

Postal Street, Manchester

Phase 2 Ground Investigation

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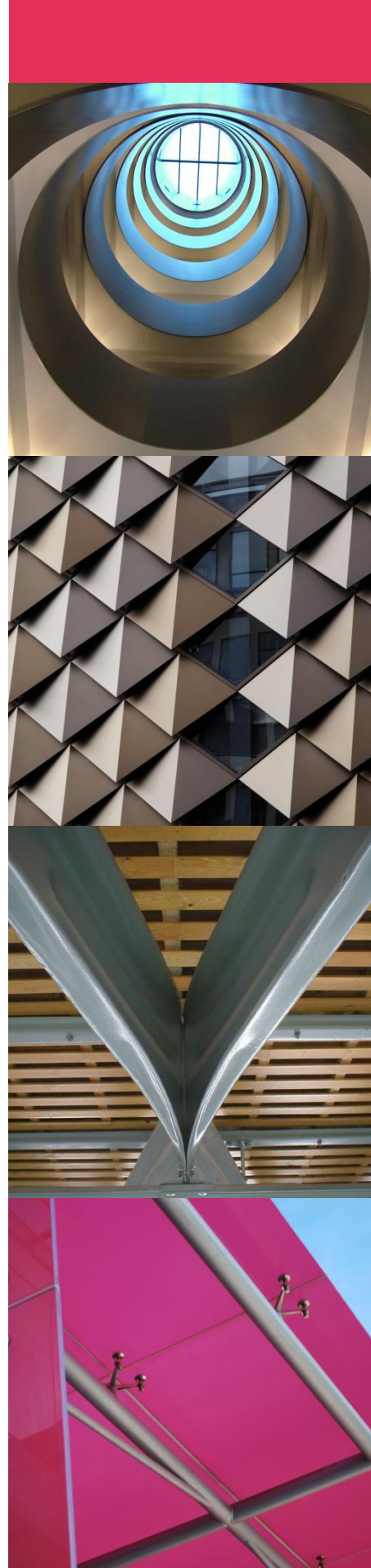
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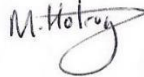
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Executive Summary

Appointment	In March 2022 Curtins were instructed by Faithful & Gould (Manchester) to undertake a Phase 2 Ground Investigation for on an area of land located directly south of Postal Street and east of Newton Street, in, Manchester, M1 1EE. The site covers an area of 0.16 Ha, centred at National Grid Reference 384730, 398440 The aim of the ground investigation is to characterise the geo-environmental and geotechnical conditions prior to the construction of a 9 storey residential block with +100 apartment units. The ground floor includes reception area and communal amenities, a cycle store, refuse store, and residential apartments in the east and north. A residents courtyard garden is present at ground level.
Current Site Status	The site is located within Manchester City Centre off Postal Street and is currently a hard standing car park to the southeast and a row of single of commercial units adjacent to Newton Street covering the remaining area of the site. The topography of the site is level. The northern boundary is marked by Postal Street, eastern boundary is marked by Dean Street, the southern boundary is marked by Faraday Street, and the western boundary is marked by Newton Street.
Summary of Phase 1	Earliest available mapping between (1850s) records the site as being occupied by a cotton mill and plate manufactory. By 1891 these buildings were demolished and replaced with two rows of terraced houses. By 1969, the terraced houses in the eastern and southern sections of the site were demolished, the houses in the north were demolished by 1985. The garages in northwest were later constructed, with the remaining area of the site occupied by car parking facilities. Based on the site's historical land use, Made Ground is anticipated. BGS mapping indicates superficial deposits comprising glacial till (clay) underlain by the Chester Formation (sandstone). The site is underlain by a Principal Aquifer within the bedrock formation and a Secondary Undifferentiated Aquifer within the superficial deposits. The nearest surface water feature is the Rochdale Canal, 125m southwest of the site. There are no surface water abstractions or discharge consents within 400m. The site not within a source protection zone and there are no groundwater abstraction points within 700m. Primary potential risks to be investigated during this report, as well as establishing ground conditions for geotechnical design, included; potential for land gas and risks to human health and groundwater from Made Ground soils.
Fieldworks Undertaken	The pre-demolition ground investigation works was undertaken between 23rd and 26th May 2022, comprising 1 Np. Cable percussion borehole to 23.30m bgl, 5 No. window sample boreholes to 5.00m to 5.45m bgl and 1 No. rotary borehole to 35.00m bgl, including rock coring. Ground gas and groundwater monitoring standpipes were installed within 5 No. boreholes. Selected soil samples were subject to chemical and geotechnical analysis and six rounds of ground gas monitoring visits have been undertaken.
Encountered Ground Conditions	The ground conditions on site generally comprised tarmac or concrete underlain by granular made ground, and reworked cohesive made ground, to 2.10m to 3.50m bgl. The underlying natural glacial till soils comprise firm or stiff silty sandy gravelly clay, with bands of sandy clayey gravel and clayey sand to 22.90m to 23.80m bgl. The bedrock formation was encountered. The bedrock formation underlying glacial till comprises extremely weak to moderately strong brown fine to coarse grained sandstone. Groundwater levels within the bedrock formation appear consistent throughout the monitoring period, with head level in the region of 22.40m to 22.50m bgl. Localised perched water may be encountered in shallow made ground soils.
Environmental Laboratory Testing and Ground Gas Monitoring Results	With respect to the proposed '<i>Residential without plant uptake</i>' end-use, elevated concentrations of lead (8 No. samples) and arsenic (1 No. sample) were recorded. 5 No. samples, recorded asbestos, recovered as amosite and chrysotile cement, amosite board and amosite loose fibres. Asbestos in soil concentrations in the region of 0.098% w/w and 4.623% w/w were recorded. Bulk asbestos fibre concentrations of 15% were recorded in chrysotile cement in BH01 (0.65m bgl) and RC01 (0.75m bgl). A maximum carbon dioxide concentration of 0.8% %_v and methane below the detection limit has been recorded in the boreholes.
Ground Contamination and Ground Gas Assessment	A Low risk rating is identified to end-users from direct contact, inhalation and ingestion of contaminants within Made Ground soils on site. The building footprint will break the source-pathway-receptor linkage across the whole site, and no volatile contamination was identified. A Moderate risk is identified to construction and maintenance workers. An asbestos management plan should be in place during construction works. Construction and maintenance workers should be provided with PPE during all works, with reference to the environmental chemistry results.

Phase 2 Ground Investigation

	A Low risk is identified to the nearby surface waters, as no gross contamination was identified during the ground investigation, and the nearest receptor is >100m from the site. A Low risk is identified to the underlying Principal Aquifer. No gross contamination identified during ground investigation works. No groundwater body has been identified in the shallow superficial deposits. Given this and the encountered impermeable cohesive Glacial Till, there is no pathway for contaminants to reach the Principal Aquifer receptor. A Low risk is identified to site end-users from ground gas migration and inhalation from soils. The Gas Screening value for the site is taken as 0.008 l/hr for carbon dioxide, corresponding to BS8485 CS1 gas regime requiring no gas protection measures.
Geotechnical Assessment	Given the high anticipated loads associated with the 9 storey apartment building, it is considered that shallow foundations will not be suitable. It is therefore advised that a piled foundation solution is adopted. Pile design and installation are continually evolving processes, it is recommended that specialist piling contractors are contracted as to the suitability and carrying capacity of the piles in the ground conditions pertaining to the site. The carrying capacity of piles depends not only on their size and the ground conditions but also their method of installation. Additional post-demolition investigation is proposed to further inform pile design. The following geotechnical consideration should also be considered: • Presence of existing services; • Based on the findings of the ground investigation, it is recommended that consideration is given to constructing suspended ground floor slabs, bearing on pile caps and supported by a network of beams. Laboratory test results indicate a Design Sulphate Class for concrete may be taken as DS-1 and AEC class of AC-1 for the made ground and natural soils.
Recommendations	Based on the findings of the ground investigation, the following recommendations are made: 1) Additional investigation is required, following demolition of the existing garages on site. Obtain environmental samples from beneath garage footprint, and additional geotechnical information to aid pile design. 2) Asbestos management plan during construction works. 3) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein. 4) A Remediation Strategy and Verification report will be required to detail and approve the above measures and ensure imported soils for soft landscaping are suitable for use. 5) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer. It is further recommended that the above is undertaken in advance of construction works commencing on site.

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1.0 Introduction

1.1 Project Background

In March 2022 Curtins were instructed by Faithful & Gould (Manchester) to undertake a Phase 2 Ground Investigation for an area of land located directly south of Postal Street and east of Newton Street, in Manchester, M1 1EE. The site covers an area of 0.16 Ha, centred at National Grid Reference 384730, 398440

The location and extent of the site is shown in *Figure 2.1* on the following page.

A site location plan is presented on *Figure 2.1*.

It is understood that the proposed site development is a 9 storey residential block with over 100 apartment units. The ground floor includes reception area and communal amenities, a cycle store, refuse store, and residential apartments in the east and north. A residents courtyard garden is present at ground level. A proposed site plan is included in *Appendix A*.

1.2 Scope of Services

A scope for the intrusive ground investigation was developed with the following aims:

- i) Support the associated planning application and support discharge of relevant pre-commencement contaminated land planning conditions; and
- ii) Obtain geotechnical information and characterise shallow site soils for foundation design for the proposed structures.

Specifically, the Phase 2 Ground Investigation Report is intended to:

- a) Determine the risk of the proposed end-user being adversely impacted by potential contamination in shallow site soils that may be present on the site due to its known current, recent and historical use;
- b) Determine if there is a risk to the end-user from soil gases including methane, carbon dioxide, carbon monoxide and hydrogen sulphide;
- c) Characterise site wide natural soils; and
- d) Recommendations for the design of foundations and building ground floor slabs.

Detailed flood risk assessment, ecology, archaeological studies and waste classification for off-site disposal are outside of the scope of this report.

2.0 Phase 1 Preliminary Site Assessment Summary

A Phase 1 Preliminary Risk Assessment report was undertaken by Curtins in November 2021 (Ref. 1). A summary of the detailed findings of this report, comprising current site setting, history, geology and hydrogeology/hydrology is presented within this Section. This Phase 2 report must be read in conjunction with the Phase 1 Preliminary Risk Assessment Report.

2.1 Current Setting

The site is located within Manchester City Centre off Postal Street and is currently a hard standing car park to the southeast and a row of single of commercial units adjacent to Newton Street covering the remaining area of the site. The topography of the site is level. The northern boundary is marked by Postal Street, eastern boundary is marked by Dean Street, the southern boundary is marked by Faraday Street, and the western boundary is marked by Newton Street.

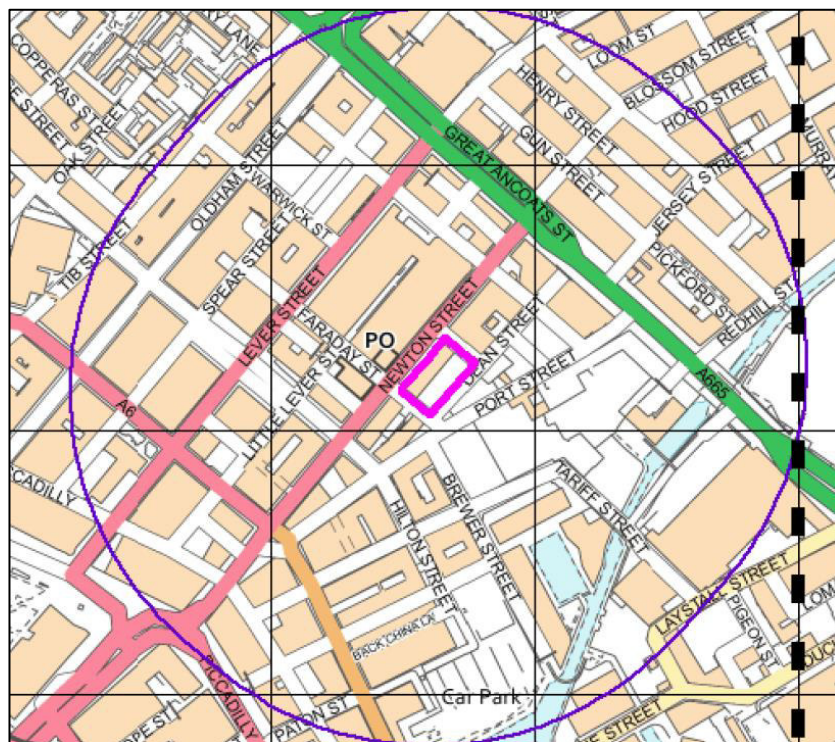


Figure 2.1 – Site Location Plan, approximate site boundary outlined in pink and 250m buffer in purple. (Landmark Information Group)

2.2 Previous Site Use

Earliest mapping (1848-1851) records the site with industrial buildings including a cotton mill and a plate manufactory. By 1891 these buildings have been demolished and replaced with two rows of terraced houses. By 1969 the terraced houses within the eastern and southern sections of the site have been demolished with the houses in the northern and western demolished by 1985. Two large buildings have

been constructed along the north western boundary adjacent to Newton Street with remain to present day with the south of the site adjacent to Dean Street remaining as car parking.

Throughout the site's history, its surroundings are generally occupied by residential properties and industrial buildings with most being demolished and reconstructed or redeveloped with commercial buildings and car parking with limited contaminative potential.

2.3 Published Geology

A review of British Geological Survey (BGS) map, 1:50,000 Scale, Solid and Drift Editions, Manchester, Sheet 85, (Ref. 2) indicates the following geological sequence:

- Glacial Till Deposits; and
- Chester Formation.

There are no BGS faults recorded on site.

There are 3 BGS recorded boreholes located within 50m of the site boundary (Ref. 2), these are detailed and presented within *Table 4.2* below:

Table 2.3 – Historical Borehole Record from Surrounding Area

Record Reference	Location (NGR)	Details (bottom to top of strata/details/thickness of strata)	
SJ89NW3779	19m Northwest (384700,398460)	0.00m to 0.10m bgl	Bituminous Surfacing (0.10m)
		0.10m to 0.45m bgl	Reinforced Concrete (0.35m)
		0.45m to 0.70m bgl	Made Ground of clay, ashes and brick (0.25m)
SJ89NW3986	28m East (384774,398429)	0.70m to 2.90m bgl	Made Ground of soft brown clay with stone and brick inclusions (2.20m)
		2.90m to 5.00m bgl	Stiff/very stiff brown silty and sandy CLAY with grey fissures, stone and coal inclusions (2.10m)
		5.00m bgl	Borehole terminated
SJ89NW3985	44m Southwest (384692,398379)	0.00m to 0.05m bgl	Bituminous Surfacing (0.05m)
		0.05m to 0.25m bgl	Setts (0.20m)
		0.25m to 0.35m bgl	Made Ground of ashes, cinders and stones (0.10m)
SJ89NW3985	44m Southwest (384692,398379)	0.35m to 1.70m bgl	Made Ground of clayey ashes, cinders and brick pieces (0.35m)
		1.70m to 5.30m bgl	Stiff brown silty and sandy CLAY with grey fissures, stone and coal inclusions with very stiff zones (3.60m)
		5.30m	Borehole terminated
SJ89NW3985	44m Southwest (384692,398379)	0.00m to 0.05m bgl	Bituminous Surfacing (0.05m)
		0.05m to 0.25m bgl	Setts (0.20m)
		0.25m to 0.55m bgl	Ashes (0.30m)
SJ89NW3985	44m Southwest (384692,398379)	0.55m to 1.20m bgl	Made Ground of stiff brown clay, ashes and brick pieces (0.35m)
		1.20m to 4.50m bgl	Very stiff brown silty and sandy CLAY with grey fissures, stone and coal inclusions (3.30m)
		4.50m to 6.50m bgl	Firm/stiff silty and sandy laminated CLAY with grey fissures, stone and coal inclusions (2.00m)

Record Reference	Location (NGR)	Details (bottom to top of strata/details/thickness of strata)
		6.50m Borehole terminated

2.3.1 Made Ground Deposits

The BGS maps do indicate Made Ground on site.

2.3.2 Superficial Deposits

Glacial Till Deposits comprising a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

2.3.3 Bedrock Deposits

Bedrock deposits are present as the Chester Formation of Triassic age, comprising sandstone.

2.3.4 Mining and Quarrying

The site is located within a coal mining reporting area; however, is not within a high-risk area and the nearest coal mining features (shafts, outcrops, etc.) are not within 1km of the site. Therefore, risk to the development from historic coal mining is low and has not been considered further.

There are no BGS recorded mineral sites within 1km of the site.

2.3.5 Other Pertinent Geological Existing Geological Records

The previous report confirms that there is a no hazard to very low risk from the following ground stability hazards on the site; collapsible ground, compressible ground, ground dissolution, landslide ground, running sands and shrinking or swelling clay.

UK Radon Mapping confirms the site is situated in area where less than <1% of homes are above the radon action level. Radon protection measures are therefore not considered necessary within the proposed development.

2.4 Hydrogeology and Hydrology

Environment Agency data indicates that the geological sequence underlying the site has the following hydrogeological characteristics:

Table 2.4 – Geological/Hydrogeological Succession

Geology	Associated Hydrogeological Classification
Made Ground	N/A
Glacial Till Deposits ¹	Secondary Undifferentiated Aquifer ³
Chester Formation ²	Principal Aquifer ⁴

Notes:

1. A heterogeneous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
2. Aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type.
3. The formation comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish-brown sandy matrix and consist mainly of pebbles of brown or purple quartzite. Gravel is composed of well-rounded pebbles, cobbles and boulders in a coarse to fine granulestone and silty sandstone matrix.
4. These are layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.

The nearest surface water feature is the Rochdale Canal, located approximately 125m southeast. River Quality is noted as Grade B.

There are no surface water abstractions within 900m and no active discharge consents recorded within 400m of the site.

The site is not situated within a Source Protection Zone (SPZ). There are no groundwater abstraction point within 700m of the site.

There are two pollution incidents to controlled waters recorded within 250m of the site. Recorded 226m south and 250m east both dated 1996 and noted as Category 3 – minor incident.

2.5 Landfill

There are no recorded landfill sites within 700m of the site.

Historical maps identified the presence of a wharf and basin approximately 49m southeast of the site until 1923, that may have been infilled.

The Envirocheck Report (Ref. 1) identifies one potentially infilled land (water) within 50m of the site which was infilled with unknown material in 1923 located 49m southeast which is assumed to be the historic basin and wharf.

2.6 Unexploded Ordnance (UXO) Risk Assessment

Risk mapping for UXO's has placed the site in a moderate-risk area (Ref. 4). Moderate-risk areas are those that show a bomb density of between 11 and 50 bombs per 1000 acres and that may contain potential WWII targets. A review of the available historic mapping does not show any evidence of bomb

damage to the site. The risk mapping indicates that there are Luftwaffe targets approximately 700m north of the site.

Analysis of historical bomb mapping from the University of Manchester (Figure 2.6) shows that less than 74m west from the site a fire bomb (red circle) had hit and damaged a building in June 1941 (Ref. 5).

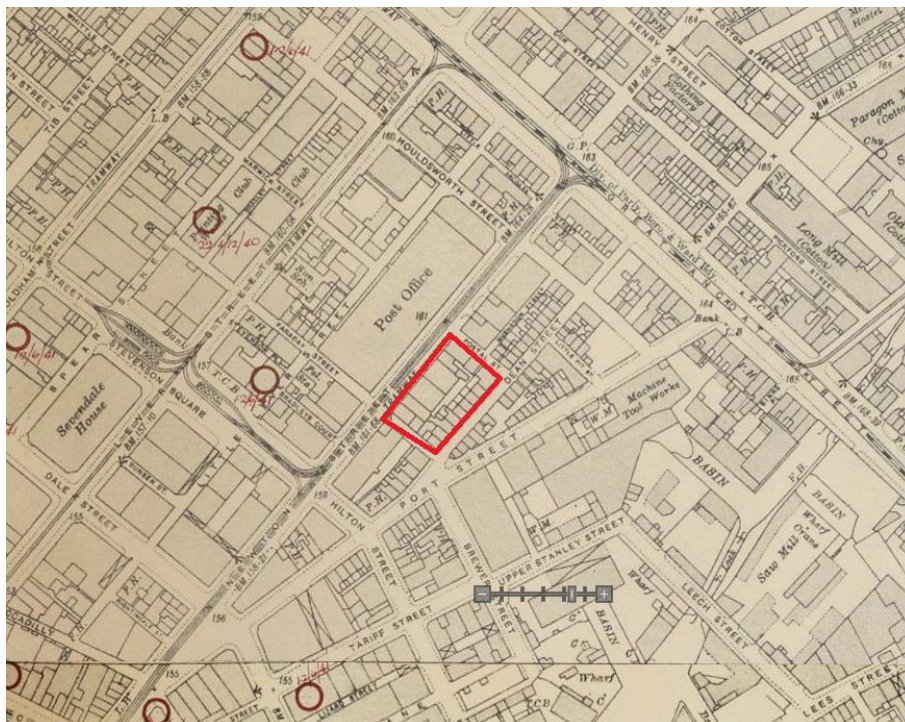


Figure 2.6: Site boundary shown in red.

Given the proximity to the nearest bomb strike, and no recorded damaged buildings in the immediate vicinity of the site, a detailed UXO risk assessment was not obtained for the ground investigation works.

During construction works, the Principal Contractor should undertake their own unexploded ordnance risk assessment prior to commencement.

2.7 Summary of Phase 1 PCSM

A summary of potential pollutant linkages at the development site identified in the previous Phase 1 reports (Ref. 1) is presented in *Table 2.7*, were identified as requiring further investigation to enable the safe redevelopment of the site.

Table 2.7 – Preliminary Conceptual Site Model

Phase 2 Ground Investigation

Source	Pathway	Receptor	Risk
Significant sources of on-site contamination: - Made Ground of unknown composition from uncontrolled deposition of materials onsite during the construction and demolition of industrial buildings and terraced houses on site - Potential contamination from oils/hydrocarbons relating to the hardstanding car parking on site. Significant sources of off-site contamination: - Uncontrolled deposition of Made Ground during the construction of roads and structures and demolition near and adjacent to the site's boundaries. - Potential contamination from industrial works within 100m surrounding the site. - Potential contamination from oils/hydrocarbons relating to the garage 40m from the site and from hardstanding car parking on site.	Direct contact, ingestion, inhalation (dust and vapours)	End-user of site (High rise residential) & Construction Workers	Moderate
	Vertical migration through the superficial deposits (soils) May occur due to existing service corridors and physical processes including; capillary action and downwards into the natural deposits through infiltration.	Groundwater Secondary Undifferentiated Strata (Superficial deposits)	Moderate/ Low
		Groundwater Principal Aquifer (bedrock)	
		Surface Water (Rochdale canal located over 125m southeast)	Low
Significant sources of ground gas: - Historic basin and wharf located 49m to the southern boundary of the site infilled with unknown material that has the potential to contain organic / putrescible material. - Localised organically rich deposits present within the natural soils..	Vertical and horizontal migration through existing service corridors and the underlying superficial deposits	Site End Users (High rise residential)	Moderate

Potential contaminants of concern associated with the sources identified within the Conceptual Site Model in *Section 6.0* of this reporting include but are not limited to: broad range aliphatic and aromatic hydrocarbons present within any fuel oils; polycyclic aromatic hydrocarbons (PAHs); inorganic compounds including heavy metals; asbestos present in discarded building materials from historical uses of the site.

Potential contaminants associated with the airborne dust/particulates include but are not limited to polycyclic aromatic hydrocarbons and inorganic compounds including toxic metals that are also accounted for by potential onsite contaminants of concern.

3.0 Phase 2 Investigation Scope of Works

Site investigation works were undertaken by Curtins between 23rd and 26th May 2022.

The scope of the ground investigation was designed in general accordance with current UK guidance including:

- LCRM (Ref. 6);
- British Standard (BS) 10175:2011+A2:2017 (Ref. 7);
- BS5930:2015+2020 (Ref. 8); and,
- BS EN1997: Part 2:2007 Eurocode 7 (Ref. 9).

The scope and rationale are summarised in *Table 3.0*.

Table 3.0 – Scope and Rationale of Fieldwork Undertaken

Exploratory Hole Type	Exploratory Hole Reference	Ground Level (m AOD)	Exploratory Hole Depth (m bgl)	Rationale
Cable Percussion Boreholes	BH01	48.81	23.30	To inform foundation design. To obtain soil samples for soil chemical analysis. To allow for ground gas and groundwater monitoring.
Window Sample Boreholes	WS01 WS02 WS03 WS04 WS05	48.86 48.77 48.58 48.54 48.94	5.45 5.00 5.45 5.45 5.45	To inform foundation design. To obtain soil samples for soil chemical analysis. To allow for ground gas and groundwater monitoring.
Rotary Boreholes	RC01	48.69	35.00	To inform foundation design. To obtain soil samples for soil chemical analysis. To allow for ground gas and groundwater monitoring.

For information regarding the location of the exploratory hole locations, refer to Curtins drawing ref. 080401-CUR-00-XX-DR-GE-80004-V01-Exploratory Hole Location Plan, included in Appendix A.

3.1 Soil Logging and Sampling

Exploratory borehole arisings were logged on site by a qualified Engineer. All exploratory holes were logged in accordance with the requirements of BS5930:2020 (Ref. 8) including recording observed visual and olfactory indications of contamination.

Exploratory hole logs are provided in *Appendix B*.

3.2 Monitoring Well Installations

Ground gas and groundwater monitoring slotted 50mm diameter pipes were installed within 3no. window sample boreholes, 1no. cable percussive borehole (shallow and deep installation) and 1no. rotary borehole.

A bentonite seal was placed above and below the screened section of the borehole to minimise potential for downward migration of contaminants and the creation of a preferential migratory pathway. A gravel aggregate surround was installed in the annulus between the sides of the borehole and the slotted sections of pipe.

The monitoring wells were primarily designed to assess the potential for ground gas and to collect groundwater where possible. The screened sections therefore focused on the more permeable near surface deposits which are likely to be producing ground gas.

The installed response zones are summarised in *Table 3.2* below.

Table 3.2 – Monitoring Well Response Zones

Borehole Ref.	Response Zone(s) m bgl (m AOD)	Strata Description(s)
BH01 (shallow)	1.00 – 3.00 (47.71 – 45.71)	Made Ground
BH01 (deep)	19.50 – 22.50 (29.31 – 26.31)	Glacial Till
WS01	1.00 – 2.50 (47.86 – 46.36)	Made Ground
WS03	1.00 – 2.00 (47.58 – 46.58)	Made Ground
WS05	1.00 – 2.20 (47.94 – 46.74)	Made Ground
RC01	26.00 – 35.00	Chester Formation

Copies of borehole logs can be referred to in *Appendix B* of this report.

3.3 Post-Investigation Monitoring

3.3.1 Ground Gas and Groundwater Monitoring

Six groundwater level and ground gas monitoring visits over three months have been undertaken, to assess the groundwater levels and the ground gas conditions. Visits were undertaken between 31st May 2022 and 8th August 2022.

The results of the groundwater level monitoring are detailed in *Section 6.1*.

The results of the ground gas monitoring are detailed in *Section 8.0*.

4.0 Laboratory Analysis

4.1 Geo-environmental Analysis

Representative soil samples were selected for laboratory chemical analysis, based on field observations and to provide information about the encountered ground conditions.

Soil samples were placed in laboratory provided containers and stored in cool boxes prior to being transported to the nominated laboratory under the laboratory's chain of custody documentation. The laboratory selected by Curtins for chemical and geotechnical analysis was Envirolab Ltd (UKAS and MCERTS accredited). Geotechnical analysis was sub-contracted i2 Analytical, (UKAS accredited laboratory).

The sampling positions were generally located in a non-targeted, systematic array, to give an adequate and representative coverage of the sites proposed end use and the immediate environmental setting, concentrated in the near surface deposits.

4.1.1 Soil Analysis

The source material of contaminants of concern potentially present on the site was considered to include, amongst others; organic matter, ash and fill, hydrocarbons (e.g. fuel/oils), polyaromatic hydrocarbons (PAHs), heavy metals, asbestos, VOCs, SVOCs and PCBs. The extent of the above is captured by the broad environmental testing suites listed in *Table 4.1.1*.

Table 4.1.1 – *Environmental Chemistry Analysis Suite: Soils*

Suite Ref.	Analyte	Limit of Detection
Soils Suite	Asbestos Screen	-
	pH Value	0.01 pH
	2:1 Water Soluble Sulphate	0.01 g/l
	Soil Organic Matter (SOM)	0.1% w/w
	Arsenic, Chromium, Chromium VI, Copper, Lead, Nickel, Selenium	1 mg/kg
	Zinc	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.17 mg/kg
	Cyanide (total)	1 mg/kg
	Phenols (screen)	0.2 mg/kg
	PAHs (16 MS)	0.01 – 0.08 mg/kg

Suite Ref.	Analyte	Limit of Detection
	TPH CWG Aro/Ali Split	0.01 – 1 mg/kg
SVOCs/VOCs	SVOCs	100 – 500 µg/kg
	VOCs	1 -10 µg/kg

A total of 9 No. soil samples were obtained from the boreholes and tested for Curtins Suite A. All samples were obtained from the Made Ground.

A total of 3 No. made ground soil samples were tested for SVOCs and VOCs.

Two samples of possible ACM were recovered and sent to the laboratory for assessment. Quantification of the asbestos was undertaken on these samples.

Asbestos quantification was undertaken on three further soil samples where asbestos was positively identified during initial laboratory screening.

Copies of the environmental chemistry testing certificates are presented in *Appendix C*.

4.2 Geotechnical Testing

Soil samples for testing were prepared in accordance with BS1377: Part 1:2016 (Ref. 10). The undertaken geotechnical testing is summarised in *Table 4.2*.

Table 4.2 – Geotechnical Testing

Test Type	Quantity	Standard
In Situ Testing		
Standard Penetration Testing	51	BS 5930: 2015+2020, Clause 41
Laboratory Testing (General Testing - Foundation Design)		
Atterberg Limit	13	BS1377 1990, Part 2 (clause 4.5, 5.3 & 5.4)
Moisture Content	13	BS1377 1990, Part 2
Triaxial Multistage	2	BS 1377:PT2:1990, Part 7.2 BS 1377:PT7:1990: Part 9.4
One-Dimensional Consolidation	2	BS1377 1990, Part 3
Partial Size Distribution (wet sieve)	5	BS EN 17892: Part4:2016, clause 5.2.2 and 5.2.3
Water Soluble Sulphate	21	ISO 17025 MCERTS
pH Value	21	ISO 17025 MCERTS

Test Type	Quantity	Standard
Point Load Strength	10	ISRM 2007
UCS	3	ISRM 2007

The results of the geotechnical testing are summarised in *Section 6.0* of this report.

Copies of the geotechnical testing certificates can be referred to in *Appendix D*.

5.0 Encountered Ground Conditions

The ground conditions across the site, determined during the ground investigation works generally comprised hardstanding, overlying granular and cohesive made ground. Glacial till was recorded beneath the made ground comprising granular and cohesive material, itself underlain by sandstone of the Chester Formation.

5.1 Encountered Ground Conditions

A summary of the ground conditions encountered during the Curtins site investigation works is presented below, with detailed information presented on the exploratory hole logs which can be referred to in *Appendix B*.

Table 5.1 – Summary of Ground Conditions Encountered

Stratum	Depth to top of strata, m bgl (m Above Ordinance Datum (AOD))	Recorded Thickness (m)		Description
		Min	Max	
Made Ground	0.00 (6.20 – 7.00)	2.10	3.50	MADE GROUND of various gravel, sand and clay compositions, including upper tarmacadam layers. Composition varies position to position, see <i>Section 5.2</i> for details.
Glacial Till	1.80 – 3.50	1.50 ¹	21.20	Firm to stiff gravelly sandy silty clay Sandy clayey gravel, Slightly clayey sand
Chester Formation	22.90 – 23.80	0.50 ¹	11.20 ¹	Extremely weak to moderately strong, brown, fine to coarse grained sandstone

1 – Thickness not proved

5.2 Made Ground

Made Ground was encountered in all exploratory hole locations on site, to a maximum depth between 1.80m and 3.50m bgl. The Made Ground comprised various compositions as outlined in *Table 5.1*, details of which are noted below and within the Exploratory Hole Logs in *Appendix B*.

5.2.1 Surface Covering

Tarmacadam was identified at ground level in all exploratory hole locations to depths of between 0.02m bgl and 0.17m bgl.

A concrete layer was identified within WS02 underlying the tarmacadam at a depth 0.15mbgl to a depth of 0.25m bgl.

5.2.2 Granular Made Ground

Granular Made Ground was encountered in all exploratory boreholes at depths of between 0.02m and 2.50m bgl and was found to be underlie the surface covering Made Ground material.

Granular Made Ground was identified at various depths and varied between gravels and sands. The granular Made Ground were predominantly encountered as gravelly, cobbly fine to coarse sands, or sandy clayey cobbly gravels. Gravels and cobbles were typically angular to subrounded brick and concrete, alongside fragments of tarmac, timber, metal, plastic, ash, clinker, ceramic, mudstone, siltstone, quartz and sandstone.

5.2.3 Cohesive Made Ground

Cohesive Made Ground was encountered in BH01, WS02 and RC01 at depths of between 0.95m and 2.40m bgl and was found to be underlie the granular Made Ground material.

Cohesive Made Ground was described as a soft to firm, sandy gravelly clay. Gravels were typically described as angular to subrounded of brick and sandstone. It is likely that the cohesive made ground is reworked natural material.

5.3 Glacial Till

Glacial Till deposits were encountered underling the Glacial Till deposits in all exploratory hole locations. The Glacial Till encountered was predominantly cohesive with small granular deposits interbedded.

Glacial Till deposits were encountered at depths of between 1.80m and 3.50m bgl. The base of this deposit was encountered in BH01 and RC01 at depths of between 22.90m and 23.80m bgl.

The cohesive Glacial Till deposits were predominantly encountered as firm (occasionally soft near surface) or stiff slightly gravelly to very gravelly, sandy, slightly silty to silty clay.

The granular layers of Glacial Till were encountered interbedded within the cohesive deposits, and comprised sandy clayey gravels, and slightly clayey sands. The granular material is laterally discontinuous, deemed to be localised lenses.

5.4 Chester Formation

Chester Formation sandstone bedrock was encountered underlying the Glacial Till deposits in BH01 and RC01 at depths of between 22.90m bgl and 23.80m bgl (25.91m AOD and 24.89m AOD).

The Chester Formation sandstone encountered within BH01 was described as a sandstone recovered as a sandy gravel. This was likely due to the chiselling action of the drilling methodology breaking the solid bedrock.

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The sandstone recovered in RC01 was recorded as extremely weak to moderately strong, brown, fine to coarse grained sandstone. Fractures were described as generally sub-horizontal or sub-vertical, extremely closely to medium spaced, undulating/planar/stepped rough, undulating/planar smooth. Parts of the sandstone horizons have been recovered as non-intact, noted as being weathered to a gravel of sub-angular coarse sandstone.

5.5 Observed Potential Contamination

No potential visual or olfactory contamination was observed during the intrusive investigation works.

5.6 Obstructions Encountered

No obstructions were encountered during the intrusive investigation works.

5.7 Groundwater

A summary of the groundwater levels recorded during the siteworks is presented in *Table 5.7a*.

Table 5.7a – Groundwater Noted During Site Investigation

Borehole Ref.	Water Strikes			
	Strike Depth m bgl (m AOD)	Water Depth after 20 mins m bgl (m AOD)	Strata	Notes
BH01	15.50	15.50	Glacial Till	-
WS02	2.50	-	Made Ground	-
WS03	3.50	-	Glacial Till	-
WS05	2.00	-	Made Ground	-

Six rounds of groundwater monitoring have been undertaken between 31st May 2022 and 8th August 2022, the results of which are presented in *Table 5.7b*.

Table 5.7b – Groundwater Monitoring Results

Borehole Ref.	Installation Strata	Response Zone m bgl (m AOD)	Depth, m bgl (m AOD)					
			31/05/22	16/06/22	28/06/22	19/07/22	01/08/22	08/08/22
BH01 (shallow)	Made Ground	1.00 – 3.00	Dry	2.00	1.96	2.18	1.83	1.73
BH01 (deep)	Glacial Till	19.50 – 22.50	Dry	20.88	21.45	22.34	22.12	20.28
WS01	Made Ground	1.00 – 2.50	- ¹	Dry	Dry	Dry	Dry	Dry
WS03	Made Ground	1.00 – 2.00	Dry	Dry	- ¹	Dry	Dry	Dry

Borehole Ref.	Installation Strata	Response Zone m bgl (m AOD)	Depth, m bgl (m AOD)					
			31/05/22	16/06/22	28/06/22	19/07/22	01/08/22	08/08/22
WS05	Made Ground	1.00 – 2.20	Dry	Dry	Dry	Dry	- ¹	- ¹
RC01	Chester Formation	26.00 – 35.00	- ¹	23.35	22.40	22.36	22.42	22.44

¹ – Unable to access monitoring well

Based upon groundwater elevations and the underlying geology, the following considerations are given to the underlying groundwater regime:

- Groundwater levels within the bedrock formation appear consistent throughout the monitoring period, with head level in the region of 22.40m to 22.50m bgl.
- Localised perched water may be encountered in shallow made ground soils.

6.0 Ground Model

6.1 Made Ground

Made Ground was encountered in all exploratory hole locations, from ground level to a maximum depth between 2.10m and 3.50m bgl.

The geotechnical test results recorded within the Made Ground are summarised in *Table 6.1* below.

Table 6.1 – Summary of Made Ground Geotechnical Test Results

Parameter	No. of Tests	Results
In-Situ Tests		
SPT 'N' Value	14	Min: 1 Max: 29 Average: 12.43
Laboratory Tests - General		
pH	9	Min: 7.79 Max: 8.8 Average: 8.34
Water Soluble Sulphate (mg/l)	9	Min: <10 Max: 90 Average: 27.77

No parametric geotechnical analysis has been undertaken on this stratum due to its unsuitable properties for use as a founding stratum.

6.2 Glacial Till

Glacial Till was recorded underlying the made ground in all exploratory holes locations. It was typically encountered as cohesive deposits with interbedded granular deposits to depths of between 22.90m and 23.80m bgl.

6.2.1 Cohesive Glacial Till Deposits

The geotechnical tests recorded within the cohesive deposits are summarised in *Table 6.2.1a*.

Table 6.2.1a – Summary of geotechnical test results – Glacial Till

Parameter	No. of Tests	Results
In-Situ Tests		
SPT 'N' Value ⁽²⁾	19	Min: 11 Max: 44 Average: 21.37
Laboratory Tests - General		
Atterberg Test	Liquid Limit (%) ⁽¹⁾	13 Min: 20 Max: 51

Parameter	No. of Tests	Results
		Average: 35.46
Plastic Limit (%) ⁽¹⁾	13	Min: 10 Max: 23 Average: 17.15
Plasticity Index (%)	13	Min: 10 Max: 28 Average: 18.31
Modified Plasticity Index (%) ⁽¹⁾	13	Min: 9.4 Max: 28 Average: 18.01
Moisture Content (%)	13	Min: 11 Max: 29 Average: 21.23
pH	13	Min: 7.9 Max: 8.8 Average: 8.45
Water Soluble Sulphate (mg/l)	13	Min: 30 Max: 120 Average: 70
Particle Size Distribution Cobbles Gravel Sand Silt/Clay	1	0 9 42 49
Quick Undrained Multistage Triaxial	2	Min: 75 Max: 125 Average: 100
One Dimensional Consolidation in Oedometer	2	Min: 0.035 Max: 0.14 Average: 0.0875

(1) Modified plasticity index is the plasticity of components <425µm.

(2) Only includes SPTs tests in which full penetration was achieved.

A total of twelve Atterberg Tests were undertaken in the cohesive material indicating the soils behaviour. Results generally indicate low or medium plasticity clay, though BH01 (7.00m bgl) recorded high plasticity clay. The soils have generally low volume change potential in accordance with guidance from NHBC Standards Chapter 4.2 (2021). Samples from BH01 (5.00m bgl, 7.00m bgl), WS01 (2.50m bgl), WS02 (4.00m bgl) and WS04 (2.50m bgl) are classified as being of medium volume change potential. (Ref. 11). The results of the Atterberg Limits are presented on *Figure 6.2.1a*.

The SPT N results are presented on *Figure 6.2.1b* and *Figure 6.2.1c*, predominantly increasing with depth.

A moderately conservative Undrained Shear Strength, C_u , of cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 12) using **Equation 1**:

$$C_u = f_1 \times \text{SPT N} \quad \text{Equation 1}$$

Where:

C_u is the Undrained Shear Strength

f_1 is the Stroud Factor determined from Figure 1.5 (Ref. 13)

SPT N is Characteristic Standard Penetration Test Result

Using an f_1 factor of 6 for an average plasticity index of 18%, C_u values ranging between 54 and 264 kPa were determined. The estimated results generally indicate a medium to very high strength clay. The strength of the cohesive glacial till generally increases with depth.

Two Quick Undrained Multi Stage Triaxial Tests were undertaken. The tests were undertaken in BH01 at depths of 4.00m and 9.00m bgl recording values of 125 kPa and 75 kPa respectively, indicating medium and high strength clays.

Figure 6.2.1d and Figure 6.2.1e, indicates the estimated Undrained Shear Strength of cohesive glacial till derived through correlation with SPTs and plasticity indices. The results are broadly consistent with the correlation between SPT 'N' Values and plasticity.

A moderately conservative unit weight of between 16 and 20 kN/m³ is deemed suitable for medium strength clay, increasing to between 18 and 22 kN/m³ and 18 and 24 kN/m³ for high strength and very high strength cohesive soils, respectively, in accordance with BS8004:2015 (Ref. 14). The unit weight of very high strength cohesive glacial till increases to 20 to 24 kN/m³ below the groundwater table.

A moderately conservative Coefficient of Consolidation, M_v , of the cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 12) described by **Equation 2**:

$$M_v = 1 / (f_2 \times \text{SPT } N) \quad \text{Equation 2}$$

Where:

M_v is the coefficient of consolidation

f_2 is the Stroud Factor determined from Figure 1.5 (Ref. 13)

SPT N is Characteristic Standard Penetration Test Result

Using an f_2 factor of 0.58 for an average plasticity index of 18%, M_v values typically range between 0.039 and 0.192 m²/MN. The results are variable, though generally indicating a very low to medium compressibility clay, generally becoming less compressible with depth. The values are presented in *Figure 6.2.1f* and *Figure 6.2.1g*.

The Angle of Shearing Resistance, ϕ' , for the cohesive Glacial Till has been derived from the correlation with Plasticity Indices (Ref. 15) shown in *Figure 6.2.1h* and *Figure 6.2.1i*.

The Drained and Undrained Young's Modulus, E' and E_u , can be derived through the empirical relationship with Undrained Shear Strength (C_u) described in **Equation 3** and **Equation 4**, shown in *Figure 6.2.1j* and *Figure 6.2.1k*. An increasing with depth Young's modulus is

proposed for design, according to the following relationships obtained from the ICE Manual of Geotechnical Engineering, 2012:

$$E_u = 330 \times c_u \quad \text{Equation 3}$$

$$E' = 200 \times c_u \quad \text{Equation 4}$$

Where:

E_u is the Drained Youngs Modulus, and E' is the Undrained Youngs Modulus

C_u is the Undrained Shear Strength

The Drained and Undrained Young's Modulus, E' and E_u , for the cohesive Glacial Till has been derived from the correlation with Plasticity Indices shown in *Figure 6.2.1h* and *Figure 6.2.1i*.

It should be noted that care should be taken in using linear stiffness values derived from relationships as they do not necessarily reflect the non-linear nature of soil stiffness. The actual stiffness will be strain dependent and non-linear and should be considered in detailed design of sensitive structures.

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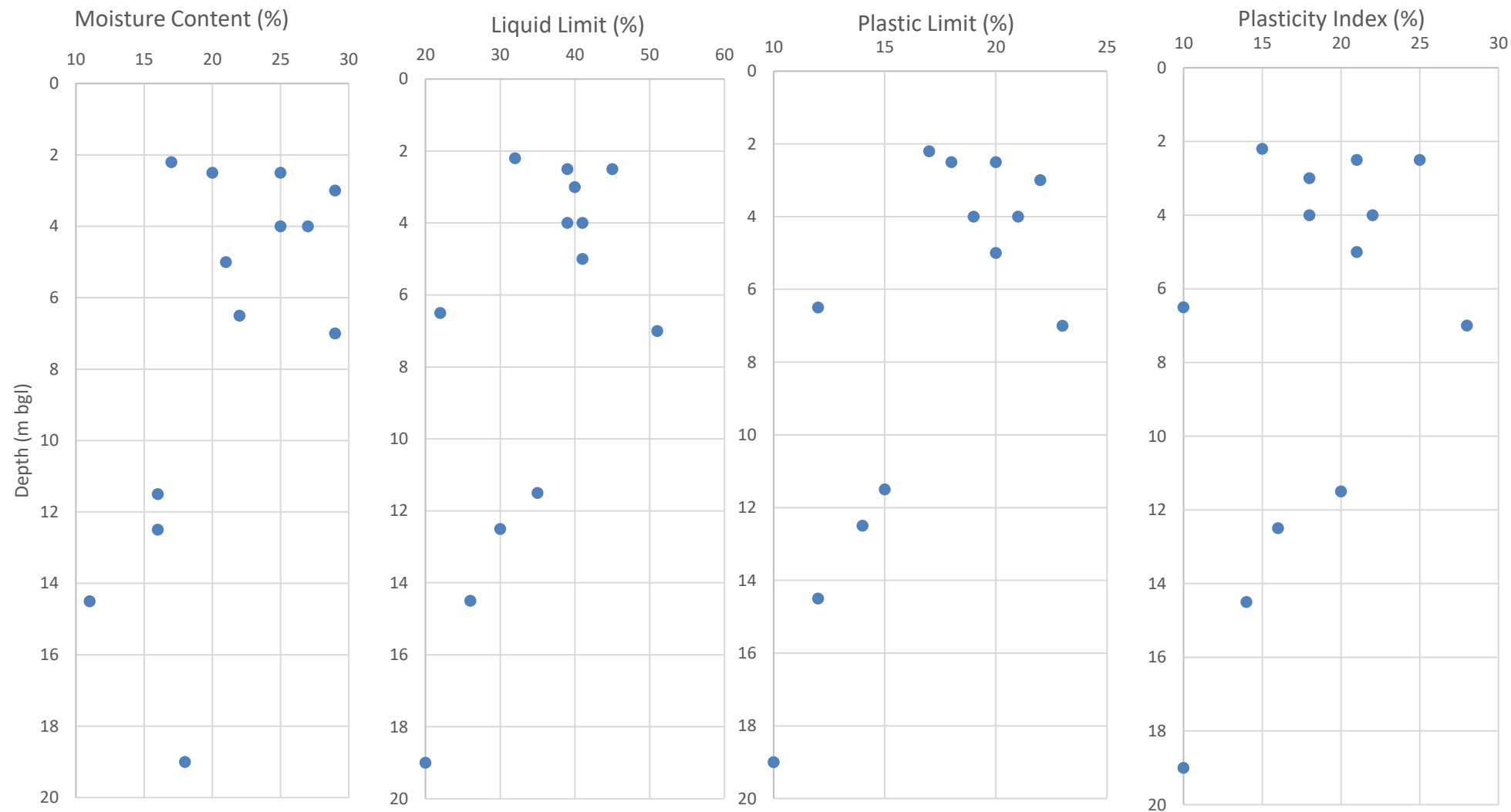


Figure 6.2.1a – Summary of Atterberg Test Results

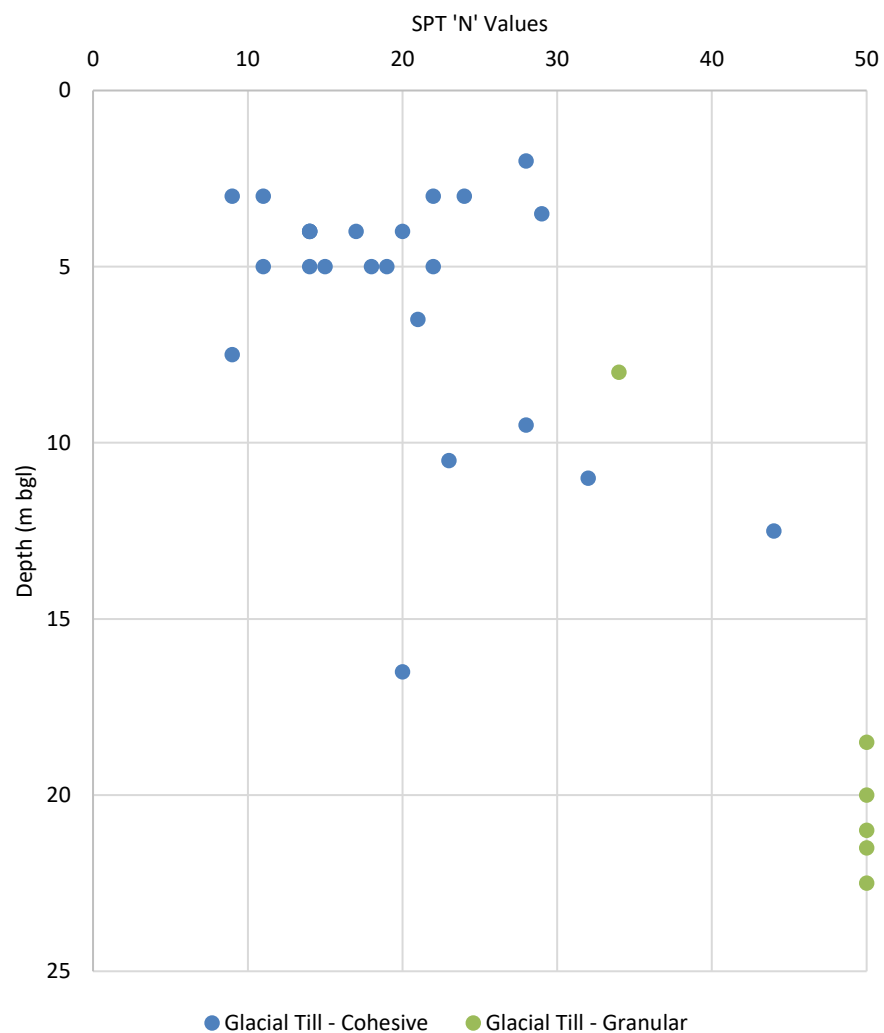


Figure 6.2.1b – Standard Penetration Test vs. Depth

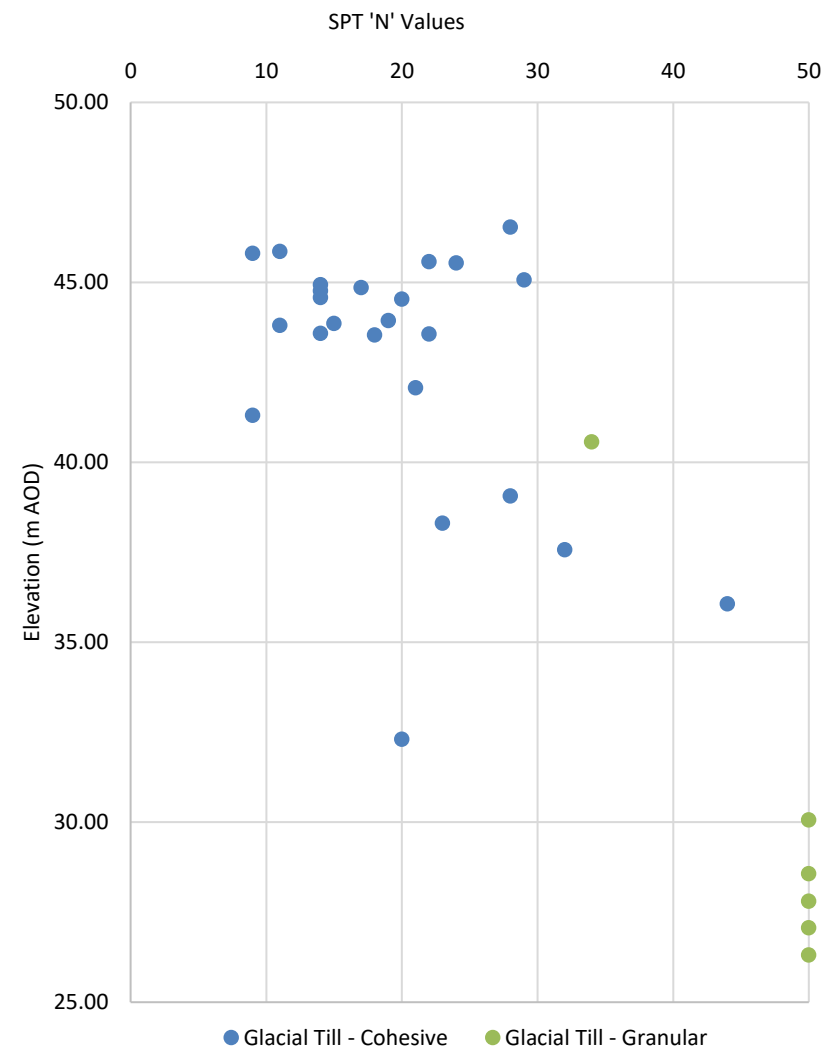


Figure 6.2.1c – Standard Penetration Test vs. Elevation

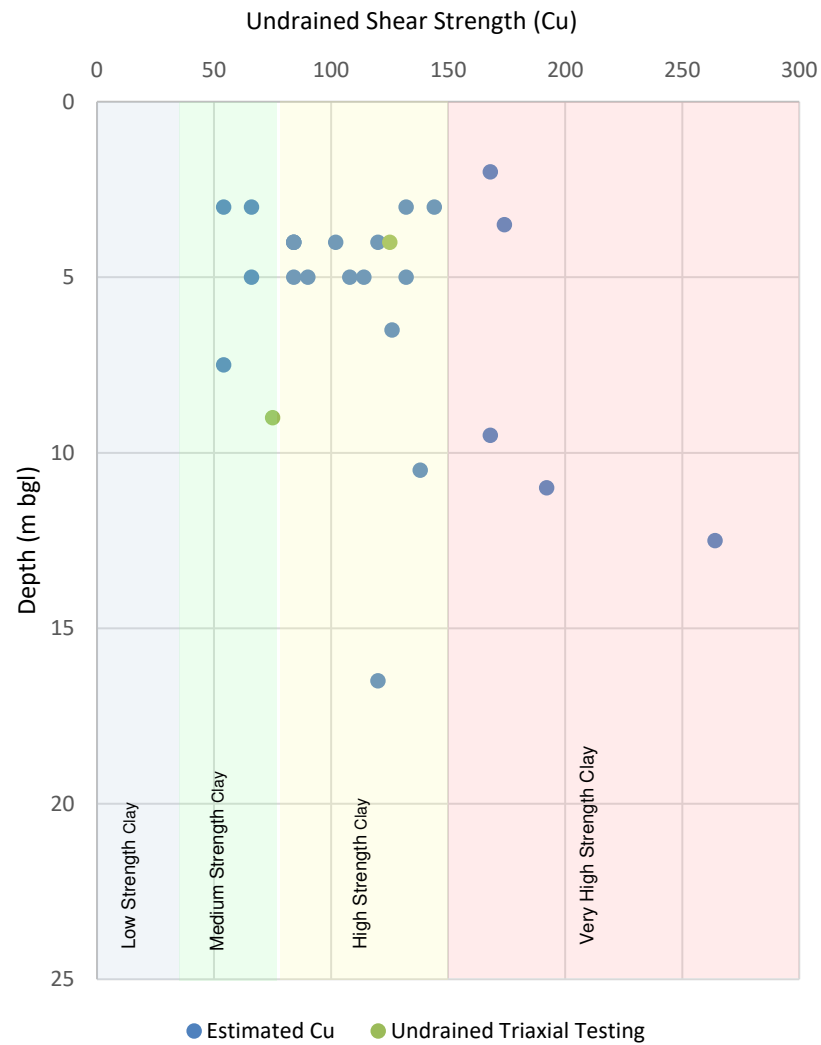


Figure 6.2.1d – Estimated Undrained Shear Strength vs Depth

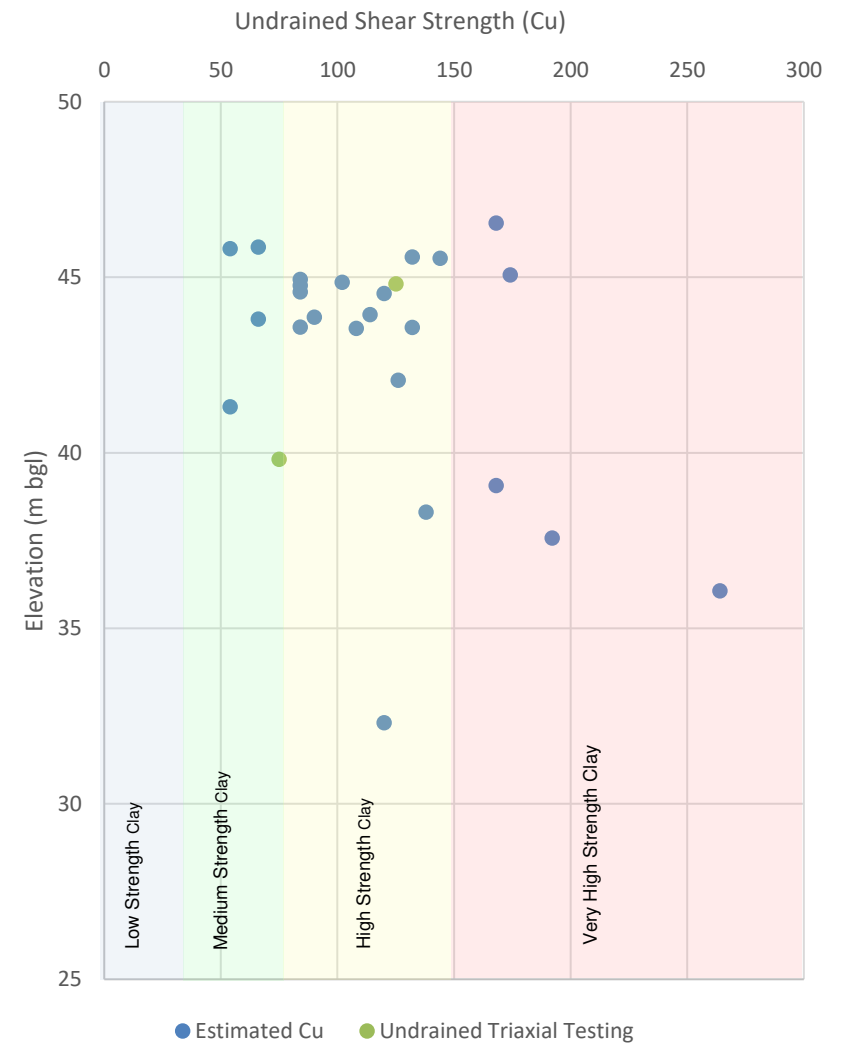


Figure 6.2.1e – Estimated Undrained Shear Strength vs Elevation

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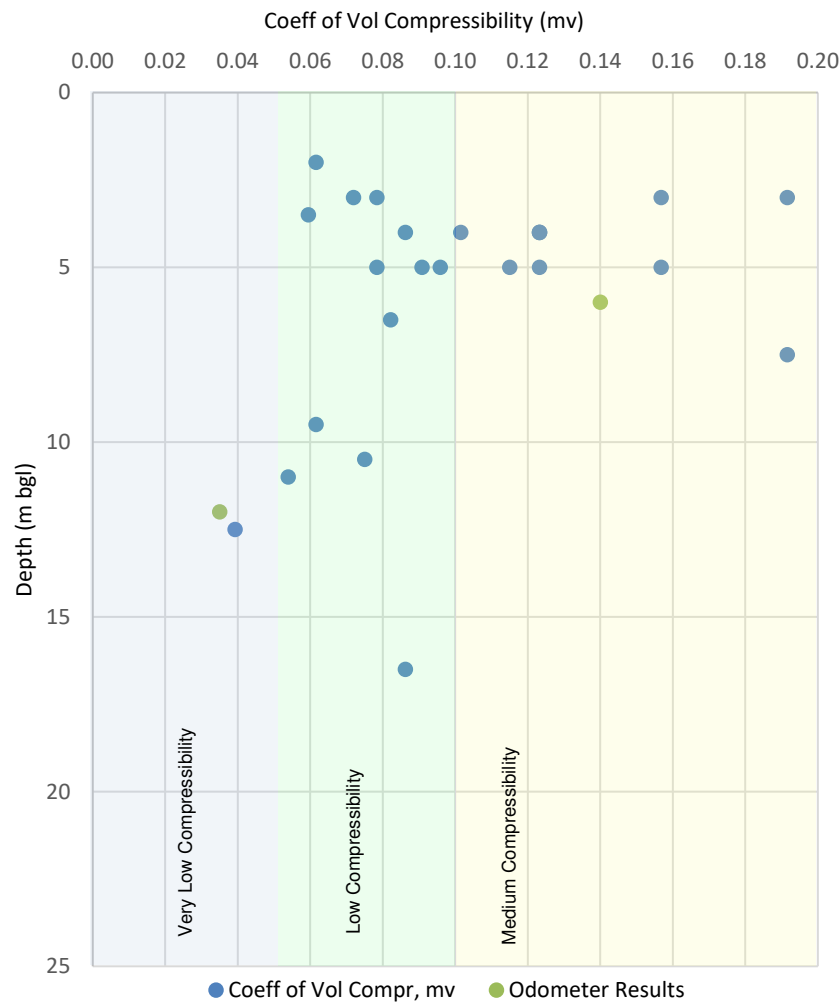


Figure 6.2.1f – Estimated Volume Compressibility Coefficients (Mv) vs Depth

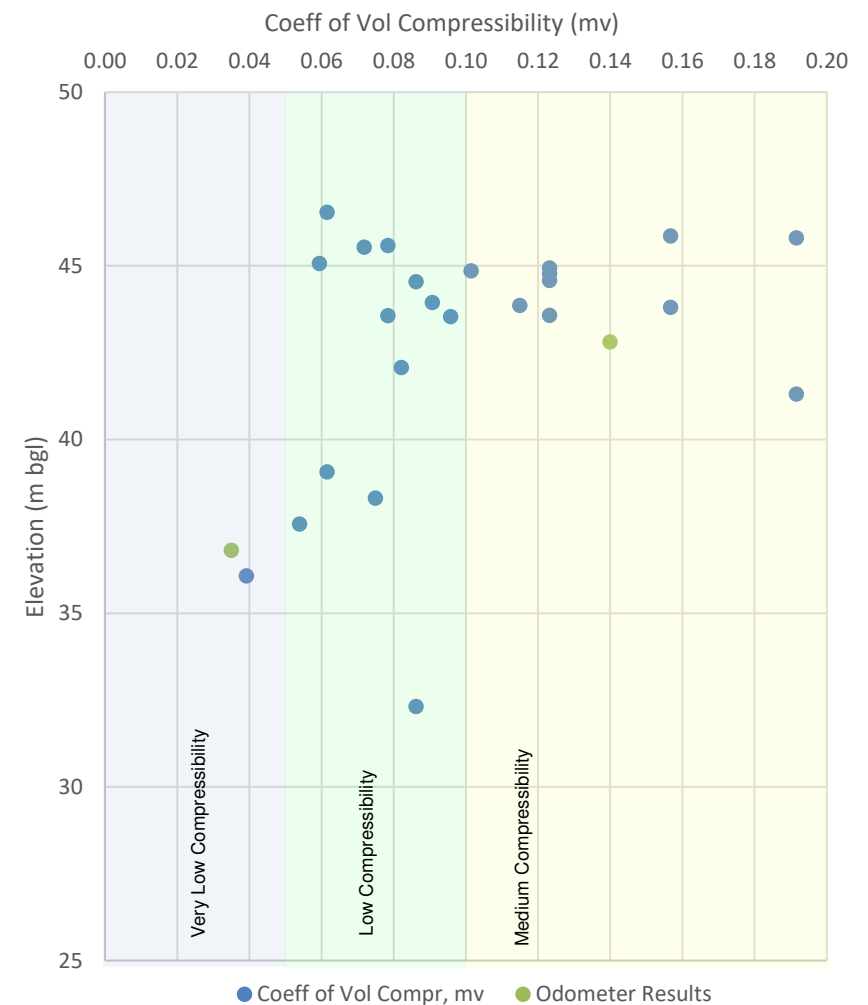
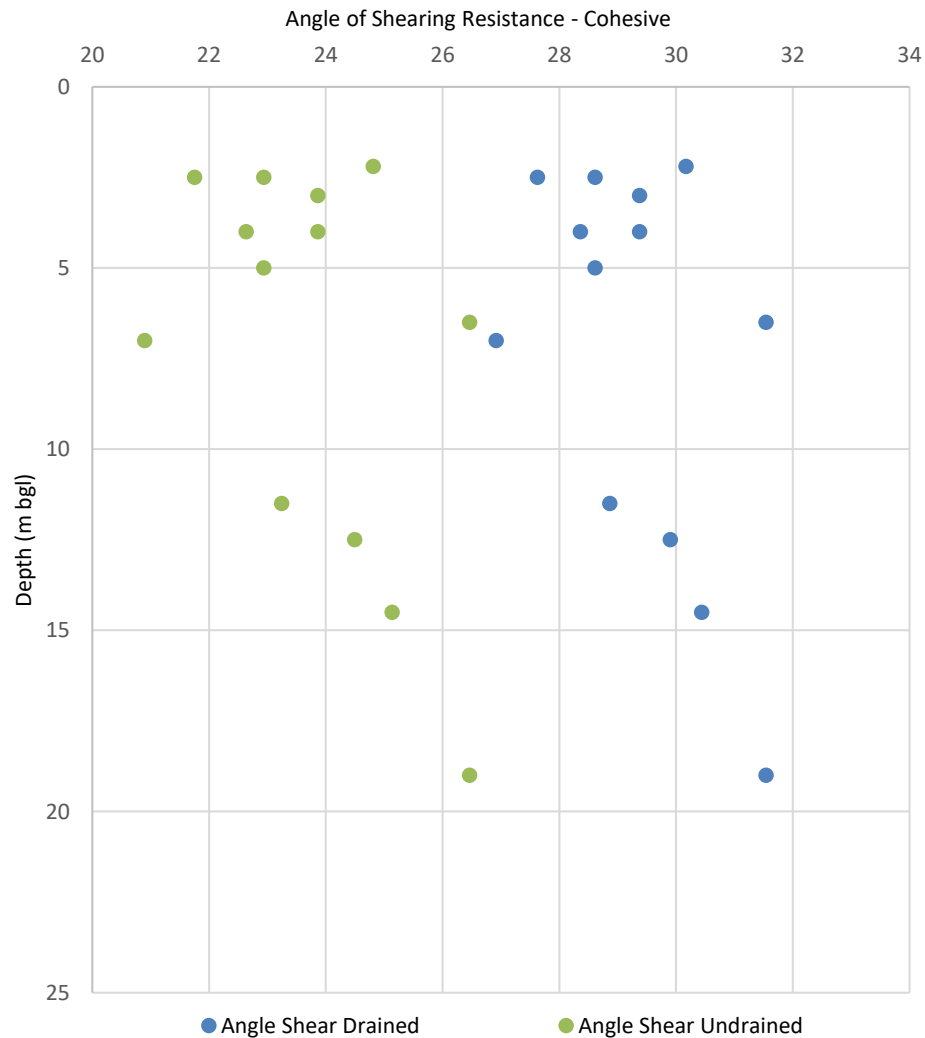
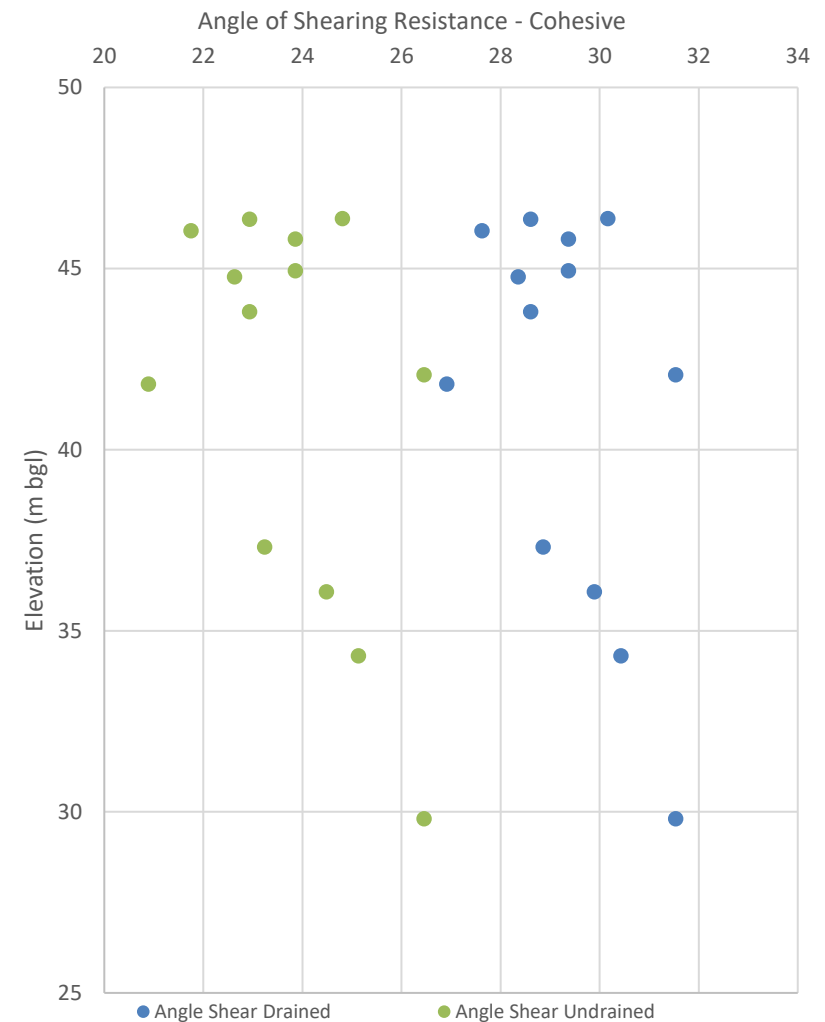


Figure 6.2.1g – Estimated Volume Compressibility Coefficients (Mv) vs Elevation

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**Figure 6.2.1h** – Angle of Shearing Resistance (Cohesive) vs Depth**Figure 6.2.1i** – Angle of Shearing Resistance (Cohesive) vs Elevation

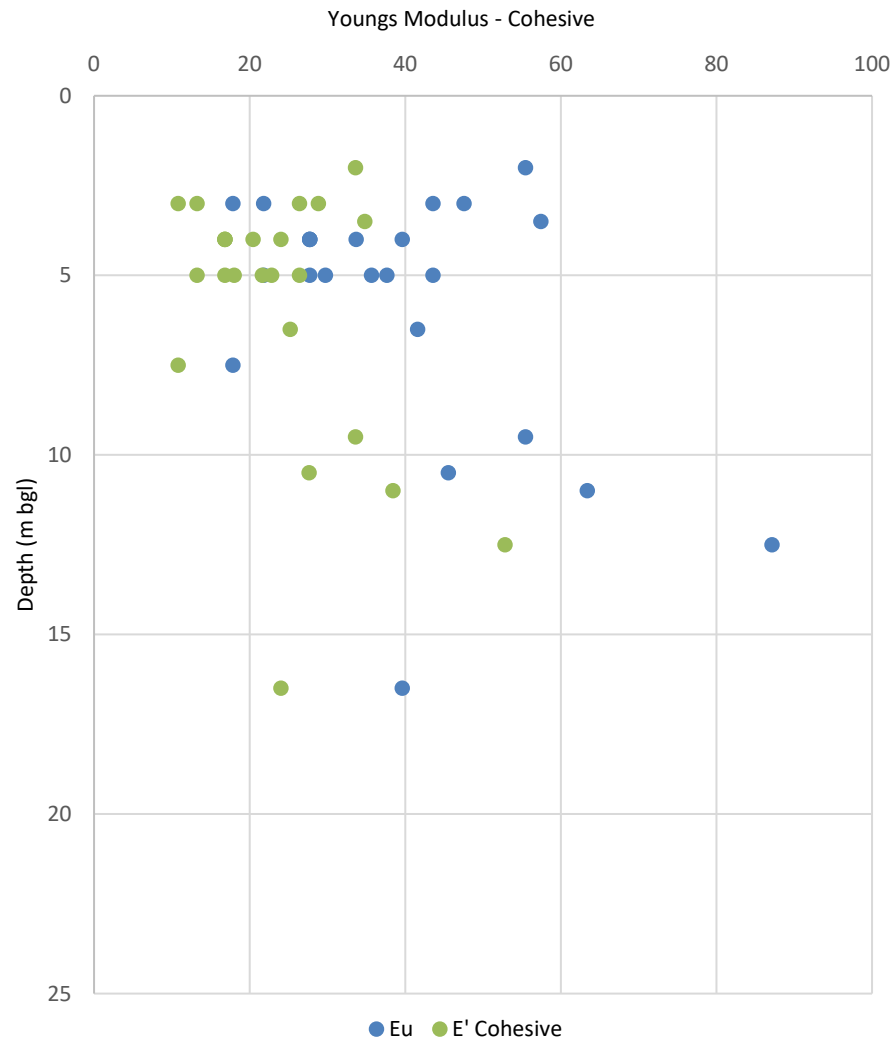


Figure 6.2.1j – Estimated Young's Modulus (Cohesive) vs Depth

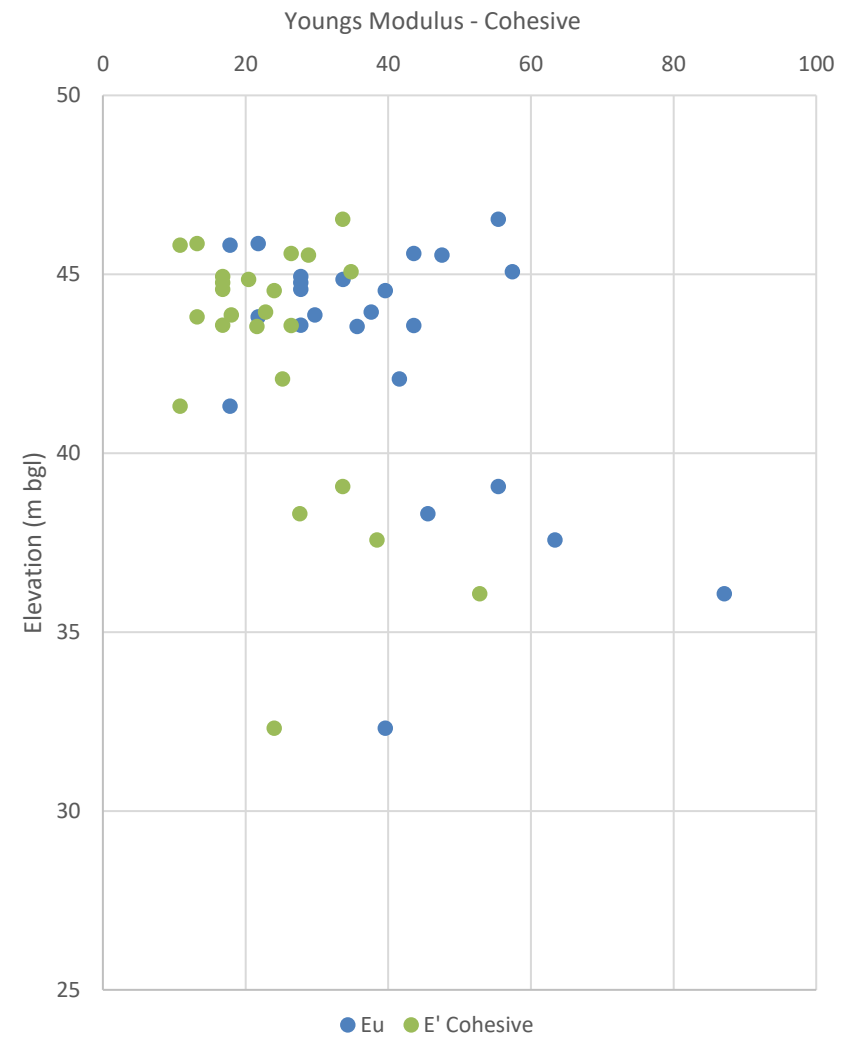


Figure 6.2.1k – Estimated Young's Modulus (Cohesive) vs Depth

6.2.2 Granular Glacial Till Deposits

The geotechnical test results recorded within the granular deposits are summarised in *Table 6.2.2*.

Table 6.2.2 – Summary of granular geotechnical test results

Parameter	No. of Tests	Results
In-Situ Tests		
SPT 'N' Value ⁽¹⁾	1	34
Laboratory Tests - General		
Particle Size Distribution	4	See Figure 6.2.2

(1) Full penetration achieved only

Six SPT 'N' value was recorded, which partially penetrated the granular glacial till deposit, however, only one result achieved full penetration of the strata within BH01. Due to this, no estimated geotechnical parameters of the granular Glacial Till are presented within the ground model.

Figure 6.2.2 summarises the results of ten Particle Size Distribution Tests, generally confirming the field descriptions recorded in the exploratory hole logs.

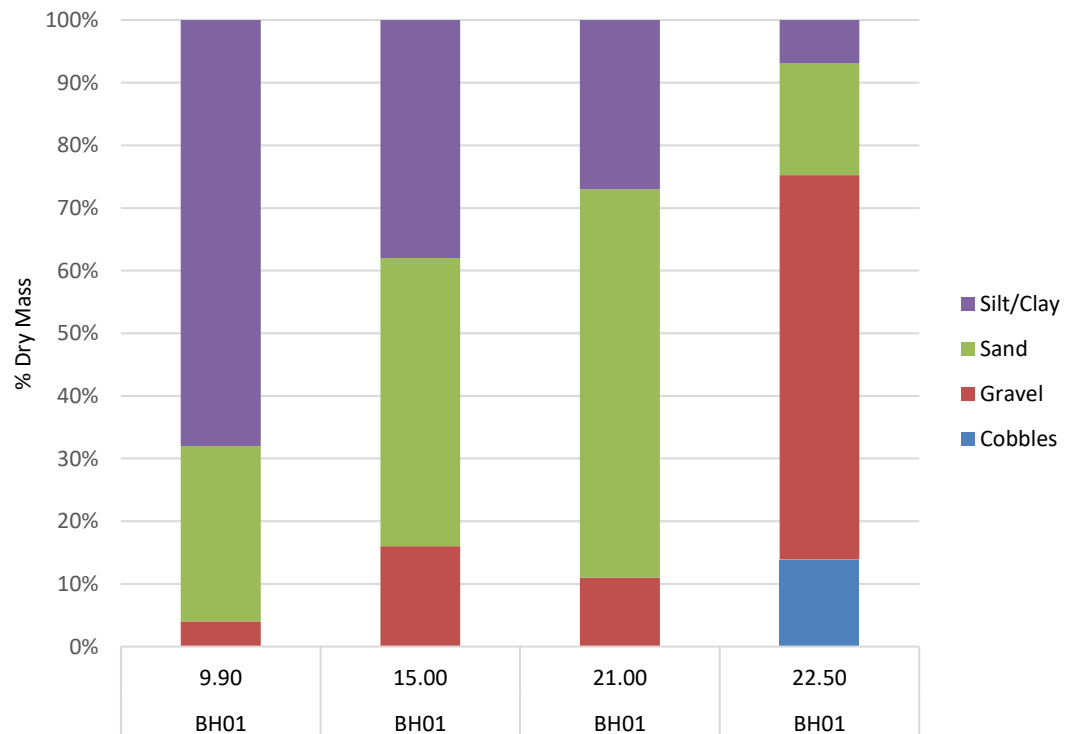


Figure 6.2.2 – Summary of PSD test results

6.3 Chester Formation

The Chester Formation bedrock was encountered underlying Glacial Till deposits in BH01 and RC01. The Chester Formation comprised sandstone deposits solely. Sandstone was recorded as extremely weak to moderately strong, brown, fine to coarse grained sandstone. There were zones of non-intact core recorded in the exploratory holes, details of which can be referred to in exploratory hole logs in *Appendix B*.

Rock Quality Designation (RQD) recorded in the cored samples ranged from 28 to 100% (averaging 66%) which classifies it as of very poor to good rock mass quality, with the quality of rock varying with depth. The 100 RQD was recorded at the top of the bedrock formation, between 24.08m to 24.50m bgl. Total Core Recovery (TCR) and Solid Core Recovery (SCR) are fairly regular between core runs. The Rock Quality Parameters are presented in *Figure 6.3.3a* and *Figure 6.3.3b*.

A summary of the geotechnical testing results for the sandstone bedrock are presented in *Table 6.3b*. Full details of geotechnical testing are included in *Appendix D*.

Table 6.3.2b – Summary of geotechnical test results

Parameter		No. of Tests	Results
In-Situ Tests			
SPT 'N' Value		2	Min: >50 Max: >50 Average: >50
Laboratory Test Results			
Point Load Indices (Is50) (MPa)	Axial Plane	10	Min: 0.09 Max: 0.58
Unconfined Compressive Strength, UCS (MPa)		3	Min: 11.1 Max: 17.7
Derived Parameters			
Estimated UCS from Point Load Indices	Axial Plane	10	Min: 1.98 Max: 12.76

Overall, 10No. axial Point Load Tests (PLT) were undertaken on selected samples of sandstone from rotary cores. Axial plane PLT (Is(50)) results ranged from 0.09MPa and 0.58MPa. No diametral plane tests were undertaken.

An approximation of the unconfined compression strength (UCS) of the rock may be derived from the following relationship, described in *Equation 5*:

$$UCS = PLT \text{ Is}(50) \times f_1 \quad \text{Equation 5 (Tomlinson)}$$

Where f_1 is derived from the correlation between PLT Is(50) and UCS Results

Due to the limited set of UCS results, a published correlation factor of 22 has been used for sandstone (Ref. 13). Based on this relationship, estimated UCS values for bedrock range between 1.98MPa and 12.76MPa for axial tests, indicating the rock tested has strength index of very weak to weak. These findings show a high variability than the strengths indicated during the field descriptions, typically recorded as extremely weak to medium strong. This is likely due to localised areas of lower strength sandstone chosen for laboratory analysis.

The estimated UCS results are not consistent with the UCS testing result which are 14.8MPa, 17.1MPa and 11.1MPa. The reason for termination was due to single shear and axial cleavage. The results indicate that the intact rock is weak. This is generally inconsistent with strength described in the field. The results are shown in *Figure 6.3.3c* and *Figure 6.3.3d*.

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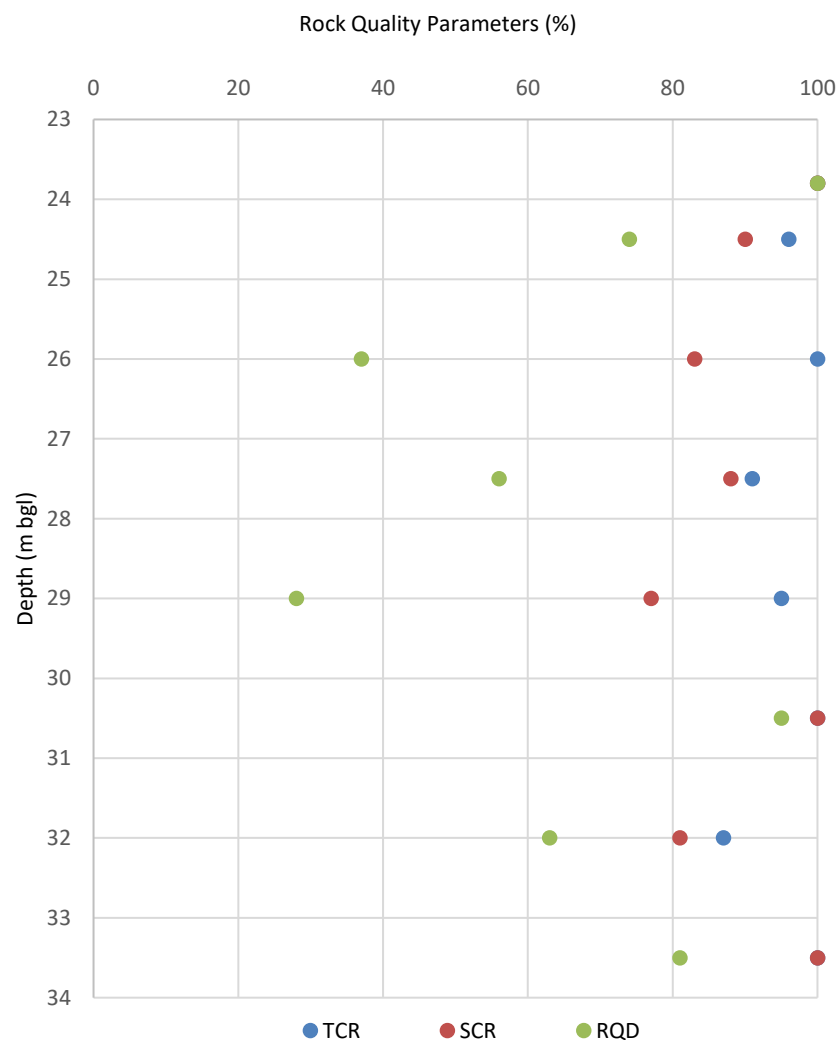


Figure 6.3.3a – Rock Quality Parameters vs. Depth

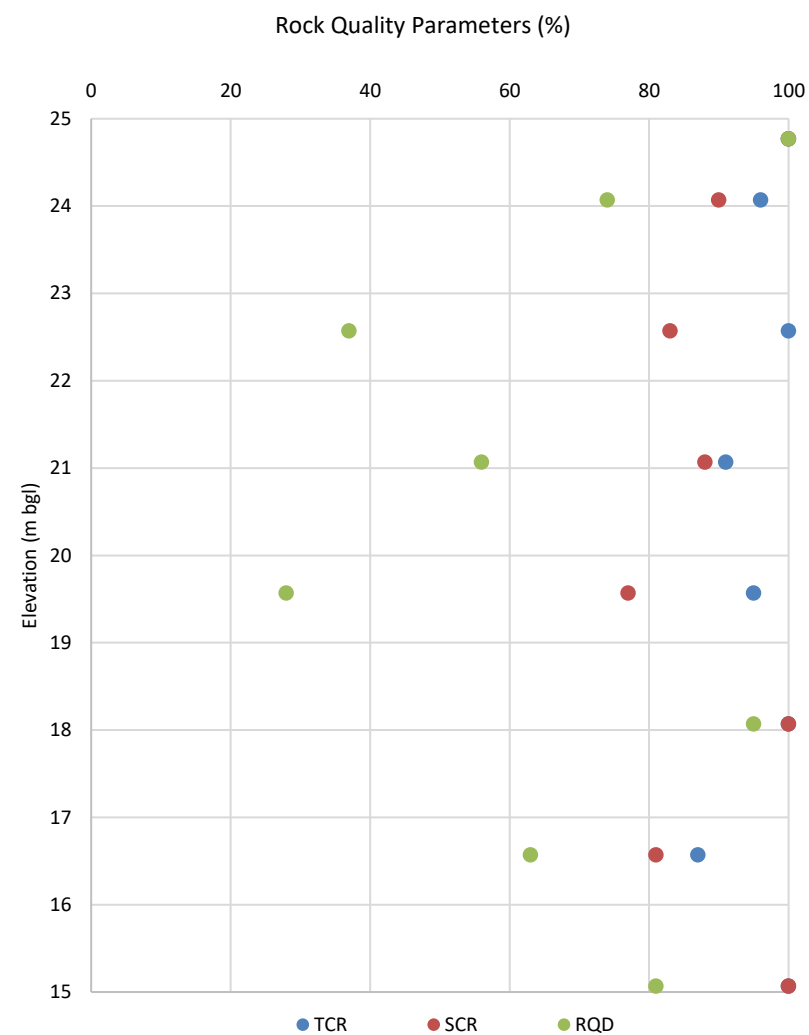


Figure 6.3.3b – Rock Quality Parameters vs. Elevation

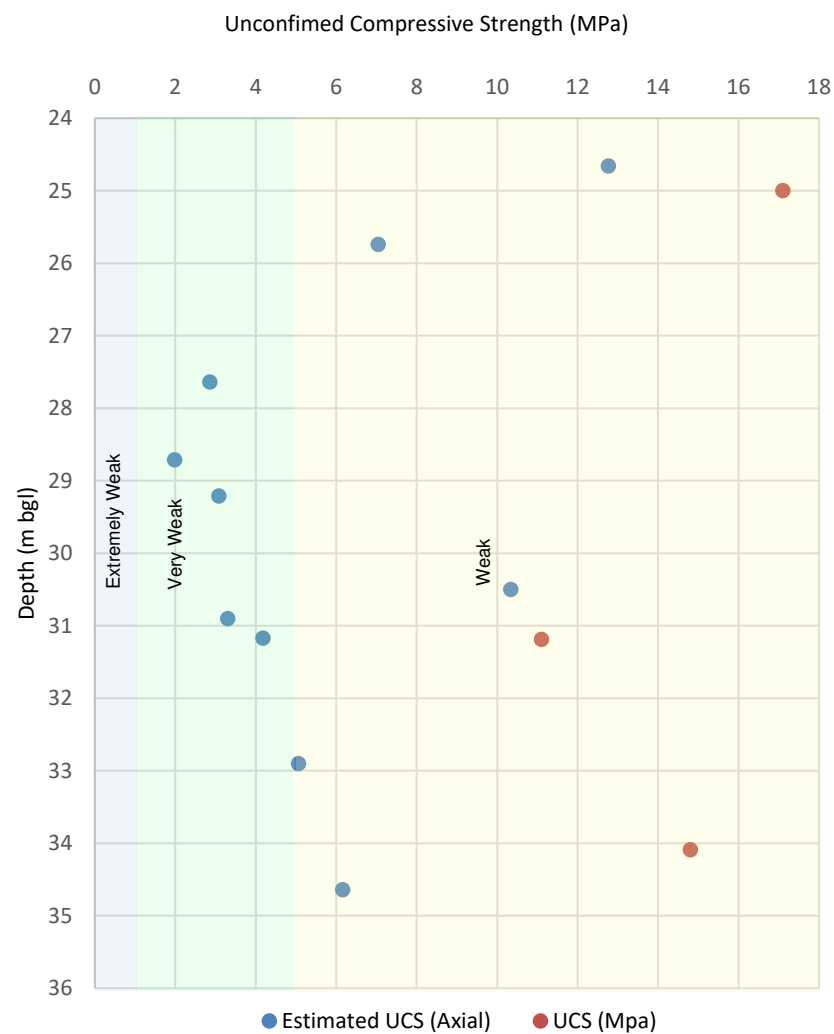


Figure 6.3.3c – Unconfined Compressive Strength vs Depth

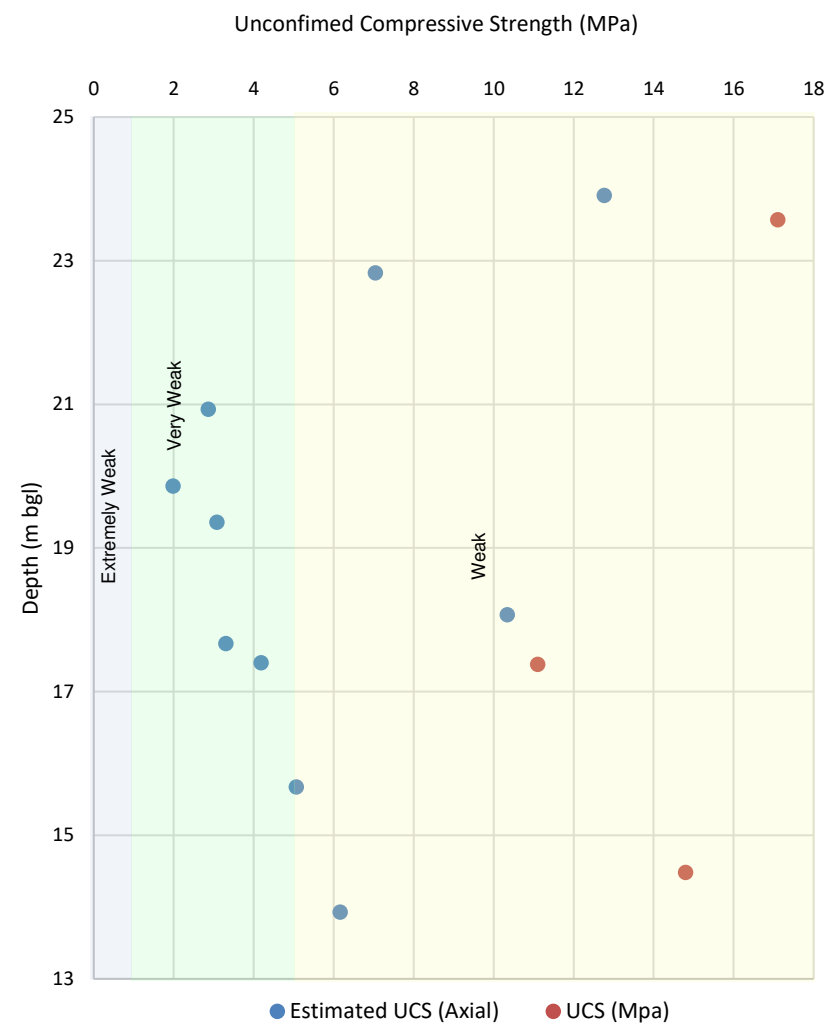


Figure 6.3.3d – Unconfined Compressive Strength vs Elevation

6.4 Aggressive Ground Conditions

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, 3rd edition of 2005 (Ref. 16). A summary of the results obtained as a part of the ground investigation are summarised in *Table 6.4a* below.

Table 6.4a –Aggressive Chemical Environment for Concrete (ACEC) Site Classification

Stratum	Test Type	Range
Made Ground	pH	7.79 – 8.61
	Water Soluble Sulphate (mg/l)	<10 – 90
Glacial Till	pH	7.9 – 8.8
	Water Soluble Sulphate (mg/l)	35 – 120

Table 6.4b –Aggressive Chemical Environment for Concrete (ACEC) Site Classification

Stratum	Design Sulphate Class	ACEC Class ⁽¹⁾
Made Ground	DS-1	AC-1
Glacial Till	DS-1	AC-1

(1) ACEC assessment was based on the *mobile* groundwater condition for a *brownfield* scheme area.

In these conditions, and as a preliminary assessment and subject to further testing, it is considered that deterioration of buried concrete due to sulphate or acid attack is unlikely to occur. The preliminary design of buried concrete, based on the Curtins ground investigation, according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-1 (AC-1) conditions assuming mobile groundwater for the Made Ground.

7.0 Ground Contamination Assessment

This section of the report includes the assessment of the potential contamination, solid, liquid and gas, identified on the subject site which may present a risk to the proposed end users, associated utilities and the wider environment.

In guidance published by the Environment Agency, the risk to human health or controlled waters is determined through an assessment of pollutant linkages between a source of contamination (within the ground or groundwater either on or off site) and a sensitive receptor such as end users of the site, building materials, edible plants grown in gardens or groundwater abstracted for drinking. This is termed a source-pathway-receptor relationship. The same model is applied to the assessment of risk arising from ground gases as detailed within BS8576:2013 (Ref. 17).

These models have a common approach, which is one of a tiered assessment. At each stage of the assessment further detail can be applied to the conceptual site model to provide a detailed interpretation on a site by site basis. As part of the planning process this approach is adopted to establish either if the site is 'suitable for use' or whether additional work or else remedial work is required for the site to be deemed so.

The sub-sections hereafter therefore incorporate the first tier (Tier 1) of this approach otherwise referred to as the Generic Quantitative Risk Assessment (GQRA). The GQRA builds on the qualitative risk assessment presented in the Phase 1 Desk Study (Ref. 1) conjunction with observations made during the ground investigation and is based solely on the results of the chemical and other testing data obtained as part of Curtins ground investigation. The GQRA is used to build/refine the Conceptual Site Model (CSM) for the site as detailed and presented in *Section 9.0* of this report.

The following sections present more detail on the risk assessment methodology rationale for the main receptors.

7.1 Human Health GQRA

Detailed guidance on human health risk assessment is available within several documents, published by both the Environment Agency and Defra. Guidance includes Contaminated Land Exposure Assessment (CLEA) v1.071 model (Ref. 18) Report SC050021/SR2: Human Health Toxicological Assessment of Contaminants in Soil (Ref. 19) and Report SC059921/SR3: Updated Technical Background to the CLEA Model (Ref. 20).

A generic quantitative risk assessment (GQRA) has been carried out for the Potential Contaminant Linkages (PCLs) investigated by screening of soil contamination data against relevant Generic Assessment Criteria (GAC) where available, including:

- i) **Soil Guideline Values (SGVs):** These have been published by the Environment Agency and are trigger values for screening out low risk areas of land contamination. SGV's give an indication of representative average concentrations of chemicals in soil, below which long-term health risks

are likely to be minimal. SGVs have been published for several contaminants including arsenic, cadmium, mercury, nickel, selenium, BTEX, phenols and dioxins, furans and dioxin-like PCB substances for land uses including residential, allotments and commercial. The SGVs have been developed for a sandy loam soil with 6% soil organic matter (SOM) content;

- ii) **Supplementary Screening Values (SSVs):** In addition to the SGVs developed by the EA, other third-party organisations have derived SSVs for a wider range of contaminants and land uses using the CLEA Model. Curtins have adopted these numbers where applicable, including those developed by Atkins AtriskSoil™, the LQM/CIEH Suitable for Use Levels (S4UL) and EIC/AGS/CL:AIRE published thresholds;
- iii) **Category 4 Screening Levels (C4SLs):** In March 2014 Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, hexavalent chromium and lead. These values were derived to support the revised Part 2A Statutory Guidance issued in 2012 (Ref. 21) in which four categories of contaminated land are included, ranging from Category 1 (significant/high risk) to Category 4 (low risk). C4SLs are not representative of significant possibility of significant harm (SPoSH) and are low risk levels which, and therefore where the C4SLs are not exceeded, land can be demonstrated to be in Category 4 and cannot be determined as contaminated land.

7.1.1 Adopted Soil Human Health GACs Screening Methodology

The proposed use of the site, noted as a 9 storey residential block with 85-100 apartment units. The ground floor includes reception area and communal amenities, a cycle store, refuse store, and residential apartments in the east and north. A residents courtyard garden is present at ground level with associated areas of soft landscaping.

This end use is most analogous with a *Residential without plant uptake* end use scenario, accounting for the absence of soft landscaping or gardens and so the assessment has been undertaken against the following GACs, in order of preference for the development:

1. Environment Agency Soil Guideline Values,
2. CL:AIRE, AGS, EIC. Soil Generic Assessment Criteria for Human Health Risk Assessments,
3. LQM/CIEH 2015 S4ULs for Human Health Risk Assessment, and
4. DEFRA Category 4 Screening Levels.

The soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e. the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for the Made Ground site soils ranged from 1.97 to 10.44%.

With consideration for a calculated geometric average, Made Ground soils determine a SOM of 1.00%. As such, a comparison against Tier 1 Thresholds for a conservative SOM of 1% for made ground.

The adopted GAC's are listed in *Appendix F*.

7.1.2 Generic Assessment Criteria Screening of Soil Laboratory Results

The results of the environmental testing can be referred to in *Appendix C*, with testing undertaken on a total of nine soil samples.

With respect to the proposed end use of the site, exceedances of Lead and Mercury were recorded with respect to a *Residential without plant uptake* end-use. These exceedances are reported below in *Table 7.1.2a* below.

Table 7.1.2a – Summary of GAC exceedances compared against 'Commercial' thresholds

Determinant	Exploratory Hole ID	Depth (m bgl)	Stratum	Concentration (µg/kg)	GAC (mg/kg)
Arsenic	WS03	1.70	Made Ground	35	35
Lead	WS01	0.30	Made Ground	679	310
	WS02	0.40	Made Ground	1600	
	WS02	1.50	Made Ground	685	
	WS03	1.70	Made Ground	361	
	WS04	1.00	Made Ground	363	
	BH01	0.25	Made Ground	1580	
	BH01	0.75	Made Ground	3380	
	RC01	0.40	Made Ground	566	

All soil samples (plus two additional possible asbestos samples) were screened for asbestos, positive identification was reported within five samples. The results are summarised below in *Table 7.1.2b*.

Table 7.1.2b – Positively Identified Asbestos

Borehole Ref.	Depth (m bgl)	Strata	Determinant	Quantification (% w/w)
WS04	1.00	Made Ground	Amosite Cement and Chrysotile Cement	0.339
WS05	0.60	Made ground	Amosite Board & Amosite Loose Fibres	0.098
BH01	0.65	Made Ground	Chrysotile Cement (Bulk fibre)	15
BH01	0.75	Made Ground	Chrysotile Cement	4.623
RC01	0.75	Made Ground	Chrysotile Cement (Bulk fibre)	15

8.0 Ground Gas Assessment

The assessment of risk presented by ground gases is assessed with reference to guidance published by CIRIA (Assessing Risks Posed by Hazardous Ground Gases to Buildings, C665 (Ref. 22), BSI Publication Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings BS8485:2015+2019 (Ref. 23) and other broadly accepted references such as the Ground Gas Handbook 2009 (Ref. 24).

The ground gas risk assessment adopts a tiered approach. In the first instance this involves a re-evaluation of the Conceptual Site Model described within the Phase 1 Preliminary Site Assessment and thereafter validating this conceptual model with the ground gas data, the semi-quantitative risk assessment.

8.1 Ground Gas Monitoring Results

To characterise the site's ground gas regime and validate the qualitative assessment of ground gas risk standpipe installations were incorporated within selected boreholes, as detailed in *Section 3.2*.

An initial programme of six gas monitoring visits over three months was proposed. Six gas monitoring visits have been undertaken, between 31st May 2022 and 8th August 2022 with barometric pressure recorded between 1011 and 1019mb. Rising barometric pressure was recorded on the first visit, steady state on the final visit and falling barometric state on the second, third, fourth and fifth visits.

The results log sheets are contained within *Appendix E* and summarised in *Table 8.1a*.

Table 8.1a – Summary of Ground Gas Monitoring Results

Exploratory Hole ID	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Peak Gas Flow (l/hr)	Steady State Gas Flow (l/hr)
BH01 (shallow)	<0.1	0.4	20.4	-1.7	<0.1
BH01 (deep)	<0.1	0.7	5.4	22.6/-12.8	<0.1
RC01	<0.1	0.7	19.6	-42.6	<0.1
WS01	<0.1	0.8	19.7	10.1	<0.1
WS03	0.1	0.6	11.7	-22.7	<0.1
WS05	<0.1	0.2	20.3	<0.1	<0.1

Methane (CH₄) was recorded below the instrument's detection limit within all the monitoring wells throughout the monitoring period.

Maximum carbon dioxide (CO₂) concentrations were recorded of 0.8% in WS08 on the fourth monitoring visit.

Carbon monoxide (CO) and hydrogen sulphide was recorded within several boreholes across the monitoring visits. However, all concentrations recorded were less than 5 and 3 parts per million respectively.

The greatest peak air flow rate was recorded in RC01 at -42.6 l/hr on the sixth monitoring visit. All peak air flow rates recorded during the monitoring period returned to a steady state of <0.1 l/hr..

8.2 Ground Gas Assessment

The Conceptual Site Model presented in *Section 2.7* highlighted made ground with degradable organic content as a potential source of ground gas generation. The report suggests no records of organic rich drift deposits (e.g. peat) being present. Noxious and asphyxiate gases were attributed to include, but not limited to, carbon dioxide, carbon monoxide, methane and hydrogen sulphide. The Phase 1 identified a **Moderate** Risk.

Made ground soils were encountered in all boreholes across the site. Monitoring wells were installed in 4 No. borehole locations to assess the gassing potential and associated risk from such soils.

A total of 6 No. monitoring visits have been undertaken, under various atmospheric conditions, including rising, falling and steady barometric state, and during precipitation events. On this basis, the steady state air flow rates and maximum gas concentrations will be used to derive the gas screening value for the site.

In accordance with BS8485:2015 (Ref. 23) consideration of the recorded soil gas flow rates, presented below, enables hazardous gas flow rates (Q_{hg}) to be evaluated. Q_{hg} can be derived for both 'representative' and 'worst case' scenarios and a comparison made in support of an appropriate assessment of ground gas risk. The 'representative' scenario considers the highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole, and the 'worst case' check uses the highest Q_{hg} across the entire dataset irrespective of location and discrete monitoring events.

Evaluation of the 'representative' scenario and worst case check records a maximum Q_{hg} of 0.008 l/hr for carbon dioxide where the maximum reading 0.8% v/v was used. This is taken as the gas screening value (GSV) for the site.

Methane was recorded below the limit of detection on all monitoring visits and therefore the risk is low.

The GSV indicates a CS1 classification on site, no gas protection measures are required.

The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction. Appropriate ground gas monitoring and safety measures should be in place during the works, as the potential presence of ground gases could pose a risk in any confined spaces of deep excavations.

9.0 Revised Conceptual Site Model

The Preliminary Conceptual Site Model (PCSM) presented in the Phase 1 Report (Ref.1) and discussed in *Section 2.7* of this report has been revised following the GQRA in *Section 7.0* above. The Revised Conceptual Site Model (CSM) is summarised in the table overleaf.

The CSM details the source-pathway-receptor linkages or potential pollutant linkages (PPL) that have been identified as relevant for the site. The GQRA details the associated level of risk relating to these potential pollutant linkages.

The CSM follows the framework outlined within CIRIA C552 (Ref. 25) which is summarised within *Appendix G*.

The 'risk rating' within the CSM refers to the risk that the source, pathway, receptor linkage or PPL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation.

Risks presented by Mining are discussed and assessed within *Section 2.4.4*.

Risks presented by Unexploded Ordnance are discussed and assessed in *Section 2.6*.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 (Ref. 26) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk.

It has been assumed that any future construction works on site will be undertaken in compliance with these requirements and therefore construction workers involved in the building works at the site have been discounted as a human receptor in the conceptual site model.

Reference should be given to the environmental testing results discussed within *Section 7.0* and presented within *Appendix C*.

Qualitative Risk
AssessmentGeneric
Quantitative Risk
AssessmentDetailed
Quantitative Risk
Assessment or;
Remedial Action

- The table below represents the Second stage in the land quality risk assessment process; the Revised Conceptual Site Model following the Quantitative Risk Assessment.
- For a development site to be deemed 'suitable for use' the level of risk needs to be brought down to acceptable levels, i.e. low to very low risk. The purpose of each stage of risk assessment is ultimately to establish if there is a requirement for additional levels of assessment to be made to have sufficient confidence to support a risk characterisation or management decision, e.g. remedial action.
- In the absence of specific site data, a Generic Quantitative Risk Assessment is invariably recommended.

Conceptual Site Model			Generic Qualitative Risk Assessment			Comments	Action
Identified Source	Pathway(s)	Receptor(s)	Consequence	Likelihood of Occurrence	Risk Rating		
Exceedances in the Made Ground were identified when compared to <i>Residential without plant uptake</i> end-use thresholds for Metals (Arsenic and Lead). Asbestos detected in multiple locations (loose fibres and bulk)	Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation	Site end-users High rise residential	Medium Human Health Risk	Unlikely	Low	Environmental chemical analysis recorded with respect to a ' <i>Residential without plant uptake</i> ' end use scenario. Asbestos detected in multiple locations, including fragments	Asbestos management plan during construction works. Construction workers to be provided with appropriate PPE for the works being undertaken, with reference to the environmental chemical results presented herein.
	Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation	Construction and maintenance workers	Medium	Likely	Moderate	A residents courtyard garden is present at ground level with associated areas of soft landscaping.. Elevated concentrations recorded are of non-volatile contaminants, and therefore the pathway between site soils and end users is broken by the building footprint. Remediation would be required in areas of soft landscaping.	Remedial action to be detailed within Remediation Strategy.
	Vertical and horizontal migration through superficial deposits	Controlled Waters (Groundwater) Secondary Undifferentiated Aquifer (Superficial) Principal Aquifer (Bedrock) The site is not located within a Source Protection Zone.	Medium	Unlikely	Low	No gross contamination identified during ground investigation works. No groundwater body has been identified in the shallow superficial deposits. Given this and the encountered impermeable cohesive Glacial Till, there is no pathway for contaminants to reach the Principal Aquifer receptor.	No further action required
	Horizontal migration over and through the superficial deposits (soils)	Controlled Waters (Surface Water) Nearest surface water feature is the Rochdale canal located over 125m southeast No surface water abstraction points within 900m.	Medium	Unlikely	Low	Considering the distance from the site to the nearest surface water receptor and the encountered contamination within the Made Ground, this pathway is considered unlikely.	No further action required
Deep made ground and organic matter and/or contamination as source material for the generation of ground gas.	Ground gas & vapour migration and inhalation	Site end-users Residential End Users	Medium	Unlikely	Low	All boreholes recorded low concentrations of Carbon Dioxide (<5% v/v). Methane recorded below the limit of detection (<0.1%).	No gas protection measures are required. .
		Construction and maintenance workers	Medium Standard Health & Safety precautions likely to be used by workers)	Unlikely	Low	GSV for the site of 0.008 l/hr for carbon dioxide. A Characteristic Situation 1 (CS1) gas regime has been established to date.	The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction

10.0 Engineering Assessment and Recommendations

10.1 Introduction

This section will assess the relevant geotechnical issues for the proposed development comprise a 9 storey residential apartment building. The proposed development plan is contained within *Appendix A*.

The engineering assessment considers foundation design, bearing capacity, settlement, excavations, and pavement design for the site. Finished Floor Levels for the buildings and structures along with structural details and loadings have not yet been provided. It should be noted that detail may change in the development of designs beyond the issue of this Phase 2 Report and the Construction Designer should satisfy themselves regarding the adequacy of their design and proposed approach to construction by reference to the on-going project design proposals, the ground investigation information and their own examination of the site.

10.2 Summary of Ground Conditions

The ground conditions on site generally comprised made ground from ground level to 2.10m to 3.50m bgl, comprising a tarmac or concrete surface covering, underlain by granular made ground, with fragments of brick, concrete, tarmac, timber, metal, plastic, ash, clinker, ceramics, mudstone, siltstone, quartz and sandstone, or cohesive made ground, comprising likely reworked natural material.

Natural soils comprise generally cohesive glacial till, comprising firm or stiff brown slightly gravelly to very gravelly, sandy, slightly silty to silty clay. Thin, localised, lenses of granular soils were also encountered. Extremely weak to moderately strong brown sandstone bedrock of the Chester Formation was encountered at 22.90m to 23.80m bgl (25.91m to 24.89m AOD).

Groundwater head level within the bedrock is in the region of 22.40m to 22.50m bgl.

Localised perched water may be encountered in shallow made ground soils.

10.3 Geotechnical Considerations

10.3.1 Presence of Existing Services

The presence of existing services may require capping and/or diversion associated with the development, which should be managed through the appropriate utility suppliers during the construction phase. The Principal Contractor should ensure that appropriate mitigation measures are put in place during the construction phase (i.e. during excavation of foundations).

10.3.2 Obstructions and Relict Foundations

Although no obstructions were recorded during the ground investigation, relict foundations may be encountered during excavations, and foundations associated with the existing garaged will require breaking out. There is potential for obstructions to be encountered beyond the findings of this investigation.

10.3.3 Variable Made Ground

Made Ground was encountered in all the exploratory hole locations from ground level to depths of between 2.10m and 3.50m bgl across the site. The Made Ground should not be considered as a suitable founding stratum.

10.4 Foundation Options

10.4.1 Shallow Foundations

Due to the likely loads of the proposed development, comprising a 9 storey residential apartment building, and deep Made Ground (2.10m to 3.50m bgl), it is considered that traditional shallow foundations are unlikely to be suitable.

10.4.2 Piled Foundations

It is therefore advised that a piled foundation solution is adopted.

Pile design and installation are continually evolving processes, it is recommended that specialist piling contractors are contracted as to the suitability and carrying capacity of the piles in the ground conditions pertaining to the site.

The carrying capacity of piles depends not only on their size and the ground conditions but also their method of installation.

Pile design and installation are continually evolving processes, it is recommended that specialist piling contractors are contracted as to the suitability and carrying capacity of the piles in the ground conditions pertaining to the site.

Additional post-demolition investigation is proposed to further inform pile design.

10.5 Ground Floor Slabs

Based on the findings of the ground investigation, it is recommended that consideration is given to constructing suspended ground floor slabs, bearing on pile caps and supported by a network of beams. Soft/deleterious material should be removed and replaced with suitably compacted granular fill.

10.6 Excavations

Based on observations on site, together with the results of in-situ and laboratory tests, it is considered that excavations to <1.20m bgl should stand unsupported in the short term. Side support for safety purposes should of course be provided to all excavations which appear unstable, and those >1.20m deep, in accordance with Health and Safety Regulations.

Suitable side slope angles must be checked and provided by a suitably qualified temporary works contractor for any excavations.

Groundwater may be encountered as seepages in shallow excavations for foundations or services as perched water present. It is considered that groundwater inflows, if encountered, may be controlled by pumping from sumps.

Excavation through layers of Made Ground encountered across the site should be feasible using conventional site plant.

10.7 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest (Ref. 16) and laboratory testing undertaken accordingly in *Section 6.4*.

In the consideration of sulphate attack on buried concrete, reference has been made to BRE SD1 (2005 Ed), which classifies the site as a brownfield site with a mobile groundwater conditions the results of the concrete classification tests received have indicated a DS-1, AC-1 classification for the Made Ground and natural soils.

11.0 Conclusions & Recommendations

11.1 Conclusions

A revised tabulated revised Conceptual Site Model has been derived following the findings on the Generic Quantitative Risk Assessment risk assessment and is presented in *Section 9.0*.

11.1.1 Ground Contamination

With respect to the proposed end use of the site, elevated concentrations of lead were recorded in 8 No. made ground soil samples and arsenic in 1 No. soil sample. with respect to Residential without home grown produce end-use. Asbestos was identified within 5 No. samples, recovered as amosite and chrysotile cement, amosite board and amosite loose fibres. Asbestos in soil concentrations in the region of 0.098% w/w and 4.623% w/w were recorded. Bulk asbestos fibre concentrations of 15% were recorded in chrysotile cement in BH01 (0.65m bgl) and RC01 (0.75m bgl).

A **Low** risk to proposed site end-users from direct contact, inhalation and ingestion of contaminants within Made Ground soil is determined. No volatile contamination was identified and the proposed building footprint will break any source-pathway-receptor linkage.

5 No. samples, recovered as amosite and chrysotile cement, amosite board and amosite loose fibres. Asbestos in soil concentrations in the region of 0.098% w/w and 4.623% w/w were recorded. Bulk asbestos fibre concentrations of 15% were recorded in chrysotile cement in BH01 (0.65m bgl) and RC01 (0.75m bgl). included herein. A **Moderate** risk is identified to construction and maintenance workers. An asbestos management plan should be in place during construction works. Construction and maintenance workers should be provided with PPE during all works, with reference to the environmental chemistry results.

11.1.2 Ground Gas Assessment

Methane concentrations was recorded below the limit of detection on all monitoring visits.

Maximum carbon dioxide concentrations were recorded at 0.8% v/v, recorded in WS1 on the fourth monitoring visit. Evaluation of the 'representative' scenario and worst case check records a maximum Q_{hg} of 0.008 l/hr for carbon dioxide where the maximum reading 0.8% v/v was used. This is taken as the gas screening value (GSV) for the site.

Therefore a Characteristic Situation 1 (CS1) gas regime has been assigned to the site.

A **Low** risk rating is therefore identified to proposed site end users from inhalation of hazardous ground gases corresponding to CS1 gas regime and no ground gas protection measures required.

The Curtins Phase 1 Report (Ref. 1) confirms the site is situated in a lower probability radon area where <1% of homes are above the radon action level. On this basis radon protection measures are not considered necessary in the construction of new dwellings or extensions.

11.2 Recommendations

Based on the findings of the ground investigation, the following recommendations are made:

- 1) Additional investigation is required, following demolition of the existing garages on site. Obtain environmental samples from beneath garage footprint, and additional geotechnical information to aid pile design.
- 2) Asbestos management plan during construction works.
- 3) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein and within *Appendix C*.
- 4) A Remediation Strategy and Verification report will be required to detail and approve the above measures and ensure imported soils for soft landscaping are suitable for use.
- 5) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer.

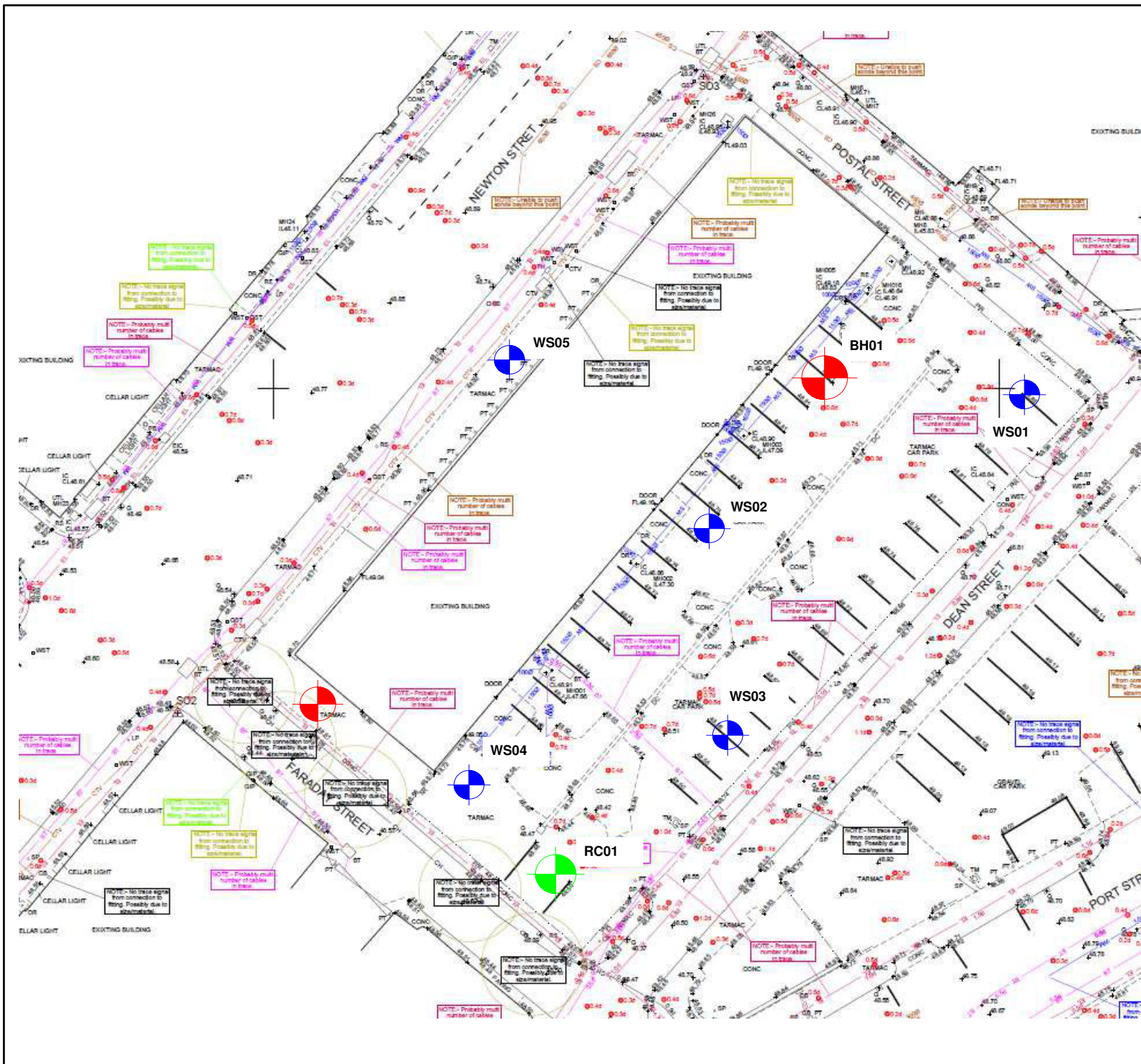
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Appendix A – Drawings

- Curtins (2022) 080401--CUR-00-XX-DR-GE-80004-P02 Exploratory Hole Location Plan.
- Hawkins Brown (2021) POST-HBA-ZZ-00-DR-A-20-0100-P.13 Postal Street Proposed Floor Plan – Ground Floor



PRE-DEMOLITION INVESTIGATION

-  CABLE PERCUSSIVE BOREHOLE
-  WINDOW SAMPLE BOREHOLE
-  ROTARY CORED BOREHOLE

POST-DEMOLITION INVESTIGATION

-  CABLE PERCUSSIVE BOREHOLE
-  MACHINE EXCAVATED TRIAL PITS

Rev:	Description:	Date:	By:	Chkd:
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Status:	INFORMATION
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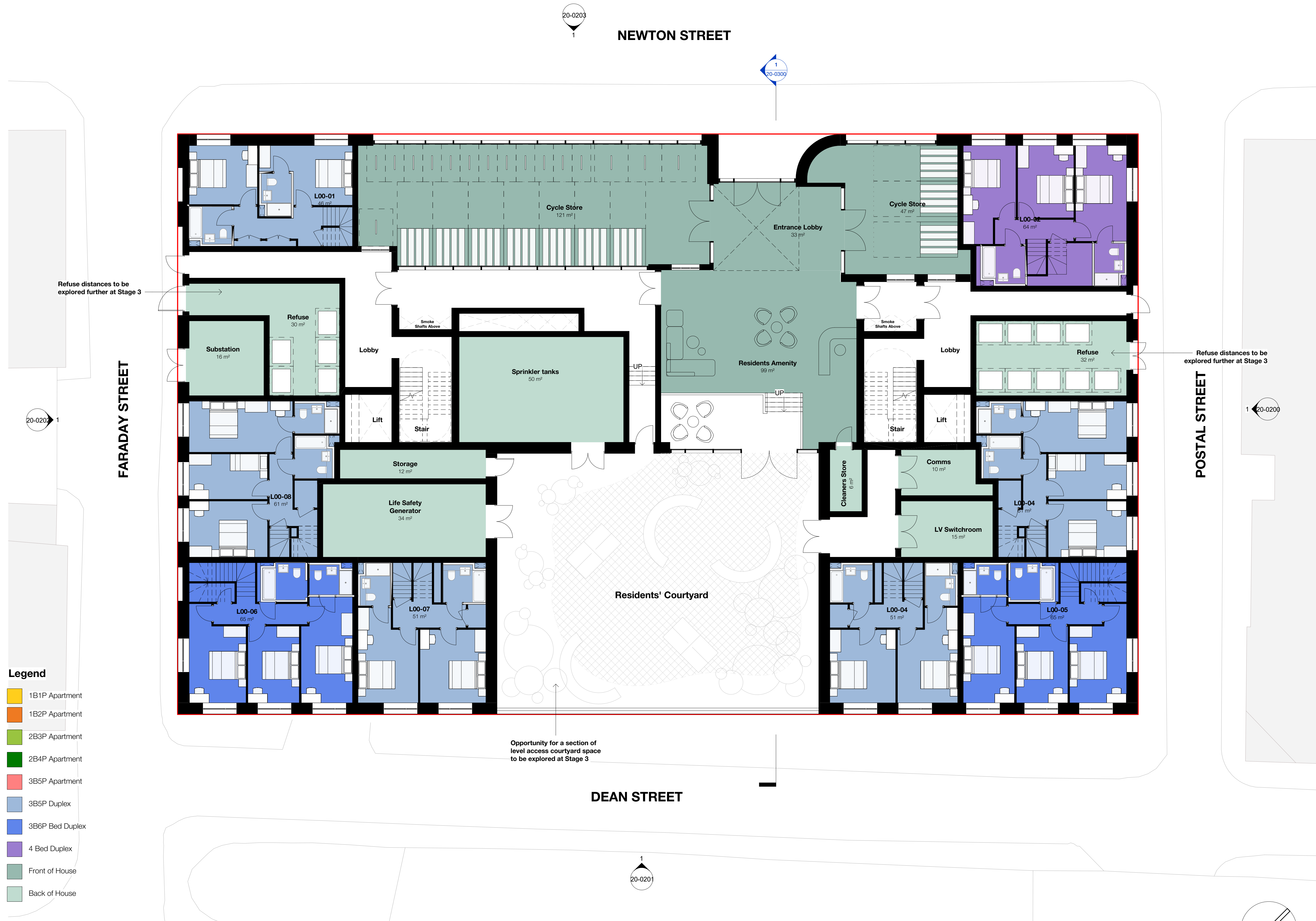
Project:	POSTAL STREET
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Drg Title:	EXPLORATORY HOLE LOCATION PLAN
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Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	12/05/2022	JL	RA

Drg No:	Rev:
080401-CUR-00-XX-DR-GE-80004	P02

Note: Finished floor level of ground floor
Townhouses are to be are level +850mm
as shown on elevations and sections.



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No implied licence exists. This drawing should not be used to calculate areas for the purposes of valuation. Do not scale this drawing. All dimensions to be checked on the site by the contractor and such dimensions to be their responsibility. All work must comply with relevant British Standards and Building Regulations requirements. Drawing errors and omissions to be reported to the architect. To be read in conjunction with Architect's specification and other consultant information.

Rev	Description	Date
P.1	Issued for Information	22.11.21
P.2	Issued for Information	08.12.21
P.3	Issued for Information	26.01.22
P.4	Issued for Information	27.01.22
P.5	Issued for Coordination	01.02.22
P.6	Issued for Information	09.02.22
P.7	Issued for Information	22.03.22
P.8	Issued for Information	25.03.22
P.9	Issued for Information	08.04.22
P.10	Stage 2 Issue	22.04.22
P.11	Stage 2 Revised Layout	24.06.22
P.12	Issued for Information	04.08.22
P.13	Issued for Information	19.08.22

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Hawkins\Brown

Project
Postal Street
Postal Street
Manchester
M1 2EE

Drawing
Proposed Floor Plan - Ground Floor

Scale @ A1
1 : 100
Date
22/11/21

Drawn By
TM
Checked By
TD

Job Number 210258	Status S2	Purpose of Issue Issued for Information
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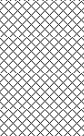
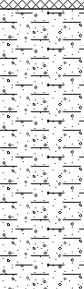
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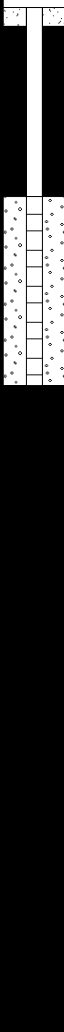
Appendix B – Exploratory Hole Logs

- 2022 Exploratory Borehole logs.
 - Window Sample Boreholes WS01 – WS05
 - Cable Percussion Boreholes BH01
 - Rotary Borehole RC01

					Borehole Log		Borehole No. WS01 Sheet 1 of 1		
Project Name: Postal Street				Project No. 080401		Co-ords: 384751.64 - 398449.70		Hole Type WS	
Location: Northern Quarter, Manchester				Level: 48.86		Scale 1:40			
Client: Faithful & Gould				Dates: 24/05/2022 - 24/05/2022		Logged By JL			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			48.81		MADE GROUND: Tarmacadam	1	
	0.30	ES							MADE GROUND: Greyish brown clayey gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, sandstone, concrete, plastic and mudstone. Cobbles are angular to subangular of brick.
	0.75	ES							2
	1.20		N=1 (1,0/0,0,1,0)						
	2.00		N=17 (1,0/3,5,5,4)	2.15	46.71				
			2.50	D				Firm brown slightly gravelly CLAY. Gravel is subangular to rounded, fine to medium of sandstone and mudstone.	3
	3.00		N=11 (3,4/6,1,0,4)						
			3.60	D				Orangish brown very clayey fine to medium SAND.	4
	4.00		N=17 (3,3/4,4,4,5)	4.05	44.81				
			5.00		N=15 (2,3/4,3,4,4)			Firm brown slightly sandy gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of sandstone and mudstone	5
		5.45			43.41		End of borehole at 5.45 m	6	
								7	
								8	

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered. Borehole installed with ground gas/water monitoring installation to 2.50m bgl in Made Ground.

					Borehole Log			Borehole No. WS02 Sheet 1 of 1	
Project Name: Postal Street				Project No. 080401		Co-ords: 374729.50 - 398440.40		Hole Type WS	
Location: Northern Quarter, Manchester				Level: 48.77		Scale 1:40		Logged By JL	
Client: Faithful & Gould				Dates: 24/05/2022 - 24/05/2022					
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05	ES		0.05	48.72		MADE GROUND: Tarmacadam MADE GROUND: Yellowish grey gravelly SAND. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of concrete, brick and sandstone. MADE GROUND: Concrete	
		0.15			48.62				
		0.25			48.52				
		1.30	47.47		MADE GROUND: Blackish grey slightly clayey gravelly SAND, with occasional cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, concrete, plastic, ash, clinker, and sandstone. Cobbles are angular to subangular of brick. MADE GROUND: Soft to firm brown gravelly CLAY. Gravel is angular to subrounded, fine to coarse of brick, concrete, sandstone and mudstone (reworked natural)				
		1.50	ES				D	N=6 (1,0/1,0,2,3)	
		2.00	2.00						
		3.00	N=4 (1,0/2,1,0,1)		Firm brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of sandstone.				
		4.00	4.00				D	N=14 (2,1/3,3,3,5)	
		5.00	43.77	End of borehole at 5.00 m					

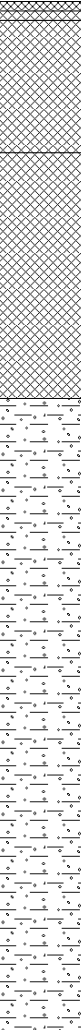
					Borehole Log			Borehole No. WS03 Sheet 1 of 1		
Project Name: Postal Street					Project No. 080401		Co-ords: 384731.17 - 398426.14		Hole Type WS	
Location: Northern Quarter, Manchester					Level: 48.58		Scale 1:40		Logged By TW	
Client: Faithful & Gould					Dates: 23/05/2022 - 23/05/2022					
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.05	48.53		MADE GROUND: Tarmacadam	1	
					0.15	48.43		MADE GROUND: Yellowish brown sandy GRAVEL. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, sandstone, mudstone and quartz.		
					0.17	48.41		MADE GROUND: Tarmacadam		
				N=20 (1,0/3,8,6,3)				MADE GROUND: Brown slightly clayey sandy GRAVEL, with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, sandstone, and quartz. Cobbles are angular of brick.	1	
			ES		1.60	46.98		MADE GROUND: Brown clayey gravelly SAND. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, ceramic, siltstone and quartz.		
				N=10 (4,4/3,2,2,3)	2.10	46.48		Soft greyish brown silty slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and quartz.		
			2.20 - 2.65	D		2.80	45.78		Firm brown slightly silty gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and quartz. <i>Sand bands within clay from 3.00m to 3.20m bgl.</i>	3
				N=22 (3,3/5,5,6,6)	3.50	45.08	Firm to stiff greyish brown thinly laminated very silty slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of siltstone and sandstone.			
				N=14 (2,3/3,3,4,4)	4.00	44.58	Firm orangish brown slightly clayey slightly sandy SILT.			
			4.00 - 4.45	D		4.90	43.68		Firm brown slightly silty gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and quartz.	5
				N=14 (2,3/3,3,3,5)	5.45	43.13	End of borehole at 5.45 m			
									7	
									8	

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 3.50m bgl. Borehole installed with ground gas/water monitoring installation to 2.00m bgl in Made Ground.





					Borehole Log		Borehole No. WS04 Sheet 1 of 1			
Project Name: Postal Street				Project No. 080401		Co-ords: 384713.65 - 398422.16		Hole Type WS		
Location: Northern Quarter, Manchester				Level: 48.54		Scale 1:40				
Client: Faithful & Gould				Dates: 24/05/2022 - 24/05/2022		Logged By JL				
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.05	48.49		MADE GROUND: Tarmacadam MADE GROUND: Orangish brown clayey gravelly SAND. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete and sandstone. MADE GROUND: Brown gravelly SAND, with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, sandstone and quartz. Cobbles are angular of brick. MADE GROUND: Brown slightly clayey gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, sandstone and quartz. Cobbles are angular of brick. Firm brown slightly gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of mudstone and sandstone. <i>Becoming stiff from 2.50m bgl.</i>		
				0.10	48.44					
				0.80	47.74					
	1.00	ES								
	1.20		N=29 (2,3/5,10,7,7)							
				2.00	N=28 (5,10/13,7,3,5)	2.10			46.44	
				2.50	D					
				3.00		N=24 (3,4/5,6,6,7)				
				3.80	D					
				4.00		N=20 (2,4/4,5,5,6)				
			5.00		N=18 (3,3/4,4,5,5)					
					5.45	43.09		End of borehole at 5.45 m		

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered. Borehole backfilled with arisings.



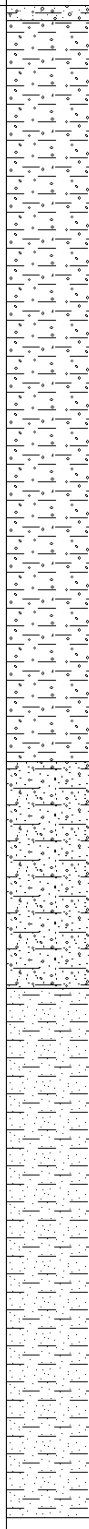
					Borehole Log		Borehole No. WS05 Sheet 1 of 1			
Project Name: Postal Street				Project No. 080401		Co-ords: 384717.74 - 398453.56		Hole Type WS		
Location: Northern Quarter, Manchester				Level: 48.94		Scale 1:40				
Client: Faithful & Gould				Dates: 25/05/2022 - 25/05/2022		Logged By TW				
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.02	48.92		MADE GROUND: Tarmacadam		
					0.10	48.84				MADE GROUND: Grey gravelly SAND. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of concrete, sandstone and mudstone.
				0.40	48.54					MADE GROUND: Orangish brown sandy GRAVEL. Gravel is subangular to rounded, fine to coarse of brick, concrete, ash, sandstone and quartzite
	0.60	ES								MADE GROUND: Yellowish brown gravelly slightly clayey SAND. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete, sandstone and quartz. <i>Siltstone cobbles from 0.70 to 1.20m bgl. Becoming clayey from 1.30m bgl.</i>
	1.20		N=27 (1,1/3,3,7,14)							
	2.00		N=2 (0,0/1,0,0,1)		1.80	47.14				
	2.40	ES								
	3.00		N=8 (1,0/2,3,2,1)		3.20	45.74				
	4.00		N=14 (2,2/2,3,4,5)		3.80	45.14				
	4.00 - 4.45	D								
5.00		N=9 (1,2/1,2,3,3)		5.45	43.49					
							End of borehole at 5.45 m			

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 2.0m bgl. Borehole installed with ground gas/water monitoring installation to 2.30m bgl in Made Ground.

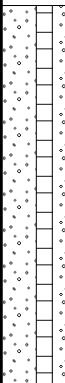
						Borehole Log		Borehole No. BH01 Sheet 1 of 3	
Project Name: Postal Street				Project No. 080401		Co-ords: 384738.14 - 398450.85		Hole Type CP	
Location: Northern Quarter, Manchester				Level: 48.81		Scale 1:50		Logged By JL	
Client: Faithful & Gould				Dates: 23/05/2022 - 24/05/2022					
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	ES	N=15 (2,2/7,4,2,2)	0.05 0.10	48.76 48.71		MADE GROUND: Tarmacadam	
		0.65 0.75	ES ES		0.95	47.86		MADE GROUND: Greyish blackish brown slightly clayey very gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, tarmac, timber, metal, sandstone, concrete and plastic. Cobbles are angular to subangular of brick.	
		1.20 1.20	B					MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular to subrounded, fine to coarse of brick and sandstone (reworked natural)	
		2.00 2.00	D	N=7 (1,1/2,1,2,2)	2.45	46.36		Soft light brown very sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to medium of sandstone and mudstone	
		3.00 3.00 3.00	B D	N=9 (1,0/1,2,3,3)	3.15	45.66		Firm brown slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone.	
		4.00 - 4.45	U	Ublow=68					
		4.50	D					Becoming a stiff clay from 4.50m bgl.	
		5.00 5.00	D	N=11 (2,2/2,3,3,3)				Sand bands within clay from 5.10m to 9.50m bgl, max 10cm thick.	
		6.00 - 6.45	U	Ublow=78					
		6.50	D						
		7.00	D						
		7.50 7.50	D	N=9 (1,1/2,2,2,3)					
		8.50	D						
		9.00 - 9.45	U	Ublow=120					
		9.50	D		9.50	39.31		Brown clayey slightly sandy GRAVEL of subangular to rounded, fine to coarse of sandstone, mudstone and coal.	
	9.90	D							
Continued on next sheet									10

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 15.50m bgl. Refusal on bedrock at 22.90m bgl. Borehole installed with ground gas/water monitoring installation to 22.50m bgl in Glacial Till.

					Borehole Log		Borehole No. BH01 Sheet 2 of 3			
Project Name: Postal Street				Project No. 080401		Co-ords: 384738.14 - 398450.85		Hole Type CP		
Location: Northern Quarter, Manchester				Level: 48.81		Scale 1:50				
Client: Faithful & Gould				Dates: 23/05/2022 - 24/05/2022		Logged By JL				
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					10.10	38.71		Stiff brown slightly gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of sandstone and mudstone.		
		10.50 10.50 10.50	B D	N=23 (5,5/5,5,6,7)						11
		11.50	D							
		12.00 - 12.45	U	Ublow=110						12
		12.50	D							
		13.50 13.50 13.50	B D	50 (25 for 110mm/50 for 40mm)						13
		14.50	D							
		15.00 15.00 - 15.45	B U	Ublow=120	15.00	33.81				14
		16.00	D							15
		16.50 16.50 16.50	B D	N=20 (6,12/6,3,5,6)	16.50	32.31				16
		17.50 - 17.95	U	Ublow=120						17
		18.50	D							18
		19.00	D							19
	19.50 19.50 19.50	B D	50 (25 for 105mm/50 for 105mm)				20			
Continued on next sheet										

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 15.50m bgl. Refusal on bedrock at 22.90m bgl. Borehole installed with ground gas/water monitoring installation to 22.50m bgl in Glacial Till.



					Borehole Log		Borehole No. BH01 Sheet 3 of 3		
Project Name: Postal Street				Project No. 080401		Co-ords: 384738.14 - 398450.85		Hole Type CP	
Location: Northern Quarter, Manchester				Level: 48.81		Scale 1:50			
Client: Faithful & Gould				Dates: 23/05/2022 - 24/05/2022		Logged By JL			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.50	D						
		21.00	B		21.00	27.81			21
		21.00	D					Brown coarse SAND.	
		21.00		50 (25 for 70mm/50 for 110mm)					
		21.80	D		21.80	27.01			22
								Brown very sandy GRAVEL of subrounded to rounded, medium to coarse sandstone, mudstone, coal and siltstone.	
		22.50	B						
		22.50		50 (25 for 120mm/50 for 180mm)					
		23.00		50 (25 for 25mm/50 for 25mm)	22.90	25.91			23
		23.30	D					SANDSTONE recovered as brown sandy GRAVEL of angular to subangular, medium to coarse sandstone.	
	23.30		50 (25 for 15mm/50 for 20mm)	23.40	25.41				
End of borehole at 23.40 m									
									24
									25
									26
									27
									28
									29
									30

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 15.50m bgl. Refusal on bedrock at 22.90m bgl. Borehole installed with ground gas/water monitoring installation to 22.50m bgl in Glacial Till.



					Borehole Log		Borehole No. RC01 Sheet 1 of 4		
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC	
Location: Northern Quarter, Manchester				Level: 48.69		Scale 1:50			
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022		Logged By TW			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05	48.64		MADE GROUND: Tarmacadam	1
	0.40	ES		0.10	48.59	MADE GROUND: Brown sandy GRAVEL of subangular to subrounded, fine to coarse of concrete and brick.			
	0.75	ES		0.12	48.57		MADE GROUND: Tarmacadam	2	
	1.20	D	N=14 (1,2/1,4,4,5)			MADE GROUND: Dark brown slightly sandy slightly clayey GRAVEL, with frequent cobbles. Gravel is angular to subrounded, fine to coarse of brick, concrete, ash, and sandstone. Cobbles are angular to subangular of brick.			
	1.20			1.50	47.19		Abundant cobbles of brick from 0.30m to 0.60m bgl.	3	
	2.00	D		2.00	46.69	MADE GROUND: Greyish blackish brown slightly clayey very gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, tarmac, timber, metal, sandstone, concrete and plastic. Cobbles are angular to subangular of brick.			
				2.40	46.29		MADE GROUND: Orangish grey sandy GRAVEL of angular to subrounded, fine to coarse, brick, concrete and sandstone	4	
				2.60	46.09		MADE GROUND: Soft to firm brown gravelly slightly sandy CLAY. Gravel is angular to rounded, fine to coarse of brick, and sandstone (reworked natural)		
				3.50				Soft to firm brown slightly gravelly slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	5
				5.00					
			6.35	42.34			Firm to stiff brown gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	7	
			7.10	41.59			Brown slightly clayey SAND (poor recovery)		
			8.00					8	
			8.75	39.94					
			9.50					9	
			9.50						
								10	

Continued on next sheet

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

					Borehole Log			Borehole No. RC01 Sheet 2 of 4	
Project Name: Postal Street					Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC
Location: Northern Quarter, Manchester					Level: 48.69		Scale 1:50		
Client: Faithful & Gould					Dates: 23/05/2022 - 26/05/2022		Logged By TW		
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		11.00		N=32 (3,4/5,9,9,9)					11
		12.50 12.50	D	N=44 (3,5/11,10,12,11)					12
		14.00		N=50 (5,8/50 for 288mm)					13
		15.50 15.50	D	N=50 (5,9/50 for 235mm)	15.40	33.29		Firm brown very gravelly CLAY. Gravel is subrounded to rounded, fine to medium of sandstone, shale, coal, quartz and mudstone	14
		17.00		50 (20 for 55mm/50 for 105mm)					15
		18.50 18.50	D	50 (25 for 70mm/50 for 135mm)	17.50	31.19		Brown slightly clayey gravelly SAND (poor recovery). Gravels is subrounded to rounded, medium to coarse of sandstone, mudstone and shale	16
									17
									18
									19
					20.00	28.69		Continued on next sheet	20

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

				Borehole Log			Borehole No. RC01 Sheet 3 of 4		
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC	
Location: Northern Quarter, Manchester				Level: 48.69		Scale 1:50			
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022		Logged By TW			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.00		50 (25 for 70mm/50 for 77mm)	23.80	24.89		Brown very clayey sandy GRAVEL of rounded, fine to coarse, sandstone, mudstone, limestone and shale.	
	21.50 21.50	D	50 (10,15/50 for 105mm)						
	24.08 - 24.50	C							
	24.66 - 24.78	C							
			25.00 - 25.33	C		26.78	21.91		Weak, thinly bedded, brown medium grained SANDSTONE <i>Moderately spaced, 0-5 degrees, planar and stepped smooth</i>
			25.74 - 25.94	C					
			26.02 - 26.10	C					
			27.64 - 27.80	C					
			28.36 - 28.49	C		27.75	20.94		Extremely weak to weak, thinly bedded, brown coarse grained SANDSTONE
			28.72 - 28.97	C					
		29.21 - 29.38	C						
					29.13	19.56		Weak, thinly bedded, brown medium grained SANDSTONE	
								Set 1-Very closely to closely spaced, 0-5 degrees, planar rough and planar smooth. Set 2-Medium spaced, 45 degrees, planar rough	
								Extremely weak, thinly bedded, brown medium to coarse grained SANDSTONE	
Continued on next sheet								30	

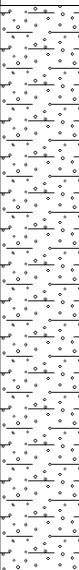
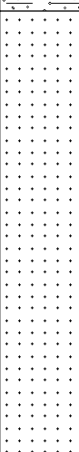
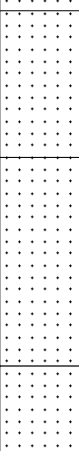
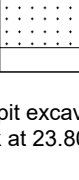
Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

					Borehole Log		Borehole No. RC01 Sheet 4 of 4		
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC	
Location: Northern Quarter, Manchester				Level: 48.69		Scale 1:50			
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022		Logged By TW			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		30.01 - 30.08	C		30.42	18.27		Weak to moderately strong, thinly bedded, brown fine to medium grained SANDSTONE. <i>Very closely to medium spaced, 5-15 degrees, planar and undulating rough, planar smooth</i>	
		30.50 - 30.80	C						
		30.90 - 31.11	C						
		31.17 - 31.35	C						
		31.51 - 31.78	C						
			32.00 - 32.33	C		33.15	15.54		Gravel band of subangular fine to medium sandstone and mudstone at 32.69m to 32.78m bgl <i>Very closely to closely spaced, 10-15 degrees, planar rough</i>
		32.90 - 33.09	C						
		33.60 - 33.68	C						
		34.09 - 34.45	C						
		34.68 - 34.86	C						
					34.47	14.22		Weak, thinly bedded, brown coarse grained SANDSTONE with frequent gravel inclusions <i>Very closely to medium spaced, 5-10 degrees, planar rough and planar smooth</i>	
					35.00	13.69		Weak, thinly bedded, brown fine grained SANDSTONE	
End of borehole at 35.00 m									
Remarks									
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.									



							Rotary Core Log			Borehole No. RC01 Sheet 1 of 4	
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53			Hole Type RC		
Location: Northern Quarter, Manchester				Level: 48.69			Scale 1:50			Logged By TW	
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022							
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
1		0.05					0.05	48.64		MADE GROUND: Tarmacadam	1
		0.10					0.10	48.59		MADE GROUND: Brown sandy GRAVEL of subangular to subrounded, fine to coarse of concrete and brick.	
		0.12					0.12	48.57		MADE GROUND: Tarmacadam	
		0.40	ES							MADE GROUND: Dark brown slightly sandy slightly clayey GRAVEL, with frequent cobbles. Gravel is angular to subrounded, fine to coarse of brick, concrete, ash, and sandstone. Cobbles are angular to subangular of brick.	
		0.75	ES							Abundant cobbles of brick from 0.30m to 0.60m bgl.	
		1.20	D				1.50	47.19		MADE GROUND: Greyish blackish brown slightly clayey very gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, tarmac, timber, metal, sandstone, concrete and plastic. Cobbles are angular to subangular of brick.	
		2.00	D				2.00	46.69		MADE GROUND: Orangish grey sandy GRAVEL of angular to subrounded, fine to coarse, brick, concrete and sandstone	
		2.00 - 3.50		73	0	0	2.40	46.29		MADE GROUND: Soft to firm brown gravelly slightly sandy CLAY. Gravel is angular to rounded, fine to coarse of brick, and sandstone (reworked natural)	
							2.60	46.09		Soft to firm brown slightly gravelly slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	
2		3.50 - 5.00		100	0	0				Firm to stiff brown gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	2
		5.00 - 6.50		97	0	0					
		6.50	D				6.35	42.34			
		6.50 - 8.00		43	0	0	7.10	41.59		Brown slightly clayey SAND (poor recovery)	
		8.00 - 9.50		57	0	0	8.75	39.94		Stiff brown gravelly slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	
		9.50	D								
Continued on next sheet											10

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

							Rotary Core Log				Borehole No. RC01 Sheet 3 of 4						
Project Name: Postal Street							Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC						
Location: Northern Quarter, Manchester							Level: 48.69		Scale 1:50		Logged By TW						
Client: Faithful & Gould							Dates: 23/05/2022 - 26/05/2022										
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description							
				TCR	SCR	RQD											
		20.00 - 21.50	D	37	0	0	23.80	24.89		Brown very clayey sandy GRAVEL of rounded, fine to coarse, sandstone, mudstone, limestone and shale.	21						
		21.50 - 23.00		0	0	0					22						
		23.00 - 23.80		38	0	0					23						
		23.80 - 24.50		100	100	100					24						
		24.50 - 24.66	C	96	90	74	26.78	21.91		Weak, thinly bedded, brown medium grained SANDSTONE <i>Moderately spaced, 0-5 degrees, planar and stepped smooth</i> <i>Very closely to medium spaced, 10-15 degrees, planar rough</i>	24						
		24.66 - 25.00	C								25						
		25.00 - 25.74	C								25						
		25.74 - 26.02	C								26						
		26.02 - 26.60	NI	100	83	37	27.75	20.94		Set 1-Extremely closely to closely spaced, 5-10 degrees, planar rough. Set 2-Closely spaced, 85 degrees, planar rough Extremely weak to weak, thinly bedded, brown coarse grained SANDSTONE Set 1-Extremely closely to moderately spaced, 5-10 degrees, planar rough. Set 2-Medium spaced, 65 degrees, planar smooth Weak, thinly bedded, brown medium grained SANDSTONE	26						
		26.60 - 27.50	15								27						
		27.50 - 27.64	NI								27						
		27.64 - 27.80	C								28						
		27.80 - 28.36	13 C	95	77	28	29.13	19.56		Set 1-Very closely to closely spaced, 0-5 degrees, planar rough and planar smooth. Set 2-Medium spaced, 45 degrees, planar rough Extremely weak, thinly bedded, brown medium to coarse grained SANDSTONE	28						
		28.36 - 28.72	C								29						
		28.72 - 29.21	NI								29						
		29.21 - 30.50	13								30						
Continued on next sheet																	
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.																	

							Rotary Core Log		Borehole No. RC01 Sheet 4 of 4		
Project Name: Postal Street							Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC
Location: Northern Quarter, Manchester							Level: 48.69		Scale 1:50		
Client: Faithful & Gould							Dates: 23/05/2022 - 26/05/2022		Logged By TW		
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		30.01 - 30.08	C				30.42	18.27		Weak to moderately strong, thinly bedded, brown fine to medium grained SANDSTONE. <i>Very closely to medium spaced, 5-15 degrees, planar and undulating rough, planar smooth</i>	
		30.50 - 30.80	NI C								
		30.90 - 31.11	C								
		31.17 - 31.35	C	100	100	95	33.15	15.54		Gravel band of subangular fine to medium sandstone and mudstone at 32.69m to 32.78m bgl <i>Very closely to closely spaced, 10-15 degrees, planar rough</i>	
		30.50 - 32.00	C								
		31.51 - 31.78	C 14								
		32.00 - 32.33	C				34.47	14.22		Weak, thinly bedded, brown coarse grained SANDSTONE with frequent gravel inclusions <i>Very closely to medium spaced, 5-10 degrees, planar rough and planar smooth</i>	
		32.00 - 33.50	NI	87	81	63					
		32.90 - 33.09	C 7								
		33.60 - 33.68	C								
	34.09 - 34.45	C	100	100	81	35.00	13.69		End of borehole at 35.00 m		
	33.50 - 35.00	C									
	34.68 - 34.86	C									

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

Appendix C – Chemical Laboratory Testing Results

- May 2022 Investigation
 - Envirolab, Final Analytical Test Report 22-05332-1

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/05332
Issue Number: 1

Date: 09 June, 2022

Client: Curtins Consulting (Manchester)
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: Jonathan Lord
Project Name: Postal Street, Manchester
Project Ref: B080401
Order No: EBMA 3399
Date Samples Received: 23/05/22
Date Instructions Received: 30/05/22
Date Analysis Completed: 09/06/22

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	7.94	7.86	8.36	8.34	7.79	8.38	8.14	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.02	<0.01	0.05	0.02	0.01	<0.01	0.09	g/l	0.01	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic Matter _D ^{M#}	7.9	4.9	4.9	18.0	GLB	GLB	3.4	% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	29	13	11	35	15	<1	6	mg/kg	1	A-T-024s
Boron (water soluble) _D	<1.0	1.2	1.2	<1.0	<1.0	<1.0	<1.0	mg/kg	1	A-T-027s
Cadmium _D ^{M#}	2.5	1.7	1.6	2.2	1.9	1.4	1.3	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	221	75	183	195	43	15	63	mg/kg	1	A-T-024s
Chromium _D ^{M#}	26	28	23	23	17	22	18	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead _D ^{M#}	679	1600	685	361	363	73	1580	mg/kg	1	A-T-024s
Mercury _D	3.05	0.59	0.93	2.82	1.84	1.14	2.12	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	31	30	29	41	15	18	15	mg/kg	1	A-T-024s
Selenium _D ^{M#}	2	<1	1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc _D ^{M#}	146	91	99	127	100	65	264	mg/kg	5	A-T-024s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD	NAD	Amosite & Chrysotile	Amosite	NAD			A-T-045
Asbestos Matrix (visual) ₀	-	-	-	-	Cement	Board	-			A-T-045
Asbestos Matrix (microscope) ₀	-	-	-	-	-	Loose Fibres	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? ₀	N/A	N/A	N/A	N/A	Yes	No	N/A			A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) ₀	-	-	-	-	0.339	0.098	-	% w/w	0.001	A-T-054

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
PAH-16MS										
Acenaphthene _A ^{M#}	0.05	<0.01	<0.01	<0.01	<0.01	0.30	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	0.02	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	0.09	0.02	<0.02	<0.02	0.04	0.22	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.35	0.10	<0.04	<0.04	0.05	0.58	0.09	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.39	0.09	<0.04	<0.04	<0.04	0.47	0.12	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.50	0.10	<0.05	<0.05	0.06	0.62	0.15	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.23	0.06	<0.05	<0.05	<0.05	0.20	0.10	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.19	<0.07	<0.07	<0.07	<0.07	0.20	<0.07	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	0.54	0.11	<0.06	<0.06	0.07	0.74	0.10	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.10	<0.04	<0.04	<0.04	<0.04	0.07	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	0.67	0.20	<0.08	<0.08	0.14	2.74	0.23	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	0.02	<0.01	<0.01	<0.01	0.01	0.05	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.26	0.06	<0.03	<0.03	<0.03	0.24	0.10	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	0.41	0.15	<0.03	0.04	0.14	0.46	0.04	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	0.82	0.21	<0.07	<0.07	0.12	2.76	0.30	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	4.64	1.10	<0.08	<0.08	0.63	9.68	1.23	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
TPH CWG with Clean Up *C1										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	3	<1	5	<1	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	1	<1	<1	4	4	1	<1	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	25	5	3	24	22	102	23	mg/kg	1	A-T-055s
Total Aliphatics _A	26	5	3	31	26	109	23	mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	<1	<1	<1	1	<1	mg/kg	1	A-T-055s
Aro >C10-C12 _A	1	<1	<1	1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16 _A	5	2	<1	6	2	12	1	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	18	5	<1	21	5	51	5	mg/kg	1	A-T-055s
Aro >C21-C35 _A	82	21	4	100	28	119	25	mg/kg	1	A-T-055s
Total Aromatics _A	106	28	4	129	36	182	31	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	132	33	6	160	62	291	54	mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
SVOC										
4-Bromophenyl phenyl ether _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Hexachlorobenzene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Diethyl phthalate _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Dimethyl phthalate _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Dibenzofuran _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Carbazole _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Butylbenzyl phthalate _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate _A	<500	-	-	-	-	<500	-	µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
4-Nitrophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
3+4-Methylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
4-Chloro-3-methylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Nitrophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Methylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Chlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,6-Dinitrotoluene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4-Dinitrotoluene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4-Dimethylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4-Dichlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4,6-Trichlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4,5-Trichlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Chloronaphthalene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Methylnaphthalene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Phenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Pentachlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
n-Dioctylphthalate _A	<500	-	-	-	-	<500	-	µg/kg	500	A-T-052s
n-Dibutylphthalate _A	<100	-	-	-	-	125	-	µg/kg	100	A-T-052s
Nitrobenzene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Isophorone _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
Hexachloroethane _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Hexachlorocyclopentadiene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Perylene _A	<100	-	-	-	-	110	-	µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
VOC										
Dichlorodifluoromethane _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Chloromethane _A	<10	-	-	-	-	<10	-	µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene) _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromomethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Chloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Trichlorofluoromethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1-Dichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Carbon Disulphide _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Dichloromethane _A	<5	-	-	-	-	<5	-	µg/kg	5	A-T-006s
trans 1,2-Dichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1-Dichloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
cis 1,2-Dichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
2,2-Dichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromochloromethane _A [#]	<5	-	-	-	-	<5	-	µg/kg	5	A-T-006s
Chloroform _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,1-Trichloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1-Dichloropropene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Carbon Tetrachloride _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dichloroethane _A [#]	<2	-	-	-	-	<2	-	µg/kg	2	A-T-006s
Benzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Trichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Dibromomethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromodichloromethane _A [#]	<10	-	-	-	-	<10	-	µg/kg	10	A-T-006s
cis 1,3-Dichloropropene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Toluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
trans 1,3-Dichloropropene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,2-Trichloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,3-Dichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Tetrachloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Dibromochloromethane _A [#]	<3	-	-	-	-	<3	-	µg/kg	3	A-T-006s
1,2-Dibromoethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
Chlorobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Ethylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
m & p Xylene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
o-Xylene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Styrene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromoform _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Isopropylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2,3-Trichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
n-Propylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
2-Chlorotoluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
4-Chlorotoluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
tert-Butylbenzene _A [#]	<2	-	-	-	-	<2	-	µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
sec-Butylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
4-Isopropyltoluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,3-Dichlorobenzene _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,4-Dichlorobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
n-Butylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dichlorobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP) _A	<2	-	-	-	-	<2	-	µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene _A	<3	-	-	-	-	<3	-	µg/kg	3	A-T-006s
Hexachlorobutadiene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene _A	<3	-	-	-	-	<3	-	µg/kg	3	A-T-006s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
% Stones >10mm _A	-	<0.1	<0.1	-				% w/w	0.1	A-T-044
pH _D ^{M#}	-	8.61	8.21	-				pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	0.01	0.03	-				g/l	0.01	A-T-026s
Cyanide (total) _A ^{M#}	-	<1	<1	-				mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	-	<0.2	<0.2	-				mg/kg	0.2	A-T-050s
Organic Matter _D ^{M#}	-	GLB	4.5	-				% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	-	13	24	-				mg/kg	1	A-T-024s
Boron (water soluble) _D	-	<1.0	<1.0	-				mg/kg	1	A-T-027s
Cadmium _D ^{M#}	-	2.0	2.4	-				mg/kg	0.5	A-T-024s
Copper _D ^{M#}	-	122	113	-				mg/kg	1	A-T-024s
Chromium _D ^{M#}	-	18	26	-				mg/kg	1	A-T-024s
Chromium (hexavalent) _D	-	<1	<1	-				mg/kg	1	A-T-040s
Lead _D ^{M#}	-	3380	566	-				mg/kg	1	A-T-024s
Mercury _D	-	2.18	1.82	-				mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	-	19	27	-				mg/kg	1	A-T-024s
Selenium _D ^{M#}	-	<1	<1	-				mg/kg	1	A-T-024s
Zinc _D ^{M#}	-	613	362	-				mg/kg	5	A-T-024s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	-	Chrysotile	NAD	-						A-T-045
Asbestos Matrix (visual) _D	-	Cement	-	-						A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-						A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	-	Yes	N/A	-						A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) _D	-	4.623	-	-				% w/w	0.001	A-T-054
Bulk Fibre ID (inc. matrix) [^]										
Bulk Fibre Identification _D [#]	Chrysotile	-	-	Chrysotile						A-T-045
Bulk Fibre Identification Matrix (visual) _D	Cement	-	-	Cement						A-T-045
Bulk Fibre Identification - Suitable for Water Absorption Test? _D	Yes	-	-	Yes						A-T-045
Bulk Fibre Quantification % Asbestos in ACM										
Bulk Fibre - % Asbestos in ACM (HSG264) _D	15	-	-	15				% w/w	0.001	A-T-054

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
PAH-16MS										
Acenaphthene _A ^{M#}	-	0.01	0.02	-				mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	-	<0.01	<0.01	-				mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	-	0.05	0.08	-				mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	-	0.32	0.33	-				mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	-	0.29	0.37	-				mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	-	0.39	0.43	-				mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	-	0.21	0.38	-				mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	-	0.15	0.17	-				mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	-	0.39	0.44	-				mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	-	0.05	0.10	-				mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	-	0.75	0.69	-				mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	-	<0.01	0.01	-				mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	-	0.24	0.42	-				mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	-	<0.03	0.04	-				mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	-	0.20	0.27	-				mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	-	0.79	0.65	-				mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	-	3.84	4.40	-				mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
TPH CWG with Clean Up *C1										
Ali >C5-C6 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	-	<1	<1	-				mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	-	<1	1	-				mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	-	<1	5	-				mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	-	<1	5	-				mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	-	34	185	-				mg/kg	1	A-T-055s
Total Aliphatics _A	-	34	196	-				mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	-	<1	4	-				mg/kg	1	A-T-055s
Aro >C10-C12 _A	-	<1	2	-				mg/kg	1	A-T-055s
Aro >C12-C16 _A	-	3	6	-				mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	-	7	14	-				mg/kg	1	A-T-055s
Aro >C21-C35 _A	-	36	115	-				mg/kg	1	A-T-055s
Total Aromatics _A	-	46	141	-				mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	-	79	337	-				mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
MTBE _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
SVOC										
4-Bromophenyl phenyl ether _A	-	-	<100	-				µg/kg	100	A-T-052s
Hexachlorobenzene _A	-	-	<100	-				µg/kg	100	A-T-052s
Diethyl phthalate _A	-	-	<100	-				µg/kg	100	A-T-052s
Dimethyl phthalate _A	-	-	<100	-				µg/kg	100	A-T-052s
Dibenzofuran _A	-	-	<100	-				µg/kg	100	A-T-052s
Carbazole _A	-	-	<100	-				µg/kg	100	A-T-052s
Butylbenzyl phthalate _A	-	-	<100	-				µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate _A	-	-	<500	-				µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane _A	-	-	<100	-				µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether _A	-	-	<100	-				µg/kg	100	A-T-052s
4-Nitrophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
3+4-Methylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
4-Chloro-3-methylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Nitrophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Methylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Chlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,6-Dinitrotoluene _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4-Dinitrotoluene _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4-Dimethylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4-Dichlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4,6-Trichlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4,5-Trichlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Chloronaphthalene _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Methylnaphthalene _A	-	-	<100	-				µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether _A	-	-	<100	-				µg/kg	100	A-T-052s
Phenol _A	-	-	<100	-				µg/kg	100	A-T-052s
Pentachlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine _A	-	-	<100	-				µg/kg	100	A-T-052s
n-Dioctylphthalate _A	-	-	<500	-				µg/kg	500	A-T-052s
n-Dibutylphthalate _A	-	-	167	-				µg/kg	100	A-T-052s
Nitrobenzene _A	-	-	<100	-				µg/kg	100	A-T-052s
Isophorone _A	-	-	<100	-				µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
Hexachloroethane _A	-	-	<100	-				µg/kg	100	A-T-052s
Hexachlorocyclopentadiene _A	-	-	<100	-				µg/kg	100	A-T-052s
Perylene _A	-	-	186	-				µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
VOC										
Dichlorodifluoromethane _A	-	-	<1	-				µg/kg	1	A-T-006s
Chloromethane _A	-	-	<10	-				µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene) _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromomethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Chloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Trichlorofluoromethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1-Dichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Carbon Disulphide _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Dichloromethane _A	-	-	<5	-				µg/kg	5	A-T-006s
trans 1,2-Dichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1-Dichloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
cis 1,2-Dichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
2,2-Dichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromochloromethane _A [#]	-	-	<5	-				µg/kg	5	A-T-006s
Chloroform _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,1-Trichloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1-Dichloropropene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Carbon Tetrachloride _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dichloroethane _A [#]	-	-	<2	-				µg/kg	2	A-T-006s
Benzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Trichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Dibromomethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromodichloromethane _A [#]	-	-	<10	-				µg/kg	10	A-T-006s
cis 1,3-Dichloropropene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Toluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
trans 1,3-Dichloropropene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,2-Trichloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,3-Dichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Tetrachloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Dibromochloromethane _A [#]	-	-	<3	-				µg/kg	3	A-T-006s
1,2-Dibromoethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
Chlorobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane _A	-	-	<1	-				µg/kg	1	A-T-006s
Ethylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
m & p Xylene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
o-Xylene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Styrene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromoform _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Isopropylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane _A	-	-	<1	-				µg/kg	1	A-T-006s
1,2,3-Trichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
n-Propylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
2-Chlorotoluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
4-Chlorotoluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
tert-Butylbenzene _A [#]	-	-	<2	-				µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
sec-Butylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
4-Isopropyltoluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,3-Dichlorobenzene _A	-	-	<1	-				µg/kg	1	A-T-006s
1,4-Dichlorobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
n-Butylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dichlorobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP) _A	-	-	<2	-				µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene _A	-	-	<3	-				µg/kg	3	A-T-006s
Hexachlorobutadiene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene _A	-	-	<3	-				µg/kg	3	A-T-006s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

EPH CWG results have humics mathematically subtracted through instrument calculation

TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Curtins Consulting (Manchester), Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG	Project No:	22/05332
Project:	Postal Street, Manchester	Date Received:	30/05/2022 (am)
Clients Project No:	B080401	Cool Box Temperatures (°C):	14.5, 13.9

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples $5 \pm 3^{\circ}\text{C}$), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	22/05332/10	22/05332/11	22/05332/12	22/05332/13
Client Sample No											
Client Sample ID/Depth	WS01 0.30m	WS02 0.40m	WS02 1.50m	WS03 1.70m	WS04 1.00m	WS05 0.60m	BH01 0.25m	BH01 0.65m	BH01 0.75m	RC01 0.40m	RC01 0.75m
Date Sampled	24/05/22	24/05/22	24/05/22	23/05/22	23/05/22	25/05/22	23/05/22	23/05/22	23/05/22	23/05/22	23/05/22
A-T-006s	06/06/2022					06/06/2022				06/06/2022	
A-T-019s	08/06/2022	08/06/2022	08/06/2022	08/06/2022	08/06/2022	08/06/2022	08/06/2022		08/06/2022	08/06/2022	
A-T-022s	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-024s	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022		07/06/2022	07/06/2022	
A-T-026s	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022		09/06/2022	09/06/2022	
A-T-027s	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022		07/06/2022	07/06/2022	
A-T-031s	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022		07/06/2022	07/06/2022	
A-T-032 OM	07/06/2022	07/06/2022	07/06/2022	07/06/2022	01/06/2022	01/06/2022	07/06/2022		01/06/2022	07/06/2022	
A-T-040s	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022		09/06/2022	09/06/2022	
A-T-042sTCN	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-044	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-045	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022
A-T-050s	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-052s	07/06/2022					07/06/2022				07/06/2022	
A-T-054					08/06/2022	08/06/2022		06/06/2022	08/06/2022		06/06/2022
A-T-055s	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	07/06/2022	06/06/2022		06/06/2022	07/06/2022	

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Appendix D – Geotechnical Laboratory Testing Results

- May 2022 Investigation
 - i2 Analytical, Final Analytical Test Report 22-62615-1
 - i2 Analytical, Final Analytical Test Report 22-62619-1

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

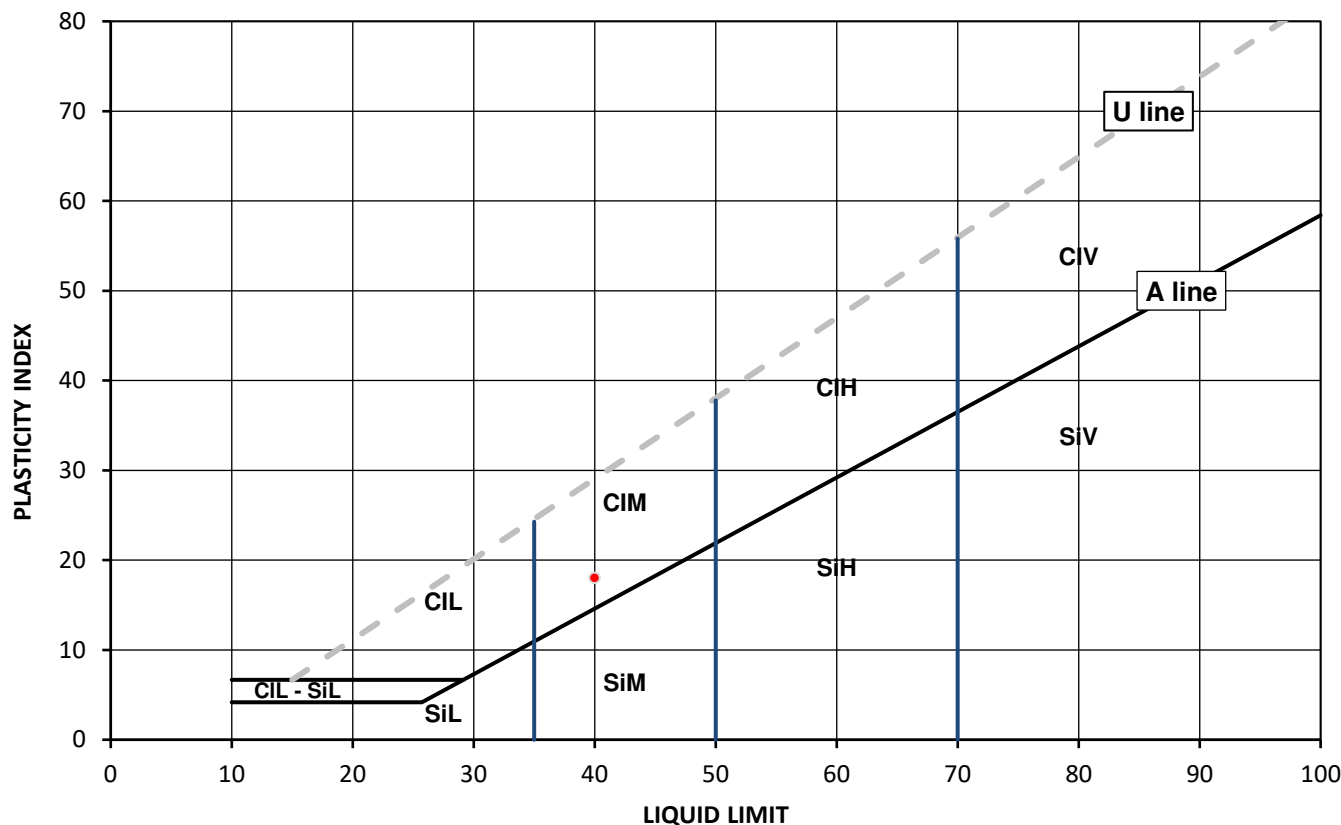
Test Results:

Laboratory Reference: 2300450
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 3.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	40	22	18	91



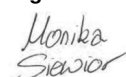
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

4041

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

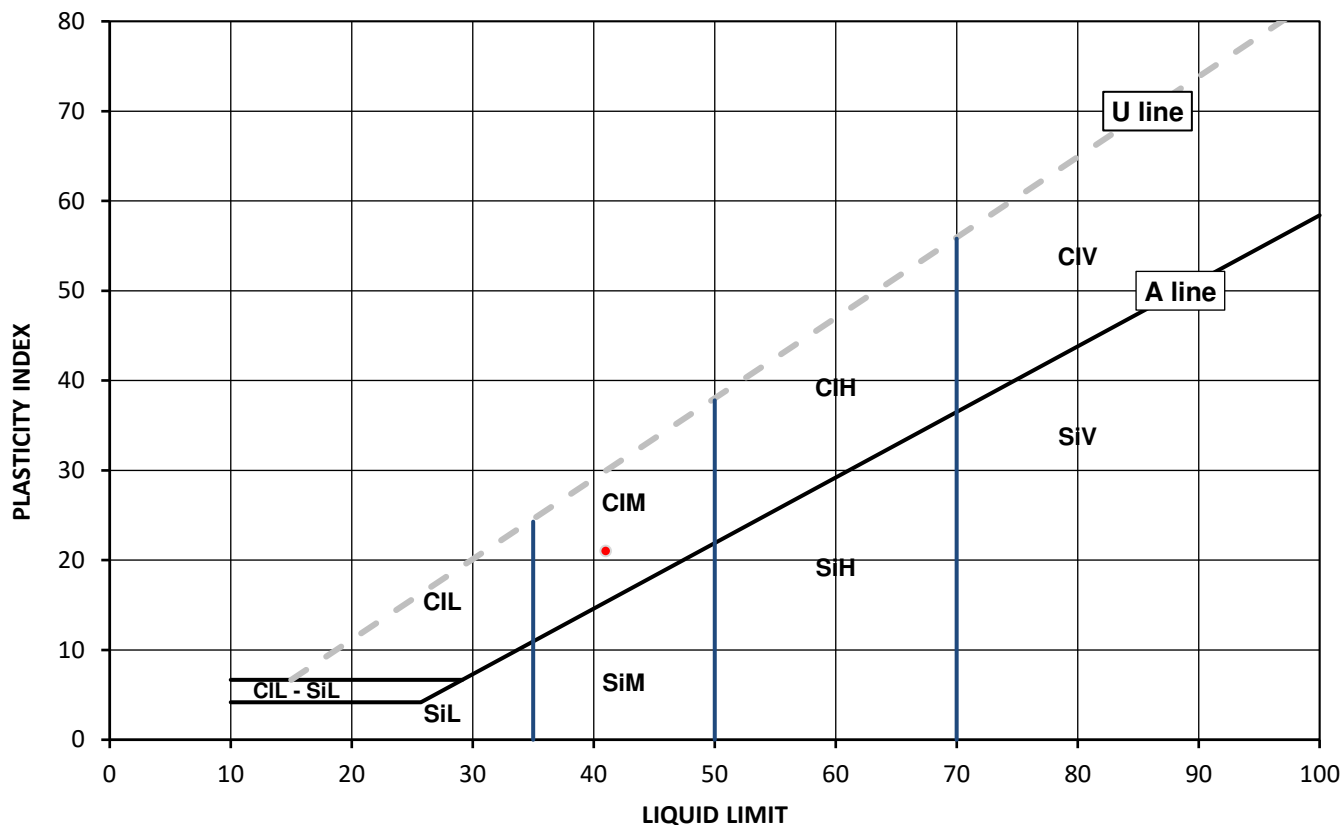
Test Results:

Laboratory Reference: 2300452
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 5.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
21	41	20	21	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

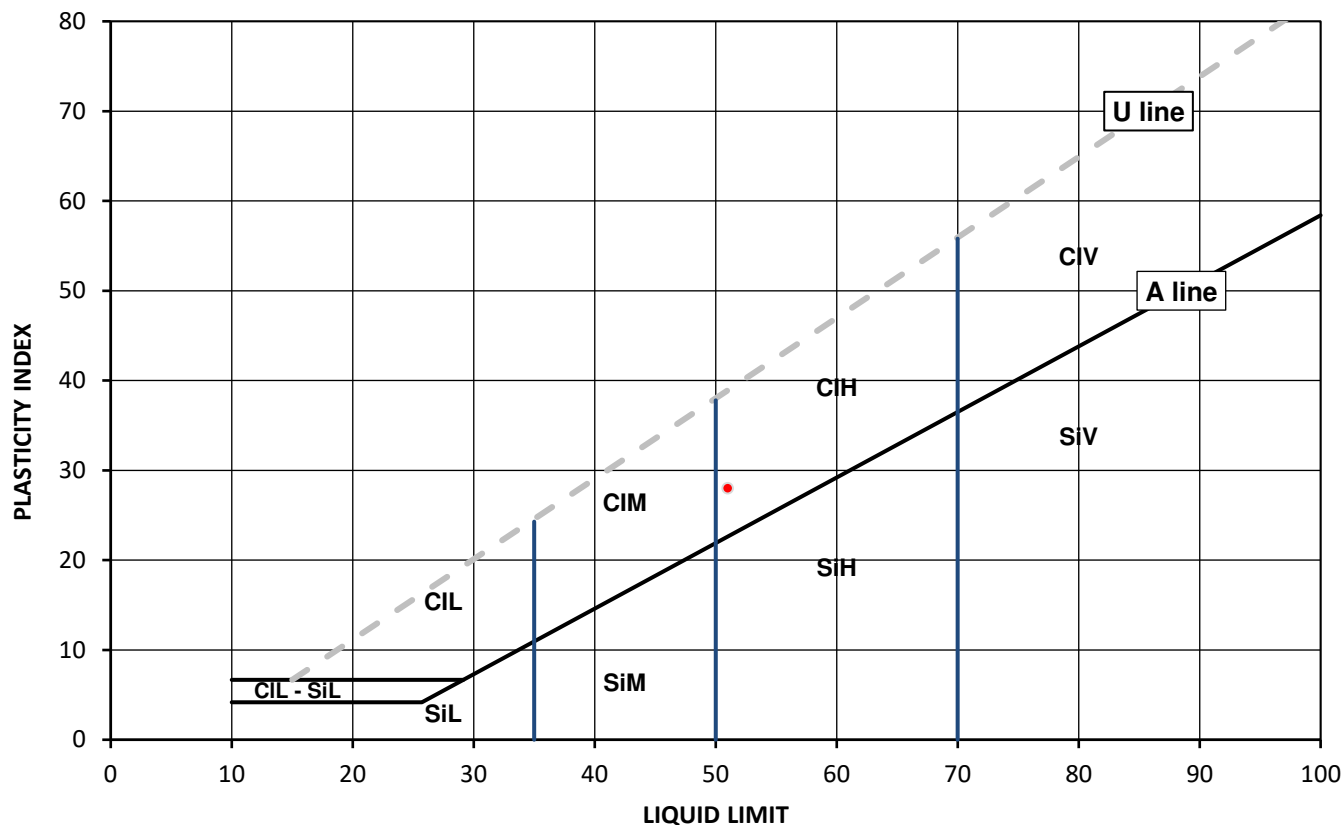
Test Results:

Laboratory Reference: 2300454
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly sandy CLAY

Depth Top [m]: 7.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	51	23	28	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

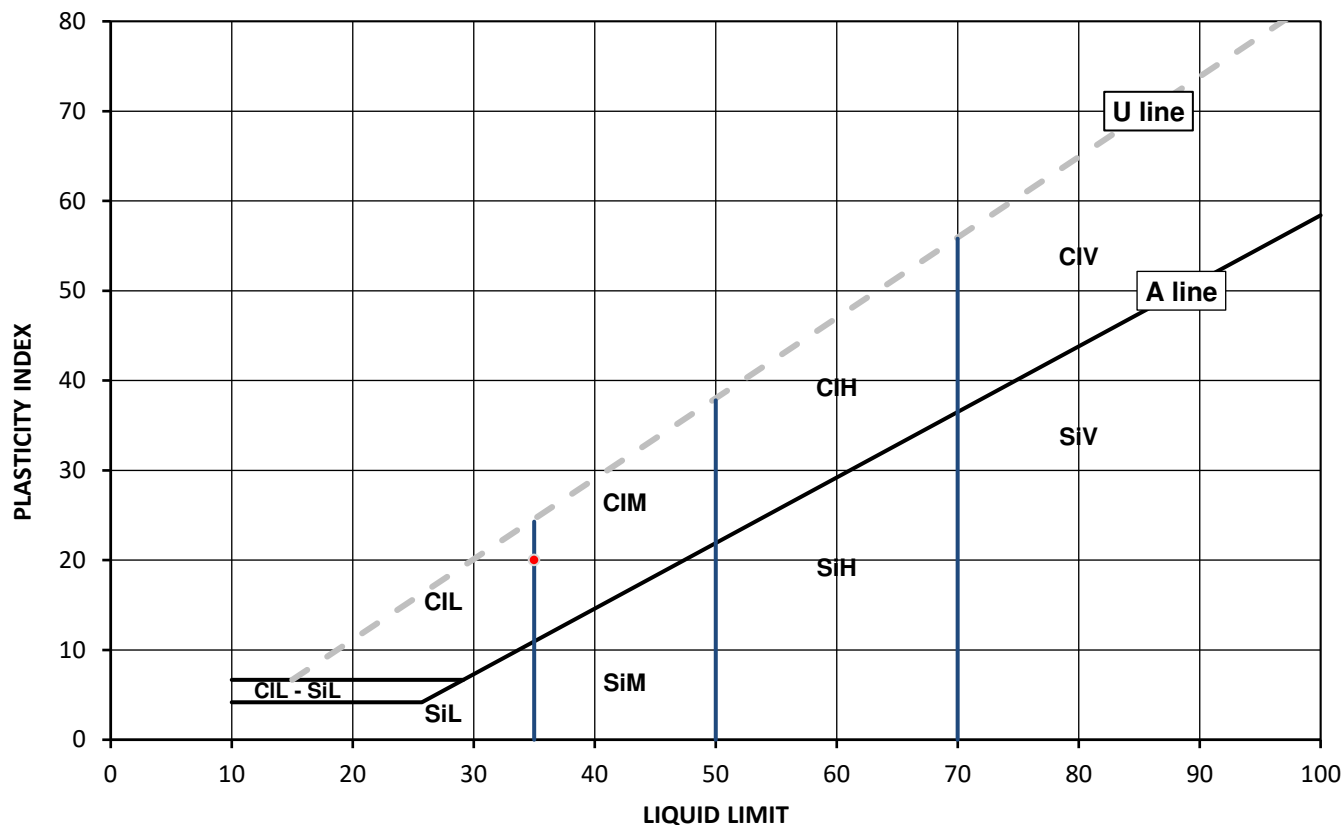
Test Results:

Laboratory Reference: 2300457
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 11.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	35	15	20	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

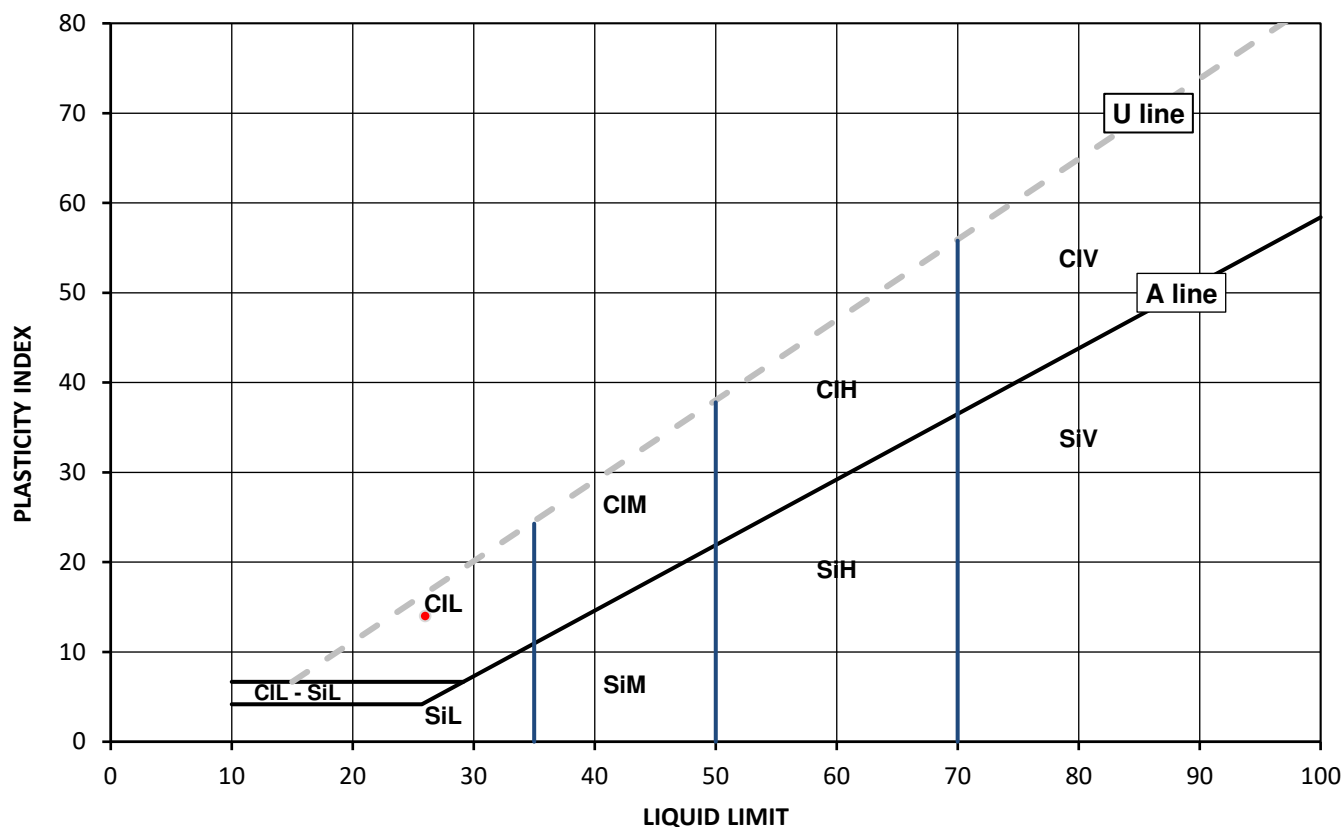
Test Results:

Laboratory Reference: 2300460
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 14.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
11	26	12	14	98



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior

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Reporting Specialist
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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

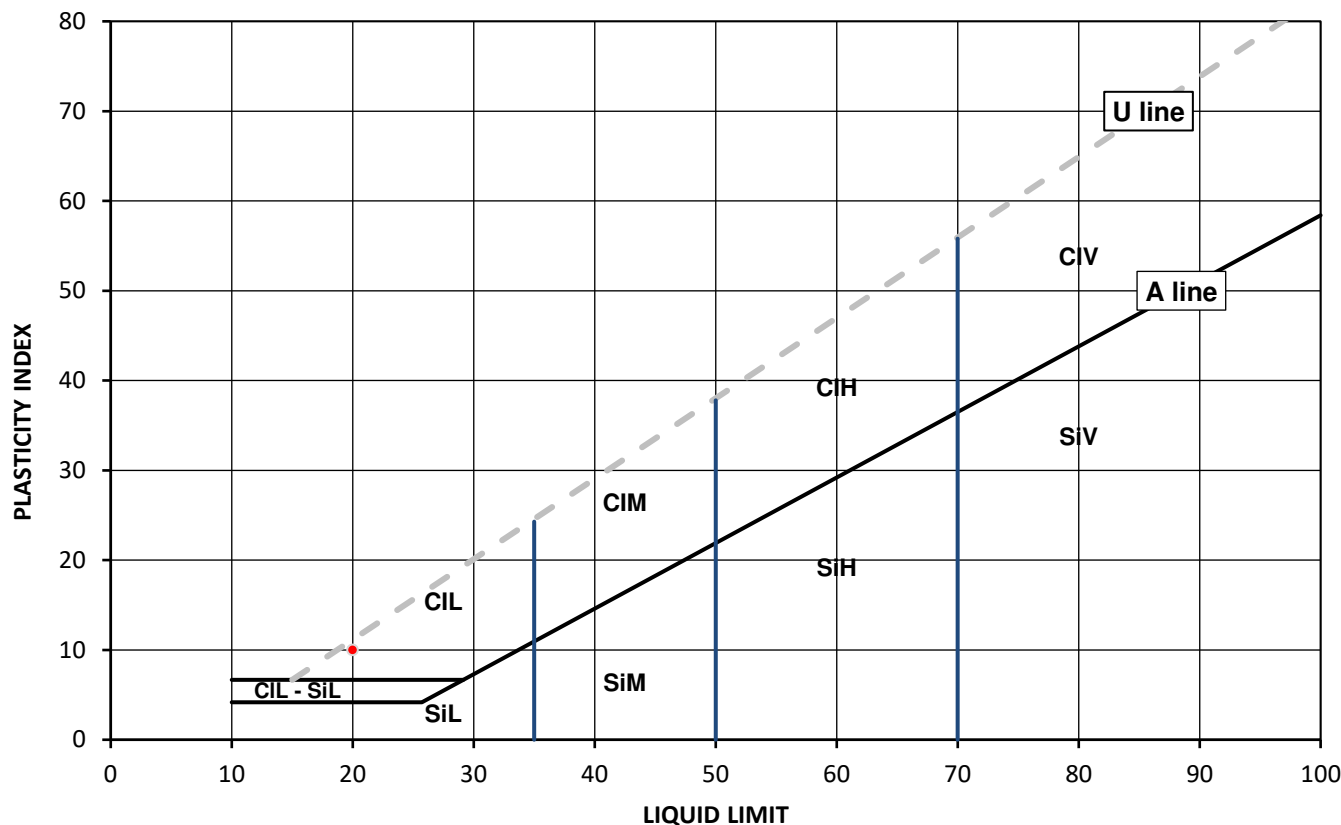
Test Results:

Laboratory Reference: 2300462
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly clayey SAND

Depth Top [m]: 19.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	20	10	10	96



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

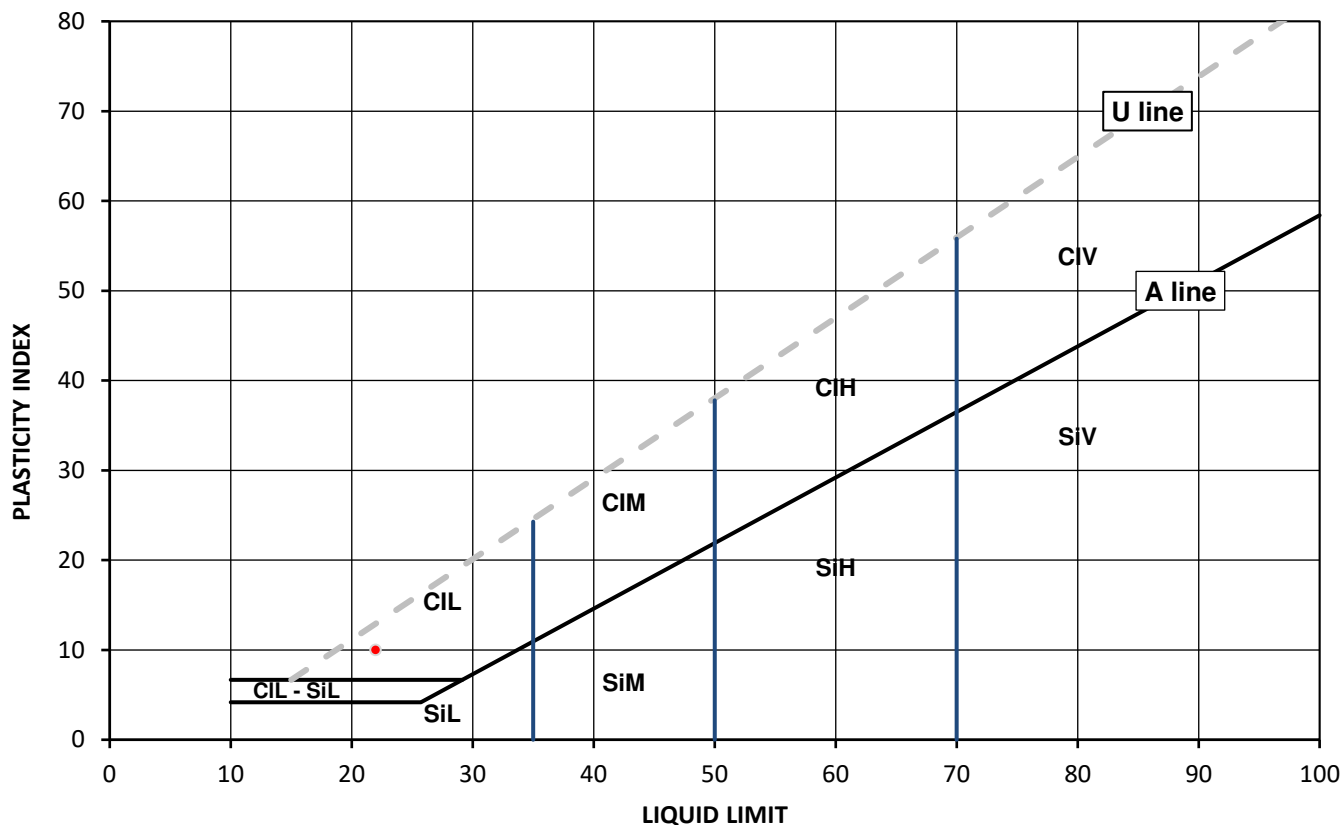
Test Results:

Laboratory Reference: 2300465
Hole No.: RC01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly clayey SAND

Depth Top [m]: 6.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	22	12	10	94



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
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Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
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Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

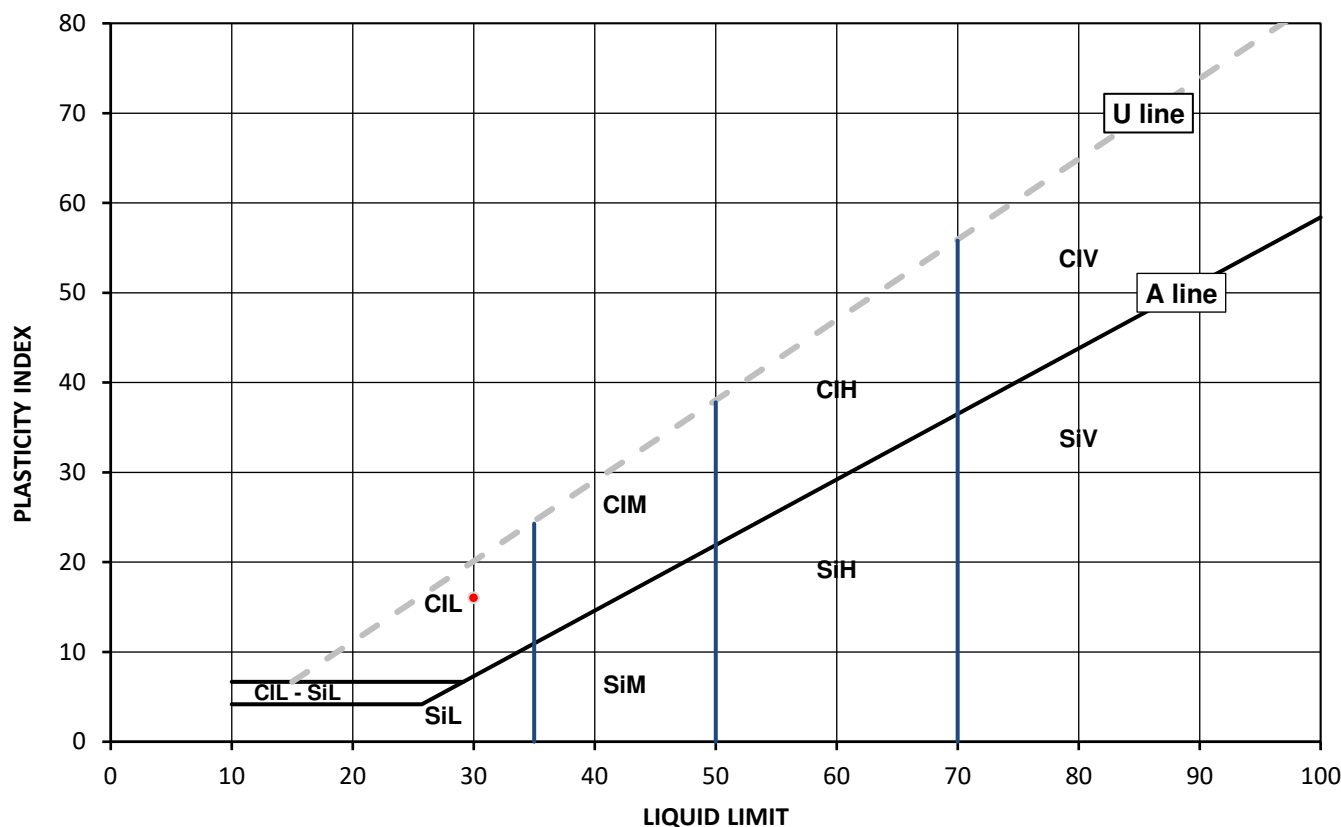
Test Results:

Laboratory Reference: 2300466
Hole No.: RC01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 12.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	30	14	16	98



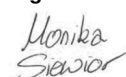
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

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i2 Analytical Ltd
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Northampton NN4 7EB

Client: CURTINS
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Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

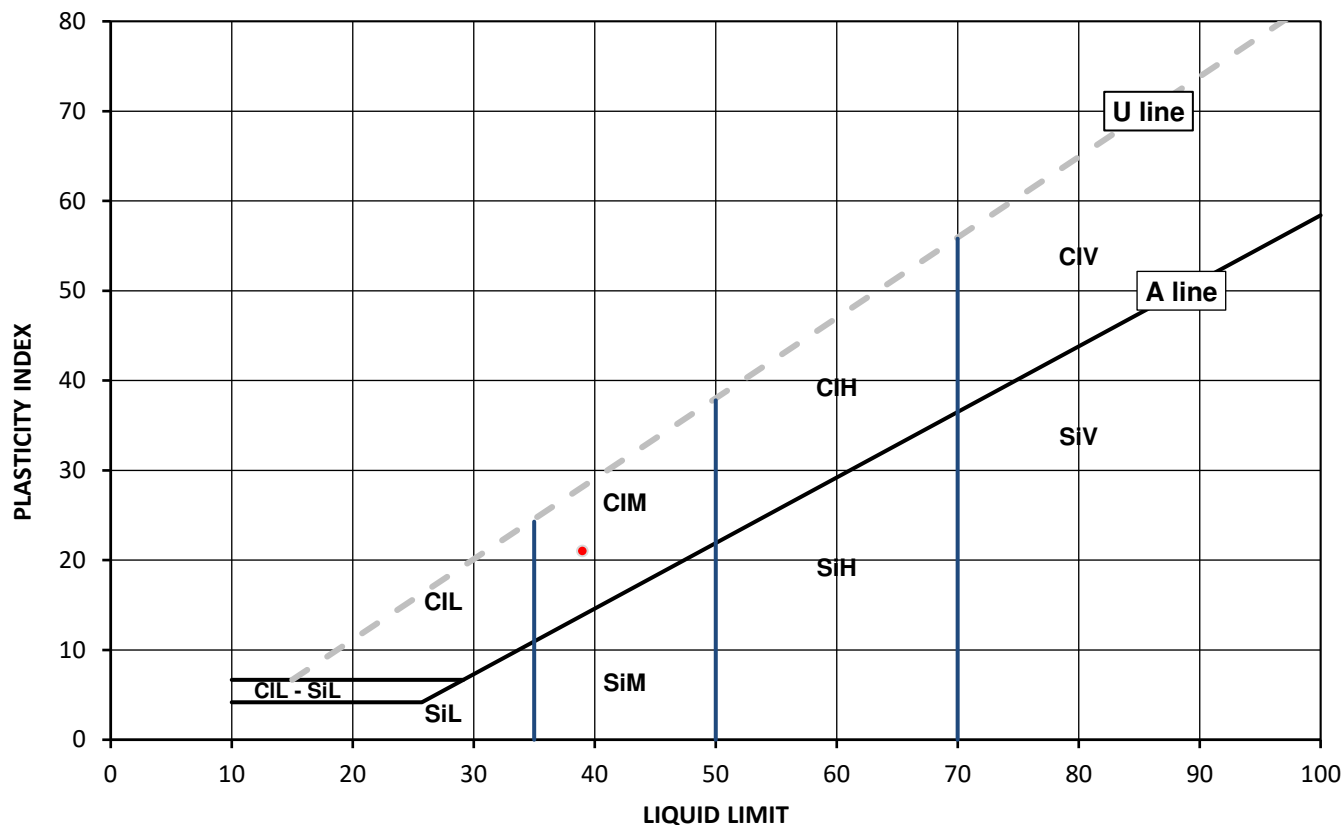
Test Results:

Laboratory Reference: 2300481
Hole No.: WS01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 2.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	39	18	21	100



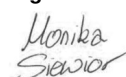
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

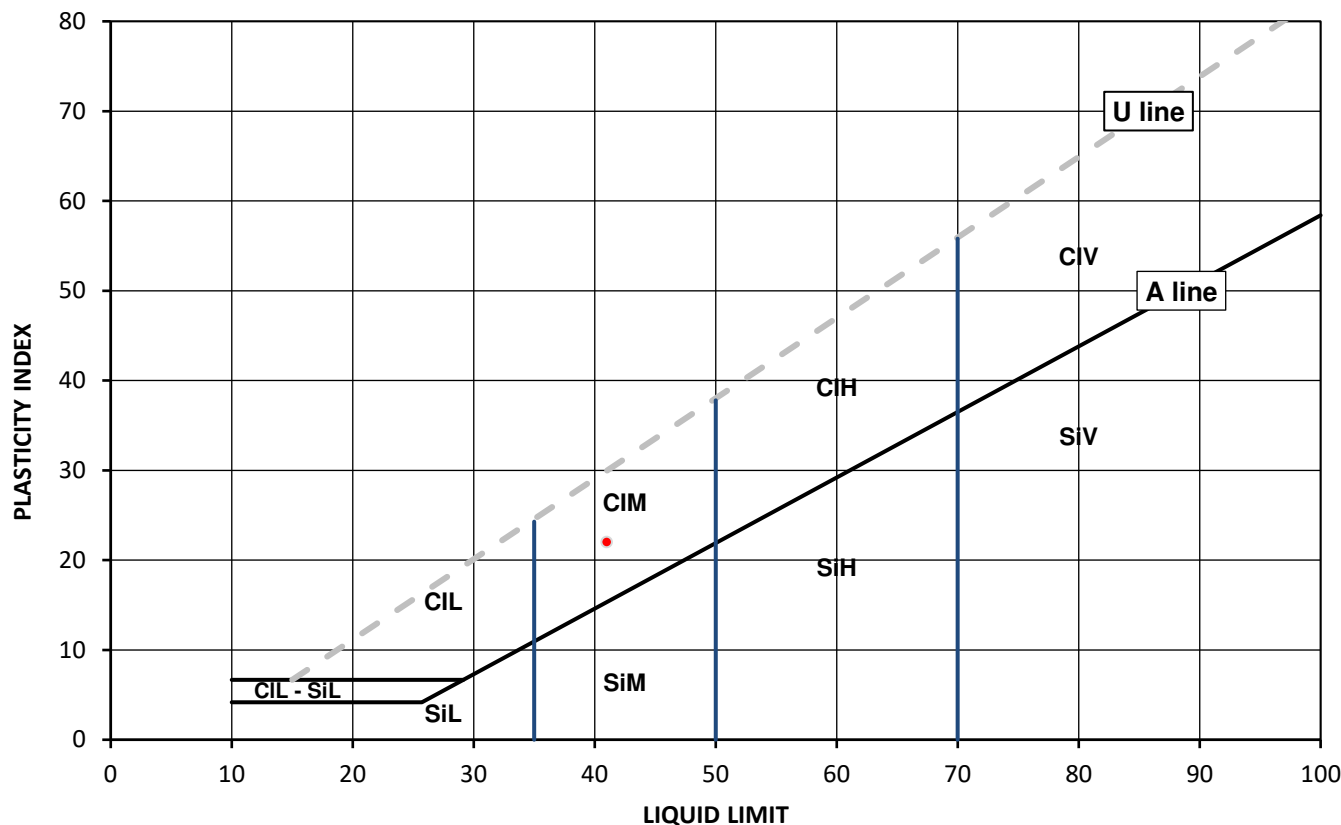
Test Results:

Laboratory Reference: 2300482
Hole No.: WS02
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 4.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
27	41	19	22	97



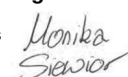
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

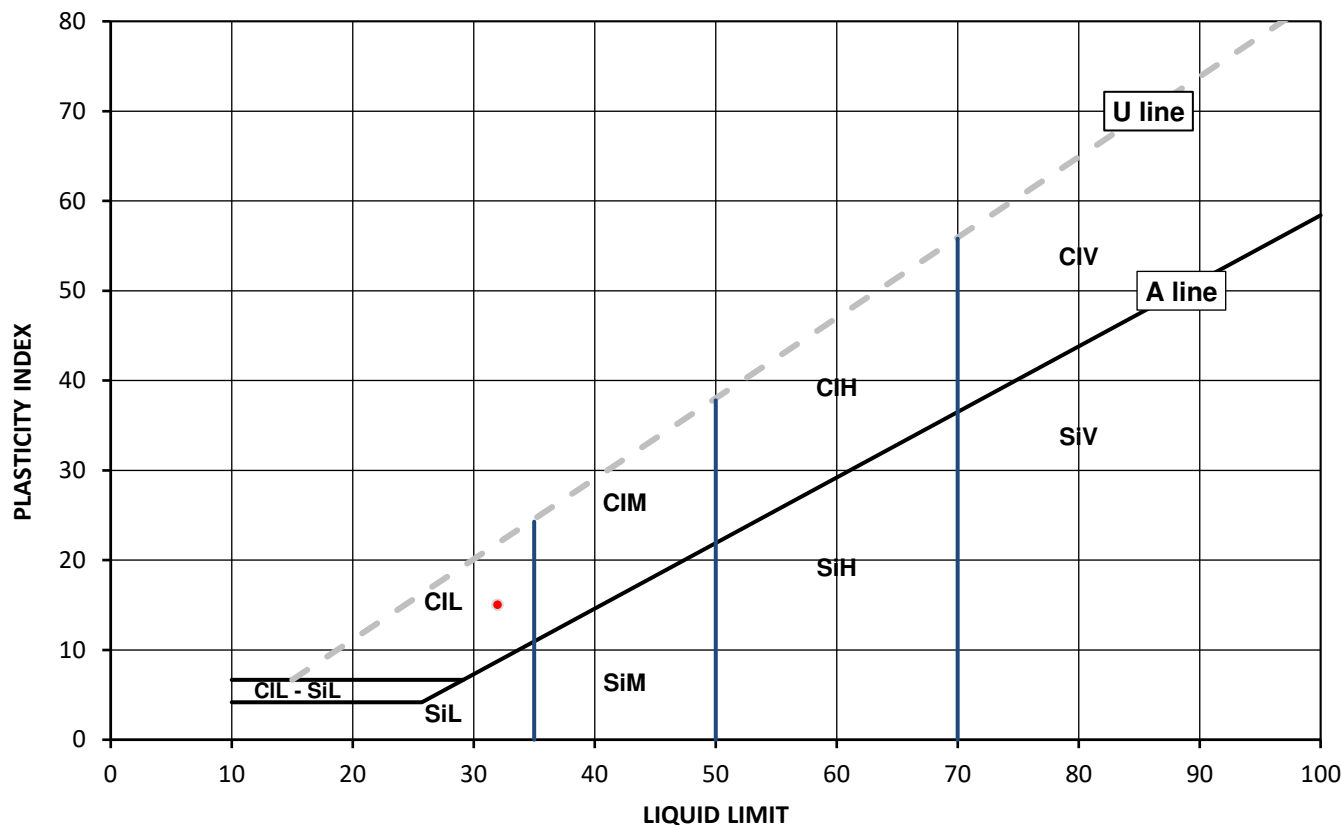
Test Results:

Laboratory Reference: 2300483
Hole No.: WS03
Sample Reference: Not Given
Sample Description: Brown very sandy CLAY

Depth Top [m]: 2.20
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	32	17	15	100



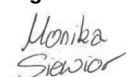
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

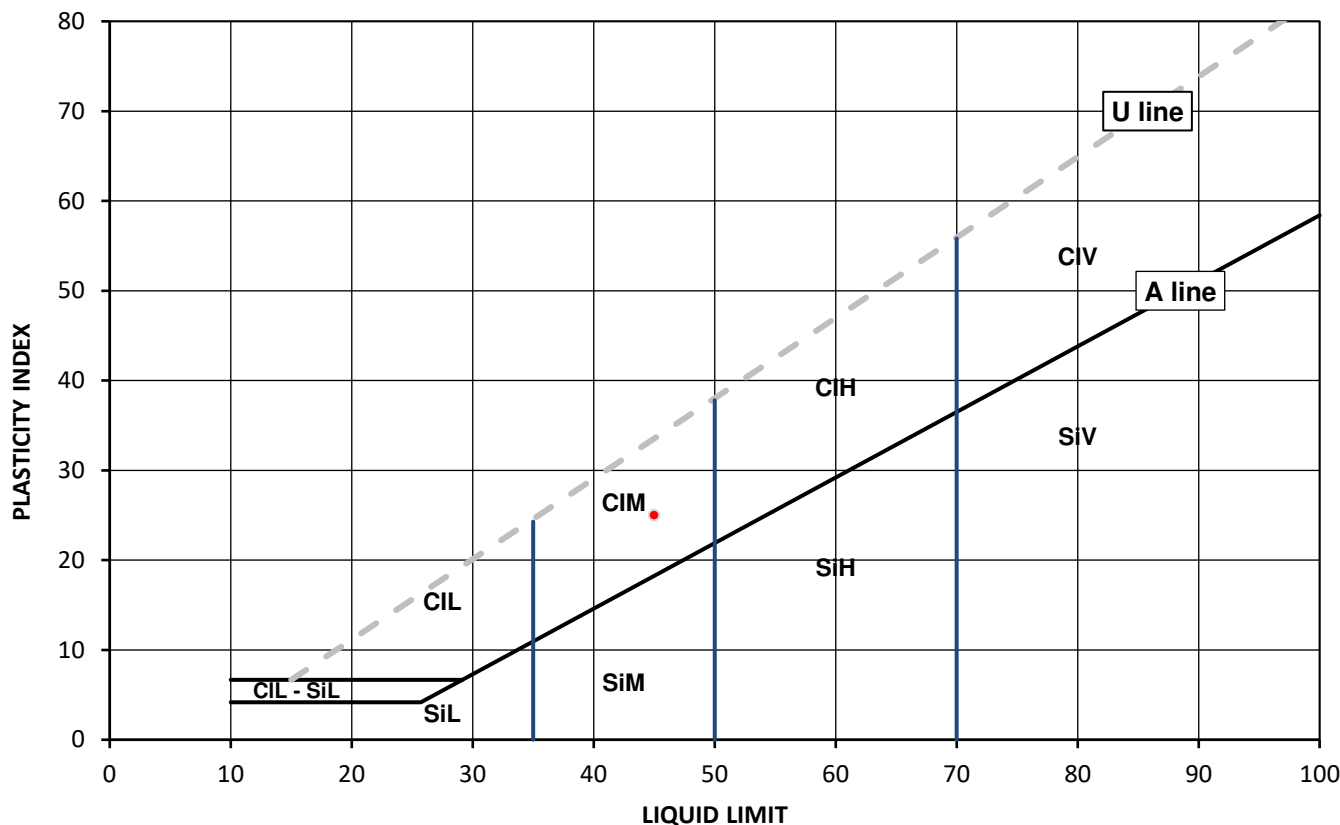
Test Results:

Laboratory Reference: 2300484
Hole No.: WS04
Sample Reference: Not Given
Sample Description: Brown slightly sandy CLAY

Depth Top [m]: 2.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
20	45	20	25	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

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Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 25/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

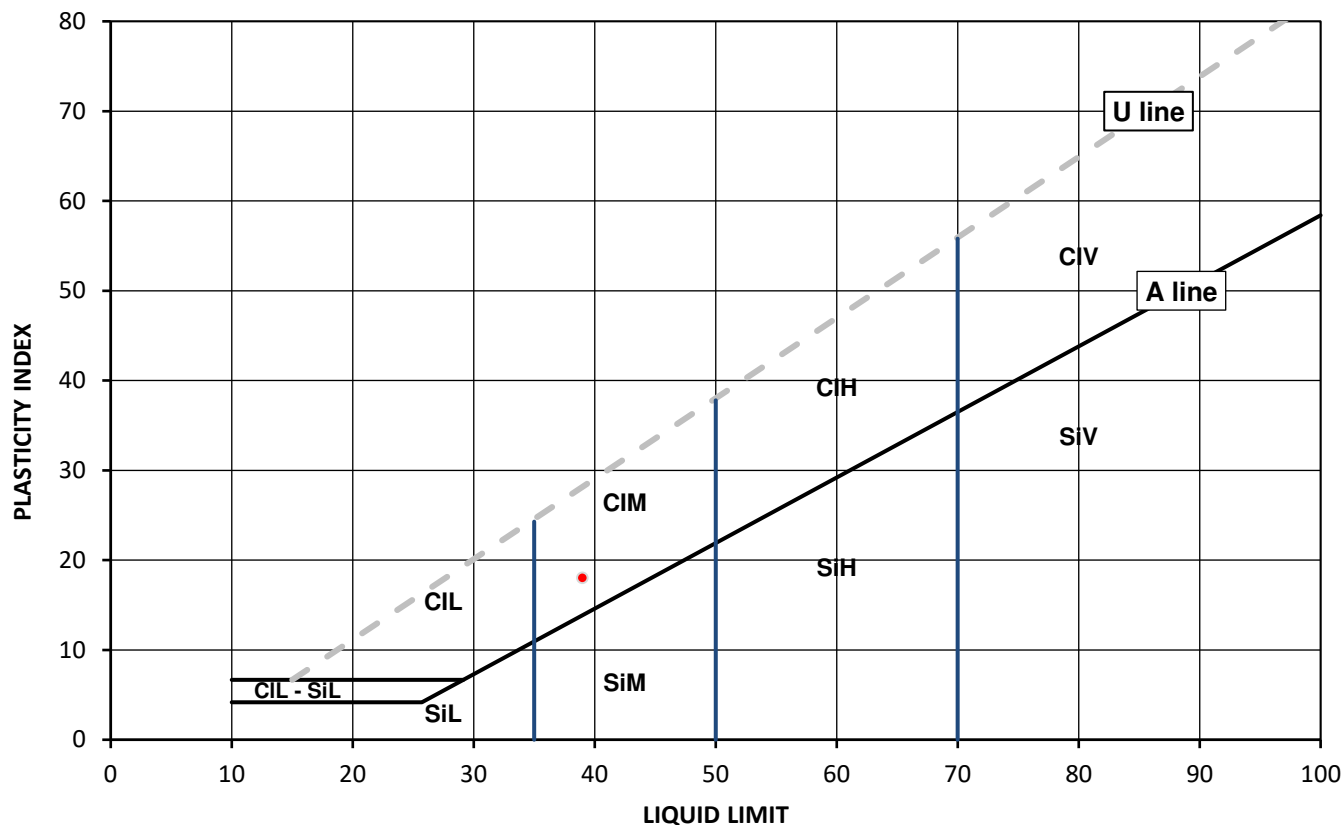
Test Results:

Laboratory Reference: 2300485
Hole No.: WS05
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 4.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	39	21	18	100



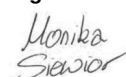
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street
West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05 - 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-2 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2300450	BH01	Not Given	3.00	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	29		91	40	22	18						
2300452	BH01	Not Given	5.00	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	21		100	41	20	21						
2300454	BH01	Not Given	7.00	Not Given	D	Brown slightly sandy CLAY	Atterberg 4 Point	29		100	51	23	28						
2300457	BH01	Not Given	11.50	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	16		100	35	15	20						
2300460	BH01	Not Given	14.50	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	11		98	26	12	14						
2300462	BH01	Not Given	19.00	Not Given	D	Brown slightly gravelly clayey SAND	Atterberg 4 Point	18		96	20	10	10						
2300465	RC01	Not Given	6.50	Not Given	D	Brown slightly gravelly clayey SAND	Atterberg 4 Point	22		94	22	12	10						
2300466	RC01	Not Given	12.50	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	16		98	30	14	16						
2300481	WS01	Not Given	2.50	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	25		100	39	18	21						
2300482	WS02	Not Given	4.00	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	27		97	41	19	22						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Siewior

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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
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Northampton NN4 7EB



Environmental Science

4041

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street
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Contact: EBMA Testing
Site Address: Postal Street

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05 - 25/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-2 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2300483	WS03	Not Given	2.20	Not Given	D	Brown very sandy CLAY	Atterberg 4 Point	17		100	32	17	15						
2300484	WS04	Not Given	2.50	Not Given	D	Brown slightly sandy CLAY	Atterberg 4 Point	20		100	45	20	25						
2300485	WS05	Not Given	4.00	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	25		100	39	21	18						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B080401

Job Number: 22-62615

Date Sampled: 23/05 - 24/05/2022

Date Received: 26/05/2022

Date Tested: 10/06/2022

Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2300450	BH01	Not Given	3.00	Not Given	D	Brown slightly gravelly sandy CLAY		29	Sample was quartered, oven dried at 106.1 °C			
2300452	BH01	Not Given	5.00	Not Given	D	Brown sandy CLAY		21	Sample was quartered, oven dried at 106.1 °C			
2300454	BH01	Not Given	7.00	Not Given	D	Brown slightly sandy CLAY		29	Sample was quartered, oven dried at 106.1 °C			
2300457	BH01	Not Given	11.50	Not Given	D	Brown sandy CLAY		16	Sample was quartered, oven dried at 106.1 °C			
2300460	BH01	Not Given	14.50	Not Given	D	Brown slightly gravelly very sandy CLAY		11	Sample was quartered, oven dried at 106.1 °C			
2300462	BH01	Not Given	19.00	Not Given	D	Brown slightly gravelly clayey SAND		18	Sample was quartered, oven dried at 106.1 °C			
2300465	RC01	Not Given	6.50	Not Given	D	Brown slightly gravelly clayey SAND		22	Sample was quartered, oven dried at 106 °C			
2300466	RC01	Not Given	12.50	Not Given	D	Brown slightly gravelly very sandy CLAY		16	Sample was quartered, oven dried at 106 °C			
2300481	WS01	Not Given	2.50	Not Given	D	Brown sandy CLAY		25	Sample was quartered, oven dried at 106 °C			
2300482	WS02	Not Given	4.00	Not Given	D	Brown slightly gravelly sandy CLAY		27	Sample was quartered, oven dried at 106 °C			

Comments:

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Signed:

*Monika Siewior*Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd



4041

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing
Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05 - 25/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2300483	WS03	Not Given	2.20	Not Given	D	Brown very sandy CLAY		17	Sample was quartered, oven dried at 106.1 °C			
2300484	WS04	Not Given	2.50	Not Given	D	Brown slightly sandy CLAY		20	Sample was quartered, oven dried at 106.1 °C			
2300485	WS05	Not Given	4.00	Not Given	D	Brown sandy CLAY		25	Sample was whole tested, oven dried at 106 °C			

Comments:

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Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

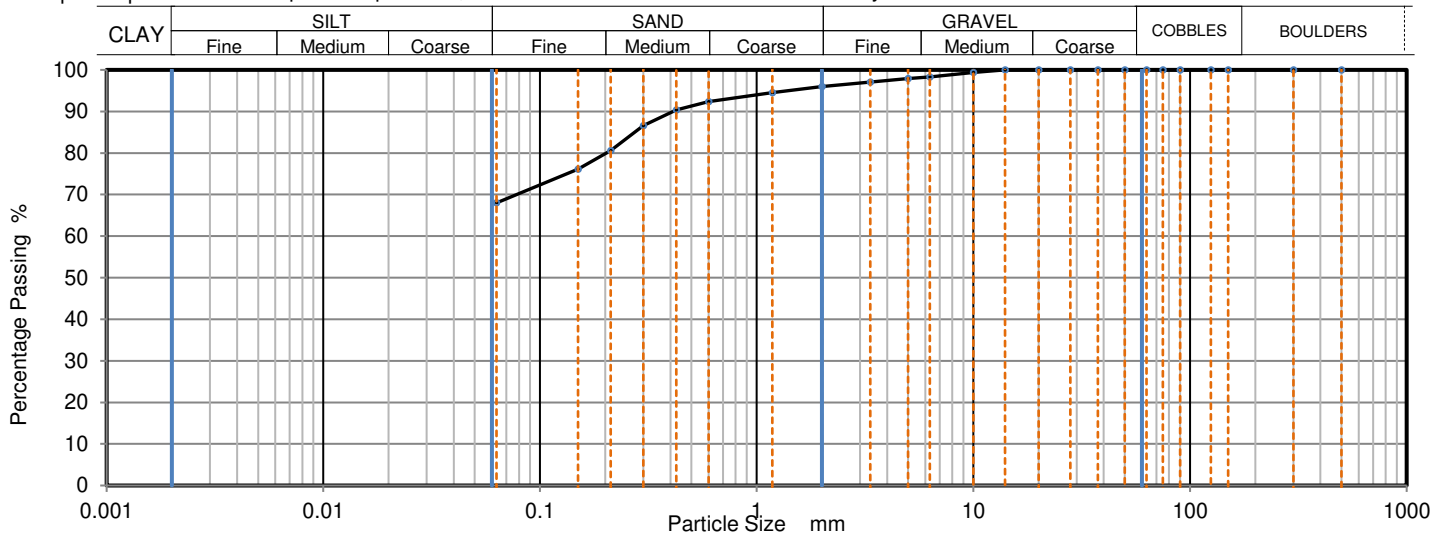
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300456
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY
Sample Preparation: Sample was quartered, oven dried at 106.1 °C and broken down by hand.

Depth Top [m]: 9.90
Depth Base [m]: Not Given
Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	98		
3.35	97		
2	96		
1.18	95		
0.6	92		
0.425	90		
0.3	87		
0.212	81		
0.15	76		
0.063	68		

Sample Proportions	% dry mass
Very coarse	0
Gravel	4
Sand	28
Fines <0.063mm	68

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	N/A
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

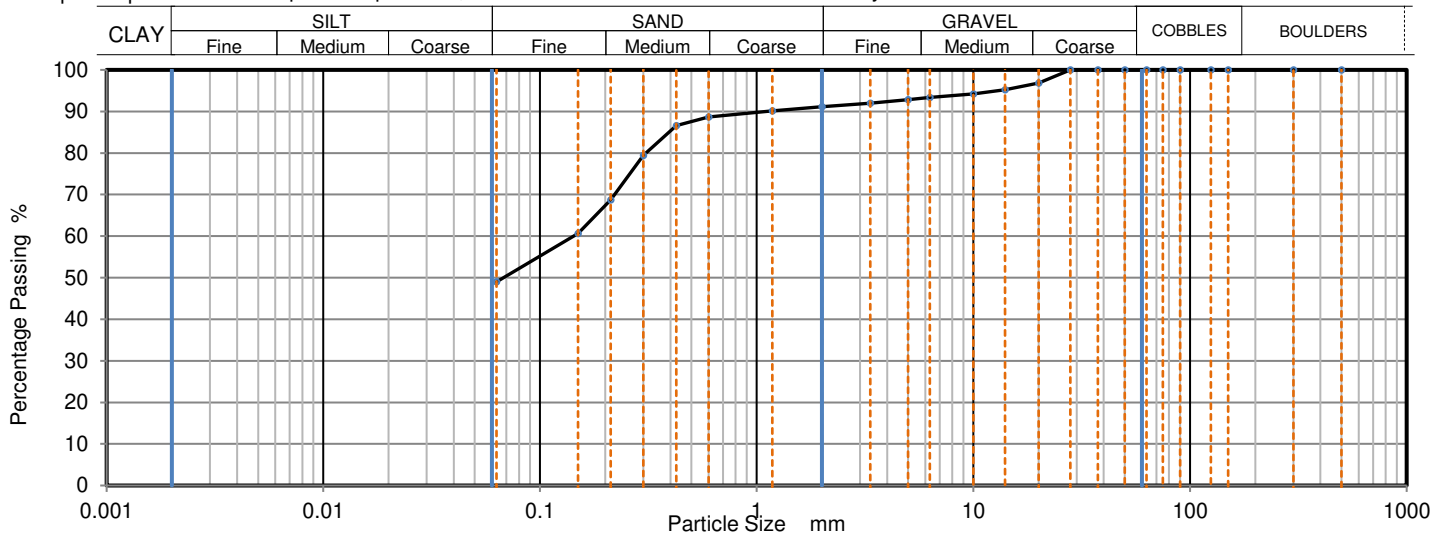
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300459
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown gravelly very sandy CLAY
Sample Preparation: Sample was quartered, oven dried at 106.1 °C and broken down by hand.

Depth Top [m]: 13.50
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	97		
14	95		
10	94		
6.3	93		
5	93		
3.35	92		
2	91		
1.18	90		
0.6	89		
0.425	87		
0.3	79		
0.212	69		
0.15	61		
0.063	49		

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	42
Fines <0.063mm	49

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 2.3
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

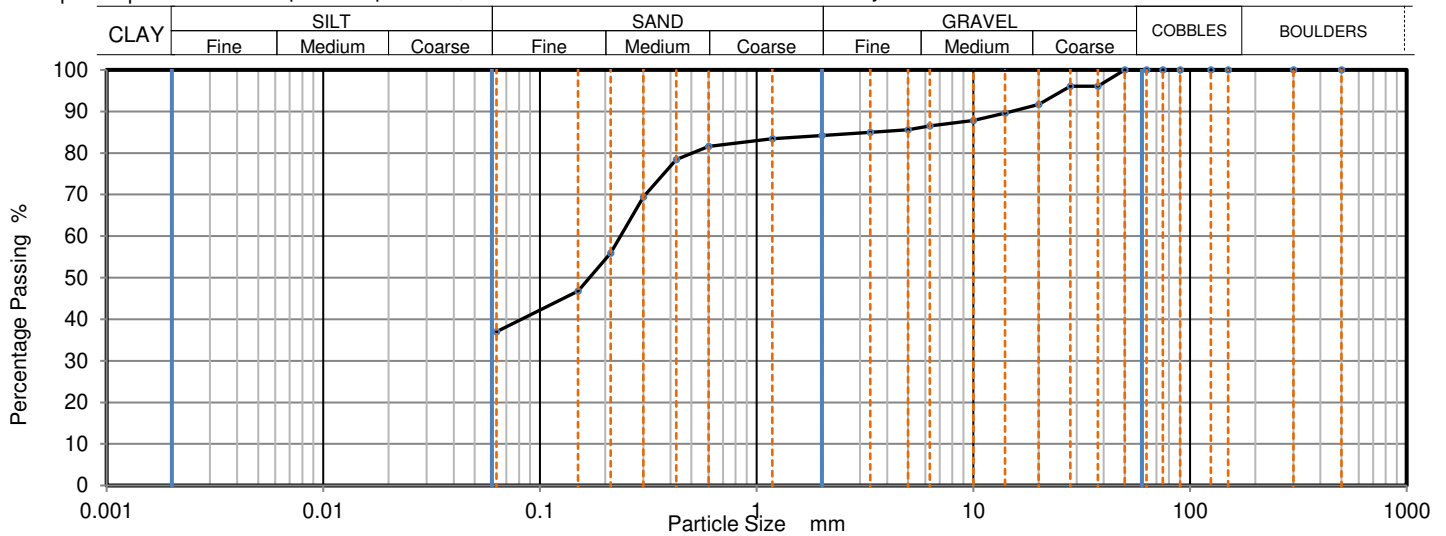
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300461
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown gravelly very clayey SAND
Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 15.00
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	96		
20	92		
14	90		
10	88		
6.3	87		
5	86		
3.35	85		
2	84		
1.18	83		
0.6	82		
0.425	78		
0.3	69		
0.212	56		
0.15	47		
0.063	38		

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	46
Fines <0.063mm	38

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 3.7
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

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Reporting Specialist
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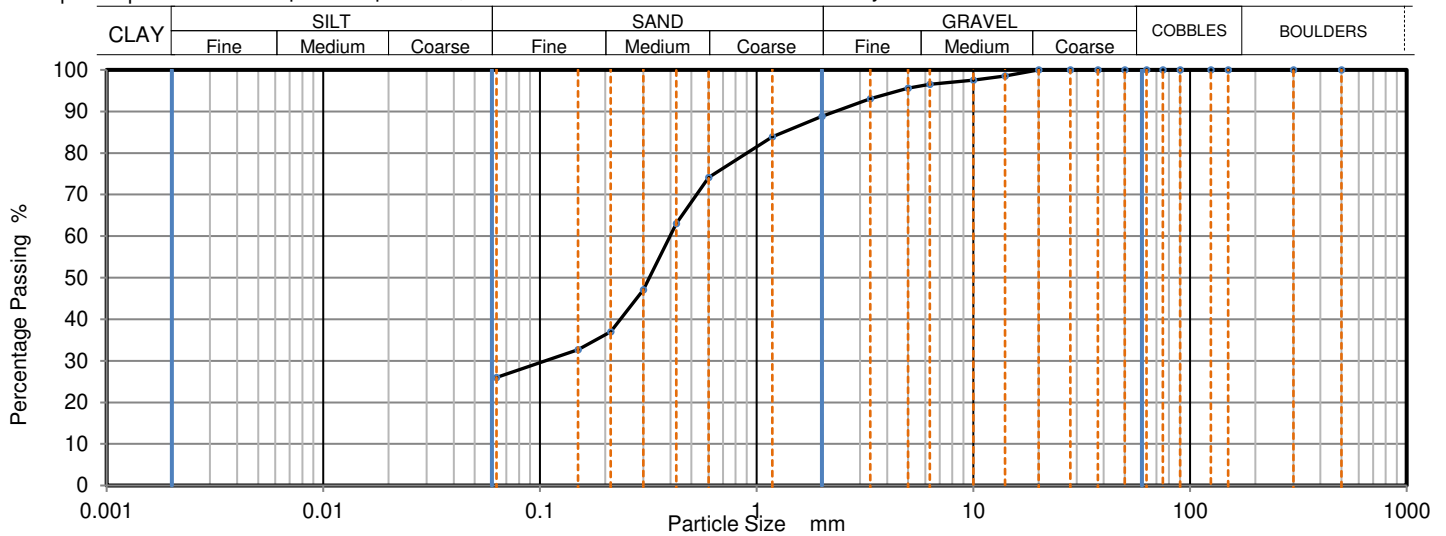
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300463
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown gravelly clayey SAND
Sample Preparation: Sample was quartered, oven dried at 106.1 °C and broken down by hand.

Depth Top [m]: 21.00
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	97		
5	96		
3.35	93		
2	89		
1.18	84		
0.6	74		
0.425	63		
0.3	47		
0.212	37		
0.15	33		
0.063	27		

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	62
Fines <0.063mm	27

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 6.3
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

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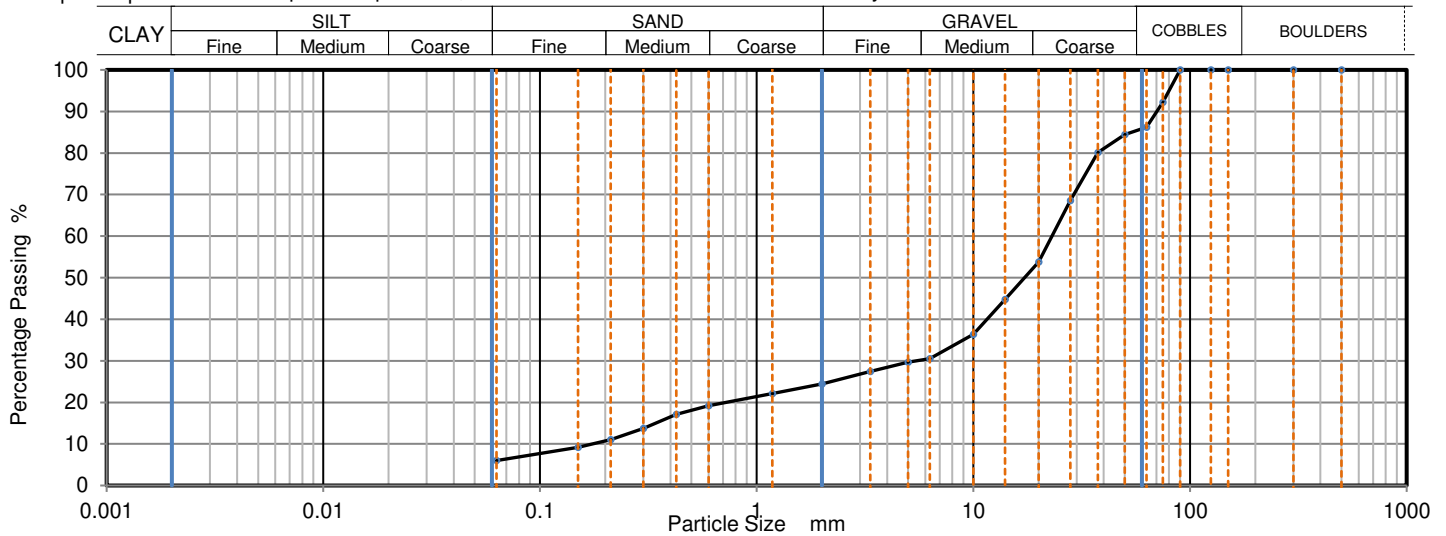
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300464
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly clayey sandy GRAVEL with cobbles
Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 22.50
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	92		
63	86		
50	84		
37.5	80		
28	69		
20	54		
14	45		
10	36		
6.3	31		
5	30		
3.35	27		
2	24		
1.18	22		
0.6	19		
0.425	17		
0.3	14		
0.212	11		
0.15	9		
0.063	7		

Sample Proportions	% dry mass
Very coarse	14
Gravel	62
Sand	18
Fines <0.063mm	7

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	130
Curvature Coefficient	7.5

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
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for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

DETERMINATION OF POINT LOAD STRENGTH

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401

Job Number: 22-62615

Date Sampled: 26/05/2022

Date Received: 26/05/2022

Date Tested: 13/06/2022

Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2300468	RC01	Not Given	14.66	14.73	C	Orangish brown SANDSTONE	WC = 6.2%	1	A	U	YES	-	99.9	56.0	46.0	2.8	76.5	0.48	0.58
2300470	RC01	Not Given	25.74	25.94	C	Orangish brown SANDSTONE	WC = 8.4%	1	A		YES	-	101.0	49.0	45.0	1.6	76.1	0.27	0.32
2300471	RC01	Not Given	27.64	27.80	C	Orangish brown SANDSTONE	WC = 7.2%	1	A		YES	-	99.8	63.0	55.0	0.7	83.6	0.10	0.13
2300472	RC01	Not Given	28.71	28.97	C	Orangish brown SANDSTONE	WC = 11.5%	1	A	U	YES	-	98.8	62.0	58.0	0.5	85.4	0.07	0.09
2300473	RC01	Not Given	29.21	29.38	C	Orangish brown SANDSTONE	WC = 12.3%	1	A	U	YES	-	99.5	66.0	58.0	0.8	85.7	0.11	0.14
2300474	RC01	Not Given	30.50	30.80	C	Orangish brown SANDSTONE	WC = 7.7%	1	A	U	YES	-	101.1	78.0	58.0	2.8	86.4	0.37	0.47
2300475	RC01	Not Given	30.90	31.11	C	Orangish brown SANDSTONE	WC = 9.2%	1	A	U	YES	-	100.5	63.0	56.0	0.9	84.6	0.12	0.15
2300476	RC01	Not Given	31.17	31.35	C	Orangish brown SANDSTONE	WC = 10.3%	1	A	U	YES	-	100.4	63.0	56.0	1.1	84.6	0.15	0.19
2300478	RC01	Not Given	32.90	Not Given	C	Orangish brown SANDSTONE	WC = 7.6%	1	A	U	YES	-	99.9	85.0	74.0	1.6	97.0	0.17	0.23
2300480	RC01	Not Given	34.64	Not Given	C	Orangish brown SANDSTONE	WC = 8.4%	1	A	U	YES	-	100.3	62.0	54.0	1.6	83.0	0.22	0.28

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

DETERMINATION OF UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Tested in Accordance with: ISRM, 2007, p153, part 1

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401

Job Number: 22-62615

Date Sampled: 26/05/2022

Date Received: 26/05/2022

Date Tested: 13/06/2022

Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Specimen Dimensions (2)				Bulk density (2)	Water Content (1)	Uniaxial Compression (3)			
		Reference	Depth Top	Depth Base	Type			Diameter	Length	H/D	Orientation of sample			Condition	Stress Rate	Mode of failure	UCS
			m	m													
2300467	RC01	Not Given	14.09	14.50	C	Orangish brown SANDSTONE		100.7	273.2	2.7	Vertical	2.31	3.9	as received	0.0377	S + AC	14.8
2300469	RC01	Not Given	25.00	25.33	C	Orangish brown SANDSTONE		100.5	286.2	2.8	Vertical	2.26	6.1	as received	0.0378	S + AC	17.1
2300479	RC01	Not Given	34.09	Not Given	C	Orangish brown SANDSTONE		100.8	275.7	2.7	Vertical	2.21	12.0	as received	0.0376	S + AC	11.1

Note: 1 - ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS, 2 - ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density, 3 - ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials, above notes apply unless annotated otherwise in the remarks. Compaction machine: VJ Tech AUTOCON - VJT 51-3011; Mode of failure legend: S - Single shear, MS - multiple shear, AC - Axial cleavage, F - Fragmented

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with: BS 1377-7: 1990: Clause 9

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing
Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 14/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300451
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY
Sample Preparation: Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.

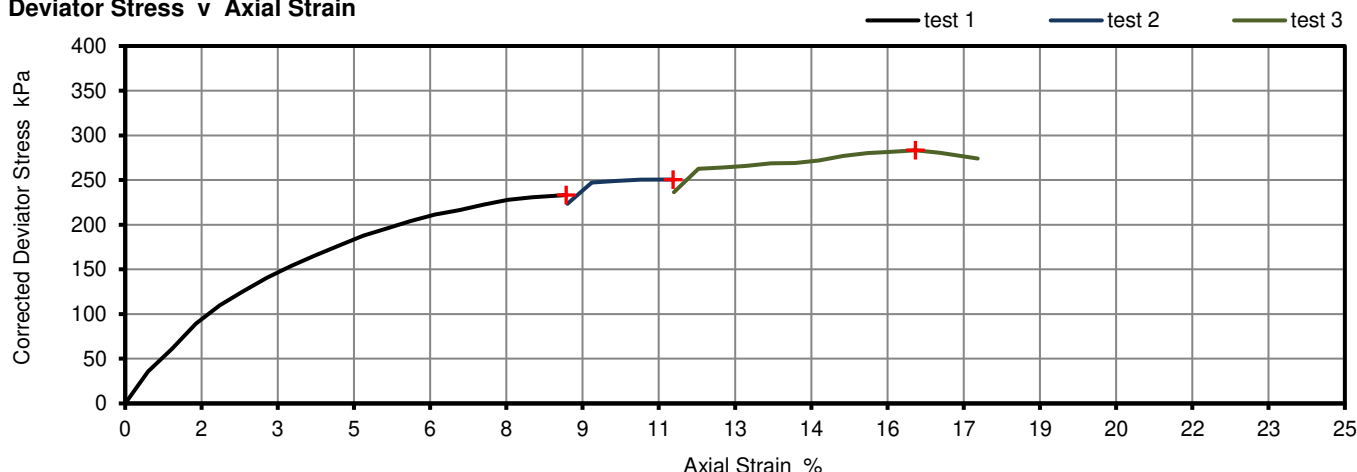
Depth Top [m]: 4.00
Depth Base [m]: 4.45
Sample Type: U

Length	200.58	mm
Diameter	101.61	mm
Bulk Density	2.10	Mg/m ³
Moisture Content	25	%
Dry Density	1.68	Mg/m ³
Membrane thickness	0.28	mm

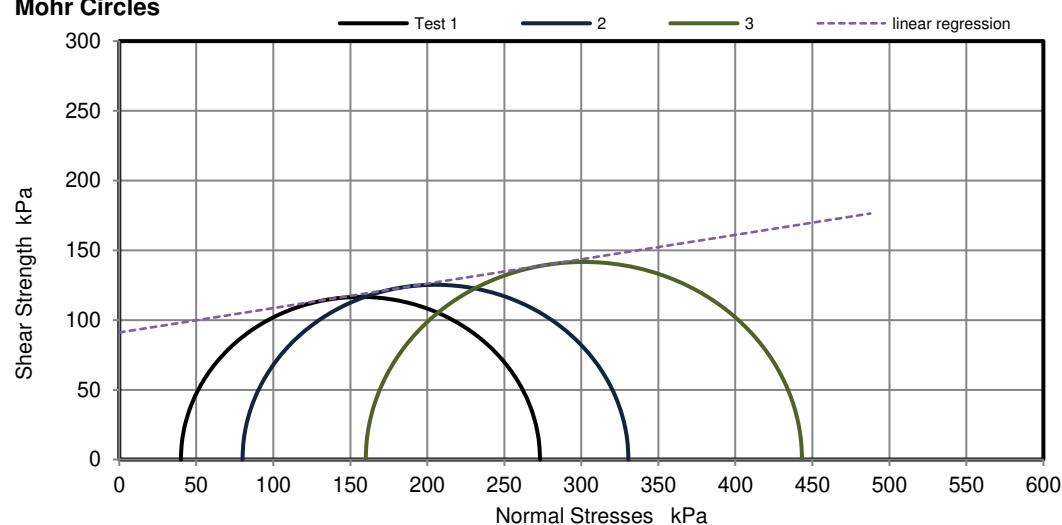
Rate of Strain
Stage Number
Cell Pressure
Axial Strain at failure
Deviator Stress, ($\sigma_1 - \sigma_3$) f
Shear strength, cu
Mode of failure
Membrane Correction

1.99			%/min
1	2	3	
40	80	160	kPa
9.0	11.2	16.2	%
233	251	283	kPa
117	125	142	kPa
Compound			
0.57	0.67	0.89	kPa

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Linear Regression
 ϕ_u 9.9 °
cu 91 kPa

Note: Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

Remarks: Correction values: 40kPa=19N, 80kPa=38N, 160kPa=86N.

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with: BS 1377-7: 1990: Clause 9

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 14/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300455
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY
Sample Preparation: Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.

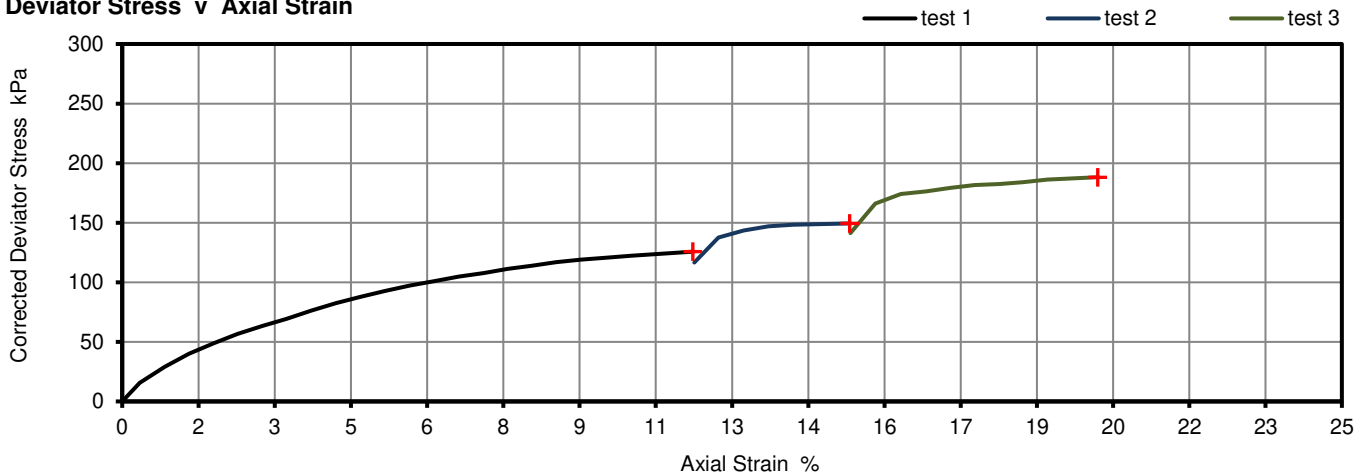
Depth Top [m]: 9.00
Depth Base [m]: 9.45
Sample Type: U

Length	139.08	mm
Diameter	69.50	mm
Bulk Density	2.18	Mg/m ³
Moisture Content	16	%
Dry Density	1.89	Mg/m ³
Membrane thickness	0.25	mm

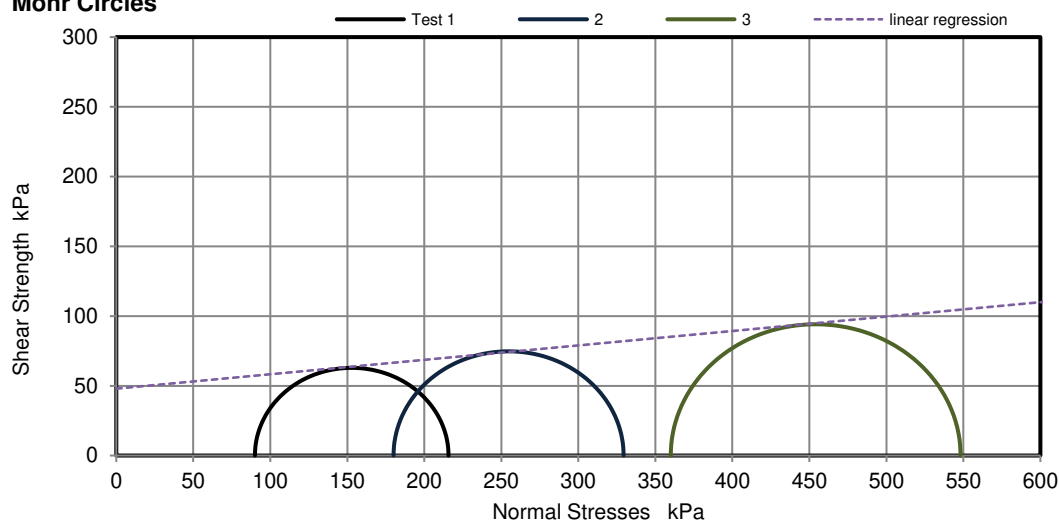
Rate of Strain
Stage Number
Cell Pressure
Axial Strain at failure
Deviator Stress, ($\sigma_1 - \sigma_3$) f
Shear strength, cu
Mode of failure
Membrane Correction

2.00			%/min
1	2	3	
90	180	360	kPa
11.7	14.9	20.0	%
126	149	188	kPa
63	75	94	kPa
Compound			
0.90	1.09	1.38	kPa

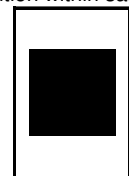
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Linear Regression
 ϕ_u 5.9 °
cu 48 kPa

Note: Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

Remarks: Correction values: 90kPa=43N, 180kPa=97N, 360kPa=184N.

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

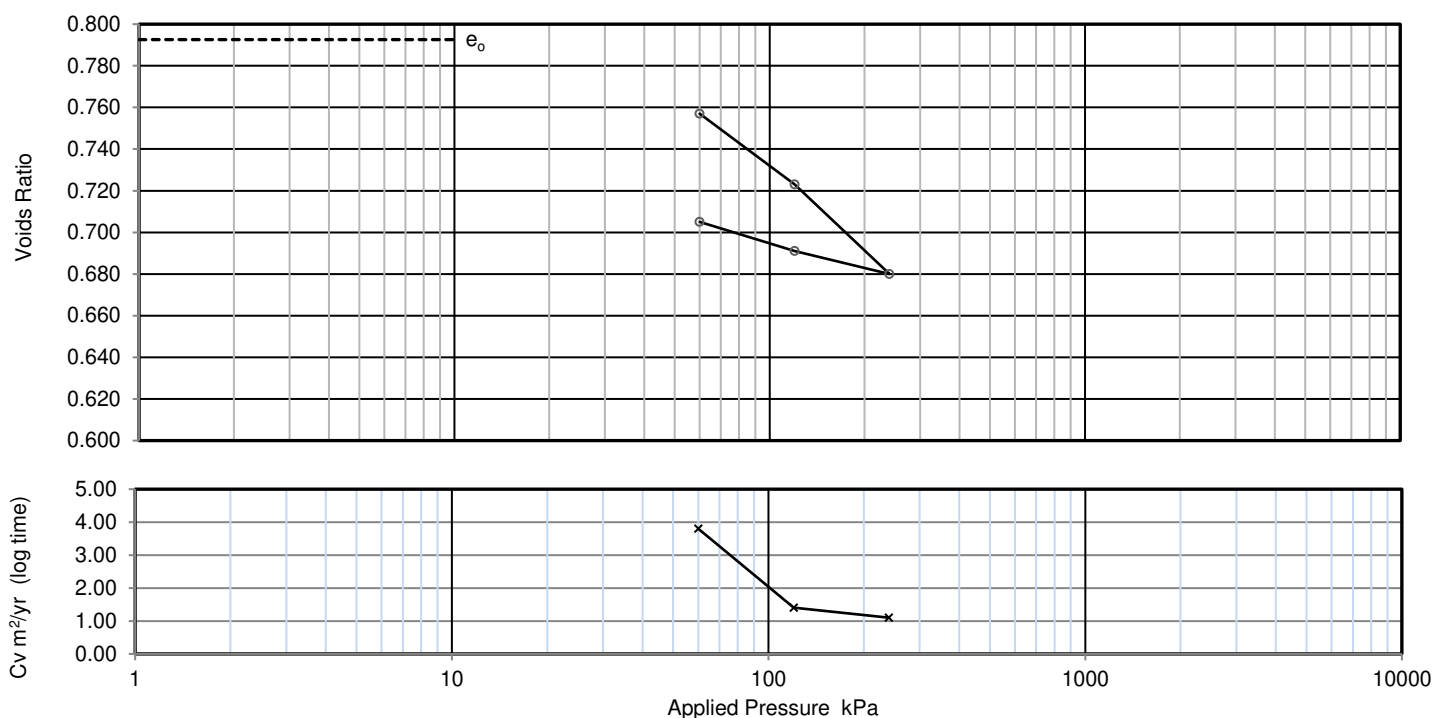
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300453
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 6.00
Depth Base [m]: 6.45
Sample Type: U

[illegible]

Preparation

Carried out on top of U100

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Total test time

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.10	-	mm
20.10	19.12	mm
30	30	%
1.92	2.02	Mg/m3
1.48	1.55	Mg/m3
0.793	0.705	
99	113	%
22.0		°C
Not measured		kPa
		%
5		days

Note: Cv corrected to 20°C

Remarks:

Signed:

Monika Siewior
Reporting Specialist

for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 17/06/2022

GF 172.16



DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

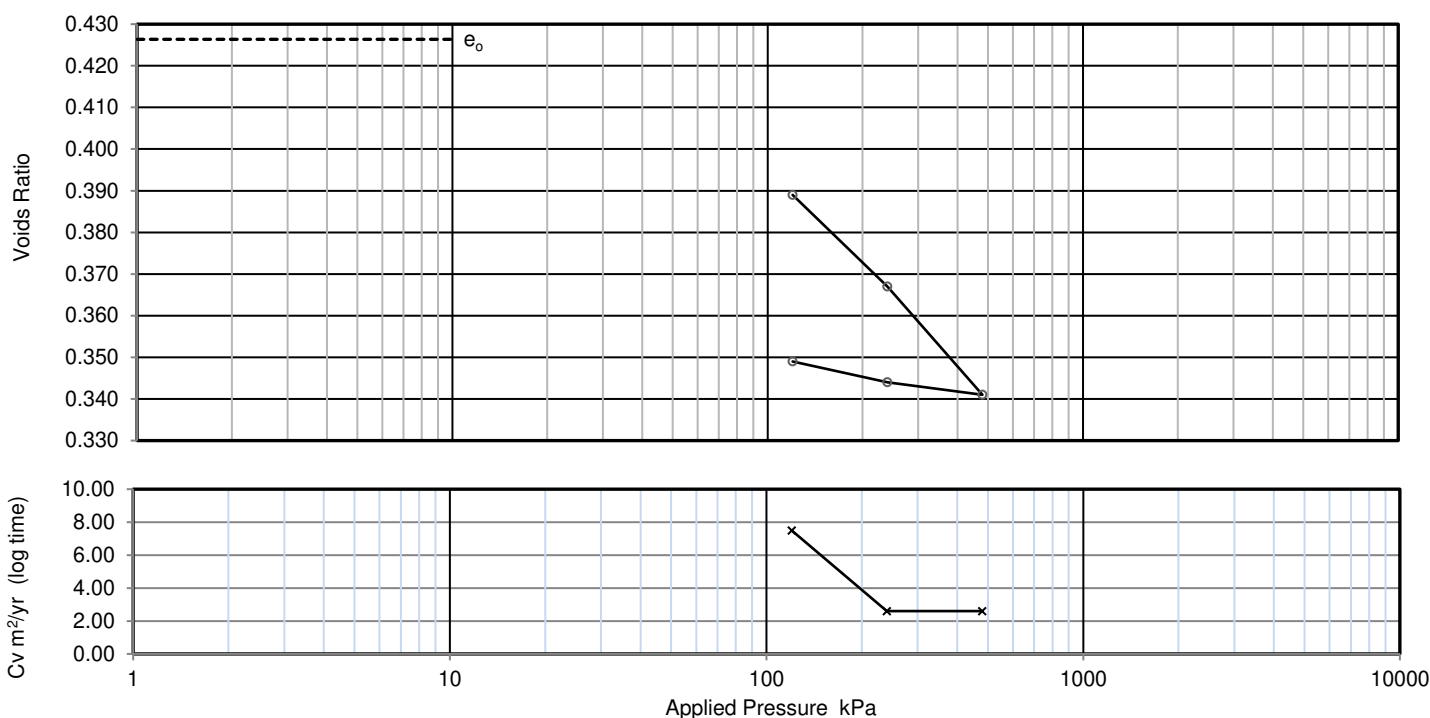
Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Laboratory Reference: 2300458
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 12.00
Depth Base [m]: Not Given
Sample Type: U

[illegible]

Preparation

Carried out on top of U100

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Total test time

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.00	-	mm
20.00	18.92	mm
18	17	%
2.18	2.29	Mg/m3
1.86	1.96	Mg/m3
0.426	0.349	
109	125	%
22.0		°C
Not measured		kPa
		%
5		days

Note: Cv corrected to 20°C

Remarks:

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Signed:

Monika
Sienior

Monika Siewior
Reporting Specialist

for and on behalf of i2 Analytical Ltd

**EBMA Testing**

Curtins
Merchant Exchange
17-19 Whitworth Street West
Manchester
M1 5WG

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: EBMA.Testing@curtins.com

Analytical Report Number : 22-62619

Project / Site name:	Postal Street	Samples received on:	26/05/2022
Your job number:	B080401	Samples instructed on/ Analysis started on:	06/06/2022
Your order number:	EBMA 3400	Analysis completed by:	16/06/2022
Report Issue Number:	1	Report issued on:	17/06/2022
Samples Analysed:	13 soil samples		

Martyna Langer

Signed:

Martyna Langer
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 22-62619

Project / Site name: Postal Street

Your Order No: EBMA 3400

Lab Sample Number				2300510	2300511	2300512	2300513	2300514
Sample Reference				BH01	BH01	BH01	BH01	BH01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00	6.50	8.50	12.50	18.50
Date Sampled				23/05/2022	23/05/2022	23/05/2022	23/05/2022	24/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	18	15	14	7.6
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	7.9	8.5	8.5	8.4
Total Sulphate as SO ₄	%	0.005	MCERTS	0.028	0.05	0.043	0.027	0.022
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.03	0.12	0.085	0.054	0.086
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	4.3	10	9.9	7.6	4.1
Total Sulphur	%	0.005	MCERTS	0.016	0.054	0.084	0.081	0.036
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	40	29	37	21
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	20	14	19	11

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

Analytical Report Number: 22-62619

Project / Site name: Postal Street

Your Order No: EBMA 3400

Lab Sample Number				2300515	2300516	2300517	2300518	2300519
Sample Reference				BH01	RC01	RC01	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				21.00	9.50	15.50	2.50	4.00
Date Sampled				24/05/2022	24/05/2022	24/05/2022	24/05/2022	24/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	3.3	12	10	15	17
Total mass of sample received	kg	0.001	NONE	0.5	0.5	1	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.6	8.8	8.5	8.4
Total Sulphate as SO ₄	%	0.005	MCERTS	0.011	0.024	0.029	0.046	0.052
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.035	0.057	0.04	0.048	0.12
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.3	6.5	3.2	5.1	6.9
Total Sulphur	%	0.005	MCERTS	0.011	0.066	0.029	0.017	0.034
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	12	21	16	15	20
Magnesium (leachate equivalent)	mg/l	2.5	NONE	6	11	8.2	7.4	9.7

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

Analytical Report Number: 22-62619

Project / Site name: Postal Street

Your Order No: EBMA 3400

Lab Sample Number				2300520	2300521	2300522
Sample Reference				WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				2.20-2.65	2.50	4.00-4.45
Date Sampled				24/05/2022	24/05/2022	25/05/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	14	23
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	8.5	8.6
Total Sulphate as SO ₄	%	0.005	MCERTS	0.034	0.043	0.04
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.06	0.11	0.065
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	5.5	13	22
Total Sulphur	%	0.005	MCERTS	0.024	0.021	0.02
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	15	23	7.8
Magnesium (leachate equivalent)	mg/l	2.5	NONE	7.5	11	3.9

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

Analytical Report Number : 22-62619

Project / Site name: Postal Street

* 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 *
2300510	BH01	None Supplied	3	Brown clay with gravel.
2300511	BH01	None Supplied	6.5	Brown clay.
2300512	BH01	None Supplied	8.5	Brown clay.
2300513	BH01	None Supplied	12.5	Brown clay.
2300514	BH01	None Supplied	18.5	Brown clay and sand with gravel.
2300515	BH01	None Supplied	21	Brown sand with gravel.
2300516	RC01	None Supplied	9.5	Brown sandy clay with gravel.
2300517	RC01	None Supplied	15.5	Brown clay and sand.
2300518	WS01	None Supplied	2.5	Brown clay and sand.
2300519	WS02	None Supplied	4	Brown clay.
2300520	WS03	None Supplied	2.20-2.65	Brown clay.
2300521	WS04	None Supplied	2.5	Brown clay.
2300522	WS05	None Supplied	4.00-4.45	Brown clay.

Analytical Report Number : 22-62619

Project / Site name: Postal Street

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
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

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

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

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

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

Appendix E – Ground Gas Monitoring Results

- Visits 1 – 6

Curtins

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project: Postal Street**Date:** 31/05/2022**Job Number:** B080401**Visit:** 1**Client:** Faithful & Gould**Weather:** Cloudy, Showers**Barometric State:** Rising**Ground Conditions:** Wet

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1011										Dry	2.12	1
BH01 (d)	1011										Dry	22.50	1
RC01	1011												2
WS01	1011												2
WS03	1011	0.0	0.0	0.0	0.0	0.4	0.4	11.7	0	1	Dry	2.00	
WS05	1011	0.0	0.0	0.0	0.0	0.2	0.2	20.3	0	0	Dry	2.27	
MAX		0.0	0.0	0.0	0.0	0.4	0.4	20.3	0	1			

Notes**Logged by****TW**

1 Borehole cap flooded - unable to gas monitor.

2 Parked car over borehole - unable to monitor.

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

GAS MONITORING LOG SHEET

Project:	Postal Street	Date:	16/06/2022
Job Number:	B080401	Visit:	2
Client:	Faithful & Gould	Weather:	Sunny
Barometric State:	Falling	Ground Conditions:	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1017	0.0	0.0	0.0	0.0	0.1	0.1	20.6	0	1	2.0	2.20	1
BH01 (d)	1017	0.0	0.0	0.0	0.0	0.0	0.0	20.9	0	0	20.88	22.50	1
RC01	1014	0.0	0.0	0.0	0.0	0.0	0.0	20.7	0	0	22.35	>30	1,2
WS01	1015	0.0	0.0	0.0	0.0	0.0	0.0	20.8	0	1	Dry	1.85	1
WS03	1017	0.0	0.0	0.0	0.0	0.4	0.4	20.3	0	0	Dry	2.00	1
WS05	1016	0.0	0.0	0.0	0.0	0.2	0.2	207.0	2	1	Dry	2.26	1
MAX		0.0	0.0	0.0	0.0	0.4	0.4	207.0	2	1			

Notes

- 1 Steady state gas flow achieved instantly
- 2 Monitored on the 17/06/2022

Logged by RT

1% gas volume = 10,000 ppm
 Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
 All other gases recorded at 'steady state' unless otherwise stated

Curtins

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project: Postal Street**Date:** 28/06/22**Job Number:** B080401**Visit:** 3**Client:** Faithful & Gould**Weather:** Sunny, Warm**Barometric State:** Falling**Ground Conditions:** Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1015	0.0	0.0	0.0	0.0	0.0	0.0	20.5	0	1	1.96	2.20	
BH01 (d)	1015	12.7	0.0	0.0	0.0	0.6	0.6	9.8	0	3	21.45	22.50	1
RC01	1015	0.0	0.0	0.0	0.0	0.0	0.0	20.7	0	0	22.40	>30	
WS01	1014	10.1	0.0	0.0	0.0	0.0	0.0	20.8	0	1	Dry	1.85	2
WS03	1014										Dry	2.00	3
WS05	1014	0.0	0.0	0.0	0.0	0.1	0.1	20.3	1	1	Dry	2.26	
MAX		12.7	0.0	0.0	0.0	0.6	0.6	20.8	1	3			

Notes**Logged by**

TW

- 1 Steady state gas flow rate reached after 2 minutes
- 2 Steady state gas flow rate reached after 30 seconds
- 3 Borehole covered by parked car

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

GAS MONITORING LOG SHEET

Project:	Postal Street	Date:	19/07/22
Job Number:	B080401	Visit:	4
Client:	Faithful & Gould	Weather:	Sunny, Warm
Barometric State:	Falling	Ground Conditions:	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1015	0.0	0.0	0.0	0.0	0.4	0.4	20.5	0	5	2.18	2.20	
BH01 (d)	1015	22.6	0.0	0.0	0.0	0.3	0.3	16.8	0	1	22.34	22.50	1
RC01	1015	-0.6	0.0	0.0	0.0	0.7	0.7	19.6	0	1	22.36	>30	1
WS01	1015	0.0	0.0	0.0	0.0	0.8	0.8	19.7	0	3	Dry	1.85	
WS03	1015	0.0	0.0	0.0	0.0	0.5	0.5	19.5	0	3	Dry	2.00	
WS05	1014	0.0	0.0	0.0	0.0	0.2	0.2	21.1	0	0	Dry	2.26	
MAX		22.6	0.0	0.0	0.0	0.8	0.8	21.1	0	5			

Notes

Logged by TW

1 Steady state gas flow rate reached after 4 minutes.

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

Curtins

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project: Postal Street**Date:** 01/08/22**Job Number:** B080401**Visit:** 5**Client:** Faithful & Gould**Weather:** Dry and Sunny**Barometric State:** Falling**Ground Conditions:** Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1014	-0.1	0.0	0.0	0.0	0.2	0.2	20.4	3	0	1.83	2.20	1
BH01 (d)	1014	-12.8	0.0	0.0	0.0	0.7	0.6	5.4	2	0	22.12	22.52	
RC01	1014	0.0	0.0	0.0	0.0	0.0	0.0	20.7	0	0	22.42	>30	
WS01	1014	0.0	0.0	0.0	0.0	0.1	0.1	20.8	0	0	Dry	1.87	
WS03	1014	0.1	0.0	0.0	0.0	0.6	0.6	19.8	0	0	Dry	2.02	
WS05	1014												2
0													
0													
0													
0													
0													
0													
0													
0													
0													
MAX		0.1	0.0	0.0	0.0	0.7	0.6	20.8	3	0			

Notes**Logged by**

JL

1 Steady state gas flow rate reached after 2 minutes

2 Parked car over borehole - unable to monitor.

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

Curtins

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project: Postal Street**Date:** 08/08/22**Job Number:** B080401**Visit:** 6**Client:** Faithful & Gould**Weather:** Sunny**Barometric State:** Steady**Ground Conditions:** Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1019	-1.7	0.0	0.0	0.0	0.2	0.2	20.6	0	0	1.73	2.20	1
BH01 (d)	1019	0.0	0.0	0.0	0.0	0.3	0.1	20.3	0	0	20.28	22.68	
RC01	1019	-42.6	0.0	0.0	0.0	0.2	0.0	19.7	0	0	22.44	>30	1,2
WS01	1019	0.0	0.0	0.0	0.0	0.3	0.2	19.8	0	0	Dry	2.86	
WS03	1019	-22.7	0.0	0.0	0.0	0.2	0.1	20.2	0	0	Dry	1.97	1
WS05	-	-	-	-	-	-	-	-	-	-	-	-	3
0													
0													
0													
0													
0													
0													
0													
0													
0													
MAX		0.0	0.0	0.0	0.0	0.3	0.2	20.6	0	0			

Notes

- 1 - Steady state air flow rate recorded after 1 second.
 2 - Depth of monitoring well greater than length of dip tape (30m)
 3 - Monitoring well could not be accessed due to parked car.

Logged by

RT

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

Appendix F – GAC Screening Thresholds

- Curtins GAC Tier 1 Thresholds

Adopted Soil Generic Assessment Criteria
Sandy loam with 6% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 21	6 21	1.8 170	33 49	7.7 21	220 250
Lead	200	310	80	2,300	630	1,300
Mercury (<i>elemental</i>)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (<i>inorganic</i>)	170	240	80	3600	120	240
Nickel	130⁽¹⁰⁾	180⁽¹⁰⁾	53⁽¹¹⁾	980⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
<i>Aliphatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅₋₅ - EC ₆	160	160	3900	12000	600000	180000
EC ₅₋₆ - EC ₈	530	530	13000	40000	620000	320000
EC ₅₋₈ - EC ₁₀	150	150	1700	11000	13000	21000
EC ₁₀₋₁₀ - EC ₁₂	760	770	7300	47000	13000	24000
EC ₁₂₋₁₂ - EC ₁₆	4300	4400	13000	90000	13000	26000
EC ₅₋₁₆ - EC ₃₅	110000	110000	270000	1800000	250000	490000
EC ₃₅₋₃₅ - EC ₄₄	110000	110000	270000	1800000	250000	490000
<i>Aromatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅₋₅ - EC ₇	300	1400	57	86000	56000	92000
EC ₅₋₇ - EC ₈	660	3900	120	180000	56000	100000
EC ₅₋₈ - EC ₁₀	190	270	51	17000	5000	9300
EC ₁₀₋₁₀ - EC ₁₂	380	1200	74	34000	5000	10000
EC ₁₂₋₁₂ - EC ₁₆	660	2500	130	38000	5000	10000
EC ₅₋₁₆ - EC ₂₁	930	1900	260	28000	3800	7800
EC ₂₁₋₂₁ - EC ₃₅	1700	1900	1600	28000	3800	7900
EC ₃₅₋₃₅ - EC ₄₄	1700	1900	1600	28000	3800	7900
Aliph + Arom EC >44-70	1900	1900	3000	28000	3800	7900
Aromatic						
Benzene	0.33 0.87	1.0 3.3	0.07 0.18	95 98	73 140	110 230
Ethyl benzene	350	840	90	2800⁽⁸⁾ [66000]	2800⁽⁸⁾ [25000]	2800⁽⁸⁾ [27000]
Toluene	610	2700	120	4400⁽⁸⁾ [190000]	4400⁽⁸⁾ [56000]	4400⁽⁸⁾ [100000]
Xylene ⁽⁹⁾	230	290	160	2600⁽⁸⁾ [32000]	2600⁽⁸⁾ [43000]	2600⁽⁸⁾ [31000]
Phenol	420	520	280	3200⁽¹⁴⁾ (38000)	3200⁽¹⁴⁾ (10000)	3200⁽¹⁴⁾ (9300)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	13	13	24	1100	4900	3000
Acenaphthylene	920	6000	160	100000	15000	30000
Acenaphthene	1100	6000	200	100000	15000	30000
Fluorene	860	4500	160	71000	9900	20000
Phenanthrene	440	1500	90	23000	3100	6300
Anthracene	11000	37000	2200	540000	74000	150000
Fluoranthene	890	1600	290	23000	3100	6400
Pyrene	2000	3800	620	54000	7400	15000
Benz(a)anthracene	13	15	13	180	29	62
Chrysene	27	32	19	350	57	120
Benzo(b)fluoranthene	3.7	4.0	3.9	45	7.2	16.0
Benzo(k)fluoranthene	100	110	130	1200	190	440
Benzo(a)pyrene	3.0 5.0	3.2 5.3	3.5 5.7	36 77	5.7 10	13 21
Indeno(123cd)pyrene	41	46	39	510	82	180
Dibenzo(ah)anthracene	0.3	0.32	0.43	3.6	0.58	1.4
Benzo(ghi)perylene	350	360	640	4000	640	1600
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.0014	0.0015	0.0018	0.12	3.5	5.4
Trichloroethene (TCE)	0.075	0.08	0.21	5.7	120	120
1,1,1,2 Tetrachlorethane	6.4	8.2	4.4	560	1400	2100
Tetrachlorethane (PCE)	0.90	0.92	3.6	95	1400	1500
1,1,1 Trichlorethane	39	40	240	3000	140000	100000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs**
- Soil organic matter (SOM) is assumed to be 6% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 <u>21</u>	6 <u>21</u>	1.8 <u>170</u>	33 <u>49</u>	7.7 <u>21</u>	220 <u>250</u>
Lead	<u>200</u>	<u>310</u>	<u>80</u>	<u>2,300</u>	<u>630</u>	<u>1,300</u>
Mercury (elemental)	1	1	26	26	16	26 ⁽⁸⁾ [30]
Mercury (inorganic)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 <u>79</u>	170 <u>170</u>
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
<i>Aliphatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₆	78	78	1700	5900	590000	130000
EC ₆ - EC ₈	230	230	5600	17000	610000	220000
EC ₈ - EC ₁₀	65	65	770	4800	13000	18000
EC ₁₀ - EC ₁₂	330	330	4400	23000	13000	23000
EC ₁₂ - EC ₁₆	2400	2400	13000	82000	13000	25000
EC ₁₆ - EC ₃₅	92000	92000	270000	1700000	250000	480000
EC ₃₅ - EC ₄₄	92000	92000	270000	1700000	250000	480000
<i>Aromatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₇	140	690	27	46000	56000	84000
EC ₇ - EC ₈	290	1800	51	110000	56000	95000
EC ₈ - EC ₁₀	83	110	21	8100	5000	8500
EC ₁₀ - EC ₁₂	180	590	31	28000	5000	9700
EC ₁₂ - EC ₁₆	330	2300	57	37000	5100	10000
EC ₁₆ - EC ₂₁	540	1900	110	28000	3800	7700
EC ₂₁ - EC ₃₅	1500	1900	820	28000	3800	7800
EC ₃₅ - EC ₄₄	1500	1900	820	28000	3800	7800
Aliph + Arom EC >44-70	1800	1900	2100	28000	3800	7800
<i>Aromatic</i>						
Benzene	0.16	0.49	0.035	50	72	100
Ethyl benzene	150	380	39	1200⁽⁸⁾ [35000]	1200⁽⁸⁾ [24000]	1200⁽⁸⁾ [22000]
Toluene	270	1300	51	1900⁽⁸⁾ [110000]	1900⁽⁸⁾ [56000]	1900⁽⁸⁾ [95000]
Xylene ⁽⁹⁾	98	120	70	1200⁽⁸⁾ [14000]	1200⁽⁸⁾ [42000]	1200⁽⁸⁾ [23000]
Phenol	290	420	140	1500⁽¹⁴⁾ (35000)	1500⁽¹⁴⁾ (10000)	1500⁽¹⁴⁾ (8300)
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>						
Naphthalene	5.6	5.6	10	460	4900	1900
Acenaphthylene	420	4600	69	97000	15000	30000
Acenaphthene	510	4700	85	97000	15000	30000
Fluorene	400	3800	67	68000	9900	20000
Phenanthrene	220	1500	38	22000	3100	6200
Anthracene	5400	35000	950	540000	74000	150000
Fluoranthene	560	1600	130	23000	3100	6300
Pyrene	1200	3800	270	54000	7400	15000
Benz(a)anthracene	11	14	6.5	170	29	56
Chrysene	22	31	9.4	350	57	110
Benzo(b)fluoranthene	3.3	4.0	2.1	44	7.2	15
Benzo(k)fluoranthene	93	110	75	1200	190	410
Benzo(a)pyrene	2.7	3.2	2	35	5.7	12
Indeno(123cd)pyrene	36	46	21	510	82	170
Dibenzo(ah)anthracene	0.28	0.32	0.27	3.6	0.57	1.3
Benzo(ghi)perylene	340	360	470	4000	640	1500
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00087	0.001	0.001	0.077	3.5	5
Trichloroethene (TCE)	0.034	0.036	0.091	2.6	120	91
1,1,1,2 Tetrachlorethane	2.8	3.5	1.9	250	1400	1800
Tetrachlorethane (PCE)	0.39	0.4	1.5	42	1400	1100
1,1,1 Trichlorethane	18	18	110	1300	140000	76000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs
- Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 1% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 <u>21</u>	6 <u>21</u>	1.8 <u>170</u>	33 <u>49</u>	7.7 <u>21</u>	220 <u>250</u>
Lead	<u>200</u>	<u>310</u>	80	<u>2,300</u>	630	<u>1,300</u>
Mercury (<i>elemental</i>)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (<i>inorganic</i>)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 <u>79</u>	170 <u>170</u>
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
EC ₅₋₅ - EC ₆	42	42	730	3200	570000	95000
EC ₆₋₆ - EC ₈	100	100	2300	7800	600000	150000
EC ₈₋₈ - EC ₁₀	27	27	320	2000	13000	14000
EC ₁₀₋₁₀ - EC ₁₂	130	130	2200	9700	13000	21000
EC ₁₂₋₁₂ - EC ₁₆	1100	1100	11000	59000	13000	25000
EC ₁₆₋₁₆ - EC ₃₅	65000	65000	260000	1600000	250000	450000
EC ₃₅₋₃₅ - EC ₄₄	65000	65000	260000	1600000	250000	450000
Aromatic risk banded hydrocarbons - TPHCWG method						
EC ₅₋₅ - EC ₇	70	370	13	26000	56000	76000
EC ₇₋₇ - EC ₈	130	860	22	56000	56000	87000
EC ₈₋₈ - EC ₁₀	34	47	8.6	3500	5000	7200
EC ₁₀₋₁₀ - EC ₁₂	74	250	13	16000	5000	9200
EC ₁₂₋₁₂ - EC ₁₆	140	1800	23	36000	5100	10000
EC ₁₆₋₁₆ - EC ₂₁	260	1900	46	28000	3800	7600
EC ₂₁₋₂₁ - EC ₃₅	1100	1900	370	28000	3800	7800
EC ₃₅₋₃₅ - EC ₄₄	1100	1900	370	28000	3800	7800
Aliph + Arom EC >44-70	1600	1900	1200	28000	3800	7800
Aromatic						
Benzene	0.08	0.3	0.017	28	72	90
Ethyl benzene	65	170	16	520⁽⁸⁾ [17000]	520⁽⁸⁾ [24000]	520⁽⁸⁾ [17000]
Toluene	120	610	22	860⁽⁸⁾ [59000]	860⁽⁸⁾ [56000]	860⁽⁸⁾ [87000]
Xylene ⁽⁹⁾	41	53	28	480⁽⁸⁾ [69000]	480⁽⁸⁾ [41000]	480⁽⁸⁾ [17000]
Phenol	180	310	66	760⁽¹⁴⁾ (31000)	760⁽¹⁴⁾ (10000)	760⁽¹⁴⁾ (7600)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	2.3	2.3	4.1	190	4900	1200
Acenaphthylene	170	2900	28	83000	15000	29000
Acenaphthene	210	3000	34	84000	15000	29000
Fluorene	170	2800	27	63000	9900	20000
Phenanthrene	95	1300	15	22000	3100	6200
Anthracene	2400	31000	380	520000	74000	150000
Fluoranthene	280	1500	52	23000	3100	6300
Pyrene	620	3700	110	54000	7400	15000
Benz(a)anthracene	7.2	11	2.9	170	29	49
Chrysene	15	30	4.1	350	57	93
Benzo(b)fluoranthene	2.6	3.9	0.99	44	7.1	13
Benzo(k)fluoranthene	77	110	37	1200	190	370
Benzo(a)pyrene	2.2	3.2	0.97	35	5.7	11
Indeno(123cd)pyrene	27	45	9.5	500	82	150
Dibenzo(ah)anthracene	0.24	0.31	0.14	3.5	0.57	1.1
Benzo(ghi)perylene	320	360	290	3900	640	1400
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00064	0.00077	0.00055	0.059	3.5	4.8
Trichloroethene (TCE)	0.016	0.017	0.041	1.2	120	70
1,1,1,2 Tetrachlorethane	1.2	1.5	0.79	110	1400	1500
Tetrachlorethane (PCE)	0.18	0.18	0.65	19	1400	810
1,1,1 Trichlorethane	8.8	9	48	660	140000	57000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs
- Soil organic matter (SOM) is assumed to be 1% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Appendix G – Risk Assessment Methodology

The site-specific risk assessment, presented in this report, follows the principle of establishing whether there is a viable linkage between a contaminant source to a potential receptor, via an exposure pathway.

The risk assessment corresponds with the total site area and incorporates both descriptive (qualitative) and, where available, numerical (quantitative) lines of evidence.

Risk assessment is the process of collating known information on a hazard or set of hazards to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of contaminant source on a site does not necessarily mean there is a risk.

The risk assessment considers the likelihood of an event taking place (accounting for the presence of the source and receptor and the viability of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment, the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to an ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in an ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Secondary A aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

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

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	<i>Harm is likely to arise</i> to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	<i>It is possible</i> that without appropriate further action <i>harm could arise</i> to a designated receptor. It is relatively <i>unlikely</i> that any such harm would be <i>severe</i> , and if any harm were to occur it is <i>more likely</i> that such harm would be <i>relatively mild</i> .
Low Risk	<i>It is possible</i> that <i>harm could arise</i> to a designated receptor from an identified hazard. It is <i>likely</i> that, at worst, if any harm was realised any effects would be <i>mild</i> .
Very Low Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation.

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