4046-02 / LM

17th November 2023

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REMEDIATION STRATEGY - LAND OFF BRIGHAM STREET, OPENSHAW

Introduction

This report pertains to a c. 0.58 Ha site located to the land west of Brigham Street, Openshaw, Manchester, M11 2JR. The site is centred on SJ 88229 97811. The site is shown on the below image:



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

The site currently comprises an open area of soft landscaping with predominantly grass cover. There are a number of semi-mature and mature trees on the southern and western edges of the site. The topography is generally level. A site location plan is contained in Appendix 1.

This Remediation Strategy is to be used for submission to Manchester City Council to develop the site proposed site development includes the construction of circa 20 No. low-rise residential houses circa 4no. apartments within a two storey apartment building with associated infrastructure, hardstanding and soft landscaping (private gardens and public open space).

Previous Work / Reports

- Curtins Phase 1 Preliminary Risk Assessment (28th April 2021) and Phase 2 Ground Investigation (24th July 2023)

Curtins Phase 1 Preliminary Risk Assessment

Earliest mapping (1848) shows that the site was undeveloped and surrounded by farmland. By 1893 the southwestern portion of the site is occupied by the Openshaw Brick Works and associated clay pit. By 1933 residential properties are shown on the site and demolished by the 1996 map. Currently, the surrounding area sees a mix of industrial, commercial and residential land uses BGS mapping indicates underlying superficial deposits are indicated to comprise Glacial Till underlain by bedrock noted as the Chester Formation. The site is underlain by a Secondary A Aquifer within the bedrock formation and a Secondary Undifferentiated Aquifer within the superficial deposits. The nearest surface water feature is the Manchester and Aston Under Lyne Canal, 302m to the north.

A Low risk was identified to surface waters and groundwaters from leaching and migration of potential contamination from site soils. Primary potential risks to be investigated during this report, as well as establishing ground conditions for geotechnical design, drainage and risks to human health from Made Ground soils.

Curtins Phase 2 Ground Investigation (24th July 2023)

The ground investigation works were undertaken by Curtins between 6th and 12th December 2022 and comprised of fourteen window sample boreholes, two Cable Percussion boreholes, and four Machine Excavated Trial Trenches. Nine positions were installed with ground gas and groundwater level monitoring installations. Selected soil samples were subject to chemical and geotechnical analysis.



Plan of Curtins ground investigation holes – TT01 is noted in the top-left hand corner.

The ground conditions recorded by Curtins were:

- **Topsoil or Made Ground** encountered from ground level to depths of between 0.22 to 1.50m bgl. Made Ground was encountered in all exploratory hole locations on site, to a maximum depth between 0.40 to 5.00m bgl. Made Ground was deepest on the south-west of the site where the historical clay pit was present. Made Ground comprised both granular and cohesive deposits. Made Ground was underlain by
- **Glacial Till** comprising variable granular and cohesive material with locally soft black organic silt and organic clay.

Perched water was encountered within CP01 (2.00m bgl), WS03 (2.44m bgl), WS13 (3.2m bgl), WS14 (2.3m bgl) and TT04 (1.70m bgl) during the ground investigation.

Chemical testing recorded numerous human health exceedances with respect to residential with plant uptake end-use. Elevated organics in the form of naphthalene (SVOC / PAH) and TPH species. The exceedances are documented in the below tables:

Exceedances across the site:

Determinant	GAC (mg/kg)	Exploratory Hole	Depth m bgl (m AOD)	Strata	Concentration (mg/kg)
Lead	200	WS03	0.40 (68.64)	Made Ground	337
		WS14	0.80 (69.08)	Made Ground	401
		TT01	1.00 (69.12)	Made Ground	344
		TT03	0.40 (68.46)	Made Ground	706
Arsenic	32	WS14	0.80 (69.08)	Made Ground	118
Mercury (elemental)	1	TT01	1.00 (69.12)	Made Ground	2.49
Aromatic EC12 – EC16	140	TT01	1.00 (69.12)	Made Ground	290
Aromatic EC16 – EC21	260	TT01	1.00 (69.12)	Made Ground	1200
Aromatic EC21 – EC35	1100	TT01	1.00 (69.12)	Made Ground	3140
Benzo(a)anthracene	7.2	TT01	1.00 (69.12)	Made Ground	22.3
Benzo(a)pyrene	2.2	TT01	1.00 (69.12)	Made Ground	15.7
Benzo(b)fluoranthene	2.6	TT01	1.00 (69.12)	Made Ground	17.1
Chrysene	15	TT01	1.00 (69.12)	Made Ground	27.4

Dibenzo(ah)anthracene	0.24	TT01	1.00 (69.12)	Made Ground	1.49
Naphthalene	2.3	TT01	1.00 (69.12)	Made Ground	3.53

*Exceedances within Made Ground in **TT01** compared against a 6% SOM GAC:*

Determinant	GAC (mg/kg)	Exploratory Hole	Depth m bgl (m AOD)	Strata	Concentration (mg/kg)
Aromatic Hydrocarbon EC21-EC35	1900	TT04	1.00 (66.997)	Made Ground	5090
Benzo(a)anthracene	15	TT04	1.00 (66.997)	Made Ground	23.2
Benzo(a)pyrene	3.2	TT04	1.00 (66.997)	Made Ground	10.8
Benzo(b)fluoranthene	4	TT04	1.00 (66.997)	Made Ground	12.4
Dibenzo(ah)anthracene	0.32	TT04	1.00 (66.997)	Made Ground	1.06

Conceptual Site Model and Risk Assessment

A **Moderate/Low** risk rating is identified to end-users and construction workers from direct contact, inhalation and ingestion of contaminants within Made Ground soils on site, due to exceedances recorded above nominated screening criteria. Site to be covered by hardstanding and soft landscaping.

Remedial actions are required.

A **Low** risk rating is currently identified to controlled waters in relation to groundwater and surface water receptors, accounting for the limited sources of contamination encountered within site soils and limited pathways for migration.

The gas risk assessment was evaluated using the NHBC Traffic Light Classification and BS8485:2019 Classification systems. The NHBC Classification indicates the site is classified as Green, where designs confirm with the NHBC 'model' low rise house. The BS8485:2019 Classification, using the 'borehole' scenario, is consistent with a Characteristic Curtins 1 (CS-1) gas regime, where gas protection measures will not be required. Please refer to the Curtins Phase 2 Report appended to this Remedial report for further details.

Below further works / remedial actions specific to the site are as follows:

- ITEM1: Delineation of the TPH and Naphthalene hotspot inTT01
- ITEM 2: Clean Cover System Design of all soft landscaped areas

Further good practice / standard remedial actions are also noted i.e. material management and importation testing requirements.

REMEDIAL STRATEGY

Programme of works:

- ITEM 1 will be undertaken as part of the initial groundworks (enabling works) and will be documented upon completion.

- ITEM 2 will be undertaken during the end of the construction phase works and will be submitted along with the final validation items upon completion.

ITEM 1: Naphthalene Delineation (TT01)

Delineate Naphthalene (SVOC) exceedance in TT01 for further assessment. Subject to findings it could then be retained on site within a suitable area such as beneath hardstanding or soft landscaping in accordance with an MMP, or disposed of off-site.

Material deemed to be impacted through either visual or olfactory observations or as a result of notable PID readings (> 50 ppm) will be excavated and stockpiled on an impermeable membrane. The membrane will be placed upon a clay containment bund and covered to negate the risk of soils leaching and dispersal of any odours and/or vapours.

An IGE engineer will regularly monitor the stockpiled material with a PID to determine the need for boundary monitoring (albeit not anticipated). This material will then be subject to detailed laboratory analysis to determine the suitability for reuse or the requirements for off-site disposal.

The chemical testing suite will consist of naphthalene, TPH-CWG and SOM as contaminants of concern.

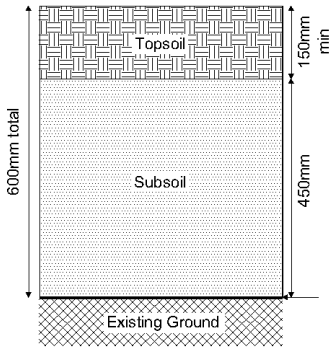
Upon completion of the delineation and excavation, the sides and base of the resulting void(s) where impacted material is present will be chemically validated to confirm that no impacted materials remain in situ.

Validation samples will be collected at c 5 - 10 linear metre centres from the side and base of the excavation. The results of this validation testing will be directly compared to the GACs noted above to demonstrate that no unacceptable level of risk to human health, controlled waters or the wider environment remains.

ITEM 2: Clean Cover System

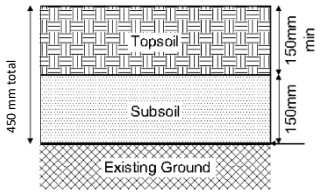
The following procedure is outlined for use in private gardens and in areas of soft landscaping where Made Ground is deeper than 600mm below finalised levels (450mm in areas of soft landscaping):

1. Excavate to 600mm bgl in private gardens (450mm in soft landscaping areas).
2. A 600mm clean cover system is recommended to be added to the proposed private gardens (450mm in soft landscaping areas). This is to consist of:
   -
   - No less than 150mm and no more than 300mm suitable topsoil, underlain by;
   - Suitable subsoil to a total (topsoil + subsoil) depth of 600mm (450mm in areas of soft landscaping), underlain by;
   - Validate in line with the below strategy.



Where Made Ground is shallower than 600mm in garden areas or shallower than 450mm in soft landscaped areas, excavating to the required depth for a cover system in these areas would constitute source removal. Therefore, where this is the case, the following procedure is proposed:

1. Excavate to the base of the Made Ground (<600mm in gardens and <450mm in soft landscaping areas). A clean cover system is not necessary.
2. Add suitable subsoil and topsoil to create a garden / soft landscaping to the client's specification.
3. Validate in line with the below strategy.



No topsoil is present on-site so it will need to be imported and this must be validated as detailed below to ensure its suitability for use (i.e., no glass or plastic is to be included and meets chemical testing acceptability criteria). Based upon initial chemical testing it is anticipated that it will be feasible to reuse the site-won subsoil on-site which may be won from drainage trench excavation arisings and the like during development. These must also be chemically tested as with imported soils to ensure their suitability for use.

Ground Gas Protection Measures

No ground gas protection measures radon are required for the above site based upon the Curtins Phase 2 investigation works.

Export of Materials

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

Stockpile Management

During the course of the development there will be areas of stockpiled soils intended for use within the proposed gardens that will have been approved for use on site. It is imperative that the stockpiles are well managed to avoid inadvertent mixing or depositing of surplus or deleterious materials that would compromise the continued use. We would recommend that the site management reviews the proposed positions for placement of stockpiles and places either fencing or warning signs to ensure compliance.

Unexpected Contamination

If any visual or olfactory evidence of contamination is encountered during construction work, then the work must be halted, and the Local Authority Environmental Health Officer and Environment Agency should be contacted immediately in order to agree any necessary remediation measures.

VALIDATION REQUIREMENTS

ITEM 1: Naphthalene Delineation (TT01)

Documentation of the delineation exercise will consist of:

- Plans and logs of excavated materials
- Depths and IDs of sample locations
- Provision of PID results of in-situ and stockpiled materials
- Chemical testing of the excavated materials and 'in-situ' validated hotpot 'walls'
- Volumetrics of impacted material
- Strategy for re-use / disposal at the site

This will be included in an enabling works validation letter. Rather than waiting until completion of build phases activities i.e. cover system.

ITEM 2: Clean Cover System Validation

Topsoil will be imported and subsoil for use in the clean cover system may be won from site or imported, but nevertheless all soils for use in the proposed garden area shall be subject to the below validation and testing to determine that they are '*suitable for use'*:

- Details of the source of the topsoil and subsoil.
- Visual inspection to determine the absence of deleterious anthropogenic constituents.
- Waste transfer notes to provide evidence of source of imported soils.
- Confirmation of addition of suitable topsoil and subsoil with photographs.
- If imported, topsoil and subsoil is required to be tested at source prior to import to confirm suitability. In line with Manchester City councils guidance, no soils are to be imported to site until information on their source, the results of any soil analysis, and an assessment of their suitability for use has been submitted to and agreed in writing by the LPA.
- All topsoil and subsoil, whether site-won or imported is required to be tested at the following frequency, in line with Manchester City Council's 'Planning and Contaminated Land Technical Guidance':

Table 2 Sampling frequencies for imported or site-won fill materials

End-Use	Greenfield Soils	Remediated Soils	Brownfield Soils	Unknown Soil Source
Residential Gardens	1:200m^3	1:100m^3	1:50m^3	1:50m^3
Soft landscaping	1:200m^3	1:150m^3	1:150m^3	1:150m^3
Other	1:200m^3	1:200m^3	1:200m^3	1:200m^3

Extract taken from Manchester City Council 'Planning and Contaminated Land, Technical Guidance' (dated February 2021).
https://www.manchester.gov.uk/download/downloads/id/11878/planning_guidance_relating_to_ground_contamination.pdf

Once tested, the results are to be compared against the GACs for a 'residential with home grown produce' end use, noted below:

Suite	Determinand (mg/kg unless stated)	Acceptability Criteria for:			
		Private Gardens	Public Open Space (residential)	Soft Landscaping or Public Open Space (Park)	General Fill
A	Asbestos (%)	ND	ND	ND	<0.001 – 0.01%
B	pH	>6 - <8[3]	>6 - <8[3]	>6 - <8[3]	>5 - <10[3]
	Total Cyanide	0.5[3]	0.5[3]	0.5[3]	0.5[3]
	Free Cyanide	0.5[3]	0.5[3]	0.5[3]	0.5[3]
	Soluble Sulphate (mg/l)	500[3]	500[3]	500[3]	500[3]
C	Arsenic	37	79	170	640
	Beryllium	1.7	2.2	63	12
	Boron	290	21000	46000	240000
	Cadmium	11	120	560	190
	Chromium (III)	910	1500	33000	8600
	Chromium (VI)	6	7.7	220	33
	Copper	2400	12000	44000	68000
	Lead	200[1]	630[1]	1300	2330[1]
	Inorganic Mercury	40	120	240	1100
	Nickel	130	230	800	980
	Selenium	250	1100	1800	12000
	Vanadium	410	2000	5000	9000
	Zinc	3700	81000	170000	730000
D	Naphthalene	2.3	4900	1200	
	Acenaphthylene	170	15000	29000	
	Acenaphthene	210	15000	29000	
	Fluorene	170	9900	20000	
	Phenanthrene	95	3100	6200	
	Anthracene	2400	74000	150000	
	Fluoranthene	280	3100	6300	
	Pyrene	620	7400	15000	
	Benzo(a)anthracene	7.2	29	49	
	Chrysene	15	57	93	
	Benzo(b)fluoranthene	2.6	7.1	13	
	Benzo(k)fluoranthene	77	190	370	
	Benzo(a)pyrene	2.2	5.7	11	
	Indeno(1,2,3-cd)pyrene	27	82	150	
	Dibenz(a,h)anthracene	0.24	0.57	1.1	
	Benzo(ghi)perylene	320	640	1400	
E	Total PAHs				1000[4]
F	TPH-CWG - Aliphatic >EC5 - EC6	42	570000	95000	
	TPH-CWG - Aliphatic >EC6 - EC8	100	600000	150000	

	TPH-CWG - Aliphatic >EC8 - EC10	27	13000	14000	
	TPH-CWG - Aliphatic >EC10 - EC12	130	13000	21000	
	TPH-CWG - Aliphatic >EC12 - EC16	1100	13000	25000	
	TPH-CWG - Aliphatic >EC16 - EC21	65000	250000	450000	
	TPH-CWG - Aliphatic >EC21 - EC35				
	TPH-CWG - Aliphatic > EC35 - EC44	65000	250000	450000	
	TPH-CWG - Aromatic >EC5 - EC7	70	56000	76000	
	TPH-CWG - Aromatic >EC7 - EC8	130	56000	87000	
	TPH-CWG - Aromatic >EC8 - EC10	34	5000	7200	
	TPH-CWG - Aromatic >EC10 - EC12	74	5000	9200	
	TPH-CWG - Aromatic >EC12 - EC16	140	5100	10000	
	TPH-CWG - Aromatic >EC16 - EC21	260	3800	7600	
	TPH-CWG - Aromatic >EC21 - EC35	1100	3800	7800	
	TPH-CWG - Aromatic > EC35 - EC44	1100	3800	7800	
G	TPH > EC6 - EC40				5000[4]
H	Benzene	0.087	72	90	
	Toluene	130	56000	87000*	
	Ethylbenzene	47	24000	17000*	
	p & m-xylene	56	41000	17000*&**	
	o-xylene	60	41000	17000*	
	MTBE (Methyl Tertiary Butyl Ether)	LOD[3]	LOD[3]	LOD[3]	

LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015) used unless stated:

1) *Category 4 Screening Levels (March 2014)*
2) *CL:AIRE Soil GAC for Human Health Assessment (January 2010)*
3) *In-house screening criteria used as no GAC methodology currently exists*
4) *Hazardous waste thresholds. This limit only applies to imported material, not to in-situ soil.*

Assumed 1% SOM (most conservative) for those values dependent upon SOM. ND = Not Detected. LOD = Limit of Detection
**Exceeds vapour saturation limit*
***Exceeds solubility saturation limit*

When the above has been completed and prior to occupation, this information will be compiled in a validation / completion report which will be submitted to and approved in writing by the local planning authority. Further details on the successful installation of cover systems are contained in Appendix 4.

Validation Report

The Validation Report is to be submitted to the Manchester City Council as part of the discharge of planning conditions.

Yours sincerely,

Liam McMahon

Principal Engineer

Enc.

Appendix 1 – Site Location Plan
Appendix 2 – Curtins Phase 2 Ground Investigation Report
Appendix 3 – Clean Cover System Guidance

APPENDIX 1

NOTES:
- THE CONTRACTOR IS RESPONSIBLE FOR CHECKING DIMENSIONS, TOLERANCES & REFERENCES. ANY DISCREPANCY TO BE VERIFIED WITH THE ARCHITECT BEFORE PROCEEDING WITH THE WORKS.
- WHERE AN ITEM IS COVERED BY DRAWINGS OF DIFFERENT SCALES, THE LARGER SCALE DRAWING TO BE WORKED TO.
- DO NOT SCALE FROM THE DRAWING. FIGURED DIMENSIONS TO BE WORKED TO IN ALL CASES.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH:

Materials Key

- 450mm x 450mm concrete paving to front and 1800mm wide patios at rear of dwellings
- Tarmac areas
- Grassed areas
- Shrub planting
- Existing tree to be retained
- Existing tree to be removed
- New tree
- WB Water butt (volume to be a minimum of 200ltrs)
- UCP New uncontrolled crossing point
- S External storage
- Dwelling bin storage (4x240l bin capacity)
- New sewer diversion with 6m easement highlighted

Boundary Treatments

- 1800mm high concrete post and timber panel fence (to separate rear gardens to a distance of 3000mm from the rear facade)
- 1800mm high concrete post with 1500mm high timber panel fence and 300mm timber trellis on top (used between rear gardens). No trellis adjacent to bin store.
- 900mm high metal railings (from back of pavement to building line)
- 450mm high low brick wall with 450mm high metal railings, on low side (along back of pavement)

Existing Boundary Treatments

- High metal railings
- Low metal railings

Existing Features

- LP Existing lamp post

Schedule of Accommodation

Housetype	Description	Area/m2	Total	Plot Nos.
A	2B3P House	70.6	10	09-12, 17-22
B	3B4P House	87.9	7	03-08, 23
C	4B5P House	100.2	3	01,02, 24
D1(Gr)	2B3P Apartment	61.9	2	13, 14
D2(1st)	2B3P Apartment	69.4	2	15, 16
Total			24	

(Car parking : 2 & 3-bed 100%; 4-bed 200% shown)

Tenure

- Social Rent (4no.)
- Affordable Rent (10no.)
- Shared Ownership (10no.)

Rev	Date	By
A Layout amended to planning comments. Tenure updated	10.05.23	MT

Client: One Manchester

Project: Project500.Ph1.Brigham Street Openshaw

Description: Proposed Site Plan

Purpose of issue: PLANNING

Drawn by:	Checked by:	Scale:	
JH	MT	1:200@A1	
Date:	Project No:	Drawing No:	Rev:
Aug 22	20-051	02	A

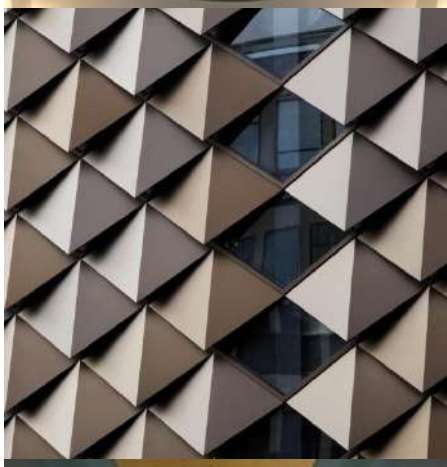
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N

0m 4m 8m 16m 24m

APPENDIX 2









Brigham Street

Phase 2 Ground Investigation

Curtins Ref: 081427-CUR-00-XX-RP-GE-00002

Revision: P02

Issue Date: 24th July 2023

Client Name: One Manchester

Client Address: Lovell House, 6 Archway, Manchester, M15 5RN

Site Address: Land Off Brigham Street, Openshaw, Manchester, M11 2JR

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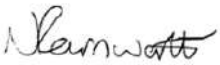
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Rev	Description	Issued by	Checked	Date
P01	Report Issue	JL	NF	27/01/2023
P02	Updated following completion of gas monitoring	RT	NF	24/07/2023

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins Limited with respect to the information contained in the report will not extend to any third party.

Author	Signature	Date
J Provis BSc (Hons) MSc Geo-Environmental Engineer		27 February 2023

Reviewed	Signature	Date
J Lord BSc (Hons) MSc Senior Geo-Environmental Engineer		27 February 2023

Authorised	Signature	Date
N Farnworth BSc (Hons) MCIWEM Principal Geo-Environmental Engineer		27 February 2023

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Executive Summary

Appointment	In October 2022 Curtins were instructed by One Manchester to undertake a Phase 2 Intrusive Ground Investigation at land west of Brigham Street, Openshaw, Manchester, M11 2JR. The site is centred on SJ 88229 97811and covers an area of approximately 0.588 Ha. The aim of the ground investigation is to determine the ground conditions beneath the site, as well as to characterise the groundwater conditions and chemical composition of the site soils for contamination assessment. It is understood that the proposed site development includes the construction of circa 20 No. low-rise residential houses circa 4no. apartments within a two storey apartment building with associated infrastructure, hardstanding and soft landscaping (private gardens and public open space).
Current Site Status	The site currently comprises an open area of soft landscaping with predominantly grass cover. There are a number of semi-mature and mature trees on the southern and western edges of the site. The topography is generally level.
Summary of Phase 1	Earliest mapping (1848) shows that the site was undeveloped and surrounded by farmland. By 1893 the southwestern portion of the site is occupied by the Openshaw Brick Works and associated clay pit. By 1933 residential properties are shown on the site and demolished by the 1996 map. Currently, the surrounding area sees a mix of industrial, commercial and residential land uses BGS mapping indicates underlying superficial deposits are indicated to comprise Glacial Till underlain by bedrock noted as the Chester Formation. The site is underlain by a Secondary A Aquifer within the bedrock formation and a Secondary Undifferentiated Aquifer within the superficial deposits. The nearest surface water feature is is the Manchester and Aston Under Lyne Canal, 302m to the north. A Low risk was identified to surface waters and groundwaters from leaching and migration of potential contamination from site soils. Primary potential risks to be investigated during this report, as well as establishing ground conditions for geotechnical design, drainage and risks to human health from Made Ground soils.
Fieldworks Undertaken	The ground investigation works were undertaken between 6th and 12th December 2022 and comprised of fourteen window sample boreholes, two Cable Percussion boreholes, and four Machine Excavated Trial Trenches. Nine positions were installed with ground gas and groundwater level monitoring installations. Selected soil samples were subject to chemical and geotechnical analysis.
Encountered Ground Conditions	Topsoil or Made Ground encountered from ground level to depths of between 0.22 to 1.50m bgl. Made Ground was encountered in all exploratory hole locations on site, to a maximum depth between 0.40 to 5.00m bgl. Made Ground was deepest on the south-west of the site where the historical clay pit was present. Made Ground comprised both granular and cohesive deposits Made Ground was underlain by Glacial Till comprising variable granular and cohesive material with locally soft black organic silt and organic clay. Perched water was encountered within CP01 (2.00m bgl), WS03 (2.44m bgl), WS13 (3.2m bgl), WS14 (2.3m bgl) and TT04 (1.70m bgl) during the ground investigation.
Environmental Laboratory Testing	With respect to the proposed end use of the site, 14no. exceedances were recorded with respect to Residential with plant uptake end-use. Exceedances relate to PAH and TPH species in TT01 including for Naphthalene a semi volatile organic compound. Exceedances for heavy metals (arsenic and or lead) were also recorded in WS12, TT01, TT03 and WS03. Asbestos was not identified onsite or during laboratory analysis.
Ground Contamination and Ground Gas Assessment	A **Moderate/Low** risk rating is identified to end-users and construction workers from direct contact, inhalation and ingestion of contaminants within Made Ground soils on site, due to exceedances recorded above nominated screening criteria. Site to be covered by hardstanding and soft landscaping. A **Low** risk rating is currently identified to controlled waters in relation to groundwater and surface water receptors, accounting for the limited sources of contamination encountered within site soils and limited pathways for migration.

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Geotechnical Assessment	The gas risk assessment was evaluated using the NHBC Traffic Light Classification and BS8485:2019 Classification systems. The NHBC Classification indicates the site is classified as Green, where designs confirm with the NHBC 'model' low rise house. The BS8485:2019 Classification, using the 'borehole' scenario, is consistent with a Characteristic Situation 1 (CS-1) gas regime, where gas protection measures will not be required.
	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 demolition and construction phase. The Principal Contractor should ensure that appropriate mitigation measures are put in place during the demolition and construction phase. One obstruction was recorded during the ground investigation in WS05, the position was backfilled with the arisings and moved 0.5m to the north. It is recommended that all obstructions are grubbed out during the enabling works, or their location accurately recorded. Shallow foundations are unlikely to be suitable for the apartment blocks and low-rise houses in the west of the site and in the north-east of the site. Alternative solutions such as ground improvement (e.g. vibro or piles) should be considered. Additional ground investigation may be required for the design of a ground improvement or piling solution. Approximately 8 low rise houses in the east of the site may be suitable for shallow foundations. It is advised CBR tests are undertaken at subgrade level, to establish the actual CBR value and determine the subgrade surface modulus. Laboratory test results indicate a Design Sulphate Class for concrete may be taken as DS-1 and ACEC 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) Install clean capping layer in soft landscaped areas on site. 2) Delineate Naphthalene (SVOC) exceedance in TT01 for further assessment. Subject to findings it could then be retained on site within a suitable area such as beneath hardstanding or soft landscaping in accordance with an MMP, or disposed of off-site. 3) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities. 4) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer. 5) This Phase 2 Ground Investigation Report should be issued to ground improvement or piling specialists. 6) Additional ground investigation may be required for the design of a ground improvement or piling solution. 7) CBR tests are undertaken at subgrade level, to establish the actual CBR value and determine the subgrade surface modulus.

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Appendices

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Appendix B - Exploratory Hole Logs

Appendix C - Chemical Laboratory Testing Results

Appendix D - Geotechnical Laboratory Testing Results

Appendix E - Ground Gas Monitoring Results

Appendix F - GAC Screening Thresholds

Appendix G - Risk Assessment Methodology

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1.0 Introduction

1.1 Project Background

In October 2022 Curtins were instructed by One Manchester to undertake a Phase 2 Intrusive Ground Investigation at land west of Brigham Street, Openshaw, Manchester, M11 2JR.

The site is centred on SJ 88229 97811 and covers an area of approximately 0.588 Ha. A site location plan is presented on *Figure 2.1*.

The aim of the ground investigation is to determine the ground conditions beneath the site, as well as to characterise the groundwater conditions and chemical composition of the site soils for contamination assessment.

It is understood that the proposed site development includes the construction of 20 No. low-rise residential houses 4no. apartments within a two storey apartment building with associated infrastructure, hardstanding and soft landscaping (private gardens and public open space). The proposed development plans are presented 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.

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2.0 Phase 1 Preliminary Site Assessment Summary

A Phase 1 Preliminary Risk Assessment report was undertaken by Curtins in April 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 at the corner of Brigham Street and Meech Street, Manchester. The site is currently occupied by public open space, with grass surface cover. Bingham Street marks the eastern boundary, Meech Street marks the southern boundary. Footpaths cross the site on the northern boundary with dwelling on Stan Jolly Walk with dwellings on Connie Street marking the eastern boundary.

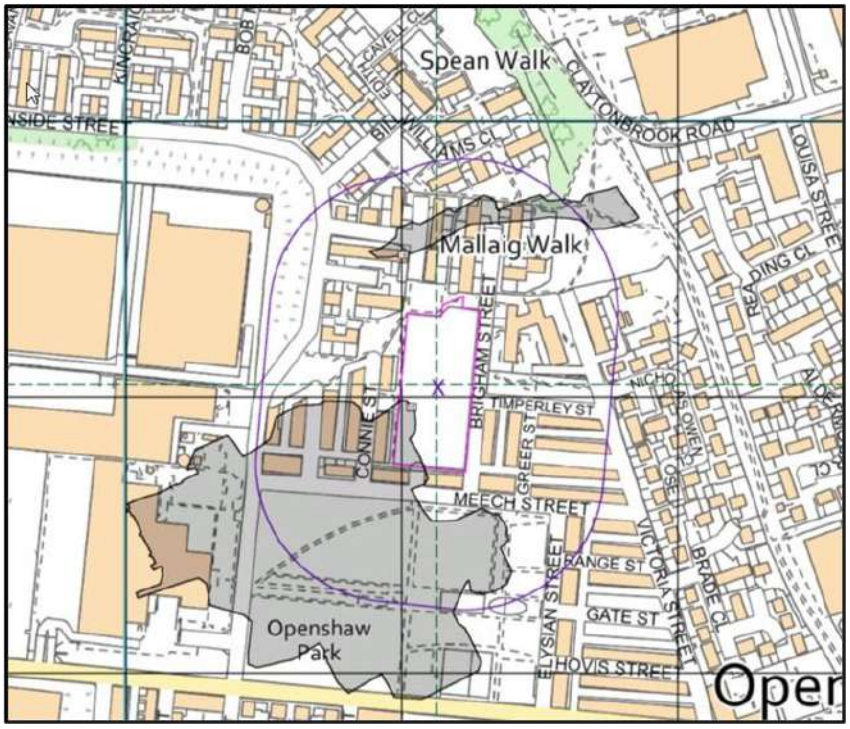


Figure 2.1 *– Site Location Plan (site boundary shown in pink and 250m/500m buffer in purple).*

2.2 Previous Site Use

Earliest mapping (1848) shows that the site was undeveloped and surrounded by farmland. By 1893 the southwestern portion of the site is occupied by the Openshaw Brick Works (and associated clay pit). The extent of extractive industries is shown in grey in Figure 2.1 (Openshaw Brick Works at south west of site and off site, sand pit to north). In 1933 residential properties are shown on the site, which are and demolished by the 1996 map.

The surrounding area sees a mix of industrial, commercial and residential land uses over the maps consulted with the sites northern boundary marked by the former Clayton Brook. Clayton Brook is not shown by 1930s mapping and may have been culverted or diverted. Engineering works are shown to the west and north of the site at their height on the 1933 and then reduce in scale from the 1960s onwards.

2.3 Published Geology

A review of British Geological Survey (BGS) map, 1:50,000 Scale, Solid and Drift Editions, Manchester, Sheet 085, 2011, indicates the following geological sequence:

- Glacial Till; and
- Chester Formation.

There is one BGS recorded fault line within 1km of the site. The nearest is located approximately 600m west of the site, orientated north to south. The fault identified the boundary between the Chester Pebble Beds Formation and the Halesowen Mudstone Formation.

Table 2.3 *– Historical Borehole Record from Surrounding Area*

Record Reference	Location (NGR)	Details (bottom to top of strata/details/thickness of strata)	
SJ89NE123	20m northeast (388275, 397868)	0.00m to 11.00m bgl 11.00m to 25.0m bgl 25.00m to 89.00 bgl 89.00m to 316.00m bgl 316.00m to 396.00 bgl *396.00m bgl*	Drift – Sandy gravelly Clay (11.00m) Red SANDSTONE with shale bands (14.00m) Interbedded Shale and Sandstone with occ limestone bands (64.00m) Red SANDSTONE (227m) Upper Coal Measures (80.00m) *Borehole terminated*
SJ89NE896	60m east (388320, 397840)	0.00m to 0.10m bgl 0.10m to 0.30m bgl 0.30m to 3.50m bgl 3.50m to 4.45m bgl *4.45m bgl*	MADE GROUND: Tarmacadam over cobblestone (0.10m) MADE GROUND: Cinder and ash FILL. (0.20m) Medium Dense light reddish SAND (3.20m) Loose dark brown SAND and sandy SILT (0.95m) *Borehole terminated*

2.3.1 Made Ground Deposits

BGS Records do not indicate the presence of Made Ground on site, however the site's historic land use, primarily as residential dwellings and a historical clay pit in south west, suggests that Made Ground soils may be present beneath the site.

2.3.2 Superficial Deposits

Glacial Till deposits comprising a heterogenous mix of clay, sand, gravel and boulders in varying widely in shape and size. Local borehole records indicate cohesive and granular superficial deposits between 0-10m bgl under Made Ground deposits.

2.3.3 Bedrock Deposits

Bedrock deposits are present as the Chester Formation, comprising of pebbly sandstones with mudstone. Local boreholes indicate red sandstone bedrock is at 14.00m.

2.3.4 Mining and Quarrying

A review of the Coal Authority interactive mapping (Ref. 19) for the area indicates that the site is located within a Coal Mining Reporting Area, however it is not located within a Development High-Risk Area. The nearest Development High-Risk Areas are associated with coal outcrops to the west and northwest of the site.

There are no recorded mine entries within 1km of the site.

There are no recorded coal workings and no probable coal workings within 500m of the site.

Consequently, the risk to development from historic coal mining is considered to be **Low**. No further actions are required to further assess the risk to development from historic coal mining.

The closest recorded BGS mineral sites is located 68m southwest of the site, an opencast site known as Openshaw Brickworks which extracted common clay and shale from superficial soils (Till) but has now ceased. Records shown extraction likely extended on to the site.

2.3.5 Other Pertinent Geological Existing Geological Records

The Envirocheck report confirmed 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.

The Envirocheck Report (Red. 1) and BGS Radon Mapping (Ref. 20) confirms the site is situated in an area where <1% of homes are above the radon action level. Radon protection measures are therefore not considered necessary within the proposed development. However, where the new development incorporates a basement the advice of a specialist Radon assessor must be obtained.

2.4 Hydrogeology and Hydrology

The nearest surface water feature recorded by the Envirocheck report (Ref.1) is the Manchester and Aston Under Lyne Canal, 302m to the north.

One recorded pollution incident to controlled waters has occurred within 500m of the site. A Category 3 minor incident of crude sewerage being discharged into the Manchester Ship Canal occurred on the 28th June 1994.

The Canal & River Trust and the British Waterways Board hold six surface water abstraction licences within 1km of the site.

There are three discharge consents located within 500m of the site held by United Utilities Water Limited.

2.5 Landfill

There are no BGS recorded landfill sites within 500m of the site. A historic landfill site is located 137m northeast of the site where Inert Waste and Liquid Sludge was deposited. Dates of operation are not known.

The nearest area of infilled land is located on site and is the marked as a former quarry pit, most likely associated with the Openshaw Brick Works. In addition, an area of infilled land associated with water is also marked on the site, potentially associated with the former Clayton Brook located on the northern boundary of the site.

Further infilled water features (Pond, marsh, river, stream etc.) are located 147m northeast, 176m south, 190m northwest, 240m south, 256m west, 310m northwest, 322m north, 348m northeast and 380m west dated between 1848 and 1956.

2.6 Unexploded Ordnance (UXO) Risk Assessment

Risk mapping (Ref. 21) for UXO's has placed the site in a Moderate risk area. Moderate-risk regions are those with a bombing density of up to 15 to 49 bombs per 1000 acres. These areas are considered to have a moderate USB risk. In general, further action to mitigate the risk is considered prudent, although not essential. Care is required when assessing the risk for specific sites where the risk may be higher because of local wartime activity.

A review of the available historic mapping did not identify any evidence of bomb damage onsite or within close proximity of the site boundary. No ruins were recorded in the immediate vicinity of the development site, and no buildings appear to have been demolished following WWII on or surrounding the site. Detailed bomb strike mapping does not record any strikes or damage on the site.

Considering the above, the risk of encountering potential UXO as part of future intrusive GI works was considered **Low**.

If unexploded ordnance is discovered during any works, stop immediately, prevent access to the area, and inform the police. If the site boundary or location changes then the UXO risk should be reassessed.

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*

Source	Pathway	Receptor	Risk
On-site Sources • Uncontrolled deposition of Made Ground associated with the construction/demolition onsite associated with the historic properties on site and infilling of clay pit in south west. **Off-site Sources** • Uncontrolled deposition of Made Ground during the construction of roads and structures and demolition near and adjacent to the site's boundaries as well as local industrial activity.	Direct contact, ingestion, inhalation (dust and vapours)	**End-user of site** (Carpark staff and visitors)	**Moderate/ Low**
	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.	**Controlled Waters** (Groundwater) Principal Aquifer (Bedrock), overlain by Glacial Till Deposits (Secondary Aquifer – Undifferentiated). There are no potable groundwater abstraction points within 1km. The site is not within a designated Source Protection Zone.	**Low**
	Horizontal migration over and through the superficial deposits (soils)	**Controlled Waters** (Surface Water) Nearest surface water feature is a drain 302m north. Six surface water abstraction points exist within 1km.	
Potential sources of ground gas: • Potential localised organically rich deposits present within the natural soils as well as soils associated with the former Clayton Brook watercourse. • Infilled former Openshaw Brick Works quarry/pit site.	Vertical and horizontal migration through existing service corridors and the underlying superficial deposits	**End-user of site** (Residents)	**Moderate**

Potential contaminants of concern associated with the sources identified within the previous report 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; and asbestos present in discarded building materials.

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.

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3.0 Phase 2 Investigation Scope of Works

Site investigation works were undertaken by Curtins between 6th and 12th December 2022.

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

- LCRM (Ref. 2);
- British Standard (BS) 10175:2011+A2:2017 (Ref. 3);
- BS5930:2015+2020 (Ref. 4); and
- BS EN1997: Part 2:2007 Eurocode 7 (Ref. 5).

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	Exploratory Hole Depth (m bgl)	Rationale
Window Sample Boreholes	WS01 WS02 WS03 WS04 WS05 WS05A WS06 WS07 WS08 WS09 WS10 WS12 WS13 WS14	3.40 5.45 5.45 3.00 1.50 5.00 3.50 2.85 3.60 2.80 5.00 5.00 4.40 5.45	Confirm shallow ground conditions. Collect soil samples for chemical and geotechnical testing. Undertake in-situ testing.
Cable Percussion Boreholes	CP01 CP02	10.00 10.00	Confirm shallow ground conditions. Confirm deep ground conditions. Confirm depth of Made Ground within historic clay pit.
Machine Excavated Trial Trenches	TT01 TT02 TT03 TT04	2.40 1.90 2.10 3.90	Determine the edge of the historic clay pit at the South-West of the site.

For information regarding the location of the exploratory hole locations, refer to Curtins drawing ref. '081427-CUR-00-XX-DR-GE-001-V01 -Brigham Street GI' within *Appendix A*.

Exploratory hole locations were limited by the presence of existing services on site, particularly for the machine excavated trial trenches which could not be extended further eastwards in order to further delineate the historical clay pit extent for this reason.

3.1 Soil Logging and Sampling

Exploratory borehole and trial trench arisings were logged on site by a qualified Engineer. All exploratory holes and trial trenches were logged in accordance with the requirements of BS5930:2020 (Ref. 4) 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 2no. cable percussive boreholes, and 7no. window sample boreholes during the investigation, within shallow Made Ground and superficial soils.

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 either:

i. the potential for ground gas generation in shallow site soils; or
ii. Monitor groundwater levels and collect groundwater samples for chemical analysis

The screened sections for ground gas monitoring focussed on shallow and deeper Made Ground, and the underlying superficial soils, which may generate ground gases or which are more permeable for groundwater monitoring.

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

Table 3.2 – *Monitoring Well Response Zones*

Borehole Ref.	Response Zone(s) (m bgl)	Strata Description(s)
CP01	2.0 - 5.0	Made Ground
CP02	7.0 - 10.0	Natural - Granular
WS01	1.0 – 3.0	Made Ground
WS02	0.5 – 1.5	Made Ground
WS05A	1.0 – 2.5	Made Ground
WS06	2.6 – 3.5	Natural - Granular
WS08	1.0 – 3.0	Made Ground
WS10	1.0 – 4.0	Natural - Granular
WS13	0.8 – 3.6	Natural - Granular

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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 monitoring rounds were undertaken between 9th January 2021 and 27th March 2023 to assess the groundwater levels and the ground gas conditions.

The results of the groundwater level monitoring are detailed in *Section 5.6.*

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

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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.

A total of 11 No. Made Ground samples and 8 No. natural soil sample were selected for chemical testing. 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 analysis was Envirolab Ltd a UKAS and MCERTS accredited. Geotechnical analysis was sub-contracted to i2 Analytical, a UKAS and MCERTS accredited laboratory.

Given the lack of any obvious sources of potential contamination the sampling positions were generally located in a non-targeted, systematic array, beneath the proposed development footprint, to give 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 and asbestos. 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	0.1 pH
	2:1 Water Soluble Sulphate	0.01 g/l
	Soil Organic Matter (SOM)	0.4% w/w
	Arsenic, Chromium, Chromium VI, Copper, Lead, Nickel, Selenium	0.20 - 1 mg/kg
	Zinc	0.5 mg/kg
	Boron (water soluble)	0.4 mg/kg
	Cadmium	0.1 mg/kg
	Mercury	0.1 mg/kg
	Cyanide (total)	0.5 mg/kg

Suite Ref.	Analyte	Limit of Detection
	Phenols (screen)	0.3 mg/kg
	PAHs (USEPA 16)	0.1 mg/kg
	TPH (Aro/Ali Split)	1 mg/kg

A total of 19 No. soil samples were obtained from the boreholes and tested for Curtins Suite A. 11 No. samples were obtained from the Made Ground, and 8 No. sample was obtained from the natural soils. Copies of the environmental chemistry testing certificates are presented in *Appendix C*.

4.1.2 Groundwater Analysis

No water samples were taken post investigation as the CSM from the Phase 1 concluded a risk to groundwater and surface water is Low. Ground conditions encountered within the ground Investigation typically confirmed this assessment.

4.2 Geotechnical Testing

Soil samples for testing were prepared in accordance with BS1377: Part 1:2016 (Ref. 6). 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	63	BS 5930: 2015+2020, Clause 41
Laboratory Testing (General Testing - Foundation Design)		
BRE Suite S1C(1)	18	ISO-17025 MCERTS
Atterberg Limit	12	BS1377: Part 2: 1990, (clause 3.2 4.3, & 5)
Moisture Content	18	BS1377 1990 Part 2
PSD Wet Sieve	4	BS 1377: Part 2: 1990, Clause 9.2
Triaxial – Single Stage	2	BS 1377-7: 1990: Clause 8
One Dimensional Consolidation	1	BS 1377-5; 1990: Clause 3

(1) The BRE Suite S1C testing includes the detection of: pH (2.5:1 Extract), Sulphate (as SO4) - Water Soluble (2:1), Magnesium - Water Soluble (2:1) , Nitrate (as NO3) - Water Soluble (2:1), Chloride - Water Soluble (2:1) within soils.

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 of topsoil, overlying granular Made Ground. Cohesive and granular strata was recorded beneath the Made Ground. Bedrock was not encountered.

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	Recorded Thickness (m)		Description
		Min	Max	
Topsoil	0.00	0.22	0.40	Grass over a dark brown slightly gravelly, slightly clayey sand with frequent rootlets. Gravel of brick and cement.
Made Ground	0.00 – 0.40	0.40(1)	4.6	Dark brown and reddish brown slightly clayey gravelly sand with frequent cobbles and occasional roots and rootlets. <u>Overlying</u> Light brown fine to medium sand.
Glacial Till (cohesive)	0.40 – 5.00	0.20(1)	5.00(1)	Firm greyish brown slightly gravelly slightly sandy clay. , WS02 and WS03 show very soft black very sandy organic silt and very soft light greyish brown silt, respectively.
Glacial Till (Granular)	1.80 – 4.10	0.30	2.16	Brown slightly clayey fine to medium sand.

Base not encountered.

5.2 Made Ground

Made Ground was encountered in all exploratory hole locations on site, to a maximum depth between 0.40 to 5.00m bgl. Made Ground was deepest in CP01 located at the south west of the site within the suspected historical clay pit. Deeper Made Ground likely associated with the infilled clay pit was also encountered in TT01, TT02, TT03, TT04 and WS01.

The Made Ground comprised various compositions, details of which are noted below and within the Exploratory Hole Logs in *Appendix B.*

5.2.1 Topsoil/Surface Covering

Topsoil was identified within all locations from ground level to depths between 0.10 to 0.50m bgl. The topsoil was described as grass cover over a dark brown slightly clayey slightly gravelly sand.

5.2.2 Granular Made Ground

Granular Made Ground was encountered within all exploratory boreholes and trial trenches at various depths and was generally encountered as slightly clayey gravelly sand with occasional cobbles of brick. Granular Made Ground was identified to depths of between ground level and 4.00m bgl. The granular Made Ground was found beneath the surface covering of topsoil.

5.2.3 Cohesive Made Ground

Cohesive Made Ground was encountered in CP01, WS05A, WS09 and WS13 and was encountered underlying the granular Made Ground to depths of between 0.50 to 2.40m bgl.

The cohesive Made Ground was described as generally a Greyish brown firm slightly gravelly sandy clay, or brown slightly gravelly slightly sandy clay, or Dark grey silty clay.

5.2.4 Reworked Ground

Reworked ground likely associated with the historical infilling of the clay pit in the south west of site was encountered in CP01, TT01, TT02, TT03, TT04 and WS01, and was encountered underlying the Topsoil and granular Made Ground to depths of 0.50m to 4.00m bgl.

The reworked ground was described as generally as Brown silty clay with pockets of fine to medium sand or greyish brown silty clay.

The reworked ground in WS01 was generally described as Orangish brown medium to coarse sand, from 0.34m bgl, to a depth of 3.40m bgl.

5.3 Glacial Till

Glacial Till was encountered where the base of the Made Ground was identified.

Glacial Till deposits comprised as cohesive and granular material. The base of the Glacial Till was not identified during the ground investigation. Cohesive Glacial Till was identified from 0.40m to 4.00m bgl, to a depth of between 0.40 to 10.00m bgl.

The cohesive Glacial Till was described as a firm greyish brown silty sandy clay or mottled grey and black slightly sandy slightly gravelly clay.

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Locally soft black very sandy organic silt was encountered within WS02 at 1.54 to 1.80m bgl. Soft clay deposits underlying was also recorded as 'organic'.

Granular Glacial Till was identified from 0.5m to 4.10m bgl, to a depth of between 2.40m to 5.45m bgl, and was generally identified at a shallow depth overlying the cohesive till.

The granular Glacial Till was described as Brown fine to medium Sand or Greyish brown slightly gravelly slightly clayey fine to medium sand.

5.4 Observed Potential Contamination

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

5.5 Obstructions Encountered

Obstructions were encountered within WS01, WS04, WS05, WS07, WS08 and WS09, where dense/ hard stratum resulted in early termination. A relic concrete slab was encountered in TT03 at 0.60m bgl, this was readily excavated with site plant and recovered as cobbles.

WS05 was moved 0.5m north due to the early termination, where WS05A reached the desired depth.

5.6 Groundwater

Four instances of groundwater ingress were recorded throughout the site; within TT04, WS03, WS13 and WS14 All encounters with the groundwater were slow flowing and are presumed to be perched water encounters.

Groundwater was recorded as seepages within three of the five boreholes, WS202, WS203 and WS205 during the site investigation. A summary is detailed below within *Table 3.3a*.

Table 5.6a – *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
CP01	2.00 (68.85)	1.80 (68.65)	Granular Made Ground	Water strike at 2.00m bgl, borehole noted as dry after drilling.
WS03	2.44 (69.66)	-	Granular Glacial Till	Water strike at 2.44m bgl, borehole noted as dry after drilling.
WS13	3.20 (70.05)	-	Cohesive Made Ground	Water strike at 3.20m bgl, borehole noted as dry after drilling. Sand was damp.
WS14	2.30 (69.52)	-	Cohesive Glacial Till	Water strike at 2.30m bgl, borehole noted as dry after drilling.
TT04	1.70 (69.70)	-	Granular Made Ground	Water strike at 3.20m bgl, water seepage was very slow with a stagnant odor.

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Groundwater was recorded during gas monitoring visits and the borehole response zones are detailed in *Table 5.6b*.

Table 5.6b – *Monitoring Well Response Zones*

Borehole Ref.	Installation Strata	Response Zone m bgl (m AOD)	Depth to water level m bgl (m AOD)					
			09/01/23	01/02/23	17/02/23	24/2/23	16/03/23	27/03/23
CP01	Granular Made Ground	2.00 – 5.00 (70.05 – 73.05)	2.30	2.50	2.66	2.72	2.55	2.55
CP02	Cohesive Glacial Till	7.00 – 10.00 (75.42 – 78.42)	1.76	2.11	2.26	2.29	2.33	1.99
WS01	Granular Made Ground	1.00 – 3.00 (69.46 – 71.46)	2.63	Dry	Dry	Dry	Dry	Dry
WS02	Granular Made Ground	0.5 – 1.5 (68.66 – 69.66)	Dry	Dry	Dry	Dry	Dry	Dry
WS05A	Cohesive Made Ground	1.00 – 2.50 (70.46 – 71.96)	1.50	1.70	1.72	1.71	1.48	1.60
WS06	Granular Glacial Till	2.00 – 3.00 (71.39 – 72.39)	2.21	Dry	Dry	Dry	Dry	Dry
WS07	Granular Glacial Till	1.00 – 3.00 (70.37 – 72.37)	Dry	Dry	Dry	Dry	Dry	Dry
WS10	Cohesive Glacial Till	1.00 – 4.00 (69.58 – 72.58)	1.50	1.88	1.90	2.10	1.76	2.65
WS13	Cohesive Made Ground	0.80 – 3.60 (69.91 – 71.71)	2.18	2.75	2.85	2.84	2.14	2.33

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6.0 Ground Model

6.1 Made Ground

6.1.1 Made Ground

Made Ground was encountered in all exploratory hole locations, from ground level to maximum depths ranging between 0.50 to 4.00m bgl, where the base of Made Ground has been encountered.

The geotechnical test results recorded within the Made Ground are summarised in *Table 6.1.1* below.

Table 6.1.1 – *Summary of Made Ground Geotechnical Test Results*

Parameter	No. of Tests	Results
Laboratory Tests - General		
pH	1	7.4
Water Soluble Sulphate (mg/l)	1	16.5
Moisture Content (%)	1	18

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

6.1.2 Reworked Ground

Reworked Made Ground was encountered in CP01, TT01, TT02, TT03, and TT04 likely associated with the infilled clay pit, and was encountered under the Topsoil and granular Made Ground to a maximum depth of 0.50m to 4.00m bgl.

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

Table 6.1.2 – *Summary of Reworked Ground Geotechnical Test Results*

Parameter	No. of Tests	Results
In-Situ Tests		
SPT 'N' Value [(2)] –	1	21
Laboratory Tests - General		

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Parameter		No. of Tests	Results
Atterberg Test	Liquid Limit (%)(1)	3	Min: 35 Max: 39 Average: 37.33
	Plastic Limit (%)(1)	3	Min: 18 Max: 22 Average: 19.67
	Plasticity Index (%)(1)	3	Min: 16 Max: 20 Average: 17.67
	Modified Plasticity Index (%)(3)	3	Min: 8.16 Max: 17.40 Average: 13.62
Moisture Content (%)		3	Min: 19.00 Max: 21.00 Average: 20.00
pH		3	Min: 7.10 Max: 8.20 Average: 7.57
Water Soluble Sulphate (mg/l)		3	Min: 32.00 Max: 82.50 Average: 56.57

(1) Excludes non-plastic test results
(2) Only includes SPTs tests in which full penetration was achieved.
(3) Modified plasticity index is the plasticity of components <425µm

Three Atterberg Tests were undertaken in the cohesive material indicating the soils behave as intermediate plasticity clays with two medium volume change potential and the one sample indicating a low to medium plasticity clay with a low volume change potential, in accordance with guidance from NHBC Standards Chapter 4.2 (2021) (Ref. 7). These results of the Atterberg Limits are presented on *Figure 6.2.1a*.

One SPT 'N' value was recorded in the reworked ground, giving an 'N' value of 9, where full penetration was met (no SPT refusals were noted).

Due to the variability of reworked material it is unlikely to be considered a suitable formation strata for foundations, no further parametric analysis has therefore been undertaken.

6.2 Glacial Till

The Made Ground was underlain by Glacial Till deposits and recorded as cohesive and granular material.

6.2.1 Cohesive Glacial Till

The cohesive material was described as: a firm greyish brown silty sandy clay or mottled grey and black slightly sandy slightly gravelly clay. Locally soft black very sandy organic silt was encountered within WS02 with soft organic clays underlying.

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The geotechnical test results recorded within the cohesive Glacial Till deposits are summarised in *Table 6.2.*

Table 6.2 – *Summary of geotechnical test results – Cohesive Glacial Till*

Parameter		No. of Tests	Results
In-Situ Tests			
SPT 'N' Value (2) – Cohesive		18	Min: 0 Max: 43
Laboratory Tests - General			
Atterberg Test	Liquid Limit (%)(1)	9	Min: 26 Max: 46 Average: 36.67
	Plastic Limit (%)(1)	9	Min: 12 Max: 24 Average: 17.78
	Plasticity Index (%)(1)	9	Min: 14 Max: 25 Average: 19.22
	Modified Plasticity Index (%)(3)	9	Min: 13.58 Max: 25 Average: 18.43
Moisture Content (%)		14	Min: 9.50 Max: 20.00 Average: 15.45
pH		14	Min: 7.10 Max: 8.60 Average: 7.82
Water Soluble Sulphate (mg/l)		14	Min: 32.50 Max: 409.00 Average: 132.59

(1) Excludes non-plastic test results
(2) Only includes SPTs tests in which full penetration was achieved.
(3) Modified plasticity index is the plasticity of components <425µm

Nine Atterberg Tests were undertaken in cohesive material indicating the soils behave as low to medium plasticity clays, in accordance with guidance from NHBC Standards Chapter 4.2 (2021) (Ref. 7). These results of the Atterberg Limits are presented on *Figure 6.2.1a*.

A total of eighteen SPT 'N' values were recorded in cohesive Glacial Till, ranging from between 0 and 43, where full penetration was met in all but two cases, 9.5m bgl in CP01 and 9.0m bgl in CP02. The SPT N results are presented on *Figure 6.2.1b*, predominantly increasing in strength with depth.

A result of 0 was recorded at 2.00m bgl in WS03 and SPT results of 50 have been excluded from calculations and in order to not interfere with results.

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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. 8) using Equation 1:

$$c_u = f_1 \times \text{SPT N} \qquad \textbf{Equation 1}$$

Where:

c_u is the Undrained Shear Strength

f_1 is the Stroud Factor determined from Figure 1.5 (Ref. 9)

SPT N is Characteristic Standard Penetration Test Result

Using an f_1 factor of 5.2 for an average plasticity index of 19 %, in accordance with CIRIA C504 Engineering in Glacial Tills has been used, with derived c_u values ranging between 10 kPa and 223 kPa in accordance with BS5930 (2015+2020). The majority of the estimated results indicate a low to medium strength clay, up to a high strength clay. Generally, the strength of clay increases with depth, see *Figure 6.2.1c*.

A moderately conservative unit weight of between 18 kN/m^3 is deemed suitable for medium to high strength cohesive soils in accordance with BS8002:2015 (Ref. 10).

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. 8) described by Equation 2:

$$m_v = 1/(f_2 \times \text{SPT N}) \qquad \textbf{Equation 2}$$

Where:

m_v is the Coefficient of Consolidation

f_2 is the Stroud Factor determined from Figure 1.5 (Ref. 9)

SPT N is Characteristic Standard Penetration Test Result

Using an f_2 factor of 0.55 for an average plasticity index of 19%, m_v values typically range between 0.0423 and 0.9091 m^2/MN. The results are variable, indicating a low to medium compressibility clay with one sample at 3m bgl in WS02, indicating a high compressibility. The values are presented in *Figure 6.2.1d*.

Drained Youngs Modulus (E') can be derived using a relationship between Plasticity Index and Undrained Shear Strength (c_u) after Stroud and Butler (1975). For an average plasticity index of 19% the equation below can be used to determine E' in kPa.

$$E' = 230c_u \qquad \textbf{Equation 3}$$

E' values ranging between 2MPa and 51MPa are derived. It is important to note that c_u and therefore E' vary depending on depth and this needs to be considered in designs.

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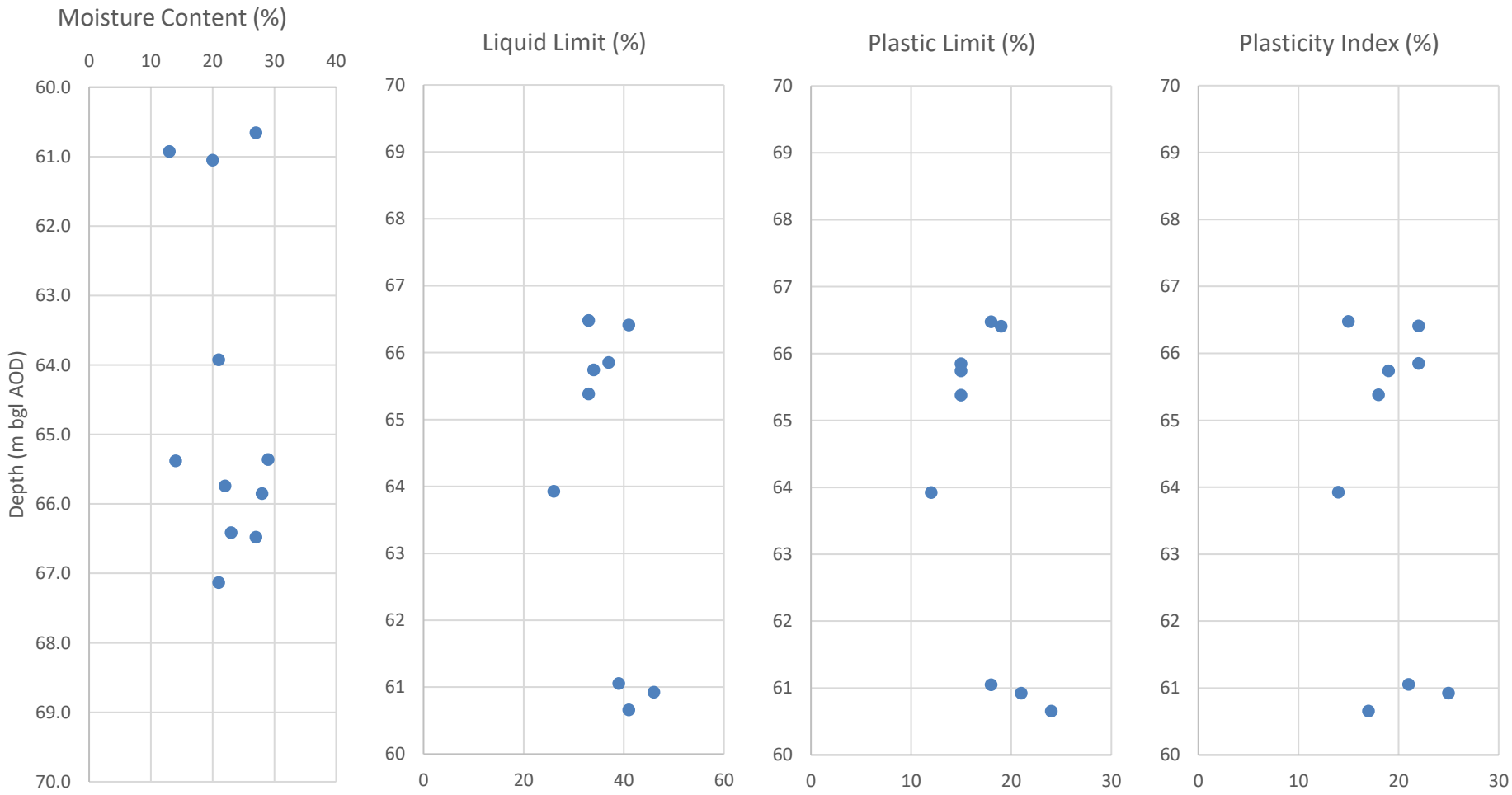


Figure 6.2.1a – *Summary of Atterberg Test Results vs Depth*

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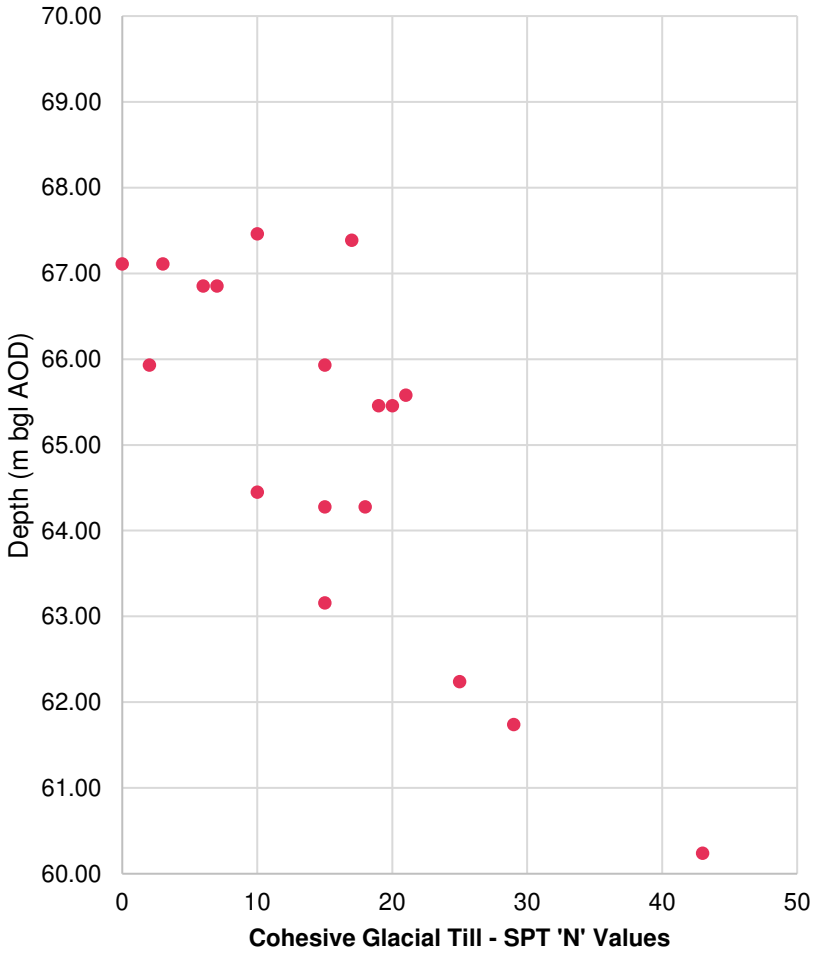


Figure 6.2.1b – *Standard Penetration Test vs. Depth - Cohesive*

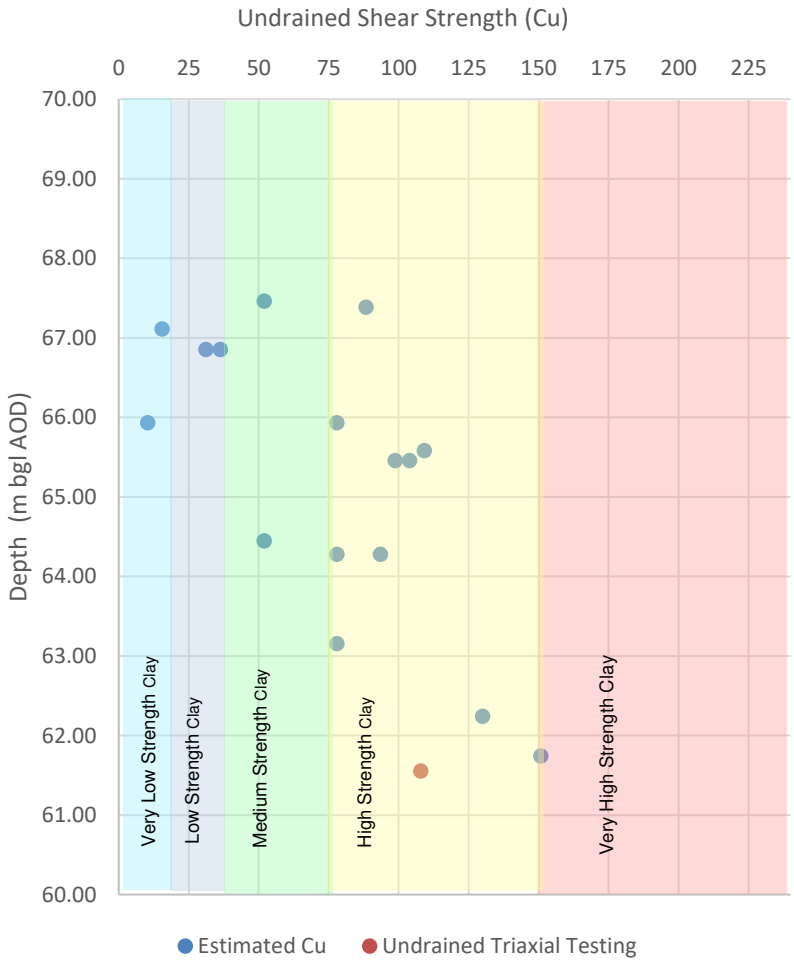


Figure 6.2.1c – *Estimated Undrained Shear Strength vs Depth*

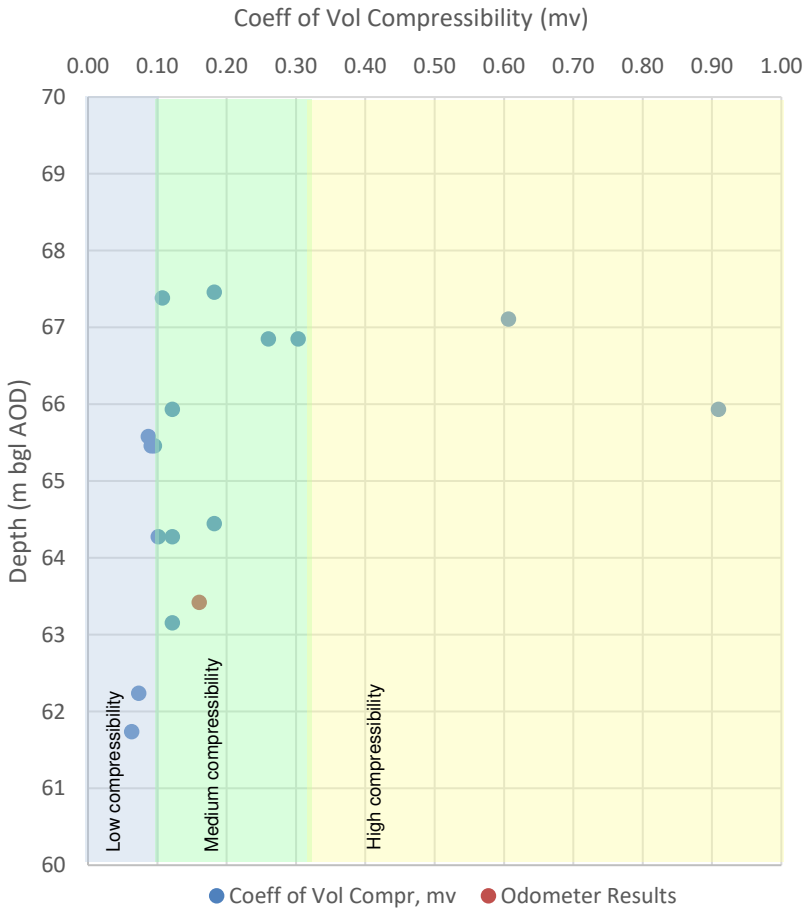


Figure 6.2.1d – *Estimated Volume Compressibility Coefficients (Mv) vs Depth*

6.2.2 Granular Glacial Till

The granular Glacial Till was described as Brown fine to medium Sand or Greyish brown slightly gravelly slightly clayey fine to medium sand.

The geotechnical test results recorded within the cohesive Glacial Till deposits are summarised in *Table 6.2.2.*

Table 6.2.2 – *Summary of Granular Glacial Till Geotechnical Test Results*

Parameter	No. of Tests	Results
In-Situ Tests		
SPT 'N' Value (2) – Granular	19	Min: 3 Max: 42
Granular Glacial Till Calculations		
Angle of Shearing Resistance (°)	10	Min: 27 Max: 39 Average: 33
E' Granular	10	Min: 7.5 Max: 28.5 Average: 17.65

(1) Excludes plastic test results
(2) Only includes SPTs tests in which full penetration was achieved.

A total of nineteen SPT 'N' values were recorded in granular Glacial Till, ranging from between 3 and 42, where full penetration was met in all but five cases. The SPT N results are presented on *Figure 6.2.2a*.

Values for Drained Youngs Modulus (E') can be derived using a relationship between Coefficient of Volume Compressibility (m_v) and SPT N-Value for Sands and Gravels after Burland and Burbridge (1985). Based on the SPT N values, derived E' values range between 3 and 110MPa. It is important to note that SPT N and therefore E' vary depending on depth and this needs to be considered in designs.

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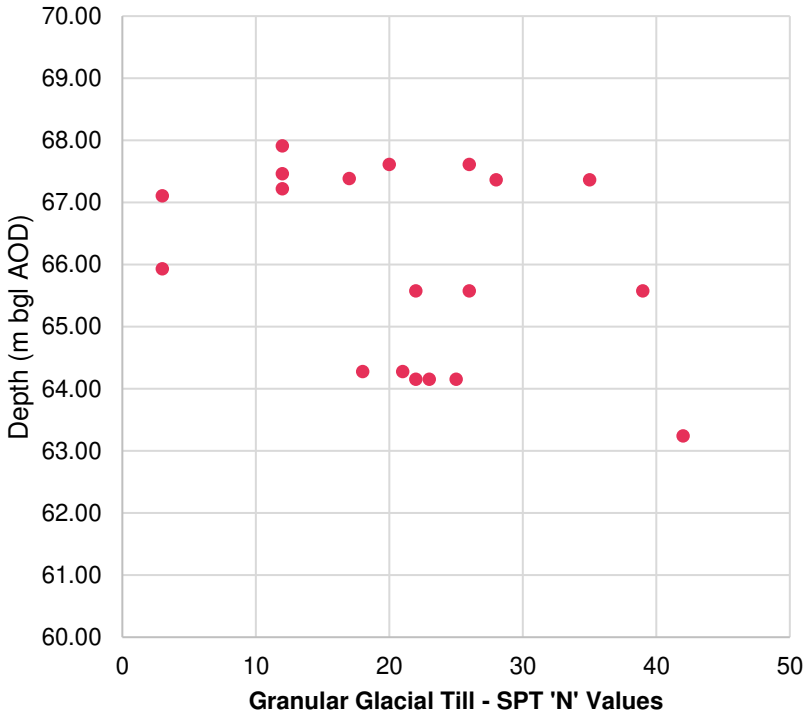


Figure 6.2.2a – *Standard Penetration Test vs. Depth - Granular*

6.3 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. 11). A summary of the results obtained as a part of the ground investigation are summarised in *Table 6.3a* below.

Table 6.3a –*Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Test Type	Range
Made Ground	pH	7.1 – 8.2
	Water Soluble Sulphate (mg/l)	16.5 – 82.5
Glacial Till	pH	7.1 – 8.6
	Water Soluble Sulphate (mg/l)	32.5 – 409

Table 6.3b –*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.

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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.

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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. 12).

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 8.0* 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. 13) Report SC050021/SR2: Human Health Toxicological Assessment of Contaminants in Soil (Ref. 14) and Report SC059921/SR3: Updated Technical Background to the CLEA Model (Ref. 15).

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

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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. 16) 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 use of the site, noted as the redevelopment of parcel of land off Brigham Street into residential properties, has been compared against the *Residential* end use scenario 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 0.20% to 56.80%.

Highly elevated soil organic matter was identified in one Made Ground sample from TT01 at 1.00m bgl (56.80%). There was nothing identified within the geological log that was indicative of elevated soil organic matter. On this basis, the elevated soil organic matter has been considered a discrepancy and results from this sample compared against a Tier 1 Thresholds for a 6% SOM individually.

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With consideration for the wider a site a calculated geometric average for Made Ground soils has been determined of a SOM of 1.54%. As such, a comparison against Tier 1 Thresholds for a conservative SOM of 1% for all other Made Ground and natural soils for *'Residential with home grown produce'* end-use has been adopted.

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

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 thirty soil samples.

With respect to the proposed end use of the site, seven exceedances were recorded with respect to *Residential with home grown produce* end-use.

No exceedances were noted within the natural soil samples.

Exceedances within the Made Ground is detailed below within Table 7.1.2.

Table 7.1.2 – *Exceedances within Made Ground compared against a 1% SOM GAC*

Determinant	GAC (mg/kg)	Exploratory Hole I.D.	Depth m bgl (m AOD)	Strata	Concentration (mg/kg)
Lead	200	WS03	0.40 (68.64)	Made Ground	337
		WS14	0.80 (69.08)	Made Ground	401
		TT01	1.00 (69.12)	Made Ground	344
		TT03	0.40 (68.46)	Made Ground	706
Arsenic	32	WS14	0.80 (69.08)	Made Ground	118
Mercury (elemental)	1	TT01	1.00 (69.12)	Made Ground	2.49
Aromatic EC12 – EC16	140	TT01	1.00 (69.12)	Made Ground	290
Aromatic EC16 – EC21	260	TT01	1.00 (69.12)	Made Ground	1200
Aromatic EC21 – EC35	1100	TT01	1.00 (69.12)	Made Ground	3140
Benzo(a)anthracene	7.2	TT01	1.00 (69.12)	Made Ground	22.3
Benzo(a)pyrene	2.2	TT01	1.00 (69.12)	Made Ground	15.7
Benzo(b)fluoranthene	2.6	TT01	1.00 (69.12)	Made Ground	17.1
Chrysene	15	TT01	1.00 (69.12)	Made Ground	27.4

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Determinant	GAC (mg/kg)	Exploratory Hole I.D.	Depth m bgl (m AOD)	Strata	Concentration (mg/kg)
Lead	200	WS03	0.40 (68.64)	Made Ground	337
		WS14	0.80 (69.08)	Made Ground	401
		TT01	1.00 (69.12)	Made Ground	344
		TT03	0.40 (68.46)	Made Ground	706
Dibenzo(ah)anthracene	0.24	TT01	1.00 (69.12)	Made Ground	1.49
Naphthalene	2.3	TT01	1.00 (69.12)	Made Ground	3.53

Table 7.1.3 – *Exceedances within Made Ground in TT01 compared against a 6% SOM GAC*

Determinant	GAC (mg/kg)	Exploratory Hole I.D.	Depth m bgl (m AOD)	Strata	Concentration (mg/kg)
Aromatic Hydrocarbon EC21-EC35	1900	TT04	1.00 (66.997)	Made Ground	5090
Benzo(a)anthracene	15	TT04	1.00 (66.997)	Made Ground	23.2
Benzo(a)pyrene	3.2	TT04	1.00 (66.997)	Made Ground	10.8
Benzo(b)fluoranthene	4	TT04	1.00 (66.997)	Made Ground	12.4
Dibenzo(ah)anthracene	0.32	TT04	1.00 (66.997)	Made Ground	1.06

An exceedance for Mercury was recorded within one exploratory hole locations in Made Ground soils. However, concentrations recorded represent total mercury rather than the GAC threshold for elemental mercury. No speciation of mercury has been completed as part of the site investigation, and without an obvious historical source of elemental mercury present on site, it's likely that concentrations recorded comprise predominantly inorganic mercury. As such, this exceedance has therefore not been considered further.

Remaining exceedances relate to PAH species and TPH's in TT01 and TT04 including for Naphthalene a semi volatile organic compound in TT01. TT01 is located on the south-west of site, outside of the proposed building footprint. It would be prudent to delineate this exceedance to assess extent, subject to findings it could then be retained on site within a suitable area such as beneath external hardstanding or soft landscaping in accordance with an MMP or disposed of off-site.

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Exceedances for heavy metals (arsenic and or lead) were also recorded in WS12, TT01, TT03 and WS03.

A clean capping layer in soft landscaped areas is recommended to mitigate the risk from non-volatile exceedances.

No suspected asbestos containing materials (ACMs) were identified in the exploratory hole logs. All soil samples were screened for asbestos. No asbestos was identified.

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8.0 Ground Gas Risk 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. 28), BSI Publication Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings BS8485:2015 (Ref. 29) and other broadly accepted references such as the Ground Gas Handbook 2009 (Ref. 30).

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

The conceptual site model concluded there was a Moderate risk from ground gas due to:

- Localised organically rich deposits present within the natural soils as well as soils associated with the former Clayton Brook watercourse.
- Infilled former Openshaw Brick Works quarry/pit site.

Nine boreholes were installed with monitoring wells as detailed in Table 3.2.

Six rounds of gas monitoring have been completed between 9th January 2021 and 27th March 2023. The results log sheets are contained within Appendix A6 and summarised in Table 6.0.

Barometric pressures ranging between 987mb and 1018mb were recorded during the monitoring period.

Table 8.0 – *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)
CP01	<0.1	3.7	11.0	1.1	<0.1
CP02	<0.1	0.2	19.5	21	<0.1
WS01	<0.1	4.7	13.6	1.5	<0.1
WS02	<0.1	1.1	17.4	0.6	<0.1
WS05A	<0.1	0.9	18.9	<0.1	<0.1
WS06	<0.1	4.6	14.9	5.4	<0.1
WS07	<0.1	5.7	14.4	5.2	<0.1
WS10	<0.1	2.5	12	<0.1	<0.1
WS13	<0.1	3.4	16.8	2.6	<0.1

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Methane concentrations were recorded below the limit of detection of the monitoring instrument in all monitoring wells throughout the monitoring period.

The greatest concentrations of carbon dioxide was recorded in WS07 on the first monitoring visit at 5.7% $^{v}/_{v}$.

Hydrogen sulphide and carbon monoxide were recorded below the instruments limit of detection throughout the monitoring programme.

The maximum peak air flow rate was recorded in CP02, at 21 l/hr on the fifth visit, reducing to an air flow rate of 0 l/hr instantly. For the purposes of this assessment, the negative values are taken as absolute values, and it is assumed that a positive air flow rate of the same value may be achieved in natural ground conditions.

Air flow rates were recorded at maximum values of between <0.1 l/hr and 21 l/hr, always reducing to a steady state of <0.1 l/hr (below the limit of detection of the monitoring instrument). Negative air flow rates were also recorded.

Elevated peak gas flow rates generally decreased to a steady state gas flow rate of <0.1 instantaneously. Considering the above, and using professional judgement, the elevated peak flow readings from the affected boreholes have been omitted from the calculations used in assessment of gas risk on site. Using these peak, instantaneous and misrepresentative flow values may result in unnecessarily conservative protection measures. 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.

From a review of groundwater level monitoring and the response zones of the monitoring wells (Table 5.6b) it can be seen that the response zone within CP02 was flooded during the monitoring visits. It is considered that the peak air flow rates in these flooded boreholes is likely to be linked to rising shallow groundwater in the solid section of the well installation causing an increase or decrease in internal pressure within the pipework, which is released, and subsequently equalised, when the valve tap is opened. This is detailed within BS8485:2015 (Ref. 29) and CL:AIRE Research Bulletin RB 17 (Ref. 28).

Two gas risk assessments have been undertaken, to account for the end use of the site.

NHBC Traffic Light Classification

Private residential dwellings, assumed to be built in accordance with the ‘model’ low-rise housing development and NHBC guidelines, will be assessed in accordance with the NHBC Traffic Light Classification.

Hazardous gas flow rates (Qhg) can be evaluated using peak air flow rates and maximum methane concentrations, and steady state air flow rates and steady state carbon dioxide concentrations. On the basis that methane concentrations were recorded below the limit of detection of the monitoring

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instrument throughout the monitoring period, the gas screening value (GSV) will be determined by the carbon dioxide concentrations recorded.

For carbon dioxide, the greatest steady state air flow rate was recorded as <0.1 l/hr in all installations. The greatest steady state carbon dioxide concentration was recorded in WS07 on the first visit (5.7%v/v). On this basis, the calculated Qhg for the site is taken as 0.0057 l/hr.

The elevated reading exhibited within WS07 (5.7%v/v), has been considered anomalous In comparison to the site dataset and has been discounted when calculating the Q_{hg} for the site. The reading was observed within the first visit to the site, subsequent visits show a decreasing carbon dioxide value over time.

The assessment indicates the site is classified as Green, where designs confirm with the NHBC 'model' low rise house.

BS8485:2019 Classification

Developments which differ significantly from the 'model' construction will be assessed in accordance with BS8485:2019. This includes low rise apartments.

The dataset obtained is considered to be representative of site conditions beneath the proposed development footprint. A range of data has been collated which captures significant temporal variation including barometric variability and various ground saturation states. As such, the gas risk assessment will utilise steady state flow rates and maximum gas concentrations when determining the maximum Qhg.

On the basis that methane concentrations were recorded below the limit of detection of the monitoring instrument throughout the monitoring period, the gas screening value (GSV) will be determined by the carbon dioxide concentrations recorded.

Evaluation of the 'borehole' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) records a maximum Q_{hg} of 0.0057 l/hr for carbon dioxide in WS07 on the first visit, where maximum steady state flow reading of 0.1 l/hr is used, and maximum gas concentrations of 5.7% v/v recorded.

Evaluation of the 'worst case' check (highest hazardous gas flow rate irrespective of when the readings were taken within a single strata/zone), records a maximum Q_{hg} of 0.0057 l/hr for carbon dioxide. The 'worst case' check utilises the peak flows when calculating the Q_{hg} values, any anomalous and unrepresentative values identified within the dataset are discounted, such as values from flooded wells and peak flow rates which dissipated instantly.

Steady state air flow rates are deemed appropriate for determining the hazardous gas flow rates (Q_{hg}) within each monitoring well, accounting for multiple monitoring visits.

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The 'borehole' scenario is considered appropriate to determine the characteristic gas regime for the site, which is consistent with a Characteristic Situation 1 (CS-1) gas regime, where gas protection measures will not be 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.

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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* & 8.0 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. 17) which is summarised within *Appendix F*.

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 2.3.4.*

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. 18) 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*.

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- 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.

Conceptual Site Model			Generic Qualitative Risk Assessment			Comments	Action
Identified Source	**Pathway(s)**	**Receptor(s)**	**Consequence**	**Likelihood of Occurrence**	**Risk Rating**		
Potential sources of on-site contamination: • Made Ground of unknown composition from uncontrolled deposition of materials onsite during the construction and demolition of the properties onsite **Potential 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 as well as local industrial activity.	Direct contact, ingestion, inhalation (dust and vapours)	**End-user of site** (Residents) **& Construction Workers**	**Medium** Chronic health risk	**Low Likelihood** Based on the site's limited development history and lack of historical industrial use, the likelihood of encountering potential contamination within the Made Ground is considered to be Low. There is potential for localised contamination related to ACM-containing structures considering structures onsite before 2000s. Likelihood of construction workers coming into contact with contamination on site can reduced by appropriate PPE.	**Moderate / Low**	14 exceedances were identified within the environmental chemical analysis of Made Ground with respect to a 'Residential' end use scenario for PAHs, heavy metals, TPHs. These are mostly located in TT01 including for Naphthalene (SVOC). No asbestos containing materials or fibres have been identified. No visual or olfactory evidence of contamination was noted in shallow site soils.	Delineate Naphthalene exceedance for further assessment of risk associated with possible vapours. Allow for clean capping layer in soft landscaped areas. Construction workers to be provided with appropriate PPE and sanitary facilities.
	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.	**Controlled Waters** (Groundwater) Principal Aquifer (Bedrock), overlain by Glacial Till Deposits (Secondary Aquifer – Undifferentiated). There are no potable groundwater abstraction points within 1km. The site is not within a designated Source Protection Zone.	**Medium** Pollution of sensitive water resources	**Unlikely** While there is the potential for localised contamination to migrate vertically through the superficial deposits to the bedrock Principal Aquifer, there is a low likelihood of potential contamination being present in the Made Ground due to lack of historical industrial land use and taking into account the lack of an SPZ.	**Low**	It is considered unlikely that contaminants will migrate vertically into the bedrock aquifer.	No further action required
	Horizontal migration over and through the superficial deposits (soils)	**Controlled Waters** (Surface Water) Nearest surface water feature is a drain 302m north. Six surface water abstraction points exist within 1km.	**Medium** Pollution of sensitive water resources	**Unlikely** Considering the distance from the site to the nearest surface water receptor and the expected low levels of contamination within the Made Ground, this pathway is considered unlikely.	**Low**	Considering the distance from the site to the nearest surface water receptor and the limited potential for significant contamination within the Made Ground, this pathway is considered unlikely.	No further action required
Potential sources of ground gas: • Localised organically rich deposits present within the natural soils as well as soils associated with the former Clayton Brook watercourse. • Infilled former Openshaw Brick Works quarry/pit site.	Vertical and horizontal migration through existing service corridors and the underlying superficial deposits	**End-user of site** (Residents)	**Medium** Human health risk	**Unlikely** Low concentrations of hazardous gases encountered typically with low flow rates.	**Low**	The NHBC Classification indicates the site is classified as Green. The BS8485:2019 Classification, indicates the site is classified as a CS-1 gas regime.	No further action required

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10.0 Engineering Assessment and Recommendations

10.1 Introduction

This section will assess the relevant geotechnical issues for the construction of residential housing, apartments, and road on the parcel of land off Brigham Street.

The engineering assessment considers bearing capacity and pavement design for the site. 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 Geotechnical Considerations

10.2.1 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 demolition and construction phase. The Principal Contractor should ensure that appropriate mitigation measures are put in place during the demolition and construction phase.

10.2.2 Obstructions

Shallow obstructions were recorded during the ground investigation in WS05 and TT03. Within WS05 the position was backfilled with the arisings and moved 0.5m to the north. Concrete recorded within TT03 was readily excavated with conventional site plant. Dense/hard stratum also resulted in borehole termination in Ws01, WS04, WS07, WS08 and WS09.

Given the site history, obstructions within the Made Ground cannot be discounted in un-investigated areas. It is recommended that all obstructions are grubbed out during the enabling works, or their location accurately recorded.

10.3 Foundation Design

It is understood the proposed development comprises several two storey residential houses and residential apartments. The loadings of the proposed houses and apartments were not available at the time of writing this report. The loads will pre-determine the suitability of foundations adopted, though are not anticipated to be high for low rise houses.

A foundation zoning plan is provided in Appendix A.

Due to the presence of deep Made Ground and / or the presence of soft / loose Glacial Till, shallow foundations are unlikely to be suitable for the apartment blocks and low-rise houses in the west of the site and in the north-east of the site. Alternative solutions such as ground improvement (e.g. vibro or piles) should be considered. For feasible solutions this Phase 2 Ground Investigation Report should be issued to ground improvement or piling specialists. Additional ground investigation may be required for the design of a ground improvement or piling solution.

Approximately 8 low rise houses in the east of the site may be suitable for shallow foundations (see Foundation Zoning Plan). Made Ground was recorded in boreholes WS06, WS07 and WS08 to depths ranging between 1.2m and 1.4m bgl, underlain by medium dense SAND with SPT N values ranging between 12 and 28. An allowable bearing capacity of 100kPa is likely to be achievable at a depth of 1.5m bgl within medium dense SAND with settlement estimated to be within acceptable limits (<25mm).

It is important that foundations are cast wholly in one material type (e.g. medium dense sand) and localised over excavation may be required to achieve this or in areas where there is deeper Made Ground. Foundations should not span granular and cohesive soils and should be formed on uniform materials.

10.4 Floor Slab

Where the Made Ground is greater than 0.6m thick the NHBC require suspended floor slabs. Ground improvement, such as excavate and replace to an engineering specification or vibro may enable a ground bearing solution subject to approval from the warranty provider in advance.

10.5 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest (Ref. 11) and laboratory testing undertaken accordingly in *Section 6.3*.

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 mobile groundwater conditions the results of the concrete classification tests received have indicated a DS-1, AC-1 classification.

10.6 Road and Hardstanding Design

The design of new pavement foundations should be in accordance with CD 225 Pavement Design, Revision 1 (2020).

For preliminary design purposes a subgrade surface modulus of 30MPa should be assumed. CBR tests were not undertaken as part of this ground investigation. It is recommended that CBR tests are undertaken at subgrade level, to establish the actual CBR value and determine the subgrade surface modulus. For preliminary design purposes a subgrade surface modulus of 30MPa should be assumed.

CBR tests should be undertaken to confirm this. Should the subgrade surface modulus be less than 30MPa, this would be unsuitable to support the construction of a pavement foundation and improvement would be required, such as excavation and replacing between 500 to 1000mm of the soft subgrade with granular fill, mechanical stabilisation (geogrids and/or geotextiles) and soil stabilisation.

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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

A **Moderate/Low** risk rating has been identified to proposed end-users and construction workers from direct contact, inhalation and ingestion of contaminants within Made Ground soils due to exceedances recorded above nominated screening criteria.

Exceedances relate to PAH and TPH species in TT01 including for Naphthalene a semi volatile organic compound. TT01 is located on the south-west of site, outside of the proposed building footprint. It would be prudent to delineate this exceedance to assess extent, subject to findings it could then be retained on site within a suitable area such as beneath hardstanding or soft landscaping in accordance with a Materials Management Plan (MMP), or disposed of off-site.

Exceedances for heavy metals (arsenic and or lead) were also recorded in WS12, TT01, TT03 and WS03.

A clean capping layer in soft landscaped areas across the is recommended to mitigate the risk from non-volatile exceedances.

No asbestos containing materials or fibres have been identified. No visual or olfactory evidence of contamination was noted in shallow site soils.

11.1.2 Controlled Waters

The Phase 1 assessed a Low risk to groundwaters and surface water receptors. No evidence of gross contamination was identified in site soils and therefore this risk rating remains unchanged.

11.1.3 Ground Gas

A **Low** risk rating has been identified to potential sources of ground gas to residential end users. The NHBC Classification indicates the site is classified as Green and the BS8485:2019 Classification, indicates the site is classified as a CS-1 gas regime.

11.2 Recommendations

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

1) Install clean capping layer in soft landscaped areas on site.
2) Delineate Naphthalene (SVOC) exceedance in TT01 for further assessment. Subject to findings it could then be retained on site within a suitable area such as beneath hardstanding or soft landscaping in accordance with an MMP or disposed of off-site.
3) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities.
4) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer.
5) This Phase 2 Ground Investigation Report should be issued to ground improvement or piling specialists.
6) Additional ground investigation may be required for the design of a ground improvement or piling solution.
7) CBR tests are undertaken at subgrade level, to establish the actual CBR value and determine the subgrade surface modulus.

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12.0 References

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3. **British Standards Institution.** (2011) Investigation of Potentially Contaminated Sites: Code of Practice (report no. BS10175:2011+A2:2017).
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9. **Stroud, M. a. B. F.** (1975) The Standard Penetration Test and the Engineering Properties of Glacial Materials
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13. **Environment Agency.** (2014) *Contaminated Land Exposure (CLEA) Tool* (version 1.06).
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17. **CIRIA C552.** (2001) Contaminated Land Risk Assessment. A Guide to Good Practice.
18. **CITB.** (2015) Construction (Design and Management) Regulations.
19. **Coal Authority** (2023) Coal Authority Interactive mapping Tool Interactive Map Viewer | Coal Authority (bgs.ac.uk)
20. **BGS** (2023) BGS radon gas mapping tool UKradon - UK maps of radon
21. **UXO** (2023) Unexploded Audenance interactive mapping tool, Search Results: All Fields similar to 'Bomb and Damage' - Maps Collection (manchester.ac.uk)

Appendix A – Drawings

- Curtins (2023), 081427-CUR-00-XX-DR-GE-001-V01, Borehole Location Plan.
- Architect's Proposed Development Plans, dated 11/11/21, 20-051_SK16
- Curtins (2023), Indicative Foundation Zoning Plan for Brigham Street, ref 081427-CUR-00-XX-DR-GE-002-V01

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Key:

Curtins Proposed Exploratory Holes (2022)

Cable Percussion borehole to max depth 10.00m bgl
* Denotes installation well included.

Window Sample Borehole to max depth 5.45m bgl.
* Denotes installation well to be included.

Machine Excavated Trial Trench to max depth 3.5m bgl.

Site Boundary

GENERAL NOTES:

Rev:	Description:	Date:	By:
--			

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Birmingham · Bristol · Cambridge · Cardiff · Douglas · Dublin · Edinburgh · Glasgow · Kendal · Leeds · Liverpool · London · Manchester · Nottingham

Project:
Brigham Street

Status:
DRAFT

Drawing Title:
Exploratory Hole Location Plan

Drawn By: JP

Checked By:

Designed By:

Date: 13/01/2023

Scale: NTS

Project No: Originator: Zone: Level: Type: Discipline: Category/Number: Rev:

081427-CUR-00-XX-DR-GE-001-V01

NOTES:
- THE CONTRACTOR IS RESPONSIBLE FOR CHECKING DIMENSIONS, TOLERANCES & REFERENCES. ANY DISCREPANCY TO BE VERIFIED WITH THE ARCHITECT BEFORE PROCEEDING WITH THE WORKS.
- WHERE AN ITEM IS COVERED BY DRAWINGS OF DIFFERENT SCALES, THE LARGER SCALE DRAWING TO BE WORKED TO.
- DO NOT SCALE FROM THE DRAWING. FIGURED DIMENSIONS TO BE WORKED TO IN ALL CASES.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH:

Materials Key

- 450mm x 450mm concrete paving to front and 1800mm wide patios at rear of dwellings
- Tarmac areas
- Grassed areas
- Shrub planting
- Existing tree to be retained
- Existing tree to be removed
- New tree
- WB Water butt (volume to be a minimum of 200ltrs)

Boundary Treatments

- 1800mm high concrete post and timber panel fence (to separate rear gardens to a distance of 3000mm from the rear facade)
- 1500mm high concrete post with 1200mm high timber panel fence and 300mm timber trellis on top (used between rear gardens)
- 900mm high metal railings (from back of pavement to building line)
- 450mm high low brick wall with 450mm high metal railings, on low side (along back of pavement)

Existing Boundary Treatments

- High metal railings
- Low metal railings

Schedule of Accommodation

Housetype	Description	Area/m2	Total	Plot Nos.
A	2B3P House	70.9	10	09-12, 17-22
B	3B4P House	88.2	7	03-08, 23
C	4B5P House	100.6	3	01, 02, 24
D1(Gr)	2B3P Apartment	61.3	2	13, 14
D2(1st)	2B3P Apartment	63.9	2	15, 16
Total			24	

(Car parking : 1, 2 & 3-bed 100%; 4-bed 200% shown)

CONNIE STREET

Ktown Walk

BRIGHAM STREET

Post

New access road off Staton Street

Existing tree

Plot 01 Type C 3-Bed
Plot 02 Type C 4-Bed
Plot 03 Type B 3-Bed
Plot 04 Type B 3-Bed
Plot 05 Type B 3-Bed
Plot 06 Type B 3-Bed
Plot 07 Type B 3-Bed
Plot 08 Type B 3-Bed
Plot 09 Type A 2-Bed
Plot 10 Type A 2-Bed
Plot 11 Type A 2-Bed
Plot 12 Type A 2-Bed
Plots 13, 15 Type D1 D2 2-Bed x2
Plots 14, 16 Type D1 D2 2-Bed x2
Plot 17 Type A 2-Bed
Plot 18 Type A 2-Bed
Plot 19 Type A 2-Bed
Plot 20 Type A 2-Bed
Plot 21 Type A 2-Bed
Plot 22 Type A 2-Bed
Plot 23 Type B 3-Bed
Plot 24 Type C 4-Bed
Shed 4m²

scale 1:200 0 10m

Rev	Date	By

Client:
One Manchester

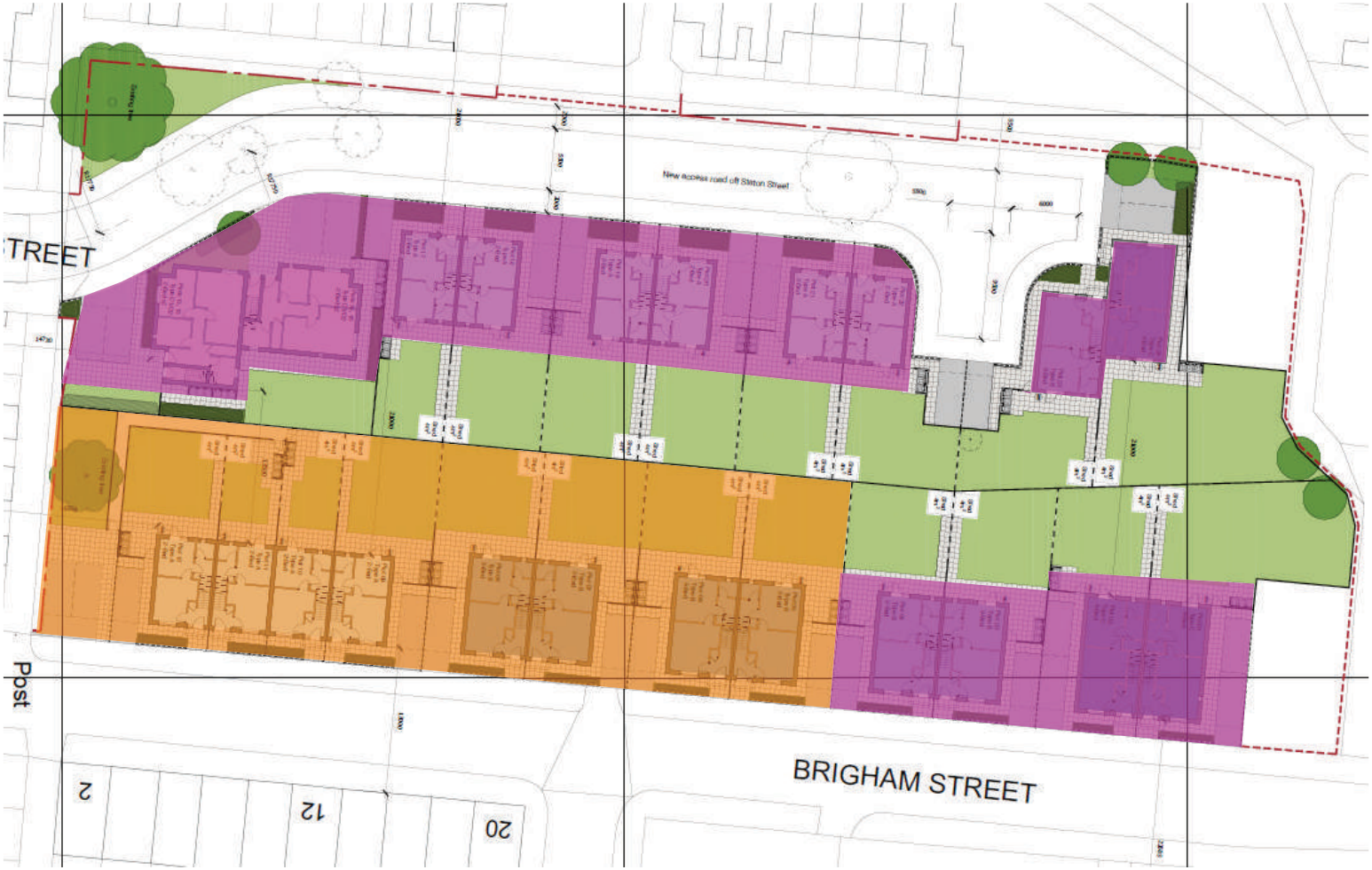
Project:
Brigham Street Development
Openshaw

Description:
Proposed Site Plan
FINAL

Purpose of issue:
PRELIMINARY

Drawn by:	Checked by:	Scale:
JH	MT	1:200@A1
Date:	Project No:	Drawing No.: Rev:
Oct 21	20-051	SK16

TRIANGLE ARCHITECTS
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Legend:

- Shallow foundations likely to be suitable
- Ground unlikely to be suitable for shallow foundations due to deep Made Ground and/or the presence of soft / loose natural soils. Alternative solution required e.g. piles or ground improvement.
- Site Boundary

N

GENERAL NOTES:

Rev:	Description:	Date:	By:
--			

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Civils & Structures · Transport Planning · Environmental · Infrastructure · Geotechnical · Conservation & Heritage · Principal Designer
Birmingham · Bristol · Cambridge · Cardiff · Douglas · Dublin · Edinburgh · Glasgow · Kendal · Leeds · Liverpool · London · Manchester · Nottingham

Project: Brigham Street		Status: DRAFT	
Drawing Title: Indicative Foundation Zoning Plan		Drawn By: RS	Checked By:
		Designed By:	Date: 23/02/2022
		Scale: NTS	

Project No: Originator: Zone: Level: Type: Discipline: Category/Number: Rev:

081427-CUR-00-XX-DR-GE-002-V01

Appendix B – Exploratory Hole Logs

- Cable Percussion Borehole Logs, CP01 – CP02
- Window Sample Borehole Logs, WS01 – WS14
- Machine Excavated Trial Trench Logs, TT01 – TT04

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Borehole Log

Borehole No. **CP01**

Sheet 1 of 3

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388261.30 - 397785.62	Hole Type CP
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	07/12/2022 - 07/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
		0.45	ES		0.40	-0.40		
		0.50 - 1.20	B		0.50	-0.50		MADE GROUND: Light brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to medium of brick.
								MADE GROUND: Greyish brown firm slightly gravelly sandy clay. Sand is fine to coarse. Gravel is sub angular fine to medium of sandstone
		1.20		N=9 (1,1/1,1,3,4)				
		1.60	D		1.60	-1.60		MADE GROUND: Brown dense slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular fine to medium of sandstone.
		2.00		N=21 (3,3/4,5,6,6)				
		2.00 - 2.45	B					
		3.00		N=17 (2,2/2,5,5,5)				
		4.00		N=25 (3,4/5,4,7,9)	4.00	-4.00		

Continued on next sheet

Remarks

Borehole Log

Borehole No. **CP01**

Sheet 2 of 3

Project Name: Brigham Street	Project No. 081427	Co-ords: 388261.30 - 397785.62	Hole Type CP
Location: Brigham Street, Openshaw		Level: 0.00	Scale 1:20
Client: One Manchester		Dates: 07/12/2022 - 07/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		4.00 - 4.45	B					Brown slightly clayey sand. Sand is fine to medium *small bands of silty clay*
		5.00		N=15 (2,3/7,1,2,5)	5.00	-5.00		Greyish brown firm silty sandy CLAY.
		5.50	ES					
		6.50		N=29 (2,3/7,12,5,5)				
		6.50 - 6.95	U					
		7.00	D					

Continued on next sheet

5 6 7 8

Remarks

AGS

Borehole Log

Borehole No.
CP01
Sheet 3 of 3

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388261.30 - 397785.62	Hole Type CP
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	07/12/2022 - 07/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		8.00		N=43 (3,4/7,12,12,12)				
		8.00 - 8.50	B					
								bands of slightly gravelly sand
		9.50		N=50 (4,5/8,11,11,20)				
					10.00	-10.00		End of borehole at 10.00 m

9
10
11
12

Remarks

AGS

Borehole Log

Borehole No. **CP02**

Sheet 1 of 3

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388213.33 - 397803.53	Hole Type CP
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
		0.50	ES					MADE GROUND: Loose dark brown slightly clayey gravelly sand with frequent cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
		1.20		N=5 (2,1/1,1,1,2)				
					1.50	-1.50		Brown fine to medium sand.
		2.00		N=12 (2,2/2,3,3,4)				
		2.10 - 2.60	B					
		3.00		N=26 (4,5/6,6,7,7)				
					3.60	-3.60		Brown slightly clayey fine to medium sand.
		3.80	ES					
		4.00		N=22 (3,4/4,5,6,7)				

Continued on next sheet

1 2 3 4

Remarks

AGS

Borehole Log

Borehole No. **CP02**

Sheet 2 of 3

Project Name: Brigham Street	Project No. 081427	Co-ords: 388213.33 - 397803.53	Hole Type CP
Location: Brigham Street, Openshaw		Level: 0.00	Scale 1:20
Client: One Manchester		Dates: 09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		4.00 - 4.50	B						
		4.50	D						
		5.00 - 5.45	U		5.00	-5.00		Stiff brown sandy CLAY.	5
		6.00		N=25 (3,4/4,6,7,8)					6
		6.00 - 6.50	B						
					7.00	-7.00		Greyish brown slightly gravelly slightly sandy clay. Sand is fine to coarse. Gravel is fine to medium subrounded of mudstone.	7
		7.50 - 7.60	D						
		7.50 - 7.95	U						8

Continued on next sheet

Remarks

AGS

Borehole Log

Borehole No.
CP02
Sheet 3 of 3

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388213.33 - 397803.53	Hole Type CP
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		9.00		N=50 (5,6/10,12,14,14)				
		9.50 - 10.00	B					
					10.00	-10.00		End of borehole at 10.00 m

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Remarks

AGS

Borehole Log

Borehole No. **WS1**

Sheet 1 of 1

Project Name: Brigham Street	Project No. 081427	Co-ords: 388221.22 - 397764.85	Hole Type WS
Location: Brigham Street, Openshaw		Level: 68.46	Scale 1:20
Client: One Manchester		Dates: 07/12/2022 - 07/12/2022	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40 - 0.50	ES		0.34	68.12		TOPSOIL: Grass overlying dark brown very sandy moderately gravelly topsoil. Sand is fine to coarse. Gravels are occasional fine to coarse sub-angular brick and concrete fragments.
		1.20		N=8 (1,1/2,2,2,2)	1.20	67.26		MADE GROUND: Light brown moderately gravelly sand. Sand is medium to coarse. Gravels are occasional sub-angular brick and concrete fragments.
		2.00		N=4 (0,0/1,1,1,1)	1.60 1.90	66.86 66.56		MADE GROUND: Loose light brown slightly clayey silty sand. Sand is fine to coarse. MADE GROUND: Orangish brown sand. Sand is medium to coarse. MADE GROUND: Loose to very loose light brown slightly silty sand. Sand is fine to coarse.
		3.00		N=50 (6,10/12,12,14,12)	2.42 2.70	66.04 65.76		MADE GROUND: Orangish brown sand. Sand is medium to coarse. MADE GROUND: Reddish brown sand. Sand is medium to coarse. *From 3.00m to 3.45m bgl material is very dense.*
					3.40	65.06		End of borehole at 3.40 m

Remarks

Hand excavated service clearance to 1.20m bgl. No groundwater encoutered.

Borehole Log

Borehole No. **WS2**

Sheet 1 of 2

Project Name: Brigham Street	Project No. 081427	Co-ords: 388210.20 - 397795.98	Hole Type WS
Location: Brigham Street, Openshaw		Level: 68.16	Scale 1:20
Client: One Manchester		Dates: 07/12/2022 -	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.29	67.87		TOPSOIL: Grass overlying dark brown very sandy moderately gravelly topsoil. Sand is fine to coarse. Gravels are occasional fine to coarse sub-angular brick and concrete fragments.	
		0.70 - 0.80	ES					MADE GROUND: Black very gravelly moderately cobbly sand. Sand is fine to coarse. Gravels are frequent fine to coarse sub-angular to sub-rounded brick, concrete, ceramics, clinker and coal fragments. Cobbles are occasional sub-angular brick and concrete fragments.	1
		1.20		N=6 (2,3/3,2,1,0)				*From 1.20m to 1.65m bgl material is loose.*	
					1.54	66.62		Black very sandy organic SILT. Sand is fine to medium.	
					1.80	66.36		Grey and black mottled slightly sandy slightly gravelly organic CLAY. Sand is fine to coarse. Gravels are fine to medium sub-angular to sub-rounded mudstone and coal fragments.	
		2.00		N=4 (0,0/1,1,1,1)	2.00	66.16		No recovery (suspected sandy gravelly organic clay).	2
								From 2.00m to 2.45m bgl material is soft to very soft.	
					2.40	65.76		Grey and black mottled slightly sandy slightly gravelly organic CLAY. Sand is fine to coarse. Gravels are fine to medium sub-angular to sub-rounded mudstone and coal fragments.	
		2.50 - 2.60 2.50 - 2.70	ES D						
		3.00		N=2 (1,0/1,0,1,0)				*From 3.00m to 3.45m bgl material is very soft.*	3
					3.42	64.74		No recovery (suspected sandy gravelly organic clay).	
		4.00		N=15 (2,3/3,4,4,4)					4

Continued on next sheet

Remarks

Hand excavated service clearance to 1.20m bgl. No groundwater encoutered.

AGS

Borehole Log

Borehole No. **WS2**

Sheet 2 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388210.20 - 397795.98	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	68.16	Scale 1:20
Client:	One Manchester		Dates:	07/12/2022 -	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								From 4.00m to 4.45m bgl material is firm to stiff.
		5.00		N=14 (3,3/3,3,4,4)				*From 5.00m to 5.45m bgl material is firm.*
					5.45	62.71		End of borehole at 5.45 m

5

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Remarks

Hand excavated service clearance to 1.20m bgl. No groundwater encoutered.

AGS

Borehole Log

Borehole No. **WS3**

Sheet 1 of 2

Project Name: Brigham Street	Project No. 081427	Co-ords: 388212.83 - 397825.21	Hole Type WS
Location: Brigham Street, Openshaw		Level: 68.24	Scale 1:20
Client: One Manchester		Dates: 07/12/2022 -	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.31	67.93		TOPSOIL: Grass overlying dark brown very sandy moderately gravelly topsoil. Sand is fine to coarse. Gravels are occasional fine to coarse sub-angular brick and concrete fragments.	
		0.40 - 0.50	ES					MADE GROUND: Black very gravelly moderately cobbly sand. Sand is fine to coarse. Gravels are frequent fine to coarse sub-angular to sub-rounded brick, concrete and ceramic fragments. Cobbles are occasional sub-angular brick and concrete fragments.	
					1.00	67.24		Soft light greyish brown/yellowish brown mottled sandy gravelly CLAY. Sand is fine to coarse. Gravels are occasional sub-rounded to sub-angular mudstone, siltstone and sandstone fragments.	1
		1.20		N=6 (0,1/2,1,2,1)					
		1.40 - 1.60	ES						
		2.00		N=0 (0,0/0,0,0,0)	2.00	66.24		Very soft light greyish brown/yellowish brown mottled sandy gravelly CLAY. Sand is fine to coarse. Gravels are occasional sub-rounded to sub-angular mudstone, siltstone, sandstone and partially decomposed wood fragments fragments.	2
	▼				2.42	65.82		Very soft light grey very sandy SILT. Sand is fine to coarse.	
		3.00		N=19 (2,3/4,5,5,5)					3
					3.21	65.03		Medium dense grey silty SAND. Sand is fine to coarse.	
		4.00		N=18 (1,1/2,4,5,7)					4

Continued on next sheet

Remarks

Hand excavated service clearance to 1.20m bgl. groundwater encoutered at 2.44m bgl.

Borehole Log

Borehole No. **WS3**

Sheet 2 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388212.83 - 397825.21	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	68.24	Scale 1:20
Client:	One Manchester		Dates:	07/12/2022 -	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		4.10 - 4.50	D		4.10	64.14		Firm to stiff grey sandy CLAY. Sand is fine to coarse.
		5.00		N=50 (4,5/50 for 225mm)				*From 5.00m to 5.45m bgl material is very dense.*
					5.45	62.79		End of borehole at 5.45 m

Remarks

Hand excavated service clearance to 1.20m bgl. groundwater encoutered at 2.44m bgl.

Borehole Log

Borehole No. **WS4**

Sheet 1 of 1

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388214.27 - 397849.78	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	68.46	Scale 1:20
Client:	One Manchester		Dates:	07/12/2022 -	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.32	68.14		TOPSOIL: Grass overlying dark brown very sandy moderately gravelly topsoil. Sand is fine to coarse. Gravels are occasional fine to coarse sub-angular brick and concrete fragments.
								MADE GROUND: Black very gravelly moderately cobbly sand. Sand is fine to coarse containing ash. Gravels are frequent fine to coarse sub-angular to sub-rounded brick, concrete and ceramic fragments. Cobbles are occasional sub-angular brick and concrete fragments.
		1.20		N=9 (14,8/2,3,2,2)	1.20	67.26		No recovery (suspected sandy gravelly silt). *From 1.20m to 1.65m bgl material is soft to firm.*
		2.00		N=17 (3,3/5,5,4,3)	2.00	66.46		Firm to stiff light greyish brown sandy SILT. Sand is fine to coarse.
					3.00	65.46		End of borehole at 3.00 m

1 2 3 4

Remarks

Hand excavated service clearance to 1.20m bgl. No groundwater encoutered.

AGS

Borehole Log

Borehole No.
WS05
Sheet 1 of 1

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388196.55 - 397832.61	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	08/12/2022 - 08/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
								MADE GROUND: Loose dark brown slightly clayey gravelly sand with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
					1.50	-1.50		End of borehole at 1.50 m

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Remarks

AGS

Borehole Log

Borehole No. **WS05A**

Sheet 1 of 2

Project Name: Brigham Street	Project No. 081427	Co-ords: 388251.40 - 397851.45	Hole Type WS
Location: Brigham Street, Openshaw		Level: 0.00	Scale 1:20
Client: One Manchester		Dates: 09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
								MADE GROUND: Loose dark brown slightly clayey gravelly sand with frequent cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
		1.20		N=4 (1,1/1,1,1,1)				
		1.50	ES		1.50	-1.50		Dark grey silty CLAY
		2.00		N=3 (1,0/1,0,1,1)				
					2.40	-2.40		Greyish brown fine to medium sand.
		2.60	ES					
		3.00		N=3 (1,0/0,1,1,1)				
		3.50	D					
					3.60	-3.60		Greyish brown silty CLAY
		4.00		N=10 (1,2/2,2,3,3)				

Continued on next sheet

Remarks
Driller dropped rod fork down hole

AGS

Borehole Log

Borehole No.
WS05A
Sheet 2 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388251.40 - 397851.45	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					4.10	-4.10		Brown fine to medium sand.
					4.40	-4.40		Greyish brown silty CLAY
					5.00	-5.00		End of borehole at 5.00 m

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Remarks
Driller dropped rod fork down hole

AGS

Borehole Log

Borehole No. **WS06**

Sheet 1 of 1

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388197.04 - 397833.65	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	08/12/2022 - 08/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick. MADE GROUND: Loose dark brown slightly clayey gravelly sand with frequent cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
		1.20		N=8 (6,9/2,2,2,2)				
					1.40	-1.40		Light brown fine to medium sand.
		1.80	ES					
		2.00		N=28 (1,5/7,7,7,7)				
					2.60	-2.60		Greyish brown firm slightly gravelly slightly clayey SAND. Sand is fine to coarse. Gravel is sub angular fine to medium of sandstone and mudstone.
		3.00	D					
		3.00		50 (10,13/50 for 200mm)				
					3.50	-3.50		End of borehole at 3.50 m

Remarks

AGS

Borehole Log

Borehole No. **WS07**

Sheet 1 of 1

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388259.94 - 397784.70	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick. MADE GROUND: Loose dark brown slightly clayey gravelly sand with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
		1.20		N=12 (1,2/3,3,3,3)	1.20	-1.20		Light brown fine to medium sand.
		1.50	ES					
		2.00		N=35 (4,7/8,8,9,10)				
		2.50	D					
		2.50		N=50 (10,12/14,14,16,6)				
					2.85	-2.85		End of borehole at 2.85 m

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Remarks

AGS

Borehole Log

Borehole No. **WS08**

Sheet 1 of 1

Project Name: Brigham Street	Project No. 081427	Co-ords: 388246.56 - 397789.91	Hole Type WS
Location: Brigham Street, Openshaw		Level: 0.00	Scale 1:20
Client: One Manchester		Dates: 09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick. MADE GROUND: Loose dark brown slightly clayey gravelly sand with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
		1.20		N=12 (1,2/2,2,4,4)	1.20	-1.20		Brown fine to medium sand.
		1.50	ES					
		2.00		N=20 (4,4/5,4,5,6)	2.00	-2.00		Light brown fine to medium sand.
		3.00		N=39 (6,8/8,10,10,11)	3.10	-3.10		Light yellowish brown fine to medium sand.
		3.40	D					
		3.50		N=50 (12,12/12,14,14,10)	3.50	-3.50		Brown fine to medium sand.
					3.60	-3.60		End of borehole at 3.60 m

Remarks

AGS

Borehole Log

Borehole No. **WS09**

Sheet 1 of 1

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388252.42 - 397763.87	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	09/12/2022 - 09/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
		0.50	ES					MADE GROUND: Loose dark brown slightly clayey gravelly sand with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
		1.20		N=11 (1,2/3,2,3,3)				
					1.30	-1.30		Brown fine to medium sand.
					1.60	-1.60		Brown slightly gravelly slightly sandy clay. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of sandstone, mudstone and organics.
		1.70	ES					*Clay contains rare purple colouration.*
		1.80	D					
					1.90	-1.90		Light brown fine to medium sand.
		2.00		N=26 (2,3/4,6,8,8)				
		2.80		N=50 (8,10/12,12,12,14)	2.80	-2.80		End of borehole at 2.80 m

Remarks

AGS

Borehole Log

Borehole No. **WS10**

Sheet 1 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388207.45 - 397865.24	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	08/12/2022 - 08/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.	
					0.50	-0.50		MADE GROUND: Loose dark brown slightly clayey gravelly sand with frequent cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.	
		0.60	ES					Light brown sl clayey fine to medium sand.	
					0.80	-0.80		Light brown and grey slightly sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of sandstone.	1
		1.20		N=7 (1,1/1,2,2,2)					
		1.50	ES						
		2.00		N=17 (3,4/4,4,5,4)	2.00	-2.00		Greyish brown firm slightly gravelly clayey SAND. Sand is fine to coarse. Gravel is sub angular fine to medium of sandstone and mudstone.	2
		3.00		N=21 (3,4/21 for 225mm)	3.00	-3.00		Greyish brown sandy CLAY. Sand is fine to medium.	3
		3.20	D						
		4.00		N=18 (1,2/2,5,5,6)					4

Continued on next sheet

Remarks

AGS

Borehole Log

Borehole No. **WS10**

Sheet 2 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388207.45 - 397865.24	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	08/12/2022 - 08/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					5.00	-5.00		End of borehole at 5.00 m

Remarks

Borehole Log

Borehole No. **WS12**

Sheet 1 of 2

Project Name: Brigham Street	Project No. 081427	Co-ords: 388198.83 - 397838.54	Hole Type WS
Location: Brigham Street, Openshaw		Level: 0.00	Scale 1:20
Client: One Manchester		Dates: 08/12/2022 - 08/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
								MADE GROUND: Loose dark brown slightly clayey gravelly sand with frequent cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and cement.Cobbles are subangular of brick.
		1.20		N=6 (1,2/1,1,2,2)	1.20	-1.20		MADE GROUND: Light brown fine to medium sand.
		1.50	ES					
					1.80	-1.80		Greyish brown fine to medium sand.
		2.00		N=3 (2,2/2,1,0,0)				
					2.40	-2.40		Greyish brown silty CLAY
		2.60	D					
		3.00		N=15 (2,3/4,3,4,4)	3.00	-3.00		Greyish brown sandy silty CLAY
		4.00		N=15 (2,2/3,4,4,4)				

Continued on next sheet

Remarks

AGS

Borehole Log

Borehole No. **WS12**

Sheet 2 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388198.83 - 397838.54	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	08/12/2022 - 08/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					5.00	-5.00		End of borehole at 5.00 m

Remarks

AGS

Borehole Log

Borehole No. **WS013**

Sheet 1 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388204.89 - 397878.17	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	05/12/2022 - 06/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	-0.10		TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
		0.45	ES					MADE GROUND: Loose dark brown slightly clayey gravelly sand with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick and. cement.
					1.10	-1.10		
		1.20		N=4 (1,1/1,2,0,1)				MADE GROUND: Firm brown slightly gravelly sandy clay with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded of brick, cement and mudstone.
		2.00		N=17 (3,4/4,4,5,4)				
					2.30	-2.30		Light brown fine to medium sand.
					2.60	-2.60		Brown sandy clay. Sand is fine to medium.
		2.70	D					
					2.80	-2.80		Greyish brown fine to medium sand.
		3.00		N=22 (4,5/5,5,6,6)				
	▼							
		3.30	ES					
		4.00		N=21 (3,1/2,5,6,8)				

Continued on next sheet

1 2 3 4

Remarks

AGS

Borehole Log

Borehole No.
WS013
Sheet 2 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388204.89 - 397878.17	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	0.00	Scale 1:20
Client:	One Manchester		Dates:	05/12/2022 - 06/12/2022	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					4.40	-4.40		End of borehole at 4.40 m

5
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8

Remarks

AGS

Borehole Log

Borehole No. **WS14**

Sheet 1 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388210.34 - 397816.10	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	68.28	Scale 1:20
Client:	One Manchester		Dates:	07/12/2022 -	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.33	67.95		TOPSOIL: Grass overlying dark brown very sandy moderately gravelly topsoil. Sand is fine to coarse. Gravels are occasional fine to coarse sub-angular brick and concrete fragments.
		0.80 - 1.00	ES					MADE GROUND: Black very gravelly moderately cobbly sand. Sand is fine to coarse. Gravels are frequent fine to coarse sub-angular to sub-rounded brick, concrete and ceramic fragments. Cobbles are occasional sub-angular brick and concrete fragments.
		1.20		N=6 (1,0/0,1,2,3)				*From 1.20m to 1.65m bgl material is loose.*
		1.80 - 2.00	D		1.75	66.53		Grey very silty sandy gravelly CLAY. Sand is fine to coarse. Gravels are occasional fine to coarse sub-rounded to sub-angular mudstone and siltstone fragments.
		2.00		N=10 (2,2/3,4,2,1)				*From 2.00m to 2.45m bgl material is soft to firm.*
	▼							
		3.00		N=20 (4,5/5,4,5,6)				*From 3.00m to 3.45m bgl material is firm to stiff.*
					3.29	64.99		Light brown silty SAND. Sand is fine to coarse.
		4.00		N=23 (1,5/5,6,6,6)				

Continued on next sheet

Remarks

Hand excavated service clearance to 1.20m bgl. groundwater encoutered at 2.30m bgl.

Borehole Log

Borehole No. **WS14**

Sheet 2 of 2

Project Name:	Brigham Street	Project No. 081427	Co-ords:	388210.34 - 397816.10	Hole Type WS
Location:	Brigham Street, Openshaw		Level:	68.28	Scale 1:20
Client:	One Manchester		Dates:	07/12/2022 -	Logged By RT

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		5.00		N=42 (4,5/42 for 225mm)				*From 4.00m to 4.45m bgl material is material is medium dense.*
								From 5.00m to 5.45m bgl material is dense.
					5.45	62.83		End of borehole at 5.45 m

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Remarks

Hand excavated service clearance to 1.20m bgl. groundwater encoutered at 2.30m bgl.

AGS

Trial Pit Log

Trialpit No **TT01**

Sheet 1 of 1

Project Name: Brigham Street	Project No. 081427	Co-ords: 388206.00 - 397780.00 Level:	Date 12/12/2022
Location: Brigham Street, Openshaw		Dimensions (m): 3.4 × 0.6, Depth 2.40	Scale 1:20
Client: One Manchester			Logged JP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
	1.00	ES					MADE GROUND: Grass cover over dark brown gravelly sand with occational cobbles and frequent roots and rootlets. Sand is fine to coarse. Gravel is subangular fine to coarse of brick, concrete and slate. Cobbles are subangular of brick.
				1.50			
	1.60	ES					MADE GROUND: Brown silty clay with pockets of brown fine to medium sand.
	1.70	D					
				2.40			End of pit at 2.40 m

1 2 3 4

Remarks: Location cleared with GPR and Cat & Genny.Pit excavated slowly with toothless bucket until to 1.20m bgl. No ground water encountered.

Stability: Stable

AGS

Trial Pit Log

Trialpit No
TT02_East
Sheet 1 of 1

Project Name: Brigham Street	Project No. 081427	Co-ords: 388208.00 - 397778.00 Level:	Date 12/12/2022
Location: Brigham Street, Openshaw		Dimensions (m): 6.9 × 0.6 Depth 1.90	Scale 1:20
Client: One Manchester			Logged JP

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							TOPSOIL: Grass cover over dark brown slightly gravelly sand with frequent rootlets and occational roots. Sand is fine to coarse. Gravel is subangulr fine to coarse of brick.
				0.22			MADE GROUND: Light brown fine to medium sand.
				0.64			MADE GROUND: Greyish brown silty CLAY.
	1.00	ES					
				1.90			End of pit at 1.90 m

Remarks: Location cleared with GPR and Cat & Genny.Pit excavated slowly with toothless bucket until to 1.20m bgl. No ground water encountered.

Stability: Stable

Trial Pit Log

Trialpit No
TT02_West
Sheet 1 of 1

Project Name: Brigham Street	Project No. 081427	Co-ords: 388202.00 - 397777.00 Level:	Date 12/12/2022
Location: Brigham Street, Openshaw		Dimensions (m): 6.9 × 0.6 Depth 1.90	Scale 1:20
Client: One Manchester			Logged JP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.22			TOPSOIL: Grass cover over dark brown slightly gravelly sand with frequent rootlets and occational roots. Sand is fine to coarse. Gravel is subangulr fine to coarse of brick.
	1.00	ES					MADE GROUND: Dark brown gravelly sand with frequent cobbles and occational roots and rootlets. Sand is fine to coarse. Gravel is subangular of brick, concrete and slate. Cobbles are subangular of brick.
	1.50	D		1.35			MADE GROUND: Greyish brown silty CLAY.
				1.90			End of pit at 1.90 m

Remarks: Location cleared with GPR and Cat & Genny.Pit excavated slowly with toothless bucket until to 1.20m bgl. No ground water encountered.

Stability: Stable

Trial Pit Log

Trialpit No **TT03**

Sheet 1 of 1

Project Name: Brigham Street	Project No. 081427	Co-ords: 388208.00 - 397789.00 Level:	Date 12/12/2022
Location: Brigham Street, Openshaw		Dimensions (m): 6 × 0.6 Depth 2.10	Scale 1:20
Client: One Manchester			Logged JP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							TOPSOIL: Grass cover over dark brown gravelly sand with occational cobbles and frequent roots and rootlets. Sand is fine to coarse. Gravel is subangular fine to coarse of brick, concrete, glass and slate. Cobbles are subangular of brick.
	0.40	ES		0.40			MADE GROUND: Brown and grey silty clay with occasional relic roots and rootlets.
	0.50	D					*Broken and eroded concrete slab extending for 1m.*
	1.00	ES					
				2.10			End of pit at 2.10 m

Remarks: Location cleared with GPR and Cat & Genny.Pit excavated slowly with toothless bucket until to 1.20m bgl. No ground water encountered.

Stability: Stable

Trial Pit Log

Trialpit No **TT04**

Sheet 1 of 1

Project Name: Brigham Street	Project No. 081427	Co-ords: 388204.00 - 397795.00 Level:	Date 12/12/2022
Location: Brigham Street, Openshaw		Dimensions (m): 5.2 × 0.6 Depth 3.90	Scale 1:20
Client: One Manchester			Logged JP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			TOPSOIL: Grass cover over dark brown slightly clayey slightly gravelly sand. Sand is fine to coarse. Gravel is sub angular to subrounded fine to coarse of brick.
							MADE GROUND: Loose dark brown and reddish brown slightly clayey gravelly sand with frequent cobbles and occational roots and rootlets. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of brick, concrete and glass.
				0.70			MADE GROUND: Loose dark brown to black gravelly sand with frequent cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of brick, cememt, mudstone, slate and glass. Cobbles are subangular of brick.
▼	1.00	ES					
				1.80			MADE GROUND: Dark grey silty clay with occasional relic roots and rootlets.
	1.90	D					
	2.00	ES					
				3.20			Brown fine to medium sand.
				3.90			End of pit at 3.90 m

1 2 3 4

Remarks: Location cleared with GPR and Cat & Genny.Pit excavated slowly with toothless bucket until to 1.20m bgl. Ground water pertubence encountered at 1.7m.

Stability: Stable

AGS

Appendix C – Chemical Laboratory Testing Results

- Envirolab, Environmental Chemistry Analysis Results, Soils

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envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

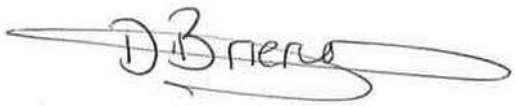
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/12186
Issue Number: 1 **Date:** 22 December, 2022

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

Project Manager: EBMA/Jonathan Provis
Project Name: Brigham Street
Project Ref: Not specified
Order No: PO2650
Date Samples Received: 09/12/22
Date Instructions Received: 13/12/22
Date Analysis Completed: 22/12/22

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/1	22/12186/2	22/12186/3	22/12186/4	22/12186/5	22/12186/6	22/12186/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	WS3	WS4	WS6			
Depth to Top	0.40	0.70	2.50	0.40	1.40	0.70	1.80			
Depth To Bottom	0.50	0.80	2.60	0.50	1.60	0.80				
Date Sampled	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	08-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	4AB	6A	4AB	5A	4AE	4AE			
% Stones >10mm$_A$	<0.1	16.0	<0.1	13.6	<0.1	19.1	<0.1	% w/w	0.1	A-T-044
pH$_D$[M#]	8.33	8.46	6.93	7.85	7.47	8.23	7.11	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$[M#]	<0.01	<0.01	<0.01	1.30	0.08	<0.01	0.05	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#]	0.7	7.6	3.6	4.5	1.0	14.9	0.4	% w/w	0.1	A-T-032 OM
Arsenic$_D$[M#]	26	8	4	29	2	17	<1	mg/kg	1	A-T-024s
Boron (water soluble)$_D$	<1.0	<1.0	1.6	<1.0	<1.0	<1.0	<1.0	mg/kg	1	A-T-027s
Cadmium$_D$[M#]	1.8	1.3	0.5	1.1	0.5	1.6	<0.5	mg/kg	0.5	A-T-024s
Copper$_D$[M#]	10	230	26	161	5	148	6	mg/kg	1	A-T-024s
Chromium$_D$[M#]	7	24	14	18	12	18	5	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#]	13	107	27	337	7	263	7	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	0.85	<0.17	0.26	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D$[M#]	12	22	13	19	8	29	5	mg/kg	1	A-T-024s
Selenium$_D$[M#]	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$[M#]	19	114	28	119	27	169	17	mg/kg	5	A-T-024s

Envirolab Job Number: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/1	22/12186/2	22/12186/3	22/12186/4	22/12186/5	22/12186/6	22/12186/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	WS3	WS4	WS6			
Depth to Top	0.40	0.70	2.50	0.40	1.40	0.70	1.80			
Depth To Bottom	0.50	0.80	2.60	0.50	1.60	0.80				
Date Sampled	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	08-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	4AB	6A	4AB	5A	4AE	4AE			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/1	22/12186/2	22/12186/3	22/12186/4	22/12186/5	22/12186/6	22/12186/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	WS3	WS4	WS6			
Depth to Top	0.40	0.70	2.50	0.40	1.40	0.70	1.80			
Depth To Bottom	0.50	0.80	2.60	0.50	1.60	0.80				
Date Sampled	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	08-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	4AB	6A	4AB	5A	4AE	4AE			
PAH-16MS										
Acenaphthene$_A^{M\#}$	0.05	0.32	<0.01	0.13	<0.01	0.38	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	0.05	<0.01	0.02	<0.01	0.04	<0.01	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	0.05	0.56	<0.02	0.22	<0.02	0.53	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.15	1.04	<0.04	0.55	<0.04	1.38	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.12	0.64	<0.04	0.39	<0.04	1.03	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.15	0.81	<0.05	0.47	<0.05	1.27	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.06	0.30	<0.05	0.18	<0.05	0.43	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	0.26	<0.07	0.17	<0.07	0.38	<0.07	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	0.17	1.03	<0.06	0.64	<0.06	1.54	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	0.06	<0.04	<0.04	<0.04	0.09	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	0.39	2.54	<0.08	1.40	<0.08	4.11	0.09	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	0.02	0.25	<0.01	0.09	<0.01	0.26	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.06	0.28	<0.03	0.18	<0.03	0.45	<0.03	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	0.19	<0.03	0.08	<0.03	0.14	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	0.25	2.26	<0.03	1.23	<0.03	2.79	0.05	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	0.37	2.29	<0.07	1.37	<0.07	3.89	0.09	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	1.84	12.9	<0.08	7.12	<0.08	18.7	0.23	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/1	22/12186/2	22/12186/3	22/12186/4	22/12186/5	22/12186/6	22/12186/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	WS3	WS4	WS6			
Depth to Top	0.40	0.70	2.50	0.40	1.40	0.70	1.80			
Depth To Bottom	0.50	0.80	2.60	0.50	1.60	0.80				
Date Sampled	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	07-Dec-22	08-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	4AB	6A	4AB	5A	4AE	4AE			
TPH CWG with Clean Up										
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	1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	2	<1	3	<1	3	<1	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	5	14	2	29	<1	43	1	mg/kg	1	A-T-055s
Total Aliphatics$_A$	5	17	2	33	<1	47	1	mg/kg	1	Calc-As Recd
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	2	<1	2	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	1	11	<1	13	<1	13	<1	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	6	80	<1	51	<1	56	2	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	18	383	2	159	<1	216	9	mg/kg	1	A-T-055s
Total Aromatics$_A$	25	477	2	226	<1	288	11	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	30	494	5	259	<1	334	12	mg/kg	1	Calc-As Recd
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: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/8	22/12186/9	22/12186/10	22/12186/11	22/12186/12	22/12186/13	22/12186/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS10	WS10	WS12	WS13	WS13	WS14	CP01			
Depth to Top	0.60	1.50	1.50	0.45	3.30	0.80	0.45			
Depth To Bottom						1.00				
Date Sampled	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	07-Dec-22	07-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	3	4A	4AB	4A	4ABE	4A			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	13.9	1.6	10.3	11.7	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.44	7.62	7.54	8.27	8.73	8.10	8.29	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	0.02	0.03	0.04	<0.01	0.02	0.04	<0.01	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\#}$	1.8	1.3	0.4	8.6	1.5	0.5	10.2	% w/w	0.1	A-T-032 OM
Arsenic$_D$$^{M\#}$	<1	<1	3	6	<1	118	<1	mg/kg	1	A-T-024s
Boron (water soluble)$_D$	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	mg/kg	1	A-T-027s
Cadmium$_D$$^{M\#}$	0.7	1.2	<0.5	0.9	<0.5	1.9	<0.5	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	33	27	6	41	9	179	6	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	16	32	8	18	8	38	8	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	18	14	4	90	5	401	14	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	0.26	0.72	<0.17	0.59	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	19	36	6	17	10	31	10	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	40	60	20	89	23	128	19	mg/kg	5	A-T-024s

Envirolab Job Number: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/8	22/12186/9	22/12186/10	22/12186/11	22/12186/12	22/12186/13	22/12186/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS10	WS10	WS12	WS13	WS13	WS14	CP01			
Depth to Top	0.60	1.50	1.50	0.45	3.30	0.80	0.45			
Depth To Bottom						1.00				
Date Sampled	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	07-Dec-22	07-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	3	4A	4AB	4A	4ABE	4A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_D^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_D$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_D$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/8	22/12186/9	22/12186/10	22/12186/11	22/12186/12	22/12186/13	22/12186/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS10	WS10	WS12	WS13	WS13	WS14	CP01			
Depth to Top	0.60	1.50	1.50	0.45	3.30	0.80	0.45			
Depth To Bottom						1.00				
Date Sampled	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	07-Dec-22	07-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	3	4A	4AB	4A	4ABE	4A			
PAH-16MS										
Acenaphthene$_A^{M\#}$	0.22	<0.01	<0.01	0.27	<0.01	0.29	0.03	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	0.33	<0.02	<0.02	0.31	<0.02	0.33	0.04	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.92	<0.04	<0.04	0.92	<0.04	0.73	0.09	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.64	<0.04	<0.04	0.79	<0.04	0.58	0.07	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.83	<0.05	<0.05	0.92	<0.05	0.66	0.09	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.26	<0.05	<0.05	0.39	<0.05	0.35	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.27	<0.07	<0.07	0.33	<0.07	0.23	<0.07	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	1.02	<0.06	<0.06	1.07	<0.06	0.78	0.11	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.06	<0.04	<0.04	0.07	<0.04	0.05	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	2.39	<0.08	<0.08	2.52	<0.08	1.94	0.25	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	0.14	<0.01	<0.01	0.17	<0.01	0.18	0.02	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.29	<0.03	<0.03	0.40	<0.03	0.35	0.04	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	<0.03	0.09	<0.03	0.14	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	1.30	<0.03	<0.03	1.61	<0.03	1.54	0.19	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	2.09	<0.07	<0.07	2.37	<0.07	1.73	0.24	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	10.8	<0.08	<0.08	12.2	<0.08	9.90	1.17	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/12186

Client Project Name: Brigham Street

Client Project Ref: Not specified

Lab Sample ID	22/12186/8	22/12186/9	22/12186/10	22/12186/11	22/12186/12	22/12186/13	22/12186/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS10	WS10	WS12	WS13	WS13	WS14	CP01			
Depth to Top	0.60	1.50	1.50	0.45	3.30	0.80	0.45			
Depth To Bottom						1.00				
Date Sampled	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	08-Dec-22	07-Dec-22	07-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	3	4A	4AB	4A	4ABE	4A			
TPH CWG with Clean Up										
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	2	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	<1	<1	4	1	4	<1	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	5	<1	<1	65	4	127	3	mg/kg	1	A-T-055s
Total Aliphatics$_A$	5	<1	<1	72	5	133	3	mg/kg	1	Calc-As Recd
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	5	<1	3	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	1	<1	<1	45	2	35	<1	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	6	<1	<1	166	5	174	4	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	26	<1	<1	352	9	610	18	mg/kg	1	A-T-055s
Total Aromatics$_A$	33	<1	<1	568	16	822	22	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	37	<1	<1	640	21	956	25	mg/kg	1	Calc-As Recd
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

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
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
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.

v2

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:**	22/12186
		Date Received:	13/12/2022 (am)
Project:	Brigham Street	**Cool Box Temperatures (°C):**	2.8
Clients Project No:			

NO DEVIATIONS IDENTIFIED
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, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/12186/1	22/12186/2	22/12186/3	22/12186/4	22/12186/5	22/12186/6	22/12186/7	22/12186/8	22/12186/9	22/12186/10	22/12186/11	22/12186/12
Client Sample No												
Client Sample ID/Depth	WS1 0.40-0.50m	WS2 0.70-0.80m	WS2 2.50-2.60m	WS3 0.40-0.50m	WS3 1.40-1.60m	WS4 0.70-0.80m	WS6 1.80m	WS10 0.60m	WS10 1.50m	WS12 1.50m	WS13 0.45m	WS13 3.30m
Date Sampled	07/12/22	07/12/22	07/12/22	07/12/22	07/12/22	07/12/22	08/12/22	08/12/22	08/12/22	08/12/22	08/12/22	08/12/22
A-T-019s	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
A-T-022s	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022
A-T-024s	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-026s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-027s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-031s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-032 OM	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-040s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-042sTCN	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
A-T-044	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
A-T-045	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022
A-T-050s	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022	16/12/2022
A-T-055s	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
Calc-As Recd	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022

Lab Sample ID	22/12186/13	22/12186/14
Client Sample No		
Client Sample ID/Depth	WS14 0.80-1.00m	CP01 0.45m
Date Sampled	07/12/22	07/12/22
A-T-019s	19/12/2022	19/12/2022
A-T-022s	16/12/2022	16/12/2022
A-T-024s	21/12/2022	22/12/2022
A-T-026s	20/12/2022	20/12/2022
A-T-027s	20/12/2022	20/12/2022
A-T-031s	20/12/2022	20/12/2022
A-T-032 OM	21/12/2022	21/12/2022
A-T-040s	20/12/2022	20/12/2022
A-T-042sTCN	19/12/2022	19/12/2022
A-T-044	19/12/2022	19/12/2022
A-T-045	14/12/2022	14/12/2022
A-T-050s	16/12/2022	16/12/2022
A-T-055s	19/12/2022	19/12/2022
Calc-As Recd	19/12/2022	19/12/2022

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

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/12261
Issue Number: 1 **Date:** 22 December, 2022

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

Project Manager: EBMA/Jonathan Provis
Project Name: Brigham Street
Project Ref: 81427
Order No: PO2663
Date Samples Received: 12/12/22
Date Instructions Received: 14/12/22
Date Analysis Completed: 22/12/22

Approved by:



Gemma Berrisford
Client Manager

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/1	22/12261/2	22/12261/3	22/12261/4	22/12261/5	22/12261/6	22/12261/7	Units	Limit of Detection	Method ref
Client Sample No			East	West						
Client Sample ID	TT01	TT01	TT02	TT02	TT03	TT03	TT04			
Depth to Top	1.00	1.60	1.00	1.00	0.40	1.00	1.00			
Depth To Bottom										
Date Sampled	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5AE	5A	4AB	4AB	6A	4A			
% Stones >10mm$_A$	32.5	<0.1	<0.1	0.7	13.4	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D$[M#]	7.65	7.60	8.21	8.18	8.23	8.31	7.72	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$[M#]	0.09	0.04	0.02	0.02	0.03	0.02	0.01	g/l	0.01	A-T-026s
Cyanide (total)$_A$[M#]	2	<1	<1	5	<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	0.7	mg/kg	0.2	A-T-050s
Organic Matter$_D$[M#]	15.0	2.4	2.2	10.9	10.9	1.4	56.8	% w/w	0.1	A-T-032 OM
Arsenic$_D$[M#]	20	10	1	20	22	<1	17	mg/kg	1	A-T-024s
Boron (water soluble)$_D$	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	mg/kg	1	A-T-027s
Cadmium$_D$[M#]	1.6	1.8	1.0	3.6	2.6	0.9	1.4	mg/kg	0.5	A-T-024s
Copper$_D$[M#]	159	21	41	265	1490	58	68	mg/kg	1	A-T-024s
Chromium$_D$[M#]	14	16	23	20	29	29	23	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#]	344	33	15	111	706	24	103	mg/kg	1	A-T-024s
Mercury$_D$	2.49	<0.17	<0.17	0.71	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D$[M#]	22	20	29	24	23	33	15	mg/kg	1	A-T-024s
Selenium$_D$[M#]	<1	<1	<1	<1	<1	<1	2	mg/kg	1	A-T-024s
Zinc$_D$[M#]	140	39	53	127	509	69	114	mg/kg	5	A-T-024s

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/1	22/12261/2	22/12261/3	22/12261/4	22/12261/5	22/12261/6	22/12261/7	Units	Limit of Detection	Method ref
Client Sample No			East	West						
Client Sample ID	TT01	TT01	TT02	TT02	TT03	TT03	TT04			
Depth to Top	1.00	1.60	1.00	1.00	0.40	1.00	1.00			
Depth To Bottom										
Date Sampled	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5AE	5A	4AB	4AB	6A	4A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/1	22/12261/2	22/12261/3	22/12261/4	22/12261/5	22/12261/6	22/12261/7	Units	Limit of Detection	Method ref
Client Sample No			East	West						
Client Sample ID	TT01	TT01	TT02	TT02	TT03	TT03	TT04			
Depth to Top	1.00	1.60	1.00	1.00	0.40	1.00	1.00			
Depth To Bottom										
Date Sampled	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5AE	5A	4AB	4AB	6A	4A			
PAH-16MS										
Acenaphthene$_A^{M\#}$	5.69	<0.01	<0.01	0.13	0.07	<0.01	1.60	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	1.66	<0.01	<0.01	0.09	0.11	<0.01	2.13	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	13.9	0.04	<0.02	0.54	0.34	<0.02	11.2	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	22.3	0.11	<0.04	1.36	1.06	<0.04	23.2	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	15.7	0.10	<0.04	0.91	0.62	<0.04	10.8	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	17.1	0.12	<0.05	1.05	0.83	<0.05	12.4	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	6.42	<0.05	<0.05	0.47	0.36	<0.05	3.80	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	6.54	<0.07	<0.07	0.36	0.27	<0.07	4.90	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	27.4	0.16	<0.06	1.20	0.92	<0.06	15.7	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	1.49	<0.04	<0.04	0.09	0.07	<0.04	1.06	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	54.4	0.20	<0.08	2.08	1.88	<0.08	25.8	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	7.85	0.02	<0.01	0.20	0.13	<0.01	6.31	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	7.34	0.05	<0.03	0.42	0.33	<0.03	3.43	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	3.53	<0.03	<0.03	0.07	0.05	<0.03	3.54	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	74.5	0.17	<0.03	1.75	1.23	0.04	27.3	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	50.4	0.20	<0.07	1.90	1.62	<0.07	23.1	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	316	1.17	<0.08	12.6	9.89	<0.08	176	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/1	22/12261/2	22/12261/3	22/12261/4	22/12261/5	22/12261/6	22/12261/7	Units	Limit of Detection	Method ref
Client Sample No			East	West						
Client Sample ID	TT01	TT01	TT02	TT02	TT03	TT03	TT04			
Depth to Top	1.00	1.60	1.00	1.00	0.40	1.00	1.00			
Depth To Bottom										
Date Sampled	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22	12-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5AE	5A	4AB	4AB	6A	4A			
TPH CWG with Clean Up										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<10	<1	<1	<1	<1	<1	<10	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<10	<1	<1	<1	<1	<1	<10	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	13	<1	2	<1	<1	1	<10	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	19	1	2	2	2	1	<10	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	67	4	6	20	20	2	79	mg/kg	1	A-T-055s
Total Aliphatics$_A$	<100	5	11	22	22	5	<100	mg/kg	1	Calc-As Recd
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<10	1	<1	1	1	<1	<10	mg/kg	1	A-T-055s
Aro >C10-C12$_A$	29	<1	<1	<1	<1	<1	37	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	290	1	2	5	3	1	295	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	1200	4	4	29	15	1	1400	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	3140	14	7	136	61	5	5090	mg/kg	1	A-T-055s
Total Aromatics$_A$	4660	20	14	171	80	7	6820	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	4760	25	25	193	102	12	6900	mg/kg	1	Calc-As Recd
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/8	22/12261/9	22/12261/10	22/12261/11	22/12261/12	22/12261/13	22/12261/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TT04	CP01	CP02	CP02	WS05	WS05	WS07			
Depth to Top	2.00	5.50	0.50	3.80	1.50	2.60	1.50			
Depth To Bottom										
Date Sampled	12-Dec-22	07-Dec-22	09-Dec-22	09-Dec-22	08-Dec-22	08-Dec-22	09-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4AE	4AEB	4A	6A	4AE	1			
% Stones >10mm$_A$	2.5	<0.1	44.6	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D^{M\#}$	7.16	8.37	8.59	9.11	7.81	8.10	7.90	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D^{M\#}$	<0.01	0.04	0.02	0.04	0.06	0.06	<0.01	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$_D^{M\#}$	3.8	1.8	2.0	1.1	2.2	1.4	0.2	% w/w	0.1	A-T-032 OM
Arsenic$_D^{M\#}$	<1	<1	5	<1	1	<1	<1	mg/kg	1	A-T-024s
Boron (water soluble)$_D$	1.6	<1.0	<1.0	<1.0	<1.0	3.0	<1.0	mg/kg	1	A-T-027s
Cadmium$_D^{M\#}$	0.9	1.0	<0.5	0.5	0.5	<0.5	<0.5	mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	15	21	22	11	11	6	3	mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	17	21	9	9	15	8	3	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead$_D^{M\#}$	13	14	30	7	18	7	2	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	0.81	<0.17	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	21	26	9	12	10	7	3	mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	<1	<1	1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	35	49	42	26	33	24	6	mg/kg	5	A-T-024s

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/8	22/12261/9	22/12261/10	22/12261/11	22/12261/12	22/12261/13	22/12261/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TT04	CP01	CP02	CP02	WS05	WS05	WS07			
Depth to Top	2.00	5.50	0.50	3.80	1.50	2.60	1.50			
Depth To Bottom										
Date Sampled	12-Dec-22	07-Dec-22	09-Dec-22	09-Dec-22	08-Dec-22	08-Dec-22	09-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4AE	4AEB	4A	6A	4AE	1			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

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Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/8	22/12261/9	22/12261/10	22/12261/11	22/12261/12	22/12261/13	22/12261/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TT04	CP01	CP02	CP02	WS05	WS05	WS07			
Depth to Top	2.00	5.50	0.50	3.80	1.50	2.60	1.50			
Depth To Bottom										
Date Sampled	12-Dec-22	07-Dec-22	09-Dec-22	09-Dec-22	08-Dec-22	08-Dec-22	09-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4AE	4AEB	4A	6A	4AE	1			
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	0.08	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	0.15	<0.02	<0.02	<0.02	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	<0.04	0.43	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	<0.04	0.45	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	<0.05	0.53	<0.05	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	0.26	<0.05	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	0.17	<0.07	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	<0.06	0.51	<0.06	<0.06	<0.06	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	0.97	<0.08	<0.08	<0.08	<0.08	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	<0.03	0.25	<0.03	<0.03	<0.03	<0.03	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$_A^{M\#}$	0.05	<0.03	0.69	<0.03	0.05	<0.03	<0.03	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	0.89	<0.07	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	<0.08	5.50	<0.08	<0.08	<0.08	<0.08	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/8	22/12261/9	22/12261/10	22/12261/11	22/12261/12	22/12261/13	22/12261/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TT04	CP01	CP02	CP02	WS05	WS05	WS07			
Depth to Top	2.00	5.50	0.50	3.80	1.50	2.60	1.50			
Depth To Bottom										
Date Sampled	12-Dec-22	07-Dec-22	09-Dec-22	09-Dec-22	08-Dec-22	08-Dec-22	09-Dec-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4AE	4AEB	4A	6A	4AE	1			
TPH CWG with Clean Up										
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	4	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	1	<1	11	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	1	1	9	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	8	5	8	21	4	6	<1	mg/kg	1	A-T-055s
Total Aliphatics$_A$	8	8	10	45	4	6	<1	mg/kg	1	Calc-As Recd
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	2	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	<1	3	1	7	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	1	3	9	5	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	11	8	41	7	3	3	<1	mg/kg	1	A-T-055s
Total Aromatics$_A$	12	13	51	23	3	3	<1	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	20	20	61	68	6	9	<1	mg/kg	1	Calc-As Recd
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: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/15	22/12261/16	22/12261/17					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS08	WS09	WS09							
Depth to Top	1.50	0.50	1.70							
Depth To Bottom										
Date Sampled	09-Dec-22	09-Dec-22	09-Dec-22							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	1A	4AE	6A							
% Stones >10mm$_A$	2.4	6.4	3.1					% w/w	0.1	A-T-044
pH$_D^{M\#}$	8.02	8.35	8.31					pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D^{M\#}$	<0.01	<0.01	<0.01					g/l	0.01	A-T-026s
Cyanide (total)$_A^{M\#}$	<1	<1	<1					mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2	<0.2					mg/kg	0.2	A-T-050s
Organic Matter$_D^{M\#}$	0.6	3.5	1.6					% w/w	0.1	A-T-032 OM
Arsenic$_D^{M\#}$	<1	6	<1					mg/kg	1	A-T-024s
Boron (water soluble)$_D$	<1.0	<1.0	<1.0					mg/kg	1	A-T-027s
Cadmium$_D^{M\#}$	<0.5	1.3	0.8					mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	5	56	17					mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	8	18	23					mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1					mg/kg	1	A-T-040s
Lead$_D^{M\#}$	7	105	11					mg/kg	1	A-T-024s
Mercury$_D$	<0.17	0.80	<0.17					mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	6	19	26					mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	2	<1	<1					mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	13	143	44					mg/kg	5	A-T-024s

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/15	22/12261/16	22/12261/17					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS08	WS09	WS09							
Depth to Top	1.50	0.50	1.70							
Depth To Bottom										
Date Sampled	09-Dec-22	09-Dec-22	09-Dec-22							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	1A	4AE	6A							
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD							A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-							A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A							A-T-045

Lab Sample ID	22/12261/15	22/12261/16	22/12261/17					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS08	WS09	WS09							
Depth to Top	1.50	0.50	1.70							
Depth To Bottom										
Date Sampled	09-Dec-22	09-Dec-22	09-Dec-22							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	1A	4AE	6A							
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	0.34	<0.01					mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	0.12	<0.01					mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	1.55	<0.02					mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	3.89	<0.04					mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	3.12	<0.04					mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	3.46	<0.05					mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	1.26	<0.05					mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	1.22	<0.07					mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	3.69	<0.06					mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	0.26	<0.04					mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	8.64	<0.08					mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	0.35	<0.01					mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	1.47	<0.03					mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	0.08	<0.03					mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	4.37	0.07					mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	7.46	<0.07					mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	41.3	<0.08					mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/12261

Client Project Name: Brigham Street

Client Project Ref: 81427

Lab Sample ID	22/12261/15	22/12261/16	22/12261/17					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS08	WS09	WS09							
Depth to Top	1.50	0.50	1.70							
Depth To Bottom										
Date Sampled	09-Dec-22	09-Dec-22	09-Dec-22							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	1A	4AE	6A							
TPH CWG with Clean Up										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	2	<1					mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	1	19	2					mg/kg	1	A-T-055s
Total Aliphatics$_A$	1	21	2					mg/kg	1	Calc-As Recd
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<1	1	<1					mg/kg	1	A-T-055s
Aro >C10-C12$_A$	<1	<1	<1					mg/kg	1	A-T-055s
Aro >C12-C16$_A$	<1	7	1					mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	<1	33	2					mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	1	109	5					mg/kg	1	A-T-055s
Total Aromatics$_A$	1	150	8					mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	2	171	10					mg/kg	1	Calc-As Recd
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s

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
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
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.

v2

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: Brigham Street

Clients Project No: 81427

Project No: 22/12261

Date Received: 14/12/2022 (am)

Cool Box Temperatures (°C): 0.2, 0.4

NO DEVIATIONS IDENTIFIED

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, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/12261/1	22/12261/2	22/12261/3	22/12261/4	22/12261/5	22/12261/6	22/12261/7	22/12261/8	22/12261/9	22/12261/10	22/12261/11	22/12261/12
Client Sample No			East	West								
Client Sample ID/Depth	TT01 1.00m	TT01 1.60m	TT02 1.00m	TT02 1.00m	TT03 0.40m	TT03 1.00m	TT04 1.00m	TT04 2.00m	CP01 5.50m	CP02 0.50m	CP02 3.80m	WS05 1.50m
Date Sampled	12/12/22	12/12/22	12/12/22	12/12/22	12/12/22	12/12/22	12/12/22	12/12/22	07/12/22	09/12/22	09/12/22	08/12/22
A-T-019s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-022s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	22/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-024s	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-026s	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-027s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-031s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-032 OM	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-040s	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-042sTCN	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-044	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
A-T-045	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022
A-T-050s	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-055s	20/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	20/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
Calc-As Recd	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	22/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022

Lab Sample ID	22/12261/13	22/12261/14	22/12261/15	22/12261/16	22/12261/17
Client Sample No					
Client Sample ID/Depth	WS05 2.60m	WS07 1.50m	WS08 1.50m	WS09 0.50m	WS09 1.70m
Date Sampled	08/12/22	09/12/22	09/12/22	09/12/22	09/12/22
A-T-019s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-022s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-024s	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-026s	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-027s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-031s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-032 OM	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-040s	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
A-T-042sTCN	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-044	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
A-T-045	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022
A-T-050s	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
A-T-055s	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
Calc-As Recd	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022

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

- I2 Analytical Geotechnical Analysis Results

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Analytical Report Number : 22-13616

Project / Site name:	Brigham Street	**Samples received on:**	15/12/2022
Your job number:	81427	**Samples instructed on/ Analysis started on:**	16/12/2022
Your order number:	2939	**Analysis completed by:**	03/01/2023
Report Issue Number:	1	**Report issued on:**	04/01/2023
Samples Analysed:	18 soil samples		

Izabela Wójcik

Signed:

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

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

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

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

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

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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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 22-13616
Project / Site name: Brigham Street

Lab Sample Number				2535591	2535592	2535593	2535594	2535595
Sample Reference				TT01 - D	TT03 - D	TT04 - D	CP01 - D	CP01 - D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.70	0.50	1.90	1.60	7.00
Date Sampled				12/12/2022	12/12/2022	12/12/2022	07/12/2022	07/12/2022
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	19	20	18	14
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	7.4	8.2	7.1	7.4	8
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.083	0.032	0.055	0.017	0.092
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	82.5	32	55.2	16.5	91.5
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	1.5	3.4	4.2	2	6.6
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	25	83	11	120	24
Magnesium (leachate equivalent)	mg/l	2.5	NONE	13	42	5.7	59	12

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

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Analytical Report Number: 22-13616
Project / Site name: Brigham Street

Lab Sample Number				2535596	2535597	2535598	2535599	2535600
Sample Reference				CP02 - D	CP02 - D	WS02 - D	WS03 - D	WS5A - D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				4.50	7.50-7.60	2.50-2.70	4.10-4.50	3.50
Date Sampled				09/12/2022	09/12/2022	07/12/2022	07/12/2022	09/12/2022
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	16	9.5	20	16	20
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	8.6	8.6	7.1	7.9	7.8
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.093	0.047	0.092	0.098	0.12
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	93	47.3	92.3	98.2	119
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.7	2.5	4.9	3.6	4.4
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	21	54	24	29	52
Magnesium (leachate equivalent)	mg/l	2.5	NONE	11	27	12	15	26

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Analytical Report Number: 22-13616
Project / Site name: Brigham Street

Lab Sample Number				2535601	2535602	2535603	2535604	2535605
Sample Reference				WS06 - D	WS07 - D	WS08 - D	WS09 - D	WS10 - D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00	2.50	3.40	1.80	3.20
Date Sampled				08/12/2022	09/12/2022	09/12/2022	09/12/2022	08/12/2022
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	14	3.5	8.3	15	11
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	7.8	7.7	7.9	7.8	8.1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.044	0.0022	0.0075	0.033	0.11
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	44.3	2.2	7.5	32.5	110
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	1.6	1	1.1	1	4.5
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	8.7	5.3	< 5.0	8.8	30
Magnesium (leachate equivalent)	mg/l	2.5	NONE	4.3	2.6	< 2.5	4.4	15

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Analytical Report Number: 22-13616
Project / Site name: Brigham Street

Lab Sample Number				2535606	2535607	2535608
Sample Reference				WS12 - D	WS13 - D	WS14 - D
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				2.60	2.70	1.80-2.00
Date Sampled				08/12/2022	08/12/2022	07/12/2022
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	19	17	17
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5
General Inorganics						
pH - Automated	pH Units	N/A	MCERTS	7.5	7.3	7.3
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.41	0.31	0.039
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	409	313	39.1
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	6.3	3.3	2
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	75	66	11
Magnesium (leachate equivalent)	mg/l	2.5	NONE	38	33	5.7

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Analytical Report Number : 22-13616
Project / Site name: Brigham 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 *
2535591	TT01 - D	None Supplied	1.7	Brown clay.
2535592	TT03 - D	None Supplied	0.5	Brown clay and loam with gravel and vegetation.
2535593	TT04 - D	None Supplied	1.9	Brown clay.
2535594	CP01 - D	None Supplied	1.6	Light brown clay.
2535595	CP01 - D	None Supplied	7	Brown clay.
2535596	CP02 - D	None Supplied	4.5	Brown clay.
2535597	CP02 - D	None Supplied	7.50-7.60	Brown clay.
2535598	WS02 - D	None Supplied	2.50-2.70	Brown clay.
2535599	WS03 - D	None Supplied	4.10-4.50	Brown clay and sand.
2535600	WS5A - D	None Supplied	3.5	Brown clay with vegetation.
2535601	WS06 - D	None Supplied	3	Brown gravelly sand.
2535602	WS07 - D	None Supplied	2.5	Light brown sand.
2535603	WS08 - D	None Supplied	3.4	Brown sand.
2535604	WS09 - D	None Supplied	1.8	Brown clay.
2535605	WS10 - D	None Supplied	3.2	Brown clay.
2535606	WS12 - D	None Supplied	2.6	Brown clay.
2535607	WS13 - D	None Supplied	2.7	Brown clay.
2535608	WS14 - D	None Supplied	1.80-2.00	Brown clay and sand with gravel and vegetation.

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Analytical Report Number : 22-13616
Project / Site name: Brigham 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
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
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
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 Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

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

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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

UKAS TESTING 4041

Environmental Science

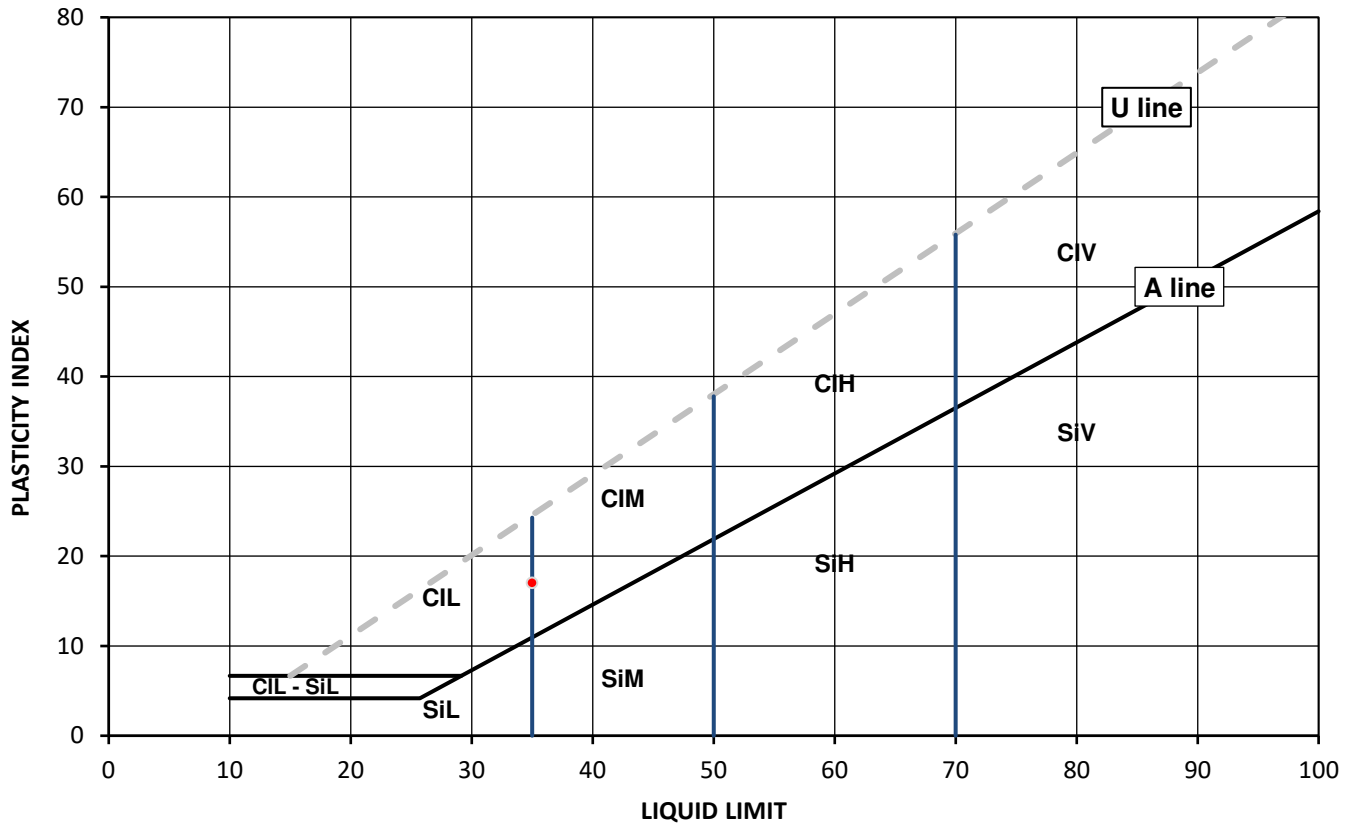
Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	12/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535542	Depth Top [m]:	1.70
Hole No.:	TT01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		
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
30	35	18	17	90



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 ClHO)

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

Remarks:

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Signed: Dudzinska Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

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

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Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	12/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

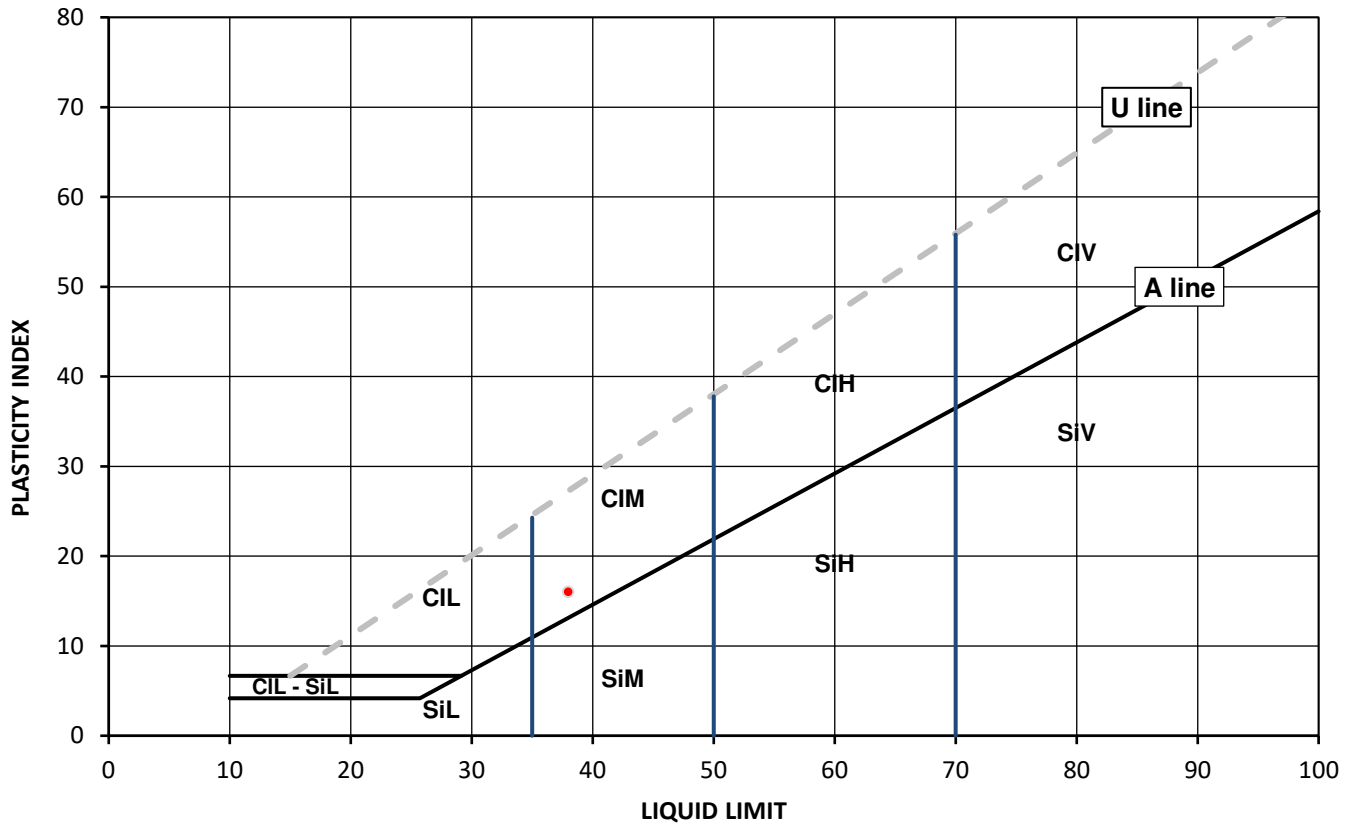
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2535543	Depth Top [m]:	0.50
Hole No.:	TT03	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Dark brown gravelly sandy CLAY		

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23	38	22	16	51



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 ClHO)

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

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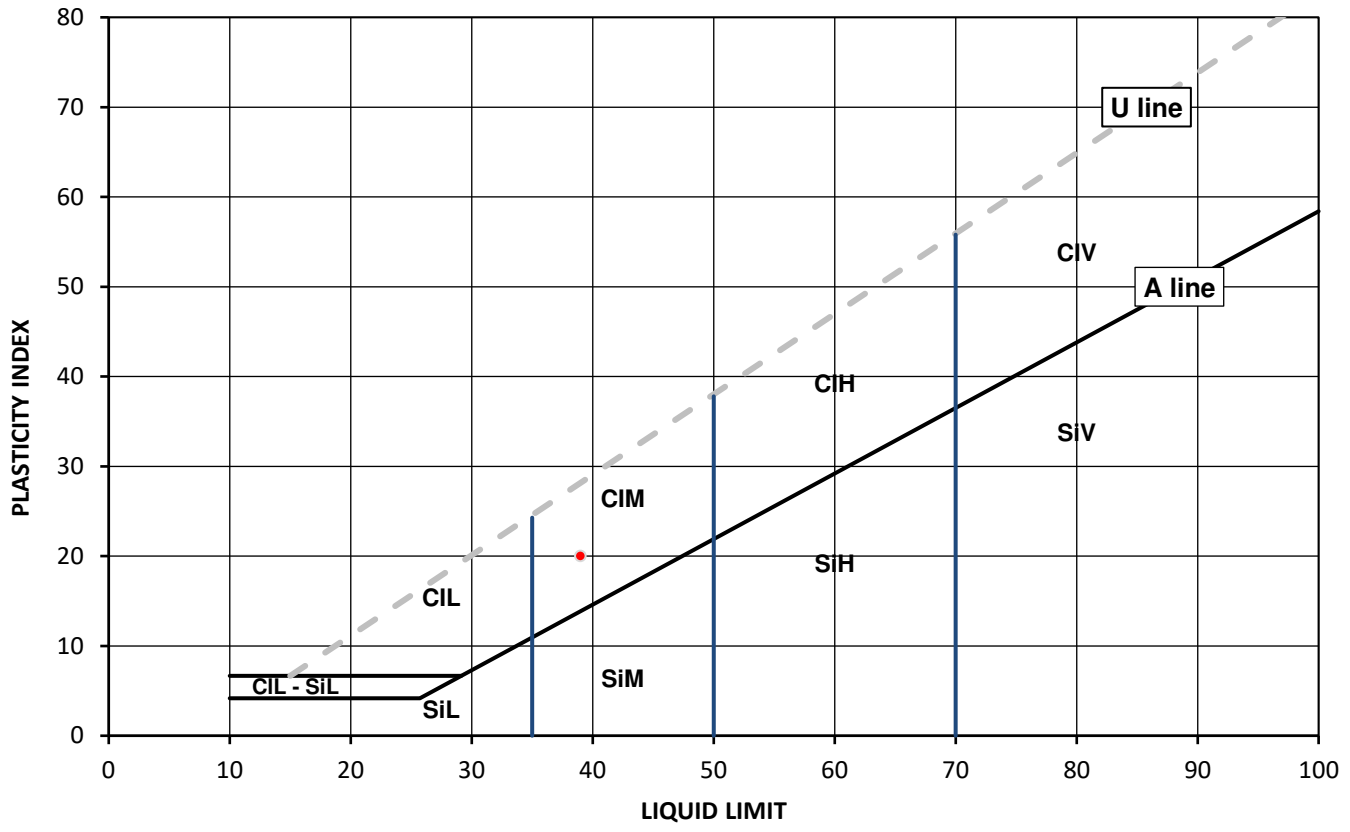
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Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	12/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535544	Depth Top [m]:	1.90
Hole No.:	TT04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		
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
31	39	19	20	87



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 ClHO)

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

Remarks:

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

4041

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	07/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

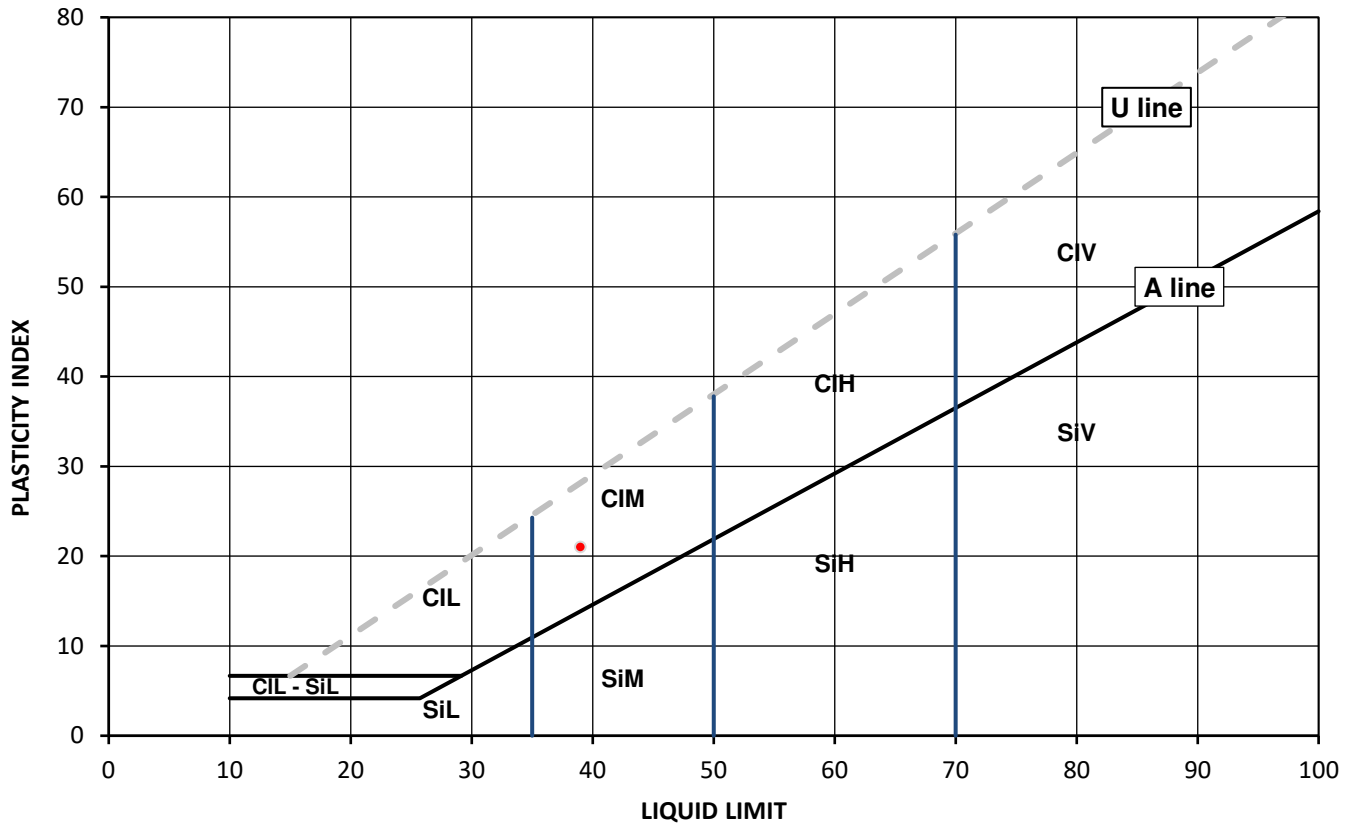
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2535549	Depth Top [m]:	7.00
Hole No.:	CP01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		

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
20	39	18	21	97



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 ClHO)

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

Remarks:

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Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

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DETERMINATION OF LIQUID AND PLASTIC LIMITS
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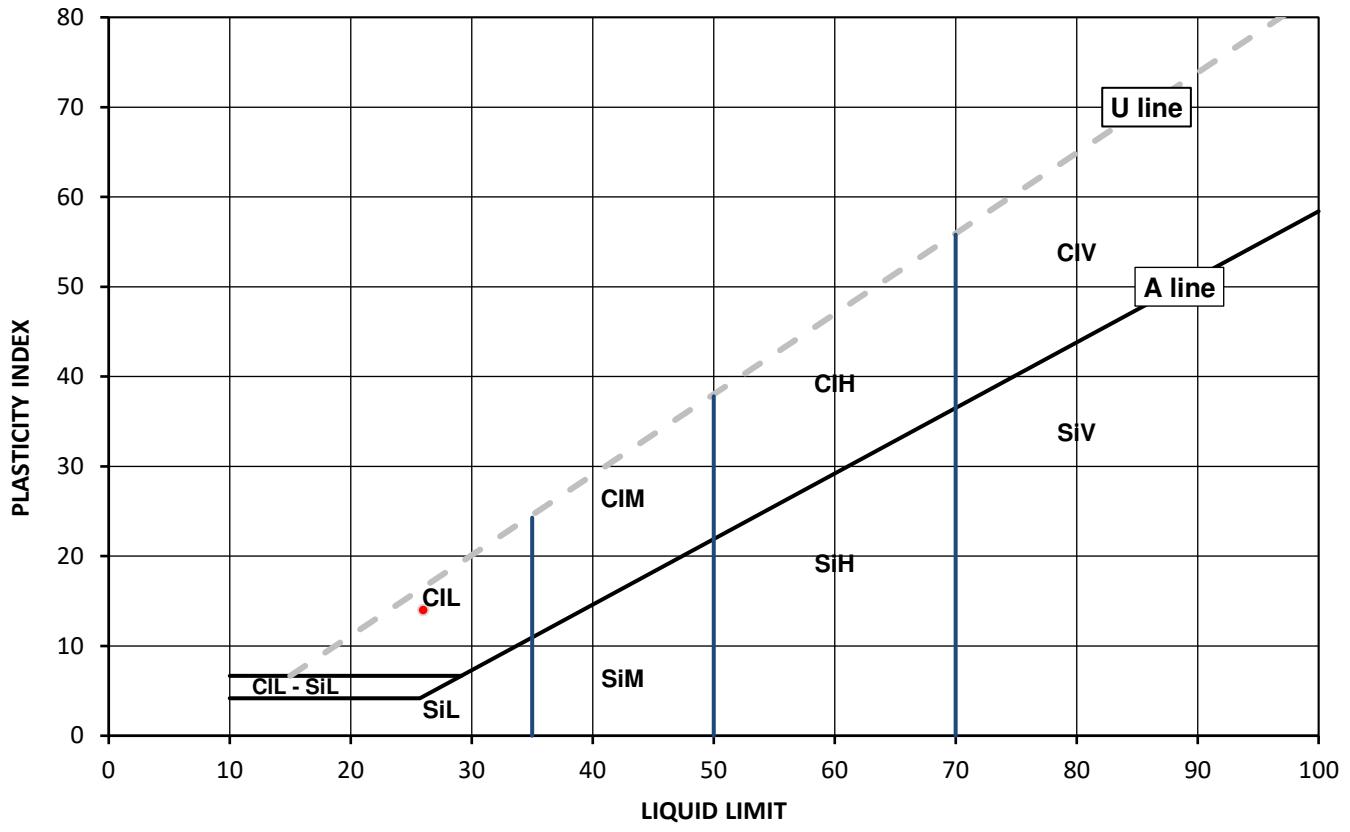
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Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	09/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535552	Depth Top [m]:	4.50
Hole No.:	CP02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
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
21	26	12	14	97



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 ClHO)

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

Remarks:

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Anna Dudzinska
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for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

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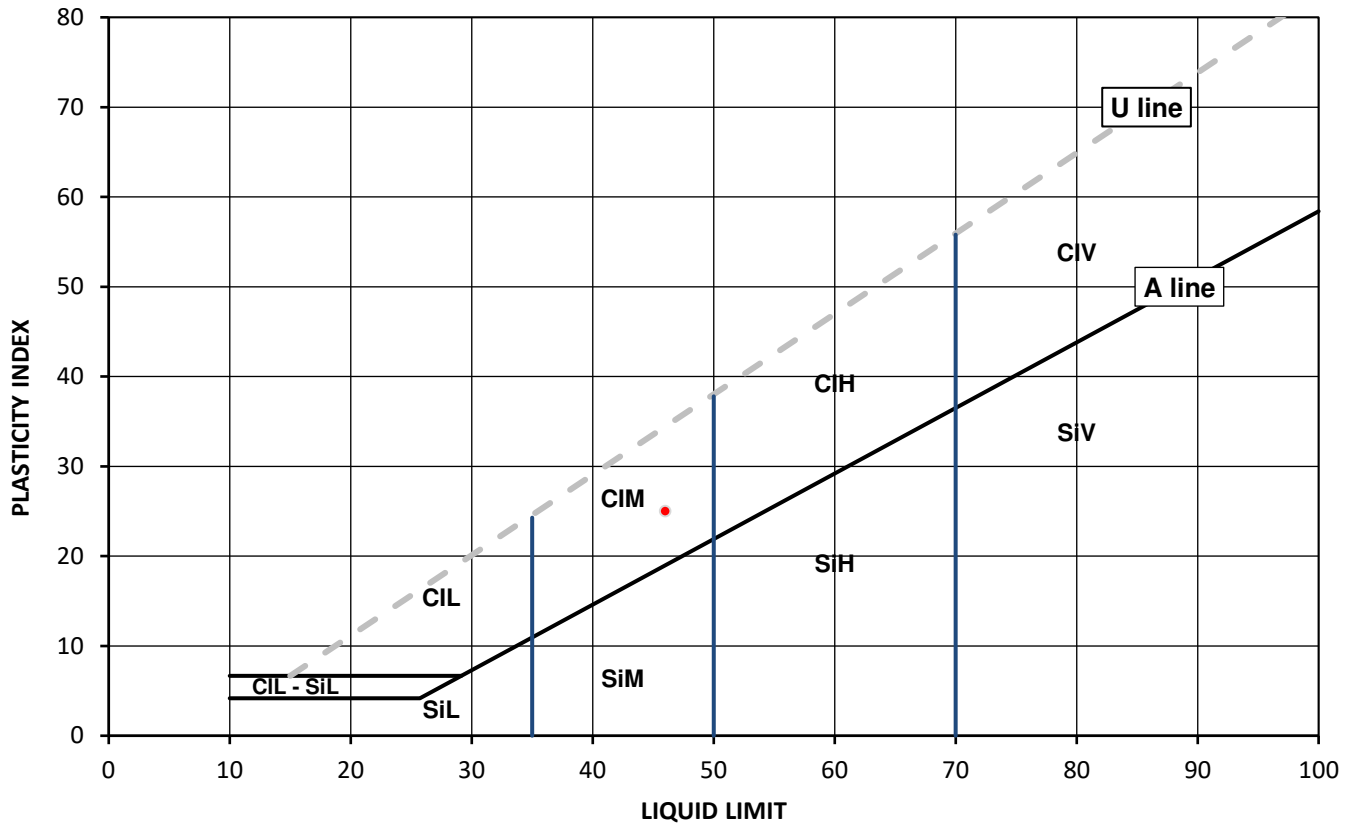
Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	09/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535554	Depth Top [m]:	7.50
Hole No.:	CP02	Depth Base [m]:	7.60
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly sandy CLAY		
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
13	46	21	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	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 ClHO)

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

Remarks:

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Signed: Dudzinska Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 236.12

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

4041

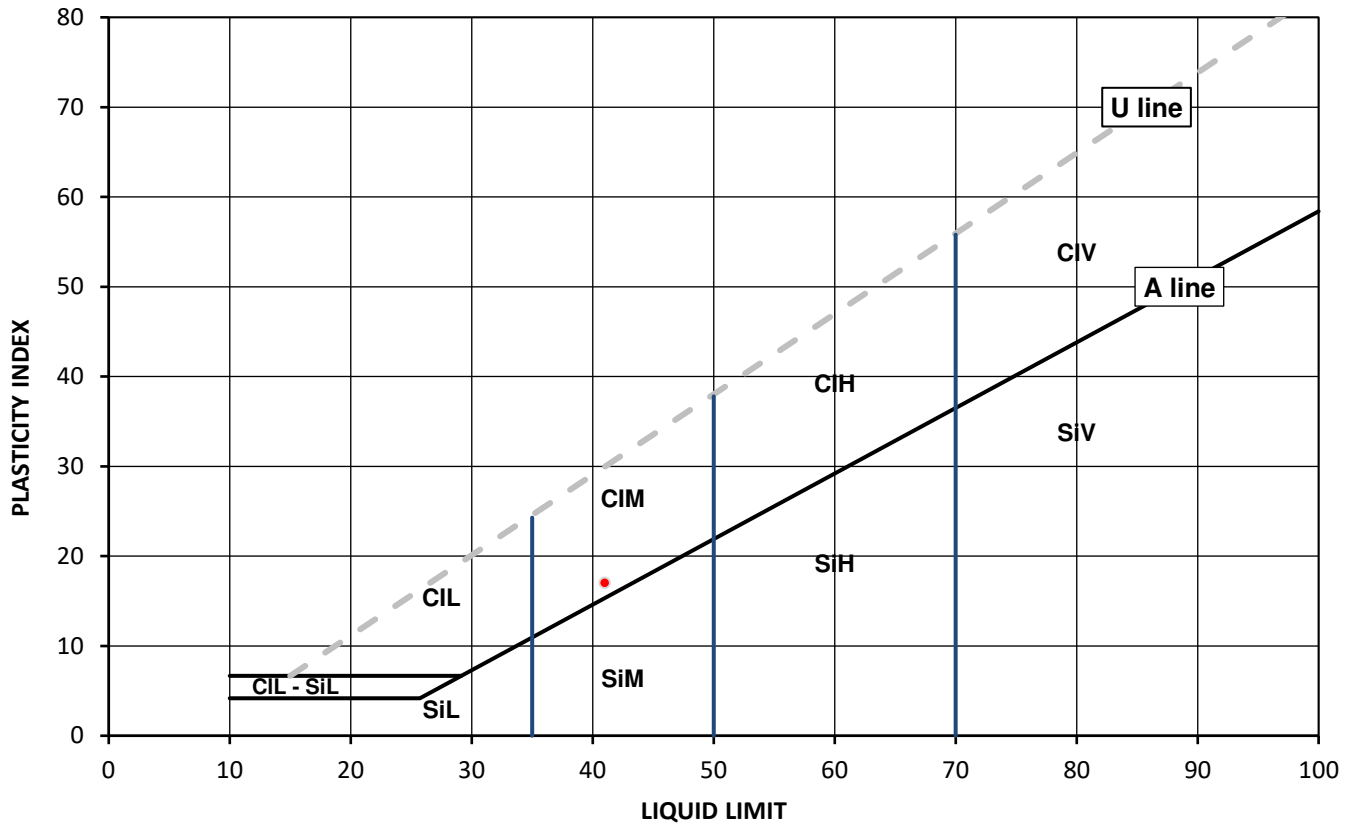
Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	07/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535556	Depth Top [m]:	2.50
Hole No.:	WS02	Depth Base [m]:	2.70
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly slightly silty CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
27	41	24	17	90



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 ClHO)

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

Remarks:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 236.12

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

UKAS TESTING 4041

Environmental Science

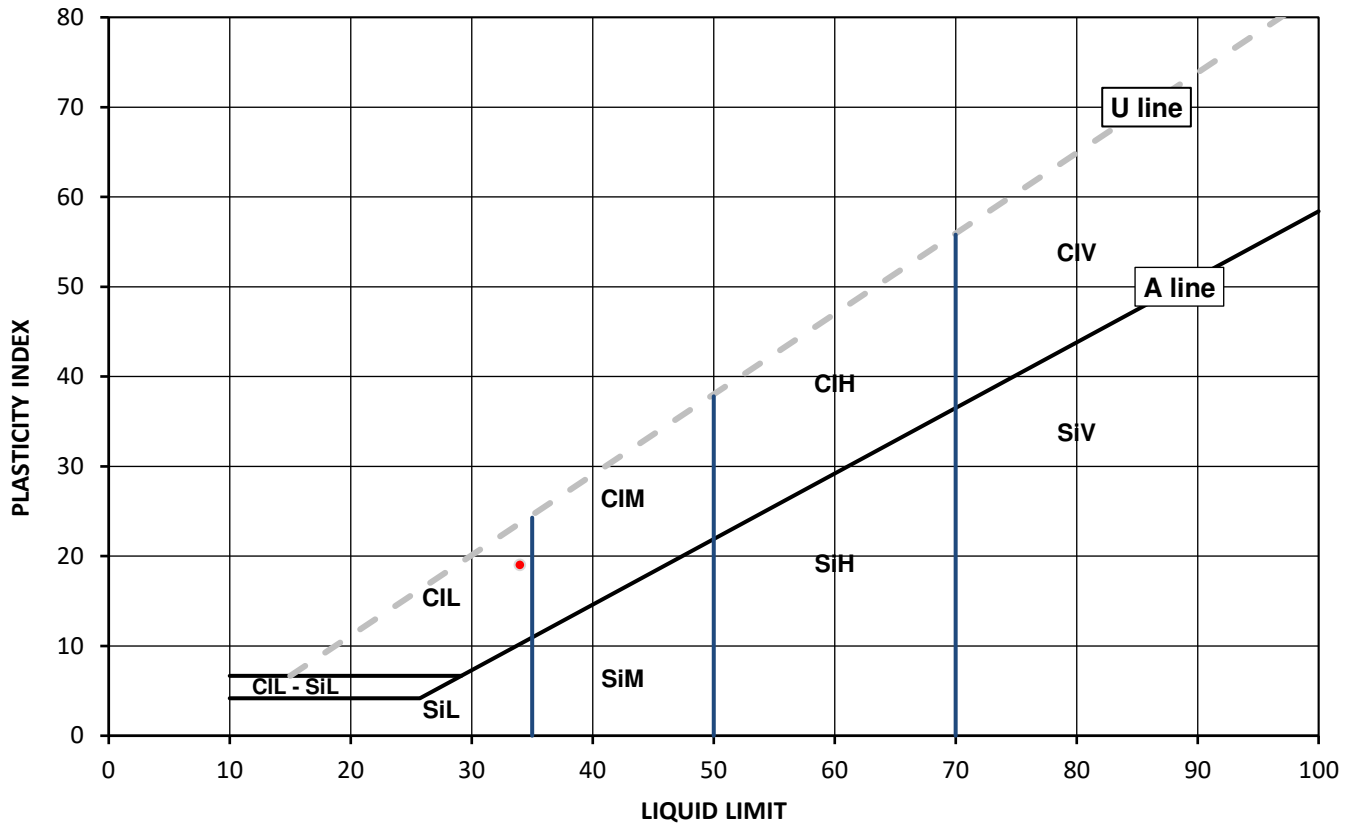
Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	07/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535557	Depth Top [m]:	4.10
Hole No.:	WS03	Depth Base [m]:	4.50
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown very sandy CLAY		
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
22	34	15	19	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 ClHO)

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

Remarks:

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Signed: Dudzinska Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 236.12

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

UKAS TESTING 4041

Environmental Science

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	08/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

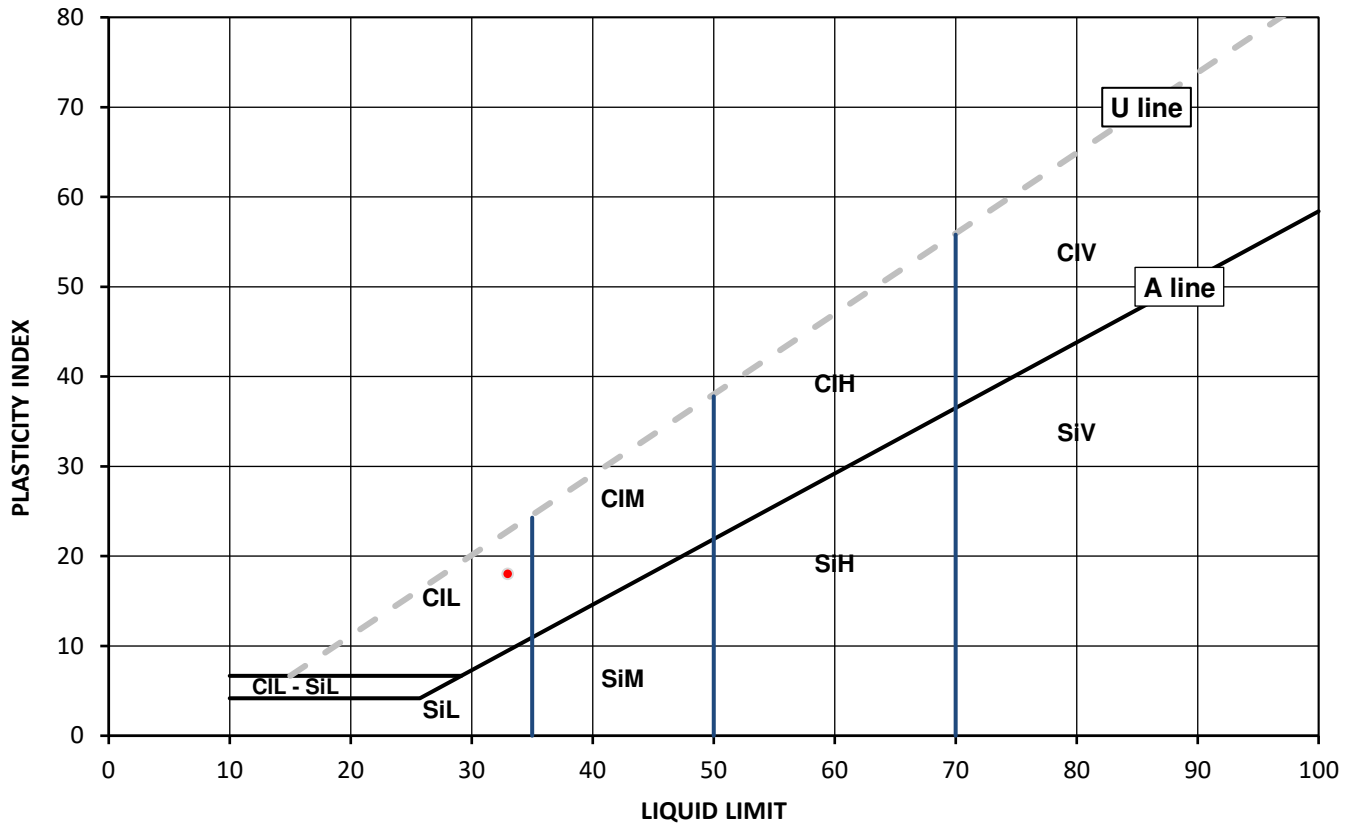
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2535563	Depth Top [m]:	3.20
Hole No.:	WS10	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very silty CLAY		

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
14	33	15	18	93



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 ClHO)

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

Remarks:

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Anna Dudzinska
PL Deputy Head of Reporting Team
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Date Reported: 04/01/2023

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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

UKAS TESTING 4041

Environmental Science

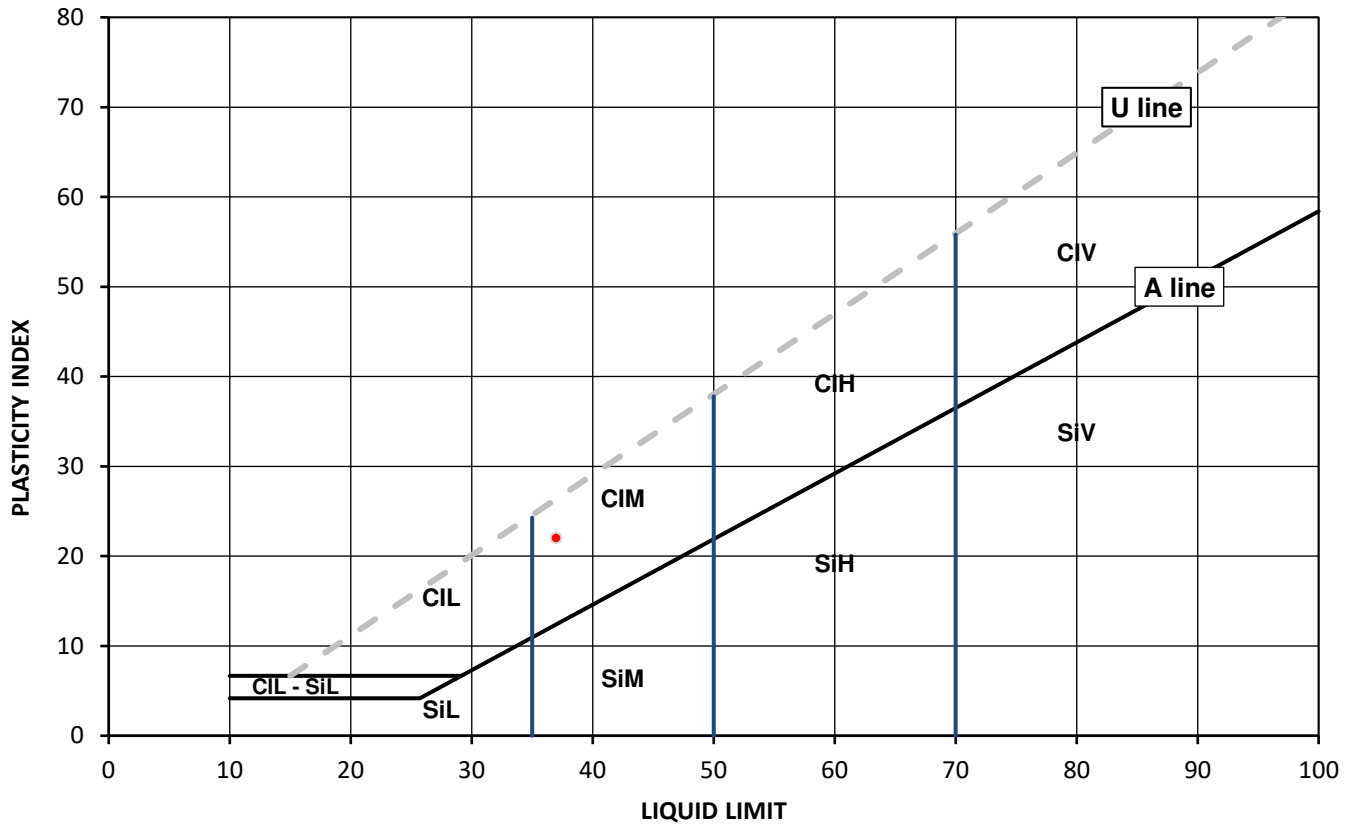
Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	08/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535564	Depth Top [m]:	2.60
Hole No.:	WS12	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		
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
28	37	15	22	92



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 ClHO)

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

Remarks:

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Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 236.12

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

UKAS TESTING 4041

Environmental Science

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	08/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

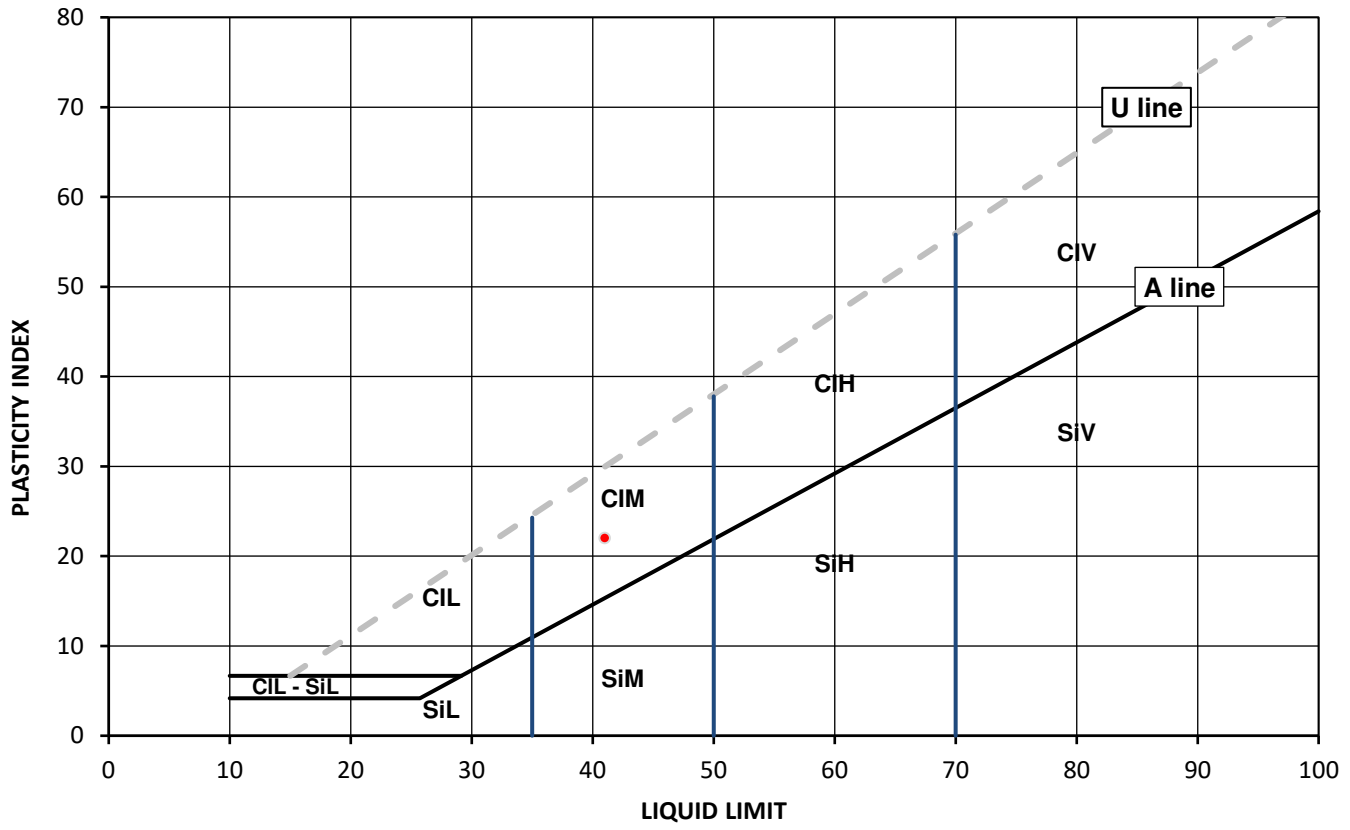
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2535565	Depth Top [m]:	2.70
Hole No.:	WS13	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown sandy CLAY		

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
23	41	19	22	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 ClHO)

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

Remarks:

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Anna Dudzinska
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Date Reported: 04/01/2023

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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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UKAS TESTING 4041

Environmental Science

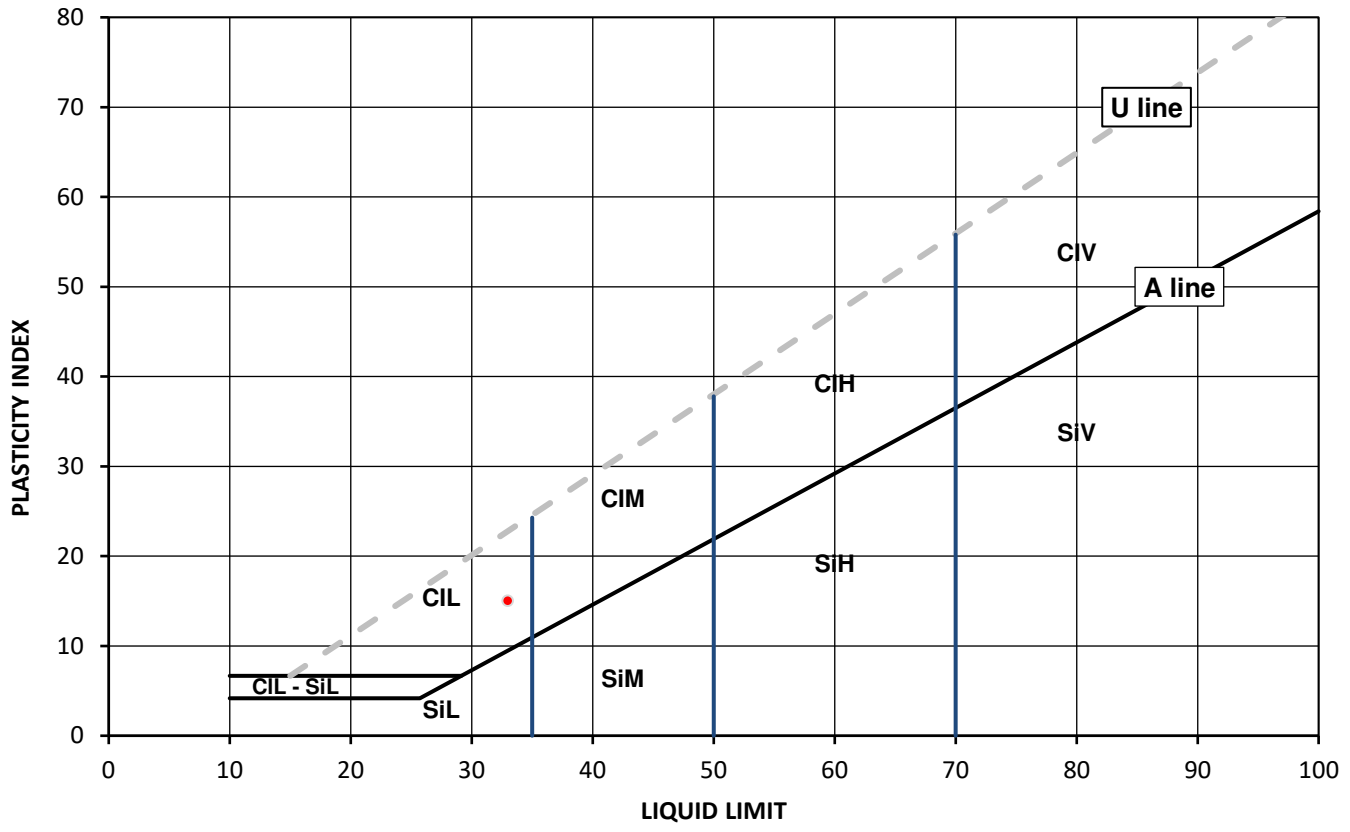
Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	07/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	28/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535566	Depth Top [m]:	1.80
Hole No.:	WS14	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
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	33	18	15	91



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 ClHO)

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

Remarks:

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Signed: Dudzinska Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 236.12

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

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

4041

Client: Curtins

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

Contact: Jonathan Provis

Site Address: Brigham 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: B1427
Job Number: 22-13610
Date Sampled: 07/12 - 12/12/2022
Date Received: 15/12/2022
Date Tested: 28/12/2022
Sampled By: Client - JP

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	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2535542	TT01	Not Given	1.70	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	30		90	35	18	17						
2535543	TT03	Not Given	0.50	Not Given	D	Dark brown gravelly sandy CLAY	Atterberg 4 Point	23		51	38	22	16						
2535544	TT04	Not Given	1.90	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	31		87	39	19	20						
2535545	CP01	Not Given	1.60	Not Given	D	Brown slightly silty CLAY		27											
2535549	CP01	Not Given	7.00	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	20		97	39	18	21						
2535552	CP02	Not Given	4.50	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	21		97	26	12	14						
2535554	CP02	Not Given	7.50	7.60	D	Brown slightly sandy CLAY	Atterberg 4 Point	13		100	46	21	25						
2535556	WS02	Not Given	2.50	2.70	D	Brown slightly gravelly slightly silty CLAY	Atterberg 4 Point	27		90	41	24	17						
2535557	WS03	Not Given	4.10	4.50	D	Brown very sandy CLAY	Atterberg 4 Point	22		100	34	15	19						
2535558	WS5A	Not Given	3.50	Not Given	D	Brown slightly silty CLAY		29											

Note: # Non accredited; NP - Non plastic

Comments:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 238.14

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

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

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

4041

Client: Curtins

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

Contact: Jonathan Provis

Site Address: Brigham Street

Client Reference: B1427
Job Number: 22-13610
Date Sampled: 07/12 - 09/12/2022
Date Received: 15/12/2022
Date Tested: 28/12/2022
Sampled By: Client - JP

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	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2535559	WS06	Not Given	3.00	Not Given	D	Brown slightly gravelly SAND		17											
2535560	WS07	Not Given	2.50	Not Given	D	Light brown SAND		4.9											
2535561	WS08	Not Given	3.40	Not Given	D	Orangish brown SAND		7.9											
2535562	WS09	Not Given	1.80	Not Given	D	Brown slightly gravelly slightly silty CLAY		21											
2535563	WS10	Not Given	3.20	Not Given	D	Brown slightly gravelly very silty CLAY	Atterberg 4 Point	14		93	33	15	18						
2535564	WS12	Not Given	2.60	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	28		92	37	15	22						
2535565	WS13	Not Given	2.70	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	23		100	41	19	22						
2535566	WS14	Not Given	1.80	2.00	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	27		91	33	18	15						

Note: # Non accredited; NP - Non plastic

Comments:

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Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 238.14

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

4041

Client: Curtins

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

Contact: Jonathan Provis

Site Address: Brigham Street

Client Reference: B1427
Job Number: 22-13610
Date Sampled: 07/12 - 12/12/2022
Date Received: 15/12/2022
Date Tested: 28/12/2022
Sampled By: Client - JP

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

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			%				
2535542	TT01	Not Given	1.70	Not Given	D	Brown slightly gravelly sandy CLAY		30	Sample was quartered, oven dried at 106.2 °C			
2535543	TT03	Not Given	0.50	Not Given	D	Dark brown gravelly sandy CLAY		23	Sample was quartered, oven dried at 106.2 °C			
2535544	TT04	Not Given	1.90	Not Given	D	Brown slightly gravelly sandy CLAY		31	Sample was quartered, oven dried at 106.2 °C			
2535545	CP01	Not Given	1.60	Not Given	D	Brown slightly silty CLAY		27	Sample was quartered, oven dried at 106.2 °C			
2535549	CP01	Not Given	7.00	Not Given	D	Brown slightly gravelly sandy CLAY		20	Sample was quartered, oven dried at 106.2 °C			
2535552	CP02	Not Given	4.50	Not Given	D	Brown slightly gravelly very sandy CLAY		21	Sample was quartered, oven dried at 106.2 °C			
2535554	CP02	Not Given	7.50	7.60	D	Brown slightly sandy CLAY		13	Sample was quartered, oven dried at 106.2 °C			
2535556	WS02	Not Given	2.50	2.70	D	Brown slightly gravelly slightly silty CLAY		27	Sample was quartered, oven dried at 106.2 °C			
2535557	WS03	Not Given	4.10	4.50	D	Brown very sandy CLAY		22	Sample was quartered, oven dried at 106.2 °C			
2535558	WS5A	Not Given	3.50	Not Given	D	Brown slightly silty CLAY		29	Sample was quartered, oven dried at 106.2 °C			

Comments:

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PL Deputy Head of Reporting Team
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Date Reported: 04/01/2023

GF 099.16

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

4041

Client: Curtins

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

Contact: Jonathan Provis

Site Address: Brigham Street

Client Reference: B1427
Job Number: 22-13610
Date Sampled: 07/12 - 09/12/2022
Date Received: 15/12/2022
Date Tested: 28/12/2022
Sampled By: Client - JP

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

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			%				
2535559	WS06	Not Given	3.00	Not Given	D	Brown slightly gravelly SAND		17	Sample was quartered, oven dried at 106.2 °C			
2535560	WS07	Not Given	2.50	Not Given	D	Light brown SAND		4.9	Sample was quartered, oven dried at 106.2 °C			
2535561	WS08	Not Given	3.40	Not Given	D	Orangish brown SAND		7.9	Sample was quartered, oven dried at 106.2 °C			
2535562	WS09	Not Given	1.80	Not Given	D	Brown slightly gravelly slightly silty CLAY		21	Sample was quartered, oven dried at 106.2 °C			
2535563	WS10	Not Given	3.20	Not Given	D	Brown slightly gravelly very silty CLAY		14	Sample was quartered, oven dried at 106.2 °C			
2535564	WS12	Not Given	2.60	Not Given	D	Brown slightly gravelly sandy CLAY		28	Sample was quartered, oven dried at 106.2 °C			
2535565	WS13	Not Given	2.70	Not Given	D	Brown sandy CLAY		23	Sample was quartered, oven dried at 106.2 °C			
2535566	WS14	Not Given	1.80	2.00	D	Brown slightly gravelly very sandy CLAY		27	Sample was quartered, oven dried at 106.2 °C			

Comments:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 099.16

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

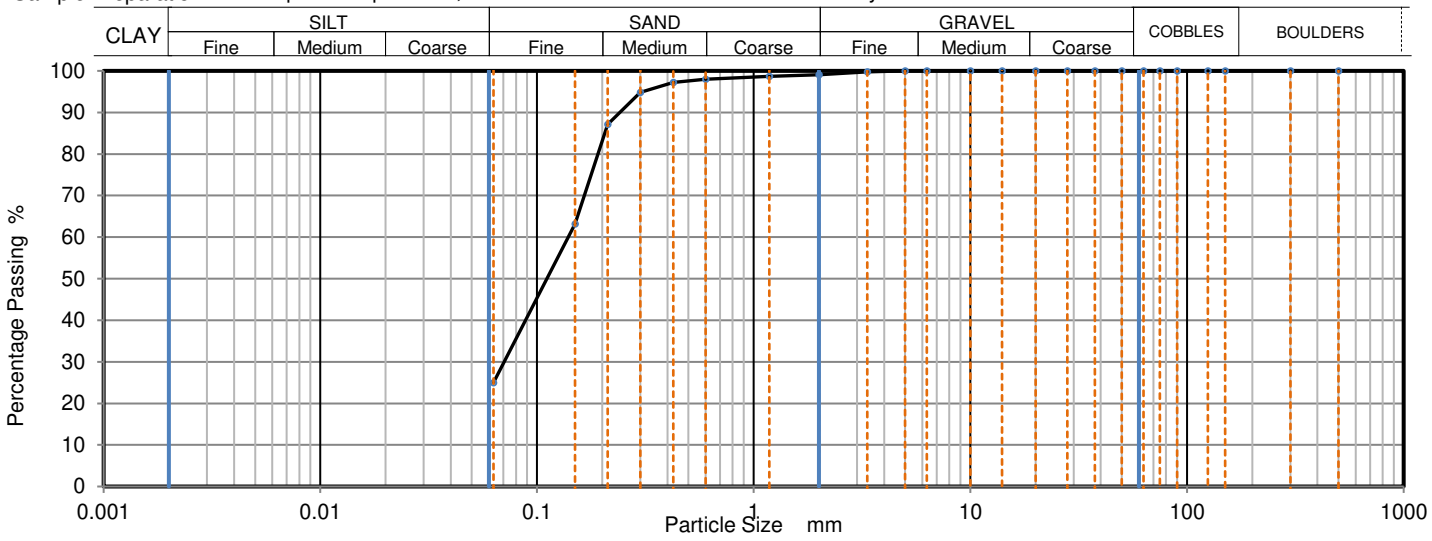
4041

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	07/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	29/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535546	Depth Top [m]:	2.00
Hole No.:	CP01	Depth Base [m]:	2.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown clayey SAND		
Sample Preparation:	Sample was quartered, oven dried at 106.5 °C and broken down by hand.		



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	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	98		
0.425	97		
0.3	95		
0.212	87		
0.15	63		
0.063	26		

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	74
Fines <0.063mm	26

Grading Analysis		
D100	mm	5
D60	mm	0.139
D30	mm	0.0697
D10	mm	
Uniformity Coefficient		> 2.2
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:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 100.21

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

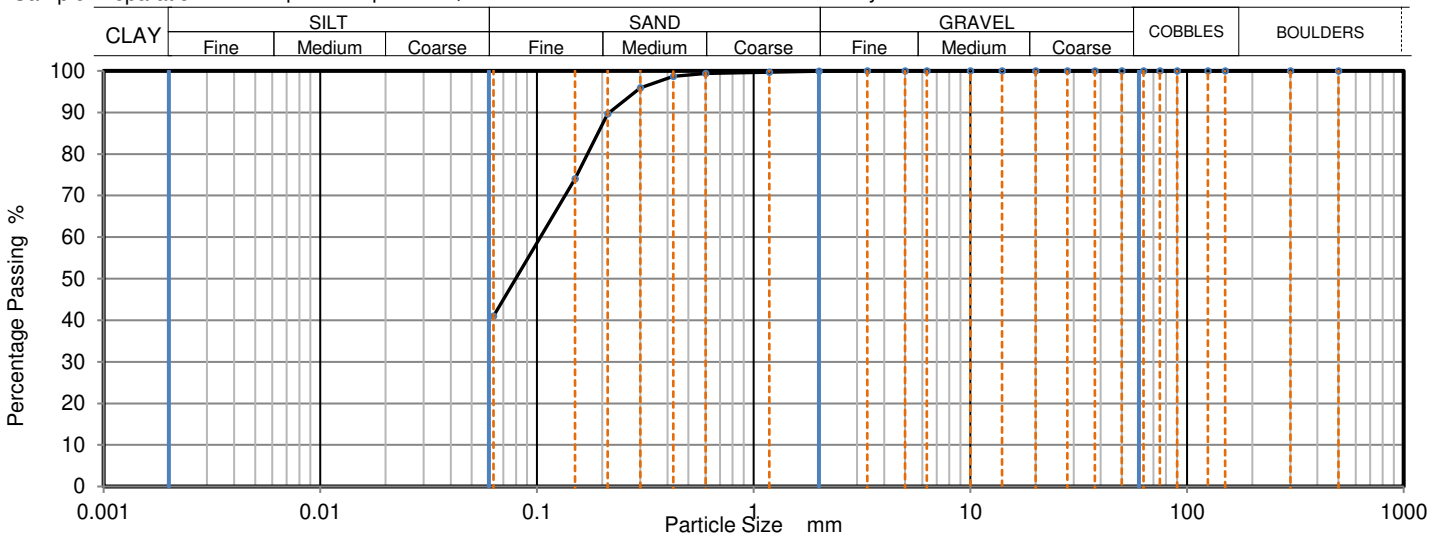
4041

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	07/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	29/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535547	Depth Top [m]:	4.00
Hole No.:	CP01	Depth Base [m]:	4.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.5 °C and broken down by hand.		



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	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	99		
0.3	96		
0.212	90		
0.15	74		
0.063	42		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	58
Fines <0.063mm	42

Grading Analysis		
D100	mm	5
D60	mm	0.103
D30	mm	
D10	mm	
Uniformity Coefficient		> 1.6
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:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 100.21

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

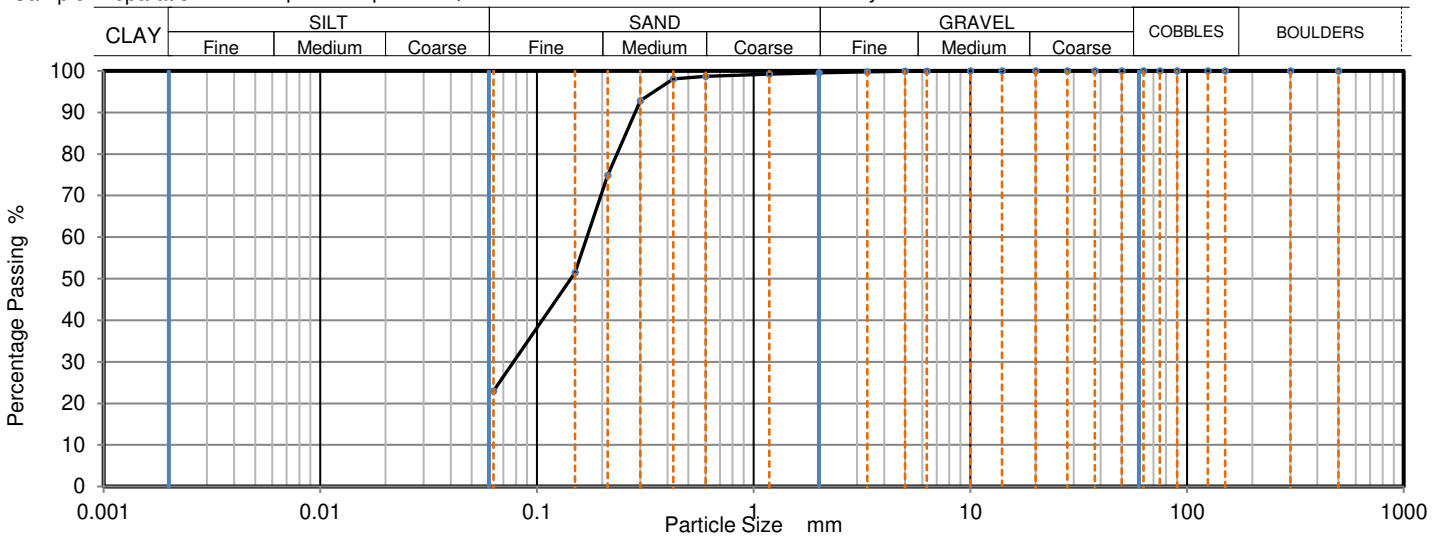
4041

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	09/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	29/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535550	Depth Top [m]:	2.10
Hole No.:	CP02	Depth Base [m]:	2.60
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Dark brown clayey SAND		
Sample Preparation:	Sample was quartered, oven dried at 108.0 °C and broken down by hand.		



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	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	98		
0.3	93		
0.212	75		
0.15	52		
0.063	23		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	76
Fines <0.063mm	23

Grading Analysis		
D100	mm	10
D60	mm	0.17
D30	mm	0.0771
D10	mm	
Uniformity Coefficient		> 2.7
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:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 100.21

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

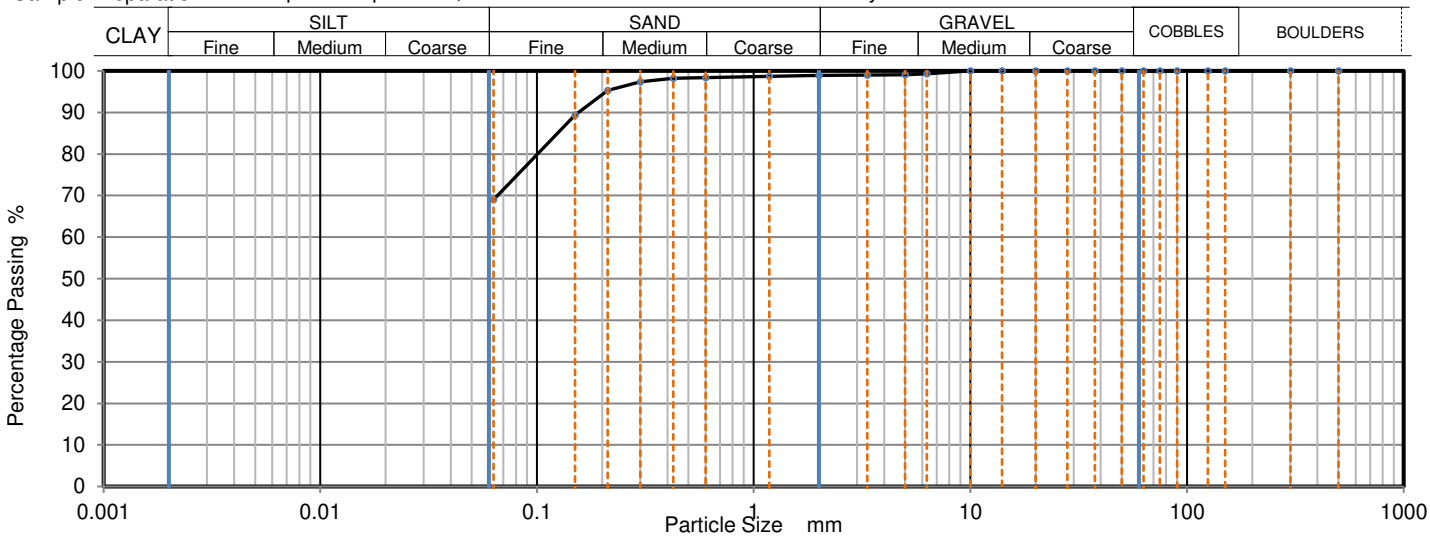
4041

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	09/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	29/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535551	Depth Top [m]:	4.00
Hole No.:	CP02	Depth Base [m]:	4.50
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Dark brown sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 108.0 °C and broken down by hand.		



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	100		
6.3	99		
5	99		
3.35	99		
2	99		
1.18	99		
0.6	98		
0.425	98		
0.3	97		
0.212	95		
0.15	89		
0.063	70		

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	29
Fines <0.063mm	70

Grading Analysis		
D100	mm	10
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:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 100.21

TEST CERTIFICATE

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

Tested in Accordance with: BS 1377-7: 1990: Clause 8

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

UKAS TESTING 4041

Environmental Science

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	07/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	02/01/2023
Site Address:	Brigham Street	Sampled By:	Client - JP

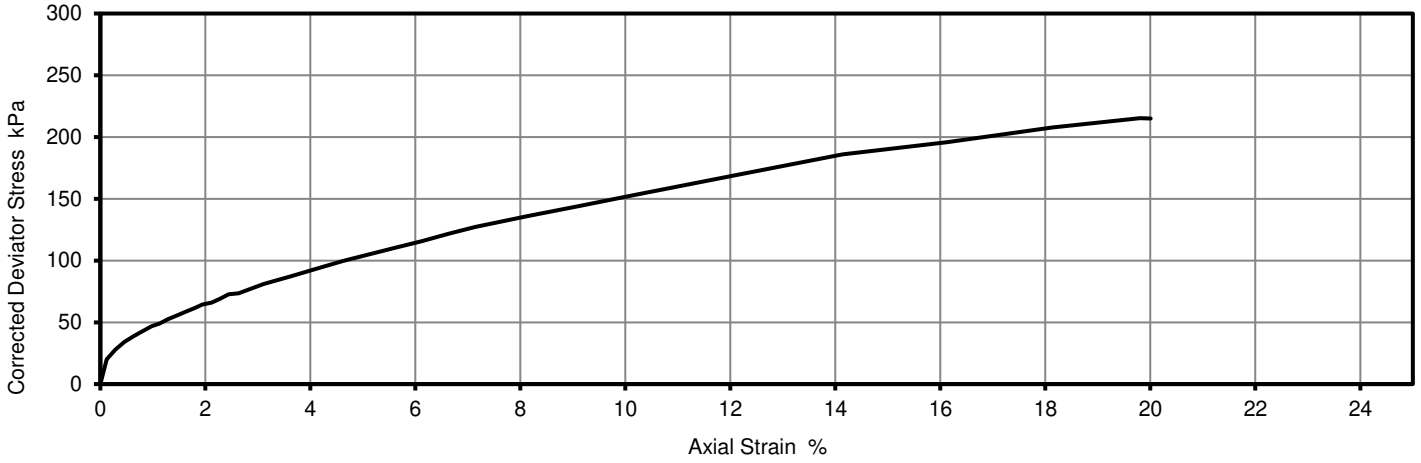
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

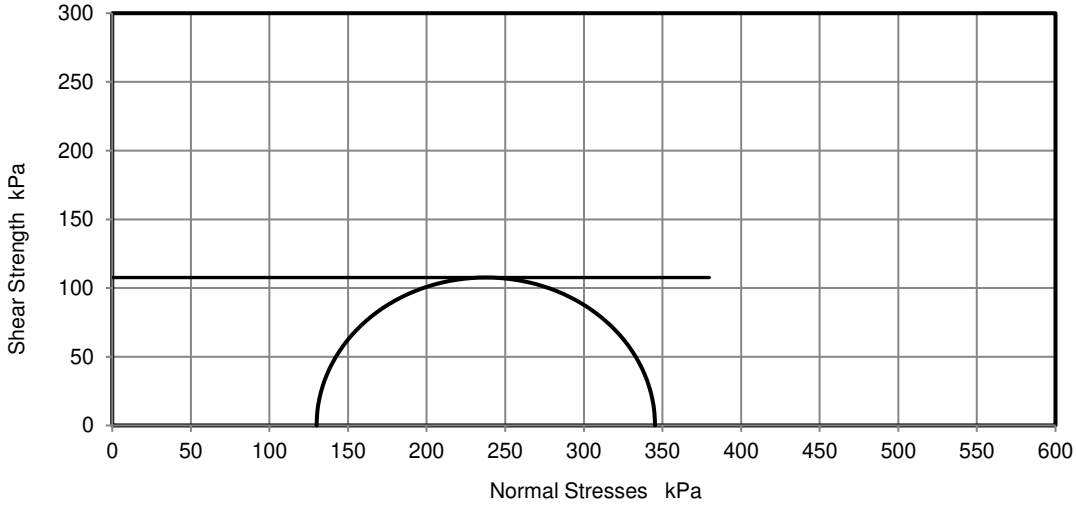
Laboratory Reference:	2535548	Depth Top [m]:	6.50
Hole No.:	CP01	Depth Base [m]:	6.95
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown slightly silty CLAY		
Sample Preparation:	Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.		

Test Number	1		Rate of Strain	2.00	%/min
Length	140.81	mm	Cell Pressure	130	kPa
Diameter	70.22	mm	Axial Strain at failure	19.8	%
Bulk Density	2.04	Mg/m3	Deviator Stress, (σ1 - σ3)f	215	kPa
Moisture Content	22	%	Undrained Shear Strength, cu	108	kPa ½(σ1 - σ3)f
Dry Density	1.67	Mg/m3	Mode of Failure	Brittle	
Membrane Correction	1.36	kPa	Membrane thickness	0.25	mm

Deviator Stress v Axial Strain

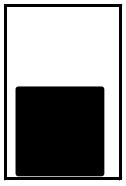


Mohr Circles





Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

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Signed: Dudzińska Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 184.12

TEST CERTIFICATE

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

Tested in Accordance with: BS 1377-7: 1990: Clause 8

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

UKAS TESTING 4041

Environmental Science

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	09/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	02/01/2023
Site Address:	Brigham Street	Sampled By:	Client - JP

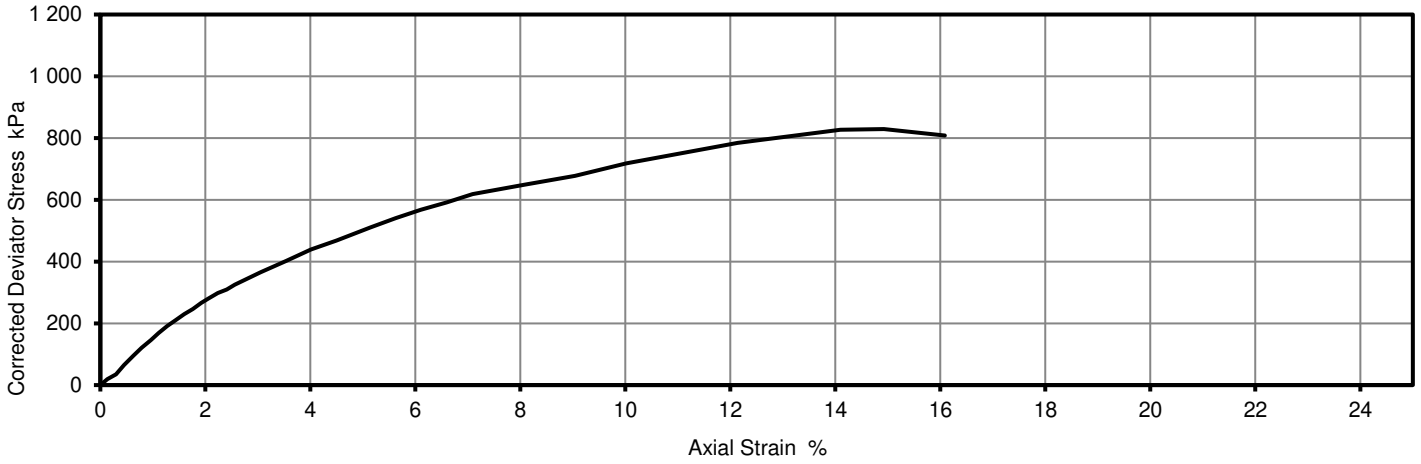
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

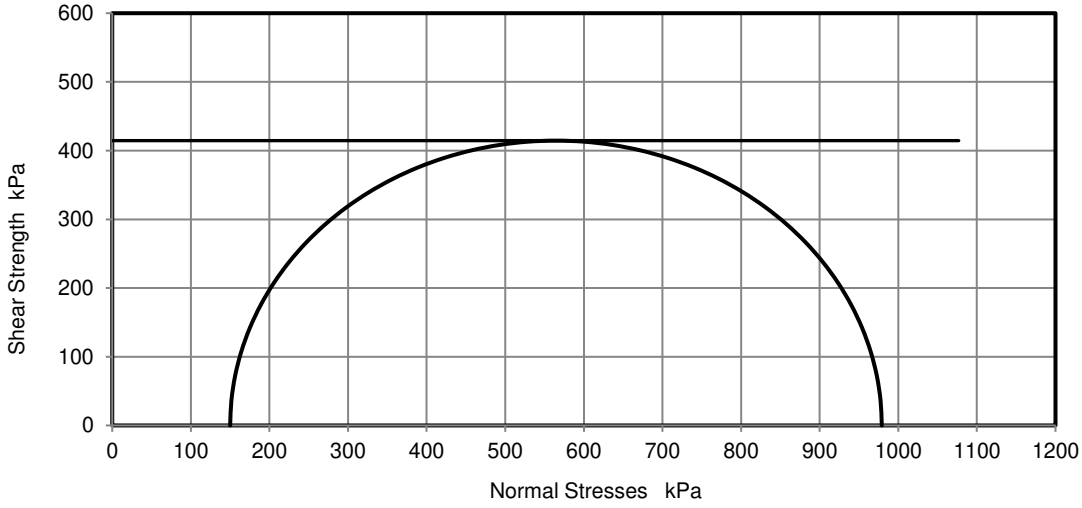
Laboratory Reference:	2535555	Depth Top [m]:	7.50
Hole No.:	CP02	Depth Base [m]:	7.95
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown slightly gravelly slightly sandy CLAY		
Sample Preparation:	Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.		

Test Number	1		Rate of Strain	2.00	%/min
Length	140.24	mm	Cell Pressure	150	kPa
Diameter	69.79	mm	Axial Strain at failure	14.9	%
Bulk Density	2.19	Mg/m3	Deviator Stress, (σ1 - σ3)f	829	kPa
Moisture Content	13	%	Undrained Shear Strength, cu	415	kPa ½(σ1 - σ3)f
Dry Density	1.94	Mg/m3	Mode of Failure	Compound	
Membrane Correction	1.04	kPa	Membrane thickness	0.24	mm

Deviator Stress v Axial Strain

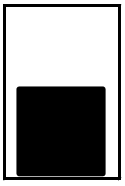


Mohr Circles





Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

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Signed: Dudzińska Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 184.12

TEST CERTIFICATE

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

UKAS TESTING 4041

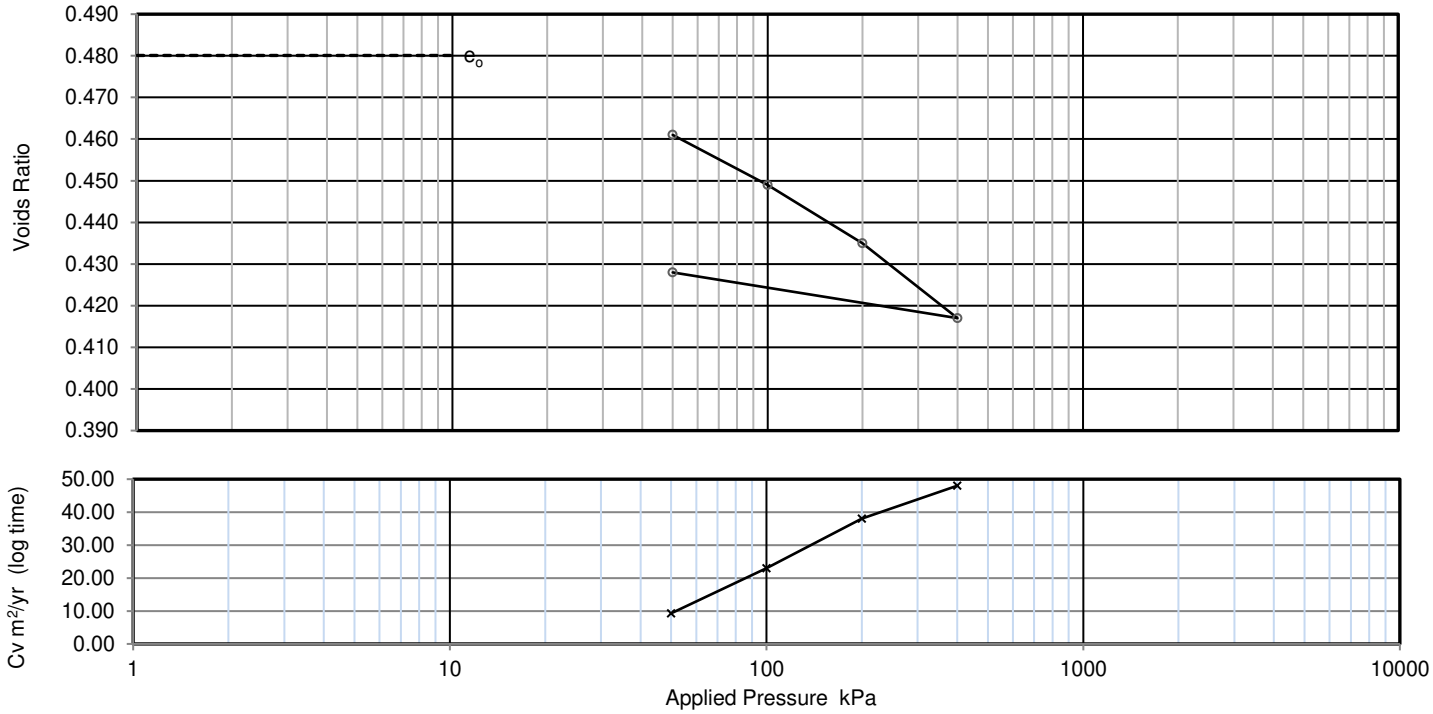
Environmental Science

Client:	Curtins	Client Reference:	B1427
Client Address:	Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-13610
		Date Sampled:	09/12/2022
		Date Received:	15/12/2022
Contact:	Jonathan Provis	Date Tested:	29/12/2022
Site Address:	Brigham Street	Sampled By:	Client - JP

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

Test Results:

Laboratory Reference:	2535553	Depth Top [m]:	5.00
Hole No.:	CP02	Depth Base [m]:	5.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown slightly sandy SILT		



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root m2/yr	Csec
0	0.480	-	-	-	-
50	0.461	0.26	9.3	7.3	0.00092
100	0.449	0.16	23	13	0.00058
200	0.435	0.096	38	20	0.00073
400	0.417	0.062	48	27	0.001
50	0.428	0.022			

Preparation

Carried out on top of U100

Index tests

Orientation of the sample	Vertical		
Particle density	assumed	2.65	Mg/m3
Liquid limit	N/A		%
Plastic limit	N/A		%

Specimen details	Initial	Final	
Diameter	50.11	-	mm
Height	20.08	19.38	mm
Moisture Content	15	18	%
Bulk density	2.07	2.19	Mg/m3
Dry density	1.79	1.86	Mg/m3
Voids Ratio	0.480	0.428	
Saturation	85	113	%
Avg. temperature for test	22.0		°C
Swelling Pressure	Not measured		kPa
Settlement on saturation			%
Total test time	5		days

Note: Cv corrected to 20°C

Remarks:

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Signed: Dudzinska Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Date Reported: 04/01/2023

GF 172.16

Appendix E – Ground Gas Monitoring Results

- Gas Monitoring Visits 1 - 6

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Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Brigham Street	**Date:**	09/01/2023
Job Number:	81427	**Visit:**	1
Client:	One Manchester	**Weather:**	Rain
Barometric State:	Raising	**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						
CP01	987	0.0	0.0	0.0	0.0	3.7	3.7	11.0	0	0	2.30	5.01	
CP02	-	-	-	-	-	-	-	-	-	-	1.76	8.90	1
WS01	988	0.0	0.0	0.0	0.0	4.7	4.7	13.6	0	0	2.63	2.75	
WS02	988	0.0	0.0	0.0	0.0	1.1	1.0	17.4	0	0	Dry	1.52	
WS05A	988	0.0	0.0	0.0	0.0	0.9	0.9	18.9	0	0	1.50	2.45	
WS06	988	0.0	0.0	0.0	0.0	4.6	4.6	14.9	0	0	2.21	2.40	
WS07	988	3.4	0.0	0.0	0.0	5.7	5.7	14.4	0	0	Dry	2.87	2
WS10	989	0.0	0.0	0.0	0.0	1.2	0.8	15.3	0	0	1.50	3.91	
WS13	989	2.6	0.0	0.0	0.0	2.7	2.7	16.8	0	0	2.18	3.36	2

Notes

1 No Gas bung on install
2 Steady gas flow reached instantly

Logged by

JP

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:	Brigham Street	**Date:**	01/02/2023
Job Number:	81427	**Visit:**	2
Client:	One Manchester	**Weather:**	Overcast and rain
Barometric State:	Steady	**Ground Conditions:**	Damp

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl
		Max	SS	Max	SS	Max	SS				
CP01	1011	0.0	0.0	0.0	0.0	3.5	3.5	12.40	0	0	2.5
CP02	-	-	-	-	-	-	-	-	-	-	2.11
WS01	1011	1.5	0.0	0.0	0.0	4.4	4.4	14.90	0	0	Dry
WS02	1011	0.6	0.0	0.0	0.0	0.3	0.3	19.50	0	0	Dry
WS05A	1011	0.0	0.0	0.0	0.0	0.9	0.9	19.50	0	0	1.7
WS06	1010	0.0	0.0	0.0	0.0	4.0	4.0	16.0	0	0	Dry
WS07	1011	0.0	0.0	0.0	0.0	4.4	4.4	15.4	0	0	Dry
WS10	1011	0.0	0.0	0.0	0.0	2.1	2.0	12.0	0	0	1.88
WS13	1011	0.0	0.0	0.0	0.0	2.5	2.5	17.2	0	0	2.75
#REF!											
#REF!											
#REF!											
#REF!											
#REF!											
0											

Notes

Logged by

1 Gas flow rate of 0 achieved instantly
2 No bung so no gas data

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

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GAS MONITORING LOG SHEET

Project:	Brigham Street	**Date:**	17/02/2023
Job Number:	81427	**Visit:**	3
Client:	One Manchester	**Weather:**	Overcast
Barometric State:	Rising	**Ground Conditions:**	Damp

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl
		Max	SS	Max	SS	Max	SS				
CP01	1009	0.0	0.0	0.0	0.0	3.3	3.3	13.2	0	0	2.66
CP02	1009	-0.4	0.0	0.0	0.0	0.0	0.0	19.6	0	0	2.26
WS01	1009	0.0	0.0	0.0	0.0	0.2	0.1	20.1	0	0	Dry
WS02	1009	0.0	0.0	0.0	0.0	0.4	0.4	18.9	0	0	Dry
WS05A	1009	0.0	0.0	0.0	0.0	0.8	0.8	19.4	0	0	1.72
WS06	1008	0.0	0.0	0.0	0.0	1.7	1.7	18.5	0	0	Dry
WS07	1009	0.0	0.0	0.0	0.0	3.5	3.5	16.7	0	0	Dry
WS10	1010	0.0	0.0	0.0	0.0	1.9	1.9	18.6	0	0	1.90
WS13	1010	0.0	0.0	0.0	0.0	2.5	2.5	17.2	0	0	2.85
0											

Notes

Logged by

1 Steady gas flow of 0 reached instantly
2 Gas bung replaced and left for 40 minutes before gas monitoring

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

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GAS MONITORING LOG SHEET

Project:	Brigham Street	**Date:**	24/02/2023
Job Number:	81427	**Visit:**	4
Client:	One Manchester	**Weather:**	Overcast/light rain
Barometric State:	Steady	**Ground Conditions:**	Damp

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						
CP01	1003	0.0	0.0	0.0	0.0	3.4	3.4	12.9	0	0	2.72	4.98	
CP02	1003	0.0	0.0	0.0	0.0	0.0	0.0	19.5	0	0	2.29	9.00	
WS01	1003	0.0	0.0	0.0	0.0	4.4	4.4	15.1	0	0	Dry	2.76	
WS02	1003	0.0	0.0	0.0	0.0	0.7	0.7	19.2	0	0	Dry	1.53	
WS05A	1003	0.0	0.0	0.0	0.0	0.8	0.8	19.1	0	0	1.71	2.43	
WS06	1003	0.0	0.0	0.0	0.0	3.6	3.6	16.7	0	0	Dry	2.39	
WS07	1004	0.0	0.0	0.0	0.0	3.0	3.0	17.5	0	0	Dry	2.86	
WS10	1003	0.0	0.0	0.0	0.0	2.5	2.5	12.1	0	0	2.10	3.90	
WS13	1003	0.0	0.0	0.0	0.0	2.6	2.6	16.9	0	0	2.84	3.22	
0													

Notes

Logged by

LW

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

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GAS MONITORING LOG SHEET

Project:	Brigham Street	**Date:**	16.03.23
Job Number:	81427	**Visit:**	5
Client:	One Manchester	**Weather:**	Overcast
Barometric State:	Rising	**Ground Conditions:**	Damp

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						
CP01	989	1.1	0.0	0.0	0.0	3.6	3.6	13.7	0	0	2.55	4.97	1
CP02	989	21.0	0.0	0.0	0.0	0.2	0.1	19.8	0	0	2.33	8.98	2
WS01	989	0.0	0.0	0.0	0.0	4.6	4.6	14.9	0	0	DRY	2.75	
WS02	989	0.0	0.0	0.0	0.0	0.5	0.5	19.9	0	0	DRY	1.52	
WS05A	990	0.0	0.0	0.0	0.0	0.7	0.7	20.0	0	0	1.48	2.43	
WS06	989	5.4	0.0	0.0	0.0	3.9	3.9	16.6	0	0	DRY	2.39	3
WS07	989	5.2	0.0	0.0	0.0	0.2	0.2	20.2	0	0	DRY	2.86	4
WS10	989	0.0	0.0	0.0	0.0	2.5	2.5	13.3	0	0	1.76	3.91	
WS13	990	0.3	0.0	0.0	0.0	3.4	3.4	17.2	0	0	2.14	3.24	5

Notes

1	Gas flow rate of 0 reached after 1:00 minute.
2	Gas flow rate of 0 reached after 1:00 minute.
3	Gas flow rate of 0 reached immediately.
4	Gas flow rate of 0 reached after 0:30 minutes.
5	Gas flow rate of 0 reached immediately.

Logged by

LW

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

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GAS MONITORING LOG SHEET

Project:	Brigham Street	**Date:**	27/03/2023
Job Number:	####	**Visit:**	6
Client:	One Manchester	**Weather:**	Sunny
Barometric State:	Raising	**Ground Conditions:**	Damp

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						
CP01	1017	0.0	0.0	0.0	0.0	0.1	0.1	19.6	0	0	2.55	4.98	
CP02	1017	0.0	0.0	0.0	0.0	0.2	0.1	19.7	0	0	1.99	8.92	
WS01	1017	0.0	0.0	0.0	0.0	0.1	0.1	19.5	0	0	Dry	2.74	
WS02	1018	0.0	0.0	0.0	0.0	0.1	0.1	19.7	0	0	Dry	1.53	
WS05A	1017	0.0	0.0	0.0	0.0	0.1	0.1	19.7	0	0	1.60	2.45	
WS06	1017	0.1	0.0	0.0	0.0	0.2	0.1	19.3	0	0	Dry	2.40	1
WS07	1017	0.0	0.0	0.0	0.0	0.1	0.1	19.5	0	0	Dry	2.87	
WS10	1017	0.0	0.0	0.0	0.0	0.1	0.1	19.6	0	0	2.65	3.90	
WS13	1017	0.0	0.0	0.0	0.0	0.2	0.2	19.7	0	0	2.33	3.23	
0													

Notes

1 Gas flow rate of 0 achieved instantly

Logged by

JP

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

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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

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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.

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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 *high probability* that *severe harm* could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	*Harm* is *likely to arise* to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	*It is possible* that without appropriate further action *harm could arise* to a designated receptor. It is relatively *unlikely* that any such harm would be *severe,* and if any harm were to occur it is *more likely* that such harm would be *relatively mild.*
Low Risk	*It is possible* that *harm could arise* to a designated receptor from an identified hazard. It is *likely* that, at worst, if any harm was realised any effects would be *mild.*
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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APPENDIX 3

EXAMPLE INSTALLATION OF CLEAN COVER SYSTEM

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The following example shows the clean cover system installation in line with the following requirements:

- A 600mm clean cover system comprising:
  - A minimum of 150mm topsoil, underlain by
  - 300mm subsoil, underlain by
  - 150mm gravel break layer
  - A hi-viz geotextile marker

It should be noted that most cover systems require **either** a gravel break layer **or** a hi-viz geotextile marker, but the below example uses both:

Figure 1: First, the gardens are dug out to 600mm below FFL and lined with a hi-viz geotextile marker:



Figure 2: The geotextile is overlain by a 150mm clean stone break layer.



Figure 3: The break layer is overlain by 300mm sub-soil, seen here before spreading across the garden:



Figure 4: The sub-soil is overlain by 150mm topsoil to FFL:



Figure 5: The gardens are finished with turf. The overall cover system depth is 600mm:



EXAMPLE CLEAN COVER SYSTEM VALIDATION

The following example shows validation of a clean cover system in line with the following requirements:

- A 600mm clean cover system comprising:
    - A minimum of 150mm topsoil, underlain by
    - 450mm subsoil

Best practice requires three photos as follows:







Photograph 1 – Identifies the plot number and shows the validation dig location in relation to the plot.

Photograph 2 – Shows the validation depth clearly, using a staff and a marker which crosses the hole. Shows the topsoil and subsoil, and the base of the hole.

Photograph 3 – Shows the validation hole in context. The plot being validated can be seen, along with nearby plots.

The validation should be written up into a Verification Log, shown below:

Bartle House, Manchester, M2 3WQ
email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk

Verification Log

Project Name:	
Project Number:	
Location:	
Client:	

Remediation Requirements:

Validation Requirements:

Plot Number:	
Grid reference:	
Inspection date:	
Engineer:	

Photographs:

Photographs shows

This plot has PASSED / FAILED* verification (*delete as appropriate*)

*Proposed further remedial works (if FAILED):

An additional inspection IS / IS NOT required for this plot (*delete as appropriate*)