840 Yearly Rate (m3): 1 Details: Pipeline Alongside The Regents Canal, London Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 25th April 1983 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A2SE (S)	1418	4	528500 184020
	Water Abstractions Operator: British Waterways Board Licence Number: 28/39/39/0173 Permit Version: 100 Location: Oval Road, Camden - Grand Union Regents Canal Authority: Environment Agency, Thames Region Abstraction: Other Industrial/Commercial/Public Services: Non-Evaporative Cooling Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): 20 Yearly Rate (m3): 7000 Details: Land At Oval Road, Camden, London Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 8th December 1994 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A2SE (S)	1421	4	528490 184020
	Water Abstractions Operator: British Waterways Licence Number: 28/39/39/0164B Permit Version: Not Supplied Location: Southampton Bridge, LONDON, Nw8 Authority: Environment Agency, Thames Region Abstraction: Industrial Cooling (Cegb) Abstraction Type: Not Supplied Source: River Daily Rate (m3): 3840 Yearly Rate (m3): 1 Details: Annual Abstraction Total Aggregated To Another Licence For Quantity Purposes. Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A2SE (S)	1438	4	528500 184000
	Water Abstractions Operator: Hanson Quarry Products Europe Ltd Licence Number: Th/039/0039/027/R01 Permit Version: 1 Location: Kings Cross Concrete Plant-Borehole Authority: Environment Agency, Thames Region Abstraction: Mineral Products: Dust Suppression Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 25th April 2019 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1699	4	529920 184040

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Hanson Quarry Products Europe Ltd Licence Number: Th/039/0039/027/R01 Permit Version: 1 Location: Kings Cross Concrete Plant-Borehole Authority: Environment Agency, Thames Region Abstraction: Mineral Products: General use relating to Secondary Category (High Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 25th April 2019 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1699	4	529920 184040
	Water Abstractions Operator: Hanson Quarry Products Europe Ltd Licence Number: Th/039/0039/027/R01 Permit Version: 1 Location: Kings Cross Concrete Plant-Borehole Authority: Environment Agency, Thames Region Abstraction: Mineral Products: General Washing/Process Washing Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 25th April 2019 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1699	4	529920 184040
	Water Abstractions Operator: Hanson Quarry Products Europe Ltd Licence Number: Th/039/0039/027 Permit Version: 2 Location: Kings Cross Concrete Plant-Borehole Authority: Environment Agency, Thames Region Abstraction: Mineral Products: General use relating to Secondary Category (High Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Kings Cross Concrete Plant, Off York Way, London. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 13th August 2012 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1699	4	529920 184040
	Water Abstractions Operator: Hanson Quarry Products Europe Ltd Licence Number: Th/039/0039/027 Permit Version: 1 Location: Kings Cross Concrete Plant-Borehole Authority: Environment Agency, Thames Region Abstraction: Mineral Products: General use relating to Secondary Category (High Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Kings Cross Concrete Plant, Off York Way, London. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 21st April 2010 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1699	4	529920 184040

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Hanson Quarry Products Europe Ltd Licence Number: 28/39/39/0222 Permit Version: 1 Location: Kings Cross Concrete Plant-Borehole Authority: Environment Agency, Thames Region Abstraction: Mineral Products: General use relating to Secondary Category (High Loss) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Kings Cross Concrete Plant, Off York Way, London. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 31st August 2006 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A5SW (SE)	1699	4	529920 184040
	Water Abstractions Operator: British Waterways Board Licence Number: 28/39/39/0172 Permit Version: 100 Location: Grand Union Canal At Camley Street Nature Park, London Authority: Environment Agency, Thames Region Abstraction: Environmental: Non-remedial River/Wetland Support: Make-Up or Top Up Water Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): 16 Yearly Rate (m3): 2273 Details: Camley Street Nature Park, Camden, London, Nw1 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 18th September 1991 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(SE)	1988	4	529750 183600
	Groundwater Vulnerability Map Combined Classification: Unproductive Aquifer (may have productive aquifer beneath) Combined Vulnerability: Unproductive Combined Aquifer: Unproductive 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	528867 185414
	Groundwater Vulnerability - Soluble Rock Risk None				
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A13SW (SW)	0	5	528867 185414
	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				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
30	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 81.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (N)	385	6	528831 185826
31	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 100.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18SW (N)	398	6	528824 185839
32	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 11.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A18NW (N)	909	6	528552 186300

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
33	**Licensed Waste Management Facilities (Locations)** Licence Number: 80349 Location: Recycling Centre, Regis Road, Kentish Town, London, NW5 3EW Operator Name: Londonenergy Ltd Operator Location: Not Supplied Authority: Environment Agency - Thames Region, North East Area Site Category: Household Waste Amenity Sites **Licence Status: Modified** Issued: 10th December 1996 Last Modified: 2nd August 2019 Expires: Not Supplied Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13SW (SW)	256	4	528726 185181
	Local Authority Landfill Coverage Name: London Borough of Camden - Has no landfill data to supply		0	7	528867 185414
	Local Authority Landfill Coverage Name: London Borough of Islington - Has no landfill data to supply		463	3	529247 185694
34	**Potentially Infilled Land (Non-Water)** Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1996	A12SE (W)	340	9	528505 185367
35	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A12NE (W)	383	9	528463 185506
36	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A18NW (N)	909	9	528739 186344
37	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A18NW (N)	912	9	528738 186347
38	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1876	A18NW (N)	988	9	528719 186421
39	**Registered Waste Transfer Sites** Licence Holder: Wharf & Jetty Services Ltd Licence Reference: DL098 Site Location: BR Goods Depot, Gordon House Road, CAMDEN, London, NW5 Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Transfer Max Input Rate: Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 1st May 1982 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the road within the address or location Boundary Quality: Not Supplied Authorised Waste: Commercial Waste; Construction And Demolition Wastes Prohibited Waste: Biodegradable/Putrescible Waste; Clinical Wastes; Notifiable Wastes; Special Wastes	A12NE (NW)	535	4	528350 185650

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
40	**Registered Waste Treatment or Disposal Sites** Licence Holder: Camden L.B.C Licence Reference: T/NE/0475090 (CAM070) Site Location: Regis Road Recycling Centre, CAMDEN, London, NW5 3EP Operator Location: Environment Department, Town Hall Extension, Argyle Street, London, Greater London, Wc1h 8eq Authority: Environment Agency - Thames Region, North East Area Site Category: Recycling / Reclamation Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 10th December 1996 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the road within the address or location Boundary Quality: Not Supplied Authorised Waste: Elec/Onic Compts/Fix/Fit/App/Photocopi Empty Used Containers Lead/Acid Batteries Lighting Lamps/Tubes/Fluorescents Lwra Cat Bii Gen. Scrap Metal Waste Lwra Cat. A = Inert Wastes Lwra Cat. Bi Gen.Non-Putresc Lwra Cat. C 'Putresc' Mineral Oils Prohibited Waste: Waste N.O.S.	A13SW (SW)	305	4	528700 185140

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	528867 185414
	BGS Estimated Soil Chemistry No data available				
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528958, 185156 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 15.60 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 61.70 mg/kg Lead Measured Concentration: 625.40 mg/kg Nickel Measured Concentration: 23.20 mg/kg	A13SE (S)	244	1	528958 185156
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528670, 185654 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 28.70 mg/kg Cadmium Measured Concentration: 0.50 mg/kg Chromium Measured Concentration: 107.00 mg/kg Lead Measured Concentration: 320.30 mg/kg Nickel Measured Concentration: 50.10 mg/kg	A13NW (NW)	279	1	528670 185654
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 529215, 185284 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 20.00 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 71.50 mg/kg Lead Measured Concentration: 535.90 mg/kg Nickel Measured Concentration: 32.80 mg/kg	A14SW (E)	339	1	529215 185284
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 529189, 185724 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 38.10 mg/kg Cadmium Measured Concentration: 1.00 mg/kg Chromium Measured Concentration: 89.70 mg/kg Lead Measured Concentration: 1348.20 mg/kg Nickel Measured Concentration: 55.20 mg/kg	A13NE (NE)	439	1	529189 185724

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: 528324, 185717 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 19.50 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 78.00 mg/kg Lead Measured Concentration: 340.30 mg/kg Nickel Measured Concentration: 28.40 mg/kg	A12NE (NW)	588	1	528324 185717
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528266, 185227 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 25.00 mg/kg Cadmium Measured Concentration: 24.70 mg/kg Chromium Measured Concentration: 201.90 mg/kg Lead Measured Concentration: 430.60 mg/kg Nickel Measured Concentration: 68.10 mg/kg	A12SE (W)	608	1	528266 185227
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 529127, 184723 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 21.10 mg/kg Cadmium Measured Concentration: 0.50 mg/kg Chromium Measured Concentration: 96.30 mg/kg Lead Measured Concentration: 766.20 mg/kg Nickel Measured Concentration: 36.80 mg/kg	A8SE (S)	709	1	529127 184723
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528802, 184667 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 11.60 mg/kg Cadmium Measured Concentration: 0.40 mg/kg Chromium Measured Concentration: 21.60 mg/kg Lead Measured Concentration: 22.20 mg/kg Nickel Measured Concentration: 9.00 mg/kg	A8SW (S)	724	1	528802 184667
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528741, 186234 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 19.70 mg/kg Cadmium Measured Concentration: 0.50 mg/kg Chromium Measured Concentration: 69.80 mg/kg Lead Measured Concentration: 314.00 mg/kg Nickel Measured Concentration: 26.00 mg/kg	A18NW (N)	800	1	528741 186234

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: 528240, 184781 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 16.70 mg/kg Cadmium Measured Concentration: 0.50 mg/kg Chromium Measured Concentration: 73.90 mg/kg Lead Measured Concentration: 994.20 mg/kg Nickel Measured Concentration: 26.20 mg/kg	A7NE (SW)	880	1	528240 184781
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 529825, 185580 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 19.30 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 97.60 mg/kg Lead Measured Concentration: 237.20 mg/kg Nickel Measured Concentration: 40.90 mg/kg	A14NE (E)	949	1	529825 185580
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 529833, 185232 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 29.50 mg/kg Cadmium Measured Concentration: 3.70 mg/kg Chromium Measured Concentration: 119.40 mg/kg Lead Measured Concentration: 1057.10 mg/kg Nickel Measured Concentration: 73.40 mg/kg	A14SE (E)	952	1	529833 185232
	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	528867 185414

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	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	528867 185414
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	528867 185414
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	528867 185414
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	528867 185414
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	59	1	528855 185333
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	528867 185414
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	1	528867 185414
	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	528867 185414
	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	528867 185414

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
41	**Contemporary Trade Directory Entries** Name: Alexander Green Ltd Location: 19, Greenwood Place, London, NW5 1LB Classification: Children & Babywear - Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SW (SW)	12	-	528848 185403
42	**Contemporary Trade Directory Entries** Name: Tango Group International Location: Linton House, 39-51, Highgate Road, London, NW5 1RT Classification: Clothing Accessory Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	40	-	528813 185463
42	**Contemporary Trade Directory Entries** Name: Unity Kitchen Location: 37, Greenwood Place, London, NW5 1LB Classification: Car Customisation & Conversion Specialists **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	40	-	528809 185405
42	**Contemporary Trade Directory Entries** Name: Dictate I T Location: Linton House, 39-51, Highgate Road, London, NW5 1RT Classification: Waterproof Clothing & Rainwear **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	40	-	528813 185463
42	**Contemporary Trade Directory Entries** Name: Lawsons Outdoor Location: The Maple Building 39-51 Highgate Road, London, NW5 1RT Classification: Builders' Merchants **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	40	-	528813 185462
42	**Contemporary Trade Directory Entries** Name: Millenium Designs Ltd Location: 39-51, Highgate Road, London, NW5 1RS Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	40	-	528813 185463
42	**Contemporary Trade Directory Entries** Name: Regalfield Ltd Location: 39-51, Highgate Road, London, NW5 1RS Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	40	-	528813 185463
42	**Contemporary Trade Directory Entries** Name: The Constance Wood Group Location: 39-51, Highgate Road, London, NW5 1RS Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	40	-	528813 185463
42	**Contemporary Trade Directory Entries** Name: Alan Pharmaceuticals Location: 33 Greenwood Place, Camden, London, NW5 1LB Classification: Pharmaceutical Manufacturers & Distributors **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NW (W)	49	-	528791 185444
42	**Contemporary Trade Directory Entries** Name: Alan Pharmaceuticals Location: 33, Greenwood Place, London, NW5 1LB Classification: Pharmaceutical Manufacturers & Distributors **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (W)	49	-	528791 185444
42	**Contemporary Trade Directory Entries** Name: Billi Co Location: Unit 5A, 33, Greenwood Place, London, NW5 1LB Classification: Candle Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (W)	49	-	528791 185444
42	**Contemporary Trade Directory Entries** Name: Angelic Candles Ltd Location: Unit 5A, 33, Greenwood Place, London, NW5 1LB Classification: Candle Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (W)	49	-	528791 185444

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
42	**Contemporary Trade Directory Entries** Name: Amano Ltd Location: Studio 3B, 33, Greenwood Place, London, NW5 1LB Classification: Knitwear Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (W)	49	-	528791 185444
42	**Contemporary Trade Directory Entries** Name: Muir & Osborne Location: Studio 3B, 33, Greenwood Place, London, NW5 1LB Classification: Knitwear Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (W)	49	-	528791 185444
42	**Contemporary Trade Directory Entries** Name: Wanted Location: 33 Greenwood Place, Camden, London, NW5 1LB Classification: Clothing & Fabrics - Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NW (W)	49	-	528791 185444
42	**Contemporary Trade Directory Entries** Name: Culture Store Ltd Location: Deane House Studios,27 Greenwood Place, London, NW5 1LB Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	63	-	528780 185409
42	**Contemporary Trade Directory Entries** Name: World Classics Location: Deane House, 27, Greenwood Place, London, NW5 1LB Classification: T-Shirts **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SW (W)	63	-	528780 185409
42	**Contemporary Trade Directory Entries** Name: Sun & Seed Ltd Location: 27 Greenwood Place, London, NW5 1LB Classification: Food Products - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (W)	63	-	528780 185409
43	**Contemporary Trade Directory Entries** Name: Cuttingcolours Location: 5a, Burghley Road, London, NW5 1UD Classification: Stained Glass Designers & Producers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (N)	56	-	528870 185495
44	**Contemporary Trade Directory Entries** Name: A S Hepburn Location: 30a, Highgate Road, London, NW5 1QB Classification: Fasteners & Fixing Devices **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	69	-	528938 185451
45	**Contemporary Trade Directory Entries** Name: Coin Laundry Location: 1, Fortess Road, London, NW5 1AA Classification: Laundries & Launderettes **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	96	-	528966 185330
46	**Contemporary Trade Directory Entries** Name: Perk Clean Location: 20 Fortess Road, London, NW5 2HB Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	113	-	529006 185375
47	**Contemporary Trade Directory Entries** Name: Lewis Scaffolding Location: Flat 15, 39, Fortess Road, London, NW5 1AD Classification: Scaffolding & Work Platforms **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	130	-	528976 185499
48	**Contemporary Trade Directory Entries** Name: London Boys Scrap Yards In Kentish Town Location: 4, Fortess Road, London, NW5 2ES Classification: Car Breakers & Dismantlers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	134	-	528992 185303

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
48	**Contemporary Trade Directory Entries** Name: Mail Boxes Etc Location: 4, Fortess Road, London, NW5 2ES Classification: Freight Forwarders **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	134	-	528992 185303
48	**Contemporary Trade Directory Entries** Name: Atlantis Print Location: 4, FORTESS ROAD, LONDON, NW5 2ES Classification: Printers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	134	-	528992 185303
48	**Contemporary Trade Directory Entries** Name: Universe Pizza Location: 320, Kentish Town Road, London, NW5 2TH Classification: Catering Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	155	-	528997 185278
48	**Contemporary Trade Directory Entries** Name: Zappeo Dry Cleaning Location: 310, Kentish Town Road, London, NW5 2TH Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	179	-	529008 185257
49	**Contemporary Trade Directory Entries** Name: Don Hobson Electrical Location: 49, Lady Somerset Road, LONDON, NW5 1TY Classification: Electrical Engineers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	140	-	528794 185569
50	**Contemporary Trade Directory Entries** Name: Caesar Fashions Ltd Location: 53-79 Highgate Rd, London, NW5 1TL Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (NW)	151	-	528720 185525
50	**Contemporary Trade Directory Entries** Name: Freight-Linc Logistics Location: Studio 320,Highgate Studios,53-79 Highgate Rd, London, NW5 1TL Classification: Freight Forwarders **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (NW)	151	-	528720 185525
50	**Contemporary Trade Directory Entries** Name: Seventy One Location: UNIT 431, HIGHGATE STUDIOS 53-79, HIGHGATE ROAD, LONDON, NW5 1TL Classification: Distilleries **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	151	-	528721 185526
50	**Contemporary Trade Directory Entries** Name: Caesar Fashions Ltd Location: Highgate Studios Unit 801,53-79 Highgate Rd, London, NW5 1TL Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (NW)	151	-	528721 185526
50	**Contemporary Trade Directory Entries** Name: Airwaves Trading Ltd Location: Highgate Studios,443 Highgate Rd, London, NW5 1TL Classification: Telecommunications Equipment & Systems **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (NW)	152	-	528720 185526
51	**Contemporary Trade Directory Entries** Name: Armstrong Appliances Ltd Location: 43-45, Fortess Road, London, NW5 1AD Classification: Domestic Appliances - Servicing, Repairs & Parts **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	158	-	528989 185526

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
51	**Contemporary Trade Directory Entries** Name: Cash For Clothes Location: 49, Fortess Road, London, NW5 1AD Classification: Waste Disposal Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	172	-	529001 185534
51	**Contemporary Trade Directory Entries** Name: Lakis Meat Products Location: 61, FORTESS ROAD, LONDON, NW5 1AD Classification: Sausage Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	197	-	529007 185564
52	**Contemporary Trade Directory Entries** Name: Fabulously French Location: A, 15, Falkland Road, London, NW5 2PU Classification: Confectionery Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	198	-	529086 185343
53	**Contemporary Trade Directory Entries** Name: M D A Motors Location: 50a, Leverton Street, London, NW5 2PG Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	214	-	529108 185411
53	**Contemporary Trade Directory Entries** Name: Car Care Location: 50, Leverton Street, London, NW5 2PG Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	214	-	529108 185411
53	**Contemporary Trade Directory Entries** Name: M D A Motors Location: Ascham Street, London, NW5 2PD Classification: Garage Services **Status: Active** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (E)	258	-	529152 185411
54	**Contemporary Trade Directory Entries** Name: W A Waugh Location: 94, Highgate Road, London, NW5 1PB Classification: Printers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	226	-	528724 185627
54	**Contemporary Trade Directory Entries** Name: Easy Rubbish Location: 96a, Highgate Road, London, NW5 1PB Classification: Waste Disposal Services **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13NW (NW)	230	-	528722 185631
54	**Contemporary Trade Directory Entries** Name: Easy Rubbish Location: 96, Highgate Road, London, NW5 1PB Classification: Waste Merchants **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	230	-	528722 185631
55	**Contemporary Trade Directory Entries** Name: Kudos Records Ltd Location: FORTESS ROAD, LONDON, NW5 1AG Classification: Distribution Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	228	-	528979 185632
55	**Contemporary Trade Directory Entries** Name: Merit Cleaning Co Location: 15, Lady Somerset Road, London, NW5 1UR Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	249	-	528971 185661
56	**Contemporary Trade Directory Entries** Name: Tse Europe Ltd Location: 79, Fortess Road, London, NW5 1AG Classification: Knitwear Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	237	-	529008 185620

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
57	**Contemporary Trade Directory Entries** Name: Kleen Machine Location: 347, Kentish Town Road, London, NW5 2TJ Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	246	-	528994 185170
57	**Contemporary Trade Directory Entries** Name: Drycleaning Collections Location: 347, Kentish Town Road, London, NW5 2TJ Classification: Dry Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (SE)	246	-	528994 185170
58	**Contemporary Trade Directory Entries** Name: Get Location: Alpha House, Regis Road, London, NW5 3EW Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SW (S)	270	-	528777 185137
58	**Contemporary Trade Directory Entries** Name: Henry Bertrand Ltd Location: 52, Holmes Road, London, NW5 3AB Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	307	-	528789 185093
58	**Contemporary Trade Directory Entries** Name: Magnet Trade Location: Mary Brancker House, 54-74, Holmes Road, London, NW5 3AQ Classification: Joinery Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SW (S)	307	-	528759 185104
59	**Contemporary Trade Directory Entries** Name: Howden'S Joinery Ltd Location: Regis Road, London, NW5 3EW Classification: Builders' Merchants **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (S)	278	-	528879 185109
59	**Contemporary Trade Directory Entries** Name: Acquisitions Location: 24-26, HOLMES ROAD, LONDON, NW5 3AB Classification: Fireplaces & Mantelpieces **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	321	-	528855 185067
60	**Contemporary Trade Directory Entries** Name: Caraselle Ltd Location: Unit 4, Kentish Town Industrial Estate, Regis Road, London, NW5 3EW Classification: Laundry & Dry Cleaning Supplies **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	280	-	528670 185201
60	**Contemporary Trade Directory Entries** Name: Caraselle Location: Unit 4, Kentish Town Industrial Estate, Regis Road, London, NW5 3EW Classification: Laundries & Launderettes **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	280	-	528670 185201
60	**Contemporary Trade Directory Entries** Name: Caraselle Location: Unit 4, Kentish Town Industrial Estate, Regis Road, London, NW5 3EW Classification: Laundry & Dry Cleaning Supplies **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	280	-	528670 185201
60	**Contemporary Trade Directory Entries** Name: Caraselle Location: Unit 4, Kentish Town Industrial Estate, Regis Road, London, NW5 3EW Classification: Clothing Accessory Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	280	-	528670 185201
60	**Contemporary Trade Directory Entries** Name: Caraselle Ltd Location: Unit 4, Kentish Town Industrial Estate, Regis Road, London, NW5 3EW Classification: Clothing Accessory Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	280	-	528670 185201

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
162	**Contemporary Trade Directory Entries** Name: Normsbridge Filling Station Location: 139-143, Camden Road, London, NW1 9HA Classification: Petrol Filling Stations - 24 Hour **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A9SW (SE)	973	-	529516 184646
163	**Contemporary Trade Directory Entries** Name: Stonegate Cleaning Location: Flat 4, Stonegate, St. Silas Place, London, NW5 3QP Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A7SE (SW)	973	-	528235 184657
164	**Contemporary Trade Directory Entries** Name: Additive Location: 61-63, ROCHESTER PLACE, LONDON, NW1 9JU Classification: Printers **Status: Active** Positional Accuracy: Automatically positioned to the address	A8SE (S)	984	-	529116 184432
165	**Contemporary Trade Directory Entries** Name: Doidge Fastenings Ltd Location: Bush Industrial Estate, Station Road, London, N19 5UW Classification: Fasteners & Fixing Devices **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19NW (NE)	995	-	529477 186217
166	**Contemporary Trade Directory Entries** Name: Figgy Location: Flat 1, 240, Camden Road, London, NW1 9HE Classification: Oils - Edible **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	997	-	529667 184764
167	**Contemporary Trade Directory Entries** Name: E D Elson Location: 104, Junction Road, London, N19 5LB Classification: Builders' Merchants **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19NW (N)	998	-	529230 186366
168	**Fuel Station Entries** Name: Parliament Hill Service Station Location: 138-140, Highgate Road , Kentish Town , London, Inner London, NW5 1PB Brand: Pace Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Manually positioned to the address or location	A18SW (NW)	428	-	528634 185810
169	**Fuel Station Entries** Name: Whittington Service Station Location: 207-209, Junction Road , Tufnell Park , London, Inner London, N19 5QA Brand: Obsolete Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Manually positioned to the address or location	A19NW (NE)	757	-	529220 186104
170	**Fuel Station Entries** Name: Court Service Station Location: 160a, Malden Road , Kentish Town , London, Inner London, NW5 4BT Brand: Obsolete Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Located by supplier to within 100m	A12SW (W)	838	-	528033 185200
171	**Fuel Station Entries** Name: Fairways Garage Location: 139-143, Camden Road Sandall Road, Camden Town , London, Inner London, NW1 9HA Brand: Total Premises Type: Not Applicable **Status: Obsolete** Positional Accuracy: Manually positioned to the address or location	A9SW (SE)	973	-	529530 184658
172	**Points of Interest - Commercial Services** Name: Ace Asbestos Ltd Location: Linton House 39-51, Highgate Road, London, NW5 1RT Category: Recycling Services Class Code: Recycling, Reclamation and Disposal Positional Accuracy: Positioned to address or location	A13NW (NW)	40	8	528813 185463

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
173	**Points of Interest - Commercial Services** Name: M & A Coachworks Location: 36 Fortess Road, London, NW5 2HB Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13NE (E)	123	8	529009 185439
173	**Points of Interest - Commercial Services** Name: M & A Coachworks Location: 36 Fortess Road, London, NW5 2HB Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13NE (E)	123	8	529009 185440
174	**Points of Interest - Commercial Services** Name: Mail Boxes Etc (UK) Ltd Location: 4 Fortess Road, London, NW5 2ES Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SE (SE)	134	8	528992 185303
174	**Points of Interest - Commercial Services** Name: Car Valeting Centre Location: 369-377 Kentish Town Road, London, NW5 2TJ Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A13SE (SE)	180	8	528985 185239
174	**Points of Interest - Commercial Services** Name: Kentish Valeting Service Location: 369-377 Kentish Town Road, Camden, London, NW5 2TJ Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A13SE (SE)	180	8	528985 185239
175	**Points of Interest - Commercial Services** Name: Freight-Linc Logistics Location: Studio 320, Highgate Studios, 53-79 Highgate Rd, London, NW5 1TL Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13NW (NW)	151	8	528720 185525
176	**Points of Interest - Commercial Services** Name: M D A Motors Location: 50a Leverton Street, London, NW5 2PG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (E)	214	8	529108 185411
176	**Points of Interest - Commercial Services** Name: Car Care Location: 50 Leverton Street, London, NW5 2PG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (E)	214	8	529108 185411
176	**Points of Interest - Commercial Services** Name: Car Care Garages Location: 50 Leverton Street, London, NW5 2PG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (E)	214	8	529108 185411
176	**Points of Interest - Commercial Services** Name: Jack Autos Location: 50a Leverton Street, London, NW5 2PG Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (E)	214	8	529108 185411
176	**Points of Interest - Commercial Services** Name: M D A Motors Location: Ascham Street, Camden, London, NW5 2PD Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A13SE (E)	214	8	529108 185409
177	**Points of Interest - Commercial Services** Name: Kudos Records Ltd Location: Fortess Road, London, NW5 1AG Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13NE (NE)	228	8	528979 185632

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
190	**Points of Interest - Commercial Services** Name: Court Service Station Location: 160a Malden Road, London, NW5 4BT Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A12SW (W)	832	8	528053 185158
191	**Points of Interest - Commercial Services** Name: Continental Cars Location: Campdale Road, London, N7 0ED Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SE (NE)	886	8	529559 185980
191	**Points of Interest - Commercial Services** Name: Continental Cars Ltd Location: Campdale Road, London, N7 0ED Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A19SE (NE)	886	8	529559 185980
192	**Points of Interest - Commercial Services** Name: Hector Miller Location: 58 Rochester Place, London, NW1 9JX Category: Construction Services Class Code: Metalworkers Including Blacksmiths Positional Accuracy: Positioned to address or location	A8SE (S)	901	8	529079 184509
192	**Points of Interest - Commercial Services** Name: Mda Motors Location: 50 Rochester Place, London, NW1 9JX Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A8SE (S)	922	8	529097 184492
192	**Points of Interest - Commercial Services** Name: M.D.A Motors Location: 50 Rochester Place, London, NW1 9JX Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A8SE (S)	922	8	529097 184492
193	**Points of Interest - Commercial Services** Name: Megaone Distributors Location: 6 Malden Road, London, NW5 3HR Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A7SE (SW)	915	8	528334 184652
194	**Points of Interest - Commercial Services** Name: Nuco Ltd Location: 30 Northpoint Square, London, NW1 9AW Category: Recycling Services Class Code: Recycling, Reclamation and Disposal Positional Accuracy: Positioned to address or location	A9NE (SE)	959	8	529681 184847
195	**Points of Interest - Commercial Services** Name: Pest Control Camden Location: 196 Malden Road, London, NW5 4BS Category: Contract Services Class Code: Pest and Vermin Control Positional Accuracy: Positioned to address or location	A12SW (W)	963	8	527897 185227
196	**Points of Interest - Commercial Services** Name: Autodeutsche Location: 139-147 Camden Road, London, NW1 9HA Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A9SW (SE)	971	8	529529 184659
197	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	34	8	528817 185457
197	**Points of Interest - Manufacturing and Production** Name: A-Zfreeofficefinder.Com Location: Linton House 39-51, Highgate Road, London, NW5 1RS Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to address or location	A13NW (NW)	40	8	528813 185463

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
197	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	42	8	528811 185463
197	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13SW (W)	62	8	528782 185407
197	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	90	8	528777 185497
197	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	90	8	528777 185497
197	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	103	8	528803 185532
197	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	103	8	528803 185532
197	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	109	8	528749 185494
198	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NE (NE)	67	8	528937 185448
198	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NE (NE)	68	8	528937 185449
198	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NE (NE)	79	8	528934 185469
198	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NE (NE)	79	8	528934 185469
198	**Points of Interest - Manufacturing and Production** Name: Piano Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13SE (E)	98	8	528993 185397

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
199	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13SE (SE)	108	8	528921 185288
199	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13SE (SE)	108	8	528921 185288
200	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NW (W)	136	8	528709 185472
201	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NE (E)	153	8	529046 185415
201	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A13NE (E)	157	8	529050 185416
202	**Points of Interest - Manufacturing and Production** Name: Tank Location: NW5 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A13SW (SW)	226	8	528666 185285
203	**Points of Interest - Manufacturing and Production** Name: Tank Location: NW5 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A13SE (S)	299	8	528945 185096
204	**Points of Interest - Manufacturing and Production** Name: Air Shaft Location: NW5 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to an adjacent address or location	A12NE (W)	336	8	528504 185459
205	**Points of Interest - Manufacturing and Production** Name: Tank Location: NW5 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A13NE (NE)	342	8	529184 185576
206	**Points of Interest - Manufacturing and Production** Name: Industrial Estate Location: NW5 Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to an adjacent address or location	A13SW (SW)	344	8	528696 185095
206	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A8NW (S)	352	8	528771 185052
206	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A8NW (S)	353	8	528771 185051

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
219	**Points of Interest - Manufacturing and Production** Name: Works Location: N19 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19NW (NE)	875	8	529251 186221
220	**Points of Interest - Manufacturing and Production** Name: Mecca Business Centre Location: 127 Kentish Town Road, London, NW1 8PB Category: Industrial Features Class Code: Business Parks and Industrial Estates Positional Accuracy: Positioned to address or location	A8SE (S)	903	8	528956 184488
221	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A9NE (SE)	935	8	529744 185004
221	**Points of Interest - Manufacturing and Production** Name: Works Location: NW5 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A9NE (SE)	938	8	529735 184979
222	**Points of Interest - Manufacturing and Production** Name: Nuco Location: 30 Northpoint Square, London, NW1 9AW Category: Extractive Industries Class Code: Oil and Gas Extraction, Refinery and Product Manufacture Positional Accuracy: Positioned to address or location	A9NE (SE)	959	8	529681 184846
223	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A8SE (S)	961	8	529145 184464
223	**Points of Interest - Manufacturing and Production** Name: Works Location: NW1 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A8SE (S)	961	8	529141 184463
223	**Points of Interest - Manufacturing and Production** Name: Works Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A8SE (S)	987	8	529127 184432
223	**Points of Interest - Manufacturing and Production** Name: Works Location: NW1 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A8SE (S)	987	8	529132 184433
224	**Points of Interest - Public Infrastructure** Name: Kentish Town Fire Station Location: Kentish Town Fire Station 20, Highgate Road, London, NW5 1NS Category: Central and Local Government Class Code: Fire Brigade Stations Positional Accuracy: Positioned to address or location	A13SE (E)	38	8	528933 185393
225	**Points of Interest - Public Infrastructure** Name: Easy Rubbish Location: 96a Highgate Road, London, NW5 1PB Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A13NW (NW)	230	8	528722 185631
225	**Points of Interest - Public Infrastructure** Name: Easy Rubbish Location: 96 Highgate Road, London, NW5 1PB Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A13NW (NW)	230	8	528722 185631

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
226	**Points of Interest - Public Infrastructure** Name: Kentish Town Rail Station Location: Leighton Road, NW5 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A13SE (SE)	317	8	529107 185159
226	**Points of Interest - Public Infrastructure** Name: Kentish Town Station Location: Leighton Road, NW5 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A13SE (SE)	317	8	529107 185159
227	**Points of Interest - Public Infrastructure** Name: Kentish Town Police Station Location: Kentish Town Police Station 12a, Holmes Road, London, NW5 3AE Category: Central and Local Government Class Code: Police Stations Positional Accuracy: Positioned to address or location	A8NE (S)	339	8	528923 185051
227	**Points of Interest - Public Infrastructure** Name: Junk & Disorderly Location: 2 Old Dairy Mews, Kentish Town Road, London, NW5 2JW Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A8NE (S)	432	8	528956 184962
228	**Points of Interest - Public Infrastructure** Name: Parliament Hill Service Station Location: 138-140 Highgate Road, London, NW5 1PB Category: Road And Rail Class Code: Petrol and Fuel Stations Positional Accuracy: Positioned to address or location	A18SW (NW)	428	8	528634 185810
229	**Points of Interest - Public Infrastructure** Name: Tesco Petrol Filling Station Location: 199-203 Kentish Town Road, London, NW5 2JU Category: Road And Rail Class Code: Petrol and Fuel Stations Positional Accuracy: Positioned to address or location	A8NE (S)	597	8	528936 184792
230	**Points of Interest - Public Infrastructure** Name: Gospel Oak Rail Station Location: Gordon House Road, NW5 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A12NE (NW)	622	8	528266 185674
230	**Points of Interest - Public Infrastructure** Name: Gospel Oak Station Location: Gordon House Road, NW5 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A12NE (NW)	622	8	528266 185674
231	**Points of Interest - Public Infrastructure** Name: Kentish Town West Rail Station Location: Wilkin Street Mews, NW5 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A8NW (SW)	663	8	528600 184785
231	**Points of Interest - Public Infrastructure** Name: Kentish Town West Station Location: Wilkin Street Mews, NW5 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A8NW (SW)	663	8	528600 184785
232	**Points of Interest - Public Infrastructure** Name: Normsbridge Filling Station Location: 139-143 Camden Road, London, NW1 9HA Category: Road And Rail Class Code: Petrol and Fuel Stations Positional Accuracy: Positioned to address or location	A9SW (SE)	972	8	529530 184658
233	**Points of Interest - Recreational and Environmental** Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A13SE (SE)	190	8	529035 185266

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
233	**Points of Interest - Recreational and Environmental** Name: Playground Location: Leverton Street, NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A13SE (SE)	191	8	529037 185267
234	**Points of Interest - Recreational and Environmental** Name: Play Area Location: NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	284	8	528605 185593
235	**Points of Interest - Recreational and Environmental** Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A13SW (SW)	391	8	528532 185189
235	**Points of Interest - Recreational and Environmental** Name: Playground Location: Woodyard Close, NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A13SW (SW)	391	8	528532 185189
235	**Points of Interest - Recreational and Environmental** Name: Play Area Location: NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A12SE (SW)	409	8	528481 185233
236	**Points of Interest - Recreational and Environmental** Name: Playground Location: Nr Leighton Road, NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A14SW (SE)	391	8	529258 185249
236	**Points of Interest - Recreational and Environmental** Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A14SW (SE)	393	8	529259 185247
237	**Points of Interest - Recreational and Environmental** Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A18SW (N)	407	8	528701 185820
237	**Points of Interest - Recreational and Environmental** Name: Playground Location: Twisden Road, NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A18SW (N)	407	8	528701 185819
238	**Points of Interest - Recreational and Environmental** Name: Play Area Location: NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A18SW (N)	431	8	528823 185872
239	**Points of Interest - Recreational and Environmental** Name: Playground Location: Gillies Street, NW5 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to address or location	A12SE (W)	445	8	528437 185240
239	**Points of Interest - Recreational and Environmental** Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A12SE (W)	446	8	528436 185239

Data Suppliers

A selection of organisations who provide data within this report

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

Useful Contacts

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	**London Borough of Camden - Pollution Projects Team** Seventh Floor, Town Hall Extension, Argyle Street, London, WC1H 8EQ	Telephone: 020 7278 4444 Fax: 020 7860 5713 Website: www.camden.gov.uk
3	**London Borough of Islington - Environmental Health Department** 159 Upper Street, Islington, London, N1 1RE	Telephone: 020 7527 2000 Fax: 020 7477 3057 Website: www.islington.gov.uk
4	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.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 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
8	**PointX** 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
9	**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
10	**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
	LASI	Langley Silt Member	Clay and Silt	Not Supplied - Devensian

Bedrock and Faults

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

GEA

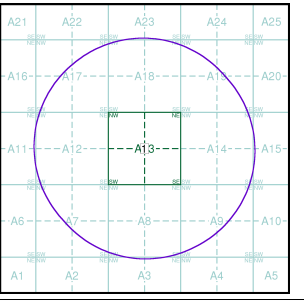
Geology 1:50,000 Maps

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



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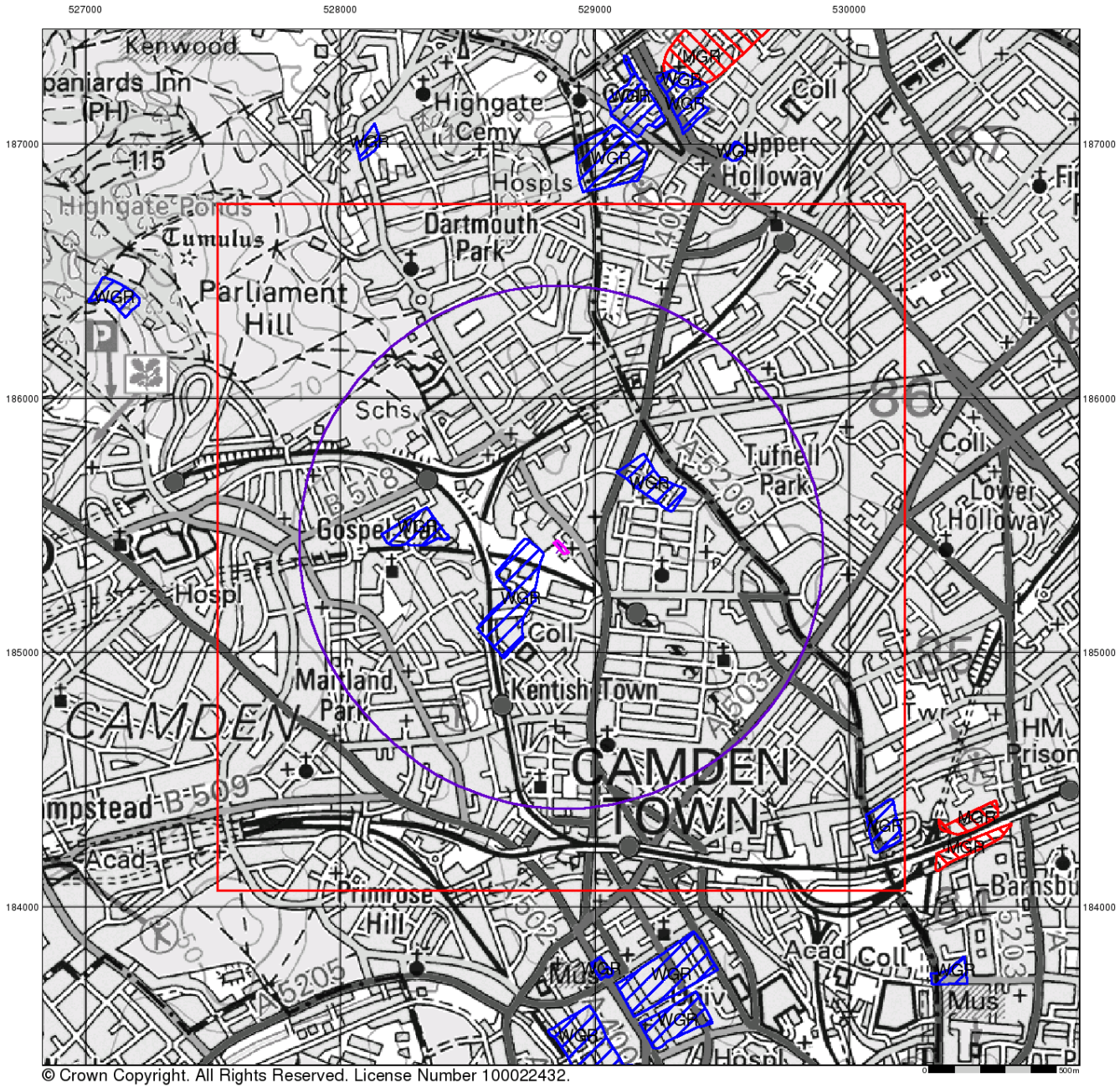
Customer Reference:	J21343
National Grid Reference:	528870, 185410
Slice:	A
Site Area (Ha):	0.12
Search Buffer (m):	1000

Site Details:

The Highgate Centre, 19-37, Highgate Road, LONDON, NW5 1JY



GEA

Artificial Ground and Landslip

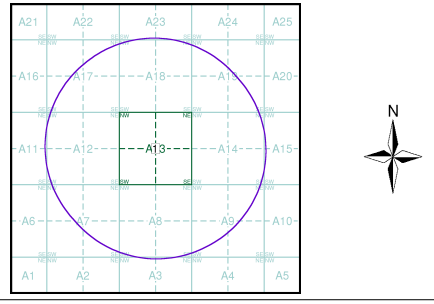
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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



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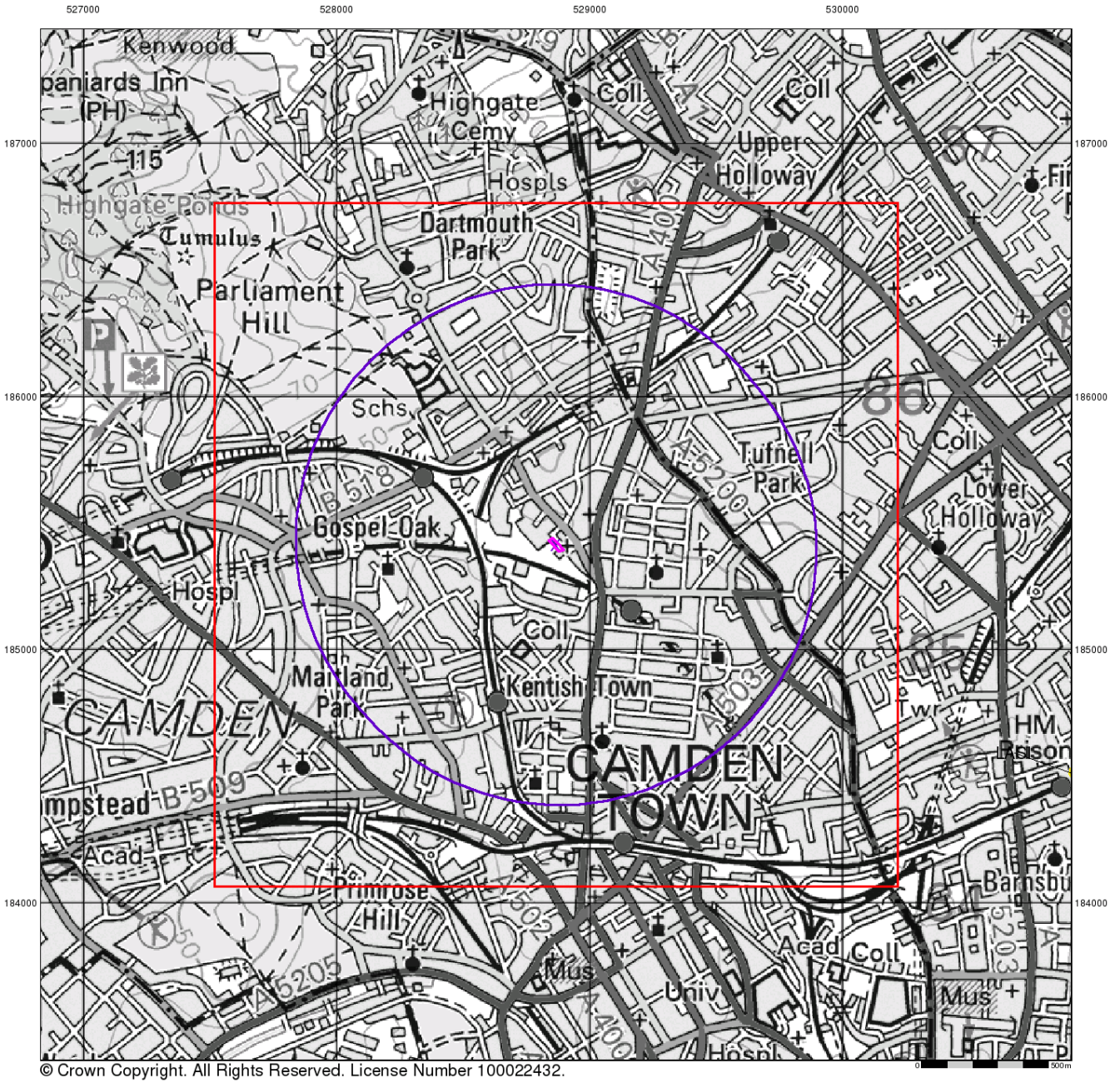
Web: www.envirocheck.co.uk



GEA

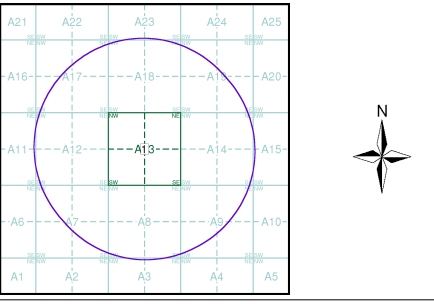
Superficial Geology

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



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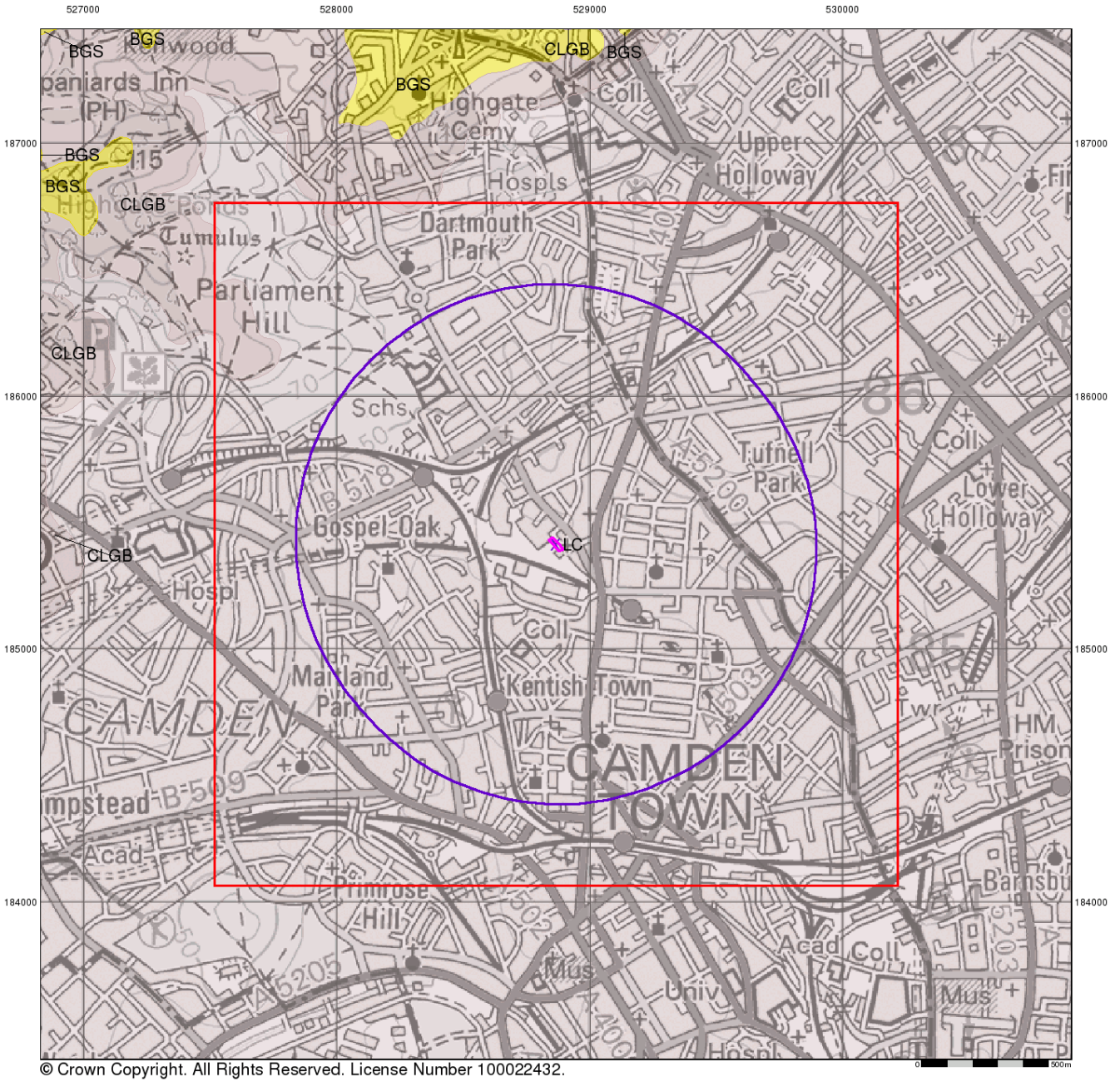


GEA

Bedrock and Faults

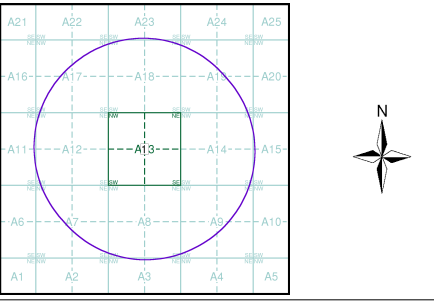
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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



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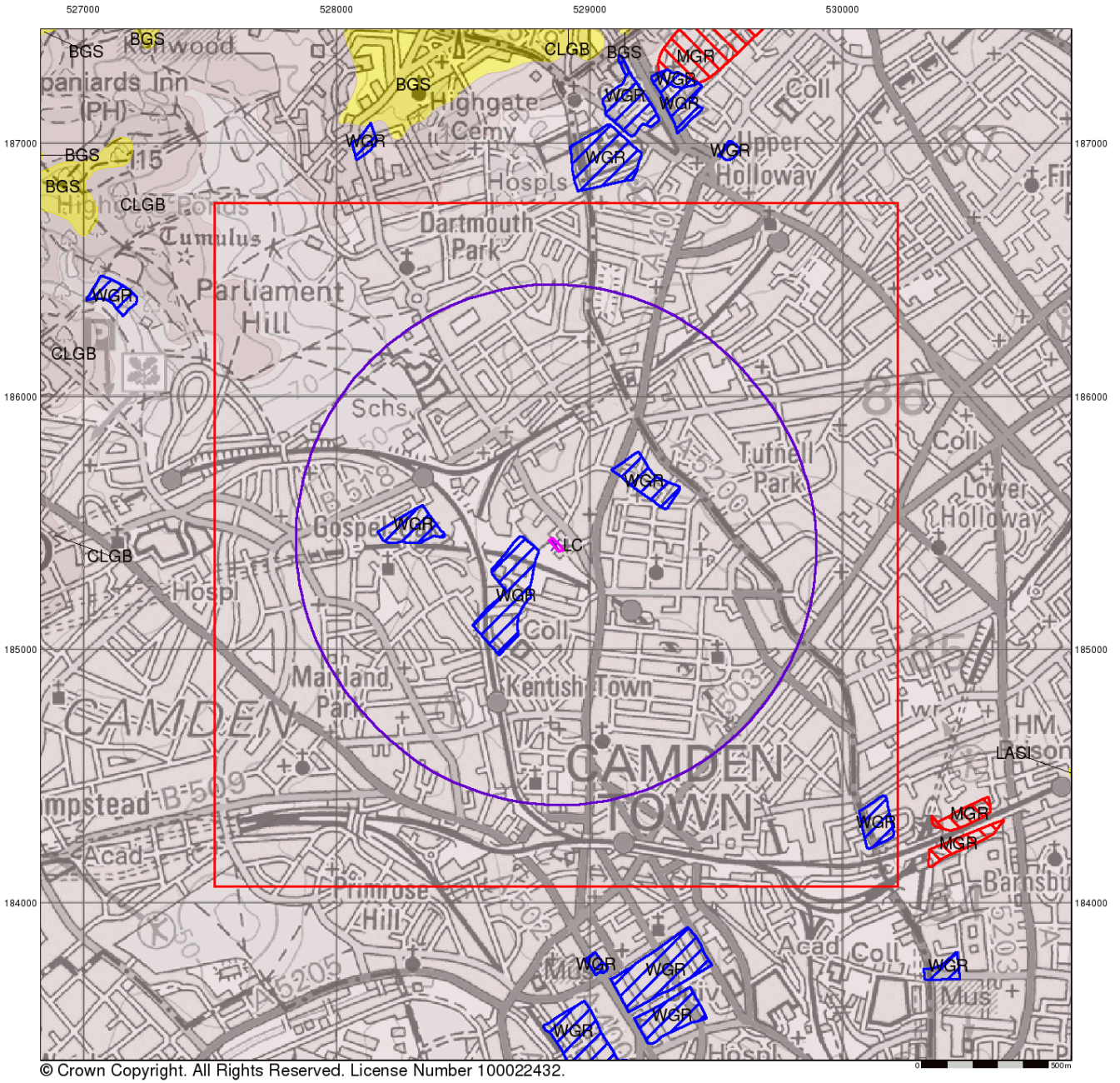

GEA

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

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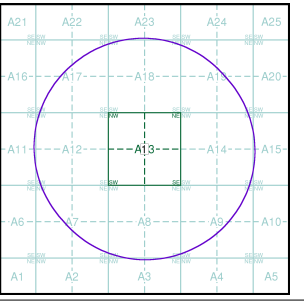
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



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Site Details:

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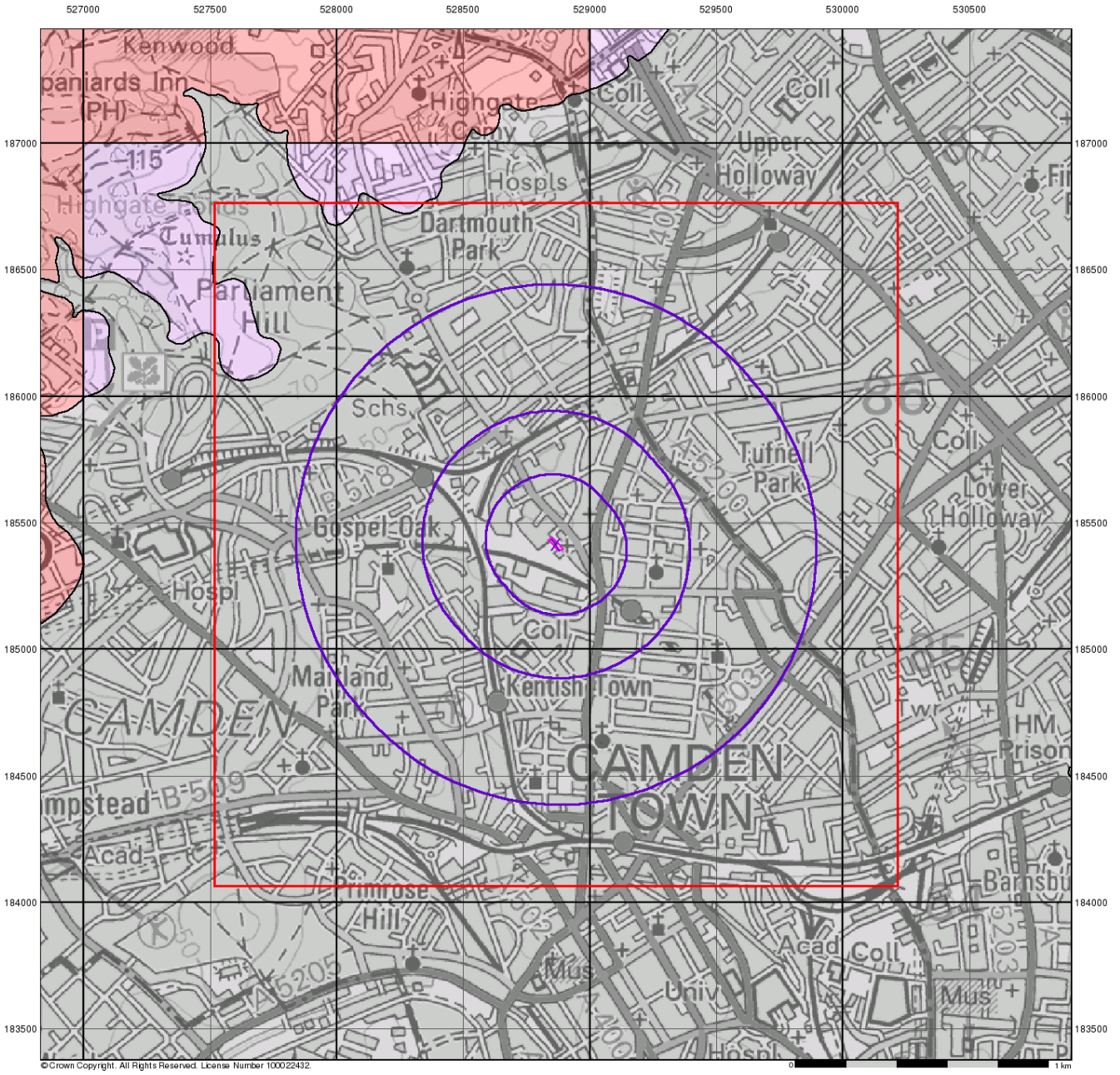


GEA

Groundwater Vulnerability

General

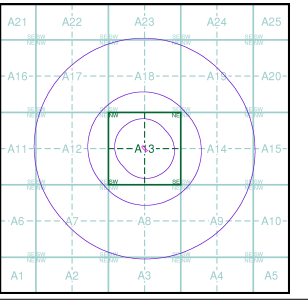
Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

Bedrock Aquifers	Superficial Aquifers
High Vulnerability, Principal Aquifer	High Vulnerability, Principal Aquifer
High Vulnerability, Secondary Aquifer	High Vulnerability, Secondary Aquifer
Medium Vulnerability, Principal Aquifer	Medium Vulnerability, Principal Aquifer
Medium Vulnerability, Secondary Aquifer	Medium Vulnerability, Secondary Aquifer
Low Vulnerability, Principal Aquifer	Low Vulnerability, Principal Aquifer
Low Vulnerability, Secondary Aquifer	Low Vulnerability, Secondary Aquifer

Unproductive Aquifer
Soluble Rock

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	289056008_1_1
Customer Ref:	J21343
National Grid Reference:	528870, 185410
Slice:	A
Site Area (Ha):	0.12
Search Buffer (m):	1000

Site Details

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Landmark INFORMATION GROUP
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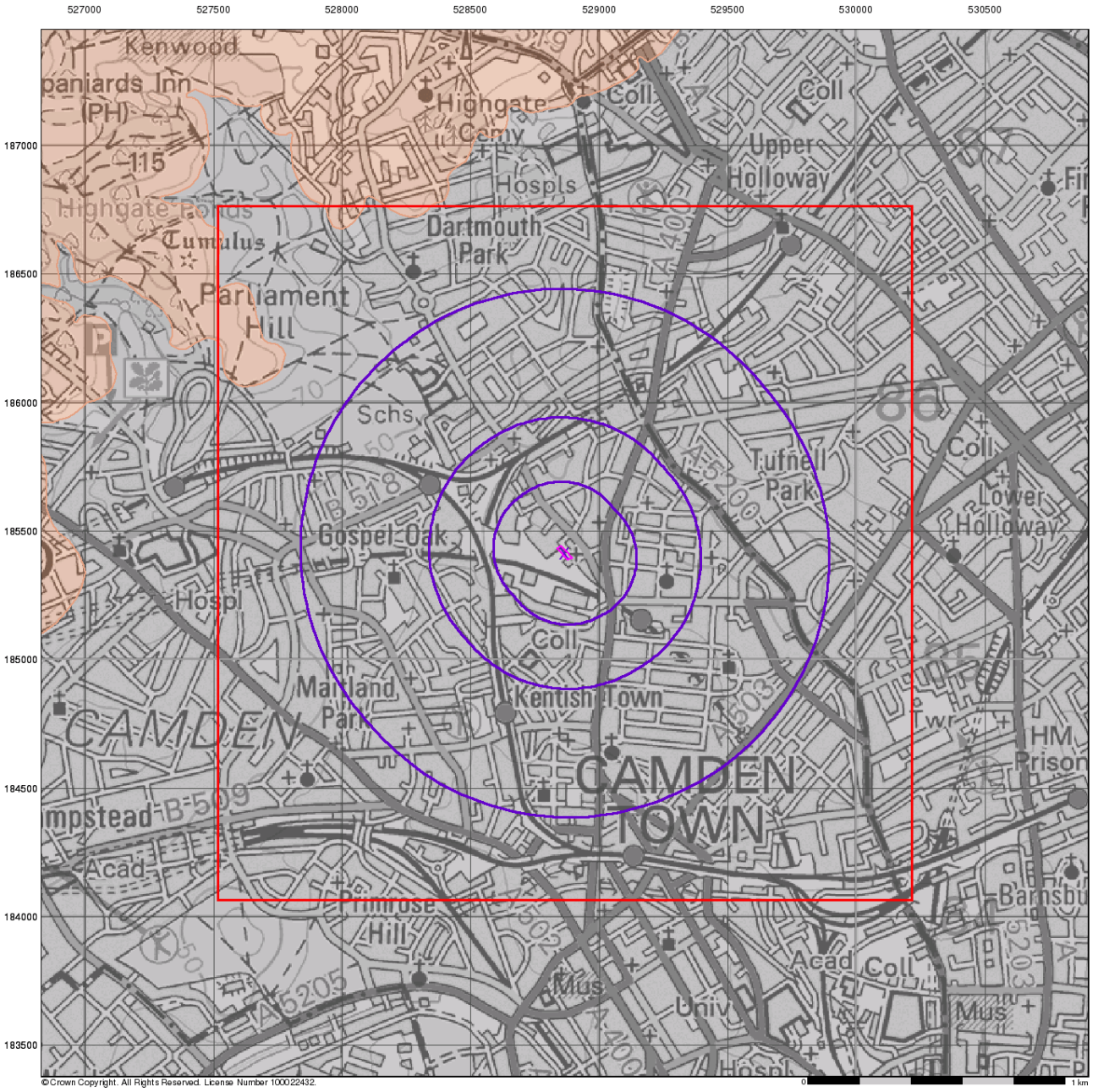


GEA

Bedrock Aquifer Designation

General

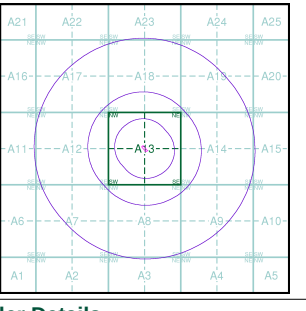
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



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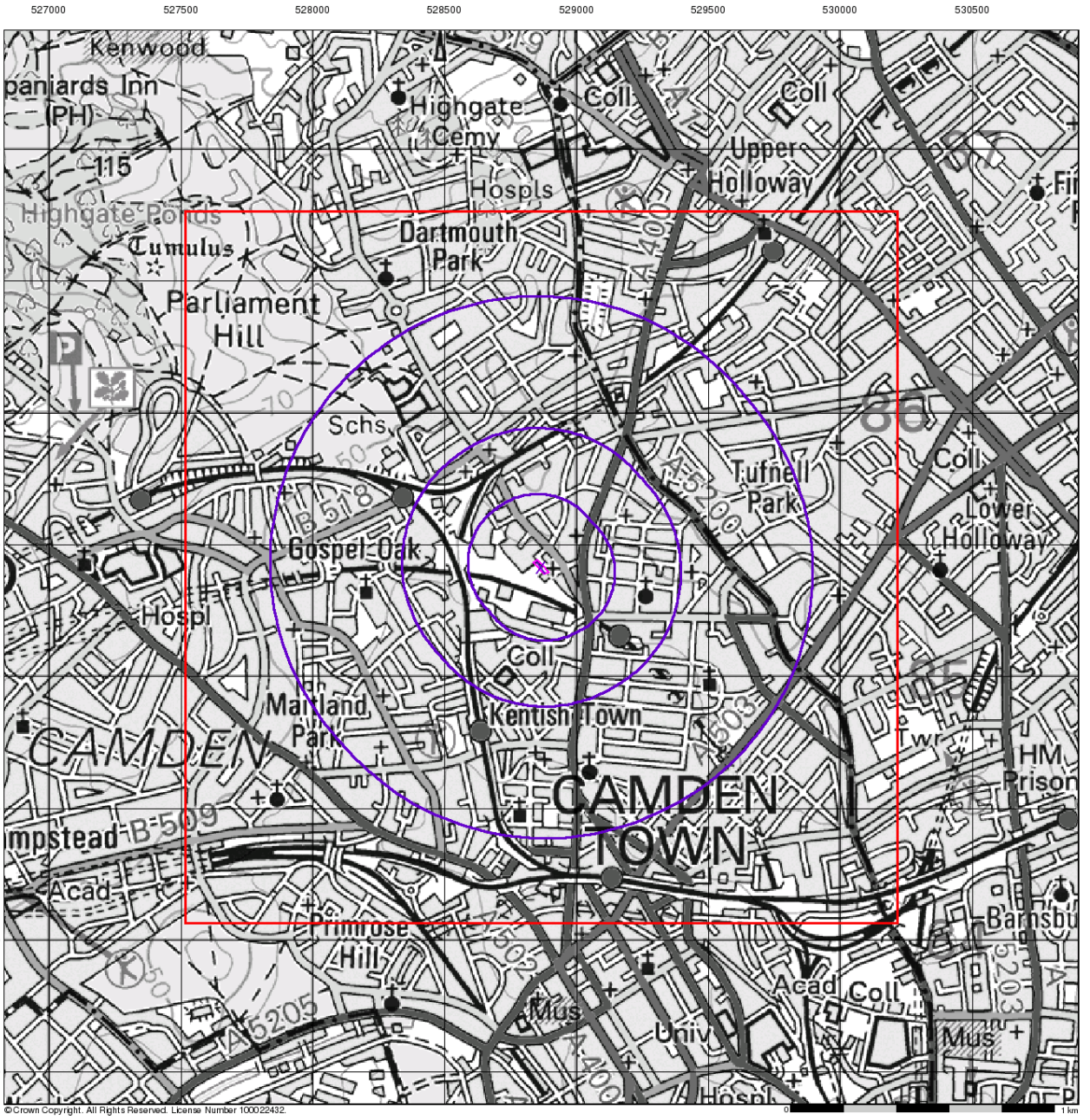


GEA

Superficial Aquifer Designation

General

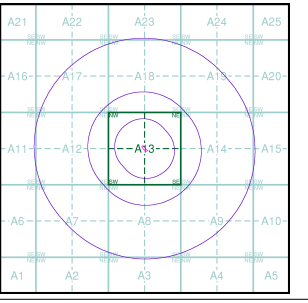
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



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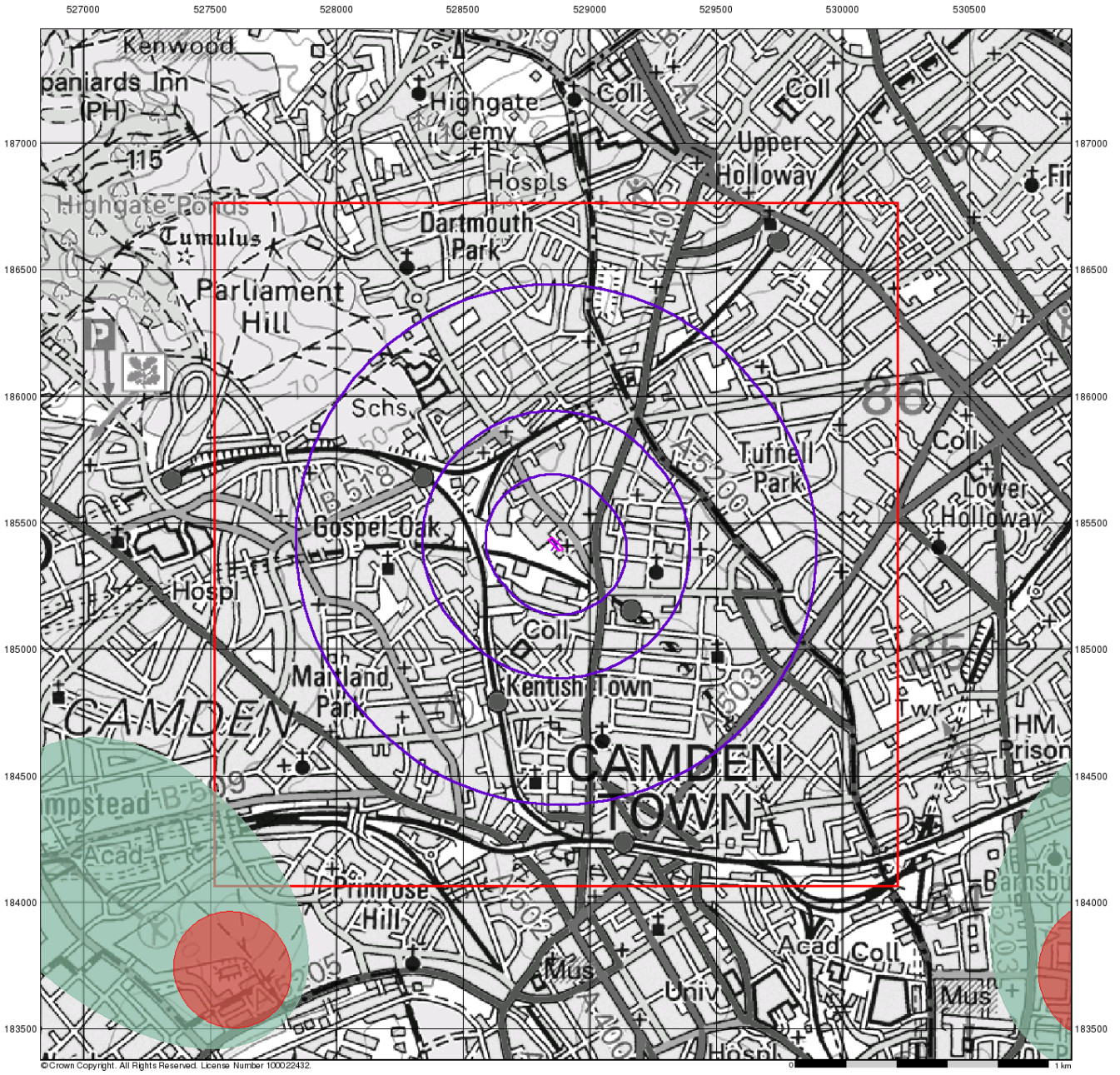


GEA

Source Protection Zones

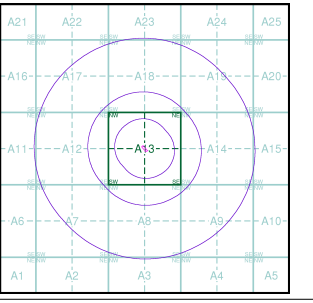
General

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



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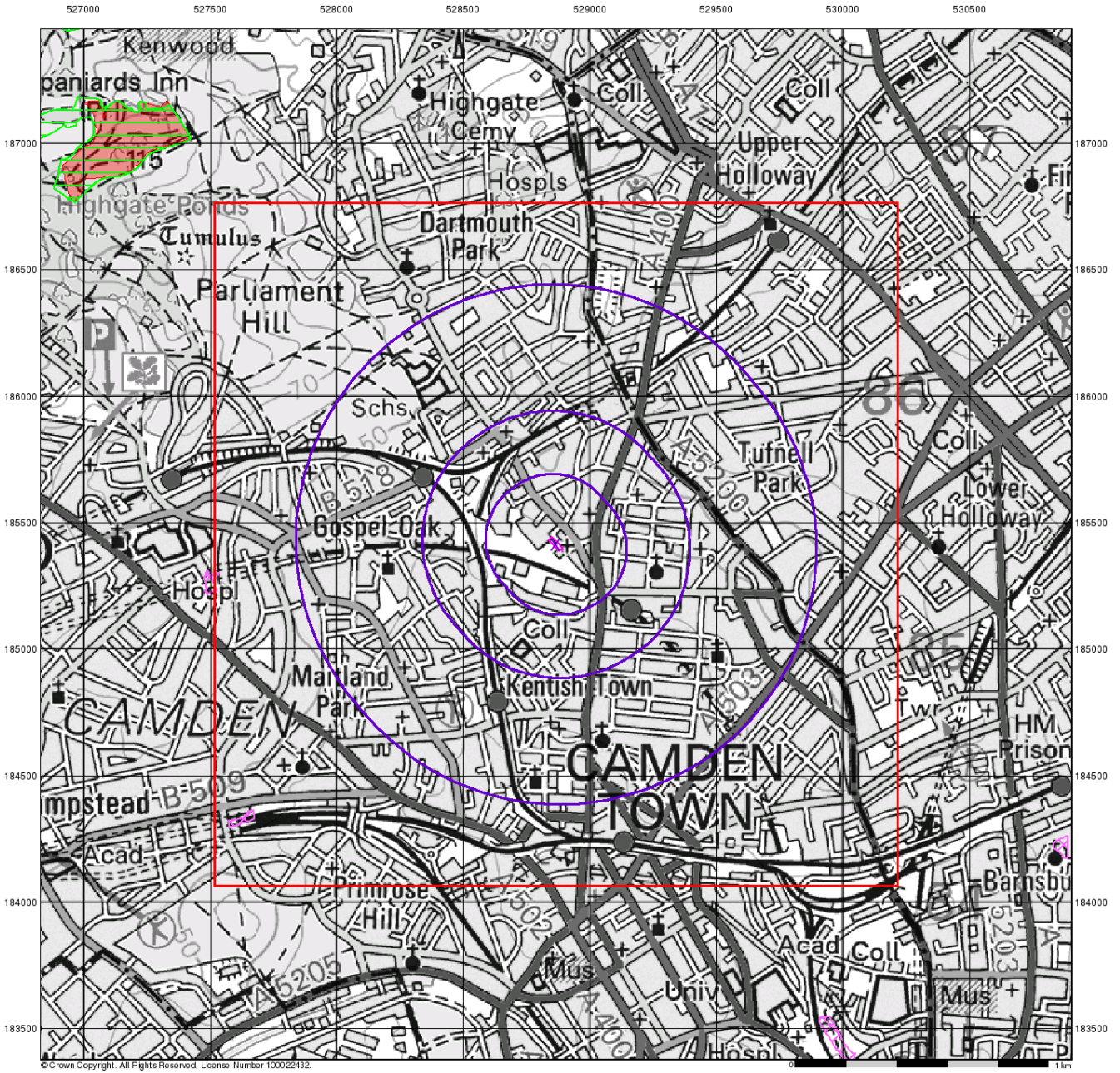


GEA

Sensitive Land Uses

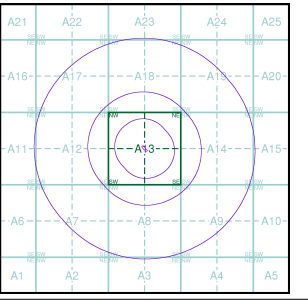
General

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

Sensitive Land Uses

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

Site Sensitivity Context Map - Slice A



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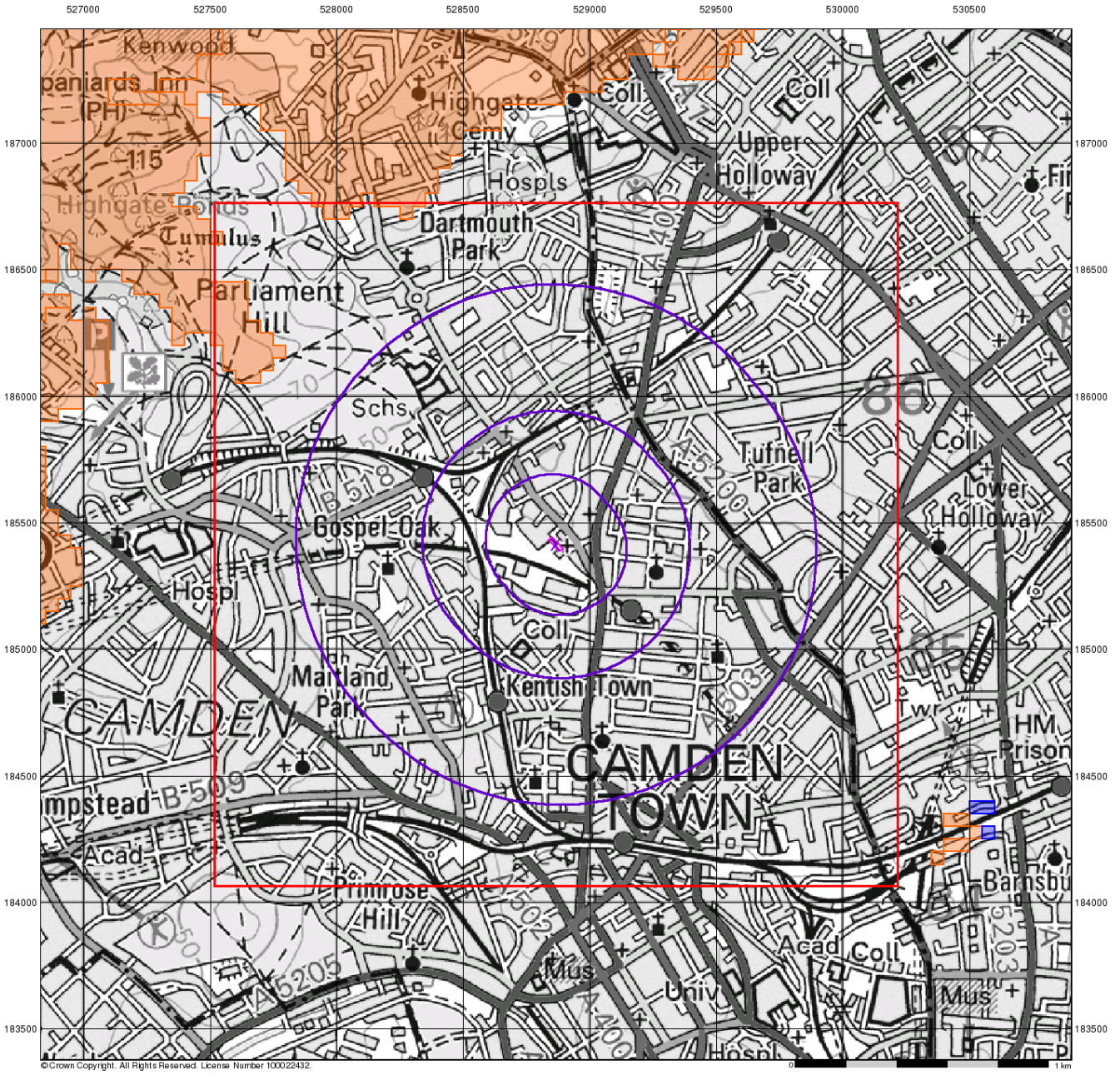


GEA

BGS Flood GFS Data

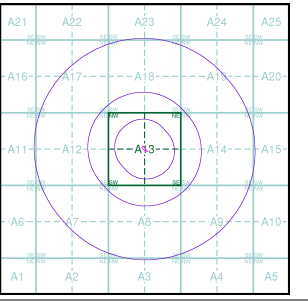
General

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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