



53 Spear Street, Manchester

Ground Investigation Report

For: Reform Developments Ltd

Innovative Geo-Environmental Engineering

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REVISIONS

Revision	Date	Prepared By	Authorised By	Remarks
First Issue	December 2018	 Alfie Leach	 Andrew Edwards	-
Revision A	5 th March 2020	 Molly Brown	 Andrew Edwards	Updated to include interpretative information, including risk assessments, conclusions and recommendations.

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1.0 **INTRODUCTION**

This ground investigation report has been prepared at the request of Reform Developments Ltd. Instructions to proceed were received in November 2018.

This geo-environmental ground investigation has been undertaken at the site following the Earth Environmental *Phase I Environmental Desk Study* (ref: A0707/15, dated: July 2018). The information obtained from the Earth Environmental report has been used to scope the geo-environmental investigation.

The site is located between 53 Spear Street and 60 Oldham Street in the Northern Quarter area of Manchester City centre, M1 1DF. The site is a total of c. 250m² in area. The National Ordnance Survey grid reference for the centre of the site is 384571E, 398545N.

This Ground Investigation report is to be used to assist in the design of a new 7 storey residential building off 53 Spear Street. The client also intends to convert the existing building at 60 Oldham Street into residential apartments with A1/A3 and A4 uses on the ground floor and basement. The site investigation works were undertaken to obtain geotechnical and environmental information for the proposed development.

1.1 **Brief**

The brief was to carry out a ground investigation at the site to obtain geotechnical and environmental information for a proposed new 7 storey residential building at 53 Spear Street. The investigation was to include the following:

- a) Construction of 1 No. cable percussive borehole to a depth of 15.0m bgl to establish the underlying ground conditions and to obtain in-situ geotechnical information. Collect representative samples from the exploratory hole and arrange appropriate chemical and geotechnical testing;

- b) Formulate conceptual models to accommodate the findings of the site investigation works in terms of the risk to human health, ground gas, controlled waters and the wider environment;
- c) Identify the risks and evaluate whether a Phase 3 numerical risk assessment and / or a Remedial Strategy, is required.

A report was initially to be provided to summarise the factual findings only. The report has been updated in March 2020 to include conclusions and recommendations.

1.2 Third Parties

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2.0 SCOPE OF GROUND INVESTIGATION

Drilling of the cable percussive borehole was carried out by DP Drilling Ltd. Testing of soil samples for environmental purposes was carried out by Chemtest Ltd. in accordance with the Environment Agency's MCERTS (Monitoring Certification) quality assurance accreditation scheme. Testing of soil samples for geotechnical purposes was carried out by Murray Rix. These organisations were appointed directly by IGE Consulting Ltd. to carry out these contracting works.

The ground investigation was undertaken in general accordance with:

- BS 5930 (2015) Code of Practice for Ground Investigation;
- BS 1377 (1990) Methods of test for Soils for Civil Engineering Purposes;
- BS 10175 (2011) + A2 (2017) Investigation of Potentially Contaminated Sites – Code of Practice; and
- BS EN 1997-2 (2007) Eurocode 7 – Geotechnical Design – Ground Investigation and Testing.

The sampling strategy for the site has been completed in accordance with CLR4 and the design of the investigation was carried out in accordance with R&D Technical Report P 5-TR066, CLR 11 and BS:8485 (2015). Further details pertaining to the site investigation works are outlined in the following sections.

The rationale for 1 No. cable percussive borehole was as follows:

- to establish the thickness, extent and characteristics of the underlying made ground and natural superficial deposits;
- to undertake in-situ geotechnical testing within these deposits;
- to obtain samples from these deposits for classification and laboratory testing;
- to establish the presence of any significant obstructions i.e. basement floor slabs;
- to establish the presence of any visual and / or olfactory contamination;

The location of the exploratory hole is shown on the plan in Appendix 1.

2.1 Site Constraints

Due to the small size of the site, only 1 No. cable percussive borehole was feasible, and this could only be carried out in the centre of the site. The requirement for bedrock sampling (core recovery) was not anticipated based upon the anticipated ground conditions.

2.2 Site Testing and Sampling

The following site tests and sampling was carried out:

- a) Retrieval of bulk disturbed samples from the cable percussive borehole at depths of between ground level and 15m bgl for the purposes of laboratory testing and classification.
- b) Where possible frequent shear strength testing was undertaken within cohesive / fine grained material (clay) using a hand shear vane (19 mm vane) in accordance with BS1377-9, at depths of between 4.00m and 8.80m bgl.
- c) Standard Penetration Tests (SPTs) were undertaken at regular intervals between 5.00m and 15.00m bgl within the borehole.
- d) Where possible, undisturbed samples (U100) were obtained from the cable percussive borehole within the underlying natural cohesive deposits (glacial till) at depths of between 4.00m and 10.45m bgl.

2.3 Geotechnical Laboratory Testing

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

- a) Determination of moisture content, liquid limit and plastic limit in accordance with BS1377 Part 2, Methods 3.2, 4.4 and 5.0 (1990).
- b) Determination of undrained shear strength in triaxial compression in accordance with BS1377 Part 7, Method 8 (1990).
- c) Determination of pH and 2:1 sulphate soil / water extract (as SO₄).

The laboratory geotechnical test results are contained within Appendix 3.

2.4 Chemical Laboratory Testing

1 No. soil sample was sub-sampled from the samples obtained during exploratory hole construction for chemical testing. These samples were placed into sterile sealed containers to facilitate MCERTS chemical laboratory testing of the potential contaminants detailed below:

Moisture content, pH, arsenic, barium, beryllium, boron, cadmium, chromium, chromium (hexavalent), copper, cyanide, lead, mercury, nickel, selenium, vanadium, zinc, sulphate, nitrate, cyanide (total and free), soil organic matter (SOM), Speciated Aliphatic and Aromatic Total Petroleum Hydrocarbon Fractions (TPHCWG), Volatile Organic Compounds (VOCs), Semi Volatile Organic Compounds (SVOCs), Speciated Polyaromatic Hydrocarbons (PAHs) and asbestos identification.

3.0 **FINDINGS**

3.1 **Ground Conditions**

The typical ground conditions encountered during the site investigation works are summarised below:

- MADE GROUND comprising brown SAND and GRAVEL with frequent whole and half bricks and occasional metal and timber fragments to a depth of 1.70m bgl (47.90m – 46.20m AOD), underlain by;
- MADE GROUND comprising a suspected CONCRETE SLAB to a depth of 1.80m bgl, underlain by;
- MADE GROUND comprising orangish brown very sandy CLAY with frequent gravel to a depth of between 1.80m and 3.80m bgl (46.10m – 44.10m AOD), underlain by;
- GLACIAL TILL comprising firm to stiff reddish-brown mottled grey slightly sandy CLAY with rare gravel to a depth of 7.50m bgl (40.40m AOD), underlain by;
- GLACIAL TILL comprising firm to stiff, brown, slightly sandy, silty CLAY with rare gravel to a depth of 15.00m bgl (32.90m AOD), where the borehole was terminated.

For the full detailed descriptions please refer to the cable percussive borehole log contained within Appendix 2.

Obstructions

A single concrete obstruction was noted at 1.70m – 1.80m bgl (36.20m – 36.10m AOD) within the made ground, suspected to be a former basement floor slab (100mm thick). Additionally, frequent whole and half bricks were noted in the made ground to a depth of 1.70m bgl (36.2m AOD).

3.2 Visual and Olfactory Evidence of Contamination

During the intrusive exploratory hole investigation works, the soils were examined carefully for both visual and olfactory evidence of contamination. A hydrocarbon odour was noted in the made ground between 0.40m and 1.50m bgl. A chemical sample was taken from this material.

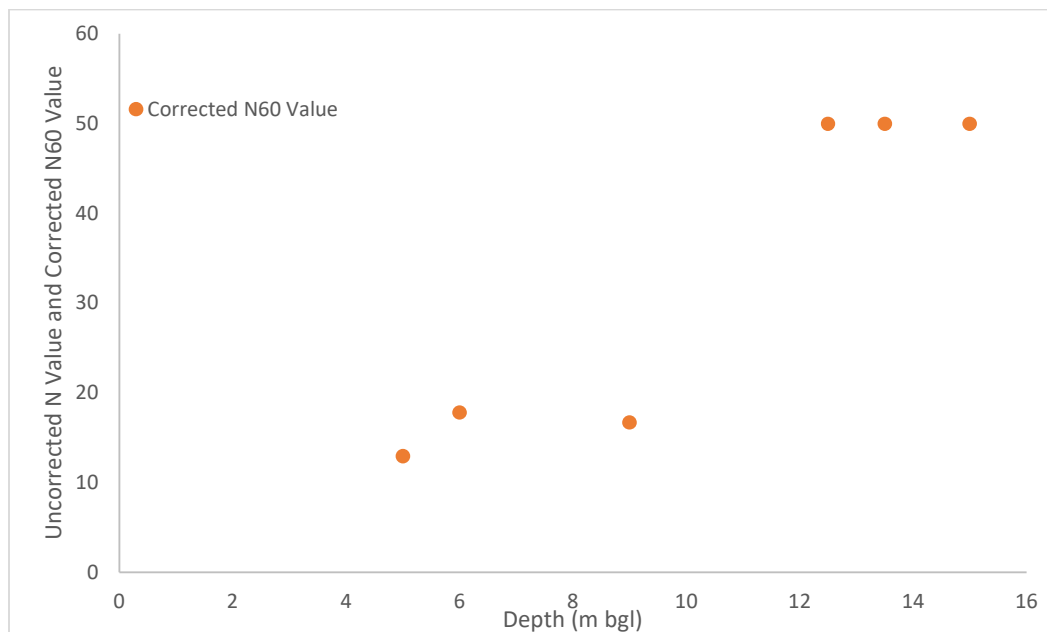
3.3 Geotechnical Site Testing

3.3.1 Standard Penetration tests (SPTs)

SPT tests were undertaken during the construction of the cable percussive borehole. The following table outlines the uncorrected N-Values and corrected N_{60} values derived from the SPT tests undertaken in the made ground and alluvium during the site investigation works:

Deposit Type	Depth Range of Tests m bgl (m AOD)	Number of Tests	Uncorrected N-Value Range	Uncorrected N-Value Average	Corrected N_{60} Range	Corrected N_{60} Average
Glacial Till	5.00 – 15.45 (32.45 – 42.90)	6	13 – 50+	32	13 – 50+	33

A graph is included below showing the increase in the N_{60} values with depth within the glacial till:



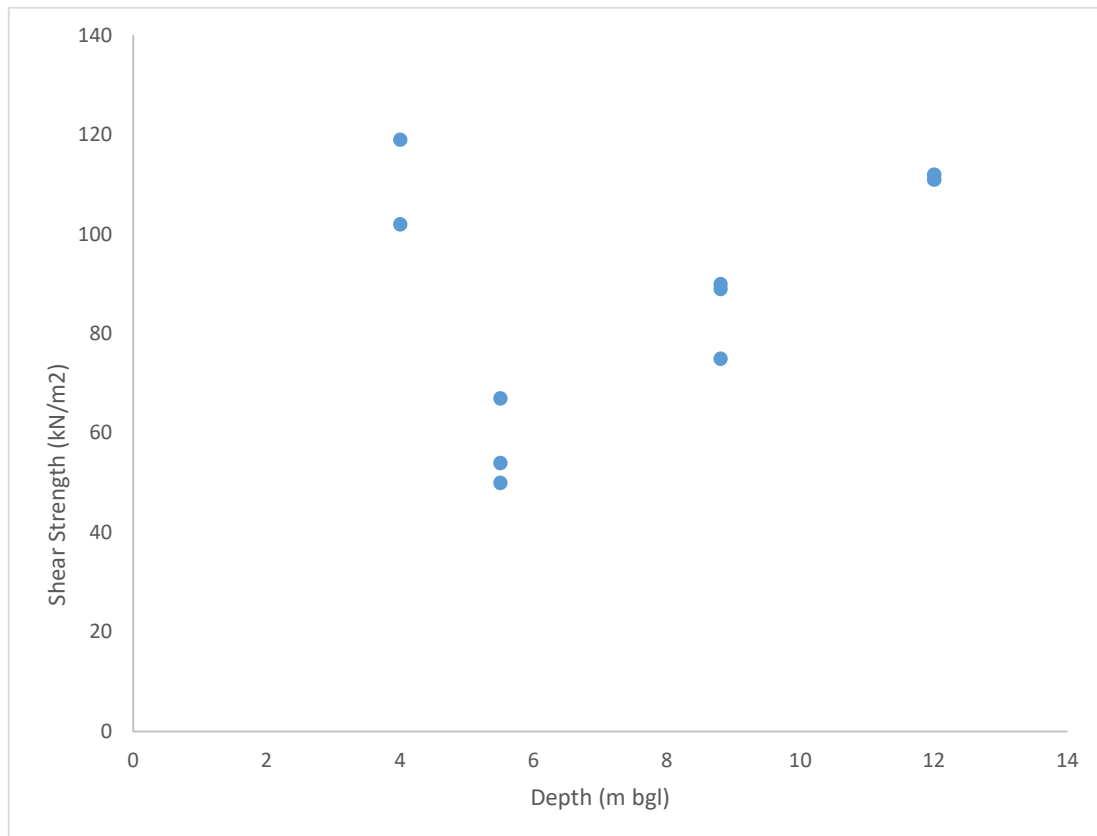
For detailed, specific information pertaining to the SPT tests, please refer to the cable percussive borehole log contained within Appendix 2.

3.3.2 Hand Shear Vane (19mm) Tests

Where possible, ex-situ shear strength testing was undertaken on samples of cohesive material (clay) within disturbed samples from the cable percussive borehole using a hand shear vane (19mm vane) in accordance with BS1377-9. The following table outlines the undrained shear strength values obtained within the glacial till encountered during the site investigation.

Deposit Type	Depth Range m bgl (m AOD)	No. of Tests	Undrained Shear Strength Range (kN/m ²)	Undrained Shear Strength Average (kN/m ²)
Glacial Till	4.00 – 12.00 (35.90 – 43.90)	10	50 – 119	87

A graph is included below showing the shear strength decreasing between 4.00m and 5.50m bgl, anticipated to be due to the increase in secondary granular constituents (i.e. silt and sand) and then increasing with depth.



For detailed, specific information pertaining to the hand shear vane tests, please refer to the cable percussive borehole log contained within Appendix 2.

3.4 Geotechnical Laboratory Testing

The results of the geotechnical laboratory tests undertaken are contained in Appendix 3 and have been summarised in the following sections.

3.4.1 Atterberg Limit Tests

The results of the Atterberg Limits testing are summarised in the table below:

Strata	Depth Range of Tests m bgl (m AOD)	No. of Tests	Moisture Content Range %	Liquid Limit Range %	Plastic Limit Range %	Plasticity Index Range	Passing through 425 micron (%)	Modified Plasticity Index
Glacial Till	4.00 – 10.45 (34.90 – 36.95)	3	15 – 27	41 – 43	17 – 18	23 – 26	93 – 98	22 - 25

3.4.2 Single Stage Undrained Triaxial Tests

The results of the Single Stage Undrained Triaxial tests are summarised in the table below:

Strata	Depth Range of Tests (m bgl)	No. of Tests	Shear Strength Range kPa (Average)	Cell Pressure Range (kPa)
Glacial Till	4.00 – 10.45 (34.90 – 36.95)	3	45 – 124 (86)	80 – 210

3.4.3 pH, Sulphate and Total Organic Carbon Tests

The results of the pH, sulphate and total organic carbon test have been summarised in the table below:

Strata	Test Depth Range m bgl (m AOD)	No. Tests	pH Range	pH Average	SO ₄ Range (mg/l)	SO ₄ Average (mg/l)
Glacial Till	4.00 – 10.45 (34.90 – 36.95)	3	7.0 – 7.1	7.03	0.25 – 0.32	0.29

In accordance with BRE Special Digest 1: Concrete in Aggressive Ground (2005), soluble sulphates were recorded within design sulphate levels DS-2 and subsequently within the Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1s.

3.5 Chemical Laboratory Test Results

The chemical laboratory test results have been summarised below:

Solid Contamination Results - Made Ground				
Determinand	No. of Samples	Range of Results	GAC	Exceedances
Inorganics, Carbon and Asbestos				
Asbestos Quantification (%)	1	No Asbestos Detected	-	-
Water Soluble Sulphate as SO ₄ 2:1 Extract (mg/l)	1	1.00	-	-
Soil Organic Matter (%)	1	4.3	-	-
pH	1	10.8	-	-
Cyanide, Total	1	<0.50	0.5 ⁽³⁾	0
Cyanide, Free	1	<0.50	0.5 ⁽³⁾	0
Nitrate as NO ₃ 2:1 water soluble (g/l)	1	<0.01	-	-
Boron (hot water soluble)	1	0.81	11000	0
Metals and Semi-Metals				
Arsenic	1	22	40	0
Barium	1	330	1300 ⁽²⁾	0
Beryllium	1	< 1.0	1.7	0
Cadmium	1	1.9	85	0
Chromium	1	18	910	0
Copper	1	76	7100	0
Mercury	1	0.58	1.2	0
Nickel	1	20	180	0
Lead	1	460	310 ⁽¹⁾	1 Exceedance
Selenium	1	0.23	430	0
Vanadium	1	22	1200	0
Zinc	1	240	40000	0
Chromium (Hexavalent)	1	<0.50	6	0
Polynuclear Aromatic Hydrocarbons (PAHs)				
Naphthalene	1	0.73	5.6	0
Acenaphthylene	1	< 0.10	4600	0
Acenaphthene	1	0.55	4700	0
Fluorene	1	0.47	3800	0
Phenanthrene	1	3.0	1500	0
Anthracene	1	0.53	35000	0
Fluoranthene	1	2.6	1600	0
Pyrene	1	2.5	3800	0
Benzo(a)anthracene	1	0.87	14	0
Chrysene	1	1.1	31	0
Benzo(b)fluoranthene	1	0.84	4.0	0
Benzo(k)fluoranthene	1	0.22	110	0
Benzo(a)pyrene	1	0.59	3.2	0
Indeno(123-cd)pyrene	1	0.16	46	0
Dibenzo(ah)anthracene	1	< 0.10	0.32	0
Benzo(ghi)perylene	1	0.33	360	0
Total PAH (Sum of USEPA 16)	1	15	-	-
Petroleum Hydrocarbons (TPH-CWG)				
All TPH fractions were recorded at concentrations below their respective detection limits.				
Volatile Organic Compounds (VOCs) and Semi Volatile Organic Compounds (SVOCs)				
All VOCs and SVOCs were recorded at concentrations below their respective detection limits.				

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

- 1) *Category 4 Screening Levels (March 2014)*
- 2) *In-house screening value has been used as no GAC methodology currently exists*

Note 1 – Units are in mg/kg unless stated.

Note 2 – Assumed 2.5% SOM (closest organic matter % used)

Note 3 – All GAC used relate to the 'residential without home grown produce' land use scenario.

3.6 Groundwater

Groundwater was not encountered during the construction of the cable percussive borehole.

4.0 **ENVIRONMENTAL CONCLUSIONS**

4.1 **Assessment of Environmental Results**

The soil sample analysis has assessed the presence of contaminants in the made ground.

One GAC exceedance for the '*residential without plant uptake*' land use scenario was recorded in the made ground sent for laboratory chemical testing. The made ground encountered on site was found to contain an elevated concentration of lead. No asbestos was detected.

However, it is understood that all made ground has been removed to accommodate a proposed basement. Therefore, the source has been removed. The natural deposits were not chemically tested due to the lack of visual or olfactory evidence of contamination.

4.2 **Revised Conceptual Models**

The following conceptual models have been formulated using the findings from the Geo-Environmental Ground Investigation and following the Earth Environmental *Phase I Environmental Desk Study* (ref: A0707/15, dated: July 2018).

4.2.1 **Human Health Risk Assessment**

The possible sources of on-site contamination identified within the Earth Environmental report include:

- On-site made ground

The human health receptors identified within the Earth Environmental report include:

- Current site users
- End users (residential occupants)
- Construction workers
- Adjacent users

The human health pathways identified within the Earth Environmental report include:

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

** Treated as one pathway*

Revised Conceptual Model for Human Health Risk Assessment

Whilst the pathways and receptors remain the same as those identified in the Earth Environmental report, the only source has been discounted as the made ground has been removed. No additional sources have been identified during the site investigation. On this basis, **no risks** to human health are present on the site. Consequently, **no remediation** is required.

4.2.2 Ground Gas Risk Assessment

Potential ground gas sources identified within the Earth Environmental report include:

- On-site made ground

Potential ground gas pathways identified within the Earth Environmental report include:

- Emissions from ground collecting in confined spaces and excavations
- Migration of gases on/off site and collecting in confined spaces on/off site

Potential ground gas receptors identified within the Earth Environmental report include:

- Construction / services maintenance workers
- Adjoining site users
- Future site users

Revised Conceptual Model for Ground Gas Risk Assessment

Whilst the pathways and receptors remain the same as those identified in the Earth Environmental report, the only source has been discounted as the made ground has been removed. No additional sources have been identified during the site investigation and no degradable / organic deposits were identified. On this basis, **no ground gas risks** are present on the site.

Consequently, **no ground gas protection measures** are required.

4.2.3 Controlled Waters Risk Assessment

No sources of on-site contamination were identified within the Earth Environmental report.

The controlled water receptors identified within the Earth Environmental report include:

- Groundwater within Principal Aquifer

The controlled waters pathways include:

- Direct downward migration through leaching and/or mobile liquids
- Off-site migration in groundwater or surface water flow

Revised Conceptual Model for Controlled Waters Risk Assessment

Whilst the receptors remain the same as those identified in the Earth Environmental report, no sources have been identified during the site investigation, as the made ground has now been removed. Also, a significant thickness of low permeability glacial till has been found (at least 11m), reducing the likelihood of any pathways. On this basis, **no risks** are present on the site.

Consequently, **no remediation** is required.

5.0 RECOMMENDATIONS

- 5.1 Following completion of the site investigation works, the risk posed to human health, ground gas or controlled waters risks relating to the proposed development is considered low. Consequently, no further works, assessment or remediation is recommended.
- 5.2 If any further visual or olfactory evidence of contamination is encountered during earthworks or construction work, then the Local Authority Environmental Health Officer and Environment Agency should be contacted immediately in order to determine appropriate mitigation measures.

APPENDIX 1

LIMITATIONS OF REPORT AND INVESTIGATION WORKS

LIMITATIONS OF REPORT

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

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

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

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

This report is a function of the date it was written and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal

provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of IGE. In the absence of such written advice of IGE, reliance on the report in the future shall be at the client's own and sole risk. Should IGE be requested to review the report in the future, IGE shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between IGE and the client.

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

LIMITATIONS OF INVESTIGATION WORK

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

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

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

Exploratory Holes

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

Extent of Contamination Testing

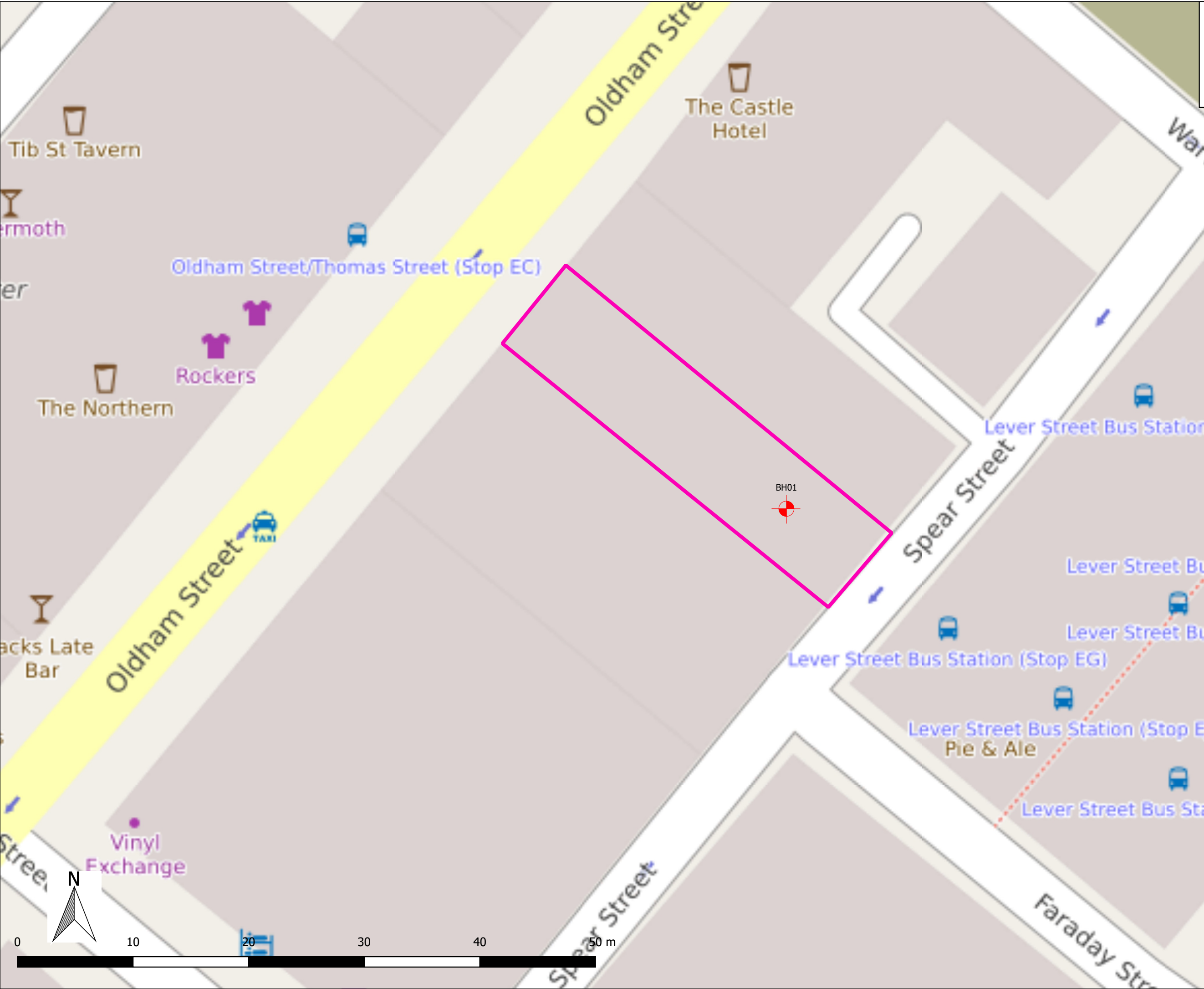
The extent of contaminated land testing carried out on samples obtained from the site has been determined in accordance with the latest legal guidance issued by the government to provide, with reasonable certainty, the probable general levels of contamination present on site that could pose a significant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

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

Extent of Geo-Environmental Studies

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

APPENDIX 2
SITE AND EXPLORATORY HOLE LOCATION PLAN



Key

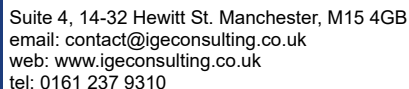
Approximate Site area

Cable Percussive Borehole Location

Rev	Drawn	Date	Description
Drawing Status: Information			
Contract: 53 Spear Street, reForm Developments Ltd			
Drawing Title: Site and Exploratory Hole Location Plan			
IGE consulting Suite 4, 14 - 32 Hewitt Street, Manchester, M15 4GB Email: contact@igeconsulting.co.uk Web: www.igeconsulting.co.uk Tel: 0161 237 9310			
Scale: 1:500		Date: Dec 2018	
Draw: AL		Checked: AJ	
Contract No.	Drawing No.		
3159	SI - 01	P1	

APPENDIX 3
CABLE PERCUSSIVE BOREHOLE LOG

IGE consulting		Suite 4, 14-32 Hewitt St. Manchester, M15 4GB email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 237 9310		Borehole Log ver. 0.5			Borehole No. BH01 Sheet 1 of 2		
Project Name: 53 Spear Street				Co-ords: 385071E - 398545N		Project No.: 3159			
Location: Manchester				Level (mAOD): 47.90		Rev.: 1.0			
Client: Reform Developments Ltd.				Dates: 24/12/2018		Logged By: AE			
				Weather: Dry and overcast		Checked By: AJ			
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description	
		Depth (m)	Type	Results					
		0.40 - 1.50	B	5kg				Brown SAND and GRAVEL with frequent whole and half bricks and occasional metal and timber fragments. Gravel is angular to subangular of fine to coarse red brick (40%), timber 10%), metal (10%) and mixed lithologies (40%). Hydrocarbon odour.	1
					1.70	46.20		CONCRETE.	
					1.80	46.10		Firm, orangish brown, very sandy CLAY with occasional gravel. Gravel is angular to subangular of fine to coarse red brick (40%) and mixed lithologies (60%). Suspected reworked glacial till.	2
									3
					3.80	44.10		Firm to stiff, reddish brown, mottled grey, slightly sandy CLAY with rare gravel. Gravel is subangular to rounded of fine to coarse mixed lithologies	4
		4.00	B	5kg					
		4.00 - 4.45	U	60% 55Bl.					
		4.00		HVP=102					
		4.00		HVP=119					
		5.00 - 5.45	SPTLS	1kg					5
		5.00	SPT	N=13					
				(2,3/3,3,3,4)					
		5.50	B	5kg					
		5.50		HVP=50					
		5.50		HVP=54					
		5.50		HVP=67					
		6.00 - 6.45	SPTLS	1kg					6
		6.00	SPT	N=16					
				(3,3/4,4,4,4)					
		7.50 - 7.95	U	100% 72 Bl.	7.50	40.40		Firm to stiff, brown, slightly sandy to sandy, silty CLAY with rare gravel. Gravel is angular to subangular of fine to medium mixed lithologies.	8
		8.80 - 9.00	B	5kg					9
		8.80		HVP=75					
		8.80		HVP=89					
		8.80		HVP=90					
		9.00 - 9.45	SPTLS	1kg					
		9.00	SPT	N=15					
				(2,3/3,4,4,4)					
Continued on next sheet									
Remarks:				Casing Details			Chiselling Details		
				Depth Top (m)	Depth Base (m)	Diameter (mm)	Depth Top (m)	Depth Base (m)	Duration (hrs)
					15.00	150	0.00	4.00	02:00
				Water Strike					
				Depth Strike (m)	Time Elapsed (min)	Water Level (m)			
SPT Energy Ratio: 67%									



ver. 0.5

BH01

Sheet 2 of 2

Project Name: 53 Spear Street

Co-ords: 385071E - 398545N

Project No.: 3159

Location: Manchester

Level (mAOD):	47.90
---------------	-------

Rev.: 1.0

Client:	Reform Developments Ltd.
----------------	--------------------------

Dates: 24/12/2018

Logged By: AE

Weather: Dry and overcast

Checked By: AJ

[illegible]

Remarks:

Casing Details			Chiselling Details		
Depth Top (m)	Depth Base (m)	Diameter (mm)	Depth Top (m)	Depth Base (m)	Duration (hrs)
	15.00	150	0.00	4.00	02:00
Water Strike					
Depth Strike (m)	Time Elapsed (min)	Water Level (m)			

SPT Energy Ratio: 67%

APPENDIX 4

GEOTECHNICAL LABORATORY TEST RESULTS



TEST REPORT

Client IGE Consulting Ltd

Address 14-32 Hewitt Street
Manchester
M15 4GB

Contract 3159 – 53 Spear Street,
Manchester

Job Number MRN 3431/10
Date of Issue 07 December 2018
Page 1 of 10

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted. This does not, however, guarantee the balance of the materials from which the tested samples have been taken to be of equal quality.



MURRAY RIX

Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

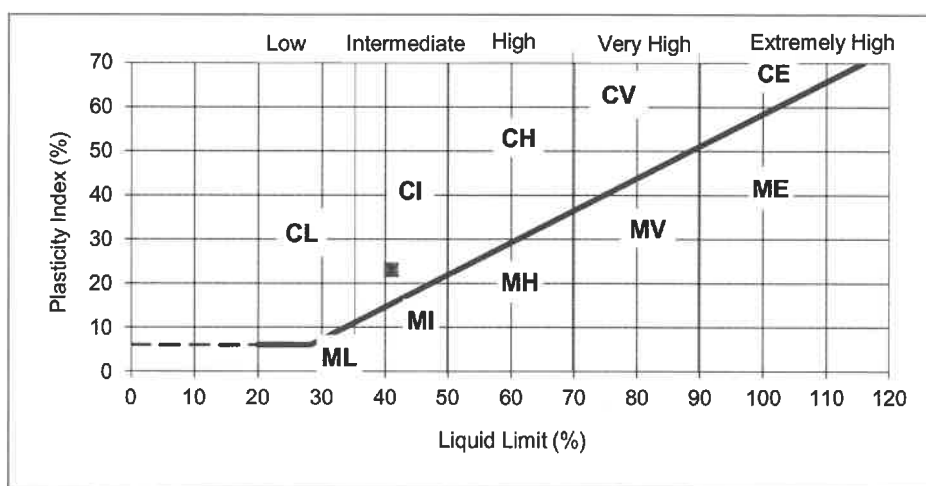
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	IGE Consulting Ltd
SITE	3159 - 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/10

SAMPLE LABEL	U100 @ 4.0m	DATE SAMPLED	28-Nov-18
SAMPLE No.	80373	DATE RECEIVED	29-Nov-18
DATE TESTED	29-Nov-18	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	41	18	23	95



REMARKS

Sample tested in natural condition

SIGNED

NAME

Page 2 of 10

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

DATE

07-Dec-18

MURRAY RIX

33C VAUXHALL INDUSTRIAL ESTATE, GREG STREET
REDDISH, STOCKPORT SK5 7BR
TEL 0161 475 0870 FAX 161 475N 0871

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION BS 1377: PART 7: 1990:CLAUSE 8 SINGLE STAGE

CLIENT	IGE Consulting Ltd
SITE	3159 - 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/9

SAMPLE LABEL	U100 @ 4.0m	DATE SAMPLED	28 November 2018
LAB SAMPLE No	80373	DATE RECEIVED	29 November 2018
DATE TESTED	30 November 2018	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation sample

SPECIMEN LENGTH	198	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	20	%
BULK DENSITY	2.14	Mg/m ³
DRY DENSITY	1.79	Mg/m ³
DEPTH OF TOP OF SPECIMEN	4.10	m
RATE OF STRAIN	2	%/min
RUBBER MEMBRANE THICKNESS	0.6	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
80	20	2.0	177.6	89

REMARKS

SIGNED

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

DATE 07 December 2018

MURRAY RIX

UNIT 33C, VAUXHALL IND. ESTATE, GREG STREET
REDDISH, STOCKPORT, SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

pH and Sulphate as SO₄
BS 1377: PART 3: 1990

CLIENT	IGE Consulting Ltd
SITE	3159 – 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/10

SAMPLE LABEL	U100 @ 4.0m	DATE SAMPLED	28 November 2018
LAB SAMPLE No	80373	DATE RECEIVED	29 November 2018
DATE TESTED	03 December 2018	SAMPLED BY	Client

ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried

PH Value	7.0	g/l
Sulphate as SO ₄ (2:1 Water Extract)	0.32	

REMARKS

SIGNED



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

DATE 07 December 2018

MURRAY RIX

Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

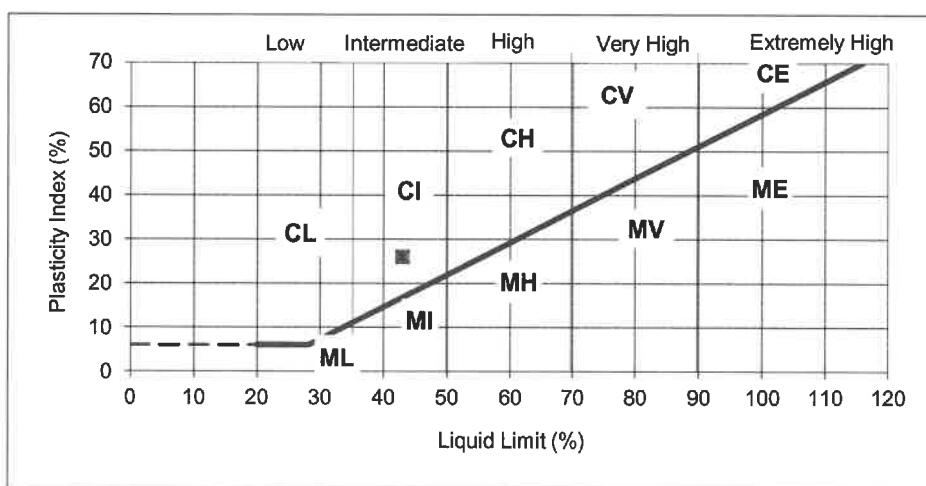
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	IGE Consulting Ltd
SITE	3159 - 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/10

SAMPLE LABEL	U100 @ 7.5m	DATE SAMPLED	28-Nov-18
SAMPLE No.	80374	DATE RECEIVED	29-Nov-18
DATE TESTED	29-Nov-18	SAMPLED BY	Client

MATERIAL	Firm brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
27	43	17	26	98



REMARKS

Sample tested in natural condition

SIGNED

NAME

Page 5 of 10

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

DATE

07-Dec-18

MURRAY RIX

33C VAUXHALL INDUSTRIAL ESTATE, GREG STREET
REDDISH, STOCKPORT SK5 7BR
TEL 0161 475 0870 FAX 161 475N 0871

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION
BS 1377: PART 7: 1990:CLAUSE 8 SINGLE STAGE

CLIENT	IGE Consulting Ltd
SITE	3159 - 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/9

SAMPLE LABEL	U100 @ 7.5m	DATE SAMPLED	28 November 2018
LAB SAMPLE No	80374	DATE RECEIVED	29 November 2018
DATE TESTED	30 November 2018	SAMPLED BY	Client

MATERIAL	Firm brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation sample

SPECIMEN LENGTH	196	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	27	%
BULK DENSITY	2.09	Mg/m ³
DRY DENSITY	1.64	Mg/m ³
DEPTH OF TOP OF SPECIMEN	7.60	m
RATE OF STRAIN	2	%/min
RUBBER MEMBRANE THICKNESS	0.6	mm

SPECIMEN AT
FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
150	20	2.0	89.9	45

REMARKS

SIGNED

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

DATE 07 December 2018

MURRAY RIX

UNIT 33C, VAUXHALL IND. ESTATE, GREG STREET
REDDISH, STOCKPORT, SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

pH and Sulphate as SO₄
BS 1377: PART 3: 1990

CLIENT	IGE Consulting Ltd
SITE	3159 – 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/10

SAMPLE LABEL	U100 @ 7.5m	DATE SAMPLED	28 November 2018
LAB SAMPLE No	80374	DATE RECEIVED	29 November 2018
DATE TESTED	03 December 2018	SAMPLED BY	Client

ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried

PH Value	7.0	g/l
Sulphate as SO ₄ (2:1 Water Extract)	0.30	

REMARKS

SIGNED


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

DATE 07 December 2018

MURRAY RIX

Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

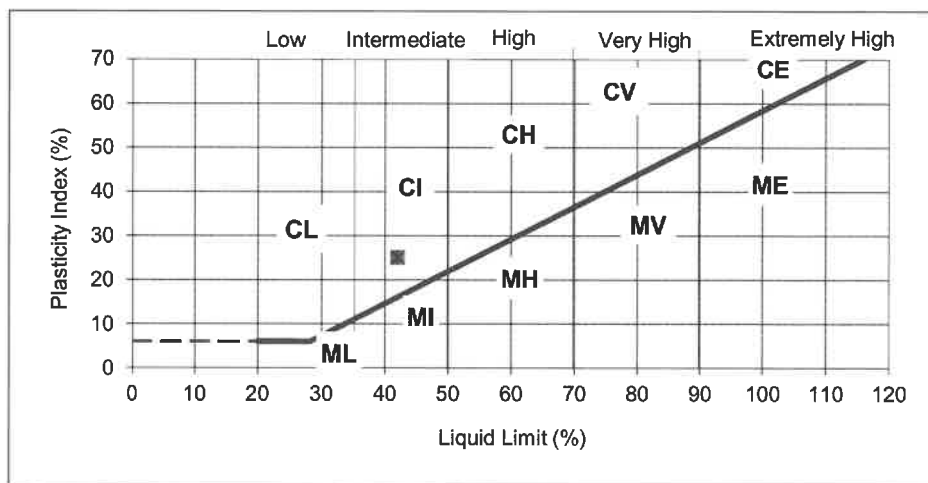
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	IGE Consulting Ltd
SITE	3159 - 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/10

SAMPLE LABEL	U100 @ 10.5m	DATE SAMPLED	28-Nov-18
SAMPLE No.	80375	DATE RECEIVED	29-Nov-18
DATE TESTED	29-Nov-18	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15	42	17	25	93



REMARKS

Sample tested in natural condition

SIGNED

NAME
Page 8 of 10

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

DATE

07-Dec-18

MURRAY RIX

33C VAUXHALL INDUSTRIAL ESTATE, GREG STREET
REDDISH, STOCKPORT SK5 7BR
TEL 0161 475 0870 FAX 161 475N 0871

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION BS 1377: PART 7: 1990:CLAUSE 8 SINGLE STAGE

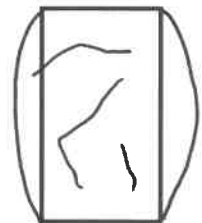
CLIENT	IGE Consulting Ltd
SITE	3159 - 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/9

SAMPLE LABEL	U100 @ 10.5m	DATE SAMPLED	28 November 2018
LAB SAMPLE No	80375	DATE RECEIVED	29 November 2018
DATE TESTED	30 November 2018	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation sample

SPECIMEN LENGTH	201	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	15	%
BULK DENSITY	2.27	Mg/m ³
DRY DENSITY	1.98	Mg/m ³
DEPTH OF TOP OF SPECIMEN	10.60	m
RATE OF STRAIN	2	%/min
RUBBER MEMBRANE THICKNESS	0.6	mm

SPECIMEN AT
FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
210	20	2.0	248.3	124

REMARKS

SIGNED

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

DATE 07 December 2018

MURRAY RIX

UNIT 33C, VAUXHALL IND. ESTATE, GREG STREET
REDDISH, STOCKPORT, SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

pH and Sulphate as SO₄
BS 1377: PART 3: 1990

CLIENT	IGE Consulting Ltd
SITE	3159 – 53 Spear Street, Manchester
JOB NUMBER	MRN 3431/10

SAMPLE LABEL	U100 @ 10.5m	DATE SAMPLED	28 November 2018
LAB SAMPLE No	80375	DATE RECEIVED	29 November 2018
DATE TESTED	03 December 2018	SAMPLED BY	Client

ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried

PH Value	7.1	g/l
Sulphate as SO ₄ (2:1 Water Extract)	0.25	

REMARKS

SIGNED



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

DATE 07 December 2018

APPENDIX 5

CHEMICAL LABORATORY RESULTS



2183

Final Report

Report No.:	18-37602-1		
Initial Date of Issue:	11-Dec-2018		
Client	IGE Consulting Ltd		
Client Address:	14-32 Hewitt Street Manchester M15 4GB		
Contact(s):	Andrew Edwards Angharad Jones Molly Brown		
Project	3159 Spear Street, Manchester		
Quotation No.:	Q17-11471	Date Received:	30-Nov-2018
Order No.:		Date Instructed:	30-Nov-2018
No. of Samples:	1		
Turnaround (Wkdays):	5	Results Due:	06-Dec-2018
Date Approved:	11-Dec-2018		
Approved By:			
Details:	Glynn Harvey, Laboratory Manager		

Project: 3159 Spear Street, Manchester

Results - Soil

Client: IGE Consulting Ltd	Chemtest Job No.:				18-37602
Quotation No.: Q17-11471	Chemtest Sample ID.:				733469
	Client Sample ID.:				BH1
	Sample Type:				SOIL
	Top Depth (m):				0.40
	Bottom Depth (m):				1.20
	Date Sampled:				26-Nov-2018
	Asbestos Lab:				DURHAM
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected
Moisture	N	2030	%	0.020	12
Stones and Removed Materials	N	2030	%	0.020	< 0.020
pH	U	2010		N/A	10.8
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.81
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	1.0
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	22
Barium	U	2450	mg/kg	10	330
Beryllium	U	2450	mg/kg	1.0	< 1.0
Cadmium	U	2450	mg/kg	0.10	1.9
Chromium	U	2450	mg/kg	1.0	18
Copper	U	2450	mg/kg	0.50	76
Mercury	U	2450	mg/kg	0.10	0.58
Nickel	U	2450	mg/kg	0.50	20
Lead	U	2450	mg/kg	0.50	460
Selenium	U	2450	mg/kg	0.20	0.23
Vanadium	U	2450	mg/kg	5.0	22
Zinc	U	2450	mg/kg	0.50	240
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	4.3
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0

Results - Soil

Client: IGE Consulting Ltd	Chemtest Job No.:				18-37602
Quotation No.: Q17-11471	Chemtest Sample ID.:				733469
	Client Sample ID.:				BH1
	Sample Type:				SOIL
	Top Depth (m):				0.40
	Bottom Depth (m):				1.20
	Date Sampled:				26-Nov-2018
	Asbestos Lab:				DURHAM
Determinand	Accred.	SOP	Units	LOD	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10
Dichlorodifluoromethane	N	2760	µg/kg	1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20
Chloroethane	N	2760	µg/kg	2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0
Bromochloromethane	N	2760	µg/kg	5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0
1,1-Dichloropropene	N	2760	µg/kg	1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane	N	2760	µg/kg	2.0	< 2.0
Dibromochloromethane	N	2760	µg/kg	10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0

Results - Soil

Client: IGE Consulting Ltd	Chemtest Job No.:				18-37602
Quotation No.: Q17-11471	Chemtest Sample ID.:				733469
	Client Sample ID.:				BH1
	Sample Type:				SOIL
	Top Depth (m):				0.40
	Bottom Depth (m):				1.20
	Date Sampled:				26-Nov-2018
	Asbestos Lab:				DURHAM
Determinand	Accred.	SOP	Units	LOD	
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0
Tribromomethane	N	2760	µg/kg	1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	N	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	N	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	N	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	N	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
4-Isopropyltoluene	N	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	N	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	N	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	0.73
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	0.55
Fluorene	U	2800	mg/kg	0.10	0.47
Phenanthrene	U	2800	mg/kg	0.10	3.0
Anthracene	U	2800	mg/kg	0.10	0.53
Fluoranthene	U	2800	mg/kg	0.10	2.6
Pyrene	U	2800	mg/kg	0.10	2.5
Benzo[a]anthracene	U	2800	mg/kg	0.10	0.87
Chrysene	U	2800	mg/kg	0.10	1.1
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	0.84
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	0.22
Benzo[a]pyrene	U	2800	mg/kg	0.10	0.59
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	0.16

Project: 3159 Spear Street, Manchester

Client: IGE Consulting Ltd	Chemtest Job No.:		18-37602		
Quotation No.: Q17-11471	Chemtest Sample ID.:		733469		
	Client Sample ID.:		BH1		
	Sample Type:		SOIL		
	Top Depth (m):		0.40		
	Bottom Depth (m):		1.20		
	Date Sampled:		26-Nov-2018		
	Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	0.33
Total Of 16 PAH's	N	2800	mg/kg	2.0	15
Total Phenols	U	2920	mg/kg	0.30	< 0.30

Results - Soil

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easily liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44 Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenzo[a,h]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and Trimethylphenols Note: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com