



Blackley Fire Station, Blackley

Phase 2 Geo-Environmental Investigation Report

For: Greater Manchester Combined Authority (GMCA)

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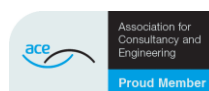
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1.0 INTRODUCTION

This Phase 2 Geo-Environmental Investigation Report has been prepared at the request of Greater Manchester Combined Authority (GMCA). Instructions to proceed were received in October 2022.

This report pertains to a c. 0.23 Ha site located to the east of Rochdale Road, c. 5.7km north of Manchester City Centre at the approximate postcode M9 7FP. The National Ordnance Survey Grid Reference for the centre of the site is 380477E, 406478N.

The site is currently occupied by a two-storey masonry fire station building with facilities including crew accommodation, offices, appliance storage and car parking. Access to the site is off Rochdale Road along the western boundary of the site. The site is bound by residential dwellings to the north, established trees to the east and an ex-service men's club to the south. An aerial photo of the site is included below and a Site Location Plan is contained in Appendix 2.

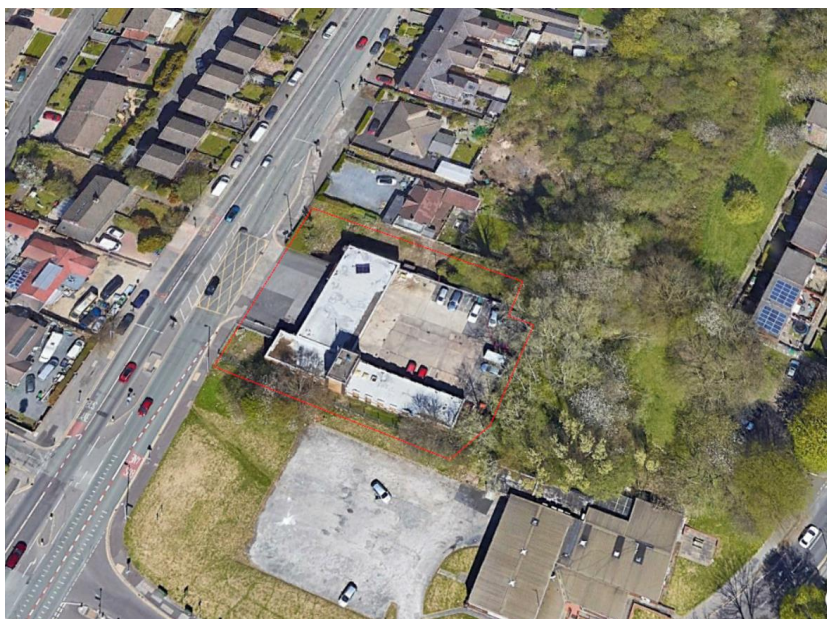


Figure 1: Aerial image of the site dated March 2021. The approximate site boundary is highlighted in pink.

This Phase 2 Geo-Environmental Investigation Report is to be used for submission to the Local Authority as part of a planning application. It is the Client's intention to demolish the existing fire station and construct a new fire station building with associated access road and areas of hard standing.

A proposed development plan is contained in Appendix 2 with an extract below as Figure 2.

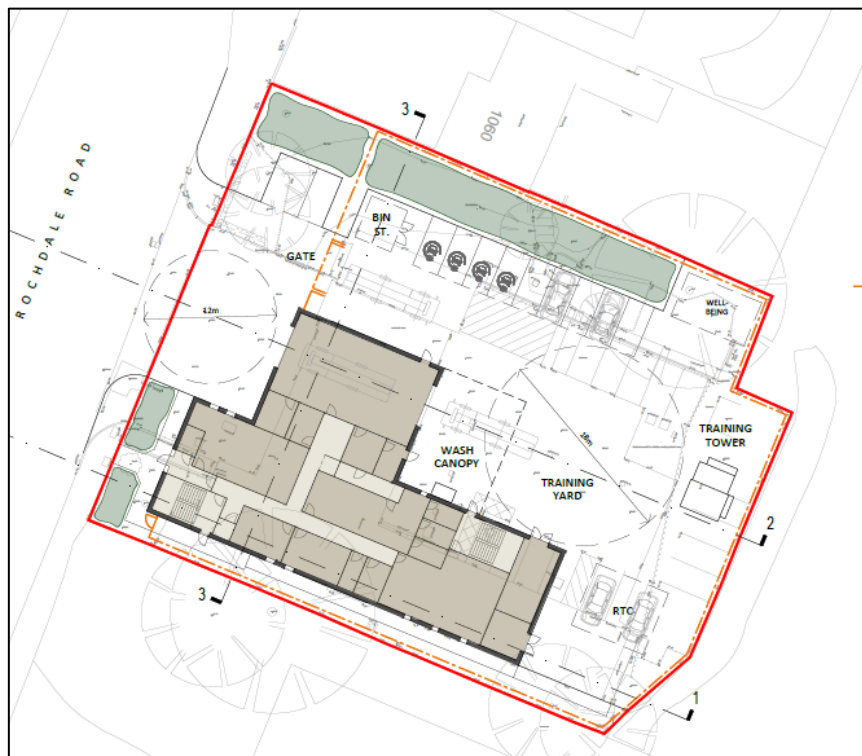


Figure 2: Proposed development layout

1.1 Brief

The brief was to carry out a Phase 2 intrusive geo-environmental ground investigation for the site based upon the findings of the *IGE Consulting Phase 1 Geo-Environmental Report (3866b-01, Rev A)* and the proposed development outlined in Section 1.0. The investigation was to include the following tasks:

- a) Undertake / install appropriate exploratory holes and collect representative samples from exploratory holes and arrange appropriate chemical testing in accordance with the latest legal framework, record olfactory and / or visual evidence of contamination during intrusive works and undertake on site in-situ and laboratory geotechnical testing;
- b) Formulate conceptual models to accommodate the findings of the ground investigation works in terms of the risk to human health, ground gas, controlled waters and the wider environment;

- c) Identify the risks and evaluate whether a Phase 3 numerical risk assessment and / or a Remedial Strategy, is required.
- d) Undertake an assessment of the ground conditions to provide outline recommendations for the proposed foundations.

A report was to be provided to summarise the findings and recommendations.

1.2 Third Parties

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2.0 SCOPE OF INVESTIGATION WORK

This Phase 2 Geo-Environmental Investigation has been designed based on the findings of the *IGE Consulting Phase 1 Geo-Environmental Investigation (3866b-01, Rev A)* and the Client's requirements in relation to the proposed development outlined in Section 1.0.

The ground investigation works were undertaken in two phases. The first phase was completed between the 23rd and 25th January 2023 and comprised 2 No. cable percussion boreholes, 4 No. dynamic sampling boreholes, 2 No. pavement cores and 6 No California Bearing Ratio (CBR) determinations via dynamic cone penetrometer (DCP). The boreholes and CBR determinations were undertaken spatially across the site, where access permitted, and the concrete cores were undertaken at the western site boundary, adjacent Rochdale Road. Subsequent laboratory testing was undertaken between 27th January and 2nd March 2023.

The second phase of investigation included the dedicated sampling of shallow site soils for PFAS concentrations and the excavation of 3 No. foundation inspection pits adjacent the existing structure. PFAS laboratory analysis was undertaken between 7th April and 2nd May 2023.

Drilling of cable percussion boreholes was completed by DMW Ltd and drilling of dynamic sampling boreholes was carried out by PM Sampling Ltd. Testing of soil samples for environmental purposes was carried out by i2 Analytical, whilst testing of soils and water for PFAS was completed by ALS Environmental, both in accordance with the Environment Agency's MCERTS (Monitoring Certification) quality assurance accreditation scheme. Testing of soils for geotechnical laboratory testing was undertaken by Murray Rix Ltd. These organisations were appointed directly by IGE Consulting to carry out these contracting works.

The locations of the exploratory holes were topographically surveyed (X-Y-Z axis) with an accuracy of 20mm.

The ground investigation was undertaken in general accordance with:

- BS 5930 (2015) + A1 (2020) Code of Practice for Ground Investigation;

- BS EN ISO 17892 Geotechnical investigation and testing – Laboratory testing of soil;
- BS 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice; and
- BS EN 1997-2 (2007) Eurocode 7 – Geotechnical Design – Ground Investigation and Testing.

The environmental sampling strategy for the site has been completed in accordance with CLR4 and the design of the investigation was carried out in accordance with R&D Technical Report P 5-TR066, LCRM (2020) and BS:8485 (2015) + A1 (2019). Further details pertaining to the ground investigation works are outlined in the following sections.

The limitations of the investigation work and report are included in Appendix 1.

The cable percussion and dynamic sample boreholes were undertaken in order to achieve the following:

- to establish the thickness, extent and characteristics of any possible Made Ground and underlying natural superficial deposits;
- to undertake in-situ geotechnical testing within these deposits;
- to obtain samples from these deposits for classification and laboratory testing;
- to allow for the installation of ground gas and groundwater monitoring wells.

An extract of the exploratory hole location plan is presented below as Figure 3, with the full plan contained in Appendix 2.

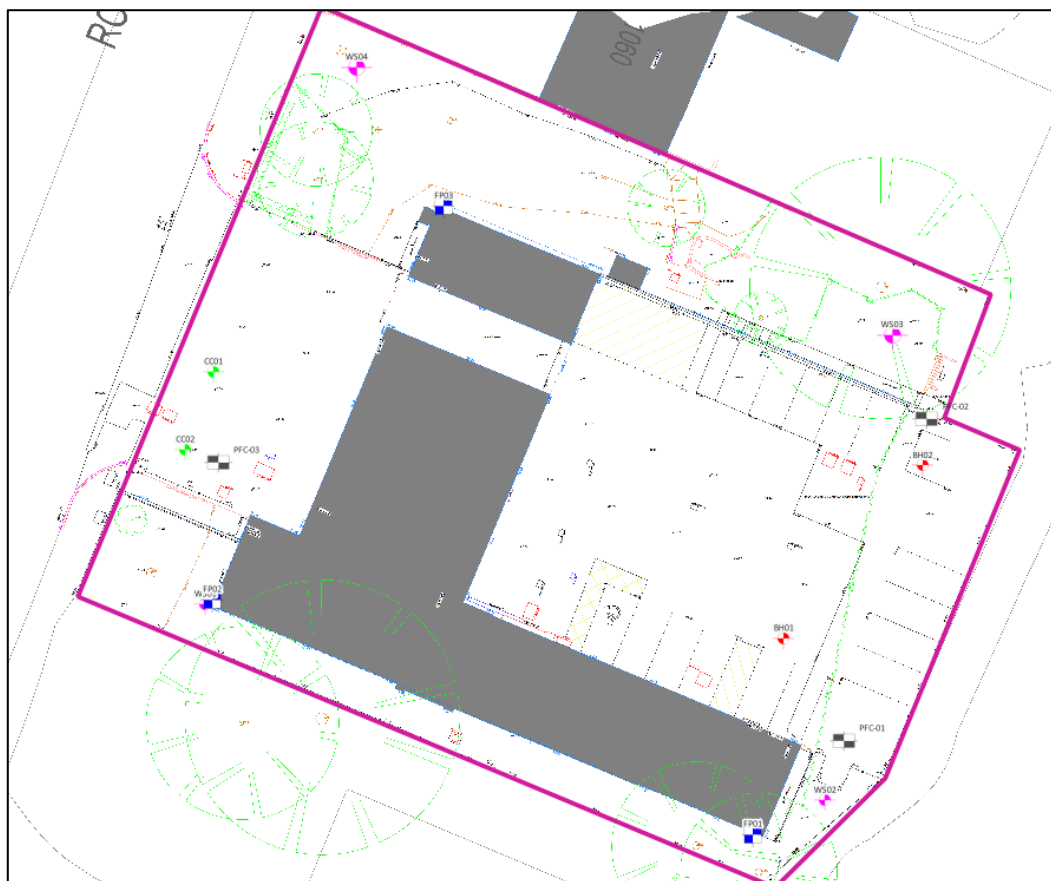


Figure 3: Exploratory Hole Location Plan extract. Taken from IGE Drawing SI-05 rev A

2.1 Cable Percussion Boreholes

2 No. cable percussion boreholes (BH01 and BH02) were completed using 150mm diameter casing and tools to depths of 16.84m and 14.94m bgl (63.75 and 65.73m AOD), respectively. The boreholes were placed at the eastern site section, where access permitted and outside of the basement footprint. The boreholes were begun by coring the hardstanding at the surface to allow for drilling to take place.

Upon completion, the boreholes were backfilled with hydrated bentonite pellets and returned to flush hardstanding at the surface.

The locations of the boreholes are shown on the exploratory hole location plan in Appendix 2 and exploratory hole logs are contained in Appendix 3.

2.2 Dynamic Sampling Boreholes

4 No. dynamic sampling boreholes (WS01 to WS04, inclusive) were drilled spatially across the site to 5.45m bgl (76.10m to 71.15m AOD).

The locations of the dynamic sampling boreholes are shown on the exploratory hole location plan in Appendix 2 and the dynamic sampling borehole logs are contained in Appendix 4.

2.3 Pavement Cores

2 No. pavement cores (CC01 and CC02) were completed at the western site boundary on the raised access area. These cores were completed to investigate the hardstanding thickness and the underlying construction of the access area.

2.4 PFAS Sampling

Anecdotal evidence at the site suggested that aqueous fire-fighting foam (AFFF) had not been used at the site for training purposes. The risk of PFAS compounds being present in the ground and able to reach the sensitive receptors identified (Principal Aquifer within bedrock) was assessed to be low.

In order to confirm the assessment of the Phase 1 report that the site is at a low risk from PFAS compounds, a supplementary phase of investigation was completed to determine the concentrations of PFAS within the site soils.

During this supplementary phase of investigation, IGE personnel followed industry-wide best-practice guidance for PFAS sampling, including using fresh, powderless, nitrile gloves for the handling of all sample media and soil, rinsing all sampling equipment with PFAS-free de-ionised water prior to use and not allowing the use of PFAS containing equipment including permanent markers, waterproof clothing and spray paint.

3 No. concrete cores (PFC-01, PFC-02 and PFC-03, inclusive) were undertaken across the site to allow for the collection of shallow site soils for PFAS analysis. The sub-base material directly beneath the hardstanding was collected and submitted for PFAS in soils analysis. As part of a quality assurance programme, a duplicate sample

(DUP-A) was collected from one of the locations and also submitted for PFAS in soils analysis.

The concrete core barrel equipment and the shovels used for sampling were rinsed with PFAS-free de-ionised water before sampling. A rinsate sample from the concrete core and shovel (FIELD-BLANK) was collected and submitted for PFAS in water analysis. A sample of the on-site water supply (SITE-BLANK) was also collected and submitted for PFAS in water analysis.

A concrete swab was performed on an approximate 100mm x 100mm area of hardstanding adjacent a surface water drain at the site and submitted for PFAS in concrete (swab) analysis.

The PFAS sampling locations are shown on the exploratory hole location plan in Appendix 2.

2.5 Foundation Inspection Pits

In order to determine the presence and condition of existing foundations, 3 no. foundation inspection pits (FP01, FP02 and FP03) were excavated by hand at the walls of the main fire station structure. These pits were excavated using hand tools to 1.20m bgl.

The foundation inspection pit locations are shown on the exploratory hole location plan in Appendix 2 and the exploratory hole logs are included in Appendix 5.

2.6 California Bearing Ratio Testing

CBR determinations via DCP were undertaken at 6 No. locations (BH01, BH02, WS01, WS02, WS03 and WS04). These determinations were to provide approximations of subgrade strength for hardstanding design.

The locations of the CBR determinations are shown on the Exploratory Hole Location Plan in Appendix 2. The DCP data and calculations are contained in Appendix 5.

2.7 Site Testing and Sampling

The following site tests and sampling were carried out:

- a) Retrieval of environmental samples and bulk disturbed samples from cable percussion boreholes and dynamic sampling sleeves for the purposes of chemical and geotechnical laboratory testing and classification.
- b) Retrieval of shallow soil samples from beneath concrete cores (PFC-01 to PFC-03, inclusive), concrete swab performed on hardstanding and water samples (from site supply and rinsate) for PFAS analysis.
- c) Standard Penetration Tests (SPTs) were undertaken at regular 1.00m intervals between 1.00m and 5.00m bgl within the dynamic sampling and cable percussion boreholes. SPTs were undertaken at regular 1.50m intervals beneath 5.00m bgl in the cable percussion boreholes.
- d) CBR determinations via dynamic cone penetrometer tests were undertaken at BH01, BH02, DS01, DS02, DS03 and DS04.
- e) Infiltration testing via falling head test method was completed at DS01, DS02, DS03 and DS04.

2.8 Laboratory Testing

2.8.1 Chemical Laboratory Testing

7 No. soil samples were obtained during exploratory hole construction and sent to i2 Analytical laboratories for chemical testing. These samples were placed into sterile sealed containers to facilitate MCERTS chemical laboratory testing of potential contaminants. Chemical testing suites are outlined below and are based upon a wide range of possible contaminative sources.

Asbestos ID, sulfate, pH, nitrate, total and free cyanide, arsenic, barium, beryllium, boron, cadmium, chromium, chromium (hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc, Total Petroleum Hydrocarbon screen and Speciated Polyaromatic Hydrocarbons.

4 No. soil samples, 1 No. concrete swab and 2 No. water samples were obtained during the supplementary phase of investigation for PFAS presence and sent to ALS Environmental laboratories for chemical testing. These samples were placed into

sterile sealed containers to facilitate MCERTS chemical laboratory testing of PFAS compounds.

2.8.2 Geotechnical Laboratory Testing

The following geotechnical laboratory tests were carried out on selected samples obtained from across the site:

- a) Determination of moisture content, liquid limit and plastic limit in accordance with BS EN ISO 17892-1 (2014), BS EN ISO 17892-12 Clause 5.3 and 5.5 (2018 +A1 2021), respectively.
- b) Determination of particle size analysis by dry/wet sieving and hydrometer method in accordance with BS EN ISO 17892-4 (2016); and
- c) Determination of concrete aggressivity in line with BRE SD1 (2005).

3.0 FINDINGS

3.1 Ground Conditions

The typical ground conditions encountered across the site are as follows:

- **At WS01 to WS04:**
 - **Made Ground Topsoil** comprising soft to firm dark brown sandy gravelly CLAY to a depth of between 0.25m and 0.50m bgl.
- **At BH01 and BH02:**
 - **Reinforced concrete** between 0.39 and 0.48m thick underlain by:
 - **Made Ground** comprising very gravelly medium to coarse SAND to depths of between 0.70 and 0.75m bgl, underlain by:
 - **Made Ground** comprising firm sandy gravelly CLAY to depths of between 1.10 and 2.30m bgl.
- **At all locations the Made Ground was underlain by:**
 - **Glacial Till** comprising medium dense sandy clayey SILT (locally interbedded with sand and clay) and stiff to very stiff brown CLAY.

3.2 Foundations

No evidence of existing foundations was recorded between ground level and 1.20m bgl at any of the foundation inspection pits. Made Ground similar to that encountered in the other exploratory holes was recorded to depth, with the existing brick wall exposed to the full depth of the inspection pit.

3.3 Visual and Olfactory Contamination Findings

During the intrusive exploratory hole investigation works, the soils were examined carefully for both visual and olfactory evidence of contamination. No visual and / or olfactory evidence of contamination was encountered during the ground investigation.

3.4 Water Strikes

No water strikes were recorded within any of the exploratory holes undertaken as part of the ground investigation works.

3.5 Access Restrictions

Given the presence of a basement in the centre of the site, steep slopes at the site boundaries and buried services in the access apron, the positioning of exploratory holes was somewhat limited. No pavement core could be completed at the northern edge of the access apron given the presence of underground services, whilst exploratory holes at the site perimeters had to be completed by dynamic sample techniques, rather than cable percussion.

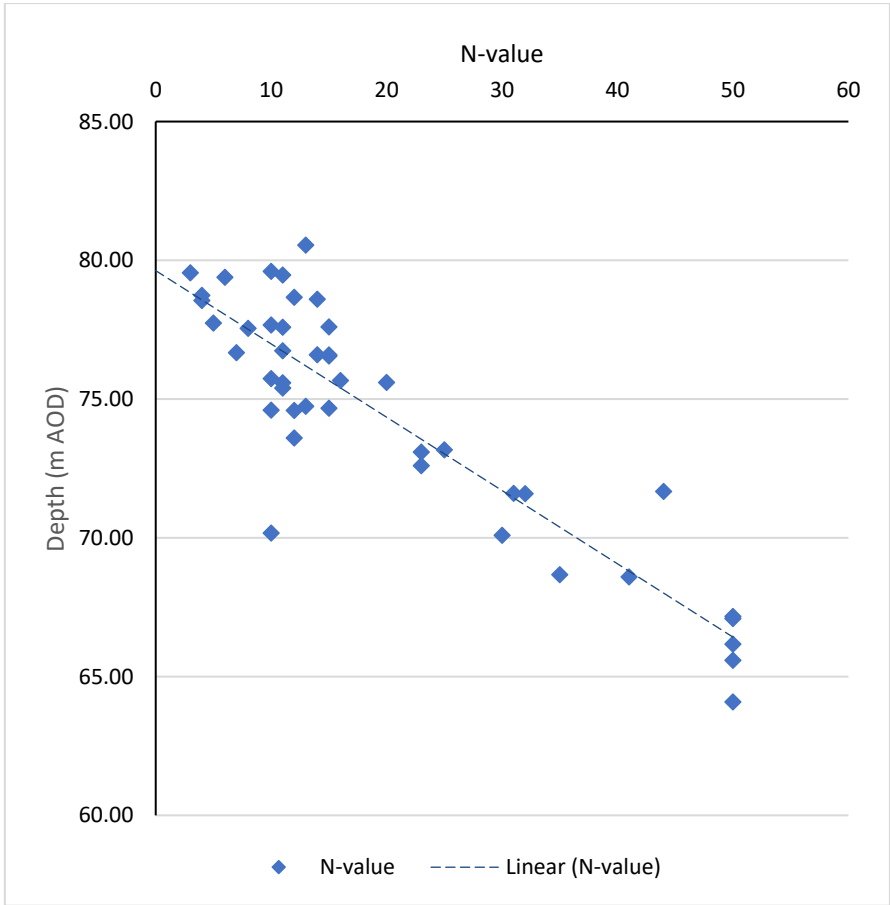
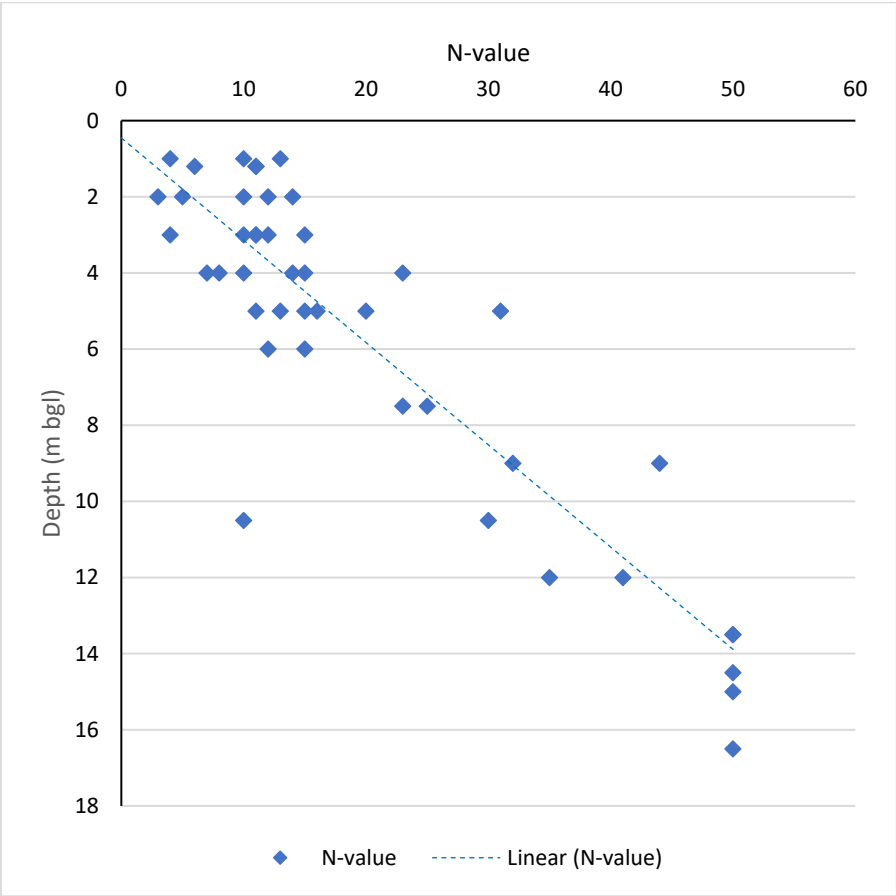
3.6 Geotechnical Site Testing

The results of the geotechnical testing undertaken during the ground investigation are summarised below.

3.6.1 Standard Penetration Tests

Standard Penetration Tests (SPTs) were undertaken at regular 1.00m intervals between 1.00m and 5.00m bgl within the dynamic sampling and cable percussion boreholes. SPTs were undertaken at regular 1.50m intervals beneath 5.00m bgl in the cable percussion boreholes.

The following scatter graphs show that there was a positive correlation between increasing uncorrected N-values with depth, both bgl and AOD.



SPT results are included on the cable percussion and dynamic sample borehole logs presented in Appendices 3 and 4, respectively.

3.6.2 Dynamic Cone Penetrometer Testing

6 No. dynamic cone penetrometer tests were undertaken to depths of between 0.932 and 0.982m bgl at BH01, BH02 and WS01 to WS04, inclusive. The results are shown below.

Location	Layer	Equivalent CBR Value (%)	Layer Thickness (mm)	Total Depth (mm)
BH01	1	43.9	31	541
	2	17.4	150	691
	3	11.3	222	913
BH02	1	21	162	612
	2	10	347	959
WS01	1	4.6	896	965
WS02	1	3.8	248	323
	2	6.8	152	475
	3	3.7	359	834
WS03	1	11.6	87	178
	2	3.5	676	854
WS04	1	2.7	870	958

Full dynamic cone penetrometer results are included in Appendix 5.

3.7 Geotechnical Laboratory Testing

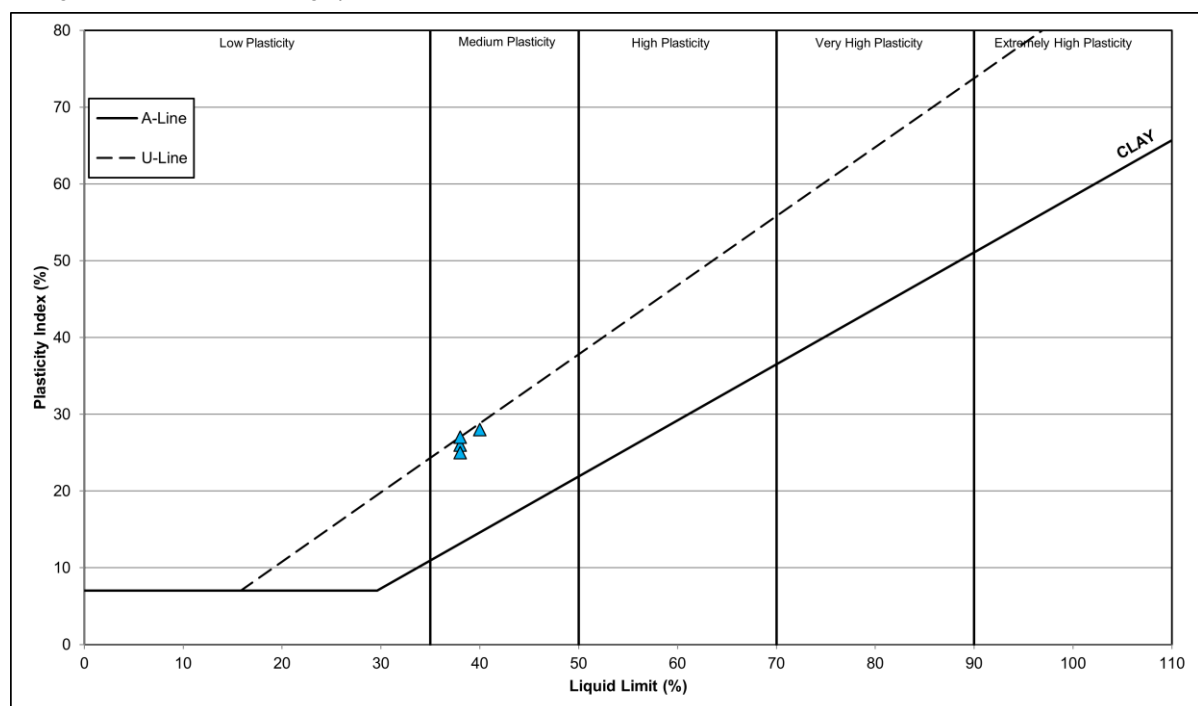
The results of the geotechnical laboratory tests undertaken during the ground investigation are summarised below. The full geotechnical laboratory test results are included in Appendix 6.

3.7.1 Atterberg Limit Tests

Atterberg limit tests were undertaken on 4 No. samples from natural Glacial Till deposits. The results of the Atterberg testing are as follows:

Sample	Sample Depth (m bgl)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Passing through 425 micron (%)	Modified Plasticity Index
BH01	13.50	13	38	12	26	85	22
BH01	16.50	13	40	12	28	90	25
BH02	12.00	10	38	11	27	89	24
BH02	14.50	12	38	13	25	72	18
Average		13	39	12	27	84	22

Orange = medium volume change potential.

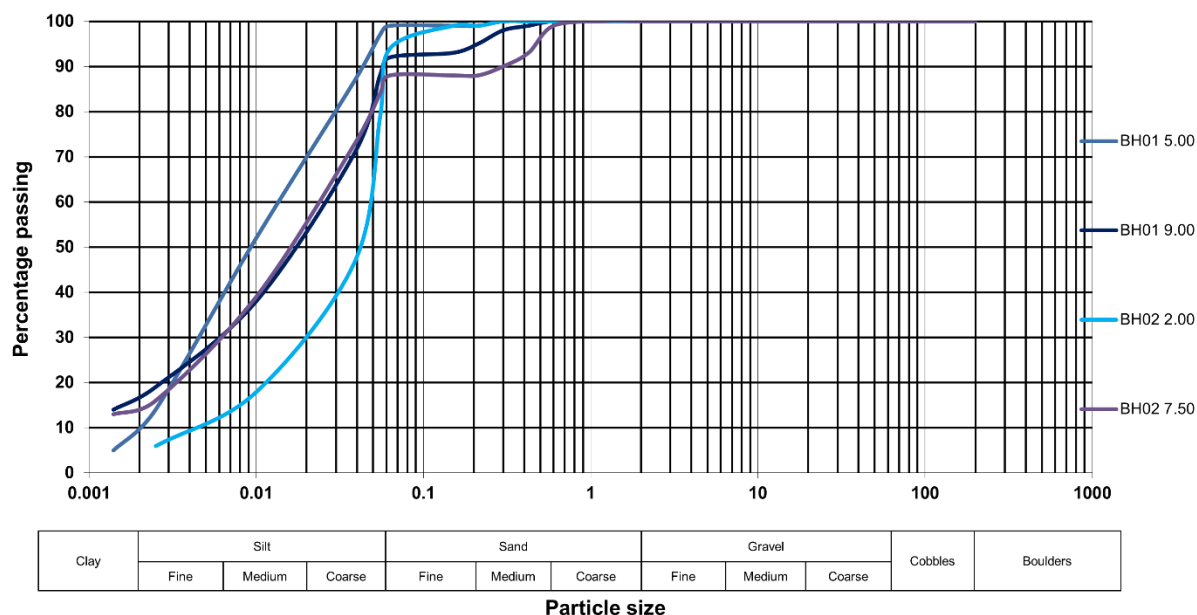


The Atterberg Limit tests indicate that the Glacial Till deposits are generally of medium plasticity in-line with BS14688 Part 2.

The Glacial Till is of medium volume change potential in-line with NHBC Chapter 4.2 guidance.

3.7.2 Particle Size Distribution Tests

Particle size distribution tests were undertaken on 4 No. Glacial Till samples. The results are summarised below:



The results are consistent and indicate that the Glacial Till soils are sandy clayey silts. It should be noted that these strata were observed to behave like coarse soils during the site investigation, with minimal cohesion exhibited. This is not uncommon for silt material. For the purposes of geotechnical design, these strata should be considered to behave as coarse soils.

3.7.3 BRE Special Digest Suite Testing

In accordance with BRE Special Digest 1: Concrete in Aggressive Ground (2005), the site has been classified as brownfield with mobile groundwater. BRE SD1 testing suites were undertaken on 8 No. samples of Glacial Till in order to determine the Design Sulfate (DS) levels and the Aggressive Chemical Environment for Concrete (ACEC). All samples are classified as DS-1, AC-1.

3.8 Environmental Laboratory Test Results

The findings of the chemical test results, summarised below, will be assessed against generic assessment criteria (GAC) for the purposes of screening allowable concentrations in comparison to the measured site concentrations. The GAC are defined based on the critical receptors identified at the site, detailed in the Phase 1 Investigation. Receptors are considered in relation to:

- Human health receptors (e.g. end-users, construction workers and the general public) via measured solid concentrations, and;

- Additional receptors which may be relevant e.g. flora/fauna, water, buried concrete.

The GAC adopted for assessment of soils in relation to Human Health are based on published LQM/CIEH S4ULs (2015) for those compounds for which published criteria are available for varying scenarios (residential, commercial, allotment, public open space). In the absence of LQM/CIEH S4ULs (2015) the following GAC defining documents are adopted - CL:AIRE Soil GAC for Human Health Assessment (2010) and Category 4 Screening Levels (C4SLs) (2014).

The primary risk to human receptors from free cyanide in soils is an acute risk (i.e. a single dose could have a lethal affect as opposed to adverse effects from cumulative intake (chronic affect)). There is no current UK guidance available for calculating acute risks from free cyanide, therefore an in-house methodology has been used to derive an acute GAC of 60 mg/kg for all exposure scenarios. The value is given for Free or Easily Liberatable Cyanide but should be used to assess Total Cyanide in the absence of cyanide speciation. In cases where the Total Cyanide exceeds the GAC then analysis for Free or Easily Liberatable Cyanide should be completed.

Chemical laboratory testing results are included in Appendix 7. Screening tables for 4 No. samples of Made Ground (WS01 at 0.30 and 0.80m bgl, WS02 at 0.20m bgl and BH01 at 0.90m bgl) and 3 No. samples of Glacial Till (WS03 at 0.90m bgl, WS04 at 1.30m bgl and BH01 at 2.50m bgl) are included in Appendix 8 and summarised below. All results have been assessed against the relevant GACs for a **commercial end use** scenario based on a measured organic matter content of **2.5%**.

3.8.1 Asbestos

An asbestos screen was performed on 4 No. samples of Made Ground and 1 No. sample of Glacial Till. No asbestos was found to be present within any of the samples tested.

3.8.2 Polycyclic aromatic hydrocarbons (PAHs)

No exceedances of the GAC were recorded in any of the samples for any of the sixteen PAH compounds analysed.

3.8.3 Metals and metalloids

No exceedances of any heavy metals or metalloids were recorded in any of the samples submitted for laboratory analysis.

3.8.4 Total Petroleum Hydrocarbons (TPH)

TPH compounds were recorded in excess of the laboratory detection limit in a number of samples; none of the concentrations were in excess of the GAC for any of the TPH-CWG bands. It was therefore not considered necessary to complete speciation testing on these samples.

3.8.5 PFAS

Analysis for PFAS concentrations in soils, water and on the concrete hardstanding was completed across the site. No exceedances of the laboratory detection limit for any PFAS compounds were recorded in soil samples, water samples or the concrete swab.

3.9 Ground Gas Monitoring

All dynamic sampling boreholes were installed with a standpipe to allow for monitoring of ground gas concentrations and any underlying groundwater which may be present:

Exploratory Hole	Response Zone Stratum	Response Zone Depth m bgl (m AOD)	
		Top of Response Zone	Base of Response Zone
WS01	Glacial Till comprising CLAY and SILT.	2.00 (74.60)	4.00 (72.60)
WS02	Glacial Till comprising SAND and CLAY.	1.00 (79.60)	4.00 (76.60)
WS03	Glacial Till comprising SAND and CLAY.	1.00 (78.74)	4.00 (75.74)
WS04	Glacial Till comprising SAND and CLAY.	2.00 (79.55)	4.00 (77.55)

The monitoring wells are constructed of 51mm diameter HDPE plain pipe to the depth of the response zone. The response zones comprise slotted pipe surrounded by a gravel annulus and sealed above and below with hydrated bentonite seals. The

monitoring wells are topped with a flush lockable cover.

A gas monitoring programme of 6 visits over 12 weeks has been completed for the dynamic sample boreholes; the results have been summarised below.

Gas Monitoring Well	Steady O ₂ Concentration (%)	Peak CO ₂ Concentration (%)	Peak CH ₄ Concentration (%)	Peak H ₂ S Concentration (ppm)	Atmospheric Pressure (mbar)	Steady Gas Flow (l/hr)
WS01	12.2 – 19.4	1.9 – 8.5	<0.1	<1	974 – 1024	<0.1
WS02	15.8 – 18.6	1.8 – 4.7	<0.1	<1	972 – 1023	<0.1
WS03	16.4 – 19.0	0.3 – 4.2	<0.1	<1	973 – 1023	<0.1
WS04	13.6 – 16.8	3.6 – 5.5	<0.1	<1	972 - 1023	<0.1

Ground gas monitoring was undertaken utilising a GFM 4300 gas analyser.

The ground gas monitoring results are included in Appendix 9.

3.10 Groundwater Depth Monitoring

The above wells were also installed for the purposes of groundwater depth monitoring. Each of the 4 No. monitoring wells were recorded to be dry during each of the 6 No. visits.

The groundwater monitoring results are included with the gas monitoring results in Appendix 9.

4.0 ENVIRONMENTAL CONCLUSIONS

4.1 Assessment of Environmental Results

Soil sample analyses have assessed the presence of contaminants on a spatial basis, and the concentrations at which they occur across the site.

No GAC exceedances for the '*commercial*' land use scenario were recorded for any of the samples (Made Ground and Glacial Till) sent for laboratory chemical testing. No asbestos was detected in any of the samples tested.

No exceedances of laboratory detection limits for PFAS compounds in either soil, water or the concrete swab were recorded. It should be noted that the results for the rinsate water sample (FIELD-BLANK) were diluted by the laboratory by a factor of 5, thus necessitating an increase in the laboratory detection limit.

No other visual or olfactory evidence of contamination was found.

4.2 Revised Conceptual Models

The original conceptual models produced in the *IGE Consulting Phase 1 Geo-Environmental Investigation Report* have been revised / updated using the findings from the Geo-Environmental Ground Investigation.

4.2.1 Human Health Risk Assessment

The possible sources of on-site contamination identified within the Phase 1 report include:

- Made Ground
- Use as Fire Station

The human health receptors identified within the Phase 1 report include:

- End users (residents – 'residential with home grown produce' land use scenario).
- Construction workers.

- The general public and adjacent site users including from possible changes in ground gas regime following development.

The human health pathways identified within the Phase 1 report include:

- Ingestion of soil directly (including on home grown produce) and indoor dust*;
- Inhalation of soil dust (indoor and outdoor);
- Dermal contact with soil (indoor and outdoor);
- Inhalation of soil vapours (indoor and outdoor);
- Oral background;
- Inhalation background.

** Treated as one pathway*

Revised Conceptual Model for Human Health Risk Assessment

Only a limited thickness of Made Ground was identified during the ground investigation works. No human health GAC exceedances were recorded on-site for the commercial land use scenario.

Consequently, the site is considered to pose a **very low risk** to human health of site occupants, the general public and construction workers. Any potential increase in risk to construction workers associated with acute interaction with soils can be mitigated with appropriate PPE and health and safety procedures.

4.2.2 Ground Gas Risk Assessment

Potential ground gas sources identified within the Phase 1 report include:

- Possible Made Ground
- Off-site historical landfill (1891-1977, 55m south)

Potential ground gas pathways identified within the Phase 1 report include:

- Preferential migration beneath hardstanding
- Foundations, service ducts and trenches
- Dissolved gases within groundwater
- Ingress through wall cavities / floors and subsequent accumulation
- Inhalation of ground gas and vapours

- Vertical and lateral migration through granular deposits / granular bands in cohesive deposits

Potential ground gas receptors identified within the Phase 1 report include:

- End users, and to a lesser extent, site workers, if confined spaces are present in which gases are able to accumulate
- Building and structures

Revised Conceptual Model for Ground Gas Risk Assessment

A limited thickness (insufficient to screen with a gas monitoring well) of Made Ground was recorded on site and is not considered a significant source of ground gas. Gas monitoring wells were installed into the natural deposits at the site.

The results of the ground gas monitoring programme (6 visits over 12 weeks) have been assessed in accordance with BS 8485 (2015) + A1 (2019). The characteristic Gas Screening Value (GSV) is calculated by dividing the maximum methane or carbon dioxide concentration by 100 and multiplying by the maximum steady flow rate recorded at the same monitoring point (the instrument detection limit of 0.1 l/hr is utilised when below detection limit flow rates are recorded). If required, the worst case GSV can be calculated by dividing the maximum carbon dioxide and methane concentration by 100 and multiplying by the maximum steady flow rate on-site.

Ground gas monitoring has recorded a maximum peak carbon dioxide concentration of 8.6% v/v at WS01. No methane was recorded above the instrument detection limit at any exploratory hole during any of the monitoring visits. No steady flow rates above detection limits were recorded.

As no steady flow rates were recorded on-site, the GSV and the worst case GSV for carbon dioxide at the site can be calculated as $(8.6/100) \times 0.1 = 0.0086 \text{ l/hr}$

Consequently, the ground gas risk on-site is deemed to be very low and in-line with Characteristic Situation 1 (CS1). Therefore, no ground gas protection measures are deemed necessary in the proposed development, in-line with BS8485 + A1 (2019).

Radon

The Indicative Atlas of Radon in England and Wales produced by the Health Protection Agency and British Geological Survey indicates that the site lies within a lower probability area, less than 1% of homes are above the action level. Consequently, BR211 (2015) indicates that no radon protection measures are necessary in the construction of new dwellings or extensions.

4.2.3 Controlled Waters Risk Assessment

The possible sources of on-site contamination identified within the Phase 1 report include:

- Made Ground
- Use as Fire Station including potential use of PFAS in firefighting foam

The controlled water receptors identified within the Phase 1 report include:

- Groundwater contained within the underlying Secondary Undifferentiated Aquifer within the superficial deposits and Principal Aquifer within the bedrock (unknown depth >25m bgl).
- Surface Water – Unnamed stream (175m south of site).

The controlled waters pathways identified within the Phase 1 report include:

- Vertical migration along future foundations and pooling at base / beneath foundations.
- Vertical migration through possible granular Made Ground (if present) and granular lenses in natural cohesive deposits.
- Lateral migration along low permeability natural deposits and pooling at relative low points.
- Negligible infiltration through low-permeability natural cohesive deposits.
- Migration through underlying bedrock.
- Migration along groundwater flow.
- Overland flow

Revised Conceptual Model for Controlled Waters Risk Assessment

Limited Made Ground was encountered on-site and based on the chemical test results and the lack of visual and olfactory evidence noted, no significant contaminative sources exist on site.

Laboratory analysis for the presence of PFAS compounds was performed on shallow site soils and on a concrete swab adjacent a site drain. A quality assurance duplicate sample was taken from one of the sampling locations (DUP-A). No exceedances of laboratory detection limits were recorded on the soil samples or the concrete swab.

As a further quality assurance procedure, water samples were taken from the site water supply (SITE-BLANK) and of the decontamination rinsate from the concrete core equipment and shovels used to collect the samples (FIELD-BLANK). No exceedances of the laboratory detection limits were recorded in either water sample.

Consequently, the risk to controlled waters is deemed **very low** as no contaminative linkages have been identified. No further assessment or remedial measures are considered necessary.

4.2.4 Conceptual Model for Building Materials & Services

In accordance with BRE Special Digest 1: Concrete in Aggressive Ground (2005), the site has been classified as brownfield with mobile groundwater. The natural soils have been classified as Design Sulfate level DS-1 and subsequently within the Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1. Therefore, no special precautions are required regarding the use of concrete within the Glacial Till deposits.

The chemical laboratory testing results are contained within Appendix 7.

5.0 GEOTECHNICAL CONCLUSIONS

5.1 Geotechnical Assessment of Ground Conditions

The site investigation works have revealed that the ground conditions at the site were very consistent comprising Made Ground underlain by Glacial Till. Hardstanding has not been considered in this section.

The principal strata identified are outlined in further detail below.

5.1.1 Made Ground - Topsoil

Made Ground Topsoil was recorded in all dynamic sample boreholes and was consistent in terms of composition. The material generally comprised dark brown, very clayey, fine to coarse sand with frequent rootlets.

5.1.2 Glacial Till

Glacial Till deposits were encountered in all exploratory holes and were noted to comprise shallow firm clays, clayey silts and sands, and stiff deep clays.

The silts were observed to behave in a granular manner during the ground investigation and have been treated as a coarse soil for the purposes of this assessment.

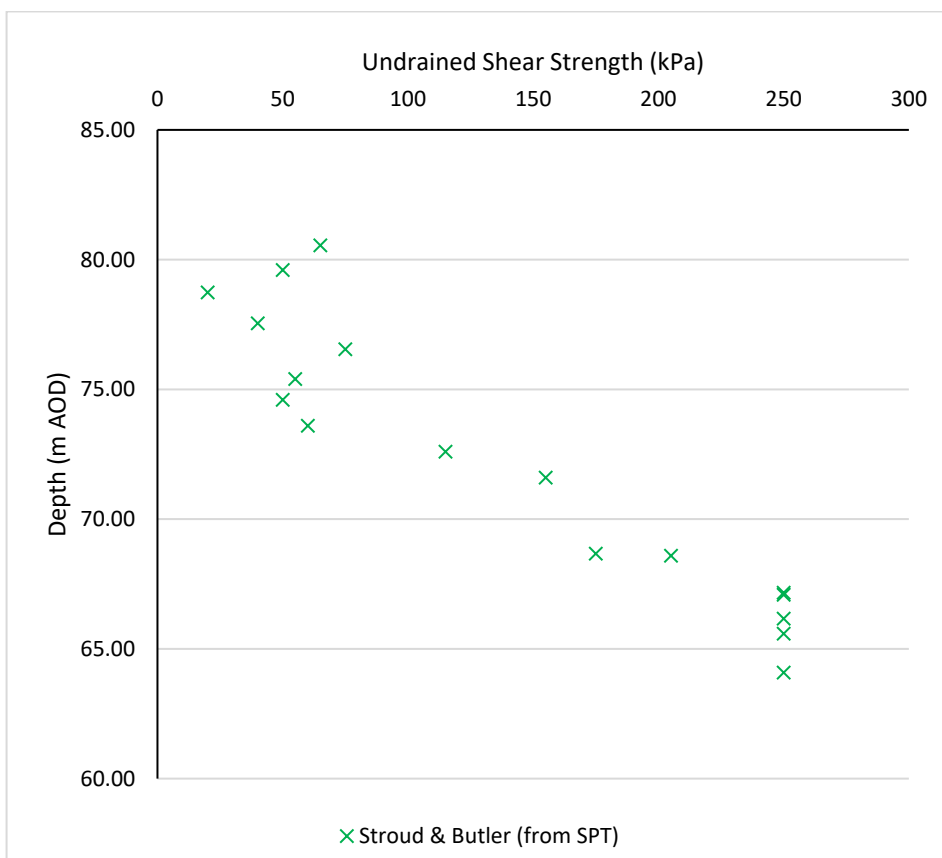
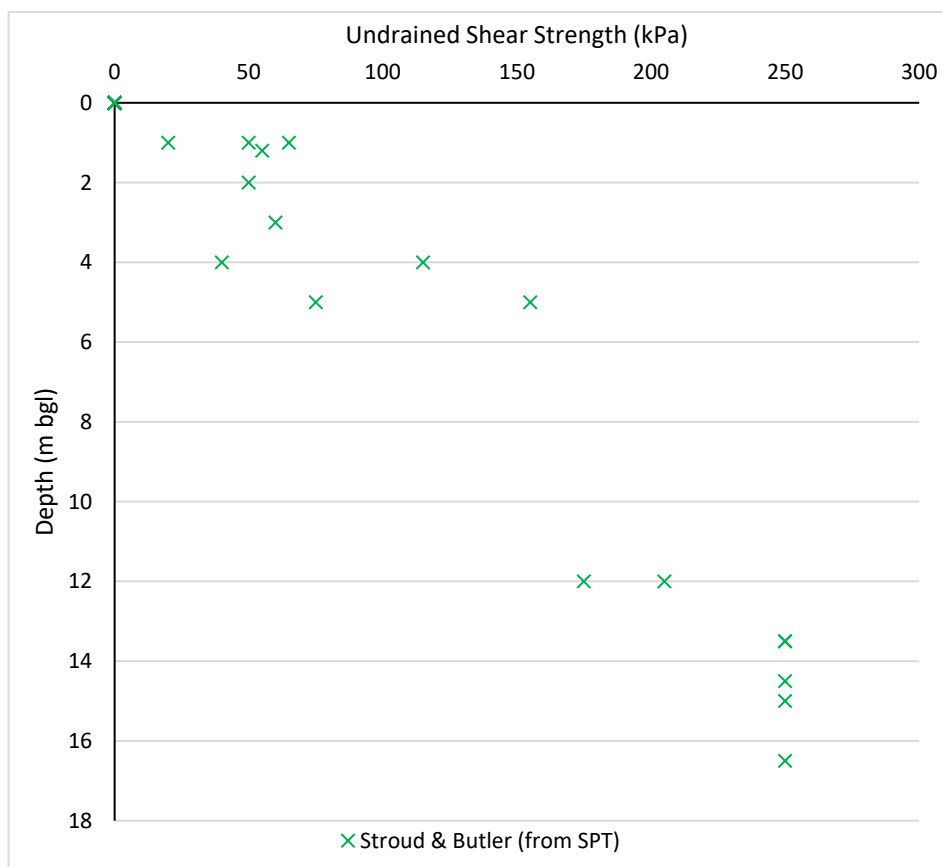
27 No. SPTs were undertaken within silts and sands, with N-values between 3 and 44 (arithmetic mean of 16).

8 No. SPTs were undertaken in the 'shallow' clay and recorded N-values between 4 and 12.

Given the anticipated requirement for deep (piled) foundations at the site, the silts, sands and shallow clays will not be considered further in this section.

7 No. SPTs were undertaken in the 'deep' clay, recording N-values between 35 and 50.

Utilising the *Stroud and Butler (1975)* empirical correlation between N-values and undrained shear strengths, the deep clay is assessed to have an undrained shear strength in excess of 150 kPa from 12.00m bgl (approximately 72m AOD).



4No. Atterberg tests were undertaken on samples of deep Glacial Till (12.00 – 16.50m bgl), which indicated that the Glacial Till deposits are clays of medium plasticity and medium volume change potential.

5.2 Foundations and Floor Slabs

Given the significant variation in levels across the site and the presence of a basement structure, it is envisaged that deep (piled) foundations will be necessary at the site. These should bear onto the cohesive (clay) soils encountered at 12.00 and 11.60m bgl (68.59 and 69.07m AOD) in BH01 and BH02, respectively. Given the presence of residential properties at the northern boundary, and the potential impact upon existing services, consideration should be given to a non-percussive piling technique.

Given the presence of numerous established trees at the site boundaries, heave precaution may be necessary for ground floor slabs subject to proposed levels.

It is recommended that a temporary working platform is undertaken in line with BRE470 with appropriate in-situ testing undertake to validate the installation. The movement / tracking of the piling rig onto and across site should be considered within the design, particularly in light of the levels on site. It is recommended that suitable plate incremental tests take to appropriate pressures are undertaken following completion of the temporary working platforms to ensure that they have been installed appropriately.

5.3 Groundwater

No natural water strikes were recorded in any of the exploratory holes. No groundwater was encountered in any of the shallow groundwater monitoring wells installed on site.

Consequently, significant groundwater control is not envisaged to be required for excavation works at the site. It would be prudent to make an allowance for localised dewatering to account for any season or temporal groundwater bodies which have

not been quantified during this investigation. However, it is anticipated that any localised groundwater could be controlled via sump pumping.

5.4 Earthworks and External Areas

5.4.1 CBR Determinations

6 No. CBR determinations were undertaken by DCP at the borehole locations. At depth, these tests generally produced results between 2.7% (WS04) and 11.3% (BH01). It is therefore assessed that minimal re-engineering would be required for the proposed development to be suitable for further hardstanding. However, further inspection and testing should be undertaken once demolition works are undertaken.

5.4.2 Access Apron

Pavement cores CC01 and COO2 were completed in the access apron. These showed the hardstanding to be between 0.32 and 0.35m thick and underlain by heavily compacted Type 1/ MOT material which was too dense to excavate by hand.

5.4.3 Earthworks

It is understood that the demolition of the existing structure will produce significant amount of material, intended for use as aggregate. This material should be subject to appropriate chemical and geotechnical screening to ensure its suitability for use.

Assuming the material is chemically and geotechnically appropriate, best practice should be followed with regards an earthworks programme, including the re-engineering of the material to an appropriate specification which is agreed prior to works and validated both during and after works. This earthworks strategy should be detailed in an Earthworks Specification which should include, amongst other things, limits on control of moisture content, re-engineering thickness, and compaction regimes. Consideration should also be given to slope stability mitigation at the site boundaries.

5.4.4 Stockpile Management

During the course of the development there will also be areas of stockpiled soils intended for use within the proposed gardens. These will have been subjected to off-site testing and approved for use on site. It is imperative that the stockpiles are well

managed to avoid inadvertent mixing or depositing of surplus or deleterious materials that would compromise the continued use. We would recommend that the site management reviews the proposed positions for placement of stockpiles and places either fencing or warning signs to ensure compliance.

5.4.5 Export of Materials

Any soils to be removed from site must be classified in accordance with WM3 under the definition of waste and chemically tested to determine their destination, i.e. reuse or landfill. Waste ticket records must also be retained as proof of the export of materials from site.

5.5 Drainage

As noted in Letter Report 3866/LM/03-b, infiltration testing via falling head test was completed in WS01, WS02, WS03 and WS04 during a gas and groundwater monitoring visit. The results are presented below and contained with Appendix 5.

Location	Response Zone (m bgl)	Test began at (m bgl)	Test ended at (m bgl)	Infiltration rate, k (m/s ²)
WS01	2 - 4	0.15	2.98	9.50x10 ⁻⁵
WS02	1 - 4	0.30	3.58	1.70x10 ⁻⁴
WS03	1 - 4	0.24	3.87	2.59x10 ⁻⁴
WS04	2 - 4	0.34	3.00	9.41x10 ⁻⁵

Infiltration rates were recorded between 1.70x10⁻⁴ and 9.50x10⁻⁵ m/s², which would ordinarily indicate that the ground conditions were suitable for soakaway drainage. However, consideration must be given to a number of other factors.

Existing and proposed site levels and surrounding levels show steep slopes present at the northern, western and southern site boundaries. With slope stability largely being governed by the presence/absence of water within the soil, the rapid influx of water through soakaway drainage could give rise to slope instability problems.

Based upon the steep slopes at the site boundaries, the use of soakaways within the proposed commercial scheme is not considered feasible at this stage.

6.0 RECOMMENDATIONS

- Following any variation in a finalised proposed development detailed design including earthworks design, proposed levels and arboricultural survey (tree survey) it is recommended that the above conclusions are re-appraised to determine the suitability.
- The conclusions of this report should be agreed with relevant regulatory authorities prior to the commencement of works.
- Following a complete programme of 6 No. visits over 12 No. weeks, no ground gas protection measures are deemed necessary for the site.
- No remedial measures are deemed necessary with respect to soil at the site.
- If any hereto unidentified visual or olfactory evidence of contamination is encountered during earthworks or construction work, then the Local Authority Environmental Health Officer and Environment Agency should be contacted immediately to determine appropriate mitigation measures.
- Recommended that given the significant volume of earthworks, in particular filling the existing basement as part of the development, a detailed earthworks strategy should be undertaken.
- It is recommended that the presence and associated constraints of all site services are established prior to significant intrusive works beginning.
- Once detailed design is known an assessment of requirements for retaining structures and impact upon third party walls / boundaries should be determined.

APPENDIX 1

LIMITATIONS OF INVESTIGATION WORK AND REPORT

LIMITATIONS OF REPORT

This consultancy report was compiled and carried out by IGE Consulting Limited ('IGE') for the client, as defined in the main report (the 'client'), on the basis of a defined programme and scope of works and the terms of a contract between IGE and the client. IGE undertook this with all reasonable skill and care, taking into account the limits of the scope of works required by the client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between IGE and the client. IGE cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outwith the agreed scope of works.

Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices. This report may not be relied upon, or transferred to, by any other party without the written agreement of its author. If a third party relies on this report, it does so wholly at its own and sole risk and IGE disclaims any liability to such parties.

It is IGE's understanding that this report is to be used for the purpose described in the 'Brief' section of this report. That purpose was a significant factor in determining the scope and the services to be provided. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without IGE's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of IGE.

This report is a function of the date it was written and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of IGE. In the absence of such written advice of IGE, reliance on the report in the future shall be at the client's own and sole risk. Should IGE be requested to review the report in the future, IGE shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between IGE and the client.

The observations and conclusions described in this report are based solely upon the scope of works agreed between the client and IGE. IGE has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. IGE is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the agreed scope of works. For the avoidance of doubt, this report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species (e.g. Japanese Knotweed). It is recommended that the client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the identification of asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace full and proper surveys.

LIMITATIONS OF INVESTIGATION WORK

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations, the potential exists for ground conditions to be encountered which are different to those considered in this report. The explored extent of the site area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried

out for a limited number of parameters, based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Exploratory Holes

Where exploratory holes have been carried out as part of this investigation, the spacing has been determined to provide a reasonable indication of the general ground conditions across the site, but the number has ultimately been limited by commercial constraints. The findings of the exploratory holes relate specifically to the exploratory hole locations and are no absolute guarantee of the ground conditions between such locations. Due allowance should be made for the possibility of variation in conditions between exploratory hole locations.

Extent of Contamination Testing

The extent of contaminated land testing carried out on samples obtained from the site has been determined in accordance with the latest legal guidance issued by the government to provide, with reasonable certainty, the probable general levels of contamination present on site that could pose a significant hazard to human health or waters. The extent of site investigation works including chemical testing has also been limited by reasonable commercial constraints. Although extensive testing of samples has been carried out, the volume of samples taken for testing are a minute fraction of the total volume of soils and groundwater present on site. Therefore, there is a residual risk that undetected pockets of contamination may be present on site, situated between testing locations.

When investigating or developing potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and temporally. The absence of certain ground, ground gas, contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

Extent of Geo-Environmental Studies

This report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species e.g. Japanese Knotweed. It is recommended that the Client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the identification asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace a full and proper survey. If an Unexploded Ordnance (UXO) report has been obtained within the report, it has been so on the basis of Health and Safety concerns and no assessment has been made other than transcribing the recommendations of the sub-contractor contained within the report. In terms of a potential contaminative source, unless ordnance has been manufactured / stored on site, UXOs will only be determined as a contaminative source following a positive identification on site.

APPENDIX 2
FIGURES AND DRAWINGS

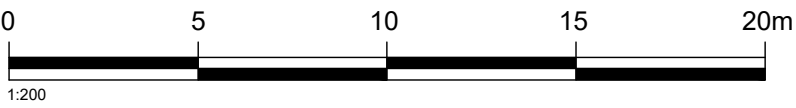
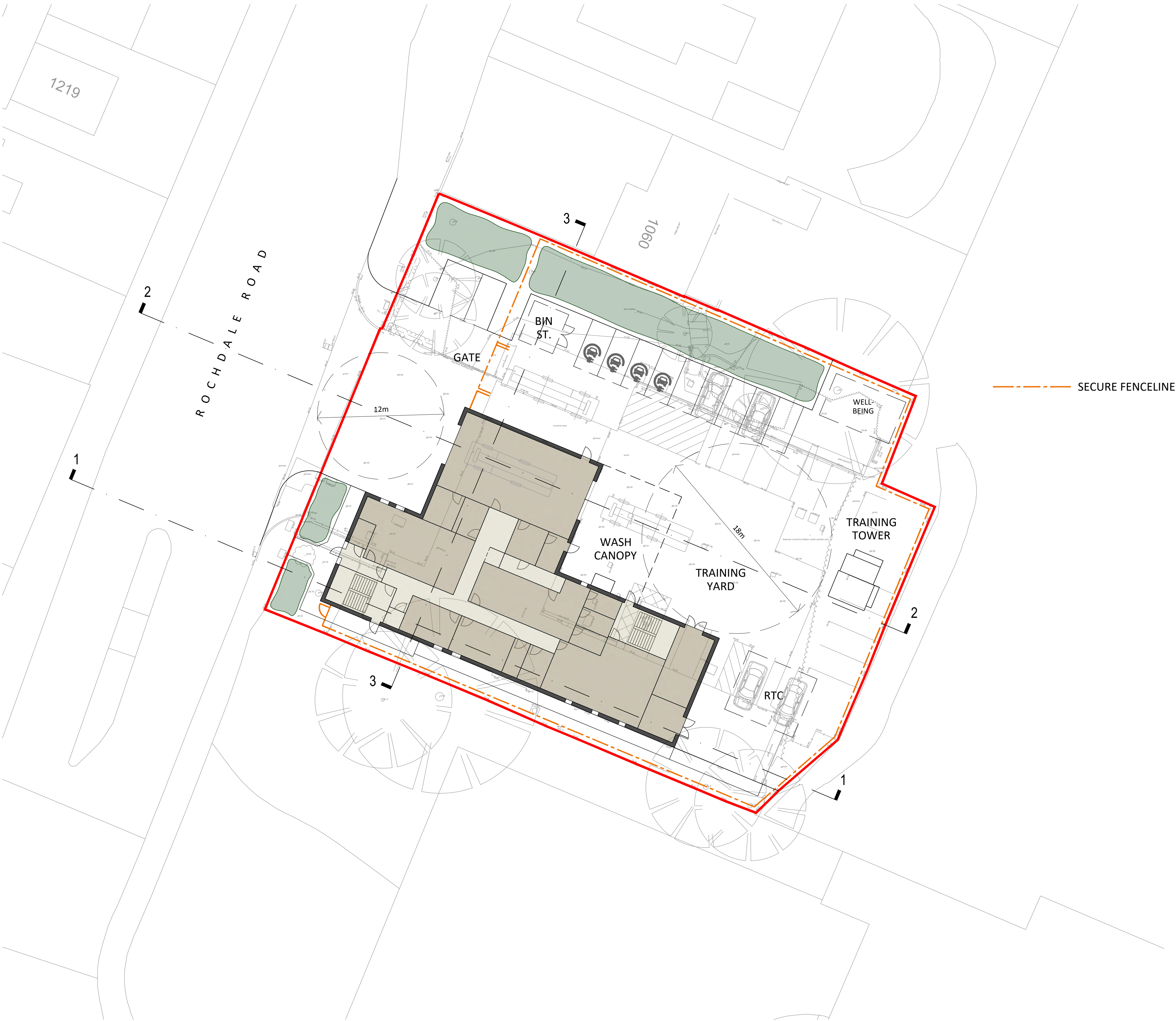


FOR GUIDANCE PURPOSES ONLY

Approximate Site Boundary



Rev	Drawn	Date	Description
Drawing Status: Information			
Contract: Blackley Fire Station			
For: Greater Manchester Combined Authority (GMCA)			
Drawing Title: Site Location Plan			
			
Office 11, Bartle House, Manchester, M2 3WQ Email: contact@igeconsulting.co.uk Web: www.igeconsulting.co.uk Tel: 0161 914 9170			
Scale: 1:800 @A3		Date: Nov 2022	
Drawn: AS		Checked: AE	
Contract No. 3866B		Drawing No. SI - 01	P1



status

FEASIBILITY

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The originator shall have no responsibility for any liability, loss, cost, damage or expense arising from or relating to any use of this document other than for its intended purpose on this project.

This drawing shall be read in conjunction with all other relevant drawings, specifications and associated documentation. Any discrepancies, errors or omissions are to be reported to the originator before proceeding with work.

All dimensions are to be checked on site by the contractor prior to proceeding with any work.

Hazard Identification

!

ref	hazard	date

N

P2	SECTION REFERENCES ADDED	ST	17.08.22
P1	FIRST ISSUE	ST	29.07.22
ref	revision	by	date

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client

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COMBINED AUTHORITY

project

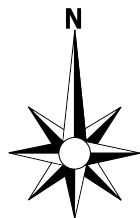
NEW FIRE STATIONS
FEASIBILITY STUDIES

drawing

BLACKLEY FIRE STATION
PROPOSED SITE PLAN
OPTION 3

drawn by	ST	date	JUL 22
checked by		date	

scale	1:200	A1
dwg no	1978.35.1206	rev P2



1219

Ward Bdy

ROCHDALE ROAD

FOR GUIDANCE PURPOSES ONLY

- Approximate Site Boundary
- Concrete Core Locations
- Dynamic Sample Boreholes
- Foundation Inspection Pits
- Cable Percussion Boreholes
- PFAS Cores

0 10 20 30 40 50 m

A	LM	10/05	Foundation Pits & PFAS Cores
Rev	Drawn	Date	Description

Drawing Status:
Information

Contract:
Blackley Fire Station

For: Greater Manchester Combined
Authority (GMCA)

Drawing Title:

Exploratory Hole Location Plan

IGE
consulting

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Web: www.igeconsulting.co.uk
Tel: 0161 914 9170

Scale: 1:300 @A3	Date: May 2023	
Drawn: LM	Checked: AE	
Contract No. 3866B	Drawing No. SI - 05	P2

APPENDIX 3

CABLE PERCUSSION BOREHOLE LOGS

IGE consulting		Office 11, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Borehole Log ver. 0.5			Borehole No. BH01 Sheet 1 of 2							
Project Name: Blackley Fire Station				Co-ords: 386077E - 403378N		Project No.: 3866b								
Location: Blackley, Greater Manchester				Level (mAOD): 80.59		Rev.: 1.0								
Client: Greater Manchester Combined Authority				Dates: 24/01/2023 - 25/01/2023		Logged By: LM								
				Weather: Clear		Checked By:								
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description						
		Depth (m)	Type	Results										
		0.60	ES	N=6 (1,1/1,1,2,2)	0.22	80.37		Reinforced CONCRETE.	1					
		0.60 - 1.20	B		0.48	80.11		MADE GROUND						
		0.90	ES		0.75	79.84		CONCRETE						
		1.20 - 1.65	B	Firm dark brown mottled black sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of sandstone, sandstone, concrete, brick fragments and clinker.			MADE GROUND							
		1.20 - 1.65	D				MADE GROUND							
		1.20	SPT				MADE GROUND							
		1.90	ES	N=11 (1,1/1,3,3,4)	2.30	78.29		Medium dense light orangish brown slightly gravelly sandy SILT. Gravel is subrounded fine of mudstone and sandstone.		2				
		2.00 - 2.45	U								GLACIAL TILL			
		2.45	D											
		2.50	ES	N=15 (2,3/3,3,4,5)										
3.00 - 3.45	B	N=12 (2,1/2,3,3,4)												
3.00 - 3.45	D										N=23 (3,3/4,5,7,7)			
3.00	SPT			N=32 (3,5/7,8,8,9)										
4.00 - 4.45	B													
4.00 - 4.45	D													
4.00	SPT													
5.00 - 5.45	B													
5.00 - 5.45	D													
5.00	SPT													
6.00 - 6.45	B													
6.00 - 6.45	D													
6.00	SPT													
7.50 - 7.95	B													
7.50 - 7.95	D													
7.50	SPT													
9.00 - 9.45	B													
9.00 - 9.45	D													
9.00	SPT													
Continued on next sheet									10					
Remarks:									Casing Details			Chiselling Details		
				Depth Top (m)	Depth Base (m)	Diameter (mm)	Depth Top (m)	Depth Base (m)	Duration (hrs)					
					12.00	150								
				Water Strike										
				Depth Strike (m)	Time Elapsed (min)	Water Level (m)								
SPT Energy Ratio:														

IGE consulting		Office 11, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Borehole Log ver. 0.5				Borehole No. BH01 Sheet 2 of 2	
Project Name: Blackley Fire Station				Co-ords: 386077E - 403378N		Project No.: 3866b			
Location: Blackley, Greater Manchester				Level (mAOD): 80.59		Rev.: 1.0			
Client: Greater Manchester Combined Authority				Dates: 24/01/2023 - 25/01/2023		Logged By: LM			
				Weather: Clear		Checked By:			
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description	
		Depth (m)	Type	Results					
		10.50 - 10.95 10.50 - 10.95 10.50	B D SPT	N=30 (5,5/7,7,7,9)	12.00	68.59		Medium dense light orangish brown slightly gravelly sandy SILT. Gravel is subrounded fine of mudstone and sandstone. GLACIAL TILL	11
		12.00 - 12.45 12.00 - 12.45 12.00	B D SPT	N=41 (5,6/9,9,11,12)				Stiff becoming very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone. GLACIAL TILL	12
		13.50 - 13.95 13.50 - 13.95 13.50	B D SPT	50 (8,13/50 for 180mm)					13
		15.00 - 15.45 15.00 - 15.45 15.00	B D SPT	50 (12,12/50 for 185mm)					14
		16.50 - 16.84 16.50 - 16.84 16.50	B D SPT	50 (7,13/50 for 190mm)					15
					16.84	63.75		Borehole terminated at 16.84m.	16
									17
									18
									19
									20
Remarks:				Casing Details			Chiselling Details		
				Depth Top (m)	Depth Base (m)	Diameter (mm)	Depth Top (m)	Depth Base (m)	Duration (hrs)
					12.00	150			
				Water Strike					
				Depth Strike (m)	Time Elapsed (min)	Water Level (m)			
SPT Energy Ratio:									

IGEconsulting Office 11, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Borehole Log ver. 0.5			Borehole No. BH02 Sheet 1 of 2				
Project Name: Blackley Fire Station				Co-ords: 386086E - 403390N		Project No.: 3866b			
Location: Blackley, Greater Manchester				Level (mAOD): 80.67		Rev.: 1.0			
Client: Greater Manchester Combined Authority				Dates: 25/01/2023 - 26/01/2023		Logged By: LM			
				Weather: Clear		Checked By:			
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description	
		Depth (m)	Type	Results					
					0.39	80.28		Reinforced CONCRETE. MADE GROUND	
		0.70 - 1.20	B		0.70	79.97		Dark greyish brown mottled orange very gravelly medium to coarse SAND. Gravel is angular fine to coarse of sandstone and limestone. MADE GROUND	
		1.20 - 1.65 1.20 - 1.65 1.20	B D SPT	N=11 (1,1/1,3,4,3)	1.10	79.57		Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of mudstone, sandstone, concrete and brick fragments. MADE GROUND	1
		2.00 - 2.45 2.00 - 2.45 2.00	B D SPT	N=12 (1,2/3,3,3,3)				Medium dense light orangish brown slightly gravelly sandy SILT. Gravel is subrounded fine to coarse of mudstone and sandstone. GLACIAL TILL	2
		3.00 - 3.45 3.00 - 3.45 3.00	B D SPT	N=10 (1,1/2,2,3,3)					3
		4.00 - 4.45 4.00 - 4.45 4.00	B D SPT	N=7 (1,1/1,2,2,2)					4
		5.00 - 5.45 5.00 - 5.45 5.00	B D SPT	N=16 (2,2/3,4,4,5)					5
		6.00 - 6.45 6.00 - 6.45 6.00	B D SPT	N=15 (2,3/3,4,4,4)					6
		7.50 - 7.95 7.50 - 7.95 7.50	B D SPT	N=25 (3,4/5,6,8,6)					7
		9.00 - 9.45 9.00 - 9.45 9.00	B D SPT	N=44 (5,5/9,11,10,14)					8
									9
									10
Remarks:				Continued on next sheet					
				Casing Details			Chiselling Details		
				Depth Top (m)	Depth Base (m)	Diameter (mm)	Depth Top (m)	Depth Base (m)	Duration (hrs)
					12.00	150			
				Water Strike					
Depth Strike (m)		Time Elapsed (min)	Water Level (m)						
SPT Energy Ratio:									

IGEconsulting Office 11, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Borehole Log ver. 0.5			Borehole No. BH02 Sheet 2 of 2				
Project Name: Blackley Fire Station				Co-ords: 386086E - 403390N		Project No.: 3866b			
Location: Blackley, Greater Manchester				Level (mAOD): 80.67		Rev.: 1.0			
Client: Greater Manchester Combined Authority				Dates: 25/01/2023 - 26/01/2023		Logged By: LM			
				Weather: Clear		Checked By:			
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description	
		Depth (m)	Type	Results					
		10.50 - 10.95 10.50 - 10.95 10.50	B D SPT	N=10 (2,2/2,3,3,2)	11.60	69.07		Medium dense light orangish brown slightly gravelly sandy SILT. Gravel is subrounded fine to coarse of mudstone and sandstone. GLACIAL TILL	11
		12.00 - 12.45 12.00 - 12.45 12.00	B D SPT	N=35 (5,6/9,9,8,9)				12	
		13.50 - 13.95 13.50 - 13.95 13.50	B D SPT	N=50 (8,10/50 for 245mm)	14.94	65.73		Stiff becoming very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and mudstone. GLACIAL TILL	13
		14.50 - 14.84 14.50 - 14.84 14.50	B D SPT	N=50 (8,10/50 for 290mm)				14	
		Borehole terminated at 14.94m.							15
									16
									17
									18
									19
									20
Remarks:				Casing Details			Chiselling Details		
				Depth Top (m)	Depth Base (m)	Diameter (mm)	Depth Top (m)	Depth Base (m)	Duration (hrs)
					12.00	150			
				Water Strike					
				Depth Strike (m)	Time Elapsed (min)	Water Level (m)			
SPT Energy Ratio:									

APPENDIX 4

DYNAMIC SAMPLE BOREHOLE LOGS

IGE consulting		Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Dynamic Sample Borehole Log ver. 1.5			Dynamic Sample No. WS01 Sheet 1 of 1			
Project Name: Blackley Fire Station				Co-ords: 386038E - 403381N		Project No. 3866b				
Location: Blackley, Greater Manchester				Level (m AOD): 76.60		Logged By LM				
Client: Greater Manchester Combined Authority				Date: 23/01/2023		Checked By				
Client: Greater Manchester Combined Authority				Weather: Clear						
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Stratum Description			
		Depth(m)	Type	Results						
		0.30	ES		0.40	76.20	Soft to firm dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of mudstone, sandstone and brick fragments. MADE GROUND			
		0.80	ES					Light orangish brown mottled light grey very clayey very gravelly fine to coarse SAND with low cobble content. Gravel is angular to subrounded fine to coarse of sandstone, mudstone and brick fragments. Cobbles are angular of whole and half bricks. MADE GROUND		
		1.00	D		1.00	75.60	Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of mudstone and sandstone. GLACIAL TILL	1		
		1.20	SPT	N=11 (1,2/2,3,3,3)						
		2.00	D						2	
		2.00	SPT	N=10 (2,2/2,2,3,3)						
		3.00	D						3	
		3.00	SPT	N=12 (1,2/2,3,3,4)						
		4.00	D		3.80	72.80	Dark brown clayey sandy SILT. GLACIAL TILL	4		
		4.00	SPT	N=23 (3,4/5,6,6,6)						
5.00	D						5			
5.00	SPT	N=31 (5,6/7,8,8,8)								
			5.45	71.15	Dynamic Sample terminated at 5.45m.			6		
Remarks:				Water Strike		Casing Details		Sample Sleeve Runs		
				Depth Strike	Remarks	Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)

IGE consulting		Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Dynamic Sample Borehole Log ver. 1.5				Dynamic Sample No. WS02 Sheet 1 of 1	
Project Name: Blackley Fire Station				Co-ords: 386079E - 403367N		Project No. 3866b			
Location: Blackley, Greater Manchester				Level (m AOD): 80.60		Logged By LM			
Client: Greater Manchester Combined Authority				Date: 23/01/2023		Checked By			
Well / Backfill		Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Stratum Description	
			Depth(m)	Type	Results				
			0.20	ES		0.25	80.35	Soft to firm dark brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and brick fragments with rare plastic. MADE GROUND	
			0.70	ES				Light orangish brown slightly gravelly very silty fine to coarse SAND. Gravel is subrounded fine of sandstone and mudstone. GLACIAL TILL	
			1.00	D		1.10	79.50	Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine of mudstone and sandstone. GLACIAL TILL	
			1.00	SPT	N=10 (1,2/2,3,2,3)				
			2.00	D		1.80	78.80	Medium dense light orangish brown slightly gravelly sandy SILT. Gravel is subrounded fine of mudstone and sandstone. GLACIAL TILL	
			2.00	SPT	N=14 (2,2/3,3,4,4)				
			3.00	D					
			3.00	SPT	N=15 (2,3/4,3,4,4)				
			4.00	D					
			4.00	SPT	N=14 (2,3/3,4,3,4)				
			5.00	D					
			5.00	SPT	N=20 (3,4/4,5,5,6)	5.45	75.15	Dynamic Sample terminated at 5.45m.	
Remarks:		Water Strike		Casing Details		Sample Sleeve Runs			
		Depth Strike	Remarks		Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)



ver. 1.5

Sheet 1 of 1

Checked By

Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)		Stratum Description	
		Depth(m)	Type	Results					
		0.40	ES		0.50	79.24	Soft to firm dark brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and brick fragments with rare ceramic and glass. MADE GROUND		
		0.90 1.00 1.00	ES D SPT	N=4 (1,1/1,1,1,1)	1.20	78.54	Light orangish brown slightly gravelly very silty fine to coarse SAND. Gravel is subrounded fine of sandstone and mudstone. GLACIAL TILL	1	
		2.00 2.00	D SPT	5 (1,2/1,2,2)	1.80	77.94	Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine of mudstone and sandstone. GLACIAL TILL	2	
		3.00 3.00	D SPT	N=11 (2,3/3,3,2,3)				3	
		4.00 4.00	D SPT	N=10 (2,2/2,2,3,3)				4	
		5.00 5.00	D SPT	N=13 (3,2/3,3,3,4)				5	
					5.45	74.29	Dynamic Sample terminated at 5.45m.	6	

Water Strike		Casing Details		Sample Sleeve Runs		
Depth Strike	Remarks	Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)

IGE consulting		Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Dynamic Sample Borehole Log ver. 1.5				Dynamic Sample No. WS04 Sheet 1 of 1		
Project Name: Blackley Fire Station				Co-ords: 386048E - 403417N		Project No. 3866b				
Location: Blackley, Greater Manchester				Level (m AOD): 81.55		Logged By LM				
Client: Greater Manchester Combined Authority				Date: 23/01/2023		Checked By				
				Weather: Clear						
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)		Stratum Description		
		Depth(m)	Type	Results						
		0.30	ES		0.40	81.15		Firm dark brown sandy slightly gravelly CLAY. Gravel is subrounded fine to mudstone, sandstone and brick fragments. MADE GROUND		
		1.00 1.00	D SPT	N=13 (1,1/2,3,4,4)				Firm dark orangish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone	1	
		1.30	ES		1.50	80.05		Loose light orangish brown silty fine to medium SAND.	2	
		2.00 2.00	D SPT	N=3 (1,0/1,0,1,1)					3	
		3.00 3.00	D SPT	N=4 (1,1/1,1,1,1)	3.20	78.35		Firm dark orangish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.		
					3.60	77.95		Soft dark grey mottled black sandy CLAY.		
					3.75	77.80		Firm dark brown mottled orangish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of mudstone and sandstone.	4	
		4.00 4.00	D SPT	N=8 (1,1/2,2,2,2)					5	
		5.00 5.00	D SPT	N=15 (2,2/4,4,3,4)	5.45	76.10		Dynamic Sample terminated at 5.45m.	6	
		Remarks:				Water Strike		Casing Details		Sample Sleeve Runs
				Depth Strike	Remarks	Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)

APPENDIX 5
IN-SITU TEST RESULTS

DYNAMIC CONE PENETROMETER TEST RESULTS

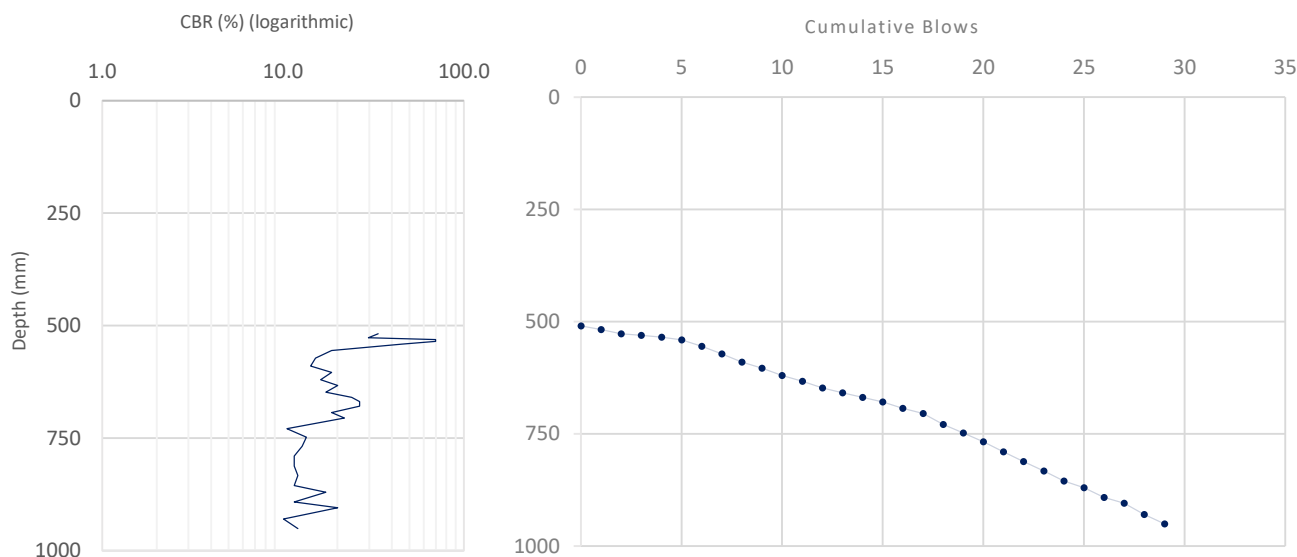
Office 16, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Site:	Blackley Fire Station
Test Date:	23/01/2023
Location:	BH01
Weather:	Overcast
Surface Covering:	Made Ground
Start Depth (mm):	510
Final Depth (mm):	951
Interpretative Method:	TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{mm/blow})$
Termination Reason:	Target Depth
Notes	none

Layer	Cumulative Blows	Total Depth (mm)	Layer Thickness * (mm)	CBR Value (%)
1	5	541	31	43.9
2	17	691	150	17.4
3	29	913	222	11.3

* Layers determined by discernible change in CBR % or by each 250mm compacted layer.



Method in line with DTP Interim Advice Note 73/06 (Rev 1) (2009) – Design Guidance For Road Pavement Foundations (Draft 25)

DYNAMIC CONE PENETROMETER TEST RESULTS

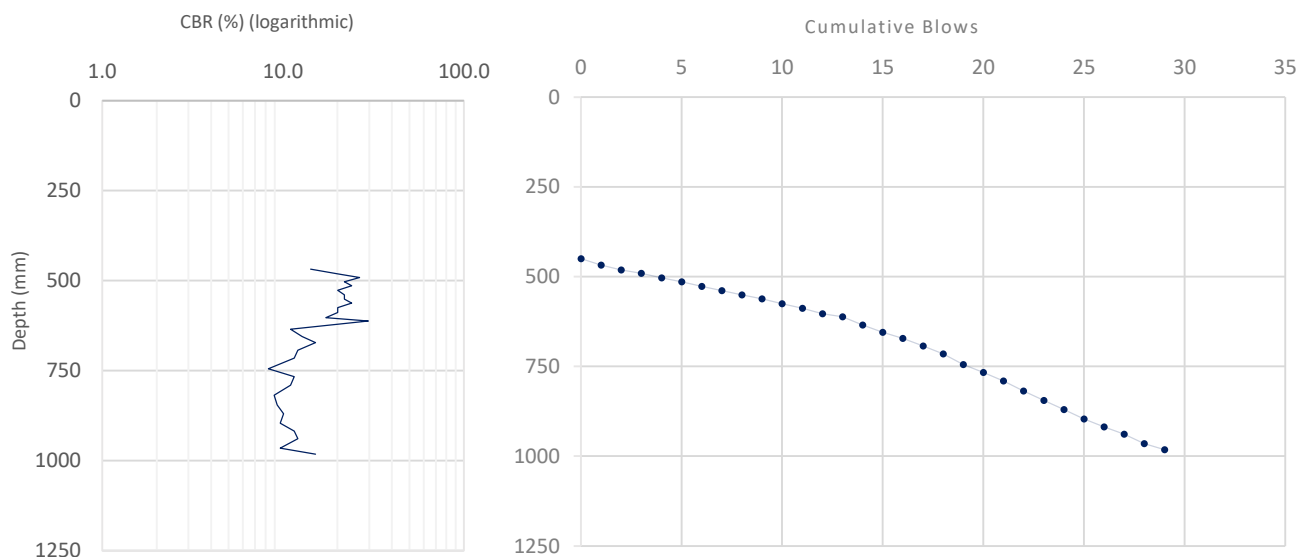
Office 16, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Site:	Blackley Fire Station
Test Date:	23/01/2023
Location:	BH02
Weather:	Overcast
Surface Covering:	Made Ground
Start Depth (mm):	450
Final Depth (mm):	982
Interpretative Method:	TRL Equation: $\log_{10}(\text{CBR}) = 2.480 - 1.057 \times \log_{10}(\text{mm/blow})$
Termination Reason:	Target Depth
Notes	None

Layer	Cumulative Blows	Total Depth (mm)	Layer Thickness * (mm)	CBR Value (%)
1	13	612	162	21
2	29	959	347	10

* Layers determined by discernible change in CBR % or by each 250mm compacted layer.



Method in line with DTP Interim Advice Note 73/06 (Rev 1) (2009) – Design Guidance For Road Pavement Foundations (Draft 25)

DYNAMIC CONE PENETROMETER TEST RESULTS

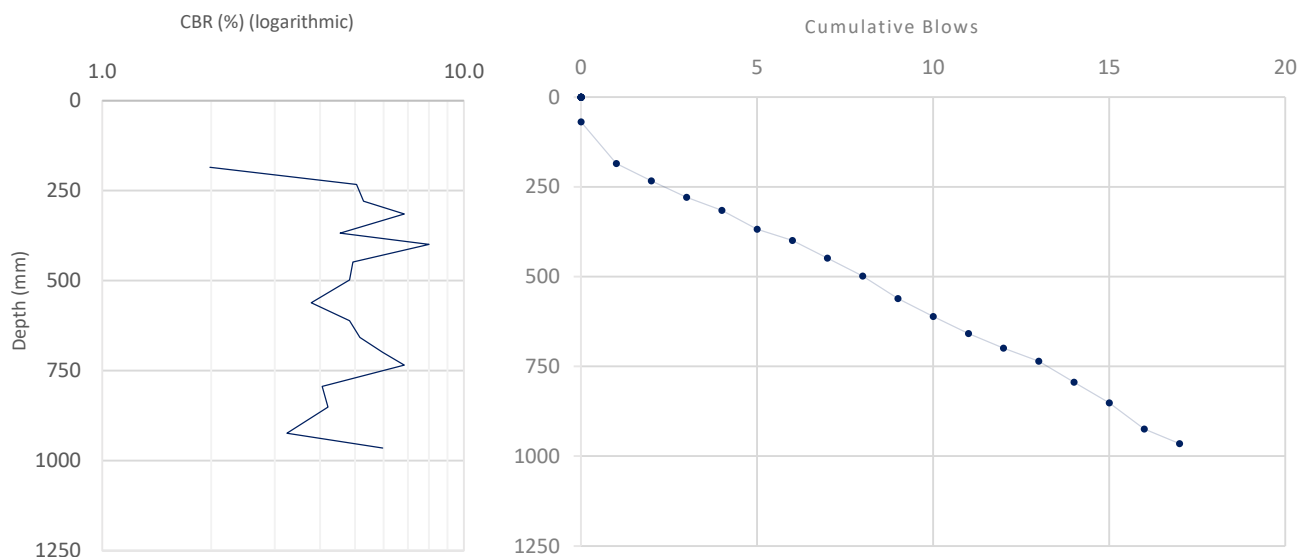
Office 16, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Site:	Blackey Fire Station
Test Date:	23/01/2023
Location:	WS01
Weather:	Overcast
Surface Covering:	Made Ground
Start Depth (mm):	69
Final Depth (mm):	965
Interpretative Method:	TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{mm/blow})$
Termination Reason:	Target Depth
Notes	None

Layer	Cumulative Blows	Total Depth (mm)	Layer Thickness * (mm)	CBR Value (%)
1	17	965	896	4.6

* Layers determined by discernible change in CBR % or by each 250mm compacted layer.



Method in line with DTP Interim Advice Note 73/06 (Rev 1) (2009) – Design Guidance For Road Pavement Foundations (Draft 25)

Geo-Environmental Engineering Services

IGE Consulting Ltd
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DYNAMIC CONE PENETROMETER TEST RESULTS

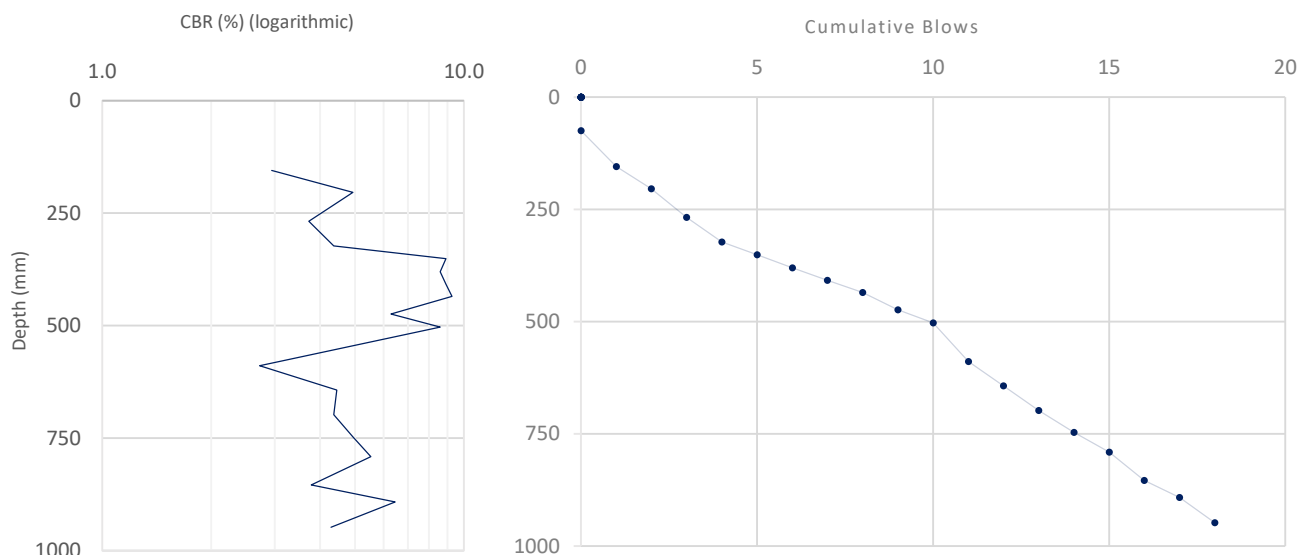
Office 16, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Site:	Blackey Fire Station
Test Date:	23/01/2023
Location:	WS02
Weather:	Overcast
Surface Covering:	Made Ground
Start Depth (mm):	75
Final Depth (mm):	948
Interpretative Method:	TRL Equation: $\log_{10}(\text{CBR}) = 2.480 - 1.057 \times \log_{10}(\text{mm/blow})$
Termination Reason:	Target Depth
Notes	None

Layer	Cumulative Blows	Total Depth (mm)	Layer Thickness * (mm)	CBR Value (%)
1	4	323	248	3.8
2	10	475	152	6.8
3	18	834	359	3.7

* Layers determined by discernible change in CBR % or by each 250mm compacted layer.



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Geo-Environmental Engineering Services

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DYNAMIC CONE PENETROMETER TEST RESULTS

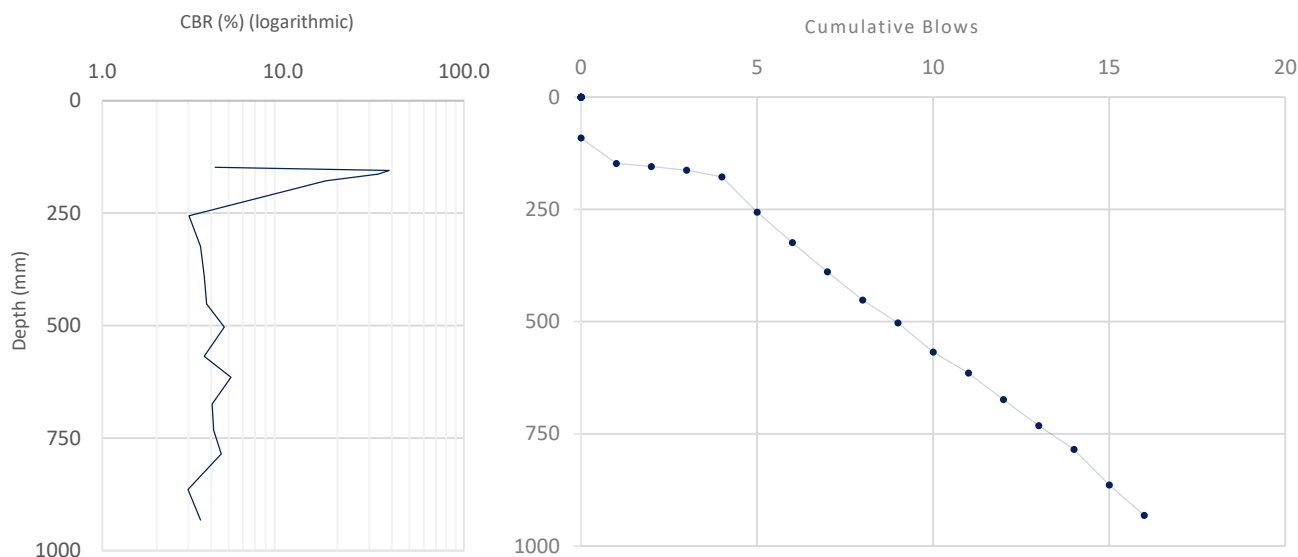
Office 16, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Site:	Blackey Fire Station
Test Date:	23/01/2023
Location:	WS03
Weather:	Overcast
Surface Covering:	Made Ground
Start Depth (mm):	91
Final Depth (mm):	932
Interpretative Method:	TRL Equation: $\log_{10}(\text{CBR}) = 2.480 - 1.057 \times \log_{10}(\text{mm/blow})$
Termination Reason:	Target Depth
Notes	None

Layer	Cumulative Blows	Total Depth (mm)	Layer Thickness * (mm)	CBR Value (%)
1	4	178	87	11.6
2	16	854	676	3.5

* Layers determined by discernible change in CBR % or by each 250mm compacted layer.



Method in line with DTP Interim Advice Note 73/06 (Rev 1) (2009) – Design Guidance For Road Pavement Foundations (Draft 25)

DYNAMIC CONE PENETROMETER TEST RESULTS

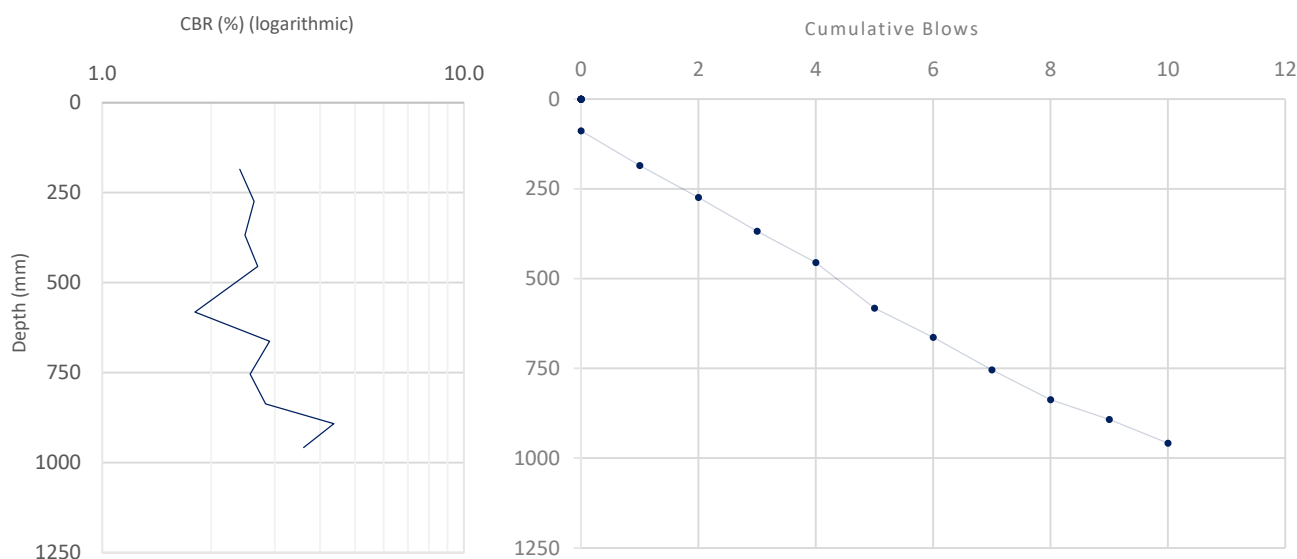
Office 16, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Site:	Blackey Fire Station
Test Date:	23/01/2023
Location:	WS04
Weather:	Overcast
Surface Covering:	Made Ground
Start Depth (mm):	88
Final Depth (mm):	0
Interpretative Method:	TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log}_{10}(\text{mm/blow})$
Termination Reason:	Target Depth
Notes	None

Layer	Cumulative Blows	Total Depth (mm)	Layer Thickness * (mm)	CBR Value (%)
1	0	958	870	2.7

* Layers determined by discernible change in CBR % or by each 250mm compacted layer.



Method in line with DTP Interim Advice Note 73/06 (Rev 1) (2009) – Design Guidance For Road Pavement Foundations (Draft 25)

Geo-Environmental Engineering Services

IGE Consulting Ltd
Registered in England No 8270758

DS01

Window Sample Hole Falling Head Test

FIELD MEASUREMENTS	Time (min)	Water Depth (m below top of casing)	Head (from water level) (m)	INPUT PARAMETERS	Borehole Depth	3.900	m
	0.00	0.150	3.750		Casing Depth	0.000	m
	0.50	0.610	3.290		Difference in Length between bottom of casing/boreholes, L	3.900	m
	1.00	0.640	3.260		Water Depth	0.000	m
	1.50	0.660	3.240		Casing Diameter, D	0.051	m
	2.00	0.680	3.220		Cross Sectional area of casing, A	0.002	m ²
	2.50	0.690	3.210		Height of casing above ground level	0.000	m
	3.00	0.700	3.200		Approximate long term water table (or base of BH see rules)	3.900	m
	3.50	0.710	3.190		Borehole End Condition (important to get right)	d	
	4.00	0.730	3.170		a= Soil flush with bottom at impervious boundary	0.102	
	4.50	0.750	3.150		b= Soil flush with bottom in uniform soil	0.140	
	5.00	0.760	3.140		c= Well point or hole extended at impervious boundary	4.682	
	6.00	0.760	3.140		d= Well point or hole extended in uniform soil	0.336	
	7.00	0.780	3.120		e= Soil in casing with bottom at impervious boundary	0.001	
	8.00	0.810	3.090		f= Soil in casing with bottom in uniform soil	0.001	
	9.00	0.840	3.060		Intake factor, F (Select correct end condition)	0.336	
	10.00	0.870	3.030		Variable Head, H ¹	3.750	m
	13.00	0.900	3.000		Time, T ¹	0.000	min
	16.00	1.050	2.850		Variable Head, H ²	0.920	m
	20.00	1.330	2.570		Time, T ²	90.000	min
	40.00	2.070	1.830	K unsat (m/s)	9.50E-05		
	60.00	2.690	1.210				
	90.00	2.980	0.920	RULES			
					1. A borehole location MUST be entered to generate k.		
					2. Enter all values in shaded cells: A, F, L and k are calculated automatically in the spreadsheet.		
					3. Head is measured to the base of the BH, or use WL if higher.		
					4. End conditions referenced in BS 5930 see notes. Usually d. <u>Formula for uncased hole.</u>		
					5. If groundwater level is below test, k is not true permeability, but indicative only.		
					6. Usually T ¹ =0 and T ² =60 or at H ¹ =25% and H ² =75% of effective depth, input H at these times.		
					7. Where 25% and 75% of effective depth cannot be calculated, an extrapolated value can be produced.		

DS02

Window Sample Hole Falling Head Test

FIELD MEASUREMENTS	Time (min)	Water Depth (m below top of casing)	Head (from water level) (m)	INPUT PARAMETERS	Borehole Depth	3.870	m
	0.00	0.300	3.570		Casing Depth	0.000	m
	0.50	0.550	3.320		Difference in Length between bottom of casing/boreholes, L	3.870	m
	1.00	0.740	3.130		Water Depth	0.000	m
	1.50	0.860	3.010		Casing Diameter, D	0.051	m
	2.00	0.900	2.970		Cross Sectional area of casing, A	0.002	m ²
	2.50	0.960	2.910		Height of casing above ground level	0.000	m
	3.00	1.030	2.840		Approximate long term water table (or base of BH see rules)	3.870	m
	3.50	1.080	2.790		Borehole End Condition (important to get right)	d	
	4.00	1.150	2.720		a= Soil flush with bottom at impervious boundary	0.102	
	4.50	1.220	2.650		b= Soil flush with bottom in uniform soil	0.140	
	5.00	1.260	2.610		c= Well point or hole extended at impervious boundary	4.653	
	6.00	1.350	2.520		d= Well point or hole extended in uniform soil	0.336	
	7.00	1.420	2.450		e= Soil in casing with bottom at impervious boundary	0.001	
	8.00	1.500	2.370		f= Soil in casing with bottom in uniform soil	0.001	
	9.00	1.580	2.290		Intake factor, F (Select correct end condition)	0.336	
	10.00	1.670	2.200		Variable Head, H ¹	3.570	m
	12.00	1.800	2.070		Time, T ¹	0.000	min
	16.00	2.000	1.870		Variable Head, H ²	0.290	m
	20.00	2.300	1.570		Time, T ²	90.000	min
	40.00	2.910	0.960	K unsat (m/s)	1.70E-04		
	60.00	3.270	0.600				
	90.00	3.580	0.290	RULES			
					1. A borehole location MUST be entered to generate k.		
					2. Enter all values in shaded cells: A, F, L and k are calculated automatically in the spreadsheet.		
					3. Head is measured to the base of the BH, or use WL if higher.		
					4. End conditions referenced in BS 5930 see notes. Usually d. <u>Formula for uncased hole.</u>		
					5. If groundwater level is below test, k is not true permeability, but indicative only.		
					6. Usually T ¹ =0 and T ² =60 or at H ¹ =25% and H ² =75% of effective depth, input H at these times.		
					7. Where 25% and 75% of effective depth cannot be calculated, an extrapolated value can be produced.		

DS03

Window Sample Hole Falling Head Test

FIELD MEASUREMENTS	Time (min)	Water Depth (m below top of casing)	Head (from water level) (m)	INPUT PARAMETERS	Borehole Depth	3.950	m
	0.00	0.240	3.710		Casing Depth	0.000	m
	0.50	0.730	3.220		Difference in Length between bottom of casing/boreholes, L	3.950	m
	1.00	0.860	3.090		Water Depth	0.000	m
	1.50	0.970	2.980		Casing Diameter, D	0.051	m
	2.00	1.100	2.850		Cross Sectional area of casing, A	0.002	m ²
	2.50	1.230	2.720		Height of casing above ground level	0.000	m
	3.00	1.360	2.590		Approximate long term water table (or base of BH see rules)	3.950	m
	3.50	1.490	2.460		Borehole End Condition (important to get right)	d	
	4.00	1.600	2.350		a= Soil flush with bottom at impervious boundary	0.102	
	4.50	1.710	2.240		b= Soil flush with bottom in uniform soil	0.140	
	5.00	1.780	2.170		c= Well point or hole extended at impervious boundary	4.731	
	6.00	1.940	2.010		d= Well point or hole extended in uniform soil	0.336	
	7.00	2.030	1.920		e= Soil in casing with bottom at impervious boundary	0.001	
	8.00	2.100	1.850		f= Soil in casing with bottom in uniform soil	0.001	
	9.00	2.180	1.770		Intake factor, F (Select correct end condition)	0.336	
	10.00	2.290	1.660		Variable Head, H ¹	3.710	m
	12.00	2.440	1.510		Time, T ¹	0.000	min
	15.00	2.640	1.310		Variable Head, H ²	0.080	m
	20.00	3.000	0.950		Time, T ²	90.000	min
	40.00	3.630	0.320	K unsat (m/s)	2.59E-04		
	60.00	3.860	0.090				
	90.00	3.870	0.080	RULES			
					1. A borehole location MUST be entered to generate k.		
					2. Enter all values in shaded cells: A, F, L and k are calculated automatically in the spreadsheet.		
					3. Head is measured to the base of the BH, or use WL if higher.		
					4. End conditions referenced in BS 5930 see notes. Usually d. <u>Formula for uncased hole.</u>		
					5. If groundwater level is below test, k is not true permeability, but indicative only.		
					6. Usually T ¹ =0 and T ² =60 or at H ¹ =25% and H ² =75% of effective depth, input H at these times.		
					7. Where 25% and 75% of effective depth cannot be calculated, an extrapolated value can be produced.		

DS04

Window Sample Hole Falling Head Test

FIELD MEASUREMENTS	Time (min)	Water Depth (m below top of casing)	Head (from water level) (m)	INPUT PARAMETERS	Borehole Depth	3.880	m
	0.00	0.340	3.540		Casing Depth	0.000	m
	0.50	0.930	2.950		Difference in Length between bottom of casing/boreholes, L	3.880	m
	1.00	1.320	2.560		Water Depth	0.000	m
	1.50	1.410	2.470		Casing Diameter,D	0.051	m
	2.00	1.450	2.430		Cross Sectional area of casing, A	0.002	m ²
	2.50	1.470	2.410		Height of casing above ground level	0.000	m
	3.00	1.510	2.370		Approximate long term water table (or base of BH see rules)	3.880	m
	3.50	1.540	2.340		Borehole End Condition (important to get right)	d	
	4.00	1.560	2.320		a= Soil flush with bottom at impervious boundary	0.102	
	4.50	1.600	2.280		b= Soil flush with bottom in uniform soil	0.140	
	5.00	1.630	2.250		c= Well point or hole extended at impervious boundary	4.663	
	6.00	1.690	2.190		d= Well point or hole extended in uniform soil	0.336	
	7.00	1.750	2.130		e= Soil in casing with bottom at impervious boundary	0.001	
	8.00	1.780	2.100		f= Soil in casing with bottom in uniform soil	0.001	
	9.00	1.840	2.040		Intake factor, F (Select correct end condition)	0.336	
	10.00	1.880	2.000		Variable Head, H ¹	3.540	m
	12.00	1.960	1.920		Time, T ¹	0.000	min
	15.00	2.070	1.810		Variable Head, H ²	0.880	m
	20.00	2.230	1.650		Time, T ²	90.000	min
	40.00	2.660	1.220		K unsat (m/s)	9.41E-05	
	60.00	2.850	1.030				
	90.00	3.000	0.880				
					RULES	1. A borehole location MUST be entered to generate k.	
						2. Enter all values in shaded cells: A, F, L and k are calculated automatically in the spreadsheet.	
				3. Head is measured to the base of the BH, or use WL if higher.			
				4. End conditions referenced in BS 5930 see notes. Usually d. <u>Formula for uncased hole.</u>			
				5. If groundwater level is below test, k is not true permeability, but indicative only.			
				6. Usually T ¹ =0 and T ² =60 or at H ¹ =25% and H ² =75% of effective depth, input H at these times.			
			7. Where 25% and 75% of effective depth cannot be calculated, an extrapolated value can be produced.				

IGEconsulting Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170				Foundation Inspection Pit Log ver. 1.0				Trial Pit No. FP01 Sheet 1 of 1			
Project Name: Blackley Fire Station					Level (mAOD):		Date: 02/05/2023		Project No. 3866b		
Location: Blackley, Greater Manchester					Weather: Overcast				Logged By JH		
Client: Greater Manchester Combined Authority					Co-ords:				Checked By		
Water Strike	Samples & In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description				
	Depth (m)	Type	Results								
				0.30			Dark brown, slightly clayey, gravelly, fine to coarse SAND with occasional rootlets. Gravel is angular to subrounded, fine to coarse of concrete and red brick. MADE GROUND				
				Soft to firm, orangish brown, slightly gravelly, slightly sandy CLAY. Gravel is angular to well rounded, fine to coarse of red brick, concrete and mixed natural lithologies. MADE GROUND							
				1.35			Trial Pit terminated at 1.35m.				
							1				
							2				
							3				
							4				
							5				
Water Strike											
Depth Strike (mbgl)		Remarks									
		No strike									
Stability: Stable											
Remarks:											



Trial Pit No.

Sheet 1 of 1

ver. 1.0

Project Name: Blackley Fire Station

Level
(mAOD):

Date: 02/05/2023

Project No.
3866b

Location: Blackley, Greater Manchester

Weather: Overcast

Logged By
JH

Client: Greater Manchester Combined Authority

Co-ords:

Checked By

1
2
3
4
5

Water Strike

Depth Strike (mbgl)

Remarks

No strike

Stability:

Stable

Remarks:

IGEconsulting Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170				Foundation Inspection Pit Log ver. 1.0				Trial Pit No. FP03 Sheet 1 of 1			
Project Name: Blackley Fire Station					Level (mAOD):		Date: 02/05/2023		Project No. 3866b		
Location: Blackley, Greater Manchester					Weather: Overcast				Logged By JH		
Client: Greater Manchester Combined Authority					Co-ords:				Checked By		
Water Strike	Samples & In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description				
	Depth (m)	Type	Results								
				0.90			Soft, dark greyish brown, slightly gravelly, slightly sandy, silty CLAY with a medium cobble content. Cobbles are angular of red brick. Gravel is angular to subrounded, fine to coarse of red brick, concrete and sandstone. MADE GROUND				
							Light brown, sandy, angular to subangular, fine to coarse GRAVEL of sandstone. MADE GROUND				
							Trial Pit terminated at 1.10m.				
							1				
							2				
							3				
							4				
							5				
Water Strike											
Depth Strike (mbgl)		Remarks									
		No strike									
Stability: Stable											
Remarks:											

APPENDIX 6

GEOTECHNICAL LABORATORY TEST RESULTS

TEST REPORT

Client IGE Consulting Ltd

Address Office 16
Bartle House
Oxford Court
Manchester
M2 3WQ

Contract 3866b -
Blackley Fire Station

Job Number MRN 4601/8
Date of Issue 02 March 2023
Page 1 of 9

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

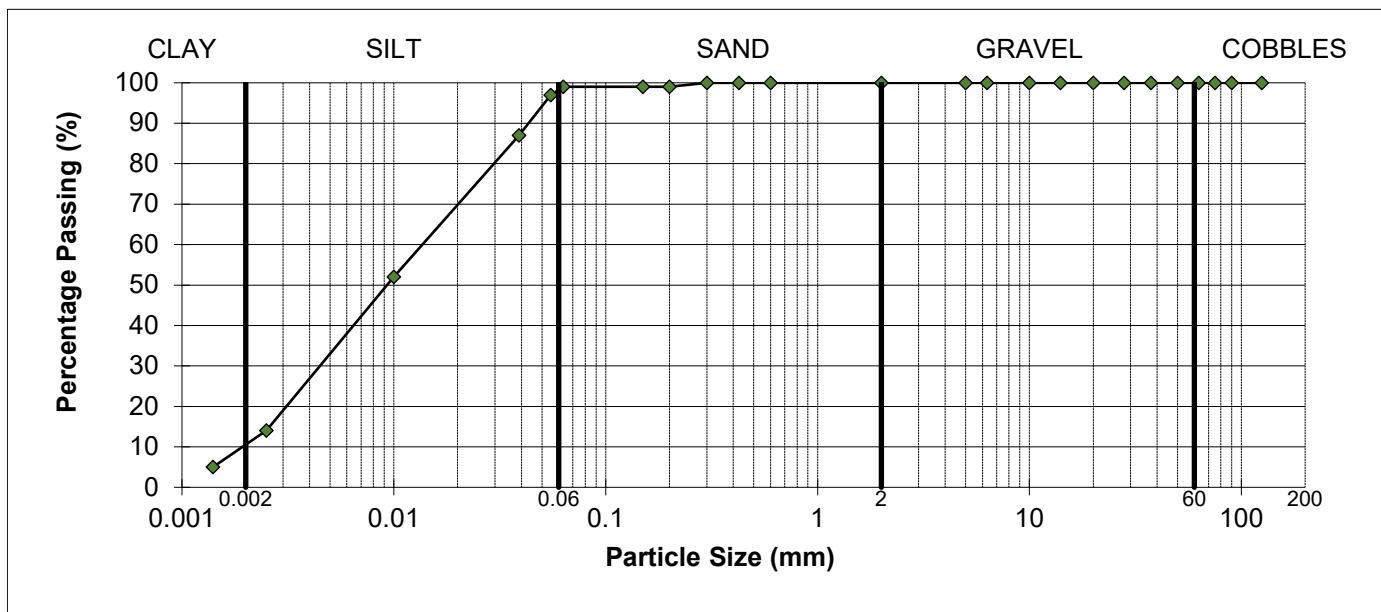
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	IGE Consulting Ltd
SITE	3866b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH01 5.00 B	DATE SAMPLED	Not advised
LAB SAMPLE No	121087	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Soft brown clayey slightly sandy SILT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	100	
75	100		0.425	100	
63	100		0.3	100	
50	100		0.2	99	
37.5	100		0.15	99	
28	100		0.063	99	
20	100		0.055	97	
14	100		0.039	87	
10	100		0.01	52	
6.3	100		0.0025	14	
5	100		0.0014	5	



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

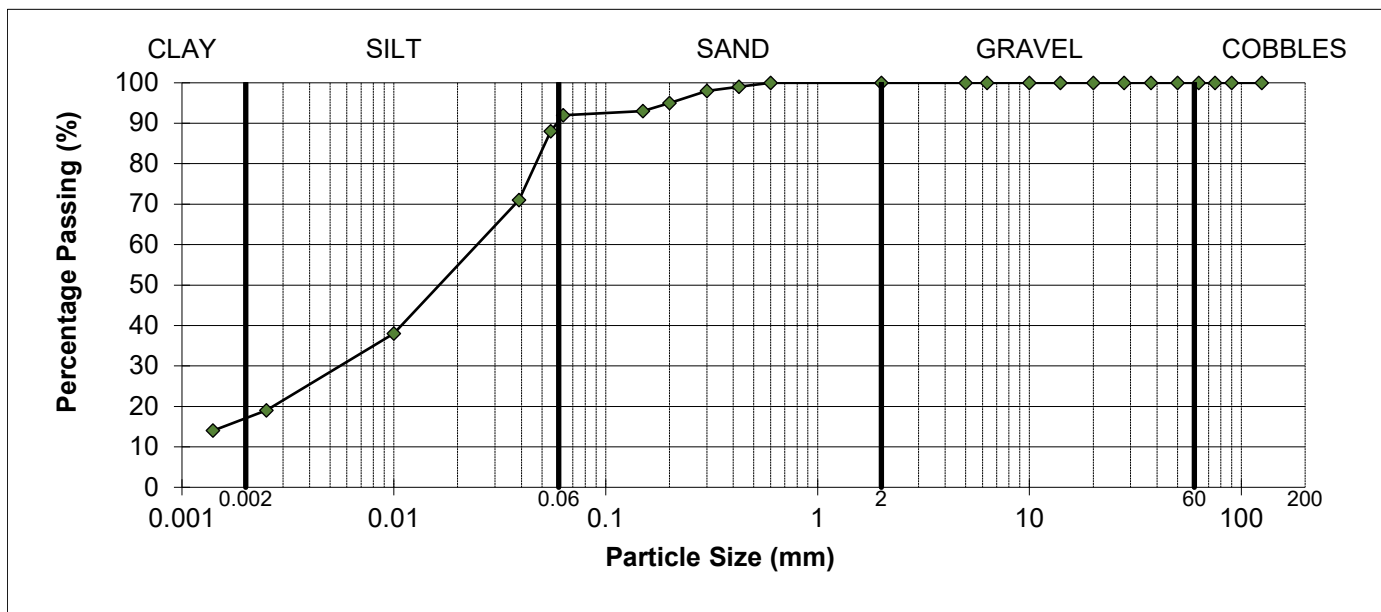
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	IGE Consulting Ltd
SITE	3866b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH01 9.00 B	DATE SAMPLED	Not advised
LAB SAMPLE No	121088	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Soft brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	100	
75	100		0.425	99	
63	100		0.3	98	
50	100		0.2	95	
37.5	100		0.15	93	
28	100		0.063	92	
20	100		0.055	88	
14	100		0.039	71	
10	100		0.01	38	
6.3	100		0.0025	19	
5	100		0.0014	14	



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

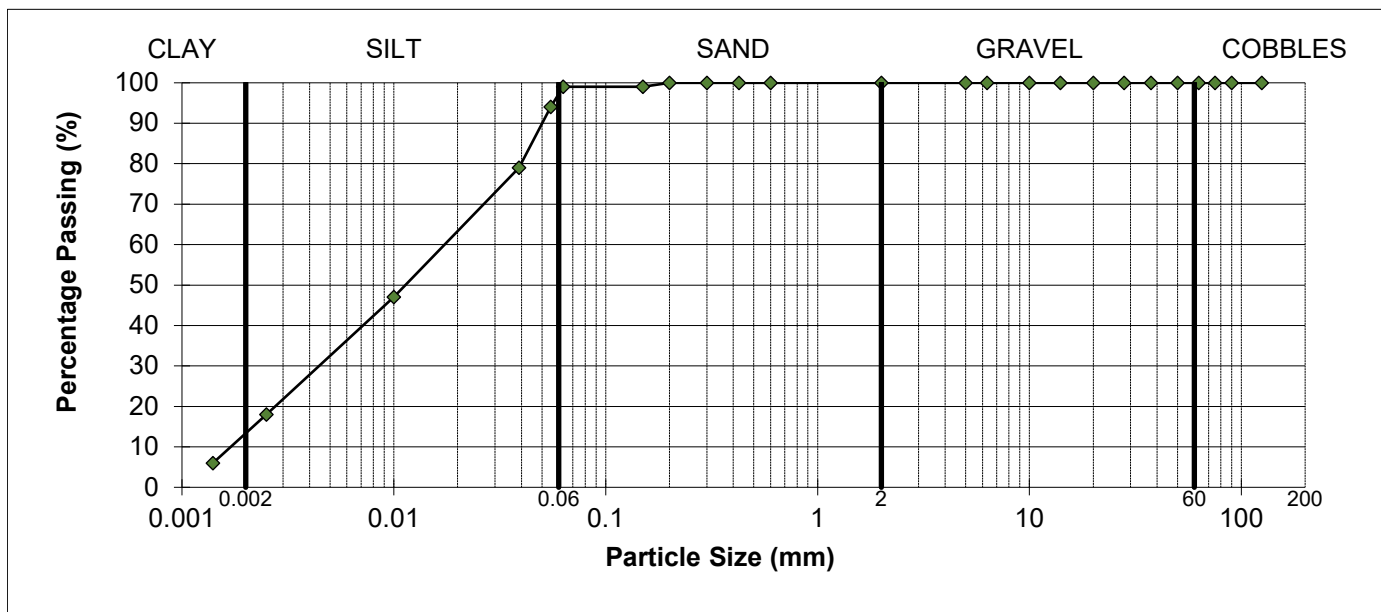
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	IGE Consulting Ltd
SITE	3866b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH02 2.00 B	DATE SAMPLED	Not advised
LAB SAMPLE No	121091	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Soft brown clayey slightly sandy SILT
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	100	
75	100		0.425	100	
63	100		0.3	100	
50	100		0.2	100	
37.5	100		0.15	99	
28	100		0.063	99	
20	100		0.055	94	
14	100		0.039	79	
10	100		0.01	47	
6.3	100		0.0025	18	
5	100		0.0014	6	



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
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PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

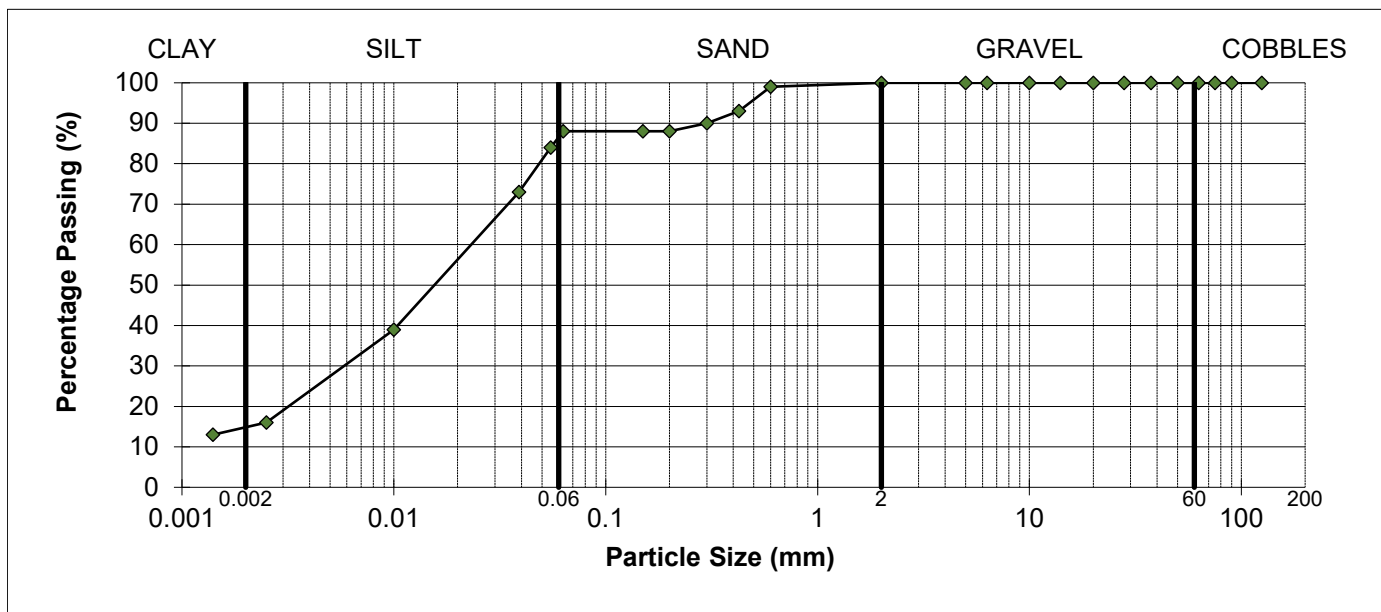
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	IGE Consulting Ltd
SITE	3866b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH02 7.50 B	DATE SAMPLED	Not advised
LAB SAMPLE No	121093	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Soft brown silty slightly sandy CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	100	
90	100		0.6	99	
75	100		0.425	93	
63	100		0.3	90	
50	100		0.2	88	
37.5	100		0.15	88	
28	100		0.063	88	
20	100		0.055	84	
14	100		0.039	73	
10	100		0.01	39	
6.3	100		0.0025	16	
5	100		0.0014	13	



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

MURRAY RIX

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014

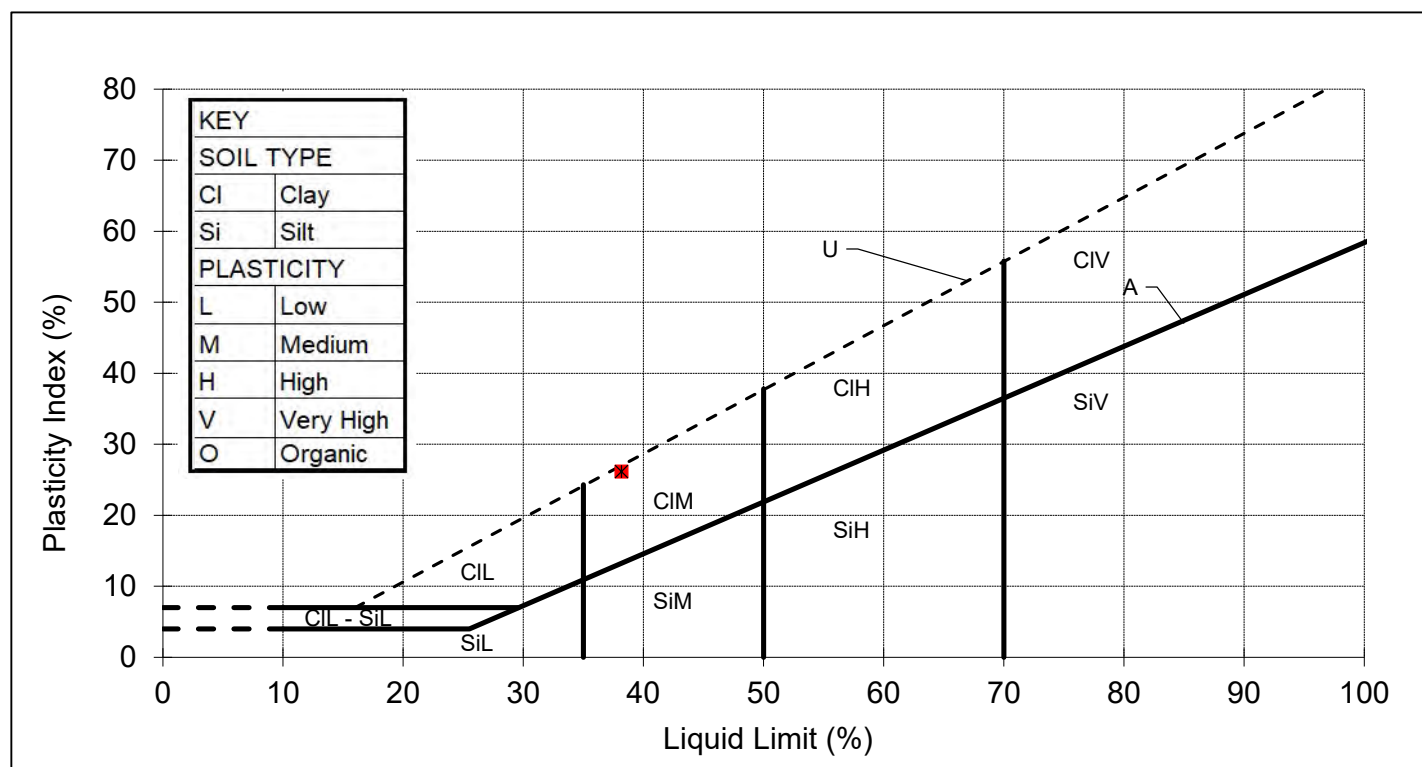
CLIENT	IGE Consulting Ltd
SITE	3966b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH01 13.50 D	DATE SAMPLED	Not advised
SAMPLE No.	121089	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Stiff brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.1	37.6	1.018	
Determination 2 (avg)	19.1	37.4		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12.9	38	12	26	85



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

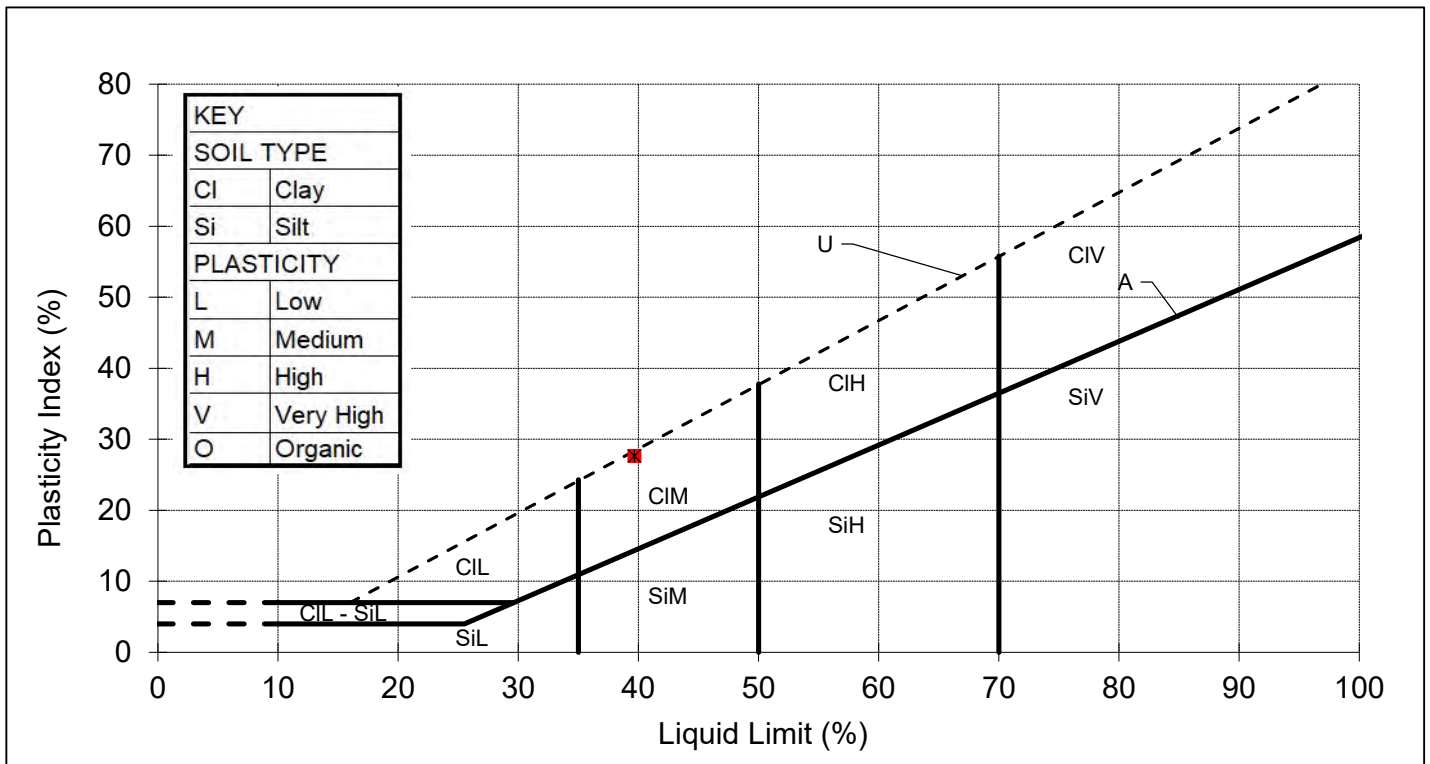
CLIENT	IGE Consulting Ltd
SITE	3966b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH01 16.50 D	DATE SAMPLED	Not advised
SAMPLE No.	121090	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Stiff brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.5	39.2	1.013	
Determination 2 (avg)	19.2	39.1		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
13.0	40	12	28	90



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

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TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014

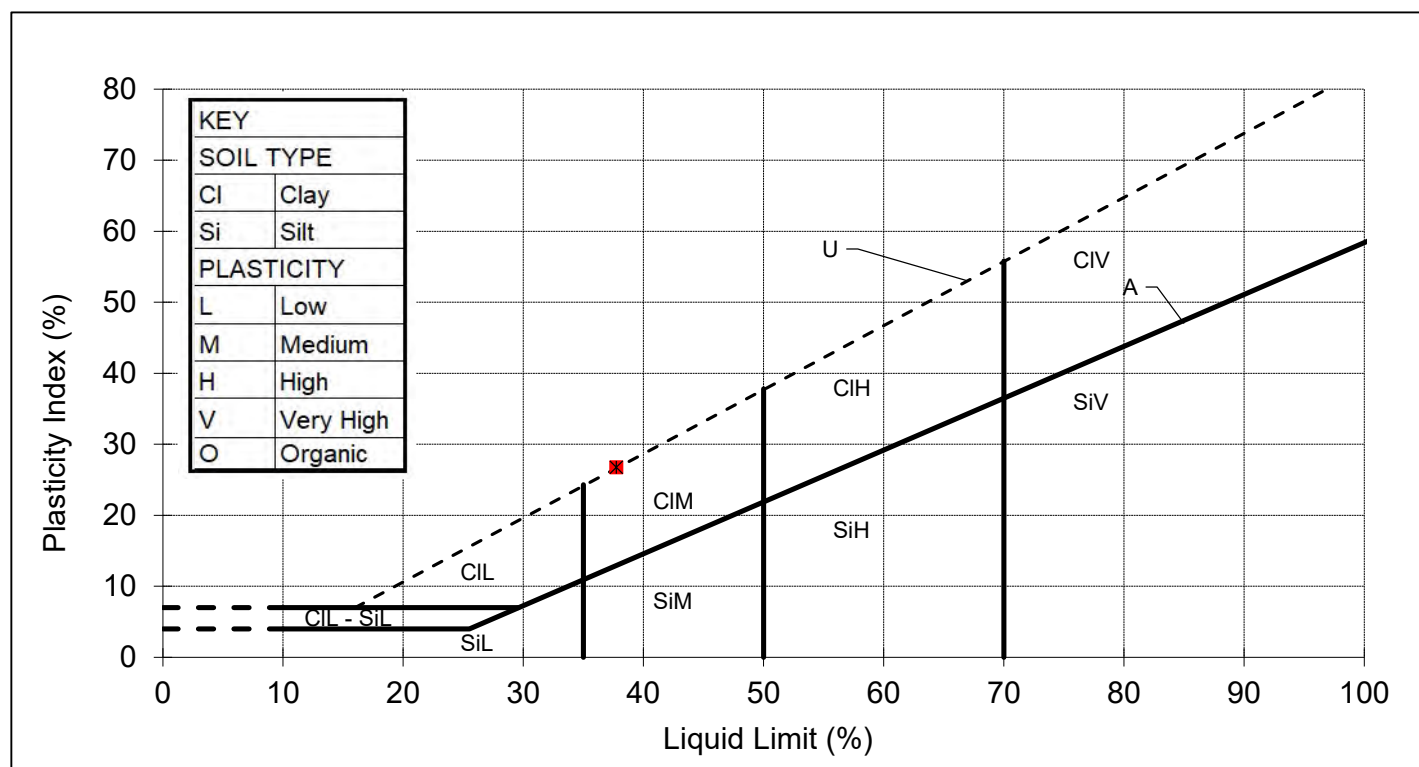
CLIENT	IGE Consulting Ltd
SITE	3966b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH02 12.00 D	DATE SAMPLED	Not advised
SAMPLE No.	121094	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Stiff brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)	Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	17.9	32.1	
Determination 2 (avg)	17.7	32.1	

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
9.7	38	11	27	89



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014

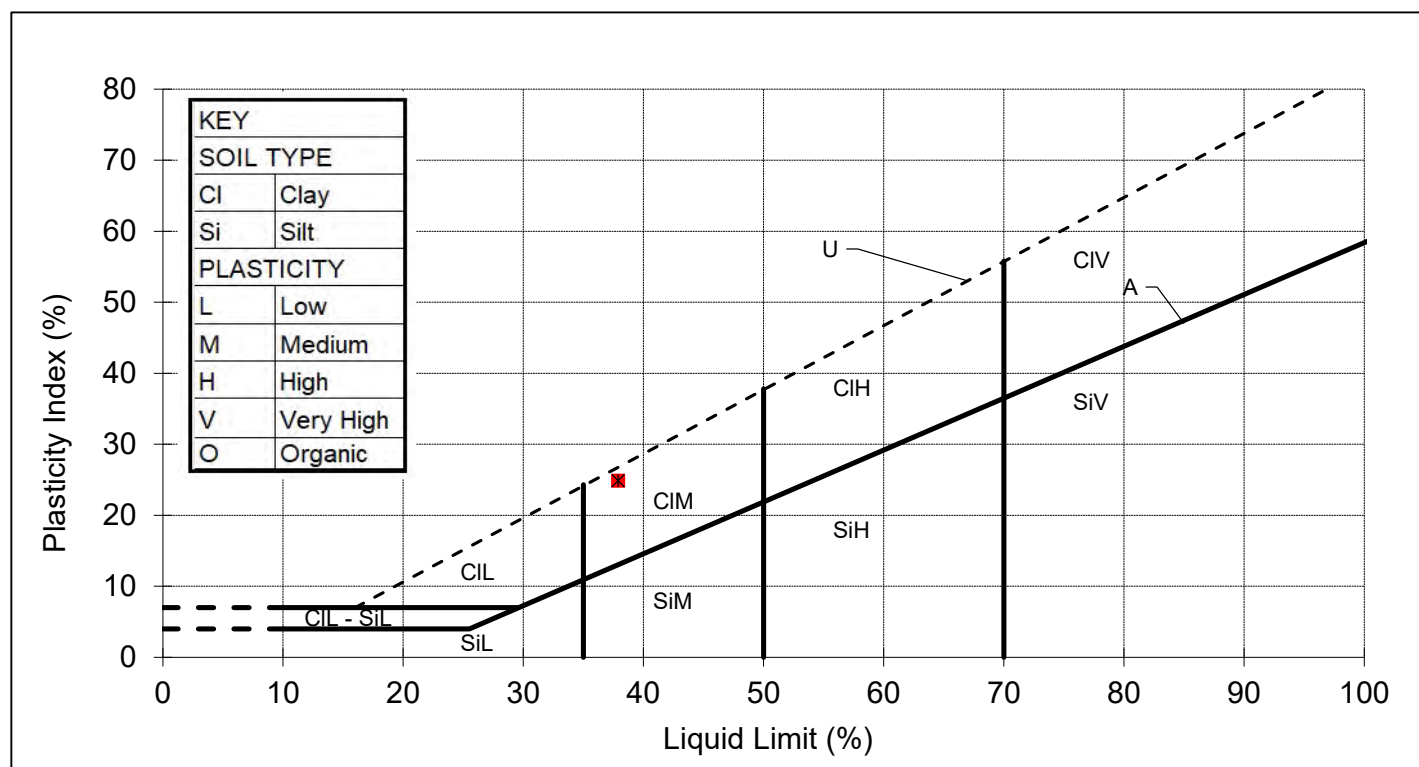
CLIENT	IGE Consulting Ltd
SITE	3966b - Blackley Fire Station
JOB NUMBER	MRN 4601/8

SAMPLE LABEL	BH02 14.50 D	DATE SAMPLED	Not advised
SAMPLE No.	121095	DATE RECEIVED	08-Feb-23
DATE TESTED	09-Feb-23	SAMPLED BY	Client

MATERIAL	Stiff brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)	Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.2	38.2	
Determination 2 (avg)	19.7	37.5	

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12.1	38	13	25	72



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

02-Mar-23

APPENDIX 7

CHEMICAL LABORATORY RESULTS

Liam McMahon
IGE Consulting
Office 11
Bartle House
Oxford Court
Manchester
M2 3WQ

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: liammcmahon@igeconsulting.co.uk

Analytical Report Number : 23-15284

Project / Site name:	Blackley Fire Station	Samples received on:	27/01/2023
Your job number:	3866B	Samples instructed on/ Analysis started on:	02/02/2023
Your order number:	3866B-020223	Analysis completed by:	14/02/2023
Report Issue Number:	1	Report issued on:	14/02/2023
Samples Analysed:	7 soil samples		



Signed:

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

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

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

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

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

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.

Analytical Report Number: 23-15284
Project / Site name: Blackley Fire Station
Your Order No: 3866B-020223

Lab Sample Number				2572189	2572190	2572191	2572192	2572193
Sample Reference				WS01	WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.80	0.20	0.90	1.30
Date Sampled				23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	12	13	17	17
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8	0.8

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	8.3	8	7.6	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	10	30	7.9	20	10
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0051	0.015	0.004	0.01	0.0051
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	5.1	14.8	4	10.2	5.1
Organic Matter (automated)	%	0.1	MCERTS	3.7	3.6	2.3	3.1	1.9
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	2	NONE	9.9	3.2	4.8	10	7.7
Water Soluble Nitrate (2:1) as NO ₃ (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0	< 5.0	5.1	< 5.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.92	0.23	< 0.05	0.54	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.15	< 0.05	< 0.05	0.67	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	1.3	< 0.05	0.77	0.07
Fluorene	mg/kg	0.05	MCERTS	0.43	0.89	< 0.05	1.4	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	4.3	8.2	1.9	13	0.67
Anthracene	mg/kg	0.05	MCERTS	0.9	2.1	0.29	2.3	0.1
Fluoranthene	mg/kg	0.05	MCERTS	5.6	8.9	2.7	14	1
Pyrene	mg/kg	0.05	MCERTS	5.6	7.9	2.6	15	1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.4	3.8	1.2	6.3	0.42
Chrysene	mg/kg	0.05	MCERTS	2.7	3.2	1.3	6.2	0.6
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	-	1.5	6.1	0.57
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	-	0.41	2.3	0.19
Benzo(b)fluoranthene & Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	3.7	4.7	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.2	2.9	1.2	5.7	0.42
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.93	1.2	0.8	2.7	0.26
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.31	0.36	< 0.05	0.83	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.2	1.4	1.2	3.4	0.36

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	31.1	47.1	15	80.6	5.71
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Analytical Report Number: 23-15284
 Project / Site name: Blackley Fire Station
 Your Order No: 3866B-020223

Lab Sample Number				2572189	2572190	2572191	2572192	2572193
Sample Reference				WS01	WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.80	0.20	0.90	1.30
Date Sampled				23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	9.8	7.7	11	9.2
Barium (aqua regia extractable)	mg/kg	1	MCERTS	500	550	210	330	77
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	0.3	< 0.2	0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.9	4.2	0.7	< 0.2	0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	17	14	19	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	64	34	41	57	29
Lead (aqua regia extractable)	mg/kg	1	MCERTS	260	120	95	75	36
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	19	15	20	16
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	22	18	23	20
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	300	360	160	130	45

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH C10 - C40 EH_CU_ID_TOTAL	mg/kg	10	MCERTS	61	400	120	100	39
TPH2 (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH C6 - C40 EH_CU+HS_CU_ID_TOTAL	mg/kg	10	NONE	61	400	120	100	39
TPH (C10 - C25) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	37	64	19	71	11
TPH (C25 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	24	340	99	29	28

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

Analytical Report Number: 23-15284
Project / Site name: Blackley Fire Station
Your Order No: 3866B-020223

Lab Sample Number				2572194	2572195
Sample Reference				BH01	BH01
Sample Number				None Supplied	None Supplied
Depth (m)				0.90	2.50
Date Sampled				24/01/2023	24/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	18	18
Total mass of sample received	kg	0.001	NONE	0.8	0.8

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	250	11
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.0056
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	123	5.6
Organic Matter (automated)	%	0.1	MCERTS	3.5	0.6
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	2	NONE	3.4	3.3
Water Soluble Nitrate (2:1) as NO ₃ (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.27	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.3	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.57	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.73	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	7.1	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.3	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	8.9	< 0.05
Pyrene	mg/kg	0.05	MCERTS	9.2	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4	< 0.05
Chrysene	mg/kg	0.05	MCERTS	3.8	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	4.2	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.4	< 0.05
Benzo(b)fluoranthene & Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.7	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.7	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.43	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.1	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	49.8	< 0.80
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Analytical Report Number: 23-15284
 Project / Site name: Blackley Fire Station
 Your Order No: 3866B-020223

Lab Sample Number				2572194	2572195
Sample Reference				BH01	BH01
Sample Number				None Supplied	None Supplied
Depth (m)				0.90	2.50
Date Sampled				24/01/2023	24/01/2023
Time Taken				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	11	4.9
Barium (aqua regia extractable)	mg/kg	1	MCERTS	520	23
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	8.5
Copper (aqua regia extractable)	mg/kg	1	MCERTS	38	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	66	8.3
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	21	11
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	63	30
Petroleum Hydrocarbons					
Petroleum Range Organics (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1
TPH C10 - C40 EH_CU_ID_TOTAL	mg/kg	10	MCERTS	100	< 10
TPH2 (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1
TPH C6 - C40 EH_CU+HS_CU_ID_TOTAL	mg/kg	10	NONE	100	< 10
TPH (C10 - C25) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	51	< 10
TPH (C25 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	51	< 10

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

Analytical Report Number : 23-15284

Project / Site name: Blackley Fire Station

* 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 *
2572189	WS01	None Supplied	0.3	Brown clay and sand with gravel and vegetation.
2572190	WS01	None Supplied	0.8	Brown clay and sand with gravel and vegetation.
2572191	WS02	None Supplied	0.2	Brown clay and sand with gravel and vegetation.
2572192	WS03	None Supplied	0.9	Brown clay and sand with gravel and vegetation.
2572193	WS04	None Supplied	1.3	Brown clay and sand with gravel and vegetation.
2572194	BH01	None Supplied	0.9	Brown clay and sand with gravel and vegetation.
2572195	BH01	None Supplied	2.5	Brown sand.

Analytical Report Number : 23-15284

Project / Site name: Blackley Fire Station

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Free cyanide in soil	Determination of free 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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
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
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-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
TPH2 (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	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
TPH Oils (Soils)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	MCERTS
DRO (Soil)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	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
Organic matter (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

Analytical Report Number : 23-15284
Project / Site name: Blackley Fire Station

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
Hexavalent chromium in soil (Lower Level)	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
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
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	TPH > C10 Dry soil n-house method with silica gel split/clean up. TPH < C10 by Wet by HS-GC-MS	L088/L076		NONE
Water Soluble Nitrate (leachate equivalent)	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Sulphate, water soluble, in soil	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

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

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

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

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC. Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

Sample Deviation Report



Analytical Report Number : 23-15284

Project / Site name: Blackley Fire Station

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH01	None Supplied	S	2572194	c	Free cyanide in soil	L080-PL	c
BH01	None Supplied	S	2572194	c	Total cyanide in soil	L080-PL	c
BH01	None Supplied	S	2572195	c	Free cyanide in soil	L080-PL	c
BH01	None Supplied	S	2572195	c	Total cyanide in soil	L080-PL	c
WS01	None Supplied	S	2572189	c	Free cyanide in soil	L080-PL	c
WS01	None Supplied	S	2572189	c	Total cyanide in soil	L080-PL	c
WS01	None Supplied	S	2572190	c	Free cyanide in soil	L080-PL	c
WS01	None Supplied	S	2572190	c	Total cyanide in soil	L080-PL	c
WS02	None Supplied	S	2572191	c	Free cyanide in soil	L080-PL	c
WS02	None Supplied	S	2572191	c	Total cyanide in soil	L080-PL	c
WS03	None Supplied	S	2572192	c	Free cyanide in soil	L080-PL	c
WS03	None Supplied	S	2572192	c	Total cyanide in soil	L080-PL	c
WS04	None Supplied	S	2572193	c	Free cyanide in soil	L080-PL	c
WS04	None Supplied	S	2572193	c	Total cyanide in soil	L080-PL	c

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Analytical Report Number : 23-15456

Project / Site name:	Blackley Fire Station	Samples received on:	24/01/2023
Your job number:	3866B	Samples instructed on/ Analysis started on:	02/02/2023
Your order number:	3866B-020223	Analysis completed by:	08/02/2023
Report Issue Number:	1	Report issued on:	10/02/2023
Samples Analysed:	4 soil samples		



Signed:

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

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

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

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

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

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

Analytical Report Number: 23-15456
Project / Site name: Blackley Fire Station
Your Order No: 3866B-020223

Lab Sample Number				2573026	2573027	2573028	2573029
Sample Reference				WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.00	4.00	5.00
Date Sampled				23/01/2023	23/01/2023	23/01/2023	23/01/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	6.8	7	19
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8	8.6	7.9	7.6
Total Sulphate as SO ₄	%	0.005	MCERTS	0.029	0.009	0.009	0.038
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.033	0.0066	0.0065	0.068
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	32.7	6.6	6.5	67.7
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.2	7.3	1.9	4
Total Sulphur	%	0.005	MCERTS	0.021	< 0.005	< 0.005	0.018
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	< 0.5	< 0.5	< 0.5	< 0.5
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	8.7	< 5.0	< 5.0	15
Magnesium (leachate equivalent)	mg/l	2.5	NONE	4.3	< 2.5	< 2.5	7.5

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

Analytical Report Number : 23-15456

Project / Site name: Blackley Fire Station

* 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 *
2573026	WS01	None Supplied	1	Brown clay and loam with gravel.
2573027	WS02	None Supplied	3	Light brown sand with gravel.
2573028	WS03	None Supplied	4	Light brown sand with gravel.
2573029	WS04	None Supplied	5	Light brown clay and sand.

Analytical Report Number : 23-15456

Project / Site name: Blackley Fire Station

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
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	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

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

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

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

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture

correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by

the client. The instructed on date indicates the date on which this information was provided to the laboratory.



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e: MURRAYRIX Group

Analytical Report Number : 23-16790

Project / Site name:	Blackley Fire Station	Samples received on:	09/02/2023
Your job number:		Samples instructed on/ Analysis started on:	09/02/2023
Your order number:	23-026	Analysis completed by:	20/02/2023
Report Issue Number:	1	Report issued on:	20/02/2023
Samples Analysed:	4 soil samples		

Izabela Wójcik
Signed:

Izabela Wójcik
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 23-16790
 Project / Site name: Blackley Fire Station
 Your Order No: 23-026

Lab Sample Number				2580403	2580404	2580405	2580406
Sample Reference				BH01	BH01	BH02	BH02
Sample Number				121086	121090	121092	121094
Depth (m)				3.00	16.50	7.50	12.00
Date Sampled				Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	11	13	8.1
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	8.2	7.6	8.1
Total Sulphate as SO ₄	%	0.005	MCERTS	0.016	0.025	0.007	0.016
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.023	0.024	0.0053	0.02
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	23.4	24.2	5.3	19.6
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	48	6.6	2.1	2.4
Total Sulphur	%	0.005	MCERTS	0.007	0.076	< 0.005	0.071
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	< 0.5	0.6	< 0.5	< 0.5
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	0.06	< 0.05	< 0.05
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	10	< 5.0	9.5
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	5	< 2.5	4.8

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

Analytical Report Number : 23-16790

Project / Site name: Blackley Fire Station

* 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 *
2580403	BH01	121086	3	Brown sand.
2580404	BH01	121090	16.5	Brown clay with gravel.
2580405	BH02	121092	7.5	Brown sand.
2580406	BH02	121094	12	Brown clay and sand with gravel.

Analytical Report Number : 23-16790

Project / Site name: Blackley Fire Station

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
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	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

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

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

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

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture

correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by

the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 23-16790

Project / Site name: Blackley Fire Station

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH01	121086	S	2580403	a	None Supplied	None Supplied	None Supplied
BH01	121090	S	2580404	a	None Supplied	None Supplied	None Supplied
BH02	121092	S	2580405	a	None Supplied	None Supplied	None Supplied
BH02	121094	S	2580406	a	None Supplied	None Supplied	None Supplied



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Website: www.alsenvironmental.co.uk

IGE Consulting
14-32 Hewitt Street
Manchester
4GB

Attention: Liam McMahon

CERTIFICATE OF ANALYSIS

Date of report Generation:	24 April 2023
Customer:	IGE Consulting
Sample Delivery Group (SDG):	230413-52
Your Reference:	3866B
Location:	Blackley Fire Station
Report No:	686628
Order Number:	3866B - 060423

We received 6 samples on Friday April 07, 2023 and 6 of these samples were scheduled for analysis which was completed on Monday April 24, 2023. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager



CERTIFICATE OF ANALYSIS

Validated

SDG: 230413-52
Client Ref.: 3866B

Report Number: 686628
Location: Blackley Fire Station

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
27830448	DUP A			05/04/2023
27830447	FIELD BLANK			05/04/2023
27830449	PFC 01			05/04/2023
27830446	PFC 02			05/04/2023
27830410	PFC 03			05/04/2023
27830411	SITE BLANK			05/04/2023

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

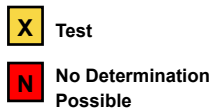
Validated

SDG: 230413-52
Client Ref.: 3866B

Report Number: 686628
Location: Blackley Fire Station

Superseded Report:

Results Legend



Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			27830448	27830447	27830449	27830446	27830410	27830411
Customer Sample Reference			DUP A	FIELD BLANK	PFC 01	PFC 02	PFC 03	SITE BLANK
AGS Reference								
Depth (m)								
Container			1kg TUB with Handle (ALE260)	1kg TUB with Handle (ALE260)	1kg TUB with Handle (ALE260)	1kg TUB with Handle (ALE260)	1kg TUB with Handle (ALE260)	1kg TUB with Handle (ALE260)
Sample Type			S	PW	S	S	S	PW
PFAS Liquids	All	NDPs: 0 Tests: 2		X				X
PFAS Solids	All	NDPs: 0 Tests: 4	X		X	X	X	
Sample description	All	NDPs: 0 Tests: 4	X		X	X	X	



CERTIFICATE OF ANALYSIS

Validated

SDG: 230413-52
Client Ref.: 3866B

Report Number: 686628
Location: Blackley Fire Station

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
27830448	DUP A		Light Brown	Loamy Sand	Stones	None
27830449	PFC 01		Light Brown	Loamy Sand	Stones	None
27830446	PFC 02		Light Brown	Loamy Sand	Stones	None
27830410	PFC 03		Light Brown	Sand	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 230413-52
Client Ref.: 3866B

Report Number: 686628
Location: Blackley Fire Station

Superseded Report:

Results Legend		Customer Sample Ref.	DUP A	FIELD BLANK	PFC 01	PFC 02	PFC 03	SITE BLANK
# ISO17025 accredited. M mCERES accredited. aq Aqueous / settled sample. diss.fltr Dissolved / filtered sample. tot.unfltr Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4*§@ Sample deviation (see appendix)	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		Soil/Solid (S) 05/04/2023 07/04/2023 230413-52 27830448	Process Water (PR) 05/04/2023 07/04/2023 230413-52 27830447	Soil/Solid (S) 05/04/2023 07/04/2023 230413-52 27830449	Soil/Solid (S) 05/04/2023 07/04/2023 230413-52 27830446	Soil/Solid (S) 05/04/2023 07/04/2023 230413-52 27830410	Process Water (PR) 05/04/2023 07/04/2023 230413-52 27830411
Component	LOD/Units		Method					
PFBA (375-22-4)	<2 ng/l		TM434		<10			<2
PFMOPrA (377-73-1)	<1 ng/l		TM434		<5			<1
3:3 FTCA (356-02-5)	<2 ng/l		TM434		<10			<2
PFPA (2706-90-3)	<1 ng/l		TM434		<5			<1
PFMOBA (863090-89-5)	<1 ng/l		TM434		<5			<1
4:2 FTS (757124-72-4)	<1 ng/l		TM434		<5			<1
NFDHA (151772-58-6)	<3 ng/l		TM434		<15			<3
PFBS (375-73-5)	<1 ng/l	TM434		<5			<1	
PFHxA (307-24-4)	<1 ng/l	TM434		<5			<1	
HFPO-DA (13252-13-6)	<2 ng/l	TM434		<10			<2	
PFEESA (113507-82-7)	<1 ng/l	TM434		<5			<1	
PFHpA (375-85-9)	<1 ng/l	TM434		<5			<1	
PFPeS (2706-91-4)	<1 ng/l	TM434		<5			<1	
5:3 FTCA (914637-49-3)	<5 ng/l	TM434		<25			<5	
ADONA (919005-14-4)	<1 ng/l	TM434		<5			<1	
6:2 FTS (27619-97-2)	<1 ng/l	TM434		<5			<1	
FBSA (30334-69-1)	<1 ng/l	TM434		<5			<1	
PFOA (335-67-1)	<0.65 ng/l	TM434		<3.25			<1	
PFHxS (355-46-4)	<1 ng/l	TM434		<5			<1	
PFNA (375-95-1)	<1 ng/l	TM434		<5			<1	
PFecHS (133201-07-7)	<1 ng/l	TM434		<5			<1	
PFHpS (375-92-8)	<1 ng/l	TM434		<5			<1	
8:2 FTS (39108-34-4)	<2 ng/l	TM434		<10			<2	
HFPO-TA (13252-14-7)	<5 ng/l	TM434		<25			<5	
PFDA (335-76-2)	<2 ng/l	TM434		<10			<2	
MeFOSAA (2355-31-9)	<2 ng/l	TM434		<10			<2	
7:3 FTCA (812-70-4)	<5 ng/l	TM434		<25			<5	
Linear PFOS (1763-23-1)	<0.65 ng/l	TM434		<3.25			<0.65	
Branched PFOS	<0.65 ng/l	TM434		<3.25			<0.65	
EtFOSAA (2991-50-6)	<2 ng/l	TM434		<10			<2	
PFUnA (2058-94-8)	<2 ng/l	TM434		<10			<2	
9Cl-PF3ONS (756426-58-1)	<1 ng/l	TM434		<5			<1	
PFNS (68259-12-1)	<1 ng/l	TM434		<5			<1	



CERTIFICATE OF ANALYSIS

Validated

SDG: 230413-52
Client Ref.: 3866BReport Number: 686628
Location: Blackley Fire Station

Superseded Report:

Results Legend		Customer Sample Ref.	DUP A	FIELD BLANK	PFC 01	PFC 02	PFC 03	SITE BLANK
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4**@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
FHxSA (41997-13-1)	<1 ng/l	TM434		<5				<1
PFDaA (307-55-1)	<2 ng/l	TM434		<10				<2
PFDS (335-77-3)	<2 ng/l	TM434		<10				<2
PFTrDA (72629-94-8)	<3 ng/l	TM434		<15				<3
11Cl-PF3OUdS (763051-92-9)	<2 ng/l	TM434		<10				<2
PFUnDS (749786-16-1)	<2 ng/l	TM434		<10				<2
PFTeA (376-06-7)	<1 ng/l	TM434		<5				<1
PFOSA (754-91-6)	<2 ng/l	TM434		<10				<2
PFDoS (79780-39-5)	<2 ng/l	TM434		<10				<2
PFTrDS (174675-49-1)	<1 ng/l	TM434		<5				<1
PFHxDA (67905-19-5)	<1 ng/l	TM434		<5				<1
MeFOSE (24448-09-7)	<10 ng/l	TM434		<50				<10
N-MeFOSA (31506-32-8)	<1 ng/l	TM434		<5				<1
EtFOSE (1691-99-2)	<10 ng/l	TM434		<50				<10
PFODA (16517-11-6)	<1 ng/l	TM434		<5				<1
N-EtFOSA (4151-50-2)	<1 ng/l	TM434		<5				<1
Total PFOS	<0.65 ng/l	TM434		<3.25				<0.65
Moisture Content Ratio (% of as received sample)	%	PM024	7.2		8.1	6.3	16	
PFBA (375-22-4) Perfluoro-n-butanoic acid	<3 µg/kg	TM338	<3		<3	<3	<3	
PFPA (2706-90-3) Perfluoro-n-pentanoic acid	<3 µg/kg	TM338	<3		<3	<3	<3	
PFHxA (307-24-4) Perfluoro-n-hexanoic acid	<2 µg/kg	TM338	<2		<2	<2	<2	
PFBS (375-73-5) Perfluoro-1-butanedisulfonate	<1 µg/kg	TM338	<1		<1	<1	<1	
PFHpA (375-85-9) Perfluoro-n-heptanoic acid	<1 µg/kg	TM338	<1		<1	<1	<1	
PFOA (335-67-1) Perfluoro-n-octanoic acid	<1 µg/kg	TM338	<1		<1	<1	<1	
PFHxS (355-46-4) Perfluoro-1-hexanedisulfonate	<1 µg/kg	TM338	<1		<1	<1	<1	
PFNA (375-95-1) Perfluoro-n-nonanoic acid	<1 µg/kg	TM338	<1		<1	<1	<1	
PFHpS (375-92-8) Perfluoro-1-heptanedisulfonate	<1 µg/kg	TM338	<1		<1	<1	<1	
PFDA (335-76-2) Perfluoro-n-decanoic acid	<1 µg/kg	TM338	<1		<1	<1	<1	
Linear PFOS(1763-23-1) Perfluoro-1-octanedisulfonate	<1 µg/kg	TM338	<1		<1	<1	<1	
Branched PFOS	<1 µg/kg	TM338	<1		<1	<1	<1	
PFUnA (2058-94-8) Perfluoro-n-undecanoic acid	<1 µg/kg	TM338	<1		<1	<1	<1	
PFDaA (307-55-1) Perfluoro-n-dodecanoic acid	<1 µg/kg	TM338	<1		<1	<1	<1	
PFOSA (754-91-6) Perfluoro-octanesulfonamide	<1 µg/kg	TM338	<1		<1	<1	<1	

09:21:29 24/04/2023



Superseded Report:

Page 7 of 10



CERTIFICATE OF ANALYSIS

Validated

SDG: 230413-52
Client Ref.: 3866B

Report Number: 686628
Location: Blackley Fire Station

Superseded Report:

Table of Results - Appendix

Method No	Description
PM024	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM338	Analysis of perfluoroalkylsulfonates and perfluorocarboxylic acids in Solids
TM434	Analysis of PFAS

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).



CERTIFICATE OF ANALYSIS

SDG: 230413-52
Client Ref.: 3866BReport Number: 686628
Location: Blackley Fire Station

Superseded Report:

Test Completion Dates

Lab Sample No(s)	27830448	27830447	27830449	27830446	27830410	27830411
Customer Sample Ref.	DUP A	FIELD BLANK	PFC 01	PFC 02	PFC 03	SITE BLANK
AGS Ref.						
Depth						
Type	Soil/Solid (S)	Process Water	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Process Water
PFAS Liquids		24-Apr-2023				24-Apr-2023
PFAS Solids	21-Apr-2023		21-Apr-2023	21-Apr-2023	21-Apr-2023	
Sample description	14-Apr-2023		14-Apr-2023	14-Apr-2023	14-Apr-2023	

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right solutions.
right partner.

To:
IGE Consulting
Oxford Court
M2 3WQ

Non-routine Analysis Report

Date: 2 May 2023

Our Reference: 23-047 (SDG: 230426-53)
Quote Reference: NRW851
Your Reference: NRW851
Location: 3866B

One swab sample was received on the 26th of April with a request for quantitative analysis of per- and polyfluorinated alkyl substances (PFAS).

We are pleased to enclose our non-routine analysis report.

Signed

Adam Gower
Technical Specialist



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1. Summary

One swab sample was requested to be analysed for PFAS.

SDG	Sample Event	Customer ID
230426-53	27898948	3966B

Table 1: Sample References

All analyses within this report are outside our accreditation status and were conducted on the "As received" sample.

2. Sample Analysis

The received swabs were extracted and analysed by LC/MS/MS with electrospray ionisation (ESI).

Identification of analytes was performed via retention time and qualifier match against a purchased standard. Quantification was performed against a multi-point calibration curve generated using standards of known concentration, using the internal standard method.



3. Results

Customer ID	3966B
Sample	27898948
PFBA	<10.0
PFPA	<10.0
PFBS	<10.0
PFHxA	<10.0
PFHpA	<10.0
PFPeS	<10.0
6:2 FTS	<10.0
PFOA	<10.0
PFHxS	<10.0
PFNA	<10.0
PFHpS	<10.0
PFDA	<10.0
L-PFOS	<10.0
Bran PFOS	<10.0
PFUnA	<10.0
PFDoA	<10.0
PFOSA	<10.0
PFTTrDA	<10.0
PFTeA	<10.0

Table 2: Results for PFAS in swab samples, in ng/swab



CERTIFICATE OF ANALYSIS

SDG: 230413-52
Client Ref: 3866B

Report Number: 686628
Location: Blackley Fire Station

Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

General

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

APPENDIX 8

CHEMICAL LABORATORY SCREENING TABLES

**Project: Blackley Fire Station**

Job No: 3866b

Lab Sample Number			2572189		2572190		2572191		2572192		2572193		2572194		2572195		GAC - S4UL unless stated										
Sample Reference			WS01		WS01		WS02		WS03		WS04		BH01		BH01		Statistical Analysis					Statistical Results					
Depth (m)			0.3		0.8		0.2		0.9		1.3		0.9		2.5		Count	Standard Deviation	Minimum	Maximum	Average	Maximum	2.5% Commercial	Pass/ Fail	Exceedances		
Date Sampled			23/01/2023		23/01/2023		23/01/2023		23/01/2023		23/01/2023		24/01/2023		24/01/2023												
Analytical Parameter (Soil Analysis)			Units	LoD	0.1		0.1		0.1		0.1		0.1		0.1		7	0.00	0.1	0.1	0.1	0.1					
Stone Content			%	0.1	15		12		13		17		17		18		7	2.43	12.00	18.00	15.71	18.00					
Moisture Content			%	0.01	0.8		0.8		0.8		0.8		0.8		0.8		7	0.00	0.800	0.800	0.800	0.800					
Total mass of sample received			kg	0.001																							
Asbestos			Type	N/A	Not-detected		Not-detected		Not-detected		-		Not-detected		Not-detected		-		5	-	-	-	-				
General Inorganics			pH Units	N/A	7.8		8.3		8		7.6		7.4		8.2		8.2		7	0.34	7.40	8.30	7.93				
pH - Automated					1		1		1		1		1		1		1		7	0.00	1.00	1.00	1.00	1.00	60	Pass	0
Total Cyanide			mg/kg	1	1		1		1		1		1		1		1		7	0.00	1.00	1.00	1.00	1.00	60	Pass	0
Free Cyanide			mg/kg	1	10		30		7.9		20		10		250		11		7	89.23	7.90	250.00	48.41				
Water Soluble Sulphate as SO4 16hr extraction (2:1)			mg/kg	2.50	0.0051		0.015		0.004		0.01		0.0051		0.12		0.0056		7	0.04271	0.00400	0.12000	0.02354				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)			g/l	0.00125	5.1		14.8		4		10.2		5.1		123		5.6		7	43.84	4.00	123.00	23.97				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)			mg/l	1.25	3.7		3.6		2.3		3.1		1.9		3.5		0.6		7	1.14	0.60	3.70	2.67				
Organic Matter (automated)			%	0.1	3.9		3.2		4.8		10		7.7		3.4		3.3		7	3.09	3.20	10.00	6.04				
Water Soluble Nitrate (2:1) as NO3			mg/kg	2	5		5		5		5.1		5		5		5		7	0.04	5.00	5.10	5.01				
Water Soluble Nitrate (2:1) as NO3 (leachate equivalent)			mg/l	5																							
Speciated PAHs			mg/kg	0.05	0.92		0.23		0.05		0.54		0.05		0.27		0.05		7	0.33	0.05	0.92	0.30	0.92	460.00	Pass	0
Naphthalene					0.15		0.05		0.05		0.67		0.05		0.3		0.05		7	0.23	0.05	0.67	0.19	0.67	97000	Pass	0
Acenaphthylene			mg/kg	0.05	0.05		1.3		0.05		0.77		0.07		0.57		0.05		7	0.49	0.05	1.30	0.41	1.30	97000	Pass	0
Acenaphthene			mg/kg	0.05	0.43		0.89		0.05		1.4		0.05		0.73		0.05		7	0.52	0.05	1.40	0.51	1.40	68000	Pass	0
Fluorene			mg/kg	0.05	4.3		8.2		1.9		13		0.67		7.1		0.05		7	4.69	0.05	13.00	5.03	13.00	22000	Pass	0
Phenanthrene			mg/kg	0.05	0.9		2.1		0.29		2.3		0.1		1.3		0.05		7	0.93	0.05	2.30	1.01	2.30	540000	Pass	0
Anthracene			mg/kg	0.05	5.6		8.9		2.7		14		1		8.9		0.05		7	5.04	0.05	14.00	5.88	14.00	23000	Pass	0
Fluoranthene			mg/kg	0.05	2.6		7.9		2.6		15		1		9.2		0.05		7	5.27	0.05	15.00	5.91	15.00	54000	Pass	0
Pyrene			mg/kg	0.05	5.4		3.8		1.2		6.3		0.42		4		0.05		7	2.25	0.05	6.30	2.60	6.30	170.00	Pass	0
Benzo(a)anthracene			mg/kg	0.05	2.7		3.2		1.3		6.2		0.6		3.8		0.05		7	2.12	0.05	6.20	2.55	6.20	350	Pass	0
Chrysene			mg/kg	0.05	-		-		1.5		6.1		0.57		4.2		0.05		5	2.58	0.05	6.10	2.48	6.10	44.00	Pass	0
Benzo(b)fluoranthene			mg/kg	0.05	-		-		0.41		2.3		0.19		1.4		0.05		5	0.96	0.05	2.30	0.87	2.30	1200	Pass	0
Benzo(k)fluoranthene			mg/kg	0.05	2.2		2.9		1.2		5.7		0.42		3.7		0.05		7	1.99	0.05	5.70	2.31	5.70	35.00	Pass	0
Benzo(a)pyrene			mg/kg	0.05	0.93		1.2		0.8		2.7		0.26		1.7		0.05		7	0.90	0.05	2.70	1.09	2.70	510	Pass	0
Indeno(1,2,3-cd)pyrene			mg/kg	0.05	0.31		0.36		0.05		0.83		0.05		0.43		0.05		7	0.29	0.05	0.83	0.30	0.83	3.60	Pass	0
Dibenz(a,h)anthracene			mg/kg	0.05	1.2		1.4		1.2		3.4		0.36		2.1		0.05		7	1.12	0.05	3.40	1.39	3.40	4000	Pass	0
Benzo(ghi)perylene			mg/kg	0.05																							
Total PAH			mg/kg	0.8	31.1		47.1		15		80.6		5.71		49.8		0.8		7	28.45	0.80	80.60	32.87				
Speciated Total EPA-16 PAHs																											
Heavy Metals / Metalloids			mg/kg	1	19		9.8		7.7		11		9.2		11		4.9		7	4.36	4.90	19.00	10.37	19.00	640	Pass	0
Arsenic (aqua regia extractable)					500		550		210		330		77		520		23		7	217.80	23.00	550.00	315.71	550.00	22000.00	Pass	0
Barium (aqua regia extractable)			mg/kg	1	0.6		0.3		0.2		0.2		0.2		0.3		0.2		7	0.15	0.20	0.60	0.29	0.60	240000	Pass	0
Boron (water soluble)			mg/kg	0.2	0.9		4.2		0.7		0.2		0.2		0.2		0.2		7	1.46	0.20	4.20	0.94	4.20	190	Pass	0
Cadmium (aqua regia extractable)			mg/kg	0.2	1.2		1.2		1.2		1.2		1.2		1.2		1.2		7	0.00	1.20	1.20	1.20	1.20	33	Pass	0
Chromium (hexavalent)			mg/kg	1.2	21		17		14		19		14		16		8.5		7	4.05	8.50	21.00	15.64	21.00	8600	Pass	0
Chromium (aqua regia extractable)			mg/kg	1	64		34		41		57		29		38		16		7	16.34	16.00	64.00	39.86	64.00	68000	Pass	0
Copper (aqua regia extractable)			mg/kg	1	260		120		95		75		36		66		8.3		7	81.74	8.30	260.00	94.33	260.00	2330	Pass	0
Lead (aqua regia extractable)			mg/kg	1	0.4		0.3		0.3		0.3		0.3		0.3		0.3		7	0.04	0.30	0.40	0.31	0.40	1100	Pass	0
Mercury (aqua regia extractable)			mg/kg	0.3	23		19		15		20		16		14		11		7	4.06	11.00	23.00	16.86	23.00	980	Pass	0
Nickel (aqua regia extractable)			mg/kg	1	1		1		1		1		1		1		1		7	0.00	1.00	1.00	1.00	1.00	12000	Pass	0
Selenium (aqua regia extractable)			mg/kg	1	29		22		18		23		20		21		11		7	5.44	11.00	29.00	20.57	29.00	9000	Pass	0
Vanadium (aqua regia extractable)			mg/kg	1	300		360		160		130		45		63		30		7	129.03	30.00	360.00	155.43	360.00	730000	Pass	0
Zinc (aqua regia extractable)			mg/kg	1																							
Petroleum Hydrocarbons			mg/kg	0.1	0.1		0.1		0.1		0.1		0.1		0.1		0.1		7	0.00	0.10	0.10	0.10				
Petroleum Range Organics (C6 - C10)																											
TPH C10 - C40			mg/kg	10	61		400		120		100		39		100		10		7	129.95	10.00	400.00	118.57				
TPH2 (C6 - C10)			mg/kg	0.1	0.1		0.1		0.1		0.1		0.1		0.1		0.1		7	0.00	0.10	0.10	0.10				
TPH C6 - C40			mg/kg	10	61		400		120		100		39		100		10		7	129.95	10.00	400.00	118.57				
TPH (C10 - C25)			mg/kg	10	37		64		19		71		11		51		10		7	25.19	10.00	71.00	37.57				
TPH (C25 - C40)			mg/kg	10	24		340		99		29		28		51		10		7	116.96	10.00	340.00	83.00				

GAC used: LQM/CIEH Suitable 4 Use Levels for Human Health Risk Assessment (3rd edition, 2015)

Category 4 Screening Levels (March 2014) used for Arsenic

In-house methodology used for Cyanide - no GAC currently available

	Exceeded GAC & C4SL
	Exceeded GAC but not C4SL
	Recorded below laboratory detection limit

This spreadsheet has been developed by IGE Consulting Ltd

APPENDIX 9

GROUND GAS AND GROUNDWATER MONITORING

Gas Monitoring

Site: Blackley Fire Station Recent weather: Dry Precipitation: None 2hr pre-visit pressure: 1035

Job No.: 3866b Date: 10.02.2023 Air temperature: 8°C Ground condition: Damp

Engineer: TP Start time: 13:20 Cloud cover: 100% Pressure trend: Falling 2hr post-visit pressure: 1034

Visit No.: 1 End time: 14:30 Wind: 5mph NE On-site activities (e.g.construction): Fire station



Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH ₄		LEL		Hex		CO ₂		O ₂			H ₂ S		CO		Total Volatiles (PID)		PID CF	Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)		(%)			(ppm)		(ppm)		(ppm)			(l/hr)	
						peak	steady	peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady	peak	steady		peak	steady
DS01	13:20	2.00 - 4.00	DRY	3.88	1024	<0.1	<0.1	<0.1	<0.1	0.014	0.014	2.5	2.5	20.2	19.3	19.3	<1	<1	<1	<1	1.1	0.2	1.0	<0.1	<0.1
DS02	13:40	1.00 - 4.00	DRY	3.90	1023	<0.1	<0.1	<0.1	<0.1	0.013	0.013	2.2	2.2	20.5	18.6	18.6	<1	<1	<1	<1	0.1	<0.1	1.0	<0.1	<0.1
DS03	14:00	1.00 - 4.00	DRY	3.95	1023	<0.1	<0.1	<0.1	<0.1	0.012	0.012	2.8	2.8	20.3	19.0	19.0	<1	<1	<1	<1	3.2	<0.1	1.0	<0.1	<0.1
DS04	14:20	2.00 - 4.00	DRY	3.88	1023	<0.1	<0.1	<0.1	<0.1	0.110	0.110	3.6	3.6	20.3	16.6	16.6	<1	<1	<1	<1	0.4	0.2	1.0	<0.1	<0.1

Comments: All wells were dry.

- Values recorded below instrument detection level.
- Response zone flooded. Results unreliable.

Gas Monitoring

Site: Blackley Fire Station Recent weather: Rain Precipitation: None 2hr pre-visit pressure: 1018

Job No.: 3866b Date: 21.02.2023 Air temperature: 8°C Ground condition: Damp

Engineer: AS Start time: 11:00 Cloud cover: 90% Pressure trend: Falling 2hr post-visit pressure: 1015

Visit No.: 2 End time: 12:10 Wind: 1.6km/h NE On-site activities (e.g.construction): Fire station



Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH ₄		LEL		Hex		CO ₂		O ₂			H ₂ S		CO		Total Volatiles (PID)		PID CF	Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)		(%)			(ppm)		(ppm)		(ppm)			(l/hr)	
						peak	steady	peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady	peak	steady		peak	steady
DS01	11:53	2.00 - 4.00	DRY	3.90	1010	<0.1	<0.1	<0.1	<0.1	0.010	0.010	8.0	8.0	19.6	13.0	13.0	<1	<1	<1	<1	0.4	0.2	1.0	<0.1	<0.1
DS02	11:35	1.00 - 4.00	DRY	3.91	1010	<0.1	<0.1	<0.1	<0.1	0.010	0.010	3.6	3.6	20.0	16.9	16.9	<1	<1	<1	<1	0.1	0.1	1.0	<0.1	<0.1
DS03	11:17	1.00 - 4.00	DRY	3.95	1009	<0.1	<0.1	<0.1	<0.1	0.010	0.010	3.5	3.5	20.0	17.3	17.3	<1	<1	<1	<1	2.7	0.2	1.0	<0.1	<0.1
DS04	11:00	2.00 - 4.00	DRY	3.88	1009	<0.1	<0.1	<0.1	<0.1	0.010	0.010	4.0	4.0	19.9	15.1	15.1	<1	<1	<1	<1	0.7	0.3	1.0	<0.1	<0.1

Comments: _____

- Values recorded below instrument detection level.
- Response zone flooded. Results unreliable.

Gas Monitoring

Site: Blackley Fire Station
 Job No.: 3866b
 Engineer: TP
 Visit No.: 3

Date: 13.03.2023
 Start time: 12:00
 End time: 13:00

Recent weather: Rain
 Air temperature: 10°C
 Cloud cover: 100%
 Wind: 5.00 km/h NE

Precipitation: Rain
 Ground condition: Wet
 Pressure trend: Rising
 On-site activities (e.g.construction): Fire station

2hr pre-visit pressure: 980
 2hr post-visit pressure: 981



Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH ₄		LEL		Hex		CO ₂		O ₂			H ₂ S		CO		Total Volatiles (PID)		PID CF	Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)		(%)			(ppm)		(ppm)		(ppm)			(l/hr)	
						peak	steady	peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady	peak	steady		peak	steady
DS01	12:00	2.00 - 4.00	DRY	3.87	974	<0.1	<0.1	<0.1	<0.1	0.013	0.013	8.5	8.5	19.7	12.2	12.2	<1	<1	<1	<1	N/A	N/A	1.0	0.6	<0.1
DS02	12:15	1.00 - 4.00	DRY	3.85	972	<0.1	<0.1	<0.1	<0.1	0.012	0.012	4.7	4.7	19.6	15.8	15.8	<1	<1	<1	<1	N/A	N/A	1.0	1.8	<0.1
DS03	12:30	1.00 - 4.00	DRY	3.90	973	<0.1	<0.1	<0.1	<0.1	0.013	0.013	4.2	4.2	20.0	16.4	16.4	<1	<1	<1	<1	N/A	N/A	1.0	0.9	<0.1
DS04	12:45	2.00 - 4.00	DRY	3.92	972	<0.1	<0.1	<0.1	<0.1	0.012	0.012	5.5	5.5	20.1	13.6	13.6	<1	<1	<1	<1	N/A	N/A	1.0	<0.1	<0.1

Comments: _____

- Values recorded below instrument detection level.
- Response zone flooded. Results unreliable.

Gas Monitoring

Site: Blackley Fire Station

Recent weather: Showers

Precipitation: None

2hr pre-visit
pressure: 1014

[illegible]

- Values recorded below instrument detection level.
- Response zone flooded. Results unreliable.

Gas Monitoring

Site: Blackley Fire Station

Recent weather:

Precipitation: None

2hr pre-visit
pressure: 989

Job No.: 3866b

Date: 31.03.2023

Air temperature: 8°C

Ground condition: Dry

Engineer: TP

Start time: 15:00

Cloud cover: 100%

Pressure trend: Rising

2hr post-visit
pressure: 993

Visit No.: 5

End time: 16:00

Wind 10 km/h NE

On-site activities
(e.g.construction): Fire station



Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH ₄		LEL		Hex		CO ₂		O ₂			H ₂ S		CO		Total Volatiles (PID)		PID CF	Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)		(%)			(ppm)		(ppm)		(ppm)			(l/hr)	
						peak	steady	peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady	peak	steady		peak	steady
DS01	15:00	1.00 - 4.00	DRY	3.85	984	<0.1	<0.1	<0.1	<0.1	0.017	0.017	7.9	7.9	20.1	13.1	13.1	<1	<1	<1	<1	0.1	0.0	1.0	-0.1	<0.1
DS02	15:15	2.00 - 4.00	DRY	3.79	984	<0.1	<0.1	<0.1	<0.1	0.018	0.018	1.8	1.8	19.9	19.1	19.1	<1	<1	<1	<1	0.1	0.0	1.0	<0.1	<0.1
DS03	15:30	2.00 - 4.00	DRY	3.86	984	<0.1	<0.1	<0.1	<0.1	0.017	0.017	4.2	4.2	20.2	16.6	16.6	<1	<1	<1	<1	2.1	0.2	1.0	<0.1	<0.1
DS04	15:45	1.00 - 4.00	DRY	3.85	984	<0.1	<0.1	<0.1	<0.1	0.018	0.018	4.7	4.7	19.8	14.6	14.6	<1	<1	<1	<1	0.8	0.2	1.0	<0.1	<0.1

Comments: _____

- Values recorded below instrument detection level.
- Response zone flooded. Results unreliable.

Gas Monitoring

Site: Blackley Fire Station Recent weather: Precipitation: None 2hr pre-visit pressure: 1031

Job No.: 3866b Date: 19.04.2023 Air temperature: 13°C Ground condition: Dry

Engineer: AS Start time: 13:36 Cloud cover: 80% Pressure trend: Rising 2hr post-visit pressure: 1029

Visit No.: 6 End time: 14:25 Wind 19 km/h E On-site activities (e.g.construction): Fire station



Exploratory hole	Time	Response zone range	Water level	Base level	Atm. pressure	CH ₄		LEL		Hex		CO ₂		O ₂			H ₂ S		CO		Total Volatiles (PID)		PID CF	Flow	
		(m bgl)	(m bgl)	(m bgl)	(mbar)	(%)		(%)		(%)		(%)		(%)			(ppm)		(ppm)		(ppm)			(l/hr)	
						peak	steady	peak	steady	peak	steady	peak	steady	high	steady	low	peak	steady	peak	steady	peak	steady		peak	steady
DS01	15:00	1.00 - 4.00	DRY	3.90	1022	<0.1	<0.1	<0.1	<0.1	0.016	0.015	2.0	2.0	20.6	18.7	18.7	<1	<1	<1	<1	0.6	0.3	1.0	-0.1	<0.1
DS02	15:15	2.00 - 4.00	DRY	3.83	1022	<0.1	<0.1	<0.1	<0.1	0.016	0.015	2.7	2.5	20.6	18.4	18.3	<1	<1	<1	<1	0.3	<0.1	1.0	<0.1	<0.1
DS03	15:30	2.00 - 4.00	DRY	3.91	1022	<0.1	<0.1	<0.1	<0.1	0.016	0.015	0.3	<0.1	20.7	20.4	20.4	<1	<1	<1	<1	2.3	0.1	1.0	<0.1	<0.1
DS04	15:45	1.00 - 4.00	DRY	3.87	1022	<0.1	<0.1	<0.1	<0.1	0.017	0.016	4.8	4.8	20.2	14.7	14.7	<1	<1	<1	<1	0.5	0.4	1.0	<0.1	<0.1

Comments: _____

- Values recorded below instrument detection level.
- Response zone flooded. Results unreliable.