

PHASE 2 SITE INVESTIGATION

Mayfield Plot M

for

U+I Group



09 December 2019



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PHASE 2 SITE INVESTIGATION

at

Mayfield Plot M

for

U+I Group

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1.0 Introduction

1.1 Background

- 1.1.1 RoC Consulting has been appointed by the client, U+I Group, to conduct a Phase 2 Site Investigation across Plot M, Mayfield (the site). It is understood that the site is to be redeveloped for commercial office space in accordance with Morris + Company architect's drawings (ref: A283-MCO-XX-00-DR-A-01101-C) provided within Appendix A.
- 1.1.2 The following assessment has been completed to support design and planning requirements for the site's redevelopment and follows on from a number of reports relating to the wider development site, specifically:
 - 1) Phase 1 Mayfield Regeneration Geo-environmental and Geotechnical Desk Study Report completed by Buro Happold, dated 10 August 2017. (ref: 035548)
- 1.1.3 It is recommended reference be made to the abovementioned report when reviewing the current assessment.
- 1.1.4 The scope of the report and its assessment has been based around the site's redevelopment proposals as outlined in the aforementioned Morris + Company architect's plans. It should be noted that any subsequent revision of the proposed redevelopment or site boundary away from the above-mentioned drawing may result in the full or partial re-interpretation of this report and assessment.

1.2 Terms of Reference

- 1.2.1 The Phase 2 Site Investigation was carried out following receipt of an instruction from Joshua Morgan of Faithful+Gould, on behalf of U+I.

1.3 Objectives

- 1.3.1 The scope of works has been tailored to meet both planning and design requirements to assist with the site's redevelopment. These considerations include:
- 1) Design a programme of site investigation works to establish ground conditions beneath the site and target known or suspected sources of contamination (as revealed by the Phase 1 desktop study).
 - 2) Completion of site investigation field works including the formation of 10 boreholes to establish the site's ground conditions and understand the underlying geology.
 - 3) Completion of geo-environmental and geotechnical laboratory analysis of soil / rock samples to determine physical and chemical characteristics.
 - 4) Completion of a detailed geotechnical assessment of site conditions to inform new building foundation and retaining wall design. The scope of this assessment will also include reference to the findings and result of previous site investigation works.
 - 5) Completion of a geo-environmental assessment utilising information provided by both the current and previous phases of site investigation works sufficient in its scope to assist with the discharge of contaminated land related planning conditions.

2.0 Limitations of Study Assessment

- 2.0.1 The report has been produced by RoC Consulting for the client solely for the purposes of a review of information for the above-mentioned site. It may not be used by any person for any other purpose other than that specified without the express written permission of RoC Consulting. Any liability arising out of its use by a third party for purposes not wholly connected with the above shall be the responsibility of that party who shall indemnify RoC Consulting against all claims, costs, damages and losses arising out of such use.
- 2.0.2 This report is written in the context of an agreed scope of work and should not be used in a different context. The report should be read in its entirety. Furthermore, new information, improved practices and changes in legislation may require re-interpretation of this report in whole or in part after its original issue. RoC Consulting reserve the right to alter their conclusions and recommendations in the light of further information that may become available.
- 2.0.3 Ground conditions can change rapidly, especially in areas of made ground, however, it is assumed that the ground conditions observed are typical and representative of the site as a whole. The ground conditions have been determined from a limited number of exploratory holes formed across the property, therefore, only a small percentage of the total area of the property has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced.
- 2.0.4 Conclusions drawn from the ground investigation should be read in this context. RoC Consulting cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.

3.0 Background Information

- 3.0.1 The overview below outlines the most salient points / considerations and it is recommended reference be made to the complete findings of previous site investigation reports for additional information / clarification.

3.1 Site Description

- 3.1.1 The site, referred to as Plot M, forms part of the wider Mayfield Strategic Regeneration Framework (SRF) within Manchester City Centre. The SRF covers an area of approximately 10ha, ranging from the immediate south/southeast of Piccadilly Railway Station to Temperance Street / Mancunian Way to the east.
- 3.1.2 The wider site is currently occupied by existing and historical urban development; from a former railway depot and associated railway lines, to a waste transfer station and numerous historical works. The River Medlock meanders east to west through the centre, flowing through a number of culverts on the site. At the time of writing, most of the site has been demolished in the central area of the SRF, with the depot used as a large event space and wider area between the River Medlock as additional event space and a car park.
- 3.1.3 Plot M, which has been the focus of this Phase 2 Site Investigation, is located south of the River Medlock (forming the sites northern boundary) and is bound to the west by Nether Street and to the east by Manor Street and a large carpark. The site's southern boundary is formed by the edge of a grassed area adjacent to the A57(M) (Mancunian Way). The site is intersected by Bond Street running east to west and contains the grassed area containing advertising boards, which gently slopes down to the north. North of Bond Street the site is hardstanding, formerly the demolished building's concrete floor, with a change in level to the exposed former basement level adjacent to the River Medlock.
- 3.1.4 The topography of the site ranges from approximately 38.88mAOD at the southernmost extent (Grassed area), 36.2mAOD at the former floor level of the demolished building (later referred to as 'Upper Floor Slab') and 33.2mAOD at the northern most extent (basement level; later referred to as 'Lower Floor Slab'). The water level of the river along the northern boundary is approximately 32mAOD at the time of the investigation.

3.2 Geological Characteristics

- 3.2.1 Review of publicly available BGS geological map records, 1:50000 Sheet85 and 1:10000 Sheets SJ89NW/NE, indicate the site is underlain by the following:

Drift Geology: Glacial Till, Diamicton

Solid Geology: Triassic Age Sandstone, Chester Pebble Beds Formation

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- 3.2.2 The mapping shows that in the vicinity of the site there are two faults that strike north west / south east. The Ardwick Fault is to the north of Piccadilly Station with a downthrow of 100 feet to the north. To the south west of the site is the East Manchester Fault which also has a downthrow to the north.
- 3.2.3 The Envirocheck report (Appendix C) indicates that the site is not located in an area which may be affected by historic Coal Mining or Brine extraction and a Coal Authority report is not required.

3.3 Site History and Environmental Characteristics

- 3.3.1 Historical records contained within the Buro Happold Phase 1 report indicate the site to be occupied by Chapelfield Dye Works, including a chimney, from the earliest available records (1848) and later (1908) becoming a rubber works. A Water Meter Works is noted during the pre-war era at the southern extent of the site.
- 3.3.2 There is no significant change, with exception of the works expanding to encompass the works to the north of the River Medlock (culverting the river immediately north of the site), until the period of WW2 when the site was affected by bombing. By the 1956 mapping record, the site is consolidated into a single building footprint and remained in this condition up until the demolition of the site in 2019.
- 3.3.3 The Phase 1 Desk Study completed by Buro Happold indicates the drift geology is classified as Secondary Aquifer (Undifferentiated) with the underlying Sandstone bedrock classed as a Principal Aquifer. The site is not said to be located within any Environment Agency Source Protection Zones or in close proximity to any sensitive water abstraction points (e.g. potable water supply well). There are no surface or groundwater abstraction points; or discharge consents, within 1000m of the site.
- 3.3.4 The nearest surface water feature is indicated immediately north of the site in the form of the River Medlock. No measurable water quality or flow rates are available for this feature. There are no surface or groundwater abstraction points; or discharge consents, within 500m of the site. The river and the area south up to Bond Street is located in a flood risk Zone 2.
- 3.3.5 A waste transfer station is located immediately 100m east of the site, with a scrap yard located beyond Hoyle Street Industrial Estate.
- 3.3.6 Public records of Manchester bombings were consulted for the site, showing records of high explosive impacts in the area of Piccadilly Station and extensive damage to structures and demolition across the wider Mayfield development, as illustrated in Figure 3.1 below.
- 3.3.7 An Unexploded Ordnance (UXO) risk assessment was undertaken as part of the aforementioned Phase 1 Desk Study report and concluded that a 'Medium' Ordnance Threat Level applies across the site and wider development and that 'a UXO threat management strategy' is required to be in place prior to intrusive engineering works.

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Figure 3.1: Manchester Bomb Map



4.0 Site Investigation Design

General

- 4.0.1 The RoC intrusive investigation was designed and completed to further investigate geo-environmental issues identified during previous site investigations as well as provide geotechnical information to facilitate new building design.
- 4.0.2 The site investigation works comprised the formation of x4 cable tool boreholes which were extended into the underlying Sandstone bedrock to depths of 20mbgl using Rotary Cored drilling methods. A total of 6 continuous dynamic sample boreholes were also completed to shallow depths to target source of contamination and support information obtained from deeper boreholes. In-situ strength testing and soil / bedrock sampling was completed at regular intervals during the formation of all exploratory holes completed across the site.
- 4.0.3 Exploratory hole placement was dictated by the findings of the Phase 1 Desktop Study to zone in on areas where current / previous industrial activity may have impacted soil quality. In addition, boreholes were located within the footprint of the proposed new development to establish ground conditions and support foundation design.
- 4.0.4 A requirement for a non-intrusive UXO survey at all exploratory locations was identified from the Phase 1 Desk Study report and was completed at all exploratory hole locations during site fieldworks.
- 4.0.5 Samples of soil collected during the investigation works are to be analysed for a variety of determinants associated with the pattern of current / historic industrial activity across the site as outlined within the preliminary conceptual site model.
- 4.0.6 Table 4.0 provided below give the location and justification for each exploratory hole formed during the site investigation fieldworks. The purposes of this table are to illustrate the targeting of potential sources of contamination during the Phase 2 site investigation works.

Table 4.0: Borehole Locations & Justification

BH/WS ID.	Reason for selection
BH101 - BH104	Located within the footprint of proposed development to establish ground conditions and understand rock quality to support the design of foundations.
WS101	Located within the footprint of the proposed development to supplement the CP boreholes and to target areas of historical activity understand the risk of contamination below ground.
WS102	
WS103	To target Made Ground surrounding the former Chimney feature and surroundings to understand the risk of contamination from its operation
WS104	
WS105	Located within the footprint of the proposed development to supplement the CP boreholes and to target former Water Meter Works and understand the risk of contamination.
WS106	Located within the footprint of the proposed development to supplement the CP boreholes and to target areas of historical activity understand the risk of contamination below ground.

- 4.0.7 Exploratory hole locations are shown on RoC Consulting drawing ES201 (Current Site) provided within Appendix A.

5.0 Site Investigation Fieldworks

- 5.0.1 Site investigation fieldworks were completed between the 30 September and 18 October 2019 by drilling contractors Taylor Drilling Services Ltd and Earth Engineering. Boreholes were formed using a Dando 150 and Commachio 205 rig (Cable Tool with Rotary follow-on Boreholes) or Competitor 150 (Window Sampler Boreholes).
- 5.0.2 Prior to commencing the investigation works, each exploratory location was subject to a non-intrusive UXO survey; of which all locations were clear of any risk associated with buried UXO.
- 5.0.3 Information with respect to buried services was obtained from relevant providers prior to commencement of the investigation works. However, as a precautionary measure all exploratory hole locations were scanned with a Cable Avoidance Tool prior to the commencement of works. In addition, hand dug service pits were completed to a depth of 1.2mbgl at all borehole locations deemed to fall in close proximity to the suspected location of possible buried service runs / infrastructure.
- 5.0.4 To ensure no new sources of contamination were introduced to underlying soils / bedrock during the formation of each borehole, steel casing was used throughout as well as vegetable oil as a lubrication medium for all drilling apparatus. Sampling equipment was also cleaned between sampling to reduce cross-contamination risks.
- 5.0.5 Soil and rock core samples were collected for subsequent chemical and geotechnical laboratory analysis. Soil samples used for geotechnical analysis were collected in 500g plastic sample tubs, U100 wax-sealed sample tubes and polythene "bulk" bags. Samples collected for chemical testing were collected in 300g glass jars and 500g plastic sample tubs. Samples were obtained from both made ground and natural strata to assess the overall quality of underlying soils. In situ soil strength was investigated using Standard Penetration Tests (SPT) within superficial deposits as well as to confirm rock head had been reached.
- 5.0.6 The shallow soils encountered during construction of the boreholes were described and logged by a suitably qualified engineer in accordance with BS 5930: Code of Practice for Site Investigations (the log sheets for which have been provided within Appendix B).
- 5.0.7 A total of 4 ground gas and ground water monitoring wells were installed within cable tool boreholes. Installation details are provided within Table 5.0 below, copies of ground water and gas monitoring records are provided within Appendix E.

Table 5.1: Monitoring Well Installations

BH ID	Monitoring well depth	Response zone	Response zone strata
BH101	4.0	2.0 to 4.0mbgl	Made Ground
BH102	8.0	3.0 to 8.0mbgl	Weathered Sandstone
BH103	4.0	2.0 to 4.0mbgl	Made Ground
BH104	8.0	3.0 to 8.0mbgl	Weathered Sandstone

6.0 Encountered Ground Conditions

- 6.0.1 The following ground conditions are summarised from the exploratory holes formed during the RoC Consulting site investigation. The following represents an overview of encountered ground conditions and it is recommended reference be made to the borehole and trial pit log sheets provided within Appendix B for a detailed strata description; all depths shown are given in metres below ground level (mbgl) unless otherwise stated).

6.1 Ground Conditions Overview

Concrete Slabs

- 6.1.1 A concrete slab, which formed the floor level (~36.9mAOD) and basement level (~33.2mAOD) of the former building, was present at all but two locations (BH104, WS105) across the site. The slab at the higher elevation is 0.15m thick and overlies granular made ground deposits, with a second slab encountered at a depth of 0.5mbgl and averages 0.2m thick at four locations (WS102, WS104, BH101 and BH103). The slab at the lower elevation is 0.15m thick and overlays a second slab which averages 0.15m in thickness. This slab sits on top of natural strata at all locations.

Made Ground

- 6.1.2 Discounting the concrete slabs, Made Ground was reported at 7 exploratory hole locations. At the southern extent of the site, Made Ground is predominantly clay with brick, glass and slate present, ranging in depths between 1.0 and 1.2m / 37.45 and 37.88mAOD.
- 6.1.3 Beneath the slab at the upper level, Made Ground predominantly comprises of loose granular material consisting of ash, brick, concrete and limestone to depths ranging 1.5mbgl to 2.95mbgl / 35.43 and 33.98mAOD. SPT 'n' values range from 6 to 45, with a mean of 21. At the lower level at the northern most extent, Made Ground was not encountered beneath the floor slab.
- 6.1.4 Underlying granular Made Ground at BH101 and BH103 is a firm reworked clay containing brick from 1.5mbgl (~35.43mAOD) to 4.1mbgl (~32.83mAOD). SPT 'n' values range from 7 to 15, with a mean of 10.

Completely Weathered / Disintegrated Bedrock

- 6.1.5 Highly weathered and disintegrated sandstone bedrock was encountered at 7 exploratory locations, ranging at depths from 0.3mbgl (32.90mAOD) (lower slab level) to 4.1mbgl (32.83mAOD; upper slab elevation) and is highly weathered with extremely weak cementation, recovered as a reddish-brown sand or sandy gravel. This ranges to depths between 31.78mAOD at the southern extent of the site to 28.70mAOD (BH102) and 24.78mAOD (BH101) at the northern extent of the site, revealing the mean thickness of the weakly cemented sandstone as 5.85m.

Competent Bedrock

- 6.1.6 From 27.94 (BH104) and 22.0mAOD (BH102), the sandstone bedrock became very weak, distinctly weathered (with localised disintegrated sections) thinly bedded sandstone, with joints dipping 10-20°. A number of drilling induced fractures occurred during the coring due to the very weak nature of the rock.

- 6.1.7 A programme of geotechnical testing was completed on rock samples obtained from site investigation works copies of which are provided within Appendix D.

6.2 Groundwater & Contamination Observations

- 6.2.1 There was one encounter with olfactory contamination, relating to hydrocarbon odour at BH103 at 3.8mbgl. An area of exposed material beneath the upper floor slab was identified as asbestos during the demolition works and was subsequently marked and covered by the demolition contractors.
- 6.2.2 There was no encountered groundwater strikes during the works.
- 6.2.3 Resting groundwater monitoring results (as revealed from borehole standpipes) indicate a groundwater table within the sandstone deposits at depths circa 33.7maOD. Full details of monitoring results have been provided within Appendix E.
- 6.2.4 During the monitoring programme, periods of heavy rainfall increased the well volume of BH102 to below the slab level. This was purged to depths averaging 2.63mbgl. This may be caused by an interaction between standing water on hard surfacing increasing the water table, due to drainage holes drilled into the slab during demolition, and the adjacent River Medlock.

Table 6.3: Groundwater Strike Information

BH ID	Water Strike Depth		Resting Water Level	
	mbgl	maOD	mbgl	maOD
BH101	-	-	DRY	
BH102	-	-	2.63	30.57
BH103	-	-	DRY	
BH104	-	-	DRY	

6.3 Below Ground Obstructions

- 6.3.1 A number of below ground obstructions were encountered during the investigation. Exploratory boreholes (BH101, BH103, WS102, WS104,) encountered a second concrete slab at depth ranging to 0.7mbgl which may relate to historical footings beneath the existing floor slab.

7.0 Laboratory Testing

- 7.0.1 To establish the physical and chemical properties of underlying soils, a programme of laboratory analysis was completed utilising samples obtained during site investigation works. This analysis comprised the testing of soil samples to assist with the estimation of risks posed by contaminated land related concerns.

Chemical Testing

- 7.0.2 RoC Consulting submitted a total of 12 soil samples and 1 water sample to a UKAS accredited testing facility for analysis against a range of determinands synonymous with the site's former industrial activity.

Determinands	No. of Tests
Toxic and phytotoxic metals and metalloids	12
Total & Speciated Polycyclic Aromatic Hydrocarbons (PAH), TPH banding, BTEX	12
Other inorganic substances (e.g. Cyanide etc)	12
Asbestos ID	12
VOC & SVOC's	3
TPH (CWG)	7

- 7.0.3 Copies of chemical testing results have been provided within Appendix C.

Geotechnical Testing

- 7.0.4 A programme of geotechnical laboratory analysis was also completed on tub and undisturbed soil samples obtained during site investigation works.

Plasticity Index

- 7.0.5 A total of x3 soil samples were tested for the determination of the cohesive Made Ground plasticity index. The depth range of samples tested varied from 2.1 to 3.4mbgl with a mean depth of 2.6mbgl. The plasticity index range varied between 17 and 22% with a mean value of 19%. These results indicate reworked clay to be of a Low plastic nature.

Particle Size Distribution

- 7.0.6 A total of x6 bulk samples of sand (suspected weathered bedrock) were subject to particle size distribution testing to confirm their principal constituent parts. Results from these tests indicate granular deposits are between 73 and 88% sand and 2 - 11% gravel with the remaining fractions comprising silt.

Rock Strength Testing

- 7.0.7 A total of x41 point load tests were completed on rock core samples obtained from rotary boreholes. The point load test can be carried out as:

- Axial, the load applied along the core axis, normal to the observed bedding
- Diametral, the load is applied across the core, parallel to the observed bedding

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- 7.0.8 For assessment purposes the measured Is_{50} values for the Axial Point Load Index results have been corrected using a conversion factor of 24 for Sandstone to establish the approximate UCS values. Samples which were deemed “irregular” were disregarded from calculations. The results are presented on Table 7.1 below.

Table 7.1: Overview to Point Load Testing Results

Borehole ID	Orientation	Is50		Interpreted UCS		
		Min (MPa)	Max (MPa)	Min (MPa)	Max (MPa)	Average (MPa)
BH101	Axial	0.01	0.11	0.24	2.64	0.96
BH102	Axial	0.02	0.11	0.48	2.64	1.44
BH103	Axial	0.03	0.17	0.72	4.08	1.92
BH104	Axial	0.05	0.15	1.20	3.60	2.16

UCS Testing

- 7.0.9 A total of 15 Unconfined Compressive Strength Tests were completed on rock core samples obtained from rotary boreholes at depths ranging between 7.08 and 19.28mbgl. Results are indicated in Table 7.2 below.

Table 7.2: Overview to UCS Strength Testing Results

Borehole ID	No. Tests	Depth Top (mbgl)	UCS (MPa) Min	UCS (MPa) Max	UCS (MPa) Mean
BH101	4	14.35 – 19.28	2.67	4.83	3.78
BH102	4	15.11 – 19.00	1.53	9.13	4.13
BH103	2	13.05 & 18.88	2.10	3.85	N/A
BH104	5	7.08 – 16.22	1.90	9.14	4.78

- 7.0.10 The Uniaxial Compressive Strength and Interpreted UCS (from the Point Load Index (Is_{50}) test (Figure 7.1 overleaf) results indicate the upper portion of the sandstone to be extremely weak. In the interval below 27.98mAOD (southern extent) to 22.0mAOD (northern extent), the results indicate the sandstone to generally be Very Weak. The classification of rock strength is given in the table below.

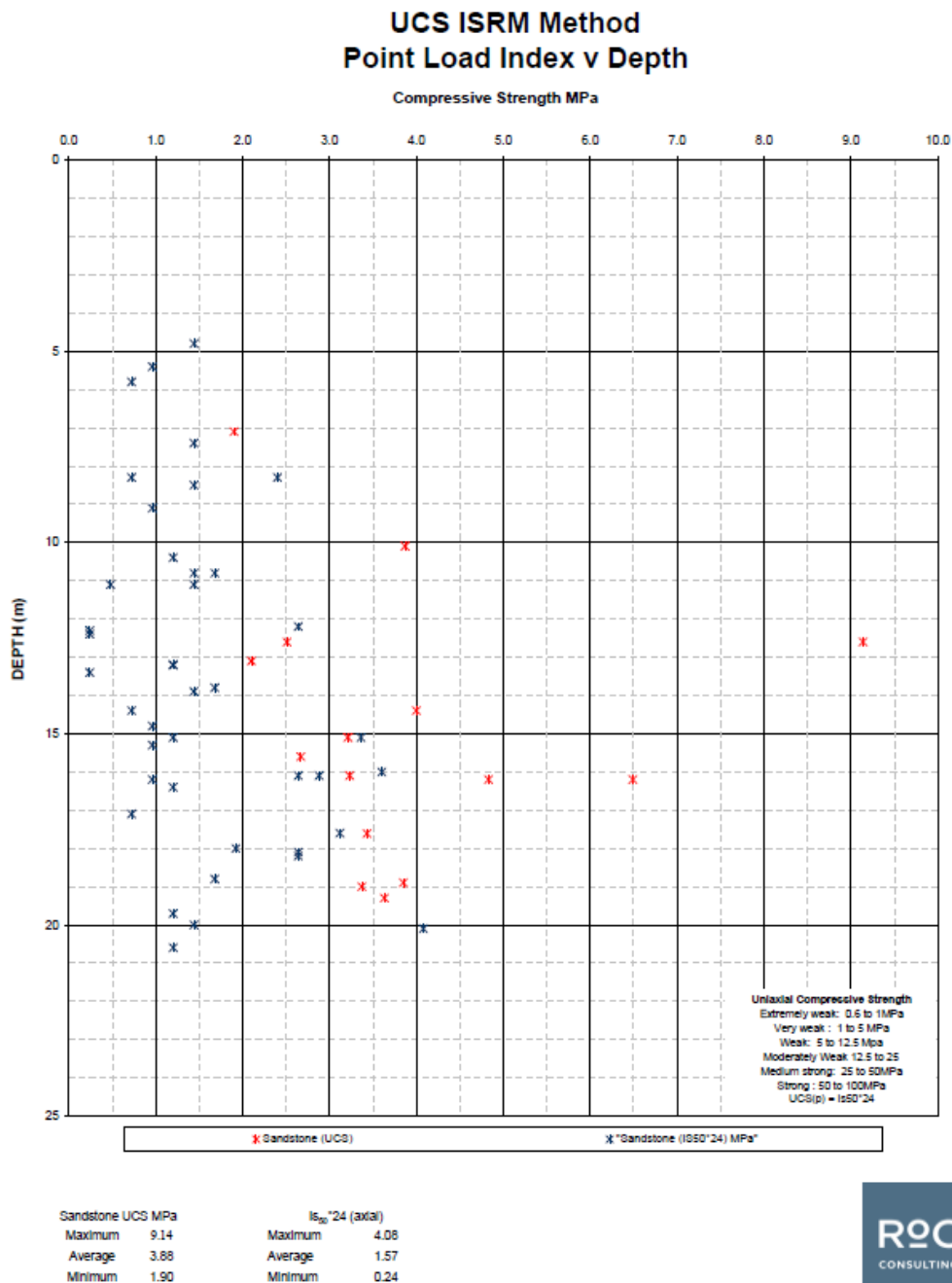
Strength Table 2 BSEN 14689:2018

Term for use in field or based on measurement	Definition for field use	Definition based on Unconfined Compressive strength.(MN/m ²)
Extremely weak	Can be indented by thumbnail. Gravel sized lumps crush between finger and thumb.	0.6 – 1.0
Very Weak	Crumbles under firm blows with point of geological hammer. Can be peeled by a pocketknife	1.0-5 .
Weak	Can be peeled by a pocketknife with difficulty. Shallow indentations made by a firm blow with the point of a geological hammer	5-12.5

- 7.0.11 Results from geotechnical laboratory testing have been provided within Appendix D.

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FIGURE 7.1: Uniaxial Compressive Strength and Interpreted UCS



8.0 Geo-Environmental Assessment

- 8.0.1 The information obtained during the desk-based study has been reviewed to establish the Preliminary Conceptual Model for the site. This model is based around the Source / Pathway / Receptor methodology as outlined in Figure 8.0.

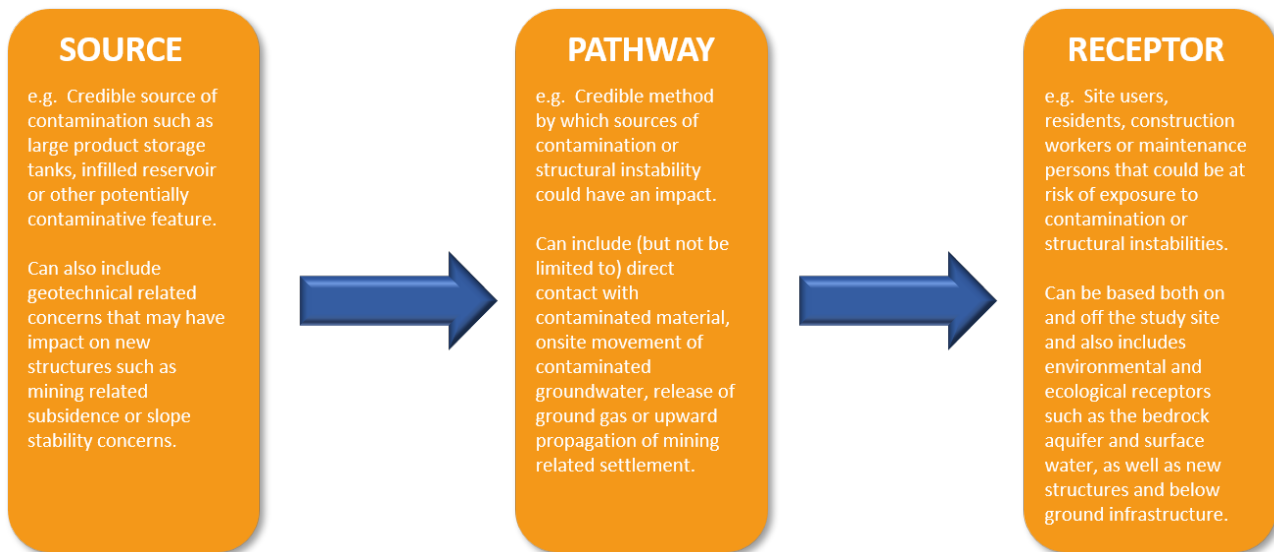


Figure 8.0 Source Pathway Receptor Diagram

- 8.0.2 Risk assessment is the process of collating known information on a hazard or set hazards in order to establish actual or potential risks to receptors. The receptor may be human health, controlled waters, a sensitive local ecosystem or even construction materials. Receptors can be connected with the hazard under consideration via one or several exposure pathways (e.g. the pathway of direct skin contact and oral exposure).
- 8.0.3 Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there is deemed to be no risk. In other words, the mere presence of a hazard at a site does not mean that there will necessarily be risks.
- 8.0.4 A CLEA CLR 8 provides a selection of contaminants that may be relevant for the assessment of contaminated land, based on site usage, because they are likely to be found on a large number of industrial sites in the UK and have the potential to affect human health and the environment. The CLEA CLR 8 documentation, along with other relevant guidance, forms the basis against which the site has been assessed.
- 8.0.5 A Preliminary desk-based risk assessment has been completed for the site utilising the current and historical environmental information available (refer to Buro Happold Phase 1 report). This report formed the basis from which the current program of ground investigations was designed and undertaken.

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- 8.0.6 The results from these intrusive site investigations have allowed a geo-environmental risk assessment to be completed in accordance with the guidelines and principals of the Environment Agency CLEA Methodology and with reference to the guidance outlined within CIRIA 552 “Contaminated land risk assessment. A good practice guide”. This risk assessment methodology considers the potential consequence / severity of risks that may be present within soils in comparison with the likelihood of exposure to or and occurrence of said risk.
- 8.0.7 A range of risk classifications are provided within CIRIA 552 further details of which are provided in Table 8.0 below.

Table 8.0: Definition of Risk Class and Consequence.

Risk Class	Definition	Example
Minor	Potential for harm, although not significant, which may result in financial loss to resolve. Ground conditions where the use of PPE would readily mitigate risks posed to human health.	Low level contamination hotspots within made ground / demolition fill materials. Stunted or impeded plant growth due to poor soil quality.
Mild	Pollution of non-sensitive water resources or damage to crops, plant growth, below ground utilities or structures.	Perched groundwater contamination overlying low permeability aquifer or aggressive sulphate concentrations in soils.
Medium	Sources of contamination identified on site have the potential to cause both long- and short-term health effects on site residents / users. Alternatively (or in conjunction with) sources of contamination may have the potential to impact surface or groundwater quality or impede vegetation growth	Elevated concentrations of hydrocarbon contamination reported within topsoil tested within residential gardens as a result of inadequate or incomplete previous remediation works. Movement of contaminated groundwater from leaking below ground storage tank into adjacent surface water course.
Severe	Sources of contamination pose a credible and acute risk to human health with potential for “Significant Harm” occurring as defined by the Part IIA of the Environmental Protection Act (1990). Alternatively (or in conjunction with risks posed to human health) sources of contamination may pose an immediate risk to controlled water resources or ecosystems.	Grossly contaminated soils are encountered or disturbed during excavation works, causing an immediate release of toxic soil vapour and leachate / contaminated groundwater flow across adjacent land.

- 8.0.8 As previously discussed the contaminated land risk assessment model evaluates both the severity of risks that may be present within soils / groundwaters in the context of threats posed to identified receptors before deriving the actual risk rating based on the probability of occurrence. Table 8.1 (provided overleaf) outlines the range likelihood of risk.

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Table 8.1: Probability Assessment

Classification	Definition
High likelihood	A credible pollutant linkage has been identified and it is very likely contaminants will impact identified receptors in both the short or long term (or is already actively doing so). The potential for harm to be caused is thus highly likely.
Likely	Pollutant linkages between the sources of contamination and identified receptors are present and it is considered likely they will become active given the right set of circumstances (e.g. contaminants currently buried below ground that are likely to be exposed or disturbed during construction / excavation works. The circumstances are such that an event is not inevitable, however, it is possible in the short term and likely over the longer term.
Low likelihood	A theoretical pollutant linkage has been identified that has the potential to exposure receptors to contaminants under the correct circumstances. However, the likelihood of such an event occurring is not a certainty, even in the long term
Unlikely	There is no / minimal likelihood a pollutant linkage would occur, even over the long term.

8.0.9 The risk assessment process is a combination of probability and consequence, recognising that it may be possible to have a significant source of contamination beneath a site (such as a large below ground chemical storage tank) that may only present a relatively moderate to low risk (owing to the fact it may be contained within a secure concrete bund). Table 8.2 indicates how the actual nature of risk is established with Table 8.3 illustrating how the risk is interpreted in the context of contaminated land risk assessment.

Table 8.2: Risk Definition

		Consequence			
		Severe	Medium	Mild	Minor
Probability	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	

Table 8.3: Description of risks posed

Risk Definition	Description
Very High	Active pollutant linkages between a significant source of contamination and identified receptors have been established and there is a high likelihood of severe harm occurring to said receptors unless immediate investigation and remediation action is taken.
High Risk	Harm is likely to arise to receptors from an identified hazard in the short and long term. Urgent investigation of the contaminant issue will be required, and remedial treatment is likely.
Moderate Risk	The possibility of harm has been identified toward receptors under the right circumstances, although the severity of harm would be relatively mild. Further investigation of identified issues would be prudent and possible need for remedial measures in the long term.
Low Risk	It is possible harm could arise to a designated receptor from identified hazard, but it is likely (if realised) any harm would be (at worst) mild.
Very Low Risk	No significant pollutant linkages have been identified and the possibly of harm occurring to receptors is low.

8.0.10 A geo-environmental risk assessment has been completed to quantify the risks posed to identified receptors (as outlined in the preliminary site conceptual model) using the information obtained during site investigation fieldworks. Broadly speaking, this risk assessment process can be divided based on the receptor group in question between:

- 1) Risks posed to human health by soil contamination (both construction persons and future site users).
- 2) Risks posed to human health by hazardous ground gas ingress (both construction persons and future site users).
- 3) Risks posed to controlled waters by soil or groundwater contamination (both surface water features and bedrock aquifers).
- 4) Risks posed to new building construction by aggressive ground conditions (namely elevated sulphate concentrations).

8.0.11 It is noted the site is being developed for commercial led end-uses, in the form of a 13-storey office building with associated public space, as per aforementioned architects plans; located in Appendix A.

8.0.12 Appropriate assessment have been completed for each of the above utilising the latest statutory and non-statutory guidance documents; for details of risks posed to human health refer to Section 8.1 (soils) and Section 8.2 (ground gas), for details of risks posed to controlled waters refer to Section 8.3 and risks posed to new structures refer to Section 8.4.

8.1 Assessment of Soil Contamination

- 8.1.1 In order to estimate the risks posed to human health from soil contamination, a quantitative risk assessment has been completed utilising the latest Environment Agency CLEA methodology. The assessment utilises the chemical testing results obtained during the site investigation fieldworks to characterise site conditions and facilitate the completion of the risk assessment process.
- 8.1.2 The assessment is based on the comparison of soil chemical testing results with published Environment Agency Category Four Screening Levels (C4SL's) under the proposed end use scenario to determine the sites suitability for use. C4SL values represent the highest acceptable values for contaminants within site soils under the proposed end use and are derived using the Environment Agency CLEA risk assessment methodology. A result in exceedance of a C4SL level may indicate the presence of contaminants within site soils and require further assessment.
- 8.1.3 It is noted only a limited number of C4SL values have been derived by the Environment Agency for use and reference has been made to LQM/CIEH Suitable For Use Values (S4UL's) for a wider range of other contaminants (Heavy Metals, Poly Aromatic Hydrocarbons, TPH, SVOC and VOC's) to increase the depth and robustness of our assessment.
- 8.1.4 Chemical testing results are compared against C4SL and S4UL values for each determinant with any results reported in exceedance of screening criteria identified and their significance reviewed. When determining the significance of any exceedances within the dataset the magnitude and frequency of the exceedance need to be taken into account, for example, a single exceedance of a screening value may be considered a localised hotspot whereas consistently elevated levels of a substance at multiple locations across the site may indicate a more prevalent contamination issue.
- 8.1.5 In addition to this assessment, an Asbestos Identification test (via the visual inspection method) has been completed on all samples of made ground obtained during the investigation to determine risks posed. Any positive occurrences of Asbestos will be subject to quantification analysis to further assess the extent and significance of risks posed.
- 8.1.6 As required, for each exceedance reference will be made to the Conceptual Site Model to establish the most likely source of contaminants and initial commentary given as to the likely scope of remedial measures. In addition, reference will also be made to the assumptions used to derive generic assessment criteria (C4SL and S4UL values) to determine their comparability with the proposed end use.
- 8.1.7 For the purposes of this assessment we have assumed a "Commercial" end use scenario when reviewing chemical testing data against C4SL / S4UL values; a "worst case" Soil Organic Matter content value of 1% has been assumed for the initial assessment.

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Summary and Assessment of Risks Posed by Soil Contamination

- 8.1.8 Results from chemical testing analysis indicate the following sources of contamination within site soils:
- 1) Evidence of Asbestos containing material was reported in 1 out of 12 samples tested, relating to Chrysotile loose fibres at 2.0mbgl (WS103) within the Made Ground (quantified 0.007%)
 - 2) There are no exceedances of CLEA SGV or CIEH LQM generic assessment criteria when reviewed under a “commercial” end use scenario.
- 8.1.9 Elevated concentrations of PAH were encountered beneath the upper floor slab within Made Ground materials; however, these were not significant and did not exceed the threshold for Commercial led end uses. Asbestos contamination is also limited to the shallow made ground deposits and may relate to previous historical changes and redevelopments.
- 8.1.10 It is noted that during the demolition of the former building, asbestos was observed 0.6mbgl beneath the upper slab; in the area of the exposed staircase. The exposure was covered by the demolition contractors to prevent mobilisation of contaminants. The asbestos material appears to have been used as construction build up within the former building floor slab and may be present in other locations across the site.
- 8.1.11 The findings of the above have been used to update the Refined Conceptual Site Model (provided within Section 9.0) as well as inform the scope of any further investigation or remedial works deemed necessary to support the sites development.

8.2 Ground Gas Risk Assessment

- 8.2.1 The Preliminary Conceptual Site model identified the Made Ground deposits as being a potential source of ground gas generation. The site is not said to be located within in an area at risk from Radon gas ingress.
- 8.2.2 It is considered the most probable exposure pathways are likely to be limited to construction workers during the site's redevelopment. Proposals indicate the site to be largely hardstanding and removal of the shallow Made Ground deposits would remove a source of gas generation
- 8.2.3 To estimate the risks posed by ground gas generation a total of 4 were installed with gas monitoring wells. The purpose of these standpipes is to investigate ground gas generation potential of shallow and at depth soils and the associated implications this may have for new building design. However, due to the shallow extent of Made Ground deposits, a total of 2 monitoring wells targeted shallow granular / bedrock deposits.
- 8.2.4 A total of 4 ground gas monitoring visits have been completed on site during varying weather conditions and atmospheric pressure (refer to Appendix E for further information). The results from these monitoring works revealed a maximum Carbon Dioxide concentration of 4.8% and a maximum Methane concentration of 3.6%. Peak flow rates are generally between 0.0 to 1.0lt/hr, with exception to BH102. Due to the monitoring well being completely submerged, the change in hydraulic pressure caused by purging the high groundwater increased the gas flow rate and has not been considered as part of this assessment. The results also indicated depleted oxygen levels within monitoring wells and an absence of carbon monoxide and hydrogen sulphide gases
- 8.2.5 Levels of methane on the site is suspected to be due to exposure of organic materials within Made Ground to atmospheric conditions, as subsequent monitoring visits indicate an overall decreased level in methane concentrations.
- 8.2.6 The principal source of ground gas generation is considered to be Made Ground contained beneath the upper elevation floor slab.
- 8.2.7 With reference to guidance provided in CIRIA C665 "*Assessing risks posed by hazardous ground gases to buildings*" and assuming the development comprises commercial led office space; the above-mentioned worst-case gas levels and borehole flow rates equate to a gas screening value of 0.01lt/hr. This value equates to a Characteristic 1 Situation with no remedial measures envisaged to control ground gas ingress.
- 8.2.8 As per compliance with current UK guidelines (CIRIA C665; Table 5.5a/b) the low sensitivity of the development (commercial led end uses) requires a minimum of 4 visits / 1 month of monitoring. As discussed above, no exceedances above 5% CO₂ was encountered, with CH₄ concentrations related to aerobic processes of the recently exposed material to the atmosphere. Combined with the minimal gas flow rates, it was deemed that additional monitoring was not required.

8.3 Controlled Waters

- 8.3.1 It is understood the site is underlain by a Principal Aquifer and is not said to be located within any Environment Agency Zone source protection zones or in close proximity to sensitive groundwater abstraction boreholes. The nearest surface water feature is indicated immediately north of the site in the form of the River Medlock and is considered to be at risk of contaminant migration from the study site.
- 8.3.2 Groundwater was not encountered during the initial investigation; however, monitoring data indicates there to be a groundwater table at the lower site elevation (BH102), adjacent to the River Medlock, contained within the bedrock from 30.57mAOD. This level fluctuates after periods of heavy rainfall, suspected to be due to percolation of groundwater from the surface via drilled holes within the slab.
- 8.3.3 In order to assess water quality, the chemical testing results were compared with published Environment Quality Standards (EQS) for freshwater. It is noted only a limited number of EQS values have been derived and therefore reference has been made to World Health Organisation (WHO) guidelines for a wider range of contaminants and to increase the robustness of our assessment.

Summary and Assessment of Risks Posed by Water Contamination

- 8.3.4 All determinands were identified to be below the screening criteria. Soil chemical testing results indicate localised elevated levels of PAH within Made Ground deposits; however, no evidence has been noted to suggest any movement of leachate or contamination into natural deposits or bedrock. Similarly, no significant source of mobile contamination was noted. Due to the lack of groundwater encountered within the Made Ground, it is considered that any contamination contained within the material is at low risk of being mobilised by groundwater.

8.4 Below Ground Concrete Construction

- 8.4.1 Current site conditions show peak potential sulphate concentrations ranging between 16 and 983; with soil pH values ranging between 8.06 and 11.38. Based on these results, it is considered that well compacted buried concrete should be designed in accordance with Class DS-2 AC-1s requirements as specified in BRE Digest Special Digest 1:2005 *Concrete in aggressive ground: Version 3*.

9.0 Refined Conceptual Site Model

9.0.1 The Environmental Protection Act Part IIA: 1990, defines contamination as land containing levels of contamination which form a risk to human health, controlled waters or other ecosystems. Therefore, contamination in exceedance of the relevant screening values is considered a source. Table 9.0 assesses and summarises the sources, pathways and receptors that may exist at the site:

Table 9.0: Refined Conceptual Site Model

Table .0		Refined Conceptual Site Model					
Source		Pathway	Receptor	Severity	Probability	Risk definition	Comments
On Site	Current Ground Conditions, including Made Ground	Dermal contact and / or ingestion; inhalation of vapours / dusts	Current Site Users	Medium	Low	Moderate / Low	The site is predominantly hard standing, with former floor slabs exposed across much of the site. The southern extent includes a road and grassed area. It is considered that the exposed area containing the suspected asbestos, although covered, is the main risk to current site users.
			Construction workers	Medium	Likely	Moderate	It is considered the risks posed to construction personnel, be sources of contamination, can be adequately mitigated against via the use of full PPE and the adoption of good hygiene and site practices.* Appropriate personal ground gas detection equipment should be deployed by all site operatives when working in below ground or confined spaces.
			Future Site Users	Medium	Unlikely	Low	The site is to be developed to comprise commercial office space and it considered future site users / maintenance persons are not at risk of exposure to sources of contamination as outlined above, as the removal of made ground during construction phase and subsequent hard standing will remove the pathway

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Table .0		Refined Conceptual Site Model					
Source		Pathway	Receptor	Severity	Probability	Risk definition	Comments
On site			Ecological [Plant Uptake]	Minor	Unlikely	Very Low	It is anticipated that the construction of the development will include the removal of low levels of contamination within the Made Ground materials. The proposals indicate there to be hardstanding surrounding the building, limiting the risk to ecology.
		Leaching of contaminated soil & impact beneath site	Controlled Waters: Aquifer	Medium	Unlikely	Moderate	The site is underlain by a Principal Aquifer and is not said to be located within any Environment Agency Zone source protection zones or in close proximity to sensitive groundwater abstraction boreholes. Contamination was not detected within the groundwater. The nearest surface water feature is indicated immediately north of the site in the form of the River Medlock (no river quality data available) and is considered to be at risk of potential contaminant migration from the site during construction phase.
			Controlled Waters: Surface Waters	Medium	Low	Low / Moderate	
			Adjacent Sites	Mild	Low	Low	
		Below ground service runs	Below ground infrastructure & construction	Medium	Low	Low / Moderate	All below ground concrete structures are to be designed in accordance with a Class DS-2 AC-1s requirements as specified in BRE Digest Special Digest 1:2005 Concrete in aggressive ground: Version 3. Removal of Made Ground is likely and would reduce the risk to low if undertaken.

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Table .0		Refined Conceptual Site Model					
Source		Pathway	Receptor	Severity	Probability	Risk definition	Comments
	Ground Gas Generation	Migration / Accumulation	Current Site Users	Severe	Unlikely	Low - Moderate	Ground gas monitoring has revealed the Made Ground to be the source of gas generation on the site. Maximum gas screening value for the site equates to 0.01lt/hr, classifying the site as Characteristic Situation 1, with no remedial requirements for the development. The site is not in an area of Radon protection.
			Construction workers	Severe	Unlikely	Low - Moderate	
			Future Site Users	Severe	Unlikely	Low - Moderate	
Off site	Potentially Contaminative Sources; Controlled waters and ground gas generation [adjacent landfills, peat bogs etc]	Leaching of contaminated soil onto site	Controlled Waters: Aquifer	Medium	Unlikely	Low	It is considered risks posed to surface and groundwater features are likely to be low owing to the degree of hard standing coverage.
		Ground gas Migration / Accumulation	Construction workers	Severe	Unlikely	Low - Moderate	It is considered the risks posed to construction personnel, by sources of contamination, can be adequately mitigated against via the use of full PPE and the adoption of good hygiene and site practises. Appropriate personal ground gas detection equipment should be deployed by all site operatives when working in below ground or confined spaces.
			Future Site Users	Severe	Unlikely	Low - Moderate	The site is as Characteristic Situation 1, with no remedial requirements for the development. The site is not in an area of Radon protection.
			Proposed development	Severe	Unlikely	Low - Moderate	

*Any sources of contamination uncovered during site development works should be brought to the immediate attention of RoC Consulting for consideration and comment.

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- 9.0.2 Re-appraisal and reassessment of the conceptual site model (following completion of investigation works) has revealed localised specific sources of contamination that could require specific remedial measures. This relates to asbestos contained within the Made Ground, however, removal of Made Ground to deliver the development platform is likely, and necessary chemical testing should be undertaken prior to disposal off site or to understand the suitability for re-use on the site.
- 9.0.3 It is recommended all construction contractors take reasonable precautions to control environmental impacts that may occur as a result of redevelopment works with respect of soil and groundwater quality. These measures should include (and not be limited to):
- 1) Any sources of contamination uncovered during site development works should be brought to the immediate attention of RoC Consulting for consideration and comment. As required, the findings and recommendations of the current assessment may require amendment to reflect changes in site condition.
 - 2) The operation of plant, refuelling facilities and general basement excavation works should include appropriate provision to reduce the risk of leakage / spillage, particularly into the site's groundwater table or exposed natural soils.
 - 3) Appropriate dust mitigation measures should be deployed during basement excavation works, particularly when handling and excavating made ground deposits.
 - 4) All excavated materials stockpiled should be periodically dampened down to control dust release. Similarly, the disposal of any material from site should be completed using covered wagons.
 - 5) Due consideration of risks posed by sediment rich or contaminated material run off into the River Medlock will be required during the construction phase with appropriate mitigation provided by contractors to protect this receptor.

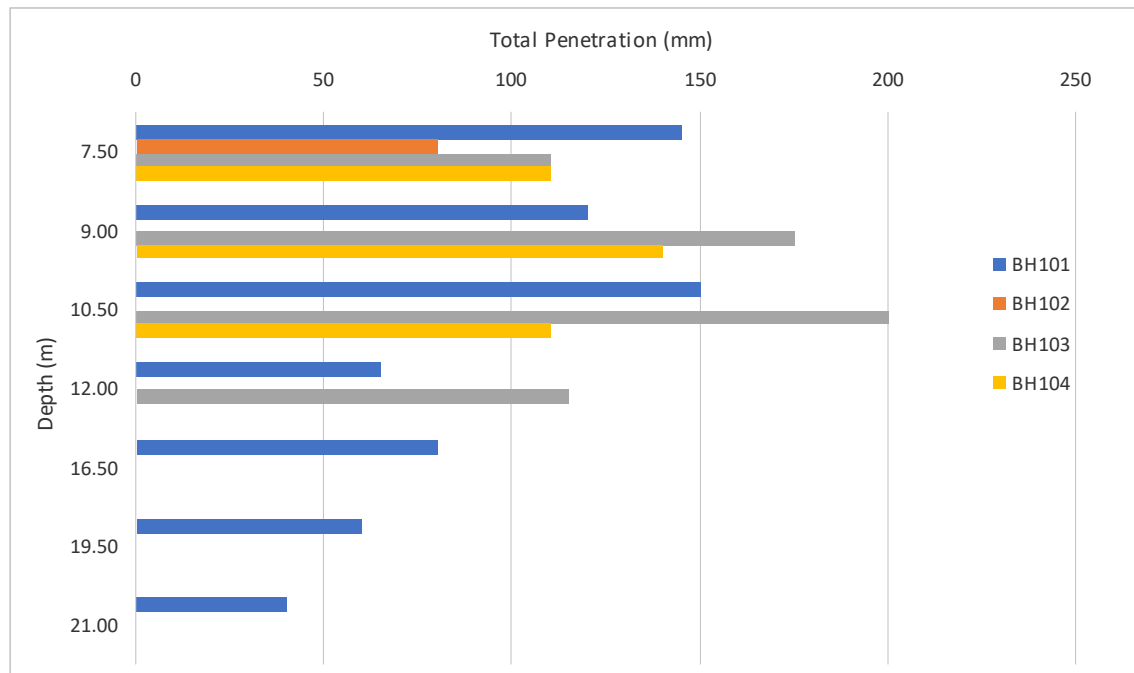
10.0 Geotechnical & Foundation Design Assessment

Background Information

- 10.0.1 It is understood the site is to be redeveloped to comprise 13-storey office block with associated amenities. The maximum column loadings associated with this development are said to be of the order of 8000kN with floor slab loadings of 12kN/per sq m.
- 10.0.2 Site investigations found Made Ground deposits from the previous land-use on site, to depths ranging 0.3 – 4.1mbgl. The natural strata is predominantly dense sand overlying extremely weak completely weathered sandstone bedrock encountered at depths ranging from 1.0 - 4.1mbgl (36.90 to 38.80mAOD), recovered as fine to coarse sand. SPT N values at this depth are 50+ (refusal). At BH101 a firm light brown mottled grey slightly gravelly sandy Clay was encountered from 1.5-4.1mbg. The SPTN value was 9 / 10. The clay was directly overlying the weathered Sandstone bedrock.
- 10.0.3 Beneath the completely weathered sandstone, the bedrock was generally reported as reddish brown extremely weak to very weak sandstone between depths of 10.91 and 13.46mbgl (27.83 and 29.89mAOD). The mechanical logging has shown: Total Core Recovery in the range 0-100% : Rock Quality Designation was in the range 0-87% more typically less than 20%. The mechanical log can reflect the incipient rock mass condition (natural rock mass parameters) and from drilling related / induced issues. The SPTN values (incomplete tests) are shown in the table below and the bar chart.

ID	Depth of Test	Reported N Value	Penetration in Test Zone (mm)
BH101	7.50	50	145
	9.00	50	120
	10.50	50	150
	12.00	50	65
	16.50	50	80
	19.50	50	60
	21.00	50	40
BH102	9.00	50	80
BH103	6.00	50	110
	7.00	50	175
	8.50	50	200
	10.00	50	115
BH104	6.00	50	110
	7.50	50	140
	12.00	50	110

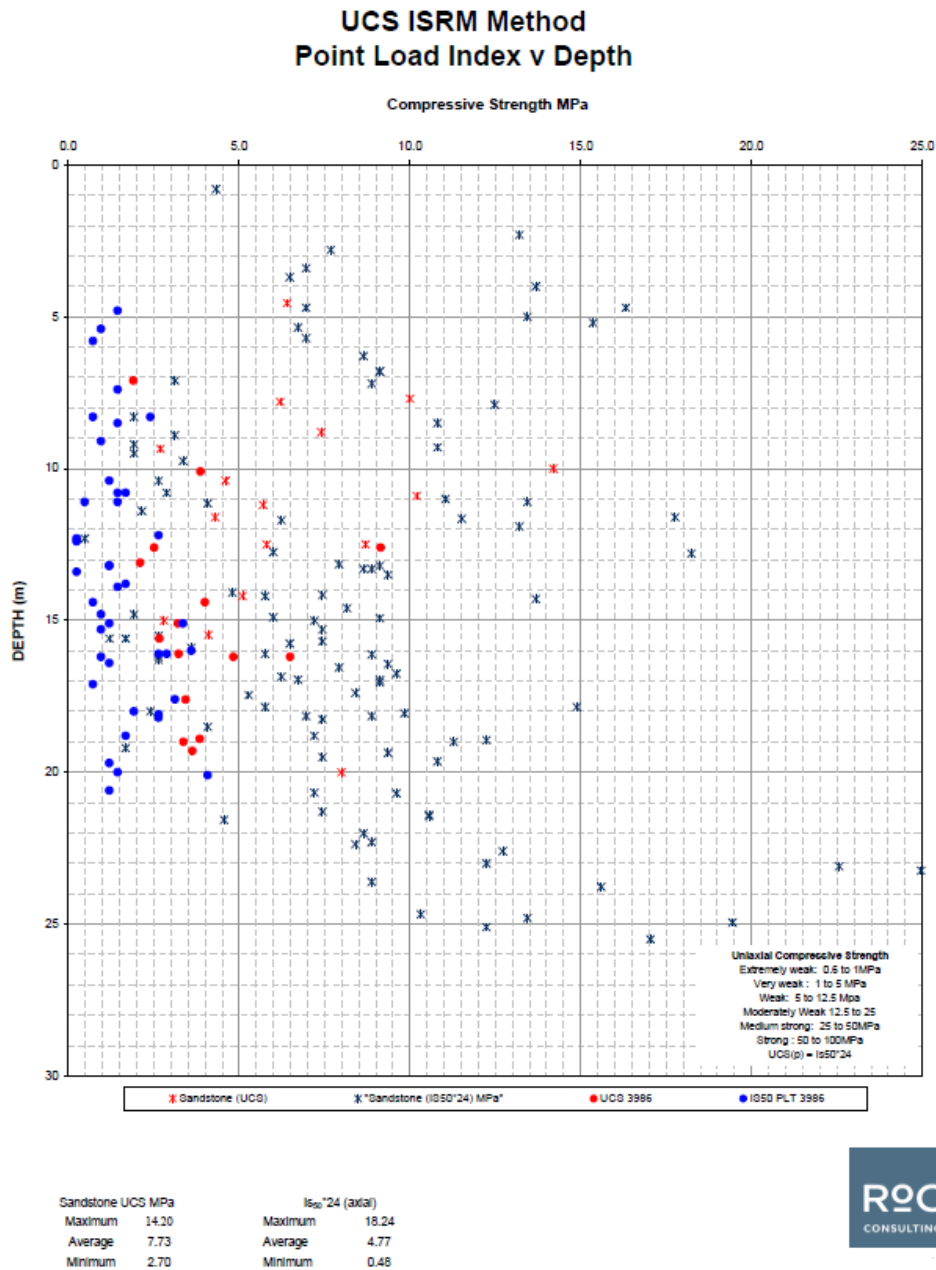
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- 10.0.4 As noted in Section 3.2, Manchester City Centre and the site is located in an area underlain by the Triassic Age Chester Formation. The formation comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish-brown sandy matrix and consist mainly of pebbles of brown or purple quartzite, with quartz conglomerate and vein quartz. In these areas, the formation is generally fines upwards, from dominantly conglomerates at the base, to interbedded conglomerates and sandstones, with sandstone and pebbly sandstone predominant in the upper part, with rare mudstones.
- 10.0.5 As discussed in Section 7.0, laboratory testing, Uniaxial Compressive Strength and Point Load Index (Is_{50}) testing was undertaken on suitable rock core samples. The results of the UCS and the estimated UCS from Point Load Index ($UCS = Is_{50} \times 24$) are present in Figure 7.1
- 10.0.6 We have compiled the rock test results with those from other site investigations completed by RoC Consulting across the Mayfield development within Chester Formation Sandstone to illustrate the weaker rock strengths identified in this ground investigation. The results are presented in Figure 10.1 below.
- 10.0.7 The rock strength tests of the 2019 boreholes show: Uniaxial Compressive Strength max 9.14MPa – min 1.90MPa. Estimated UCS Point Load Index (Is_{50}) max 4.08MPa - min 0.24MPa. The ROCP data set from Central Manchester shows Uniaxial Compressive Strength max 14.2MPa - min 2.70MPa and Estimated UCS Point Load Index (Is_{50}) max 18.24MPa - min 0.48MPa.

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Figure 10.1: Combined Project Database: Compressive Strength v Depth



10.1 New Building Foundation Design

- 10.1.1 It is not recommended new building foundations be constructed on top of Made Ground deposits. The variable composition and in situ strength of these materials is such that unacceptable levels of total and differential settlement will occur as a result.
- 10.1.2 As shown on the borehole record sheets the Made Ground is up to circa 4.0m deep and the dynamic sample boreholes confirm that there remain obstructions in the ground from previous structures.
- 10.1.3 In general, the Made Ground overlies sand both alluvial sand, reworked completely weathered sandstone and in-situ weathered sandstone. The boreholes confirm competent sandstone from a depth in the range 4.5m to 7.5m.
- 10.1.4 In view of the above, and given the variable depth to competent Sandstone bedrock, it is considered that a piled foundation will be necessary for the main structure and other significantly loaded structures.
- 10.1.5 The investigation has shown that a piled solution would terminate in the competent sandstone at a depth below 10.0m. As discussed above, the sandstone at this site location is significantly weaker than identified from other investigations undertaken across the wider Mayfield site by RoC Consulting. Based on the current investigation the Average Uniaxial Compressive Strength is 3.9MPa the Standard Deviation is 1.84, with the Point Load Index (Is50) (estimated UCS) average at 1.57MPa. To determine the variation of Standard Penetration Test in the Chester Formation we have prepared a table of linear extrapolation of the Standard Penetration Test results.

Table 10.2: Linear Extrapolation of SPT results

Depth of Test	7.50	9.00	10.50	12.00	16.50	19.50	21.00	9.00	6.00	7.00	8.50	10.00	6.00	7.50	12.00
Linear extrapolated N/300mm	103	125	100	231	188	250	375	188	136	86	75	130	136	107	136

- 10.1.6 Using the Linear Extrapolation, the N300 ranges from 75 to 375.
- 10.1.7 The piled foundations will be contractor designed. However, the design should take account of:
- (1) the variation of the SPTN value; and,
 - (2) the Uniaxial Compressive Strength and the fracture spacing. The shaft adhesion, estimated, would be circa 1MPa (N/mm²).
- 10.1.8 The review of the Standard Penetration Tests (extrapolated N/300mm) in the competent bedrock, below 12m, is estimated to be 200. For end bearing capacity would be expected to be in the range 500-900kPa. The shaft adhesion would be determined from the estimated Ø (internal friction) and the overburden pressure. For the initial assessment the Ø can be taken as 40°.

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- 10.1.9 The review of the Uniaxial Compressive Strength and Point Load Index (I_{s50}) results shows that there is a significant range in compressive strength, and we would recommend that the Design Uniaxial Compressive Strength can be taken as 2.5MPa. The end bearing capacity is determined from – $q_b = 0.5 \cdot N_c \cdot UCS_b$ - using the compressive strength at the base level (UCS_b) $N_c = 9$ and taking account of the fracture spacing. For the initial assessment the average Fracture Spacing in the competent sandstone below 12.0m can be estimated to be 200mm. For initial assessment the presumed end bearing capacity would be in the range 1000 kN/m² to 1200 kN/m²
- 10.1.10 Current site conditions show peak potential sulphate concentrations ranging between 16 and 983; with soil pH values ranging between 8.06 and 11.38. Based on these results, it is considered that well compacted buried concrete should be designed in accordance with Class DS-2 AC-1s requirements as specified in BRE Digest Special Digest 1:2005 *Concrete in aggressive ground: Version 3*.

10.2 General Comments

- 10.2.1 No entry should be permitted into excavations exceeding 1.2m depth without appropriate risk assessments, shoring and support. Whilst groundwater was not encountered in significant volumes during site investigation works the presence of a perched water table cannot be precluded. Appropriate provisions should be made to dewater excavations as and when required.
- 10.2.2 Deep excavations will require lateral support to prevent instability in the weak Made Ground, the loose near surface Sand and the firm slightly gravelly sandy Clay. Conventional steel sheet piling can be adopted. Certain dynamic sample boreholes encountered obstructions at shallow depth.
- 10.2.3 As noted above, certain dynamic sample boreholes showed obstructions at shallow depth. Obstructions will need to be removed to ensure that piling and excavation support can be installed.
- 10.2.4 Groundwater may be encountered at shallow depth, e.g. BH102 at 2.63m. A permanent perched groundwater would be accepted to be associated with the River Medlock.

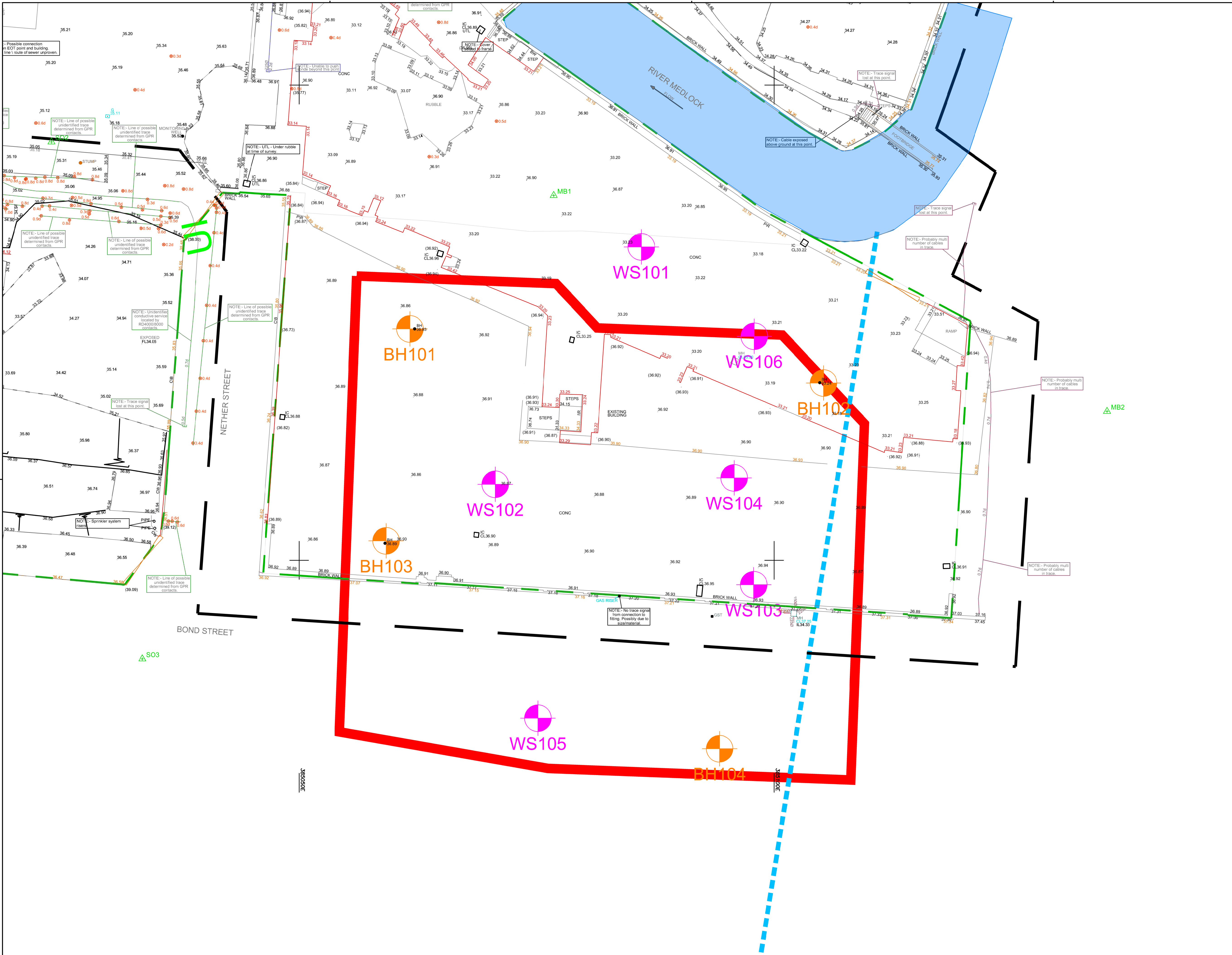
11.0 Conclusions & Recommendations

- 11.0.1 It is understood the site is to be redeveloped to comprise a 13-storey office block with associated amenities. The maximum column loadings associated with this development are said to be of the order of 8000kN with floor slab loadings of 12kN/per sq m.
- 11.0.2 Site investigations found Made Ground deposits from the previous land-use on site, to depths ranging 0.3 – 4.1mbgl. The natural strata is predominantly dense sand overlying extremely weak completely weathered sandstone bedrock encountered at depths ranging from 1.0 - 4.1mbgl (36.90 to 38.80mAOD), recovered as fine to coarse sand. SPT N values at this depth are 50+ (refusal). At BH101 was a firm light brown mottled grey slightly gravelly sandy Clay from 1.5-4.1mbg. The SPTN value was 9 / 10. The clay was directly overlying the weathered Sandstone bedrock.
- 11.0.3 Chemical assessment of site soils has not revealed, with exception to one occurrence of asbestos, any sources of soil contamination when compared against a “Commercial” end use scenario. The occurrence of further asbestos containing materials within the Made Ground and beneath the existing building floor slabs cannot be precluded, therefore appropriate due care and attention should be taken at all times when excavating site soils and any suspected sources of contamination identified brought to the immediate attention of RoC Consulting.
- 11.0.4 It is not recommended new building foundations be constructed on top of Made Ground deposits. The variable composition and in situ strength of these materials is such that unacceptable levels of total and differential settlement will occur as a result. The Made Ground is up to circa 4.0m deep there remains relic obstructions in the ground from previous structures.
- 11.0.5 It is considered that a piled foundation will be necessary for the main structure and other significantly loaded structures; the investigation has shown that a piled solution would terminate in the competent sandstone at a depth below 10m.
- 11.0.6 As required, any suspected sources of contamination discovered during the site development (outside those discussed in this report) should be brought to the attention of RoC Consulting and their implications assessed. Depending on the extent and severity, the findings and assessment of the current study may require re-interpretation and a remediation strategy proposed to support the sites development.
- 11.0.7 Copies of the current report, along with the Phase 1 Desktop Study, should be submitted to the local planning authority for consideration and comment. As required, any feedback received from the local authority should be passed back to RoC Consulting for review.



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APPENDIX A – Site Drawings



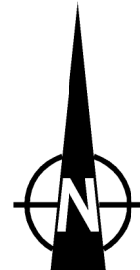
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NOTES

DRAWING NOTES

- PROPOSED DEVELOPMENT EXTENT
- ROTARY CORED BOREHOLE LOCATION
BH101
- WINDOW SAMPLER BOREHOLE LOCATION
WS101
- RECORDED LOCATION OF POTENTIAL CULVERT PROVIDED BY GROUNDSURE

- ALL EXPLORATORY BOREHOLE LOCATIONS ARE SHOWN AT NGR.
- HISTORICAL FEATURE / BUILDING INFORMATION TAKEN FROM HISTORICAL MAP RECORDS AND SHOULD BE CONSIDERED APPROXIMATE.
- LOCATION OF HISTORIC CULVERT PROVIDED BY GROUNDSURE. THE PRESENCE AND LOCATION OF THE CULVERT IS SPECULATIVE.



REV.	DATE	DETAILS	DRN.	CHK.
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DRAWING STATUS
INFORMATION

RIBA STAGE
N/A

Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W roccoconsulting.com

DRAWN ES	DATE JULY 2019	SCALES NTS
CHECKED AS	DATE JULY 2019	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE —DO NOT SCALE—
APPROV. AS	DATE JULY 2019	EMAIL FOR DRAWINGS info@roccoconsulting.com

CLIENT
U & I

PROJECT TITLE
PLOT M
MAYFIELD
MANCHESTER

DRAWING TITLE
EXPLORATORY HOLE
LOCATION PLAN

PROJECT No.	DRAWING No.	REV.
3986	ES201	R2



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APPENDIX B – Exploratory Hole Logsheets

ROC CONSULTING		Percussion Drilling Log									
Project Name: Mayfield Plot M					Client: U+I				Date: 04/10/2019		
Location: Manchester					Contractor: Earth Engineering/Taylor Drilling Services Ltd				Co-ords: E385061.66 N397524.35		
Project No. : 3986					Crew Name: J. Hurst+M. Williams				Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH101		Hole Type CP+RC		Level 36.93m AoD		Logged By LD		Scale 1:27		Page Number Sheet 1 of 5	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.15	36.78		Concrete slab (MADE GROUND)		1	
								Grey and brown slightly clayey angular GRAVEL of brick and concrete with occasional brick cobbles (MADE GROUND)			
					0.50	36.43		Concrete slab (MADE GROUND)			
			0.80	D	N=6 (1,1/2,2,1,1)	0.70	36.23		Loose brown slightly clayey slightly sandy angular GRAVEL of brick, concrete and ash. (MADE GROUND)		
			1.00	ES							
			1.20 - 1.65 1.20	D SPT							
						1.50	35.43		Firm light brown mixed grey slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse of various lithologies including rare brick. (REWORKED CLAY)		2
			1.70 - 2.00	B							
			2.00	ES							
									Very dense orangish brown slightly clayey gravelly fine to coarse SAND. Gravel is angular to sub angular, fine to coarse of Sandstone. (WEATHERED SANDSTONE)		3
			2.30 - 2.75 2.30	D SPT	N=9 (1,1/2,1,3,3)						
			3.00 - 3.45 3.00	D SPT							
			3.50 - 3.80	B							
						4.10	32.83		Very dense orangish brown slightly clayey gravelly fine to coarse SAND. Gravel is angular to sub angular, fine to coarse of Sandstone. (WEATHERED SANDSTONE)		4
			4.20 - 4.50 4.20 - 4.60 4.20	B D SPT	N=50 (5,10/50 for 255mm)						
		4.70 - 4.95 4.70	D SPT								
		5.00 - 5.30	B	50 (25 for 115mm/50 for 105mm)							
Hole Diameter		Casing Diameter		Chiselling			Inclination and Orientation				
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
6.00 21.00	150 127	4.50 7.50	150 127	4.20	6.20	01:30		0.00	20.50		
Remarks											
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl											

Percussion Drilling Log

Project Name: Mayfield Plot M			Client: U+I			Date: 04/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385061.66 N397524.35		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH101	Hole Type CP+RC		Level 36.93m AoD		Logged By LD	Scale 1:27	Page Number Sheet 2 of 5	

Well	Water Strikes	Sample and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results								
										Very dense orangish brown slightly clayey gravelly fine to coarse SAND. Gravel is angular to sub angular, fine to coarse of Sandstone. (WEATHERED SANDSTONE)		
		6.20-6.40	D				(50)	6.00	30.93		Extremely weak reddish brown SANDSTONE, completely weathered, recovered as sand within drilling flush. (CHESTER SANDSTONE FORMATION) ...6.0 - 6.37mbgl: Assumed Zone of Core Loss (A.Z.C.L) ...6.37 - 6.69mbgl: destructured ...6.69 - 6.89mbgl: distinctly weathered sandstone ...6.89 - 7.05mbgl: destructured ...7.05-7.42mbgl: distinctly weathered sandstone ...7.16mbgl: sand filled fracture ...7.27mbgl: sand filled fracture ...7.37mbgl: drilling induced fractures ...7.42 - 8.80mbgl: A.Z.C.L	6
	6.00 - 7.50	110 140 200	75	31	37						7	
	7.50 - 9.00	0 0 0	13	0	0						8	
	9.00 - 10.50	0 0 0	0	0	0					...8.87 - 9.00mbgl: destructured ...9.00 - 12.15mbgl: A.Z.C.L	9	
		Type/FI	TCR	SCR	RQD						10	

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
6.00	150	4.50	150	4.20	6.20	01:30		0.00	20.50		
21.00	127	7.50	127								

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl

Rotary Core Log

Project Name: Mayfield Plot M				Client: U+I				Date: 04/10/2019			
Location: Manchester				Contractor: Earth Engineering/Taylor Drilling Services Ltd				Co-ords: E385061.66 N397524.35			
Project No. : 3986				Crew Name: J. Hurst+M. Williams				Drilling Equipment: Dando 2000+Comacchio 205			
Borehole Number BH101		Hole Type CP+RC		Level 36.93m AoD		Logged By LD		Scale 1:27		Page Number Sheet 3 of 5	

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
							(50)	12.15	24.78	</		

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
6.00 21.00	150 127	4.50 7.50	150 127	4.20	6.20	01:30		0.00	20.50			6.00	20.50		Orangish Brown	95	100

Remarks

1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl



Rotary Core Log

Project Name: Mayfield Plot M			Client: U+I			Date: 04/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385061.66 N397524.35		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH101		Hole Type CP+RC		Level 36.93m AoD		Logged By LD		Page Number Sheet 4 of 5

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description			
				TCR	SCR	RQD								
		15.10-15.24	C				(50)				Very weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION)			
		15.24-15.42	C											
		15.60-15.91	C											
		13.50 - 16.50	40 110 310	90	72	56								
		16.06-16.19	C											
		16.20-16.36	C											
		16.50 - 19.50	40 90 120	47	28	18								...16.50 - 18.10mbgl: A.Z.C.L
19.28-19.39	C					...18.10 - 18.23mbgl: destructured								
19.28-19.39	C					...18.35 - 18.45mbgl: destructured								
19.28-19.39	C					...18.55 - 18.59mbgl: gravel filled fracture								
19.28-19.39	C					...18.70 - 18.75mbgl: gravel / sand filled fracture								
19.28-19.39	C					...18.80mbgl: drilling related erosion								
19.28-19.39	C					...19.00 - 19.50mbgl: destructured								
19.28-19.39	C					...19.50 - 19.82mbgl: A.Z.C.L								
19.28-19.39	C					...19.82mbgl: drilling erosion								
20.00-20.12	C										20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
6.00 21.00	150 127	4.50 7.50	150 127	4.20	6.20	01:30		0.00	20.50			6.00	20.50		Orangish Brown	95	100

Remarks

1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl



Rotary Core Log

Project Name: Mayfield Plot M				Client: U+I				Date: 04/10/2019			
Location: Manchester				Contractor: Earth Engineering/Taylor Drilling Services Ltd				Co-ords: E385061.66 N397524.35			
Project No. : 3986				Crew Name: J. Hurst+M. Williams				Drilling Equipment: Dando 2000+Comacchio 205			
Borehole Number BH101		Hole Type CP+RC		Level 36.93m AoD		Logged By LD		Scale 1:27		Page Number Sheet 5 of 5	

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SP1)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		19.50 - 21.00	30	78	65	36		21.00	15.93		Very weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...20.25mbgl: drilling induced fractures	21
		20.61-20.78	80 160								...20.85mbgl: gravel filled fracture	
							(50)				End of Borehole at 21.000m	21
												22
												23
												24
												25

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
6.00	150	4.50	150	4.20	6.20	01:30		0.00	20.50			6.00	20.50		Orangish Brown	95	100
21.00	127	7.50	127														

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl



Percussion Drilling Log

Project Name: Mayfield Plot M			Client: U+I			Date: 04/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385105.20 N397518.66		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH102	Hole Type CP+RC		Level 33.20m AoD		Logged By LD	Scale 1:27	Page Number Sheet 1 of 4	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.30	B	50 (7,15/50 for 105mm)	0.30	32.90		Concrete slab (MADE GROUND)	1		
		0.50	ES					Reddish very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse sandstone (WEATHERED SANDSTONE)			
		1.00 - 1.30 1.00	D SPT		0.90	32.30		Extremely weak reddish brown SANDSTONE, completely weathered, recovered as sand. (CHESTER SANDSTONE FORMATION)			
		2.00 - 2.30	B						2		
		2.60 - 2.75 2.60	D SPT	50 (25 for 70mm/50 for 70mm)					3		
		4.82-4.95	C		4.50	28.70		Extremely weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...4.50 - 4.67mbgl: destructured	5		
		Type/Fl	TCR	SCRR	QD						
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
4.50 20.00	150 127	2.00 4.50	150 127	0.90	2.60	01:00		0.00	20.00		

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 3.0 and 8.0mbgl

Rotary Core Log

Project Name: Mayfield Plot M			Client: U+I			Date: 04/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385105.20 N397518.66		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH102	Hole Type CP+RC		Level 33.20m AoD		Logged By LD	Scale 1:27	Page Number Sheet 2 of 4	

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description						
				TCR	SCR	RQD											
		5.42-5.50 4.50 - 6.00	20 80 200	87	59	31	(50)				Extremely weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...4.95mbgl: sand filled fracture ...5.30mbgl: sand filled fracture ...5.50mbgl: becomes orangish brown ...5.61 - 5.78mbgl: destructured ...5.90 - 6.04mbgl: drilling induced fractures ...6.20 - 6.40mbgl: drilling induced fractures ...6.61 - 6.74mbgl: drilling related erosion ...6.84mbgl: sand filled fracture ...7.12mbgl: sand filled fracture ...7.22mbgl: sand filled fracture ...7.50 - 8.40mbgl: Assumed Zone of Core Loss (A.Z.C.L) 8.40 - 8.50mbgl: destructured ...8.50 - 9.10mbgl: A.Z.C.L ...9.10 - 9.73mbgl: drilling induced fractures / erosion	6					
		5.77-5.90	C									7					
		7.40-7.50 6.00 - 9.00	10 70 150	47	37	20						8					
		9.10-9.20	C									9					
		9.00 - 10.50	30 70 130	92	54	15						10					
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
4.50 20.00	150 127	2.00 4.50	150 127	0.90	2.60	01:00		0.00	20.00			4.50	20.00		Orangish Brown	95	100

Remarks

1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 3.0 and 8.0mbgl

Rotary Core Log

Project Name: Mayfield Plot M			Client: U+I			Date: 04/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385105.20 N397518.66		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH102		Hole Type CP+RC		Level 33.20m AoD		Logged By LD		Page Number Sheet 3 of 4

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SP1)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		10.35-10.43	C					11.20	22.00		Extremely weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION)	11
		11.03-11.15	C								...10.50 - 11.20mbgl: drilling related erosion due to poor rock quality	
		10.50 - 12.00	40 90 140	100	57	41					Very weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...11.20mbgl: gravel filled fracture ...11.40mbgl: gravel filled fracture ...11.70mbgl: black staining on fracture	12
		12.15-12.30	C								...12.67mbgl: destructured / drilling induced fractures	
		13.15-13.25	C								...12.94 - 12.97mbgl: drilling induced fractures	13
		12.00 - 15.00	40 110 310	100	88	66					...13.15 - 13.17mbgl: gravel filled fracture ...13.35 - 13.40mbgl: drilling induced fractures ...13.55 - 13.60mbgl: sand filled fracture	
		14.36-14.50	C								...13.90 - 13.95mbgl: drilling induced fractures ...14.20mbgl: embedded gravel of quartz and marl, orange and black staining ...14.50 - 14.56mbgl: light grey sand / drilling induced fracture ...14.56 - 14.85mbgl: extremely weak distinctly weathered reddish brown MARL	14
												15

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
4.50 20.00	150 127	2.00 4.50	150 127	0.90	2.60	01:00		0.00	20.00			4.50	20.00		Orangish Brown	95	100

Remarks

1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 3.0 and 8.0mbgl



Rotary Core Log

Project Name: Mayfield Plot M	Client: U+I	Date: 04/10/2019
Location: Manchester	Contractor: Earth Engineering/Taylor Drilling Services Ltd	Co-ords: E385105.20 N397518.66
Project No. : 3986	Crew Name: J. Hurst+M. Williams	Drilling Equipment: Dando 2000+Comacchio 205

Borehole Number BH102	Hole Type CP+RC	Level 33.20m AoD	Logged By LD	Scale 1:27	Page Number Sheet 4 of 4
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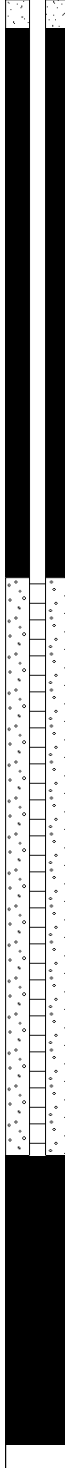
Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		15.11-15.35	C								Very weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION)	
											...15.60mbgl: becomes orangish brown	
											...15.83mbgl: drilling induced fractures	
		16.08-16.26	C									16
		15.00 - 18.00	10 110 260	100	95	76						
											...17.02 - 17.05mbgl: gravel filled fracture	17
		17.55-17.81	C								...17.50 - 17.60mbgl: drilling induced fractures	
											...17.78 - 17.80mbgl: clay filled fracture ...17.84 - 17.87mbgl: drilling induced fractures	
		18.10-18.22	C								...18.00 - 18.08mbgl: A.Z.C.L ...18.22 - 18.24mbgl: gravel filled fracture ...18.40 - 18.45mbgl: sand filled fracture	18
		18.00-18.34 19.08-19.34	20 90 260	96	91	61					...18.78mbgl: drilling induced fracture	19
								20.00	13.20		End of Borehole at 20.000m	20

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
4.50 20.00	150 127	2.00 4.50	150 127	0.90	2.60	01:00		0.00	20.00			4.50	20.00		Orangish Brown	95	100

Remarks	1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 3.0 and 8.0mbgl	
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Percussion Drilling Log

Project Name: Mayfield Plot M		Client: U+I		Date: 03/10/2019	
Location: Manchester		Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385059.15 N397502.05	
Project No. : 3986		Crew Name: J. Hurst+M. Williams		Drilling Equipment: Dando 2000+Comacchio 205	
Borehole Number BH103	Hole Type CP+RC	Level 36.89m AoD	Logged By LD	Scale 1:27	Page Number Sheet 1 of 5

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20 - 0.50	B	N=7 (4,5/3,2,1,1)	0.15	36.74		Concrete slab (MADE GROUND)	1
		0.50	ES		0.50	36.39		Brown slightly sandy slightly clayey gravel with angular brick cobbles. (MADE GROUND)	
		1.20	ES		0.70	36.19		Concrete slab (MADE GROUND)	
		1.20 - 1.65	D		1.50	35.39		Loose brown clayey angular fine to coarse GRAVEL of brick concrete and ash (MADE GROUND)	
		2.10 - 2.55	D SPT	N=15 (4,5/5,4,3,3)	3.00	33.89		Firm greyish brown slightly sandy gravelly CLAY. Gravel is angular, fine to coarse of brick, ash and concrete. (MADE GROUND)	2
		2.10	D						
		2.70	D						
		3.40 - 3.85	D SPT	N=7 (2,2/1,2,2,2)	4.10	32.79		Soft brown and grey slightly gravelly very sandy CLAY. Gravel is angular fine to coarse of brick(MADE GROUND)	3
		3.40	D						
		3.80	ES	N=50 (5,8/12,12,13,13)	4.10	32.79		...3.8mbgl: hydrocarbon odour	4
		4.00 - 4.30	B						
		4.00 - 4.40	D						
		4.00	SPT					Very Dense reddish orange brown very gravelly fine to coarse SAND. (WEATHERED SANDSTONE)	5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
5.50	150	4.50	150	4.40	6.00	01:00		0.00	20.00		
20.50	127	5.50	127								

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl

Percussion Drilling Log

Project Name: Mayfield Plot M			Client: U+I			Date: 03/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385059.15 N397502.05		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH103	Hole Type CP+RC		Level 36.89m AoD		Logged By LD	Scale 1:27	Page Number Sheet 2 of 5	

Well	Water Strikes	Sample and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results							
		5.10 - 5.45 5.10	D SPT	50 (8,11/50 for 180mm)					Very Dense reddish orange brown very gravelly fine to coarse SAND. (WEATHERED SANDSTONE)		
		5.50 - 7.00	90 100 100	55	13	7	(50)	5.50	31.39	Extremely weak reddish brown SANDSTONE, destructured. (CHESTER SANDSTONE FORMATION) ...5.50 - 6.67mbgl: Assumed Zone of Core Loss (A.Z.C.L)	6
		7.00 - 8.50	160 160 160	40	11	11	(50)			...6.67 - 7.00mbgl: extremely weak distinctly weathered ...6.75mbgl: sand filled fracture ...7.00 - 8.10mbgl: A.Z.C.L	7
	8.29-8.43	C				(50)	8.30	28.59	Extremely weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...8.40 - 8.50mbgl: drilling induced fractures ...8.50 - 8.90mbgl: A.Z.C.L ...8.90 - 8.95mbgl: destructured with marl and quartz gravel ...9.57 - 9.59mbgl: clay filled fracture ...9.59 - 9.67mbgl: sand filled fracture ...9.67 - 10.00mbgl: drilling induced fractures	8	
	8.50 - 10.00	30 80 150	73	59	17	(50)					9
		Type/FI	TCR	SCR	RQD	(50)					10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
5.50	150	4.50	150	4.40	6.00	01:00		0.00	20.00		
20.50	127	5.50	127								

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl

Rotary Core Log

Project Name: Mayfield Plot M			Client: U+I			Date: 03/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385059.15 N397502.05		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH103		Hole Type CP+RC		Level 36.89m AoD		Logged By LD		Page Number Sheet 3 of 5

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		10.00 - 11.50 10.80-10.96	20 100 220	87	46	29		11.84	25.05		Extremely weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...10.00 - 10.20mbgl: A.Z.C.L ...10.20 - 10.68mbgl: <u>destructured</u>	11
		11.06-11.21	C								...11.18mbgl: <u>sand fracture</u> ...11.38 - 11.44mbgl: <u>destructured</u> ...11.50 - 11.84mbgl: A.Z.C.L	
		11.50 - 14.50 13.05-13.26	30 90 210	89	52	32					Very weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...11.84 - 12.10mbgl: <u>destructured</u> ...12.22 - 12.55mbgl: <u>destructured</u>	12
		13.92-14.05	C								...13.00mbgl: <u>drilling induced fracture</u> ...13.23mbgl: <u>sand filled fracture</u> ...13.63 - 13.70mbgl: <u>gravel filled fracture</u> ...13.90 - 14.15mbgl: <u>drilling induced fracture</u> ...14.40 - 14.65mbgl: <u>destructured</u>	13 14 15

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
5.50 20.50	150 127	4.50 5.50	150 127	4.40	6.00	01:00		0.00	20.00			5.50	20.00		Orangish Brown	95	100

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl

Rotary Core Log

Project Name: Mayfield Plot M			Client: U+I			Date: 03/10/2019		
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd			Co-ords: E385059.15 N397502.05		
Project No. : 3986			Crew Name: J. Hurst+M. Williams			Drilling Equipment: Dando 2000+Comacchio 205		
Borehole Number BH103		Hole Type CP+RC		Level 36.89m AoD		Logged By LD		Page Number Sheet 4 of 5

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SP1)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		15.08-15.34	C								Very weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION) ...15.02 - 15.10mbgl: clay filled fracture	16
		15.60-15.91	C								...15.63 - 15.65mbgl: clay filled fracture	
		16.10-16.28	C									
		14.50-17.50	C	100	85	60						
		16.28-16.36	C									
		16.36-16.48	C									
		16.79-16.97	C								...16.65 - 16.70mbgl: sand filled fracture	
		17.04-17.20	C								...17.18 - 17.48mbgl: clay filled fracture	
											...17.48 - 18.45mbgl: A.Z.C.L	
		18.56-18.79	C								...18.45 - 18.60mbgl: destructured	
		17.50 - 20.50	C	70	56	37					...19.20 - 19.30mbgl: gravel filled fracture	19
		18.88-19.11	C								...19.30 - 19.65mbgl: drilling induced fractures	
		19.79-19.96	C									20

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
5.50 20.50	150 127	4.50 5.50	150 127	4.40	6.00	01:00		0.00	20.00			5.50	20.00		Orangish Brown	95	100

Remarks

1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl

Rotary Core Log

Project Name: Mayfield Plot M				Client: U+I				Date: 03/10/2019			
Location: Manchester				Contractor: Earth Engineering/Taylor Drilling Services Ltd				Co-ords: E385059.15 N397502.05			
Project No. : 3986				Crew Name: J. Hurst+M. Williams				Drilling Equipment: Dando 2000+Comacchio 205			
Borehole Number BH103		Hole Type CP+RC		Level 36.89m AoD		Logged By LD		Scale 1:27		Page Number Sheet 5 of 5	

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SP1)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		20.04-20.19	C					20.50	16.39		Very weak reddish brown SANDSTONE. Distinctly weathered. Joints are rough dipping 10-20degrees, thinly bedded. (CHESTER SANDSTONE FORMATION)	
		20.29-20.42	C									
											End of Borehole at 20.500m	
												21
												22
												23
												24
												25

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
5.50 20.50	150 127	4.50 5.50	150 127	4.40	6.00	01:00		0.00	20.00			5.50	20.00		Orangish Brown	95	100

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 2.0 and 4.0mbgl



Percussion Drilling Log

Project Name: Mayfield Plot M			Client: U+I		Date: 13/10/2016
Location: Manchester			Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385094.26 N397480.18
Project No. : 3986			Crew Name: M. Williams		Drilling Equipment: Comacchio 205
Borehole Number BH104	Hole Type CP+RC	Level 38.88m AoD	Logged By LD		Scale 1:27
					Page Number Sheet 2 of 4

Well	Water Strikes	Sample and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results						

Hole Diameter		Casing Diameter		Chiselling			Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination
6.00 20.00	150 127	6.00	127					0.00	20.00	

Remarks
1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Rotary Open Hole method utilised with rotary core follow on due to access constraints. 4. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 3.0 and 8.0mbgl

Rotary Core Log

[illegible]

Remarks

1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Rotary Open Hole method utilised with rotary core follow on due to access constraints. 4. Upon completion exploratory hole installed with 50mm diameter standpipe, with a response zone between 3.0 and 8.0mbgl



Rotary Core Log

Project Name: Mayfield Plot M						Client: U+I						Date: 13/10/2016					
Location: Manchester						Contractor: Earth Engineering/Taylor Drilling Services Ltd						Co-ords: E385094.26 N397480.18					
Project No. : 3986						Crew Name: M. Williams						Drilling Equipment: Comacchio 205					
Borehole Number BH104			Hole Type CP+RC			Level 38.88m AoD			Logged By LD			Scale 1:27			Page Number Sheet 4 of 4		
Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description						
				TCR	SCR	RQD											
		15.33-15.54	C								 						

Percussion Drilling Log

Project Name: Mayfield Plot M		Client: U+I		Date: 02/10/2019	
Location: Manchester		Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385085.96 N397532.00	
Project No. : 3986		Crew Name: O. Roberts		Drilling Equipment: Dando Terrier	
Borehole Number WS101	Hole Type WS	Level 33.20m AoD	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	32.90		Concrete Slab (MADE GROUND)	
		0.50 0.50	B ES					Very dense orangish brown slightly gravelly SAND. Gravel is angular to subangular fine to coarse sandstone (WEATHERED SANDSTONE)	
		0.90 1.00	SPT ES	50 (10,15/50 for 165mm)				...0.7mbgl: becoming reddish brown	1
					1.31	31.89		End of Borehole at 1.310m	2
									3
									4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.20 1.31	300 97							0.00	1.31		

Remarks

1. Inspection Pit hand excavated to 0.9m prior to drilling. 2. No groundwater was observed. 3. SPT refusal at 1.31m. 4. Upon completion exploratory hole backfilled with cocconcrete and arisings.

Percussion Drilling Log

Project Name: Mayfield Plot M		Client: U+I		Date: 02/10/2019	
Location: Manchester		Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385070.19 N397507.25	
Project No. : 3986		Crew Name: O. Roberts		Drilling Equipment: Dando Terrier	
Borehole Number WS102	Hole Type WS	Level 36.87m AoD	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	36.57		Concrete Slab (MADE GROUND)	
		0.50	B		0.45	36.42		Concrete (MADE GROUND)	
		0.50	ES					Dark brown sandy fine to coarse angular brick GRAVEL/COBBLES. (MADE GROUND)	
					0.70	36.17		...0.5mbgl: fragments of timber	
								End of Borehole at 0.700m	
									1
									2
									3
									4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
0.70	300							0.00	0.70		

Remarks

1. Inspection Pit hand excavated to 0.7m prior to encountering obstruction. 2. No groundwater was observed. 3. Concrete slab encountered at 0.7m. 4. Upon completion exploratory hole backfilled with concrete and arisings.

Percussion Drilling Log

Project Name: Mayfield Plot M		Client: U+I		Date: 02/10/2019	
Location: Manchester		Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385103.72 N397497.88	
Project No. : 3986		Crew Name: O. Roberts		Drilling Equipment: Dando Terrier	
Borehole Number WS103	Hole Type WS	Level 36.93m AoD	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.18	36.75		Concrete Slab (MADE GROUND)	
		0.50 0.50	B ES					Medium dense light brown very sandy GRAVEL. Gravel is fine to coarse, sub angular to angular of limestone. (MADE GROUND)	1
		1.00	ES						
		1.20	SPT	N=23 (2,3/4,5,8,6)					
		1.70	ES		1.70	35.23		Medium dense becoming dense dark black sandy angular fine to coarse brick and clinker GRAVEL with ash. (MADE GROUND)	2
		2.00	SPT	N=24 (5,13/10,5,5,4)					
		2.25	ES						
		2.50	SPT	N=45 (25 for 75mm/8,9,14,14)				<u>...becoming dense</u>	
					2.95	33.98		End of Borehole at 2.950m	3
									4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.20 2.50	300 97							0.00	2.50		

Remarks

1. Inspection Pit hand excavated to 1.2m prior to drilling. 2. No groundwater was observed. 3. Sampler refusal at 2.5m 4. Upon completion exploratory hole backfilled with concrete and arisings.

Project Name: Mayfield Plot M		Client: U+I		Date: 02/10/2019	
Location: Manchester		Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385095.53 N397508.59	
Project No. : 3986		Crew Name: O. Roberts		Drilling Equipment: Dando Terrier	
Borehole Number WS104	Hole Type WS	Level 36.89m AoD	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Concrete Slab (MADE GROUND)
		0.20	B		0.15	36.74		Brown gravelly fine to coarse SAND with a high cobble content. Gravel is fine to coarse sub angular to angular of brick. Cobbles are angular brick. (MADE GROUND)
		0.40	ES					
					0.50	36.39		End of Borehole at 0.500m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
0.50	300							0.00	0.50		

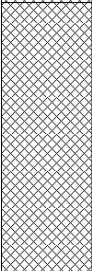
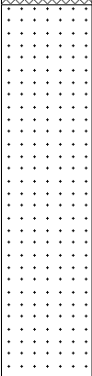
Remarks

1. Inspection Pit hand excavated to 0.5m prior to encountering obstruction. 2. No groundwater was observed. 3. Concrete slab encountered at 0.5m. 4. Upon completion exploratory hole backfilled with concrete and arisings.



Percussion Drilling Log

Project Name: Mayfield Plot M		Client: U+I		Date: 02/10/2019	
Location: Manchester		Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385075.13 N397483.39	
Project No. : 3986		Crew Name: O. Roberts		Drilling Equipment: Dando Terrier	
Borehole Number WS105	Hole Type WS	Level 38.65m AoD	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30			0.30	38.35		Dark brown slightly sandy organic CLAY with rootlets and occasional sub angular to angular fine to coarse brick fragments. (TOPSOIL)	1
		0.50 0.50	D ES					Firm brown sandy gravelly CLAY. Gravel is fine to coarse sub angular to angular of brick, glass and slate. (MADE GROUND)	
		1.00 1.00	ES SPT	N=18 (3,6/4,2,5,7)				...0.9mbgl: fragments of timber ...1.0mbgl: concrete cobble	
		1.20	ES		1.20	37.45		Very dense orangish brown gravelly fine to medium SAND. (WEATHERED SANDSTONE)	2
		1.60	SPT	N=50 (5,8/50 for 285mm)					
					2.44	36.21		End of Borehole at 2.440m	3
									4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00 2.00 2.44	300 97 87							0.00	2.44		

Remarks

1. Inspection Pit hand excavated to 1.0m prior to drilling. 2. No groundwater was observed. 3. Refusal at 2.44m. 4. Upon completion exploratory hole backfilled with bentonite and arisings.

Percussion Drilling Log

Project Name: Mayfield Plot M		Client: U+I		Date: 02/10/2019	
Location: Manchester		Contractor: Earth Engineering/Taylor Drilling Services Ltd		Co-ords: E385097.92 N397523.57	
Project No. : 3986		Crew Name: O. Roberts		Drilling Equipment: Dando Terrier	
Borehole Number WS106	Hole Type WS	Level 33.20m AoD	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40	32.80		Concrete slab (MADE GROUND) .	
		0.50 0.50	B ES					Very dense reddish brown gravelly SAND (WEATHERED SANDSTONE).	1
		0.80 - 1.20 0.90	B SPT	50 (25 for 135mm/50 for 150mm)	1.21	31.99		End of Borehole at 1.210m	2
									3
									4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
0.90	300							0.00	1.21		

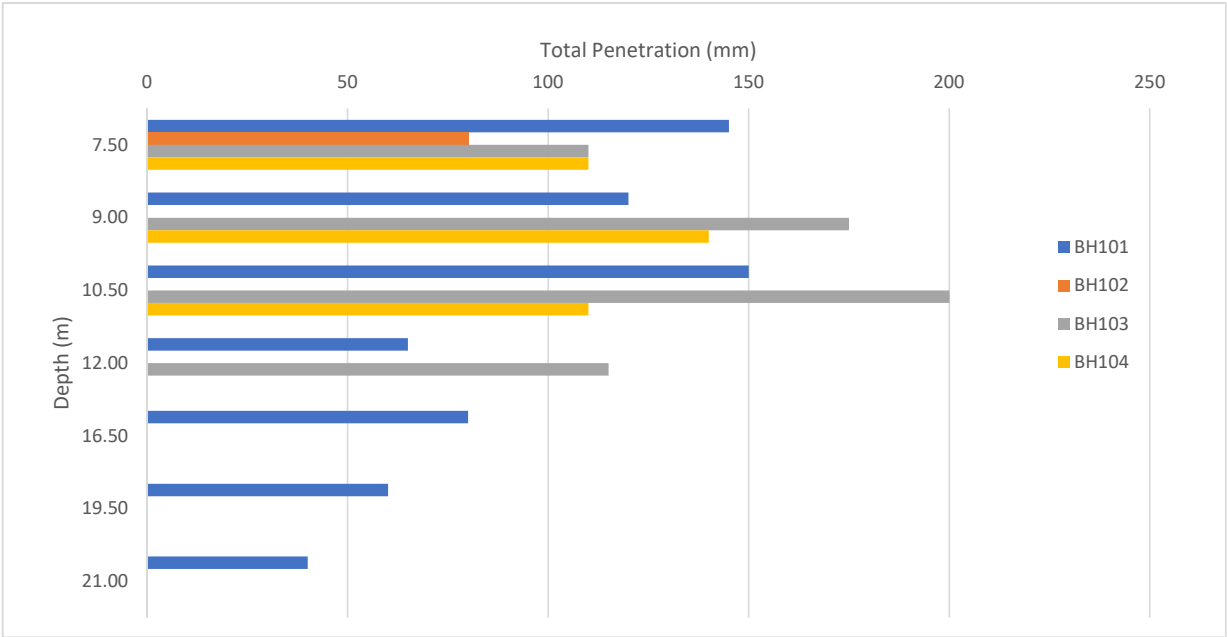
Remarks

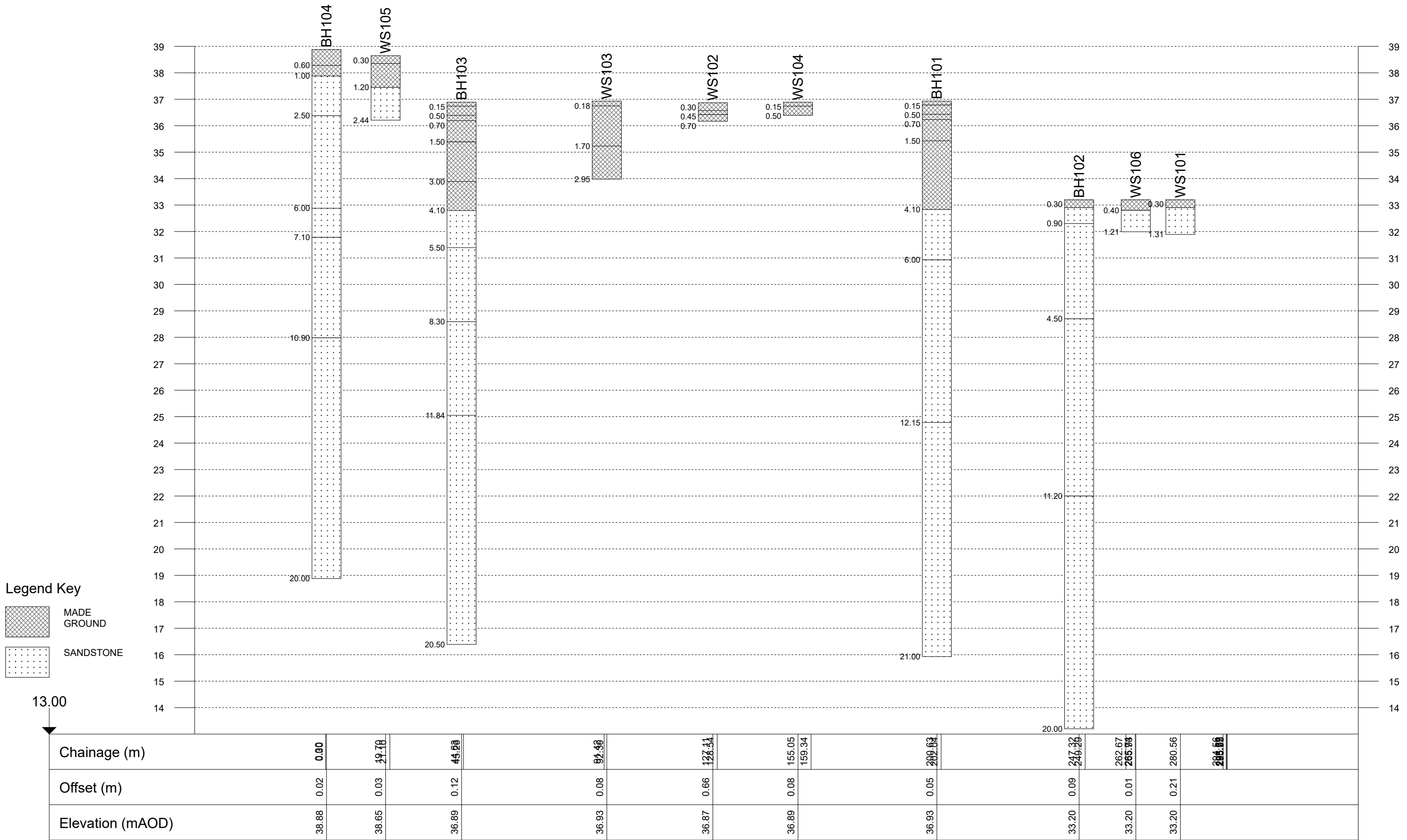
1. Inspection Pit hand excavated to 0.9m prior to drilling. 2. No groundwater was observed. 3. Upon completion exploratory hole backfilled with concrete and arisings

Project Title: Plot M, Mayfield
Project No: 3986
Work Item: In-Situ Testing within Bedrock



ID	Depth of Test	Reported N Value	Total Penetration (mm)
BH101	7.50	50	145
	9.00	50	120
	10.50	50	150
	12.00	50	65
	16.50	50	80
	19.50	50	60
	21.00	50	40
BH102	9.00	50	80
BH103	6.00	50	110
	7.00	50	175
	8.50	50	200
	10.00	50	115
BH104	6.00	50	110
	7.50	50	140
	12.00	50	110





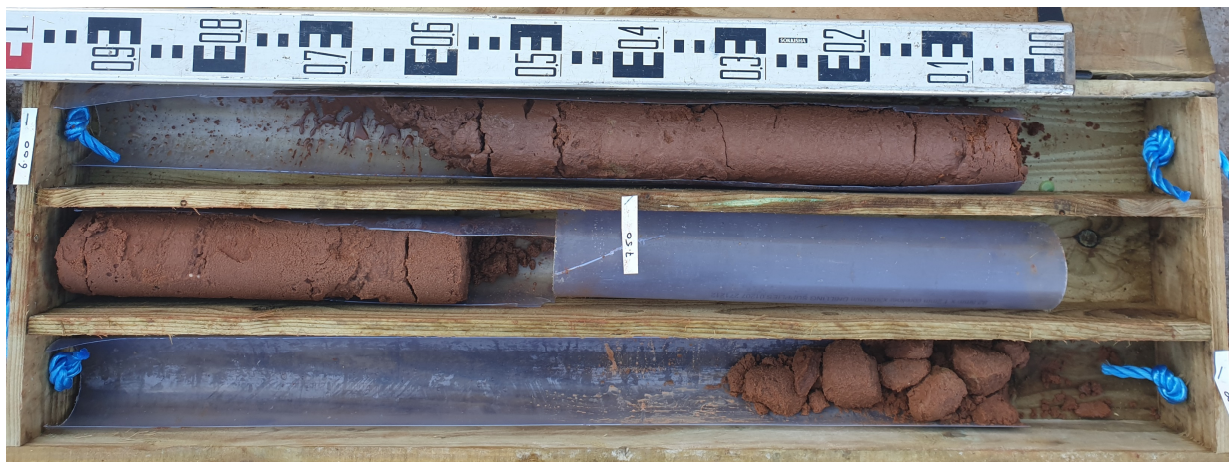


Plate No. 1: BH101- Run 1 (6.0 to 7.5m) / Run 2 (7.5 to 9.0m)

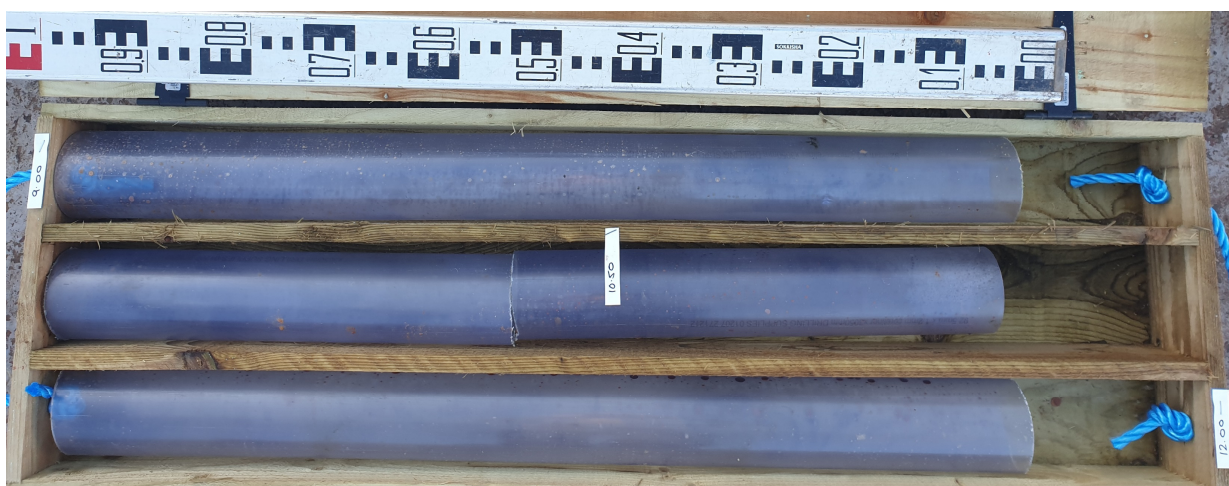


Plate No. 2: BH101- Run 3 (9.0 to 10.5m) / Run 4 (10.5 to 12.0m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

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Plate No. 3: BH101- Run 5 (12.0 to 13.5m) / Run 6 (13.5 to 15.0m)

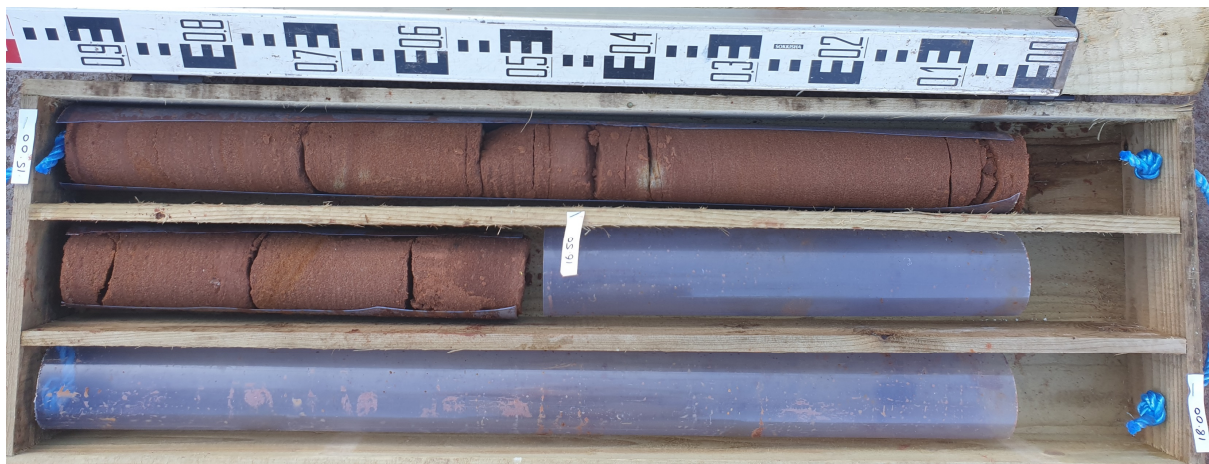


Plate No. 4: BH101- Run 6 (15.0 to 16.5m) / Run 7 (16.5 to 18.0m)

Client: U+I

Project Name: Mayfield Plot M

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Plate No. 5: BH101- Run 7 (18.0 to 19.5m) / Run 8 (19.5 to 21.0m)

Client: U+I

Project Name: Mayfield Plot M

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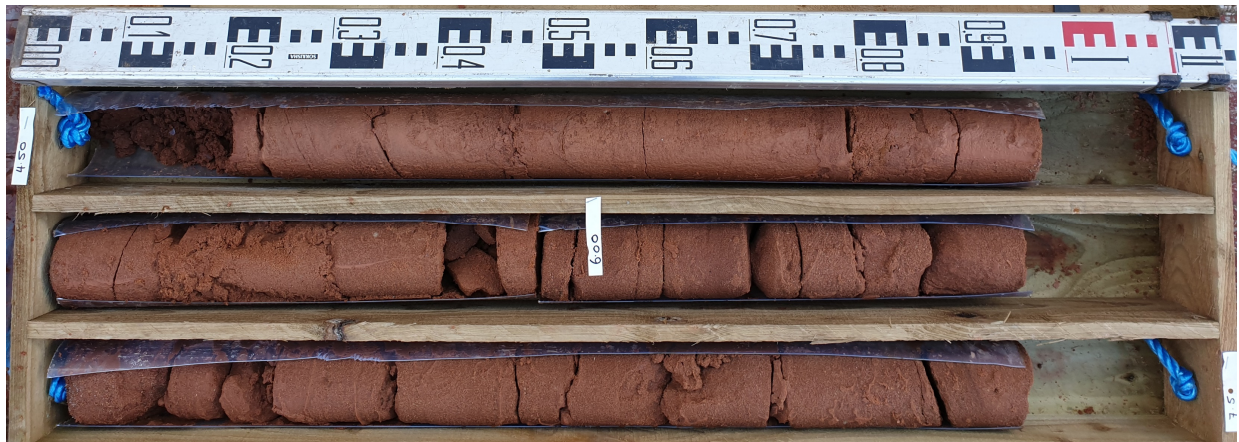


Plate No. 6: BH102- Run 1 (4.5 to 6.0m) / Run 2 (6.0 to 7.5)

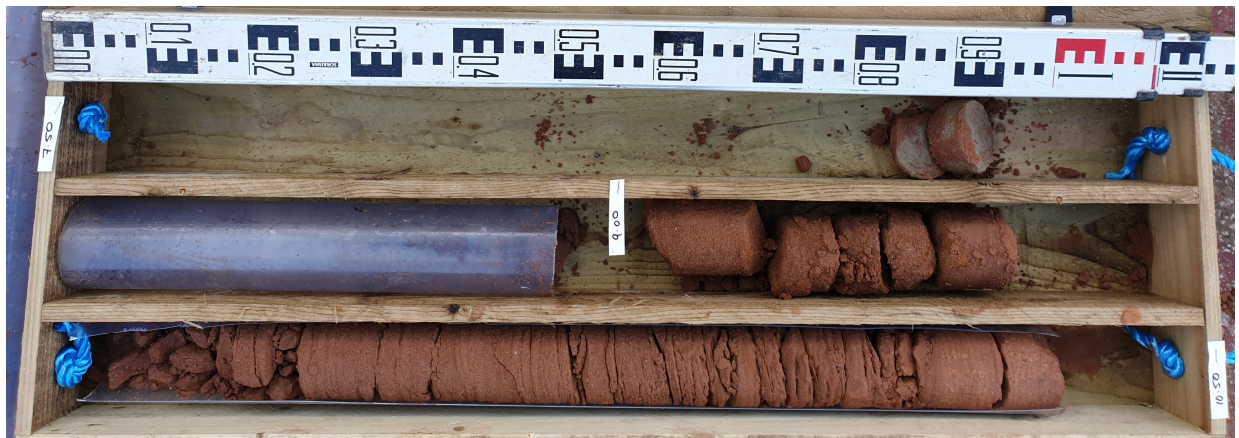


Plate No. 7: BH102- Run 2 (7.5 to 9.0m) / Run 3 (9.0 to 10.5m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

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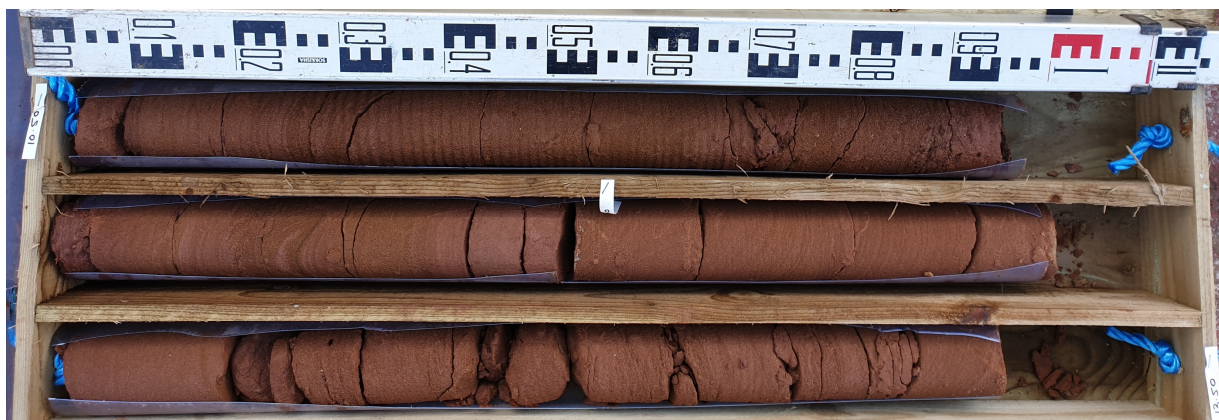


Plate No. 8: BH102- Run 4 (10.5 to 12.0m) / Run 5 (12.0 to 13.5m)



Plate No. 9: BH102- Run 5 (13.5 to 15.0m) / Run 6 (15.0 to 16.5)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

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Plate No. 10: BH102- Run 6 (16.5 to 18.0m) / Run 7 (18.0 to 20.0m)

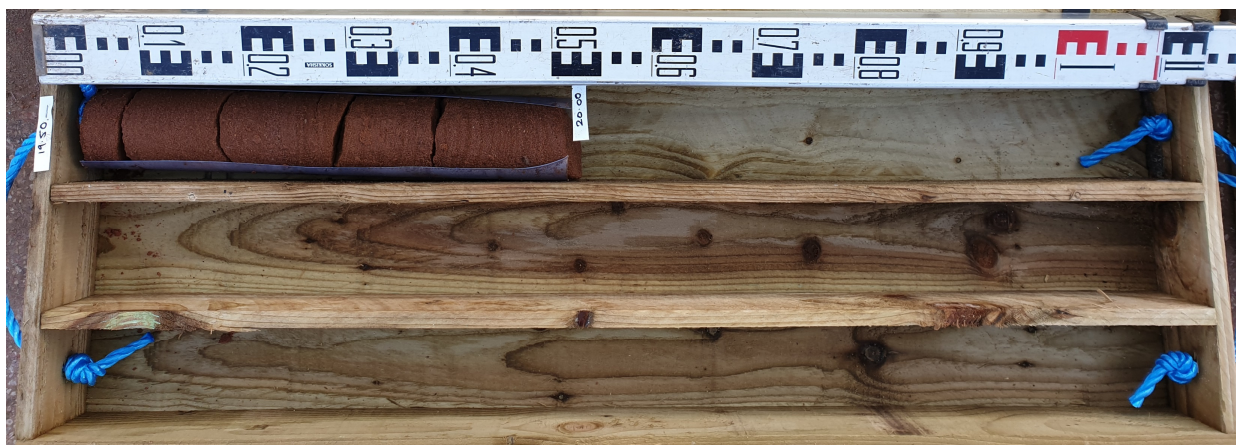


Plate No. 11: BH102- Run 7 (19.5 to 20.0m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

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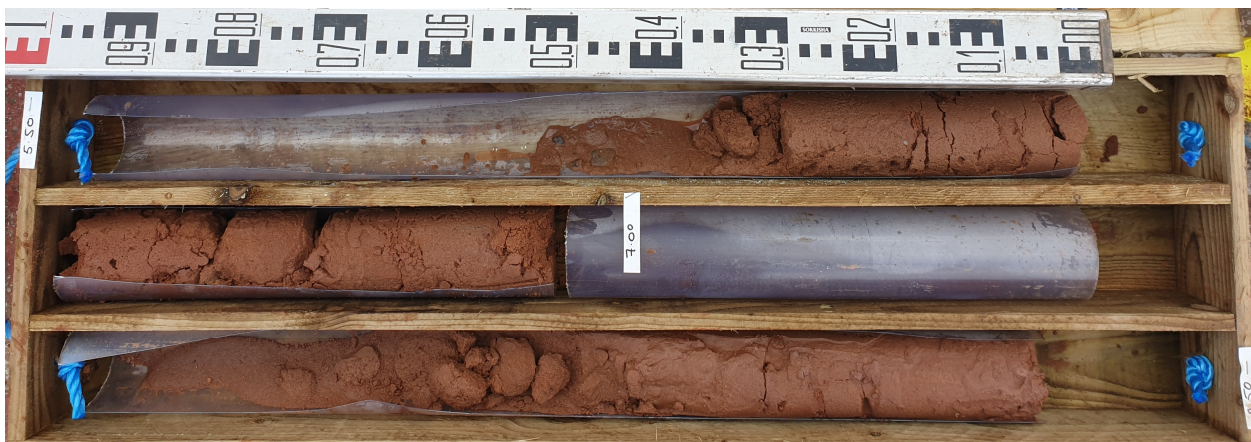


Plate No. 12: BH103- Run 1 (5.5 to 7.0m) / Run 2 (7.0 to 8.5)



Plate No. 13: BH103- Run 3 (8.5 to 10.0m) / Run 4 (10.0 to 11.5m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

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Plate No. 14: BH103- Run 5 (11.5 to 14.5m)



Plate No. 15: BH103- Run 6 (14.5 to 16.0m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

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Plate No. 16: BH103- Run 7 (17.5 to 20.5m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
T 0161 214 5390
W roconsulting.com

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Plate No. 17: BH104- Run 1 (6.0 to 7.5m) / Run 2 (7.5 to 9.0m)



Plate No. 18: BH104- Run 3 (9.0 to 10.5m) / Run 4 (10.5 to 12.0m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
T 0161 214 5390
W roccoconsulting.com

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Plate No. 19: BH104- Run 5 (12.0 to 15.0m)



Plate No. 20: BH104- Run 6 (15.0 to 18.0m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
T 0161 214 5390
W roconsulting.com

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Plate No. 21: BH104- Run 7 (18.0 to 20.0m)

Client: U+I

Project Name: Mayfield Plot M

Project No.: 3986

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
T 0161 214 5390
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**COMPLEX CHALLENGES ...
MADE SIMPLE**

APPENDIX C – Chemical Testing Results

FINAL ANALYTICAL TEST REPORT SUPPLEMENT TO TEST REPORT 19/09324 and 19/09855/1

Amendments: Request for combined report

Envirolab Job Number: 19/09324 and 19/09855
Issue Number: 3 **Date:** 28 November, 2019

Client: ROCP LIMITED
Commercial Wharf 6 Commercial Street
Castlefield
Manchester
M15 4PZ

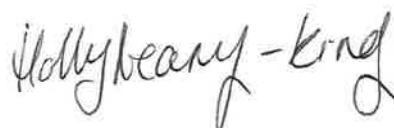
Project Manager: Liam Daley
Project Name: Mayfield Plot M
Project Ref: 3986
Order No: 1485
Date Samples Received: 03/10/19
Date Instructions Received: 04/10/19
Date Analysis Completed: 19/11/19

Prepared by:



Richard Wong
Client Manager

Approved by:



Holly Neary-King
Deputy Admin & Client Services Supervisor

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	15.5	32.2	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	8.81	11.38	9.54	9.79	8.99	8.06	8.55	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	19	499	80	16	341	983	146	mg/l	10	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	2	<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
Fraction of organic carbon _D [#]	0.0003	0.0083	0.0500	0.0973	0.0332	0.0419	0.0005	N/A	0.0003	A-T-032 FOC
Antimony _D	<5	10	<5	<5	<5	22	<5	mg/kg	5	A-T-024s
Arsenic _D ^{M#}	<1	8	<1	3	14	6	<1	mg/kg	1	A-T-024s
Barium _D	36	190	78	52	127	191	19	mg/kg	1	A-T-024s
Beryllium _D [#]	<0.5	0.6	<0.5	<0.5	0.6	<0.5	<0.5	mg/kg	0.5	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	1.1	<1.0	<1.0	1.4	<1.0	<1.0	mg/kg	1	A-T-027s
Cadmium _D ^{M#}	<0.5	0.7	1.3	0.8	0.8	<0.5	<0.5	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	2	66	5	33	42	172	6	mg/kg	1	A-T-024s
Chromium _D ^{M#}	3	37	11	13	15	12	4	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Chromium (trivalent)	3	37	11	13	15	12	4	mg/kg	1	Calc
Lead _D ^{M#}	3	193	48	89	194	256	3	mg/kg	1	A-T-024s
Mercury _D	<0.17	0.21	0.62	<0.17	<0.17	0.18	<0.17	mg/kg	0.17	A-T-024s
Molybdenum _D ^{M#}	<1	<1	<1	3	<1	<1	<1	mg/kg	1	A-T-024s
Nickel _D ^{M#}	2	30	7	15	14	9	3	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Vanadium _D ^{M#}	4	24	8	20	19	16	5	mg/kg	1	A-T-024s
Zinc _D ^{M#}	10	232	35	70	122	83	10	mg/kg	5	A-T-024s

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil [†]	NAD	NAD	NAD	Chrysotile	NAD	NAD	NAD			A-T-045
Asbestos Matrix (microscope) ₀	-	-	-	Loose fibres	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? ₀	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) ₀	-	-	-	0.007	-	-	-	% w/w	0.001	A-T-054

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	0.15	<0.01	0.14	1.88	0.40	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	0.01	<0.01	0.34	<0.10	0.06	<0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	0.18	<0.02	0.38	2.81	0.85	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	0.75	<0.04	1.16	10.3	3.58	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	0.63	<0.04	6.74	7.09	3.41	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	0.77	<0.05	6.01	9.37	4.19	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	0.50	<0.05	8.91	4.27	2.47	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	0.27	<0.07	1.46	3.30	1.50	<0.07	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	0.79	<0.06	1.97	12.7	3.27	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	0.11	<0.04	1.36	1.14	0.58	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	1.49	<0.08	1.17	21.5	6.06	<0.08	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	0.07	<0.01	0.09	1.05	0.24	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	0.50	<0.03	8.58	4.60	2.64	<0.03	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	0.03	<0.03	0.10	0.35	0.23	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	1.01	<0.03	0.51	17.1	4.16	<0.03	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	1.40	<0.07	1.77	20.5	4.90	<0.07	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	8.66	<0.08	40.7	118	38.5	<0.08	mg/kg	0.01	A-T-019s

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
TPH UKCWG										
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#}	-	2	<1	-	1	-	-	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	-	5	1	-	2	-	-	mg/kg	1	A-T-055s
Ali >C21-C35 _A	-	54	5	-	8	-	-	mg/kg	1	A-T-055s
Ali >C35-C44 _A	-	7	<1	-	8	-	-	mg/kg	1	A-T-055s
Total Aliphatics _A	-	68	6	-	20	-	-	mg/kg	1	A-T-055s
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	-	3	<1	-	2	-	-	mg/kg	1	A-T-055s
Aro >C10-C12 _A ^{M#}	-	<1	<1	-	2	-	-	mg/kg	1	A-T-055s
Aro >C12-C16 _A	-	5	<1	-	10	-	-	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	-	14	1	-	78	-	-	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	-	83	1	-	319	-	-	mg/kg	1	A-T-055s
Aro >C35-C44 _A	-	5	<1	-	11	-	-	mg/kg	1	A-T-055s
Total Aromatics _A	-	110	3	-	423	-	-	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C44) _A	-	178	9	-	442	-	-	mg/kg	1	A-T-055s
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

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
SVOC										
Hexachlorobenzene _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Diethyl phthalate _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Dimethyl phthalate _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Dibenzofuran _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Carbazole _A	-	<100	<100	-	2400	-	-	µg/kg	100	A-T-052s
Butylbenzyl phthalate _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate _A	-	837	<500	-	<5000	-	-	µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
4-Nitrophenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
3+4-Methylphenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
4-Chloro-3-methylphenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2-Nitrophenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2-Methylphenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2-Chlorophenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2,6-Dinitrotoluene _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2,4-Dinitrotoluene _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2,4-Dimethylphenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2,4-Dichlorophenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2,4,6-Trichlorophenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2,4,5-Trichlorophenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2-Chloronaphthalene _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
2-Methylnaphthalene _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Phenol _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Pentachlorophenol (SVOC) _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
n-Diethylphthalate _A	-	<500	<500	-	<5000	-	-	µg/kg	500	A-T-052s
n-Dibutylphthalate _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Nitrobenzene _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Isophorone _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Hexachloroethane _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
Hexachlorocyclopentadiene _A	-	<100	<100	-	<1000	-	-	µg/kg	100	A-T-052s
Perylene _A	-	256	<100	-	2060	-	-	µg/kg	100	A-T-052s

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Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
VOC										
Dichlorodifluoromethane _A	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Chloromethane _A	-	<10	<10	-	<10	-	-	µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene) _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Bromomethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Chloroethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Trichlorofluoromethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,1-Dichloroethene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Carbon Disulphide _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Dichloromethane _A	-	<5	<5	-	<5	-	-	µg/kg	5	A-T-006s
trans 1,2-Dichloroethene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,1-Dichloroethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
cis 1,2-Dichloroethene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
2,2-Dichloropropane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Bromochloromethane _A [#]	-	<5	<5	-	<5	-	-	µg/kg	5	A-T-006s
Chloroform _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,1,1-Trichloroethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,1-Dichloropropene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Carbon Tetrachloride _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dichloroethane _A [#]	-	<2	<2	-	<2	-	-	µg/kg	2	A-T-006s
Benzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Trichloroethene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dichloropropane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Dibromomethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Bromodichloromethane _A [#]	-	<10	<10	-	<10	-	-	µg/kg	10	A-T-006s
cis 1,3-Dichloropropene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Toluene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
trans 1,3-Dichloropropene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,1,2-Trichloroethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,3-Dichloropropane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Tetrachloroethene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Dibromochloromethane _A [#]	-	<3	<3	-	<3	-	-	µg/kg	3	A-T-006s
1,2-Dibromoethane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/1	19/09324/3	19/09324/5	19/09324/7	19/09324/8	19/09324/10	19/09324/11	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS102	WS103	WS103	WS104	WS105	WS105			
Depth to Top	0.50	0.50	1.00	2.00	0.40	1.00	1.20			
Depth To Bottom										
Date Sampled	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19	02-Oct-19			
Sample Type	Soil	Solid	Solid	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	7	7	4AB	4AB	4ABE	4A			
Chlorobenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane _A	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Ethylbenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
m & p Xylene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
o-Xylene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Styrene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Bromoform _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Isopropylbenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane _A	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,2,3-Trichloropropane _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
Bromobenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
n-Propylbenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
2-Chlorotoluene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
4-Chlorotoluene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
tert-Butylbenzene _A [#]	-	<2	<2	-	<2	-	-	µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
sec-Butylbenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
4-Isopropyltoluene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,3-Dichlorobenzene _A	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,4-Dichlorobenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
n-Butylbenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dichlorobenzene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP) _A	-	<2	<2	-	<2	-	-	µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene _A	-	<3	<3	-	<3	-	-	µg/kg	3	A-T-006s
Hexachlorobutadiene _A [#]	-	<1	<1	-	<1	-	-	µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene _A	-	<3	<3	-	<3	-	-	µg/kg	3	A-T-006s

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/12	19/09855/1	19/09855/2	19/09855/3	19/09855/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	BH101	BH103	BH103	BH104					
Depth to Top	0.50	2.00	3.80	1.20	0.80					
Depth To Bottom										
Date Sampled	02-Oct-19	07-Oct-19	03-Oct-19	03-Oct-19	14-Oct-19					
Sample Type	Soil	Soil	Soil	Soil	Soil					
Sample Matrix Code	4A	5A	5A	4AB	4ABE					
% Stones >10mm _A	<0.1	6.9	<0.1	39.9	9.6			% w/w	0.1	A-T-044
pH _D ^{M#}	9.21	-	-	-	-			pH	0.01	A-T-031s
pH _D	-	9.07	8.32	9.19	8.34			pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	16	276	133	182	297			mg/l	10	A-T-026s
Cyanide (total) _A ^{M#}	<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			mg/kg	0.2	A-T-050s
Fraction of organic carbon _D [#]	0.0004	0.0102	0.0051	0.0278	0.0188			N/A	0.0003	A-T-032 FOC
Antimony _D	<5	<5	<5	<5	<5			mg/kg	5	A-T-024s
Arsenic _D ^{M#}	<1	3	<1	6	5			mg/kg	1	A-T-024s
Barium _D	42	101	42	108	61			mg/kg	1	A-T-024s
Beryllium _D [#]	<0.5	0.7	<0.5	0.7	0.5			mg/kg	0.5	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	2.0	<1.0	1.6	<1.0			mg/kg	1	A-T-027s
Cadmium _D ^{M#}	<0.5	1.1	0.7	0.6	0.8			mg/kg	0.5	A-T-024s
Copper _D ^{M#}	2	254	10	38	29			mg/kg	1	A-T-024s
Chromium _D ^{M#}	5	24	21	7	14			mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1			mg/kg	1	A-T-040s
Chromium (trivalent)	5	24	21	7	14			mg/kg	1	Calc
Lead _D ^{M#}	6	43	13	72	60			mg/kg	1	A-T-024s
Mercury _D	<0.17	0.25	0.22	<0.17	<0.17			mg/kg	0.17	A-T-024s
Molybdenum _D ^{M#}	<1	<1	<1	1	<1			mg/kg	1	A-T-024s
Nickel _D ^{M#}	3	29	14	11	14			mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	1	<1	<1			mg/kg	1	A-T-024s
Vanadium _D ^{M#}	4	23	22	19	18			mg/kg	1	A-T-024s
Zinc _D ^{M#}	9	58	40	55	37			mg/kg	5	A-T-024s

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/12	19/09855/1	19/09855/2	19/09855/3	19/09855/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	BH101	BH103	BH103	BH104					
Depth to Top	0.50	2.00	3.80	1.20	0.80					
Depth To Bottom										
Date Sampled	02-Oct-19	07-Oct-19	03-Oct-19	03-Oct-19	14-Oct-19					
Sample Type	Soil	Soil	Soil	Soil	Soil					
Sample Matrix Code	4A	5A	5A	4AB	4ABE					
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD	NAD	NAD					A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A	N/A					A-T-045

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/12	19/09855/1	19/09855/2	19/09855/3	19/09855/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	BH101	BH103	BH103	BH104					
Depth to Top	0.50	2.00	3.80	1.20	0.80					
Depth To Bottom										
Date Sampled	02-Oct-19	07-Oct-19	03-Oct-19	03-Oct-19	14-Oct-19					
Sample Type	Soil	Soil	Soil	Soil	Soil					
Sample Matrix Code	4A	5A	5A	4AB	4ABE					
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	0.01	<0.01	<0.01	0.02			mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	0.02	<0.02	<0.02	0.04			mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04	0.10	0.18			mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04	0.08	0.18			mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05	0.11	0.24			mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	0.07	0.14			mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	0.08			mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	0.07	<0.06	0.13	0.24			mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04			mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	0.10	<0.08	0.15	0.30			mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	0.02			mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	0.07	0.16			mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03			mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	0.11	0.07	0.11	0.26			mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	0.13	<0.07	0.18	0.31			mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	0.44	<0.08	1.00	2.17			mg/kg	0.01	A-T-019s

Envirolab Job Number: 19/09324 and 19/09855

Client Project Name: Mayfield Plot M

Client Project Ref: 3986

Lab Sample ID	19/09324/12	19/09855/1	19/09855/2	19/09855/3	19/09855/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	BH101	BH103	BH103	BH104					
Depth to Top	0.50	2.00	3.80	1.20	0.80					
Depth To Bottom										
Date Sampled	02-Oct-19	07-Oct-19	03-Oct-19	03-Oct-19	14-Oct-19					
Sample Type	Soil	Soil	Soil	Soil	Soil					
Sample Matrix Code	4A	5A	5A	4AB	4ABE					
TPH UKCWG										
Ali >C5-C6 _A [#]	-	<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			mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	-	<1	<1	<1	<1			mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	-	<1	<1	<1	<1			mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	-	<1	<1	<1	<1			mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	-	<1	1	<1	<1			mg/kg	1	A-T-055s
Ali >C21-C35 _A	-	15	39	4	5			mg/kg	1	A-T-055s
Ali >C35-C44 _A	-	<1	2	<1	1			mg/kg	1	A-T-055s
Total Aliphatics _A	-	15	43	5	7			mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	-	<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			mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	-	<1	2	<1	<1			mg/kg	1	A-T-055s
Aro >C10-C12 _A ^{M#}	-	<1	1	<1	<1			mg/kg	1	A-T-055s
Aro >C12-C16 _A	-	2	2	1	2			mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	-	2	2	2	3			mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	-	9	10	7	20			mg/kg	1	A-T-055s
Aro >C35-C44 _A	-	<1	<1	3	1			mg/kg	1	A-T-055s
Total Aromatics _A	-	14	18	13	27			mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C44) _A	-	30	63	18	34			mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	-	<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			mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	-	<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			mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	-	<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			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.

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

Please contact us if you need any further information.

Envirolab Deviating Samples Report

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

Client: ROCP LIMITED, Commercial Wharf 6 Commercial Street, Castlefield,
Manchester, M15 4PZ

Project: Mayfield Plot M

Clients Project No: 3986

Project No: 19/09324

Date Received: 04/10/2019 (am)

Cool Box Temperatures (°C): 16.4, 16.6

Lab Sample ID
Client Sample No
Client Sample ID/Depth
Date Sampled
Deviation Code
F

Key

F

Maximum holding time exceeded between sampling date and analysis for analytes listed below

HOLDING TIME EXCEEDANCES

Lab Sample ID
Client Sample No
Client Sample ID/Depth
Date Sampled

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.

**Alex Smiles**

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Analytical Report Number : 19-72329

Project / Site name: Mayfield Plot M

Samples received on: 15/11/2019

Your job number: 3986

Samples instructed on: 15/11/2019

Your order number:

Analysis completed by: 26/11/2019

Report Issue Number: 1

Report issued on: 26/11/2019

Samples Analysed: 1 water sample

Signed: *Karolina Marek*

Karolina Marek
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

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

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

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

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

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



Analytical Report Number: 19-72329

Project / Site name: Mayfield Plot M

Lab Sample Number				1364629				
Sample Reference				BH102				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				14/11/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.2				
Sulphate as SO ₄	mg/l	0.045	ISO 17025	92.3				
Hardness - Total	mgCaCO ₃ /l	1	ISO 17025	153				

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16				
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.69				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04				
Calcium (dissolved)	mg/l	0.012	ISO 17025	48				
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.8				
Copper (dissolved)	µg/l	0.5	ISO 17025	3.0				
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	8.3				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.1				
Selenium (dissolved)	µg/l	0.6	ISO 17025	5.6				
Zinc (dissolved)	µg/l	0.5	ISO 17025	1.9				



Analytical Report Number: 19-72329

Project / Site name: Mayfield Plot M

Lab Sample Number				1364629				
Sample Reference				BH102				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				14/11/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

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



Analytical Report Number : 19-72329

Project / Site name: Mayfield Plot M

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L0738-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 *for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L1028-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

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

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

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

Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH102		W	19-72329	1364629	c	pH at 20oC in water (automated)	L099-PL	c



**COMPLEX CHALLENGES ...
MADE SIMPLE**

APPENDIX D – Geotechnical Testing Results

Test Type:	Sample condition:
1 - 1 point 80g / 30° fall cone method.	1 - As Received
2 - 4 point 80g / 30° fall cone method.	2 - Air Dried
3 - Non plastic determination.	3 - Washed & Air Dried

S Burke - Senior Technician
15/11/2019

Project Name:

MAYFIELD PLOT M
3986



PARTICLE SIZE DISTRIBUTION

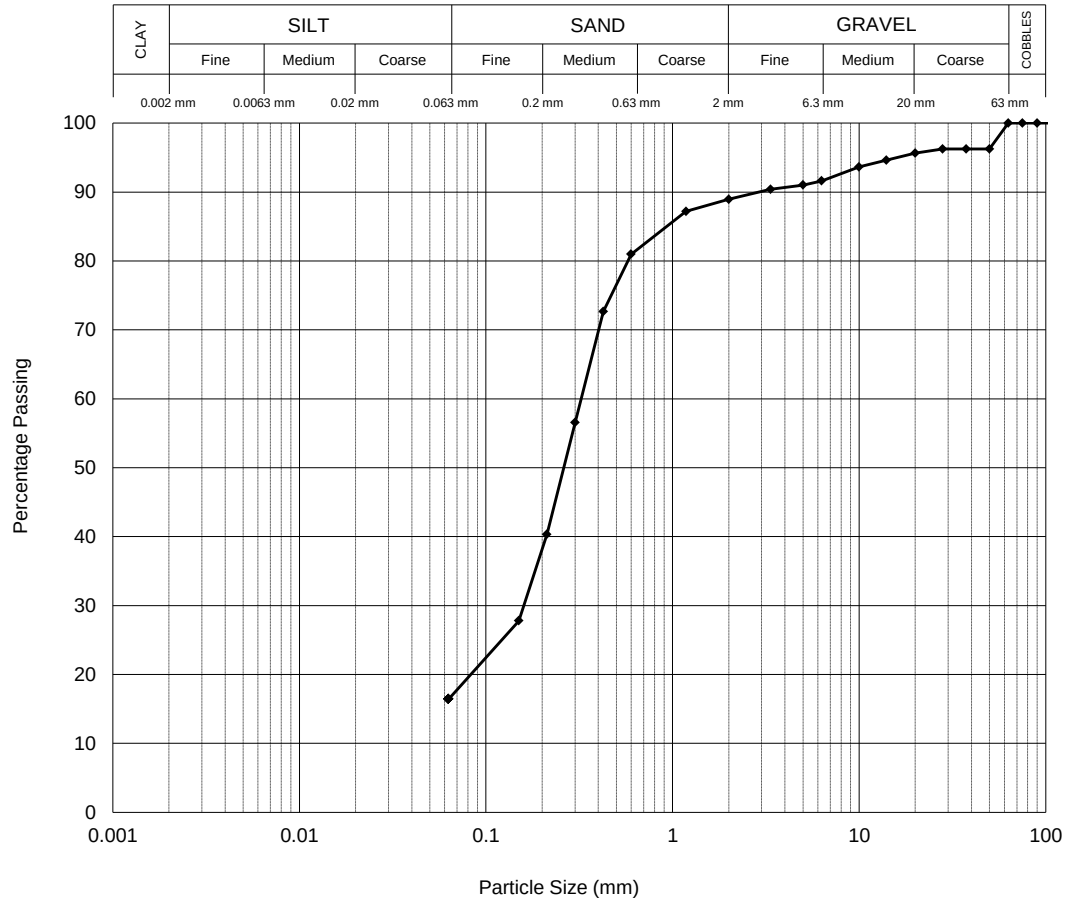
BH / TP No. BH101
 Sample Ref B8
 Depth (m) 4.20-4.50
 Sample Type B

Description

Dark brown clayey gravelly silty SAND

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	96
37.5 mm	96
28.0 mm	96
20.0 mm	96
14.0 mm	95
10.0 mm	94
6.30 mm	92
5.00 mm	91
3.35 mm	90
2.00 mm	89
1.18 mm	87
600 µm	81
425 µm	73
300 µm	57
212 µm	40
150 µm	28
63 µm	16



Particle Proportions	
Cobbles	0
Gravel	11
Sand	73
Silt & Clay	16

Checked and Approved by

S Burke

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PARTICLE SIZE DISTRIBUTION

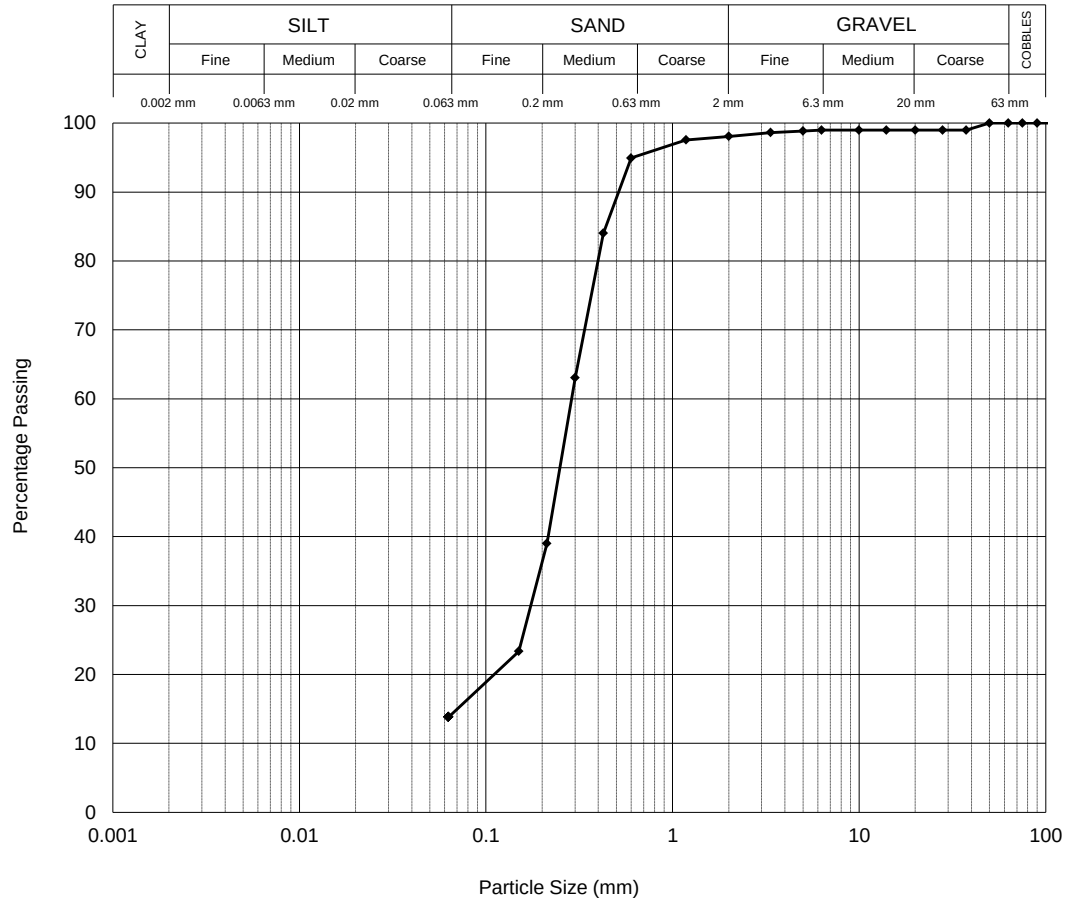
BH / TP No. BH101
 Sample Ref B10
 Depth (m) 5.00-5.30
 Sample Type B

Description

Orange brown clayey silty SAND with rare gravel.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	99
28.0 mm	99
20.0 mm	99
14.0 mm	99
10.0 mm	99
6.30 mm	99
5.00 mm	99
3.35 mm	99
2.00 mm	98
1.18 mm	98
600 µm	95
425 µm	84
300 µm	63
212 µm	39
150 µm	23
63 µm	14



Particle Proportions	
Cobbles	0
Gravel	2
Sand	84
Silt & Clay	14

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PARTICLE SIZE DISTRIBUTION

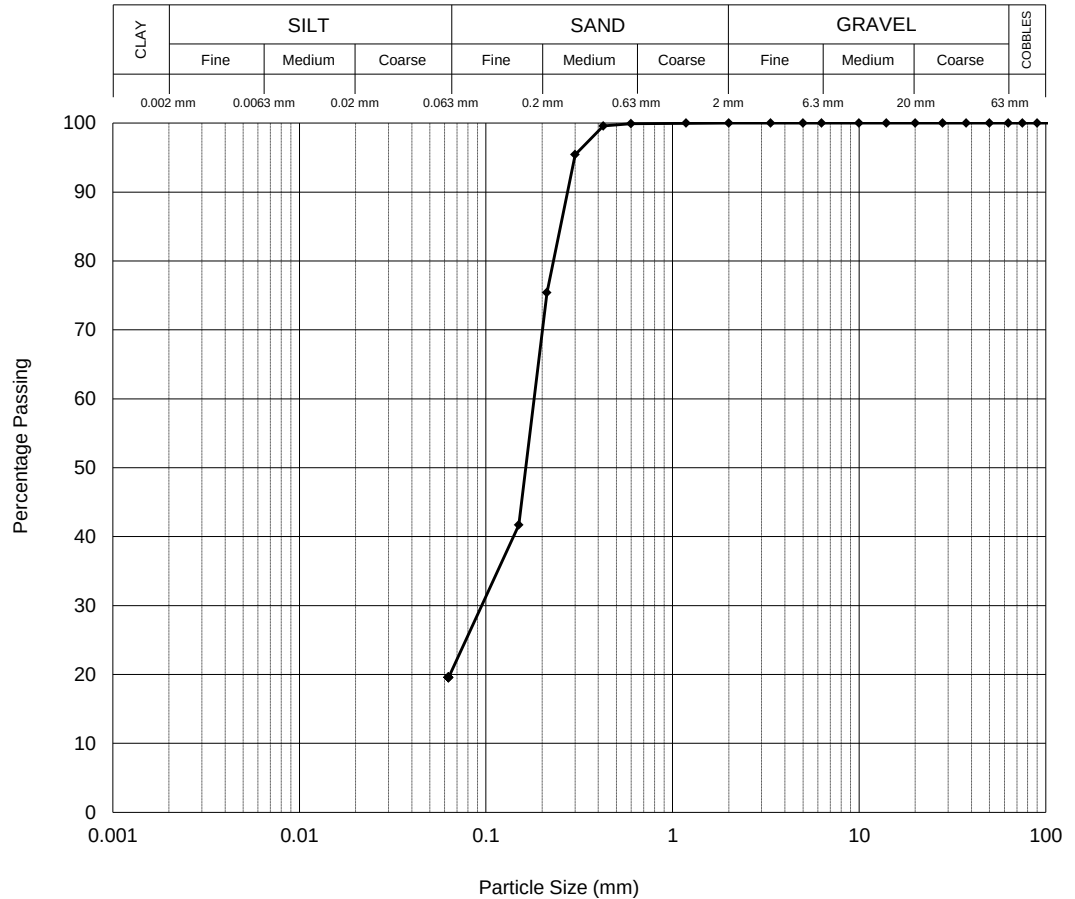
BH / TP No. BH102
 Sample Ref B4
 Depth (m) 2.00-2.30
 Sample Type B

Description

Orange brown clayey silty SAND

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	100
425 µm	100
300 µm	95
212 µm	75
150 µm	42
63 µm	20



Particle Proportions	
Cobbles	0
Gravel	0
Sand	80
Silt & Clay	20

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PARTICLE SIZE DISTRIBUTION

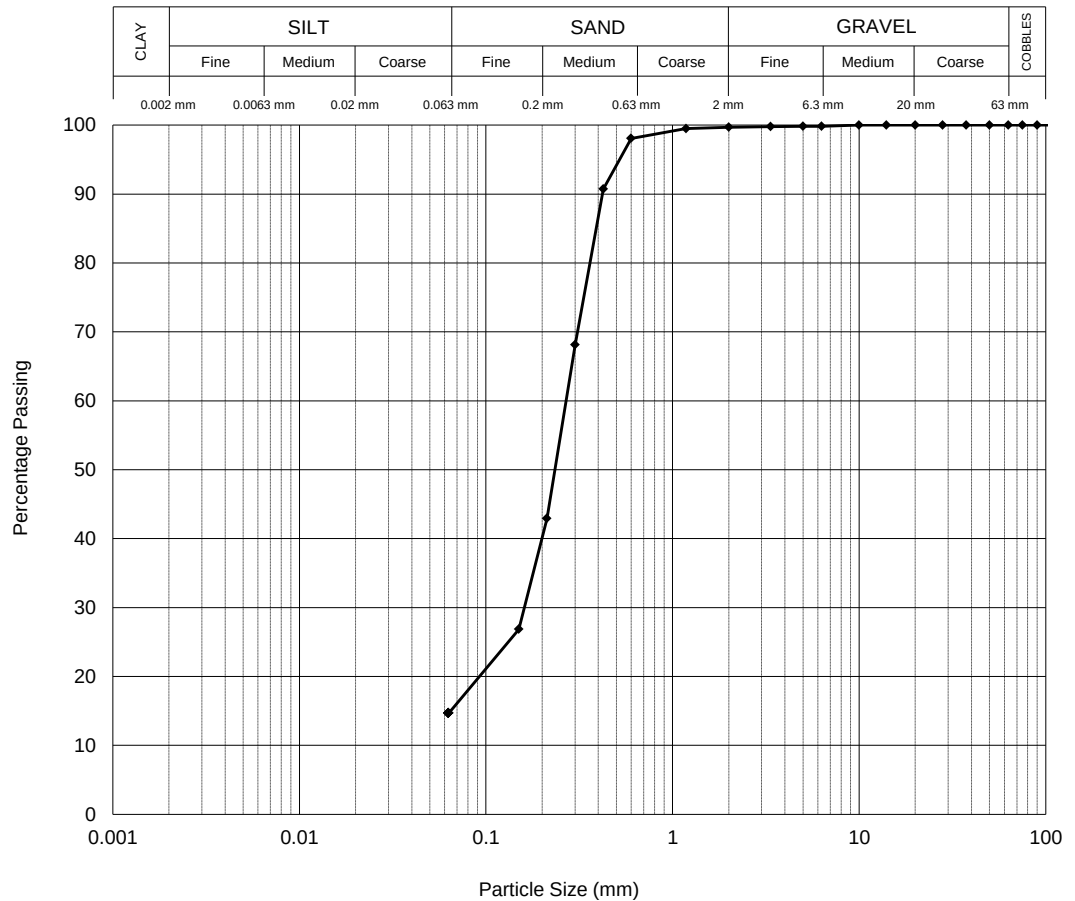
BH / TP No. BH103
 Sample Ref B9
 Depth (m) 5.70-6.00
 Sample Type B

Description

Orange brown clayey silty SAND

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	98
425 µm	91
300 µm	68
212 µm	43
150 µm	27
63 µm	15



Particle Proportions	
Cobbles	0
Gravel	0
Sand	85
Silt & Clay	15

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

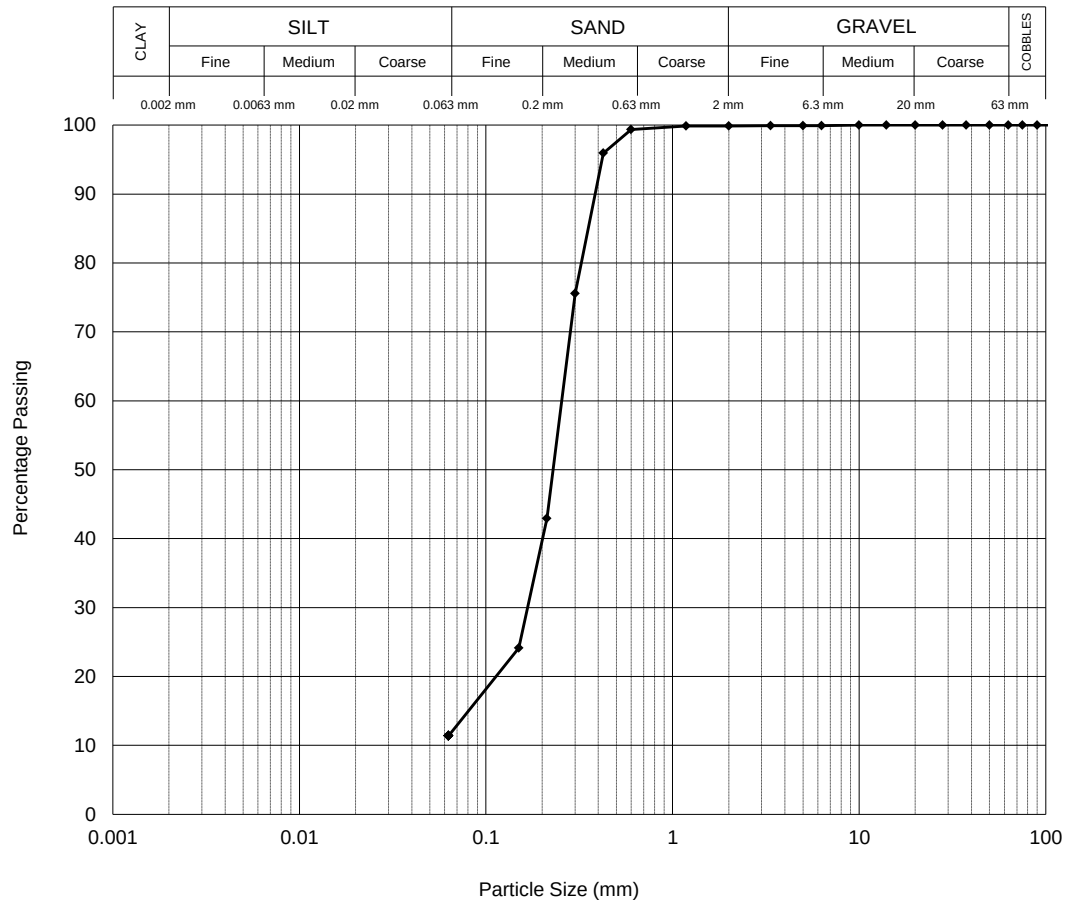
WS105
1.20-1.60
D

Description

Orange brown silty SAND

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	99
425 µm	96
300 µm	76
212 µm	43
150 µm	24
63 µm	11



Particle Proportions	
Cobbles	0
Gravel	0
Sand	88
Silt & Clay	12

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

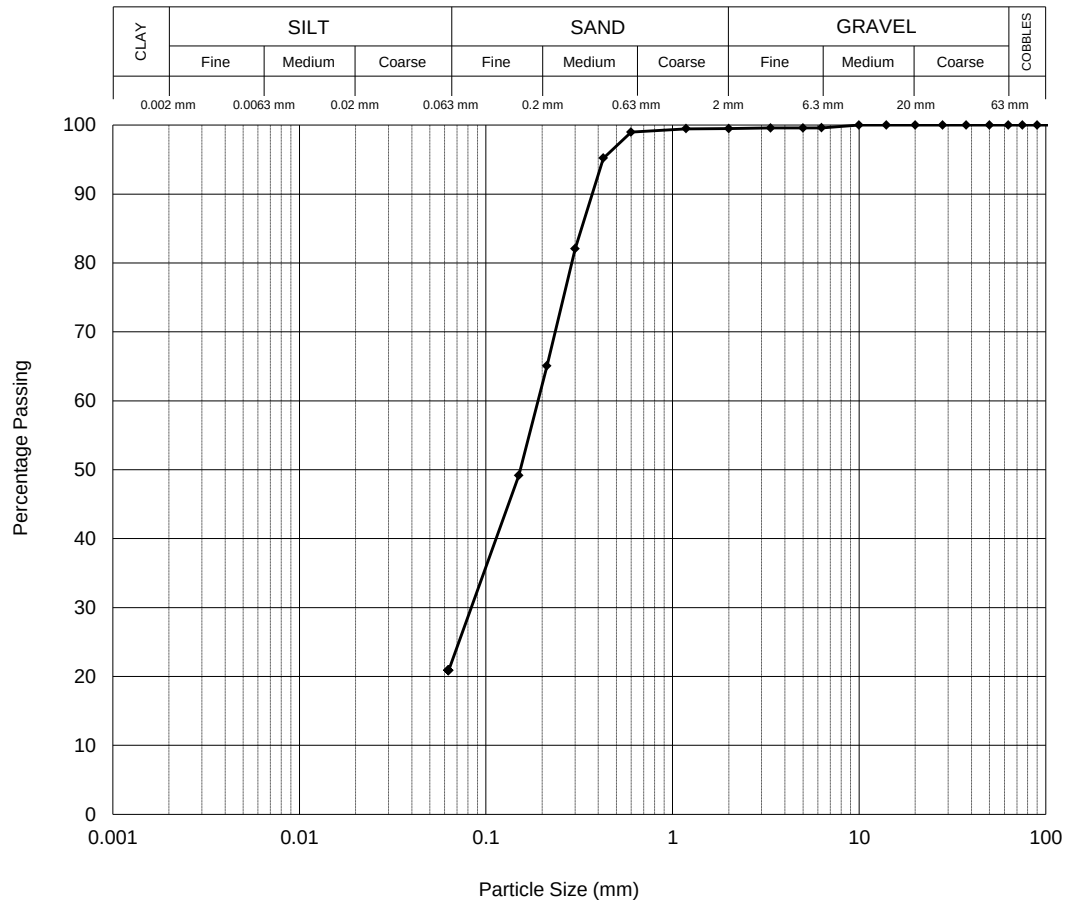
WS106
0.80
B

Description

Orange brown clayey silty SAND

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	99
600 µm	99
425 µm	95
300 µm	82
212 µm	65
150 µm	49
63 µm	21



Particle Proportions	
Cobbles	0
Gravel	0
Sand	79
Silt & Clay	21

Checked and Approved by

S Burke

S Burke - Senior Technician
15/11/2019

Project Number:

GEO / 30164

Project Name:

**MAYFIELD PLOT M
3986**

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DETERMINATION OF POINT LOAD STRENGTH ON ROCK

Sample details				Point Load test											
Borehole Ref.	Sample Ref.	Depth (m)	Description	D. Tested	Test type & Direction		Sample width W (mm)	Platen separation (mm)		Water Content (%)	Equiv. Diameter D _e (mm)	Failure Load P (kN)	I _s P/De ² (MPa)	Correction Factor F	Point Load Index I _{s(50)} (MPa)
								Start D	End D'						
BH101		12.31-12.48	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.4	69.2	68.7		86.4	0.11	0.01	1.28	0.01
BH101		12.48-12.61	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.1	65.1	64.0		83.3	0.10	0.01	1.26	0.01
BH101		13.36-13.47	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.8	73.4	72.4		88.9	0.11	0.01	1.30	0.01
BH101		14.75-14.89	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.8	72.4	71.6		87.9	0.25	0.03	1.29	0.04
BH101		15.10-15.24	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	83.2	67.2	66.1		83.7	0.26	0.04	1.26	0.05
BH101		15.24-15.42	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.2	54.5	53.2		75.5	0.15	0.03	1.20	0.04
BH101		16.06-16.19	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.1	57.2	56.4		78.2	0.56	0.09	1.22	0.11
BH101		20.00-20.12	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.4	55.1	54.3		76.8	0.32	0.05	1.21	0.06
BH101		20.61-20.78	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	83.6	67.2	65.4		83.4	0.29	0.04	1.26	0.05
BH102		4.82-4.95	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	86.5	59.8	57.2		79.4	0.31	0.05	1.23	0.06

(*) Sample failed on weakness

 Test type and direction: **D** - Diametral **A** - Axial **B** - Block **L** - Irregular lump **Pd** - Perpendicular to planes of weakness **R** - Random or unknown orientation **PI** - Parallel to planes of weakness

Checked and Approved by CC C Clergeaud (Snr. Geologist) Date: 11/11/2019	Project Number: GEO / 30164 Project Name: MAYFIELD PLOT M 3986	
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DETERMINATION OF POINT LOAD STRENGTH ON ROCK

Sample details				Point Load test											
Borehole Ref.	Sample Ref.	Depth (m)	Description	D. Tested	Test type & Direction		Sample width W (mm)	Platen separation (mm)		Water Content (%)	Equiv. Diameter D _e (mm)	Failure Load P (kN)	I _s P/De ² (MPa)	Correction Factor F	Point Load Index I _{s(50)} (MPa)
								Start D	End D'						
BH102		5.42-5.50	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.6	79.9	78.2		92.3	0.28	0.03	1.32	0.04
BH102		5.77-5.90	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.7	75.4	74.3		89.5	0.20	0.02	1.30	0.03
BH102		7.40-7.50	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	82.1	57.0	55.8		76.4	0.27	0.05	1.21	0.06
BH102		9.10-9.20	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	83.4	61.3	60.5		80.2	0.20	0.03	1.24	0.04
BH102		10.35-10.42	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.1	55.3	53.2		75.9	0.25	0.04	1.21	0.05
BH102		11.03-11.15	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	83.1	63.1	62.4		81.3	0.10	0.02	1.24	0.02
BH102		12.15-12.30	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.3	56.3	55.4		77.6	0.51	0.09	1.22	0.11
BH102		13.15-13.25	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.7	66.4	65.3		84.4	0.28	0.04	1.27	0.05
BH102		14.36-14.50	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.4	64.3	62.1		82.2	0.12	0.02	1.25	0.03
BH102		18.10-18.22	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.3	57.9	57.1		78.7	0.55	0.09	1.23	0.11

(*) Sample failed on weakness

 Test type and direction: **D** - Diametral **A** - Axial **B** - Block **L** - Irregular lump **Pd** - Perpendicular to planes of weakness **R** - Random or unknown orientation **PI** - Parallel to planes of weakness

Checked and Approved by  C Clergeaud (Snr. Geologist) Date: 11/11/2019	Project Number: GEO / 30164 Project Name: MAYFIELD PLOT M 3986	 
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DETERMINATION OF POINT LOAD STRENGTH ON ROCK

Sample details				Point Load test											
Borehole Ref.	Sample Ref.	Depth (m)	Description	D. Tested	Test type & Direction		Sample width W (mm)	Platen separation (mm)		Water Content (%)	Equiv. Diameter D _e (mm)	Failure Load P (kN)	I _s P/De ² (MPa)	Correction Factor F	Point Load Index I _{s(50)} (MPa)
								Start D	End D'						
BH103		8.29-8.43	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	86.3	80.2	79.1		93.2	0.20	0.02	1.32	0.03
BH103		10.80-10.96	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.1	56.3	54.0		76.5	0.32	0.05	1.21	0.06
BH103		11.06-11.21	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.3	54.3	53.7		75.9	0.30	0.05	1.21	0.06
BH103		13.92-14.05	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.4	68.2	67.0		85.4	0.33	0.05	1.27	0.06
BH103		15.08-15.34	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.3	77.1	76.2		90.4	0.88	0.11	1.31	0.14
BH103		16.10-16.28	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.3	79.1	78.3		92.2	0.76	0.09	1.32	0.12
BH103		16.20-16.36	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	86.1	70.1	69.2		87.1	0.25	0.03	1.28	0.04
BH103		16.34-16.48	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.9	56.3	55.2		77.2	0.24	0.04	1.22	0.05
BH103		17.04-17.20	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.1	72.1	71.3		87.9	0.13	0.02	1.29	0.03
BH103		20.04-20.19	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.2	71.5	70.1		87.2	1.03	0.13	1.28	0.17

(*) Sample failed on weakness

 Test type and direction: **D** - Diametral **A** - Axial **B** - Block **L** - Irregular lump **Pd** - Perpendicular to planes of weakness **R** - Random or unknown orientation **PI** - Parallel to planes of weakness

Checked and Approved by



C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

**MAYFIELD PLOT M
3986**
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DETERMINATION OF POINT LOAD STRENGTH ON ROCK

Sample details				Point Load test											
Borehole Ref.	Sample Ref.	Depth (m)	Description	D. Tested	Test type & Direction		Sample width W (mm)	Platen separation (mm)		Water Content (%)	Equiv. Diameter D _e (mm)	Failure Load P (kN)	I _s P/De ² (MPa)	Correction Factor F	Point Load Index I _{s(50)} (MPa)
								Start D	End D'						
BH104		8.44-8.60	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	86.2	68.5	67.3		85.9	0.38	0.05	1.28	0.06
BH104		9.29-9.41	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	83.6	56.3	55.2		76.7	0.50	0.08	1.21	0.1
BH104		10.81-10.97	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.3	82.3	81.4		94.0	0.43	0.05	1.33	0.07
BH104		13.24-13.41	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.6	52.3	50.3		73.6	0.22	0.04	1.19	0.05
BH104		13.78-13.97	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	83.2	81.8	80.6		92.4	0.41	0.05	1.32	0.07
BH104		16.00-16.16	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.4	68.2	67.2		85.5	0.89	0.12	1.27	0.15
BH104		17.58-18.00	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.6	80.1	79.2		92.9	0.90	0.10	1.32	0.13
BH104		18.00-18.21	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.4	71.2	70.2		87.4	0.48	0.06	1.29	0.08
BH104		18.21-18.37	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	84.3	63.5	61.4		81.2	0.59	0.09	1.24	0.11
BH104		19.69-19.83	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.5	65.6	64.1		83.5	0.30	0.04	1.26	0.05

(*) Sample failed on weakness

 Test type and direction: **D** - Diametral **A** - Axial **B** - Block **L** - Irregular lump **Pd** - Perpendicular to planes of weakness **R** - Random or unknown orientation **PI** - Parallel to planes of weakness

Checked and Approved by  C Clergeaud (Snr. Geologist) Date: 11/11/2019	Project Number: GEO / 30164 Project Name: MAYFIELD PLOT M 3986	 
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DETERMINATION OF POINT LOAD STRENGTH ON ROCK

Sample details				Point Load test											
Borehole Ref.	Sample Ref.	Depth (m)	Description	D. Tested	Test type & Direction		Sample width W (mm)	Platen separation (mm)		Water Content (%)	Equiv. Diameter D _e (mm)	Failure Load P (kN)	I _s P/De ² (MPa)	Correction Factor F	Point Load Index I _{s(50)} (MPa)
								Start D	End D'						
BH104		19.83-20.00	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	06/11/19	A	Pd	85.2	82.1	81.0		93.7	0.43	0.05	1.33	0.07

(*) Sample failed on weakness

Test type and direction: **D** - Diametral **A** - Axial **B** - Block **L** - Irregular lump **Pd** - Perpendicular to planes of weakness **R** - Random or unknown orientation **PI** - Parallel to planes of weakness

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C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Sample details								Uniaxial Compression Test (LF0879C (1000kN) compression frame used)							
Borehole Ref.	Sample Ref.	Depth (m)	Description	MC (%)	Degree of Saturation (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Mean after prep.		H/D Ratio	Load at Failure (kN)	UCS (MPa) 3 sig. fig.	Failure Sketch	D. Tested	Remarks
								Diameter (mm)	Height (mm)						
BH101		14.35-14.50	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	13	80.3	2.12	1.87	53.80	127.40	2.4	9.1	4		06/11/19	Re-coring 54 mm
BH101		15.60-15.91	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	16	86.2	2.08	1.79	85.70	244.50	2.9	15.4	2.67		06/11/19	
BH101		16.20-16.36	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	14	78.7	2.08	1.83	54.10	125.60	2.3	11.1	4.83		06/11/19	Re-coring 54 mm
BH101		19.28-19.39	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	15	91.1	2.15	1.86	37.90	95.60	2.5	4.1	3.63		06/11/19	Re-coring 38 mm
BH102		15.11-15.35	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	17	86.5	2.07	1.78	84.50	170.10	2.0	18.0	3.21		06/11/19	
BH102		16.08-16.26	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	14	88.8	2.15	1.88	85.10	171.50	2.0	18.4	3.23		06/11/19	
BH102		17.55-17.81	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	17	89.7	2.08	1.77	85.30	215.60	2.5	19.6	3.43		06/11/19	
BH102		19.00-19.34	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	15	86.3	2.10	1.82	85.80	227.60	2.7	19.5	3.37		06/11/19	
BH103		13.05-13.26	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	17	80.4	2.01	1.72	86.40	186.40	2.2	12.3	2.1		06/11/19	
BH103		18.88-19.11	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	17	89.3	2.08	1.77	85.70	205.70	2.4	22.2	3.85		06/11/19	

Note: The dimensional requirements of flatness (<0.02 mm), perpendicularity (<0.05 / 50 mm) and straightness (0.3 mm deviation) are not met. Specific Gravity used for Degree of Saturation is assumed unless specified by the client.

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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Sample details						Density		Uniaxial Compression Test (LF0879C (1000kN) compression frame used)							
Borehole Ref.	Sample Ref.	Depth (m)	Description	MC (%)	Degree of Saturation (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Mean after prep.		H/D Ratio	Load at Failure (kN)	UCS (MPa) 3 sig. fig.	Failure Sketch	D. Tested	Remarks
								Diameter (mm)	Height (mm)						
BH104		7.08-7.29	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	12	68.4	2.07	1.86	86.60	182.50	2.1	11.2	1.9		06/11/19	
BH104		10.07-10.27	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	13	69.4	2.01	1.77	85.70	173.50	2.0	22.3	3.87		06/11/19	
BH104		12.61-12.82	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	13	73.6	2.07	1.83	84.50	193.50	2.3	14.1	2.51		06/11/19	
BH104		15.33-15.54	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Moderately weathered.	12	80.5	2.16	1.93	85.60	172.50	2.0	52.6	9.14		06/11/19	
BH104		16.22-16.47	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Moderately weathered.	14	87.4	2.15	1.89	86.60	211.60	2.4	38.2	6.49		06/11/19	

Note: The dimensional requirements of flatness (<0.02 mm), perpendicularity (<0.05 / 50 mm) and straightness (0.3 mm deviation) are not met. Specific Gravity used for Degree of Saturation is assumed unless specified by the client.

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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH101
 Sample Ref.: -
 Depth (m): 14.35-14.50

Description:
 Very weak thinly laminated orangish brown fine to medium grained
 SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 80.3 %

Specific Gravity: 2.7 Mg/m³ (Assumed)

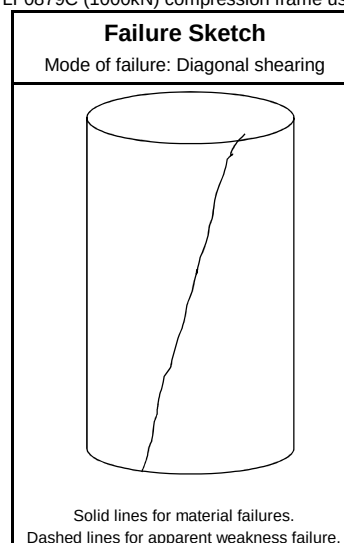
53.80 mm
127.40 mm
2.12 Mg/m ³
1.87 Mg/m ³
13 %

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

4 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
 Angle of shear plane/Horizontal: 100°

Sample type	C
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Remarks: Re-coring 54 mm

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

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C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH101
 Sample Ref.: -
 Depth (m): 15.60-15.91

Description:
 Very weak thinly laminated orangish brown fine to medium grained
 SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 86.2 %

Specific Gravity: 2.7 Mg/m³ (Assumed)

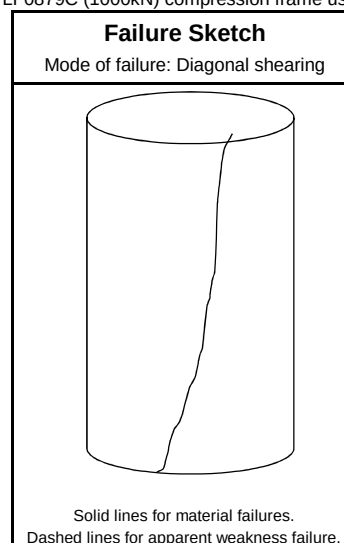
85.70 mm
244.50 mm
2.08 Mg/m ³
1.79 Mg/m ³
16 %

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

2.67 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
 Angle of shear plane/Horizontal: 100°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

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C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

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Project Name:

MAYFIELD PLOT M
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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH101
 Sample Ref.: -
 Depth (m): 16.20-16.36

Description:
 Very weak thinly laminated orangish brown fine to medium grained
 SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 78.7 %

Specific Gravity: 2.7 Mg/m³ (Assumed)

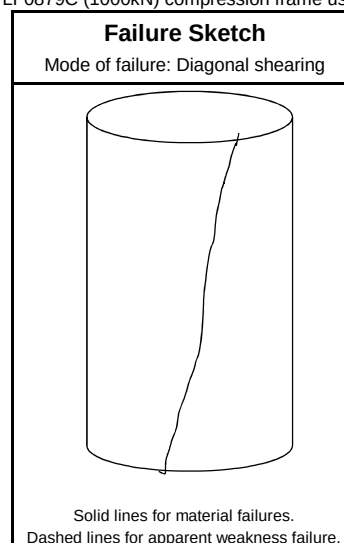
54.10 mm
125.60 mm
2.08 Mg/m ³
1.83 Mg/m ³
14 %

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

4.83 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
 Angle of shear plane/Horizontal: 100°

Sample type	C
-------------	---

Remarks: Re-coring 54 mm

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

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C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

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Project Name:

MAYFIELD PLOT M
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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH101
 Sample Ref.: -
 Depth (m): 19.28-19.39

Description:
 Very weak thinly laminated orangish brown fine to medium grained
 SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

37.90 mm
95.60 mm
2.15 Mg/m ³
1.86 Mg/m ³
15 %

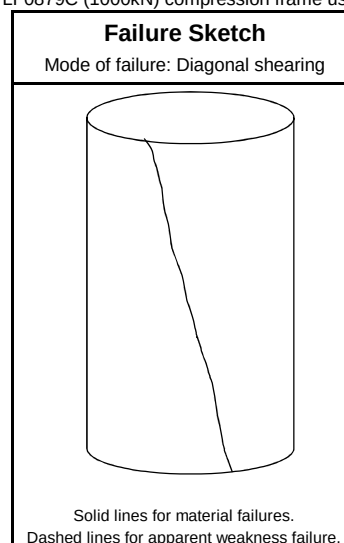
Degree of Saturation: 91.1 %

Specific Gravity: 2.7 Mg/m³ (Assumed)**Test results**

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

3.63 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
 Angle of shear plane/Horizontal: 80°

Sample type	C
-------------	---

Remarks: Re-coring 38 mm

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

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Date: 11/11/2019

Project Number:

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Project Name:

MAYFIELD PLOT M
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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH102
Sample Ref.: -
Depth (m): 15.11-15.35

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

84.50 mm
170.10 mm
2.07 Mg/m ³
1.78 Mg/m ³
17 %

Degree of Saturation: 86.5 %

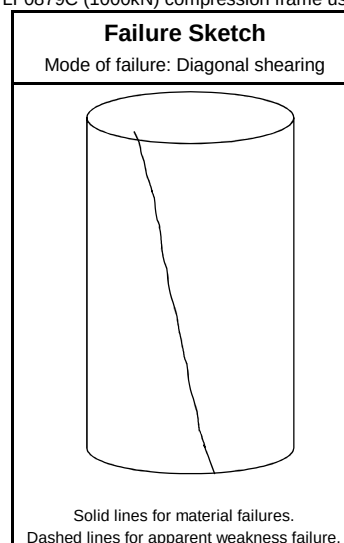
Specific Gravity: 2.7 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

3.21 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 80°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

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C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH102
Sample Ref.: -
Depth (m): 16.08-16.26

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 88.8 %

Specific Gravity: 2.7 Mg/m³ (Assumed)

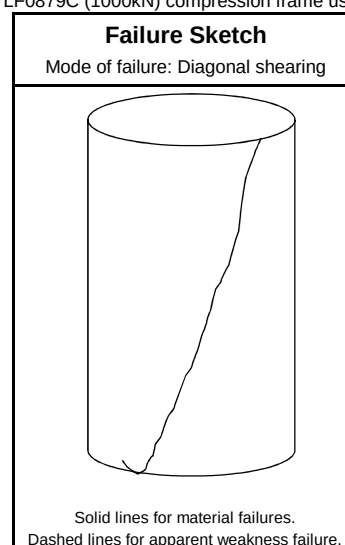
85.10 mm
171.50 mm
2.15 Mg/m ³
1.88 Mg/m ³
14 %

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

3.23 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 100°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

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Date: 11/11/2019

Project Number:

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Project Name:

MAYFIELD PLOT M
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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH102
 Sample Ref.: -
 Depth (m): 17.55-17.81

Description:
 Very weak thinly laminated orangish brown fine to medium grained
 SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 89.7 %

Specific Gravity: 2.7 Mg/m³ (Assumed)

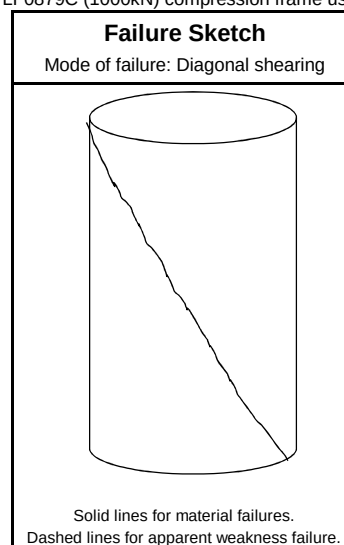
85.30 mm
215.60 mm
2.08 Mg/m ³
1.77 Mg/m ³
17 %

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

3.43 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
 Angle of shear plane/Horizontal: 65°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

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C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

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UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH102
Sample Ref.: -
Depth (m): 19.00-19.34

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

85.80 mm
227.60 mm
2.10 Mg/m ³
1.82 Mg/m ³
15 %

Degree of Saturation: 86.3 %

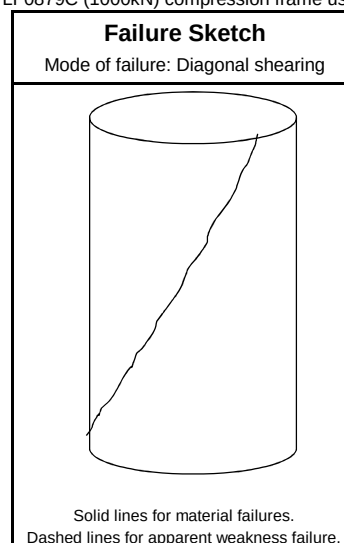
Specific Gravity: 2.7 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

3.37 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 120°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

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C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®



UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH103
Sample Ref.: -
Depth (m): 13.05-13.26

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

86.40 mm
186.40 mm
2.01 Mg/m ³
1.72 Mg/m ³
17 %

Degree of Saturation: 80.4 %

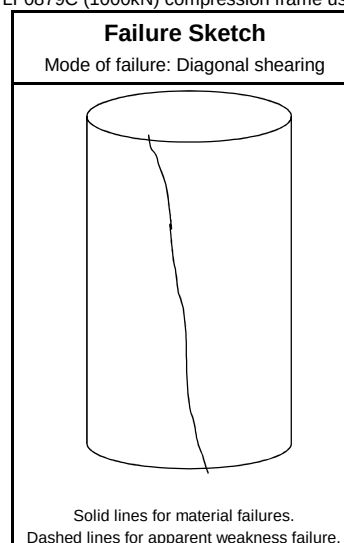
Specific Gravity: 2.7 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

2.1 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 80°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®



UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH103
Sample Ref.: -
Depth (m): 18.88-19.11

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

85.70 mm
205.70 mm
2.08 Mg/m ³
1.77 Mg/m ³
17 %

Degree of Saturation: 89.3 %

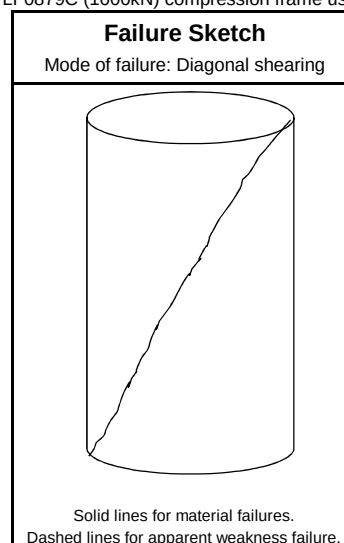
Specific Gravity: 2.7 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

3.85 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 120°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®



UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH104
Sample Ref.: -
Depth (m): 7.08-7.29

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

86.60 mm
182.50 mm
2.07 Mg/m ³
1.86 Mg/m ³
12 %

Degree of Saturation: 68.4 %

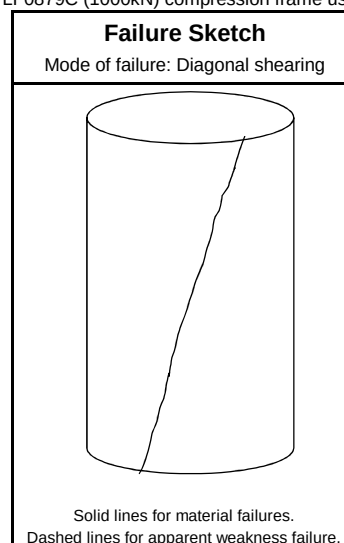
Specific Gravity: 2.7 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

1.9 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 100°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®



UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH104
Sample Ref.: -
Depth (m): 10.07-10.27

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 69.4 %

Specific Gravity: 2.7 Mg/m³ (Assumed)

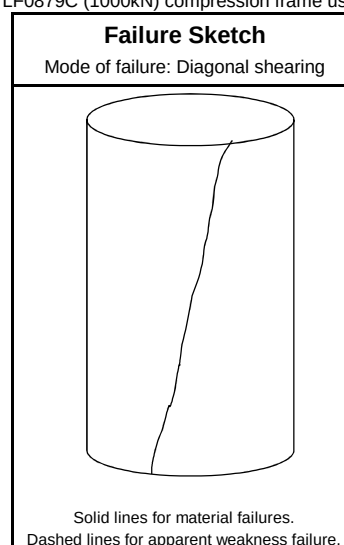
85.70 mm
173.50 mm
2.01 Mg/m ³
1.77 Mg/m ³
13 %

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

3.87 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 52°

Date tested: 06/11/2019

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®



UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH104
Sample Ref.: -
Depth (m): 12.61-12.82

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Highly weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

84.50 mm
193.50 mm
2.07 Mg/m ³
1.83 Mg/m ³
13 %

Degree of Saturation: 73.6 %

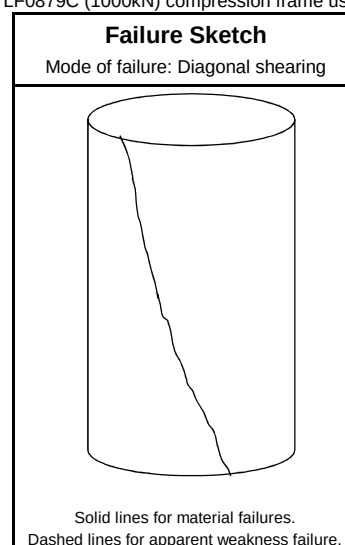
Specific Gravity: 2.7 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

2.51 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 58°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®



UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH104
Sample Ref.: -
Depth (m): 15.33-15.54

Description:
Very weak thinly laminated orangish brown fine to medium grained
SANDSTONE. Moderately weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

85.60 mm
172.50 mm
2.16 Mg/m ³
1.93 Mg/m ³
12 %

Degree of Saturation: 80.5 %

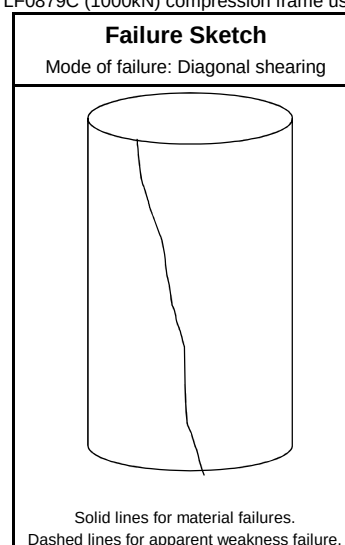
Specific Gravity: 2.7 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

9.14 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
Angle of shear plane/Horizontal: 64°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®



UNCONFINED COMPRESSIVE STRENGTH

Borehole Ref.: BH104
 Sample Ref.: -
 Depth (m): 16.22-16.47

Description:
 Very weak thinly laminated orangish brown fine to medium grained
 SANDSTONE. Moderately weathered.

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 87.4 %

Specific Gravity: 2.7 Mg/m³ (Assumed)

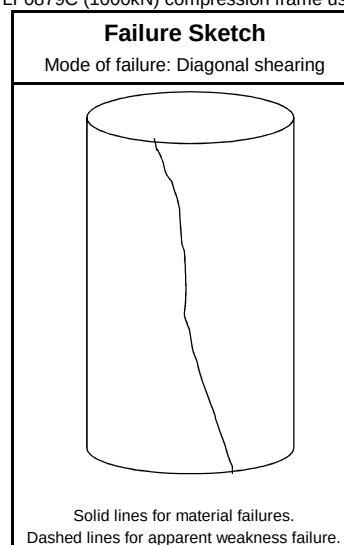
86.60 mm
211.60 mm
2.15 Mg/m ³
1.89 Mg/m ³
14 %

Test results

Unconfined Compressive Strength
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

6.49 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 06/11/2019

Angle of foliation/Horizontal: n/a
 Angle of shear plane/Horizontal: 66°

Sample type	C
-------------	---

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are not met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 11/11/2019

Project Number:

GEO / 30164

Project Name:

MAYFIELD PLOT M
3986

GEOLABS®

TESTING RESTRICTION

The following tests have been scheduled on the below project. Those listed **CANNOT** be performed for the reason stated. If alternative samples are available for the restricted tests, please supply details.

Sample details				Tests restricted	Reason for restriction and comments
Borehole Ref.	Sample Ref.	Depth (m)	Description		
BH102		18.10-18.22	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	UCS	Sample too short, Point Load done instead
BH103		15.60-15.91	Very weak thinly laminated orangish brown fine to medium grained SANDSTONE. Highly weathered.	UCS	Sample not received

Checked and Approved by

 C Clergeaud (Snr. Geologist)
 Date: 11/11/2019

Project Number:

 Project Name:

GEO / 30164

MAYFIELD PLOT M
3986





**COMPLEX CHALLENGES ...
MADE SIMPLE**

APPENDIX E – Ground Gas / Water Monitoring Results

 Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:	3986	Site:	Mayfield Plot L & M
	Date:	24.10.2019	Client:	U + I
	Engineer:	L. Daley	Equipment:	GFM 435

	2 Days Prior	1 Day Prior	On day of Monitoring
Weather Conditions:	Cloudy	Cloudy	Cloudy
Barometric Pressure Trend:	Falling	Falling	Undulating
Surface Ground Conditions:	Dry		

VISIT ONE	Start	Finish
Time:	13.45	Time: 14.45
Barometric Pressure:	999	Barometric Pressure: 999
Background Oxygen:	21.0	Background Oxygen: 21.0

Monitoring Point	Gas Concentration												Groundwater			Remarks
	Flow Rate (l/h)	Peak						Flow Rate (l/h)	Steady					Depth to Water	Depth to Base	
BH N°		CH ₄ %	CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)	CH ₄ %		CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)				
BH101	0.0	<0.1	0.9	15.7	<<<<	0/0	0.0	<0.1	0.9	15.7	<<<<	0/0	DRY	3.68	N/A	
BH102	-8.0	<0.1	0.7	17	<<<<	0/0	0.0	<0.1	0.7	17	<<<<	0/0	2.67	7.85	5.18	
BH103	0.0	3.0	4.7	3.6	69.9	0/0	0.0	3	4.7	3.6	69.9	0/0	DRY	4.82	N/A	
BH104	0.0	<0.1	0.90	17.90	<<<<	0/0	0.0	<0.1	0.90	17.90	<<<<	0/0	DRY	7.66	N/A	

Comments: <<<< : Below detection limits

 Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:	3986	Site:	Mayfield Plots L&M
	Date:	06.11.2019	Client:	U + I
	Engineer:	RM	Equipment:	GFM 435

	2 Days Prior	1 Day Prior	On day of Monitoring
Weather Conditions:	Scattered Clouds	Scattered clouds	Scattered clouds with a light cool breeze
Barometric Pressure Trend:	Rising	Falling	Falling
Surface Ground Conditions:	Dry		

VISIT TWO	Start	Finish
Time:	10.47	11.43
Barometric Pressure:	1017	1016
Background Oxygen:	20.7	20.6

Monitoring Point	Gas Concentration												Groundwater			Remarks
	Flow Rate (l/h)	Peak						Flow Rate (l/h)	Steady						Depth to Water	
CH ₄ %		CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)	CH ₄ %	CO ₂ %		O ₂ %	LEL %	H ₂ S/C O (ppm)					
BH101	0.00	0.00	1.30	14.40	<<<<	0/0	0.00	0.00	1.30	14.40	<<<<	0/0	DRY	3.54	N/A	
BH102	Submerged bung, groundwater below bung.												2.65*	7.84	7.80	
BH103	0.00	3.60	4.80	3.80	82.50	0/0	0.00	3.50	4.80	3.80	80.20	0/0	DRY	4.84	N/A	
BH104	1.00	0.00	0.90	18.00	<<<<	0/0	0.00	0.00	0.90	18.00	<<<<	0/0	DRY	7.66	N/A	

Comments: <<<< : Below detection limits; *Bung submerged, removed. Water purged down to this level rate of recharge did not permit further purging

 Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ		Job No:	3986		Site:	Mayfield Plots L&M	
		Date:	14.11.19		Client:	U + I	
		Engineer:	RM		Equipment:	GFM 435	

	2 Days Prior	1 Day Prior	On day of Monitoring
Weather Conditions:	Cloudy, light showers	Cloudy, light showers	Cloudy, light showers
Barometric Pressure Trend:	Rising	Falling	Rising
Surface Ground Conditions:	Wet		

VISIT THREE	Start	Finish
Time:	15.50	Time: 17.20
Barometric Pressure:	998	Barometric Pressure: 1000
Background Oxygen:	20.7	Background Oxygen: 20.7

Monitoring Point	Gas Concentration												Groundwater			Remarks
	Flow Rate (l/h)	Peak						Flow Rate (l/h)	Steady						Depth to Water	
CH ₄ %		CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)	CH ₄ %	CO ₂ %		O ₂ %	LEL %	H ₂ S/C O (ppm)					
BH101	0.0	<0.1	2.2	12.2	<<<<	0/0	0.0	<0.1	2.2	12.2	<<<<	0/0	DRY	3.58	N/A	
BH102	2.2	<0.1	0.1	19.9	<<<<	0/0	1.8	<0.1	0.1	19.9	<<<<	0/0	2.47*	7.8	5.33	
BH103	0.0	2.9	2.3	3.7	66.3	0/0	0.0	2.8	2.3	3.7	60	0/0	DRY	4.86	N/A	
BH104	0.0	<0.1	1.00	17.80	<<<<	0/0	0.0	<0.1	1.00	17.80	<<<<	0/0	DRY	7.67	N/A	

Comments: <<<< : Below detection limits; *Bung submerged, removed. Water purged down to this level rate of recharge did not permit further purging

 Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:	3986	Site:	Mayfield Plots L&M
	Date:	25/11/2019	Client:	U + I
	Engineer:	RM	Equipment:	GFM 435

	2 Days Prior	1 Day Prior	On day of Monitoring
Weather Conditions:	Overcast, raining	Overcast	Overcast, raining
Barometric Pressure Trend:	Rising	Rising	Falling
Surface Ground Conditions:	Wet		

VISIT FOUR	Start	Finish
Time:	11.15	12.45
Barometric Pressure:	994	994
Background Oxygen:	20.5	20.3

Monitoring Point	Gas Concentration												Groundwater			Remarks
	Flow Rate (l/h)	Peak						Flow Rate (l/h)	Steady						Depth to Water	
BH N°		CH ₄ %	CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)	CH ₄ %		CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)				
BH101	0.0	<0.1	2.30	12.70	<<<<	0/0	0.0	<0.1	2.30	12.70	<<<<	0/0	DRY	3.53	N/A	
BH102	19.0	<0.1	0.20	19.70	<<<<	0/0	0.0	<0.1	0.20	19.70	<<<<	0/0	2.71*	7.58	4.87	
BH103	0.0	0.70	2.50	1.10	15.70	0/0	0.0	0.60	2.50	1.10	14.40	0/0	DRY	4.84	N/A	
BH104	0.0	<0.1	0.70	19.20	<<<<	0/0	0.0	<0.1	0.70	19.20	<<<<	0/0	DRY	7.67	N/A	

Comments: <<<< : Below detection limits; *Bung submerged, removed. Water purged down to this level (rate of recharge did not permit further purging) then gas monitored.



**COMPLEX CHALLENGES ...
MADE SIMPLE**

APPENDIX F – Equipment Calibration Certificates

TEST DATE AND CONDITIONS			
Date		04/04/19	
Atmospheric Pressure		974	mB
Ambient Temperature		21.3	°C
Envionics Serial No.		5089	

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit 4, Fairfield Court

Seven Stars Estate

Wheler Rd

Coventry

CV3 4LJ

Tel 02476303311

Fax 02476307711



Customer	ROC Consulting
Certificate Number	120915
Order Number	322432

Serial Number	12229
Software Version	G436-00.0027/0009

Recalibration DUE Date
04/04/2020

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	400	Accept > 200 cc/min	Pump Flow @ -200mB	250	Accept > 200 cc/min
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	59.8	60	39.7	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5	5	4.9	5	6	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0	0	0	0	0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0
CO	2000	1000	0	Accept ±0.0	1000	Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	25		1000		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		974	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200 mB	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30	Accept ± 3.0	-481	-481	Accept ± 50
-3	-3	Accept ± 1.0	-21	-20	Accept ± 6.0
0	0	Accept ± 0.0	0	0	Accept ± 0.5
3	3	Accept ± 0.5	15	15	Accept ± 3.0
30	30	Accept ± 3.0	308	306	Accept ± 50
60	59.8	Accept ± 6.0	915	914	Accept ± 130
90	90.3	Accept ± 9.0	1762	1791	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10	Accept ± 2.0
0	0	Accept ± 1.0
30	30	Accept ± 1.0
60	60	Accept ± 1.0
100	100	Accept ± 1.0

Technician:
<i>Jack Rutland</i>

Date Tested:
<i>05/04/19</i>

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

TEST DATE AND CONDITIONS	
Date	4.4.19
Atmospheric Pressure	974 mB
Ambient Temp	21.3 °C
Envionics Serial No.	5089

GAS DATA LTD

Unit 4, Fairfield Court
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LJ

Tel 02476303311 Fax 02476307711



GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
322432	GFM436	12229 G436-000027/0009	120915

Calibration Technician J. R. ...

Date 4.4.19

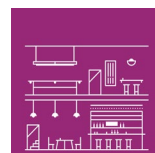
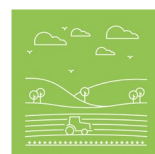
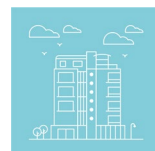
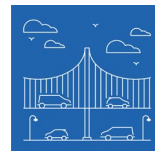
Inspection Technician [Signature] ...

Date 5.4.19

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All Keys)	P	Leather Case		✓
	Backlight	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		✓
	Comms Test	P	AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		X
	Overall Leak Test (30mB)	n/a	AC Battery Charger (AUS)		X
	Battery Charge Test	P	Gas Sample Pipe - (new issue)		X
	Service Date set to?	4.4.20	Flow Sample Pipe - (new issue)		X
Channel Tests	Data Logging Enabled?	P	Hard Carry Case		X
	Verify CH4/LEL/Hexane/PID	P	Allen Key		X
	Verify CO2	P	Spares Pot		X
	Verify O2	P	Temperature Probe		X
	Verify H2S	P	Vane Anemometer		X
	Verify CO	P	USB Cable		X
	Verify LEL	P	USB Memory stick		X
	Verify 1 st Option Gas	n/a	SM V5 Software	Ver 6.05	X
	Verify Atmospheric pressure	P	Internal Filter Pack	Qty	X
	Verify differential pressure	P	External Filter Pack	Qty	X
	Verify flow	P	Field Guide		X
	Verify temperature probe input	P	Extra Items: Gas Sample Tube Gas Flow Tube		
	Verify vane anemometer input	P			
			Comments:		
DataBase Checks	Jobcard(s) completed and signed	P			
	Jobcard(s) booked off database	P			
	Calibration certificate completed	P			
	Complete & print QI record	n/a			
Label Checks	No. of Calibration label fitted	GDC 08581			
	MCERTS label displayed	P			
	Warranty label fitted	P			
H2S Range	H2S Range from Sales Order	5000	ppm		
	H2S Range from Cal Cert	5000	ppm		
	Over-range value correct?	P			



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