Transport for Greater Manchester

EXCHANGE STREET, STOCKPORT

Ground Investigation Report

14113-WSP-SKZ-XX-RP-Y-0004
APRIL 2020

CONFIDENTIAL

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Ground Investigation Report

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WSP

8 First Street
Manchester
M15 4RP

Phone: +44 161 200 5000

WSP.com

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APPENDICES

1 INTRODUCTION

1.1 GENERAL

On the instruction of Transport for Greater Manchester, and in accordance with the fee proposal dated June 2018, WSP has undertaken geotechnical and geo-environmental consultancy works for the proposed development of land between Station Road, Daw Bank and Exchange Street in Stockport Town Centre (**Figure A.1** in **Appendix A**).

1.2 OBJECTIVES & SCOPE OF WORKS

The main objectives of the work are to identify potential development constraints with respect to geotechnical design, soil and groundwater contamination, and ground gas.

The scope of works comprises:

- Targeted intrusive investigation;
- Laboratory geotechnical and chemical testing;
- Groundwater / ground gas monitoring;
- Contamination risk assessment considering human health and the wider environment;
- Ground gas risk assessment
- Derivation of a ground model; and,
- Derivation of geotechnical parameters.

For a discussion of contamination and ground gas issues, reference should be made to:

- WSP. 2020. '*Exchange Street – Phase II Contaminated Land Assessment',* Report ref. 14113-WSP-SKZ-XX-RP-Y-0005

This report is intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2: 2007 (BSI, 2007).

1.3 BACKGROUND & DEVELOPMENT PROPOSALS

The Exchange Street site forms part of the wider Stockport Interchange development, which includes construction of a new bus interchange and, the now completed, construction of a bridge across the River Mersey.

A footbridge is proposed to improve access between the proposed Interchange and Stockport Railway Station. The proposals include re-grading the southern parts of the site and the installation of a sheet pile retaining wall to enable the construction of a step-free footway. In the northern part of the site it is proposed to raise levels by constructing a reinforced earth embankment. The footbridge is proposed between the northern end of the site (across the junction of Exchange Street and Daw Bank) to tie into the proposed Interchange.

Development proposals are presented in **Appendix B**.

1.4 GEOTECHNICAL CATEGORY

It is considered that the proposed structures fall within Geotechnical Category 2 as defined in BS EN 1997-1:2004+A1:2013 (BSI, 2014). These are conventional types of structures and foundations with no exceptional risk of difficult soil or loading conditions.

1.5 PREVIOUS REPORTS

The following reports have been previously prepared by WSP and others and should be read in conjunction with this report:

- AECOM. 2016. *Stockport Interchange – Ground Investigation Report*. Ref No. 60340298/GEO/02.
- WSP. 2018. *Exchange Street Phase I Preliminary Ground Risk Assessment*. Report Ref. 14113-WSP-SKZ-XX-RP-Y-0004.

1.6 CONFIDENTIALITY

This report is addressed to and may be relied upon by the following:

Transport for Greater Manchester
2 Piccadilly Place
Manchester
M1 3BG

This assessment has been prepared for the sole use of the above-named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP. No responsibility will be accepted where this report is used in its entirety, or in part, by any other party.

Information provided by others is taken in good faith as being accurate. WSP cannot and will not accept liability for any deficiencies in third party information.

General limitations are presented in **Appendix C.**

2 THE SITE & EXISTING INFORMATION

2.1 SITE DETAILS

The site is located immediately north of Stockport Railway Station, approximately 300m south west of Stockport Town Centre within a mixed commercial, industrial, and residential setting.

The approximate National Grid Refence of the centre of the site is 389239E, 390058N.

The site location is shown on **Figure A.1** in **Appendix A** and an aerial photograph of the site is presented below.

Photograph 2-1 - Aerial Photograph of the Site

2.2 SITE DESCRIPTION & TOPOGRAPHY

The site is irregular in shape, bounded by Daw Bank to the north, Station Road to the south, Exchange Street and the BT Exchange building to the east and railway lines and a brick-built viaduct the west.

The most southerly area of the site is currently used as a car park, surfaced with asphalt and accessed from Station Road. The car park level falls from approximately 68m above Ordnance Datum (m AOD) at its western extent (level with the railway line to the west) to 60m AOD at the eastern entrance with Station Road. Access into a Network Rail signalling building (adjacent to the western boundary of the site) is gained via a footpath from the car park.

From its entrance in the east, the car park is elevated above Station Road, with the level difference made up by a brick retaining wall, which reaches a maximum height of approximately 4m in the south west corner.

To the north of the car park, the site falls northwards from approximately 65m AOD to 47m AOD. The level difference is made up predominantly of an earthwork embankment with mature trees and shrubs on the upper sections.

A concrete surfaced, stepped public footpath traverse the earthwork embankment linking Exchange Street and Station Road.

Retaining walls are present at the toe of the slope at the northern extent of the site (junction of Exchange Street and Daw Bank), and to the rear of the BT Exchange building, at the eastern extent of the site. The wall at the northern site extent is a stone block retaining wall, which steps up from approximately 0.6m height up to 2m. The wall located behind the BT Exchange Building is brick construction along approximately half its length and stone block along the remainder and is approximately 1.8m high.

The arches of the viaduct are visible from approximately the midpoint of the western boundary; initially protruding from the earthworks and exposed to their full height on the north-western corner of the site. Further commentary on the viaduct is provided in **Section 3.6**.

A smaller gravel surfaced car park is present at the toe of the earthworks, adjacent to the BT Exchange building and accessed from Exchange Street. This car park rises from approximately 51m AOD at the Exchange Street entrance to approximately 52.5m AOD at its southern extent.

Photograph 2-2 - View facing south. Showing footpath linking to Station Road and low level car park (left)

Photograph 2-3 - The northern extent of the site viewed from the junction of Exchange Street and Daw Bank, with Stockport Viaduct in the background on the western boundary

Photograph 2-4 - The car park accessed from Exchange Street and the BT Exchange building

Photograph 2-5 – View facing south from the northern extent of the site. Heavily vegetated areas across the western part of the site.

3 ENVIRONMENTAL SETTING

3.1 INTRODUCTION

The following section presents a summary of the environmental setting and site history taken from the WSP Phase I Preliminary Ground Risk Assessment (2018). For a more detailed assessment, reference should be made to the aforementioned report.

3.2 GEOLOGY

Published geological mapping indicates that the majority of the site is underlain by Glaciofluvial Deposits, generally comprising sand and gravel, but with some finer-grained clay and silt layers. The northern extent of the site is indicated to be underlain by Glacial Till. River Terrace Deposits associated with the River Mersey are present locally in the area, outcropping adjacent to the site's north-eastern boundary.

The solid geology underlying the site comprises sandstone of the Chester Formation. There are several faults shown in the surrounding area, the closest of which is shown approximately 25m to the south of the site and trending northwest to southeast.

3.3 HYDROGEOLOGY

The Glaciofluvial Deposits are classified as a Secondary A Aquifer and the Glacial Till as a Secondary Undifferentiated Aquifer. The Chester Formation Sandstone is classified as a Principal Aquifer.

3.4 HYDROLOGY

The nearest surface water feature is the westerly flowing River Mersey, located approximately 160m to the north of the site at its closest point. In 2016 the ecological classification of the water body was "Moderate", whilst the chemical quality was classified as "Good" under the Water Framework Directive.

3.5 SITE HISTORY

Historical maps show that parts of the site have variously been occupied by a reservoir, part of a building (dye house) and railway sidings, and has been subject to earthworks to achieve its current geometry.

3.6 STOCKPORT VIADUCT

Stockport viaduct, located to the northwest of the site, was constructed in 1840 and is a Grade II listed structure. Drawings obtained from Network Rail show ground conditions around the viaduct piers to comprise Made Ground underlain by gravel and bedrock.

Drawing 36661 shows a plan view of the piers with the extent of the foundations also marked on the plan. The plan indicates that the foundations step out approximately 1m from the edge of the structure.

3.7 UNEXPLODED ORDNANCE

No readily available records have been found to indicate that the site was bombed during World War I or World War II and a detailed desk study was not considered essential.

4 GROUND INVESTIGATION

4.1 FIELDWORK

EXPLORATORY HOLES

A limited amount of ground investigation was undertaken by AECOM in November and December 2015 across the wider Stockport Interchange site, the details of which are presented in the AECOM Ground Investigation Report (AECOM, 2016). Two window samples and one borehole were undertaken within the Exchange Street site and these have been included in this assessment of ground conditions and are detailed in **Table 4-1**.

Based on the desk study information and the AECOM exploratory holes, additional ground investigation was scoped by WSP. This aimed to provide additional geotechnical information to aid the development of a ground model and support the cost-effective design of the substructures and to obtain data to allow an assessment of the contamination status of the site.

Fieldworks were undertaken between 13 November and 9 December 2019 by Geotechnics and observed by WSP. The works undertaken are summarised in **Table 4-1**.

Table 4-1 – Summary of Fieldwork

Investigation Method	No. of Positions	Depth (m BGL*)	Comments
2015 AECOM Investigation			
Window sample borehole	2 (WS221 & WS224)	0.3 – 1.7	
Cable percussion borehole	1 (BH111)	1.55	
2019 Investigation			
Machine excavated trial pit	2 (TP01 & TP02)	2.6 – 2.7	
Window sample borehole	14 WS306 – WS314, WS314A, WS315 – WS318)	0.4 – 5.45	WS318 terminated on an obstruction at 0.4m BGL
Dynamic sample borehole with rotary follow on	6 (BH303, BH304, BH305, BH305A, BH305B, BH30C)	0.8 – 19.9	BH305/A/B all terminated on obstructions within inspection pits.
Dynamic sample borehole	BH306	8.71	

* metres below ground level

The procedures followed in the investigation were in general accordance with guidance presented in BS 5930:2015 and BS 10175:2011 (BSI, 2015, 2013).

The results of the ground investigation are presented in the Factual Report (Geotechnics, 2020), which is presented in **Appendix D**. The Factual Report contains exploratory hole records, core photographs, in-situ testing data, monitoring data, and laboratory testing results.

An exploratory hole location plan is presented as **Dwg. 14113-WSP-SKZ-XX-DR-Y-0001** in **Appendix A**.

MONITORING WELLS

Combined groundwater and ground gas monitoring installations were placed in the boreholes. Details of the installations are presented on the exploratory hole records and summarised in **Table 4-2**.

Table 4-2 – Summary of Monitoring Installations

Exploratory Hole	Standpipe Diameter (mm)	Screen Top & Base (m BGL)	Strata Installed
BH303	50	2.0 – 10.0	Sandstone
BH304	50	4.0 – 10.0	Granular Glaciofluvial Deposits / Sandstone
BH305C	50	6.0 – 15.0	Glaciofluvial Deposits (Silt) / Sandstone
BH306	50	2.0 – 8.5	Glaciofluvial Deposits (Silt) / Glaciofluvial Deposits (Sand) / Sandstone
WS307	50	1.0 – 3.0	Granular Made Ground / Sandstone
WS309	50	1.0 – 1.8	Granular Made Ground / Cohesive Made Ground
WS311	50	1.0 – 4.5	Cohesive Made Ground
WS312	50	1.0 – 3.0	Glaciofluvial Deposits (Clay)
WS314	50	1.0 – 3.0	Glaciofluvial Deposits (Clay)
WS315	50	1.0 – 3.0	Glaciofluvial Deposits (Silt)
WS316	50	3.0 – 5.0	Glaciofluvial Deposits (Silt)
WS317	50	1.0 – 2.0	Granular Made Ground

SURVEYING

All exploratory holes were surveyed by Geotechnics. Eastings, northings, and Ordnance Datum elevations are presented on the exploratory hole records.

4.2 IN-SITU TESTING

STANDARD PENETRATION TESTING

Standard Penetration Tests (SPTs) were performed within the dynamic sampling sections of the boreholes and within the window sample boreholes. The test results are presented on the exploratory hole records and a plot of SPT N_{60} (corrected for hammer efficiency) versus elevation is presented as **Figure A.3** in **Appendix A**.

4.3 LABORATORY TESTING

Geotechnical testing scheduled by WSP comprised the following:

- Moisture Content;
- Atterberg Limits;
- Particle Size Distribution;
- 2.5kg compaction test
- Point Load Index;
- Unconfined Compressive Strength;
- pH; and,
- Water soluble sulphate (2:1).

Geotechnical testing results are presented in Appendix 8 of the Geotechnics Factual Report (**Appendix D**).

4.4 GROUNDWATER & GROUND GAS MONITORING VISITS

Four ground gas / groundwater monitoring visits were undertaken over a six-week period in accordance with guidance presented in BS 8484:2015 (BSI, 2016) and CIRIC C665 (Wilson et al, 2007) for a low sensitivity, low ground gas generation potential site.

Ground gas and groundwater monitoring results are provided in the Geotechnics Factual Report (2020) in **Appendix D**.

5 GROUND SUMMARY

5.1 STRATA

Published geological mapping indicates that superficial deposits across much of the site comprise Glaciofluvial Deposits with some Glacial Till in the northern part of the site. Bedrock is indicated to comprise Chester Formation Sandstone. Given the history of the site and the surrounding area, Made Ground was also anticipated.

The ground investigation recorded variable ground conditions across the site. At the northern extent of the site and in the car park off Exchange Street, recorded ground conditions generally comprised Made Ground directly overlying sandstone bedrock. WS307, WS309, and WS311 were located on the earthworks leading up to the viaduct on the western boundary of the site and recorded Made Ground comprising loose gravelly fine to coarse sand or soft to firm slightly sandy gravelly clay. Glaciofluvial Deposits were recorded in the central and southern parts of the site, increasing in thickness to the south. A limited thickness of Glacial Till was recorded underlying the Glaciofluvial Deposits in BH305C and BH306 located in the central west and southern areas of the site respectively.

A geological cross section is presented as **Figures A.5** and **A.6** in **Appendix A**.

Table 5-1 – Ground Summary

Strata		Typical Description	Depth to Base (m BGL)	Elevation of Base (m AOD)	Thickness (m)	Notes
Topsoil		-	0.1 – 0.6	50.34 – 58.89	0.1 – 0.6	-
Made Ground	Surfacing	Black tarmacadam	0.05 – 0.2	61.75 – 66.41	0.05 – 0.2	Recorded in BH306, WS 317, and WS318 located in the Station Road carpark
	Granular	Loose gravelly fine to coarse sand with a variable cobble content	0.3 – 2.6	47.85 – 65.41	0.3 – 2.6	Recorded in the majority of exploratory positions
	Cohesive	Firm slightly sandy gravelly clay with a low cobble content	0.85 – 4.89	50.07 – 64.61	0.4 – 4.39	Recorded in 8No. exploratory holes, generally towards the south and west of the site
Glaciofluvial Deposits	Sand	Medium dense gravelly silty fine to coarse sand	>3.29 – 7.7	49.00 – 61.61	>0.49 – 3.9	Recorded in BH304, BH305C, BH306, and WS317

Strata		Typical Description	Depth to Base (m BGL)	Elevation of Base (m AOD)	Thickness (m)	Notes
	Silt	Firm yellowish brown sandy silt	>2.7 – 7.2	51.12 – 62.41	0.4 – 2.45	Recorded in BH304, BH305C, BH306, TP02, WS 315, and WS316
	Clay	Soft to firm reddish brown slightly gravelly clay	2.8 – 3.0	50.48 – 59.91	1.6 – 2.6	Recorded in BH306, WS312, WS314, and WS314A
Glacial Till		Stiff reddish brown slightly sandy slightly gravelly clay	7.8 – 8.2	51.13 – 58.41	0.85 – 1.0	Only recorded in BH305C and BH306
Weathered Chester Formation Sandstone		Extremely weak reddish-brown fine to coarse grained sandstone. Recovered as sand and gravel	1.7 – 9.4	47.50 – 57.90	0.51 – 1.60	Elevation of rockhead generally falls to the north
Intact Chester Formation Sandstone		Extremely weak reddish-brown fine to coarse grained sandstone.	>19.9	<35.44	>13.5	

5.2 GROUNDWATER

Four rounds of groundwater monitoring have been undertaken and the results of these are summarised in **Table 5-2**, along with water strikes observed during drilling. No groundwater strikes were recorded during drilling.

Table 5-2 – Summary of Groundwater Monitoring

Exploratory Hole	Ground Level (m AOD)	Groundwater Depth (m BGL)		Monitoring Level (m AOD)		Strata
		Min.	Max.	Min.	Max.	
BH303	50.64	7.43	7.54	43.10	43.21	Chester Formation Sandstone
BH304	56.70	8.69	9.89	46.81	47.25	Chester Formation Sandstone
BH305C	58.93	13.50	13.63	45.30	45.43	Chester Formation Sandstone
BH306	66.61	2.93	3.88	62.73	63.68	Glaciofluvial Deposits

Exploratory Hole	Ground Level (m AOD)	Groundwater Depth (m BGL)		Monitoring Level (m AOD)		Strata
		Min.	Max.	Min.	Max.	
WS307	53.58	Dry	Dry	Dry	Dry	-
WS309	54.61	Dry	Dry	Dry	Dry	-
WS311	57.65	Dry	Dry	Dry	Dry	-
WS312	53.48	2.88	2.93	50.55	50.59	Glaciofluvial Deposits
WS314	62.71	1.80	1.94	60.77	60.89	Glaciofluvial Deposits
WS315	54.12	1.96	2.40	51.72	52.16	Glaciofluvial Deposits
WS316	58.60	2.13	3.21	51.72	52.16	Cohesive Made Ground
WS317	64.22	Dry	Dry	Dry	Dry	-

No groundwater strikes were recorded during the ground investigation. However, the drilling flush used during the rotary cored sections are likely to have masked any inflows.

The shallow wells installed within the Made Ground and superficial deposits recorded variable conditions, with several wells recording no groundwater during the monitoring period and others recording groundwater between 50.55m (2.93m BGL) and 63.68m AOD (2.93m BGL). This suggests the presence of discontinuous, perched groundwater bodies within the Made Ground and superficial deposits.

The deep wells installed within the sandstone recorded groundwater levels between 43.10m (7.54m BGL) and 48.01m AOD (8.69m BGL), generally flowing towards the north. This is considered to be the main groundwater body.

6 GROUND CONDITIONS & MATERIAL PROPERTIES

6.1 GENERAL

The following section discusses the ground conditions and material properties determined from the ground investigation and geotechnical testing described in **Section 4**.

Where necessary, determination of geotechnical parameters has been based on cautious estimates of laboratory derived results, published correlations, and field tests, complemented with engineering judgement.

Where material parameters are assumed, derived by calculation, or taken from published sources, further details are provided as to their derivation.

6.2 MADE GROUND

Made Ground was recorded in all exploratory hole positions either below a layer of topsoil or immediately at the surface. BH306, WS317, and WS318, located in the footway of Station Road or in the car park off Station Road, recorded a layer of surfacing comprising asphalt and paving slabs.

Both cohesive and granular Made Ground was recorded across the site. The Granular Made Ground generally comprised slightly gravelly slightly silty fine to coarse sand with a variable cobble content and ranged in thickness between 0.3m and 2.6m. Gravel and cobbles comprised fragments of sandstone, brick, and concrete.

Where recorded, the Cohesive Made Ground was generally underlying the Granular Made Ground and comprised a soft to firm slightly sandy gravelly clay with a variable cobble content and ranged in thickness between 0.4m and 4.39m. Gravel and cobbles comprised fragments of sandstone, coal, slag, concrete, and brick. Plastic and waste materials comprising plastic bags, fabrics, and drinks cans and bottles were recorded in WS311 between 0.5m and 0.7m BGL.

The results of in-situ and laboratory testing are summarised in **Table 6-1**.

Table 6-1 – Summary of In-Situ & Laboratory Testing – Made Ground

Parameter		No. of Tests	Min – Max	Mean
Granular Made Ground				
Moisture Content (%)		4	8 – 20	13
Optimum Moisture Content (%) – 2.5kg effort		4	7.8 – 12	10
Maximum Dry Density (Mg/m^3) – 2.5kg effort		4	1.86 – 1.97	1.91
Particle Size Distribution (%)	Gravel	4	8 – 19	15
	Sand		59 – 70	64
	Silt / Clay		11 – 30	21
pH		11	4.98 – 8.3	7.4
Water soluble sulphate SO_4 (2:1) (mg/l)		11	20 – 56	33

Parameter	No. of Tests	Min – Max	Mean
SPT N_{60}*	7	7 – 220	43
SPT $N1_{60}$†	7	10 – 330	64
Cohesive Made Ground			
SPT N_{60}*	13	10 – 78	20
Moisture Content (%)	2	23 & 28	25
Plastic Limit (%)	2	NP & 30	35
Liquid Limit (%)		NP & 15	15
Plasticity Index (%)		NP & 15	15
pH	5	5.9 – 7.9	7.2
Water soluble sulphate SO_4 (2:1) (mg/l)	5	14 – 98	40

NP Non- Plastic

* corrected for hammer efficiency

† corrected for hammer efficiency and effective stress

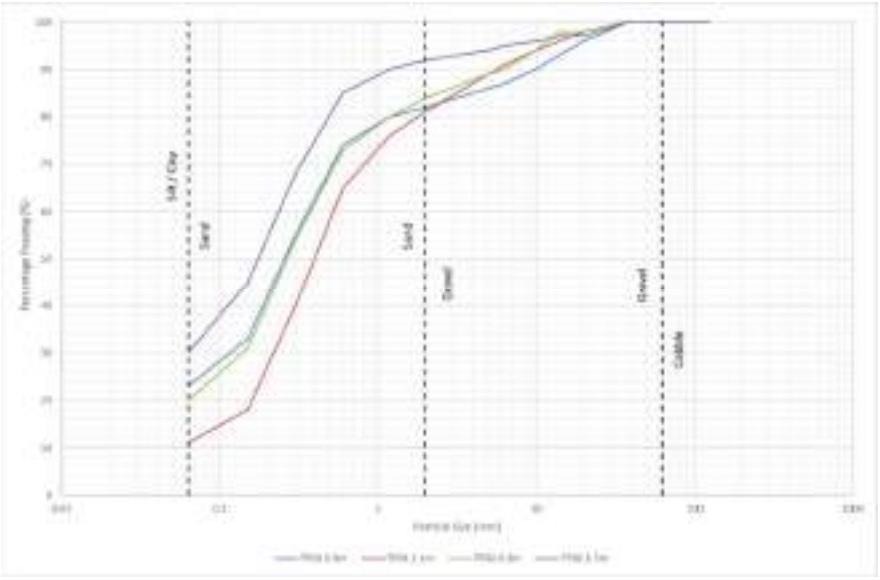
The following section discusses material parameters derived for the Made Ground. However, given its inherent variability, the parameters should be used with caution.

GRANULAR MADE GROUND

Particle Size Distribution

Particle size distribution tests indicate the composition of the Granular Made Ground samples is relatively consistent and varies between a gravelly very silty sand and a gravelly silty sand.

Figure 6-1 - Particle Size Distribution Testing - Granular Made Ground



Unit Weight

The SPT N_{60} results suggest that the Granular Made Ground is a loose to medium dense sand (BS 5930, (BSI, 2015)), which equates to a unit weight of 17kN/m^3 for a loose to medium dense sand above the water table when compared with BS 8002:2015.

Shear Strength

A correlation between peak effective angle of internal friction, φ'_{peak} and SPT $N1_{60}$ (corrected for hammer efficiency and effective stress) has been shown by Stroud (1989). Based on the SPT $N1_{60}$ results and engineering judgement, a peak effective angle of internal friction of 30° is considered appropriate.

COHESIVE MADE GROUND

Unit Weight

In accordance with guidance presented in BS 8002:2015, a bulk unit weight of 18kN/m^3 is considered appropriate for a firm clay.

Undrained Shear Strength

Based on the recorded consistency of soft to firm, SPT N_{60} results, and engineering judgement, an undrained shear strength in the region of 45kN/m^2 is considered appropriate.

Drained Shear Strength

For consideration of long term drained shear strength, the constant volume angle of shear resistance, φ'_{cv} has been estimated from the following relationship presented in BS 8002:2015 (BSI, 2015):

$$\varphi'_{cv} = 42 - 12.5log_{10}I_P$$

Where I_P is the soil's plasticity index, taken as the 20% based on the testing and engineering judgement.

Based on the above relationship, a φ'_{cv} of 26° is considered appropriate for the Cohesive Made Ground.

6.3 GLACIOFLUVIAL DEPOSITS

Glaciofluvial Deposits were recorded underlying the Made Ground in exploratory holes located on the viaduct earthworks and to the south of WS311. The Glaciofluvial Deposits were recorded to predominantly comprise a firm yellowish-brown sandy silt, but layers of soft to firm slightly gravelly clay and medium dense gravelly silty fine to coarse sand were also recorded.

Overall, the Glaciofluvial Deposits were recorded to depths between 1.4m and 7.7m BGL and ranged in thickness between 0.4m and 5.9m.

The sandy layers, ranged in thickness between 0.8m and 3.9m and generally, but not exclusively occurred below the silts

Cohesive soils were recorded in WS314, WS314A and WS312 and ranged in thickness between 1.6m and 2.6m.

The results of in-situ and laboratory geotechnical testing are summarised in **Table 6-2**.

Table 6-2 – Summary of In-Situ & Laboratory Testing – Glaciofluvial Deposits

Parameter		No. of Tests	Min – Max	Mean
Glaciofluvial Deposits - Silt				
SPT N_{60}		12	3 – 25	16
SPT $N1_{60}$		12	4 – 32	19
Moisture Content (%)		14	6 – 36	20
Liquid Limit (%)		6	18 – 39	28
Plastic Limit (%)			Non-plastic	-
Plasticity Index (%)			Non-plastic	-
Particle Size Distribution (%)	Gravel	1	-	9
	Sand		-	19
	Silt / Clay		-	72
pH		9	4.67 – 7.9	7.0
Water soluble sulphate SO_4 (2:1) (mg/l)		9	30 – 500	120
Glaciofluvial Deposits - Cohesive				
SPT N_{60}		6	7 – 14	14
Moisture Content (%)		7	8 – 19	15

Parameter	No. of Tests	Min – Max	Mean
Liquid Limit (%)	3	26 – 40	32
Plastic Limit (%)		15 – 20	17
Plasticity Index (%)		10 – 20	15
pH	4	5.58 – 8.2	6.8
Water soluble sulphate SO_4 (2:1) (mg/l)	4	16 – 60	38
Glaciofluvial Deposits - Sand			
SPT N_{60}	5	2 – 56	20
SPT $N1_{60}$	5	3 – 61	22
pH	2	7.02 & 7.37	7.2
Water soluble sulphate SO_4 (2:1) (mg/l)	2	40 & 50	45

GRANULAR GLACIOFLUVIAL DEPOSITS

Plasticity testing undertaken on the silts recorded non-plastic results and the SPT testing recorded similar values to the sands. Based on this, both soil types have been considered together.

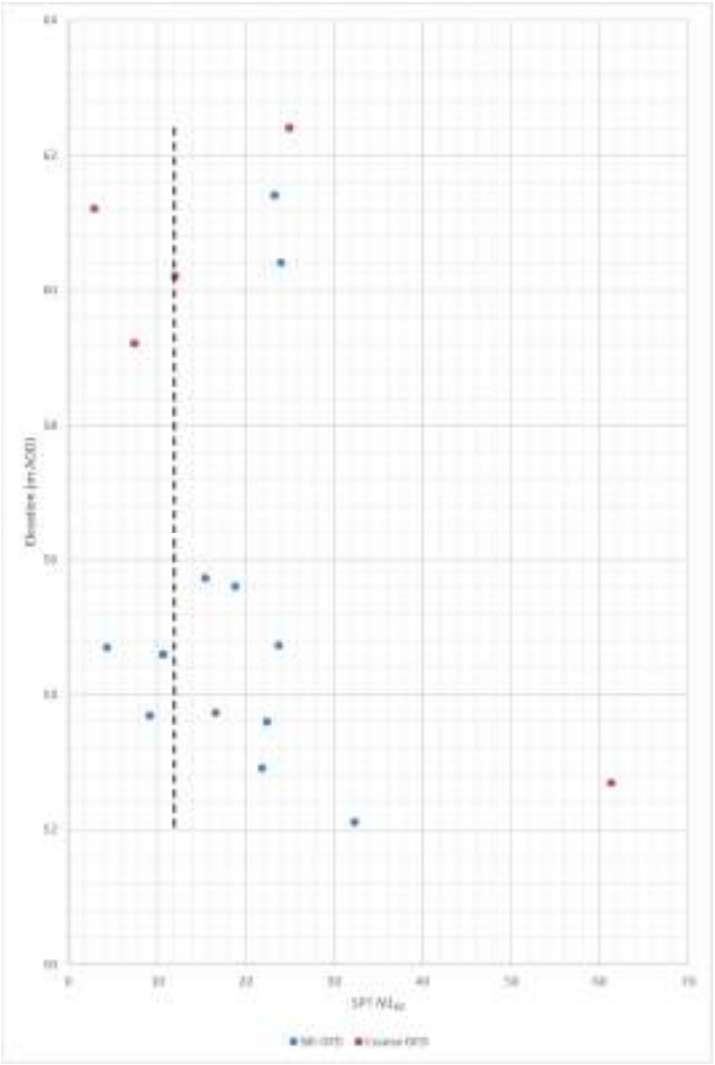
Unit Weight

The SPT N_{60} results suggest loose to medium conditions (BS 5930, (BSI, 2015)) which, based on guidance in BS 8002:2015 (BSI, 2015), corresponds to a unit weight of 17kN/m^3 (above the water table).

Shear Strength

SPT $N1_{60}$ results are presented on **Figure** 6-2 and an SPT $N1_{60}$ of 11 is considered appropriate as a characteristic value. Based on this and the correlation shown by Stroud (1989)., a peak effective angle of internal friction of 31° is considered appropriate.

Figure 6-2 – *SPT $N1_{60}$* vs Elevation – Granular Glaciofluvial Deposits



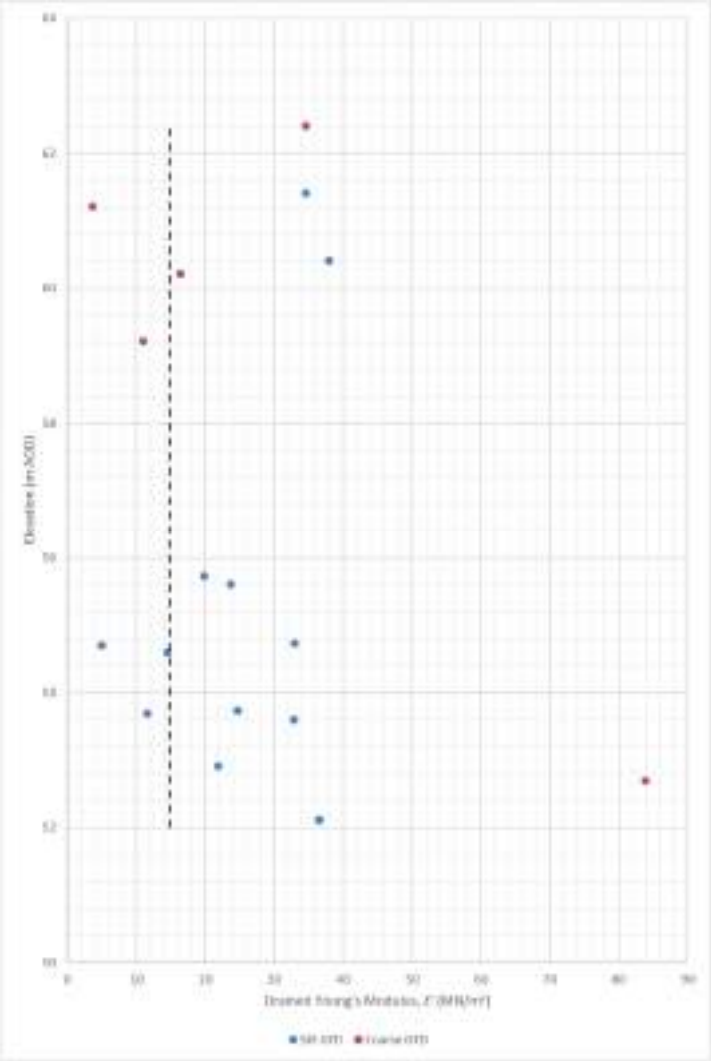
Stiffness

The drained Young's Modulus, *E'* has been determined from the following relationship:

$E'(MN/m^2) = 1.5N_{60}$ (Clayton, 1995)

Results of this relationship are presented on **Figure** 6-3 and, based on this, a drained Young's Modulus of 15MN/m^2 is considered appropriate.

Figure 6-3 – Drained Young's Modulus vs Elevation – Granular Glaciofluvial Deposits



COHESIVE GLACIOFLUVIAL DEPOSITS

Given the limited recorded occurrence of the cohesive soils, the amount of in-situ and laboratory testing is relatively small, and the parameters suggested below should be treated with caution.

Classification Testing

The three classification tests indicate that the Cohesive Glaciofluvial Deposits recorded in WS312, WS314, and WS314 comprise clay of low to intermediate plasticity (Class CL – CI).

Unit Weight

In accordance with guidance presented in BS 8002:2015 (BSI, 2015) a unit weight of 19kN/m^3 is considered appropriate for the Cohesive GFD.

Undrained Shear Strength

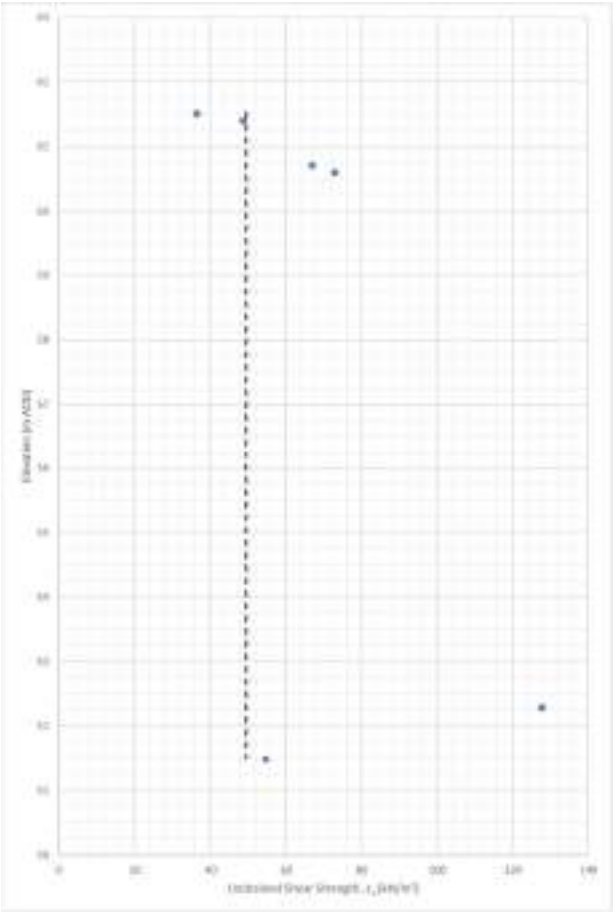
The undrained shear strength, c_u has been estimated from the following relationship with SPT N_{60}:

$$c_u(kN/m^2) = f_1 N_{60}$$

Where *f1* is a factor related to the plasticity index, taken as 5 for an upper bound plasticity index of 20% (Stroud, 1975).

Results of the above relationship are presented on **Figure 6-4** and suggest an undrained shear strength of 50kN/m^2.

Figure 6-4 - Undrained Shear Strength vs Elevation - Cohesive Glaciofluvial Deposits



Drained Shear Strength

Based on the plasticity index relationship presented in **Section 6.2** and an upper bound plasticity index of 20%, a constant volume angle of shear resistance, φ'_{cv} of 26° is considered appropriate for the Cohesive Glaciofluvial Deposits.

Stiffness

Values of drained Young's Modulus, *E'* have been estimated from the following relationship:

$E'(MN/m^2) = 0.9N_{60}$ (Clayton, 1995)

This relationship suggests a drained Young's Modulus of 10MN/m^2.

6.4 GLACIAL TILL

Cohesive Glacial Till was recorded in BH305C and BH306 to depths of 7.8m BGL and 8.2m BGL with thicknesses of 0.85m and 1m. The Cohesive Glacial Till was recorded to comprise stiff slightly sandy slightly gravelly clay with a variable cobble content.

In-situ testing is summarised in **Table 6-3**.

Table 6-3 – Summary of In-Situ Testing – Glacial Till

Parameter	No. of tests	Min – Max	Mean
SPT N_{60}	1	-	110

Given its limited recorded occurrence and the limited testing undertaken, no material parameters have been derived for the Glacial Till.

6.5 CHESTER FORMATION

Sandstone of the Chester Formation was recorded directly underlying Made Ground in exploratory positions at the northern extent of the site and in the exploratory positions located in the car park off Exchange Street. As the ground elevation increases towards the south, the Chester Formation Sandstone was recorded underlying the sequence of Made Ground, Glaciofluvial Deposits, and Glacial Till.

Recorded rockhead levels suggest that rockhead underlying the site falls from approximately 58m AOD in the south to 47.5 m AOD in the north (Dwg No. **14113-WSP-SKZ-ZZ-DR-Y-0003** in **Appendix A**). Rockhead appears to form a plateau beneath the Exchange Street carpark, with recorded levels between 50m and 51m AOD.

The sandstone was recorded as comprising an upper weathered zone, grading with depth into intact rock. Within this report the weathered zone has been taken as the depth over which the sandstone is recorded as having been recovered as gravelly fine to medium sand or where there was very little / no recovery. In the boreholes this zone was recorded to be between 0.90m (BH303) and 1.5m (BH305C) thick.

The intact rock was generally recorded as extremely weak to weak fine to coarse grained sandstone. The main discontinuity set, likely representing bedding, was recorded as horizontal to sub horizontal, very close spaced, planar and smooth. A second, subvertical discontinuity set was also recorded.

Plots of Rock Quality Designation (RQD) and Total Core Recovery (TCR) for the rotary core boreholes are presented as **Figure A.4** in **Appendix A**.

The recorded RQD appears quite variable, with no apparent correlation with elevation across the site. Likewise, TCR was highly variable within each borehole with no particular correlation evident between the boreholes.

The results of in-situ and laboratory testing are summarised in **Table 6-4**.

Table 6-4 – Summary of In-Situ & Laboratory Testing – Chester Formation Sandstone

Parameter	No. of Tests	Min – Max	Mean
SPT N_{60}	22	54 – 917*	323
SPT $N1_{60}$	22	51 – 797*	328
Axial Point Load, I_{S50} (MN/m^2)	60	0 – 0.204	0.08

Parameter	No. of Tests	Min – Max	Mean
pH	2	7.3 & 7.7	7.5
Water soluble sulphate SO_4 (2:1) (mg/l)	2	25 & 30	28
Unconfined Compressive Strength (MN/m^2)	6	1.2 – 8.2	4.3

* extrapolated values

WEATHERED CHESTER FORMATION SANDSTONE

Based on the borehole records, the highly weathered zone has been interpreted as being typically 1.5m thick.

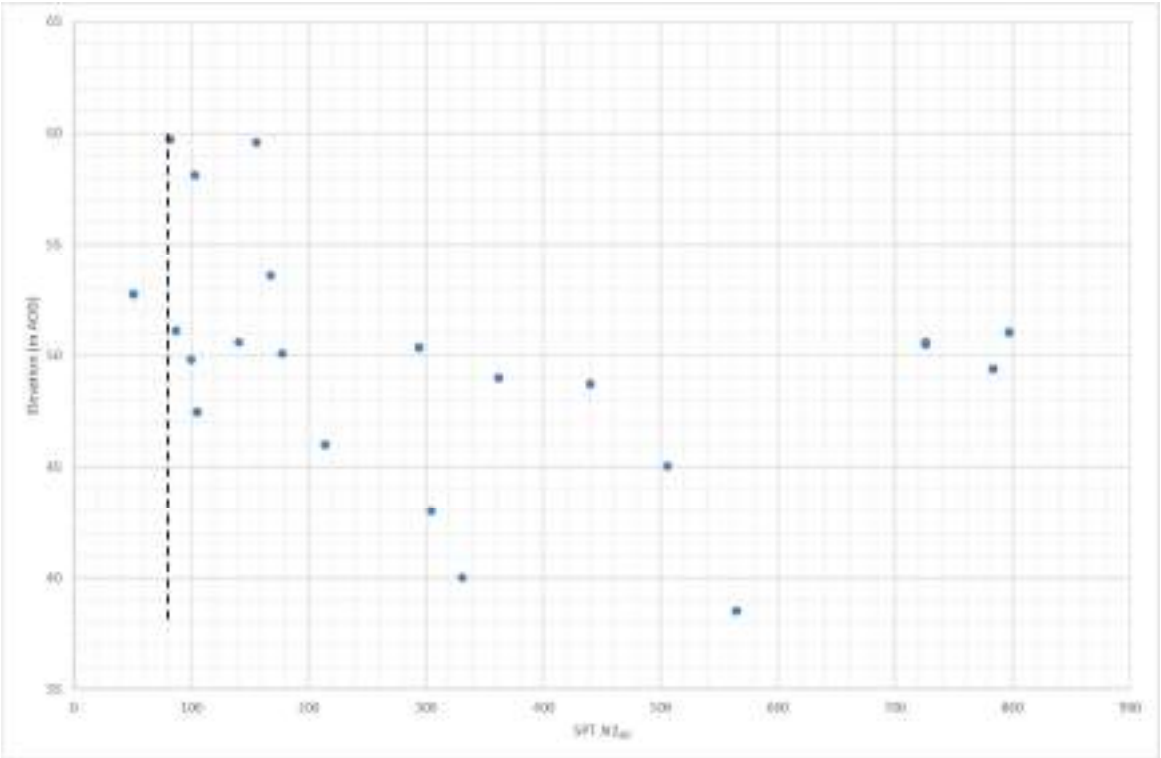
Unit Weight

The SPT N_{60} results indicate that the weathered sandstone is equivalent to a very dense sand (BS 5930:2015, (BSI, 2015)) which, in accordance with guidance presented in BS 8002:2015 (BSI, 2015) corresponds to a unit weight of 19kN/m^3 above the groundwater table.

Shear Strength

In-situ testing indicates a dense to very dense sand and, based on a lower bound SPT $N1_{60}$ of 80 (**Figure 6-5**), a characteristic φ'_{peak} of 42° is considered appropriate (Stroud, 1989).

Figure 6-5 - SPT $N1_{60}$ vs Elevation - Weathered Chester Formation Sandstone



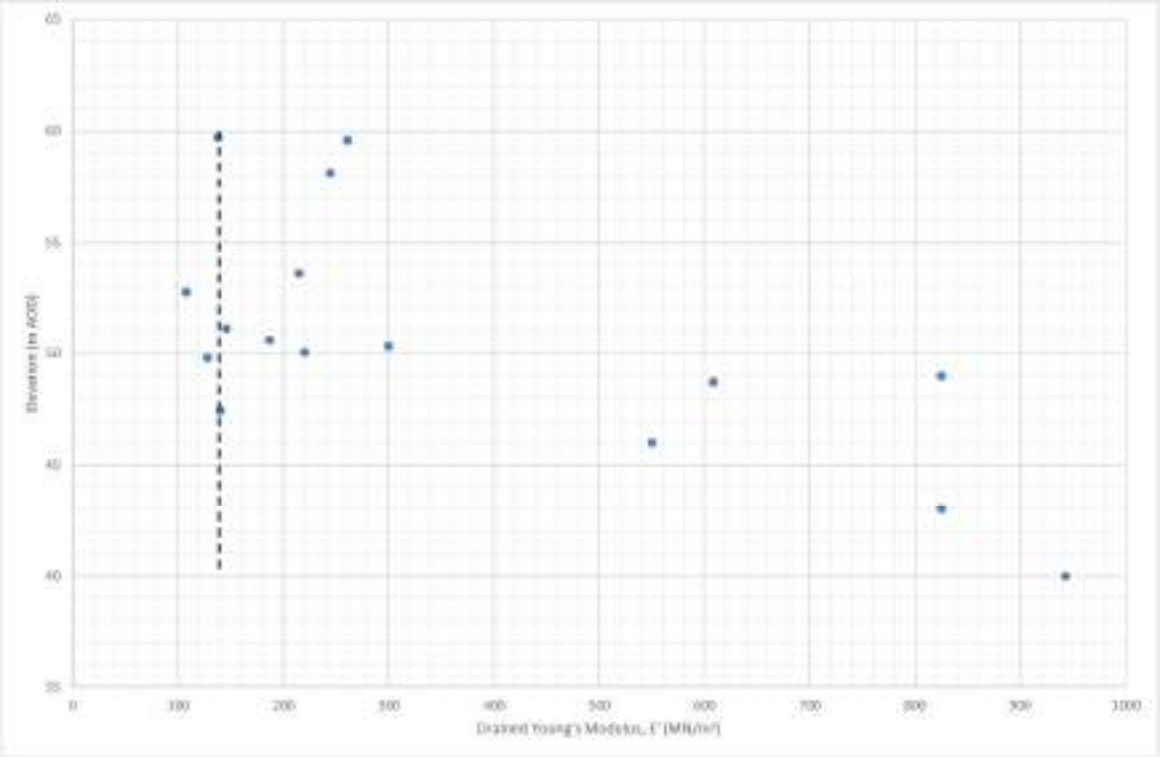
Stiffness

Values of drained Young's Modulus, *E'* for the Weathered Chester Formation Sandstone have been determined using the following relationship and are presented on **Figure 6-6**.

$E'(MN/m^2) = 2N_{60}$ (Clayton, 1995)

Based on a lower bound SPT N_{60} value of 70 and engineering judgement, a drained Young's Modulus of 140MN/m^2 is considered appropriate.

Figure 6-6 - Drained Young's Modulus vs Elevation - Weathered Chester Formation Sandstone



INTACT CHESTER FORMATION SANDSTONE

Unit Weight

The unit weight has been calculated from the mean bulk density and a characteristic unit weight of 21.2kN/m^3 is considered appropriate.

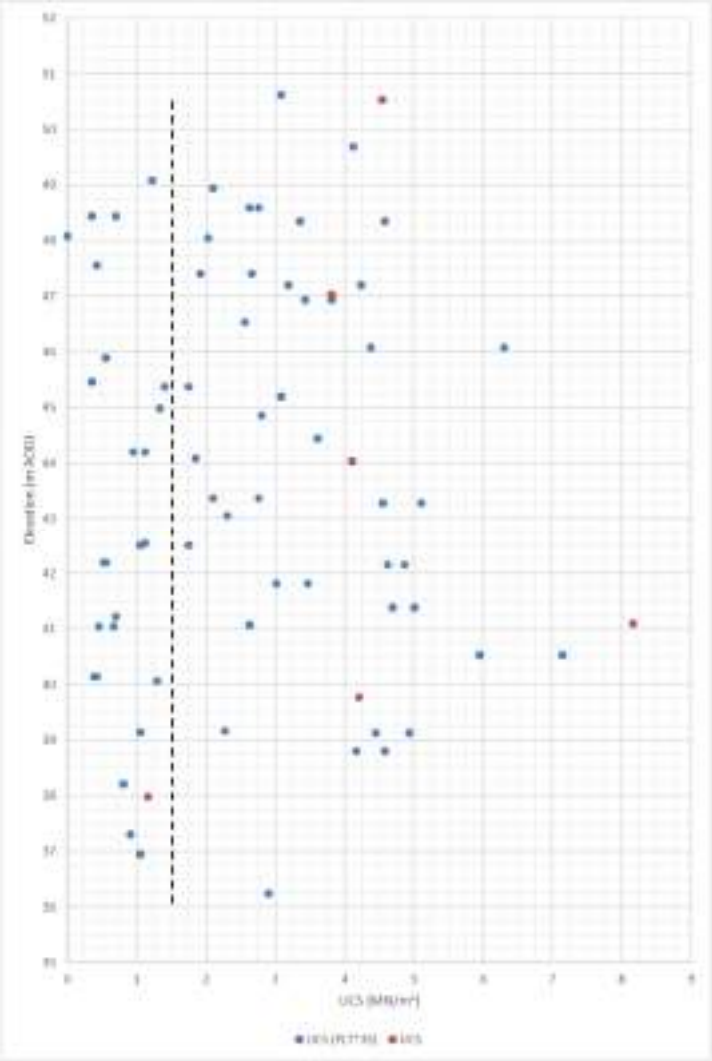
Unconfined Compressive Strength

Figure 6-7 presents a plot of unconfined compressive strength versus elevation based on point load testing of samples of the intact rock.

The point load index (I_{S50}) is converted to an equivalent UCS through the application of a correction factor, *K*. This correction factor is derived by correlating I_{S50} results with direct UCS tests at equivalent depths, and based on testing undertaken across the wider Stockport Interchange site, a *K* factor of 35 has been adopted.

Based on **Figure 6-7**, a UCS of 1.5MN/m^2 is considered appropriate for the Intact Chester Formation Sandstone.

Figure 6-7 - Unconfined Compressive Strength vs Elevation - Intact Chester Formation Sandstone



Stiffness

Values of Young's Modulus, *E'* have been derived from the following relationship developed by Whitworth and Turner (1989) and presented in CIRIA 181 (Gannon et al, 1980):

$$E'(MN/m^2) = 275\sqrt{UCS}$$

Based on the UCS relationship and the characteristic UCS given in the previous section, the relationship suggests a Young's Modulus of 340MN/m^2.

6.6 SUMMARY OF CHARACTERISTIC PARAMETERS

Table 6-5 – Summary of Characteristic Parameters

Parameter	Characteristic Value	Justification
Granular Made Ground		
Moist Bulk Unit Weight, γ_b (kN/m^3)	17	Loose to medium dense sand – BS 8002 (BSI, 2015)
Peak angle of internal friction, φ'_{peak} (°)	30	SPT $N1_{60}$ testing (Stroud, 1989)
Cohesive Made Ground		
Moist Bulk Unit Weight, γ_b (kN/m^3)	18	Low to medium strength clay – BS 8002 (BSI, 2015)
Undrained Shear Strength, c_u (kN/m^2)	45	Field description, SPT N_{60} testing, & engineering judgement
Constant volume effective angle of internal friction, φ'_{cv} (°)	26	Plasticity index relationship – BS 8002 (BSI, 2015)
Glaciofluvial Deposits (Silt & Sand)		
Moist Bulk Unit Weight, γ_b (kN/m^3)	17	Loose to medium dense sand – BS 8002 (BSI, 2015)
Peak angle of internal friction, φ'_{peak} (°)	31	SPT $N1_{60}$ testing (Stroud, 1989)
Stiffness, E' (MN/m^2)	15	SPT N_{60} testing (Clayton, 1995)
Glaciofluvial Deposits (Clay)		
Moist Bulk Unit Weight, γ_b (kN/m^3)	19	Medium strength clay – BS 8002 (BSI, 2015)
Undrained Shear Strength, c_u (kN/m^2)	50	Figure 6.4
Constant volume effective angle of internal friction, φ'_{cv} (°)	26	Plasticity index relationship – BS 8002 (BSI, 2015)
Stiffness, E' (MN/m^2)	10	SPT N_{60} testing (Clayton, 1995)
Weathered Chester Formation Sandstone		
Moist Bulk Unit Weight, γ_b (kN/m^3)	19	Very dense sand – BS 8002 (BSI, 2015)
Peak angle of internal friction, φ'_{peak} (°)	42	SPT $N1_{60}$ testing (Stroud, 1989)

Parameter	Characteristic Value	Justification
Stiffness, E' (MN/m^2)	140	SPT N_{60} testing (Clayton, 1995)
Intact Chester Formation Sandstone		
Moist Bulk Unit Weight, γ_b (kN/m^3)	21.2	Calculated from mean of bulk density testing
UCS, σ_c (MN/m^2)	1.5	Figure 6.7
Stiffness, E' (MN/m^2)	340	$E' = 275\sqrt{UCS}$ (Whitworth & Turner, 1989)

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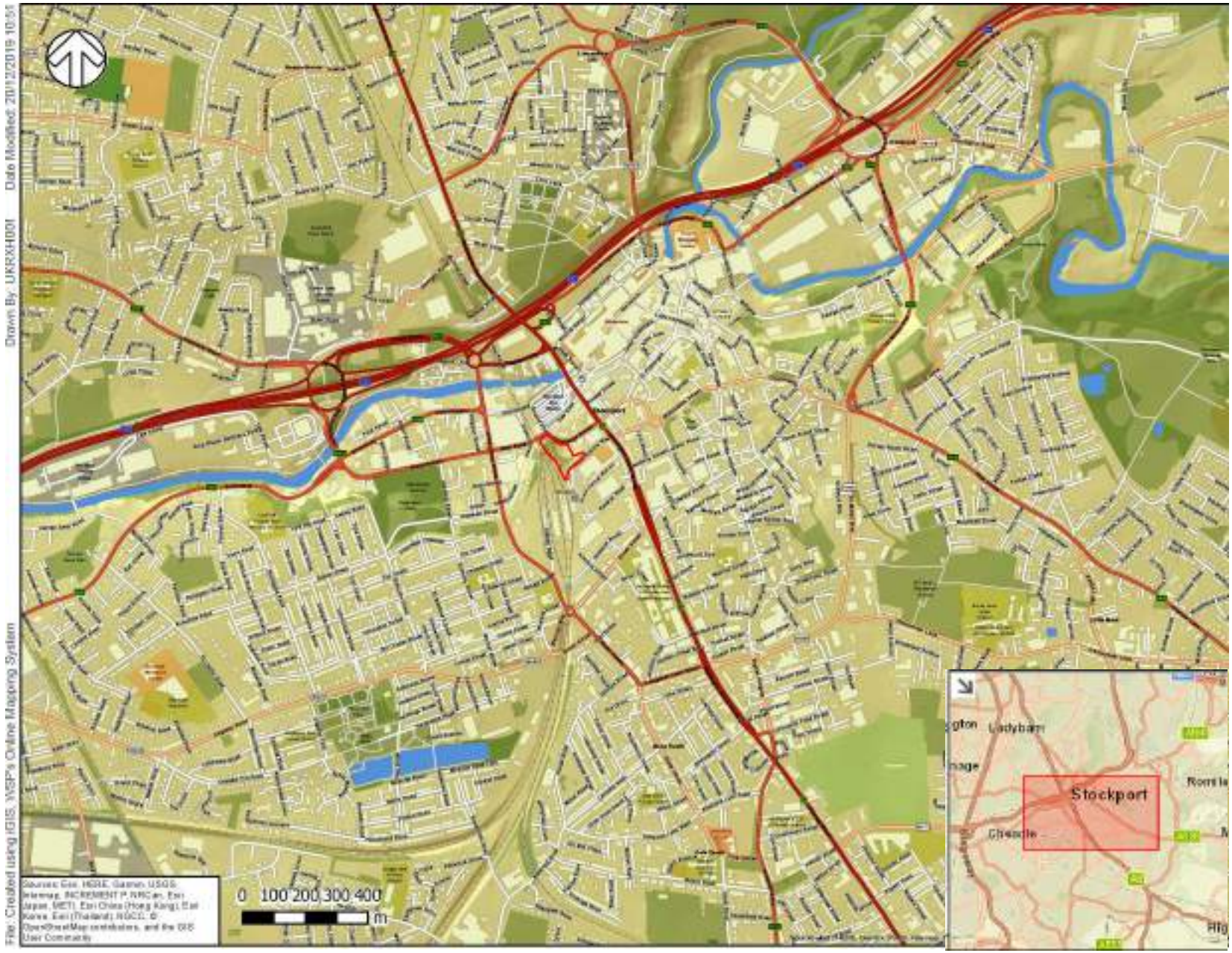
Appendix A

FIGURES & DRAWINGS



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Tel: 0161 200 5000

Project No.	70031899	Scale	NTS
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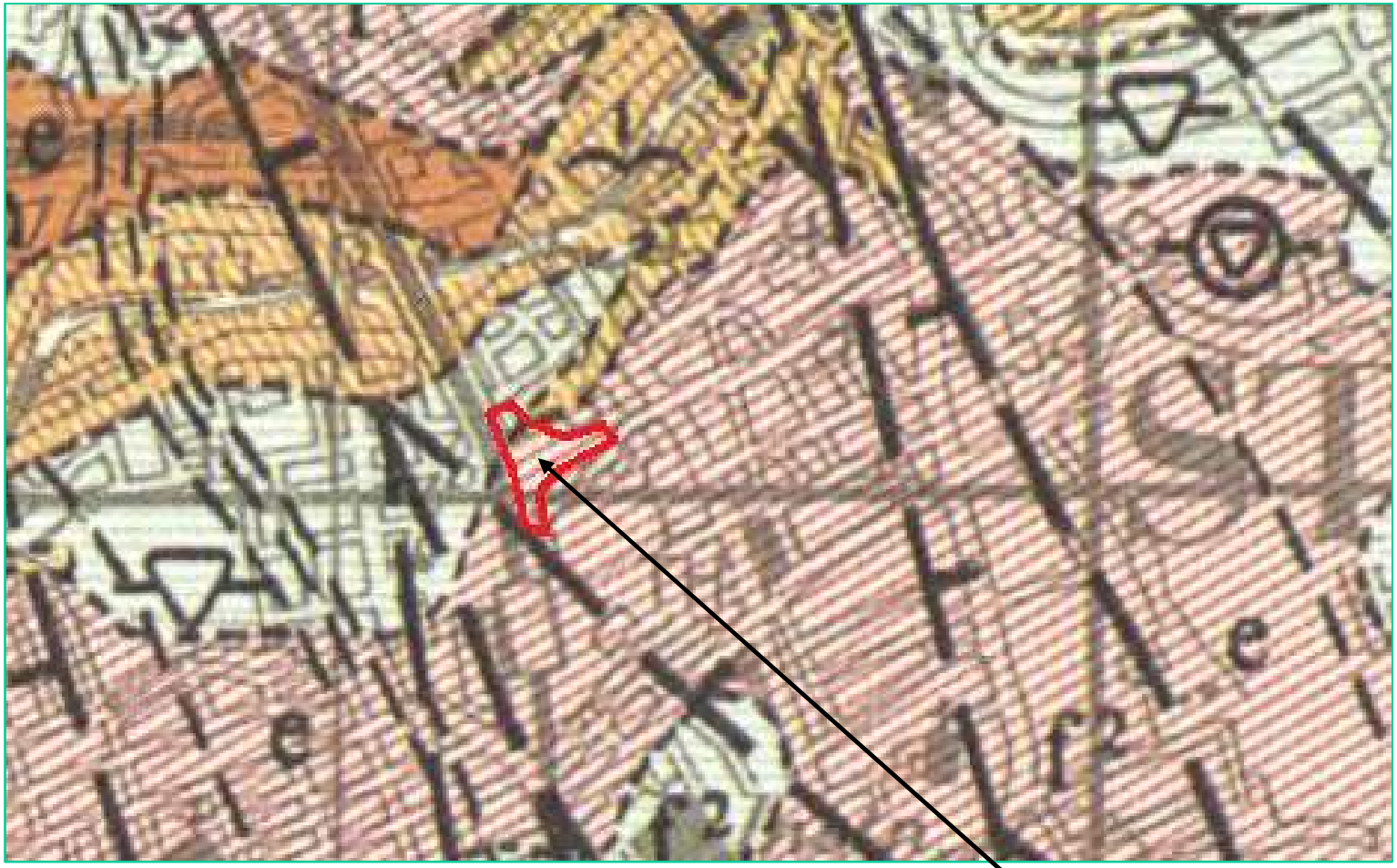
Title	Site Location Plan	Checked by	MN



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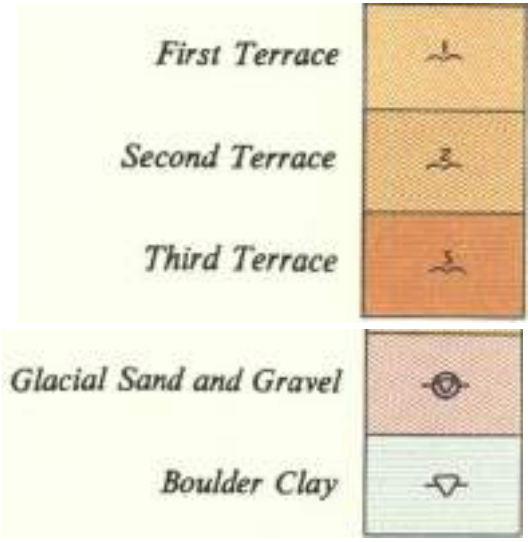

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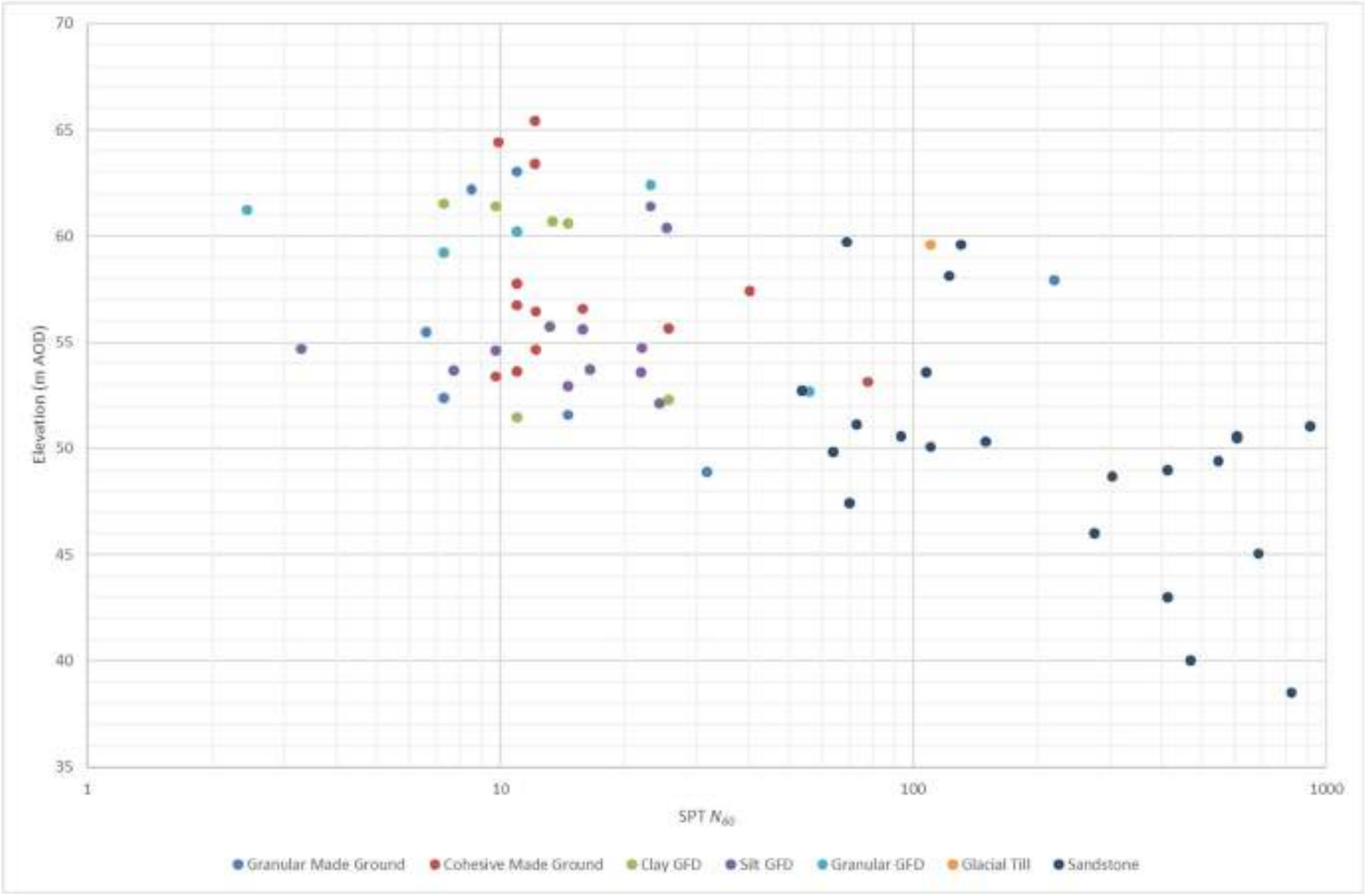

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Project No.	70031899	Scale	NTS
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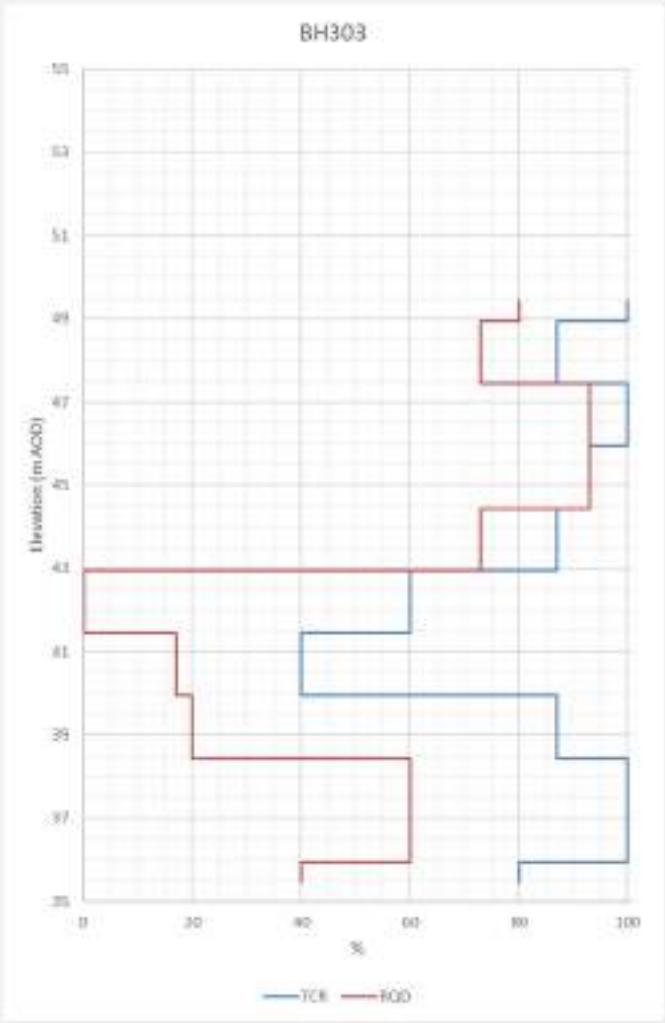
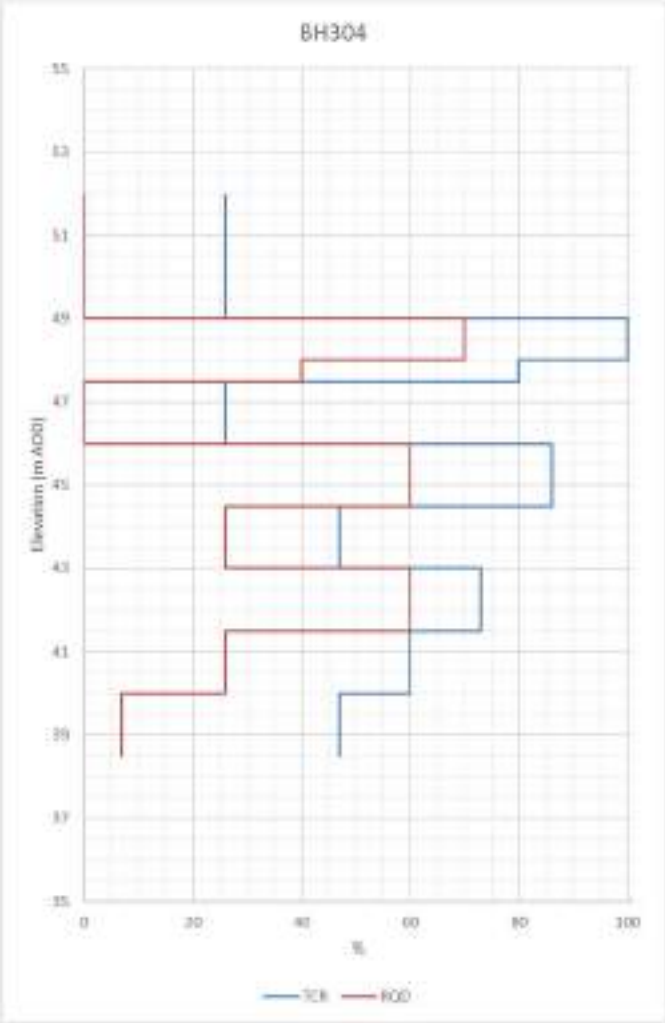
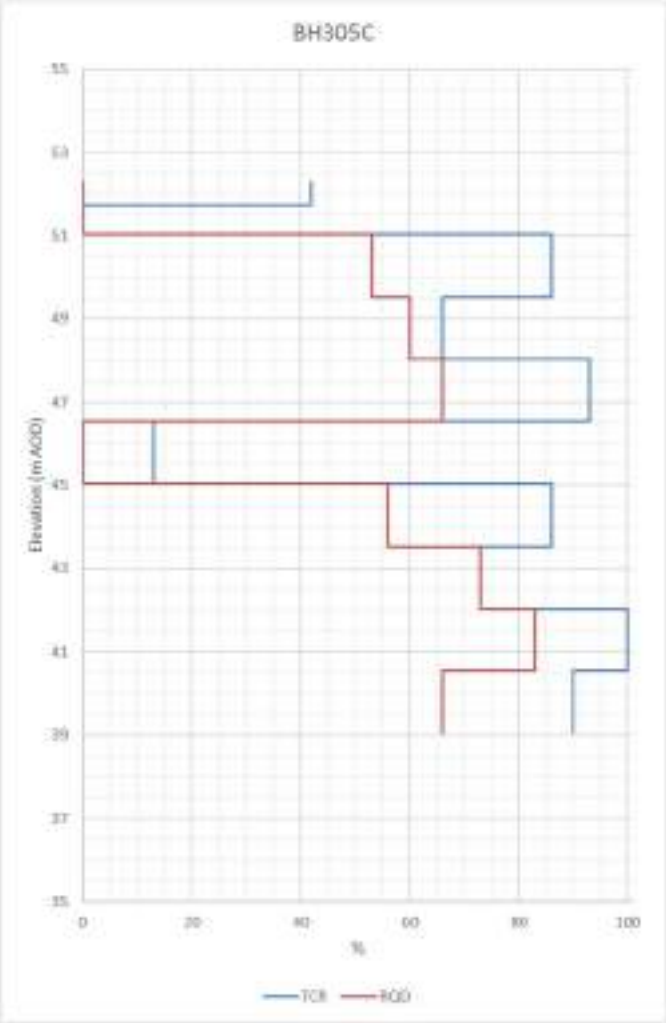
Title	SPT N_{60} vs Elevation	Checked by	MN







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Project No.	70031899	Scale	NTS
Date	February 2020	Figure No.	A.4
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Title	Total Core Recovery & Rock Quality Designation – BH303, BH304, & BH305C	Checked by	MN

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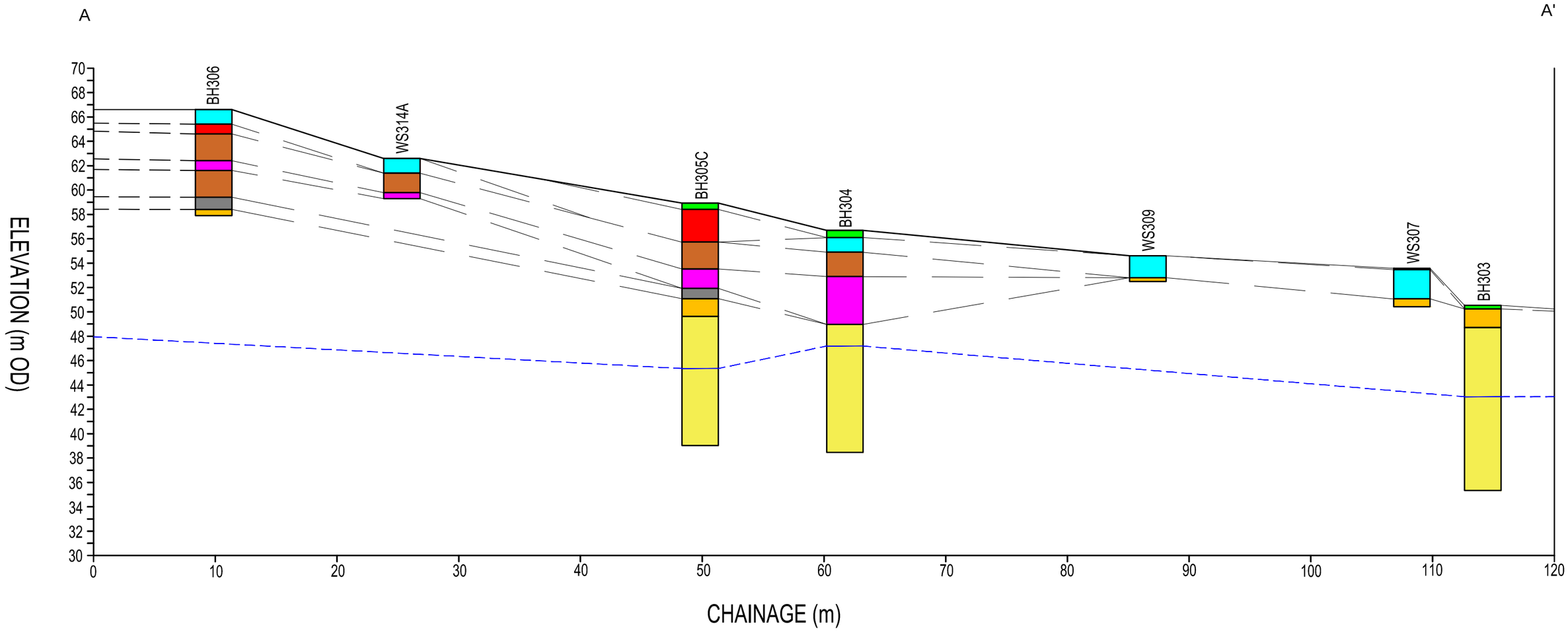

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- -INFERRED STRATA BOUNDARY
- -MEAN GROUNDWATER MONITORING LEVEL
- -INFERRED GROUNDWATER LEVEL
- -TOPSOIL
- -COHESIVE MADE GROUND
- -GRANULAR MADE GROUND
- - COHESIVE GLACIOFLUCIAL DEPOSITS
- - GRANULAR GLACIOFLUCIAL DEPOSITS
- - GLACIAL TILL
- - WEATHERED CHESTER FORMATION
- - INTACT CHESTER FORMATION

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	25/03/2020	HS	FIRST ISSUE	RH	MN

DRAWING STATUS: S2 - FOR INFORMATION

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ARCHITECT: BDP

PROJECT: STOCKPORT INTERCHANGE - EXCHANGE STREET

TITLE: EXCHANGE STREET GEOLOGICAL CROSS SECTION

SCALE @ A3:	CHECKED:	APPROVED:
1:333	MN	MN

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70031899	RH	HS	MARCH 2020

DRAWING No: FIGURE A.5

REV: P01

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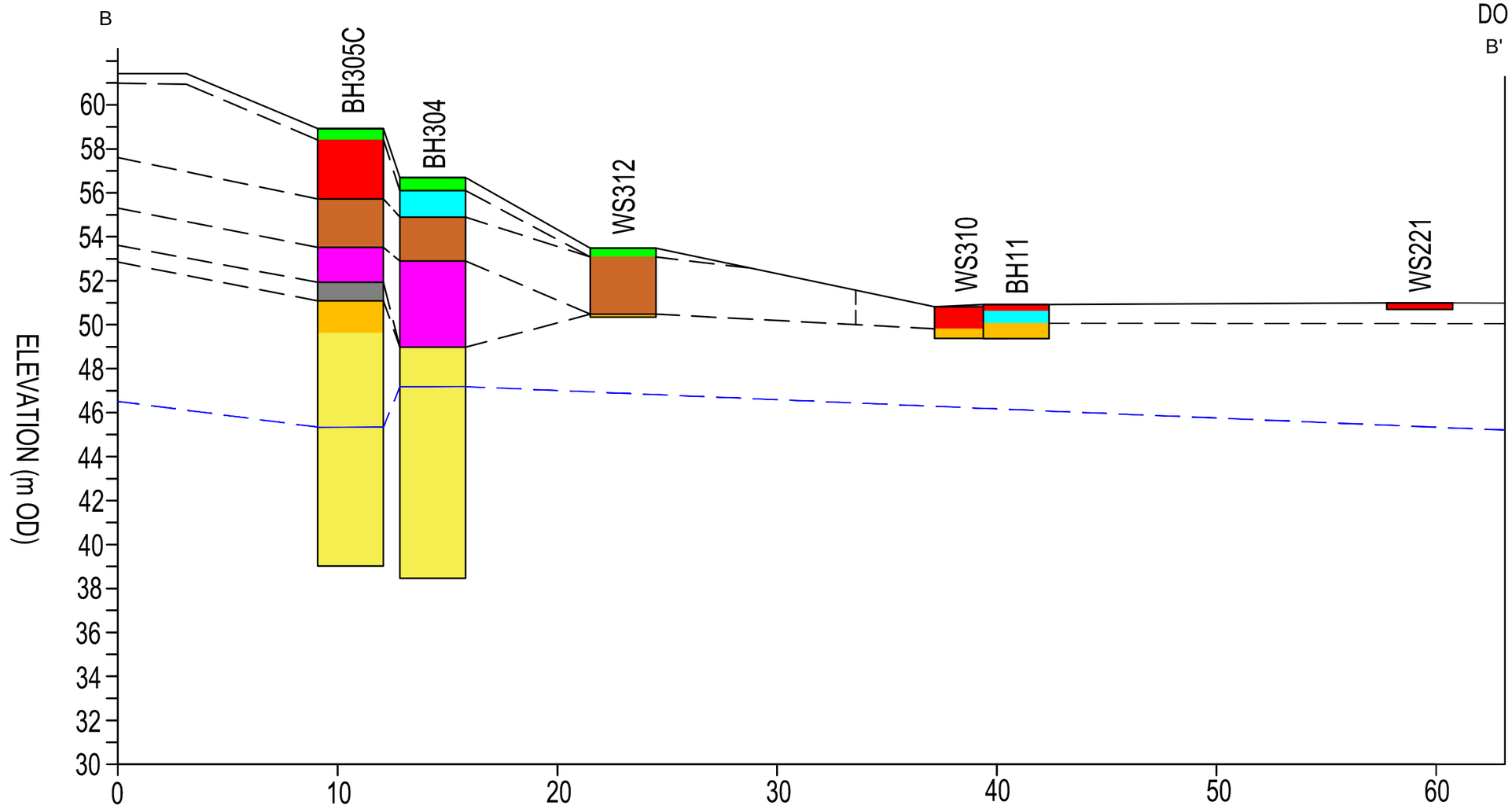

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- -TOPSOIL
- -COHESIVE MADE GROUND
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P01	25/03/2020	HS	FIRST ISSUE	RH	MN

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ARCHITECT: BDP

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TITLE: EXCHANGE STREET GEOLOGICAL CROSS SECTION

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PROJECT No:	DESIGNED:	DRAWN:	DATE:
70031899	RH	HS	MARCH 2020

DRAWING No: FIGURE A.6

REV: P01

Appendix B

DEVELOPMENT PROPOSALS

MAIN ELEVATIONS

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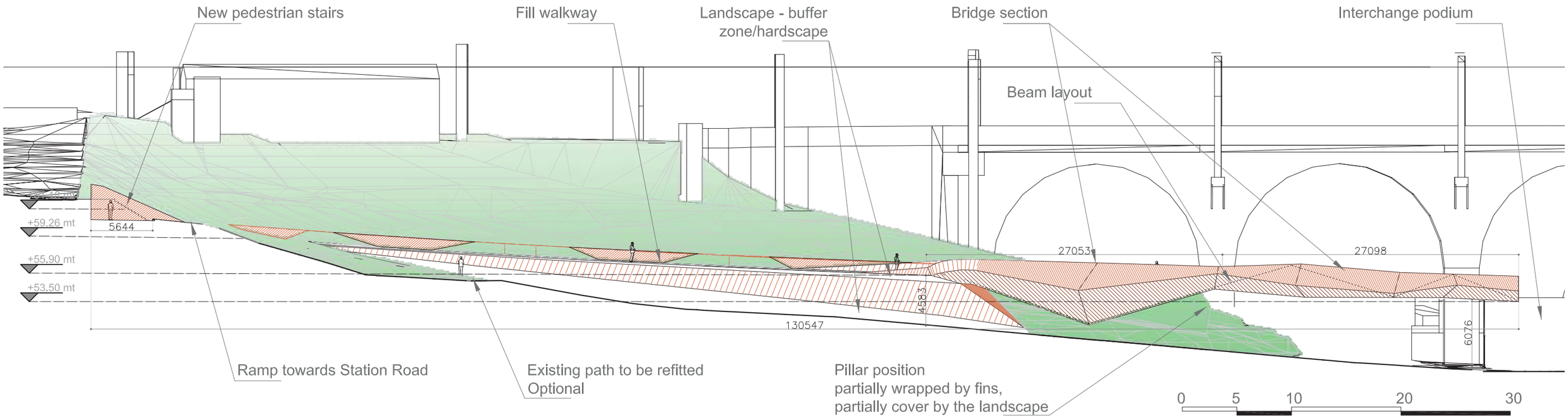

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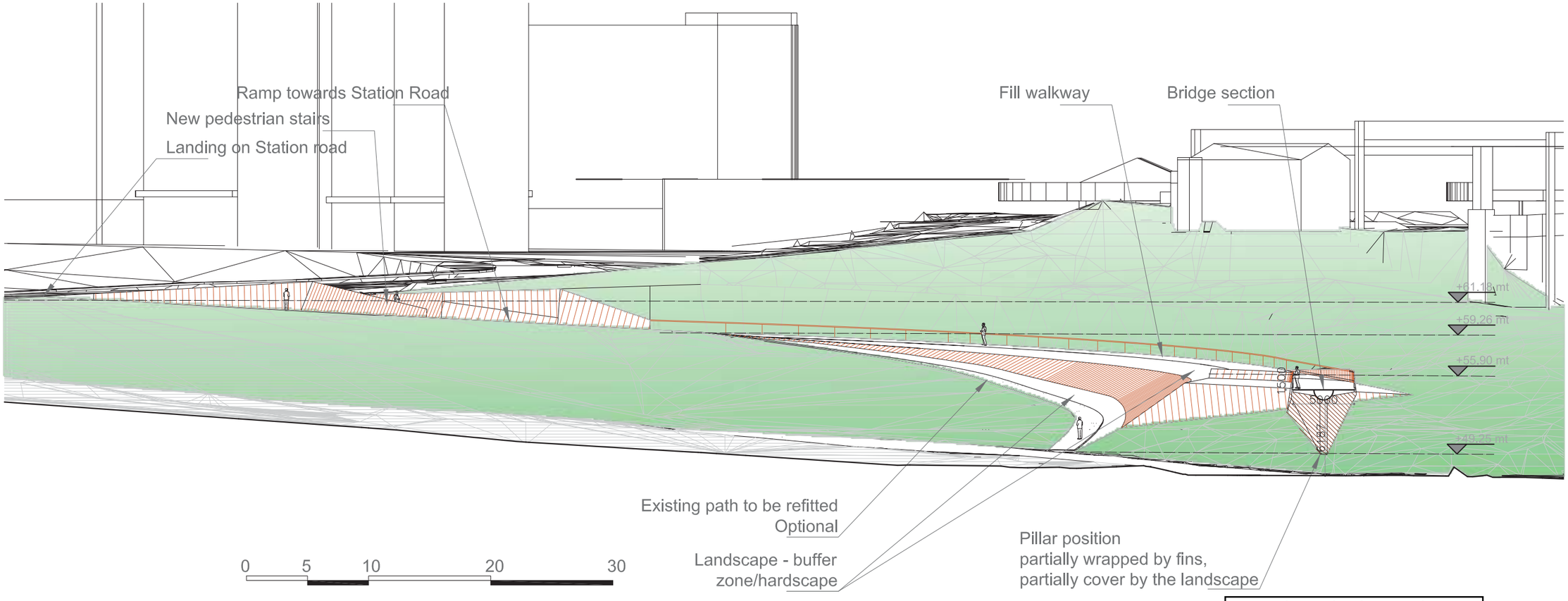

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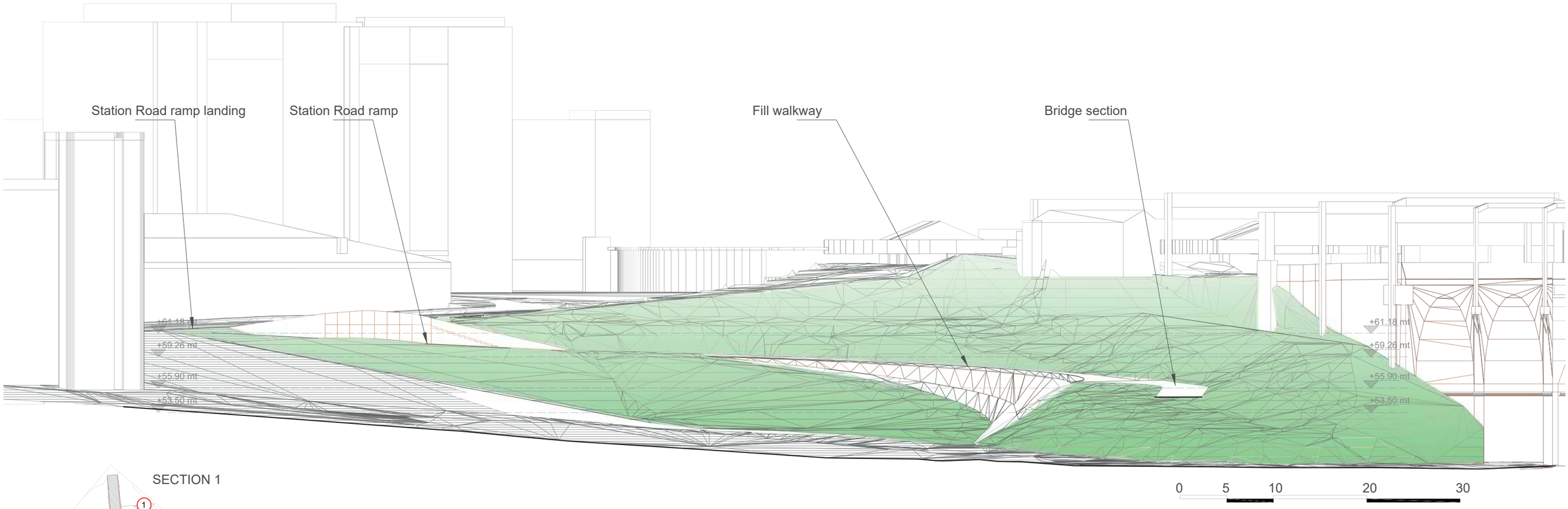
SECTIONS

BDP.



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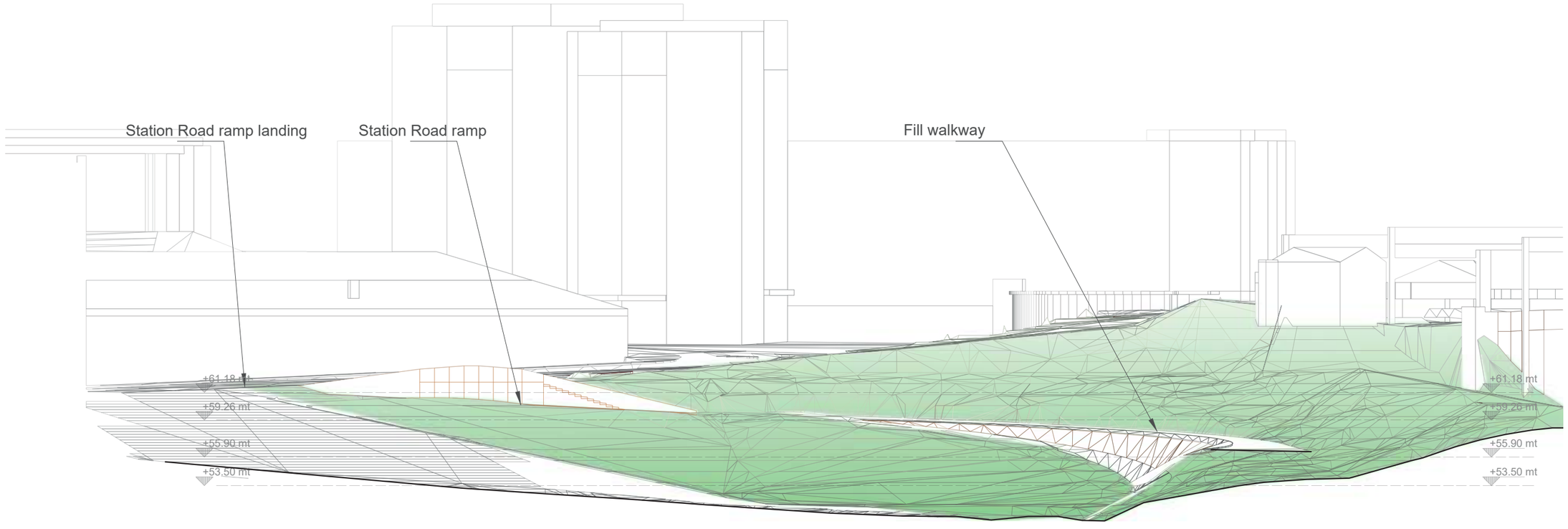

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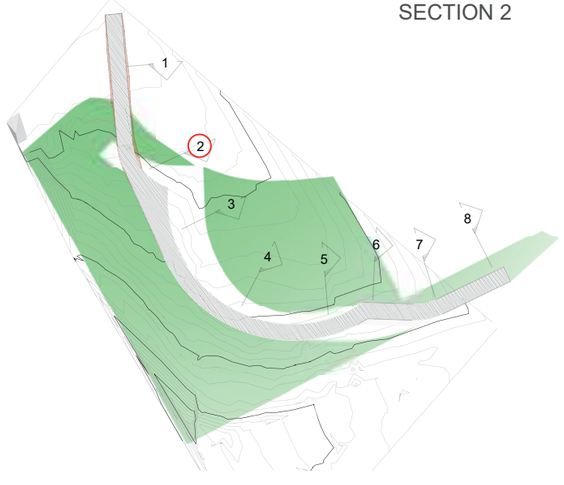

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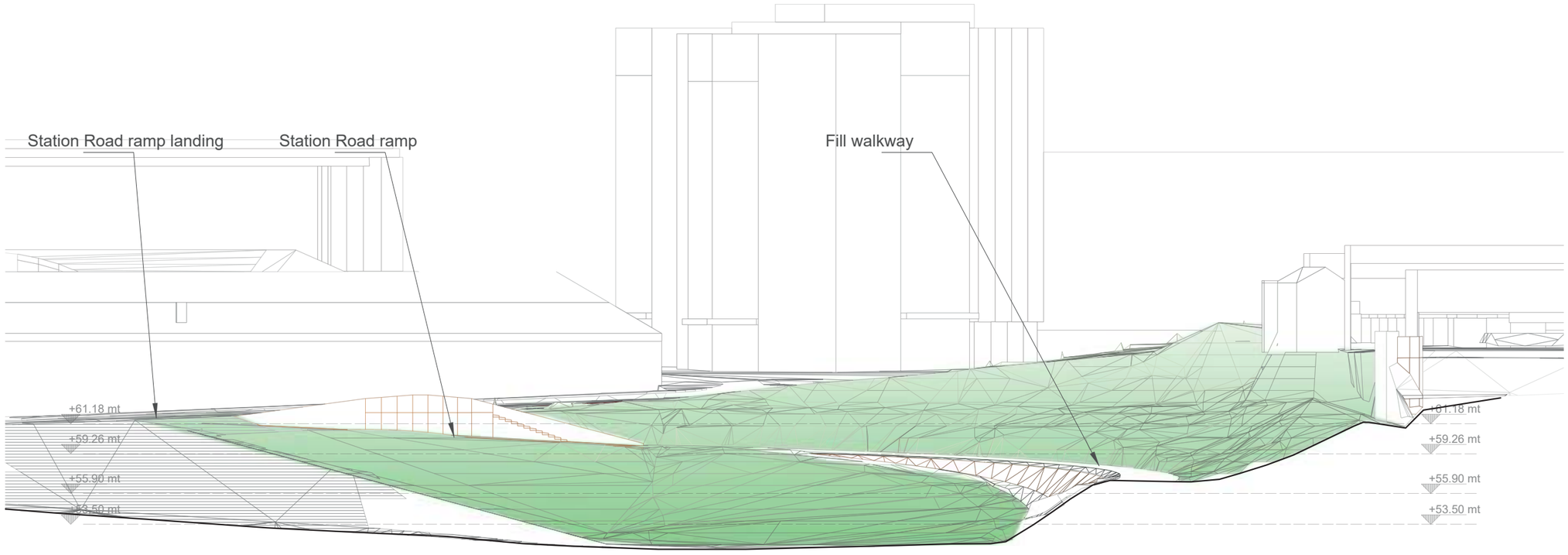

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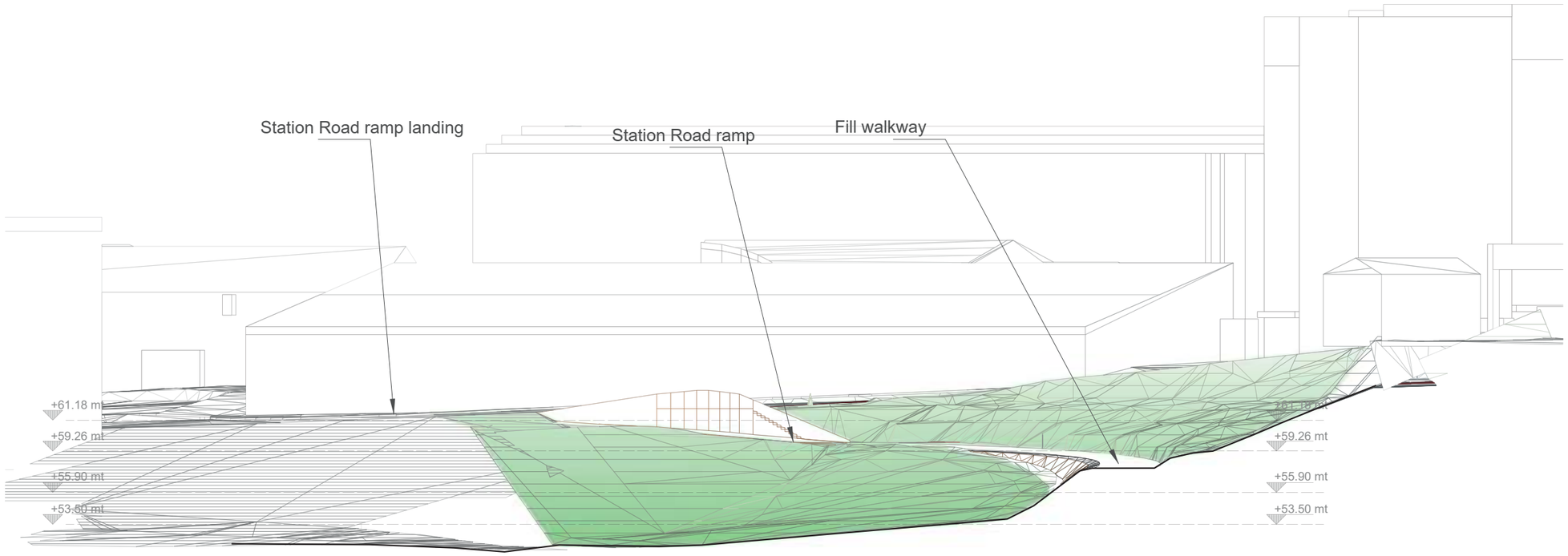

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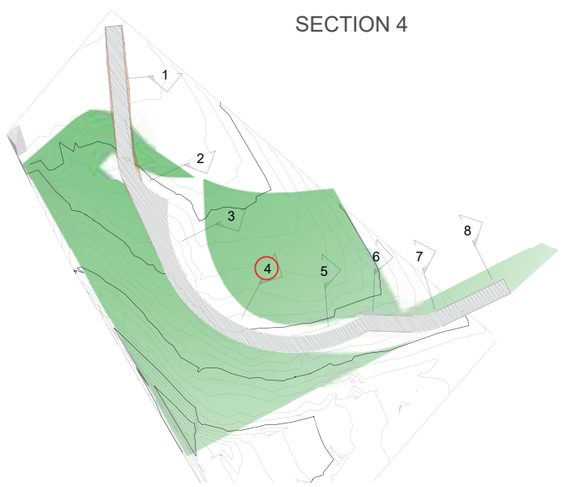

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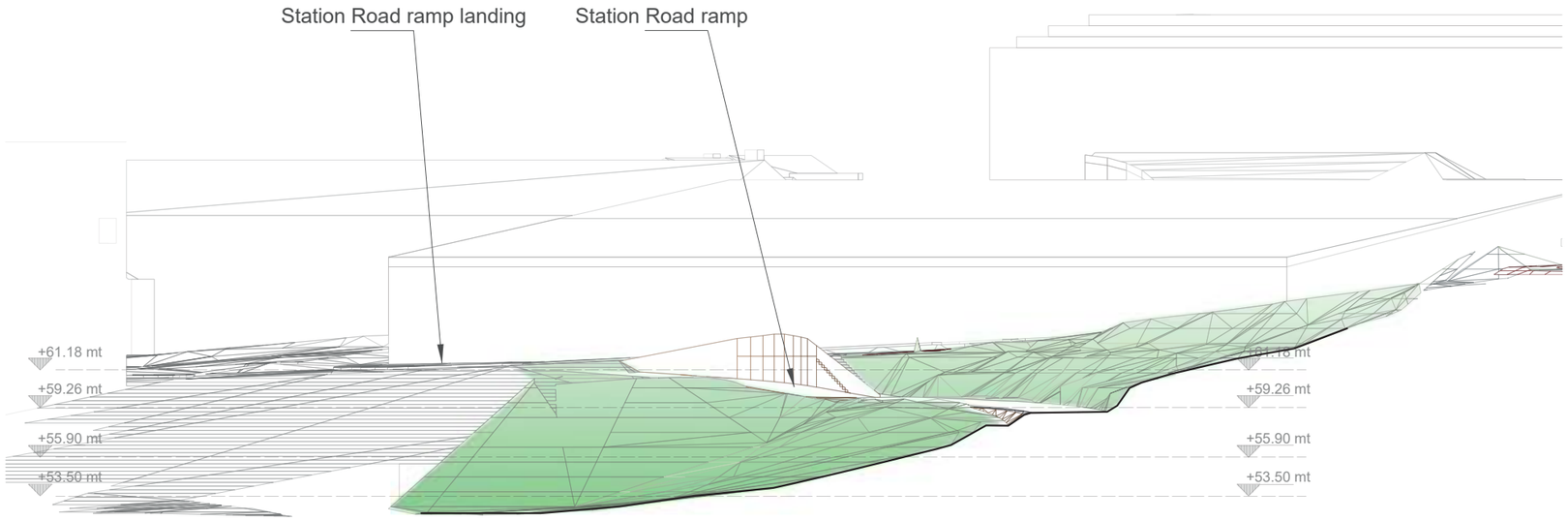

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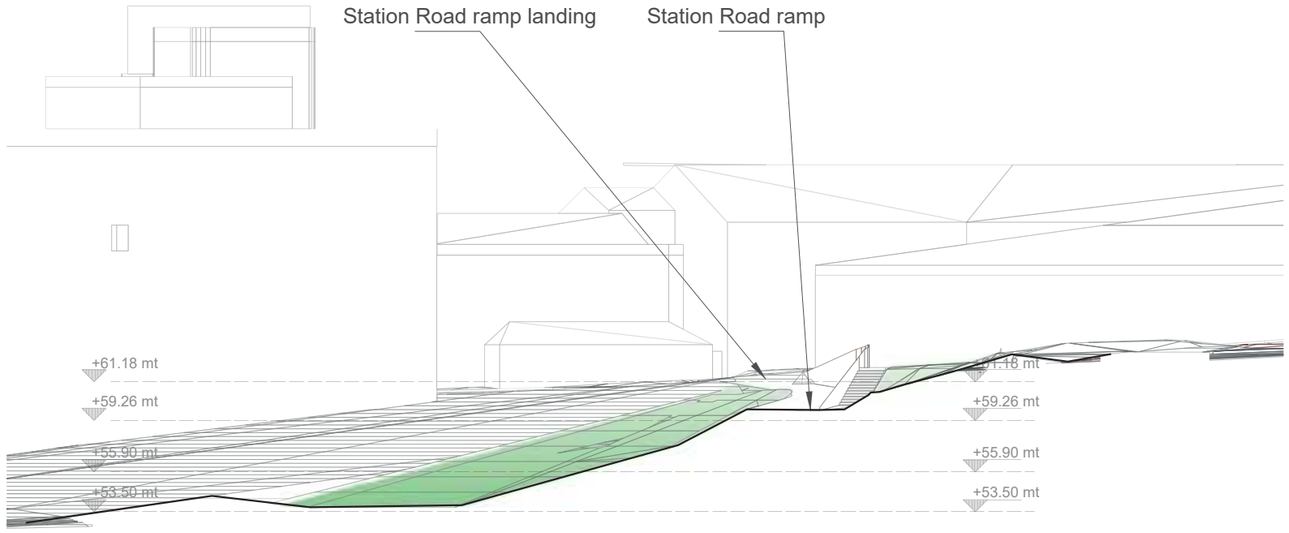

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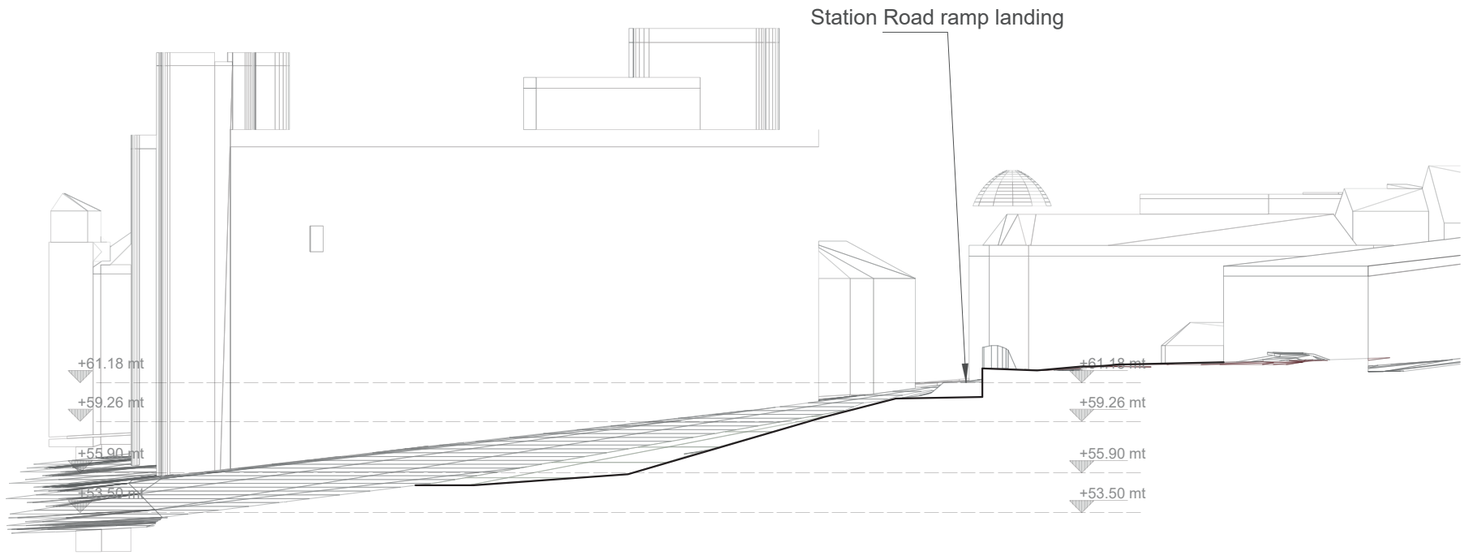

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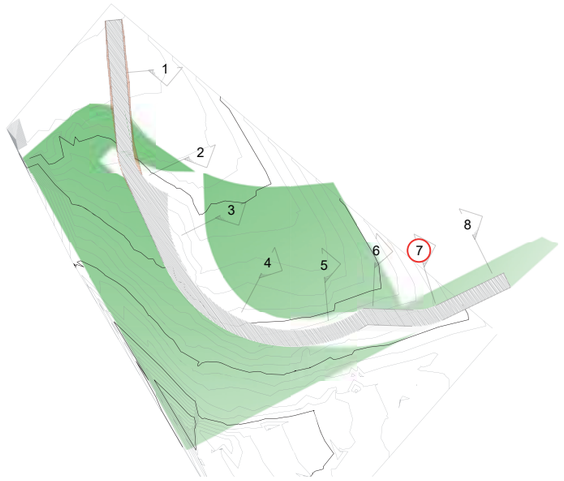

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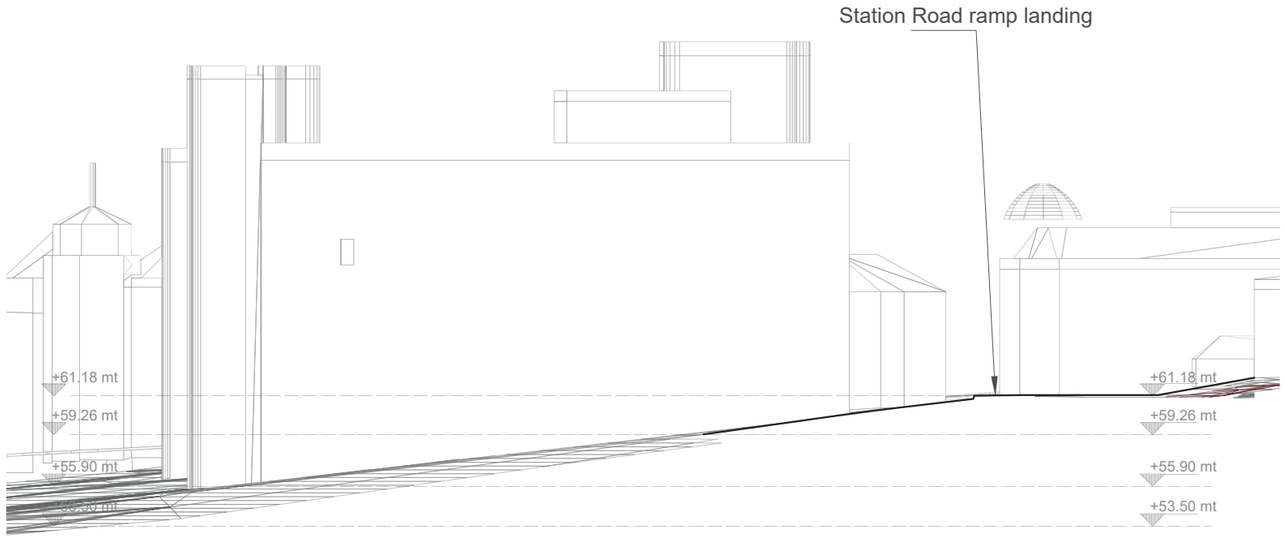

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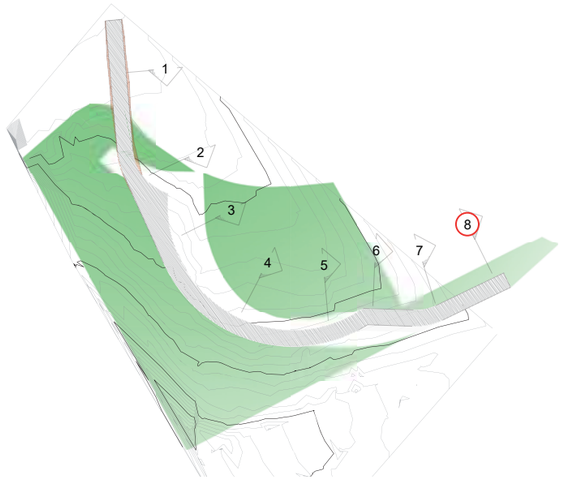

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Appendix C

GENERAL LIMITATIONS

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated

with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

28. The data is presented and will be compared with assessment criteria.

Appendix D

GEOTECHNICS FACTUAL REPORT

GEOTECHNICS
geotechnical and geoenvironmental specialists

Ground Investigation

www.geotechnics.co.uk

EXCHANGE SQUARE, STOCKPORT

Factual Report

for
Transport for Greater Manchester

Engineer : WSP UK Limited

Project Number PN194054

February 2020

Issuing Office
North West Office
The Geotechnical Centre
Unit 1, Borders Industrial Park
River Lane, Saltney
Chester
CH4 8RJ
Tel: 01244 671117
mail@chester.geotechnics.co.uk

Head Office
The Geotechnical Centre
203 Torrington Avenue
Tile Hill
Coventry
CV4 9UT
Tel: 02476 694664
mail@geotechnics.co.uk

South West Office
The Geotechnical Centre
Unit 5, Orchard Court
Heron Road, Sowton
Exeter
EX2 7NR
Tel: 01392 463110
mail@exeter.geotechnics.co.uk

North East Office
The Geotechnical Centre
Unit 1, Bypass Park Estate
Sherburn-in-Elmet
Leeds
LS25 6EP
Tel: 01977 525030
mail@yorkshire.geotechnics.co.uk

Factual Report

EXCHANGE SQUARE, STOCKPORT

for
Transport for Greater Manchester

Engineer :
WSP UK Limited

Project No:
PN194054
February 2020

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Ground Investigation
at

EXCHANGE SQUARE, STOCKPORT

Factual Report

Project No: PN194054
February 2020

1.0 INTRODUCTION

A geotechnical and geo-environmental investigation was undertaken by Geotechnics Limited at the site of proposed development works at Exchange Square, Stockport. The investigation was carried out to the instructions of the Engineer, WSP UK Limited on behalf of the Client, Transport for Greater Manchester. This report describes the work undertaken and presents the data obtained.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of this investigation was to obtain information on the ground and groundwater conditions relating to the design of the proposed works within the limitations posed by trial hole numbers, locations, depths, methods adopted and the scope of approved in situ and laboratory testing. The investigation comprised dynamic sample boreholes, some with rotary cored follow-on, foundation inspection pits, in situ and laboratory testing and reporting. A Factual Report was also commissioned.

3.0 PRESENTATION

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 4 to 6. The factual data so obtained are presented in Appendices 2 to 11 of this report. Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 11 to aid an understanding of the procedures followed and the context in which the report should be read.

In addition, data in electronic format in accordance with "The Electronic Transfer of Geotechnical Data from Ground Investigations" published by the AGS (the AGS Format) are presented separately.

4.0 THE SITE

4.1 Location

The site is located in Stockport town centre, extending from Station Road northwards to Daw Bank and Exchange Street and from Stockport railway viaduct eastwards to Stockport Telephone Exchange. The approximate Ordnance Survey National Grid Reference for the centre of the site is SJ 892 900 and an extract from the relevant 1:50,000 Scale O.S. Map is included as Appendix 1.

4.2 Description

The site is irregular in shape with maximum dimensions of approximately 100m (north-west to south-east) and 85m (north-east to south-west). Ground levels across the site generally fall towards the north, such that levels fall from around 68mOD on south-western corner of the site to around 48mOD at the junction of Exchange Street with Daw Bank.

The site comprises a stone hardcore car parking area with adjacent steeply sloping and densely vegetated areas.

The site is bounded to the north by Daw Bank and Exchange Street, to the east by Stockport Telephone Exchange, to the south by Stockport Railway Station car park and Station Road and to the west by Stockport Station and the railway viaduct.

4.3 Site Geology

The 1:50,000 scale map of Stockport published by the British Geological Survey, Sheet 98 Drift edition dated 1962, shows the site to be underlain by Glaciofluvial Deposits (recorded on the map as Glacial Sand and Gravel).

The 1:50,000 Solid edition map (dated 1977) indicates that the site is underlain by rocks of the Chester Formation (recorded on the map as

Chester Pebble Beds Formation), part of the Sherwood Sandstone Group of Triassic age. The conjectured trace of a north-west to south-east trending fault is shown to pass through or very close to the south-western corner of the site, the strata to the north-east of this fault being downthrown.

The British Geological Survey maps do not show the presence of Made Ground below the site. However, Made Ground may be present for which the British Geological Survey have no records or which are too shallow for incorporation into the maps. Given historical land uses of this site, a thickness of Made Ground would be anticipated across the site.

4.4 Hydrogeology

The Government's DEFRA MagicMap website, https://magic.defra.gov.uk/MagicMap.aspx, accessed on 24th January 2020, shows the Glaciofluvial Deposits to be classed as a Secondary A Aquifer. The Chester Formation rocks are shown to be classed as a Principal Aquifer.

5.0 PROCEDURE

5.1 Commissioning

The work was awarded following submission of a tender for work designed by the Engineer for ground investigation of the site in accordance with the Client's requirements.

5.2 General

The procedures followed in this site investigation are based on *BS 5930: 2015 – Code of Practice for Site Investigations* and *BS 10175:2011+A2:2017 - Investigation of Potentially Contaminated Sites*. The soils and rocks encountered have been described in accordance with BS5930:2015 and BS EN ISO 14688-1:2018 and BS EN ISO 14689:2018. The exploratory hole records are included in Appendices 2, 4 and 5 and their positions are shown on the Exploratory Hole Location Plan in Appendix 11.

The Exploratory Hole locations were specified by the Engineer. The co-ordinates and levels shown on the Exploratory Hole Records were measured using a Leica GPS survey device. The depths quoted on the exploratory hole records are in metres below ground level.

Prior to the investigation, a survey was carried out by CMS Surveys Limited utilising Ground Penetrating Radar (GPR) techniques to check for the presence of buried services at the proposed exploratory hole locations.

At each exploratory hole location an inspection pit was excavated using hand tools to a depth of 1.20m below ground level to check for the presence of underground services. Prior to and on completion of the excavation, the location was scanned using a cable avoidance tool (CAT).

5.3 Dynamic Sample Boreholes with Rotary Follow-on

Two (2 No.) boreholes (numbered BH304 and BH305C), up to 120mm in diameter, were sunk utilising a combination of dynamic sampling and rotary coring techniques to depths of 18.20m (BH304) and 19.90m (BH305C) below ground level. A third borehole (BH306) was sunk to a depth of 8.71m below ground level utilising a combination of dynamic sampling and rotary open-hole rock-roller drilling techniques. A fourth borehole (BH303) was sunk to a depth of 15.20m below ground level utilising rotary coring techniques. Three earlier attempts (BH305, BH305A and BH305B) at Borehole BH305C were all terminated within their inspection pits on encountering concrete obstructions. The work was carried out between 25th November and 9th December 2019.

The dynamic sample sections of the boreholes were carried out using a compressed air percussive apparatus fitted to the rotary drilling rig which drives lined steel tubes into the ground in 1.00m lengths. Samples are retrieved in the plastic liners. The liners are extruded from the sampler and placed into suitable core boxes. The retrieved liners were split and the recovered soils described before being sub-sampled into ES, D and B samples as shown on the Borehole Records. The Borehole Records are presented in Appendix 2.

Rotary coring, commenced at depths of 1.20m (BH303), 4.70m (BH304) and 6.65m (BH305C) below ground level. The drilling equipment used in the rotary sections of the boreholes on this particular contract utilised polymer/water foam as the flushing medium.

Rock cores were extruded horizontally in transparent liners and placed into suitable core boxes. Photographs of the individual core boxes are included in Appendix 3.

The strata descriptions in the open hole sections of the Borehole Records are the Drilling Foreman's estimate based on sediment and chipping returns in the flushing medium. The rate of penetration is also used as an indicator of the type of material being drilled, particularly where there is loss of flush returns. Definitive classification in terms of geology or degree of disturbance is not usually possible from these sources.

Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata.

Groundwater observations are included on the Borehole Records where appropriate. It should be noted that the addition of water to the borehole as part of the drilling process may have masked the presence of groundwater in the borehole.

On completion, monitoring standpipes were installed in Boreholes BH303, BH304, BH305C and BH306 (see Section 5.6). The inspection pits to Boreholes BH305, BH305A and BH305B were backfilled with arisings.

5.4 Dynamic Sample Boreholes

Fourteen (14 No.) Dynamic Sample Boreholes (numbered WS306 to WS318 and WS314A) were undertaken at the site to depths ranging between 0.45m (WS318) and 5.45m (WS316 and WS317) below ground level. The work was carried out between 13th and 22nd November 2019.

The Dynamic Samples were taken using the super-heavy Dynamic Probe apparatus which drives lined steel tubes into the ground in 1.00m lengths. Samples are retrieved in the plastic liners. The retrieved liners were split and the recovered soils described before being sub-sampled into ES, D and B samples as shown on the Borehole Records. The Borehole Records are presented in Appendix 4. The hole is not cased and progress depends on the nature of the strata penetrated.

Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata.

Groundwater observations are included on the Borehole Records where appropriate.

On completion, standpipes were installed in Boreholes WS307, WS309, WS311, WS312, WS314, WS315, WS316 and WS317 (see Section 5.6). The other boreholes were backfilled with bentonite and their inspection pits were filled with arisings.

5.5 Trial Pits

Two (2 No.) Trial Pits were excavated to depths of 2.60m (TP01) and 2.70m (TP02) below ground level using a 3 Tonne tracked excavator on 19th November 2019. This work was supervised on site by a geotechnical / geo-environmental engineer.

The profiles of strata or other features were recorded as excavation proceeded and measurements taken from ground level. Representative samples were taken, where appropriate, for laboratory examination and analysis and in addition, Environmental Soil samples (ES) were recovered at the depths indicated on the Trial Pit Records. Samples were taken directly from excavated materials deposited at the surface. Groundwater observations and trench stability notes are included on the Trial Pit Records, presented in Appendix 5. Photographs of the pits are presented in Appendix 6.

5.6 Instrumentation and Monitoring

Long-term monitoring of the gas and groundwater levels was made possible by the installation of standpipes as follows:

Exploratory Hole	Standpipe Slotted Pipe & Filter Zone (m)
BH303	2.00 to 10.00
BH304	4.00 to 10.00
BH305C	6.00 to 15.00
BH306	2.00 to 8.50
WS307	1.00 to 3.00
WS309	1.00 to 1.80
WS311	1.00 to 4.50
WS312	1.00 to 3.00
WS314	1.00 to 3.00
WS315	1.00 to 3.00
WS316	3.00 to 5.00
WS317	1.00 to 2.00

Monitoring of the gas and groundwater levels at the site commenced on 8th/9th January 2020 with further visits on 17th, 21st and 28th/29th January and 12th February 2020.

On each of the monitoring visits a record of the groundwater level in the standpipes was obtained. On 22nd January 2019, groundwater samples were obtained (where possible) from the monitoring standpipes following purging of the water within the wells.

In addition to the groundwater levels, the following parameters were measured and recorded in each standpipe using a Geotechnical Instruments GA5000 Gas Analyser:-

- Concentrations (% Vol) of CH_4, O_2, CO_2, along with (ppm) H_2S, CO
- Flow Rate
- Barometric Pressure

The results of the monitoring are presented in Appendix 7.

6.0 LABORATORY TESTING

6.1 Geotechnical

The laboratory testing schedule was specified by the Engineer. Unless otherwise stated, the tests were carried out in Geotechnics Limited's UKAS accredited Laboratory (Testing No. 1365) and were undertaken in accordance with the appropriate Standards as indicated below and on the Laboratory Test Certificate in Appendix 8. Any descriptions, opinions and interpretations are outside the scope of UKAS accreditation.

The tests undertaken can be summarised as follows:-

BS EN ISO 17892-1:2014

27 No.	Water Content Determination

BS EN ISO 17892-3:2015

4 No.	Particle Density Determination

BS EN ISO 17892-4:2016

6 No.	Particle Size Distribution Determination – Sieving Method

BS EN ISO 17892-12:2018

11 No.	Determination of Liquid and Plastic Limits

BS 1377:1990

Test No.		Test Description
Part 3		
5.3, 5.5	15 No.	Sulphate Analysis - Water Extract
9.5	15 No.	pH Determination
Part 4		
3.3	4 No.	Dry Density/Moisture Content relationship determination. Compaction Test - British Standard (2.5 kg Hammer)

ISRM Testing Methods

81 No.	Point Load Determination

The following testing was carried out at the laboratories of MATtest Limited (UKAS Accredited Laboratory, Number 2643).

ASTM Testing Methods

6 No.	Uniaxial Compressive Strength Determination
18 No.	Point Load Determination

The results of these tests are also presented in Appendix 8.

6.2 Contamination

Selected samples of soil were tested at the laboratories of Derwentside Environmental Testing Services Limited (UKAS accredited Laboratory Testing No. 2139) for a number of determinands in order to check on potential site contamination. The determinands were specified by the Engineer and are detailed on the results sheets in Appendix 9 together with the test result as well as the test method, accreditation and detection limit.

Selected samples of groundwater were tested at the laboratories of Element Materials Technology Environmental UK Limited (UKAS accredited Laboratory Testing No. 4225) for a number of determinands in order to check on potential site contamination. The determinands were specified by

the Engineer and are detailed on the results sheets in Appendix 10 together with the test result as well as the test method, accreditation and detection limit.

Signed for and on behalf of Geotechnics Limited.

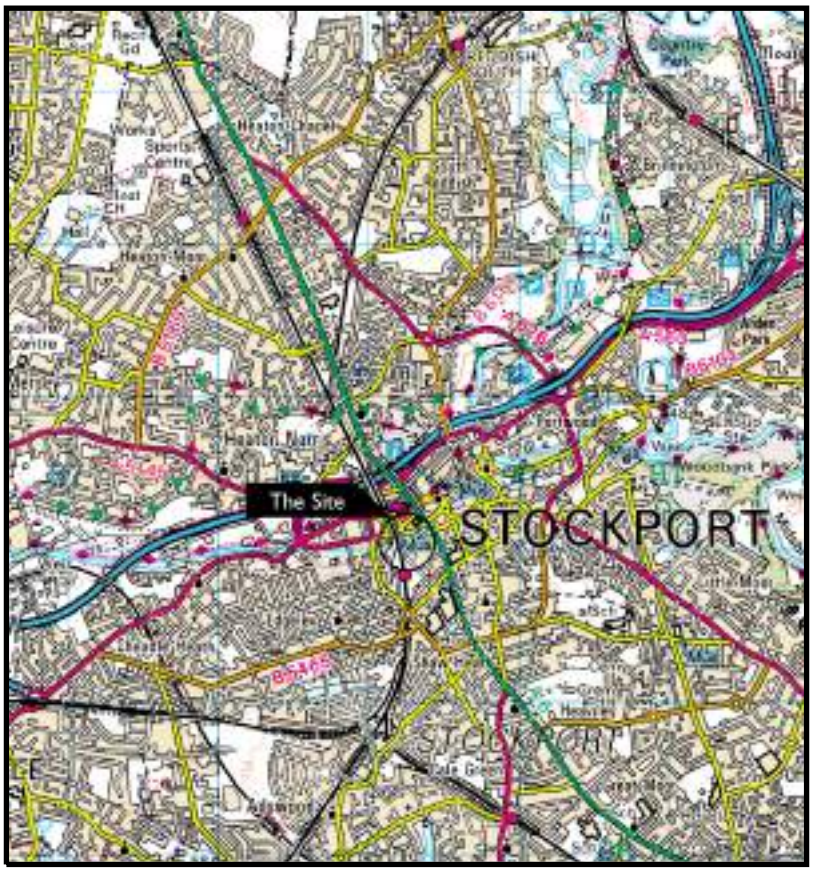
Prepared by: ……
Colin Dodd BSc (Hons), MSc, CEng, MICE
Principal Engineer

Reviewed by: ……...
John Knowles BSc (Hons), PGCE, MSc, CGeol, FGS
Principal Engineer

APPENDIX I

Site Location Plan

SITE LOCATION PLAN



EXCHANGE SQUARE, STOCKPORT
for
Transport for Greater Manchester

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APPENDIX 2

Dynamic Sample/Rotary Follow-on Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecone Probe Test
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content

(All other strengths from undrained triaxial testing)

S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/- (mm)	Total blows/penetration
( )	Extrapolated value

Groundwater

Water Strike

Depth Water Rose To

Instrumentation

Seal

Filter

Seal

Strata — Legend

Made Ground Granular

Made Ground Cohesive

Topsoil

Cobbles and Boulders

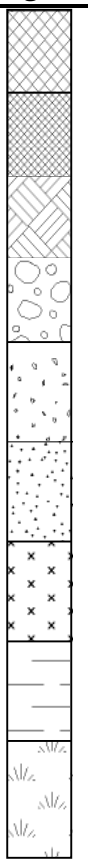
Gravel

Sand

Silt

Clay

Peat



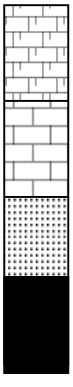
Note: Composite soil types shown by combined symbols

Chalk

Limestone

Sandstone

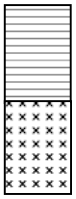
Coal



Strata, Continued

Mudstone

Siltstone

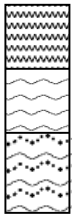


Metamorphic Rock

Fine Grained

Medium Grained

Coarse Grained

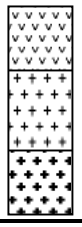


Igneous Rock

Fine Grained

Medium Grained

Coarse Grained



Backfill Materials

Arisings

Bentonite Seal

Concrete

Fine Gravel Filter

General Fill

Gravel Filter

Grout

Sand Filter

Tarmacadam

Rotary Core

RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
FRACTURE SPACING (m)	Maximum Minimum
NI	Non-intact core
NR	No core recovery
AZCL	Assumed zone of core loss

(where core recovery is unknown it is assumed to be at the base of the run)

GEOTECHNICS

BOREHOLE RECORD - Rotary Core

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH303**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389211.0** E **390104.0** N

Ground Level **50.64** m OD

Scale 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N (FI)	Description General	Description Detail	Depth	Legend	Level m OD
								G.L.		50.64
0.00- 0.30		B				TOPSOIL: Dark brown gravelly fine to coarse sand with a low cobble content. Gravel is angular to subangular fine to coarse of brick fragments. Some rootlets.				
0.20		D								
0.20		ES								
0.30- 0.54	(DRY)	D			S50/ 110			0.30		50.34
1.20- 1.70		100	0.12	24		Extremely weak to weak reddish brown fine to coarse grained SANDSTONE. Discontinuities are horizontal to subvertical, very closely to closely spaced, planar, smooth.				
(102mm)	(ADDED)	80	0.06		(12)					
1.56- 1.64		C								
1.70- 3.20	1.30	87	0.19	42	(NR)					
(102mm)	(ADDED)	73	0.06							
2.05- 2.17		C			(NI)					
2.60- 2.67		C			(7)					
3.20- 4.70	1.30	100	0.22	58	(NI)					
(102mm)	(ADDED)	93	0.05							
3.70- 3.82		C			(9)					
4.56- 4.70		C			(NR)					
4.70- 6.20	1.30	93	0.20	73						
(102mm)	(ADDED)	93	0.05							
5.45- 5.57		C			(7)					
6.20- 7.70	1.30	87	0.26	57	(NR)					
(102mm)	(ADDED)	73	0.04							
6.44- 6.55		C			(NI)					
7.27- 7.55		C			(6)		Between 7.20-9.20m, recovered as sand.			
7.70- 9.20	1.30	60		0	(NI)					
(102mm)	(ADDED)	0			(NR)					
8.10- 8.13		C								
8.45- 8.50		C			(NI)					
9.20-10.70	1.30	40	0.20	13						
(102mm)	(ADDED)	17	0.06							
9.60- 9.70		C			(NR)					

Drilling

Depth	Hole Dia	Technique	Crew
0.30	0.40	Inspection Pit	SL/CW
15.20	0.12	Rotary Core	SL/CW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			25/11/19	08:00
0.30		DRY	25/11/19	18:00
0.30		DRY	26/11/19	08:00
12.20	1.30	ADDED	26/11/19	18:00
12.20	1.30	6.20	27/11/19	08:00
15.20	1.30	ADDED	27/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					Possibly masked by drilling flush.

Remarks A 50mm standpipe was installed to 10.00m with a geowrapped slotted section from 2.00m to 10.00m with upright lockable protective cover. Backfill details from base of hole: bentonite seal up to 10.00m, gravel filter up to 2.00m, bentonite seal up to 0.20m, concrete up to ground level.
Flush: 1.20-15.20m, Foam, 100% return.

Logged by **MM**

Figure **1 of 2**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Rotary Core

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH303**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389211.0** E **390104.0** N

Ground Level **50.64** m OD

Scale 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N (FI)	Description General	Description Detail	Depth	Legend	Level m OD
					(NI)		Between 10.10-10.70m, closely spaced bands of gravel.			
10.50-10.62		C			(15)					
					(20)					
10.70-12.20 (102mm)	1.30 (ADDED)	87 20	0.30 0.30	20	(NR)		Between 10.90-11.20m, recovered as sand.			
					(3)					
11.50-11.59		C								
					(10)					
12.20-14.70 (102mm)	1.30 (ADDED)	100 60	0.45 0.10	60	(25)					
12.43-12.51		C								
					(3)					
13.34-13.45		C								
					(NI)					
					(NR)					
					(6)					
14.40-14.54		C			(NI)					
					(15)					
14.70-15.20 (102mm)	1.30 (ADDED)	80 40	0.20 0.05	37	(NI)					
						End of Borehole		15.20		35.44

Drilling

Depth	Hole Dia	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **2 of 2**
06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler and Rotary

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH304**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389237.8** E **390058.9** N

Ground Level **56.70** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (FI)	Description	Depth	Legend	Level m OD
							G.L.		56.70
0.00- 0.60	B					TOPSOIL: Dark brown gravelly slightly clayey fine to coarse sand with a low cobble content of mudstone, concrete and brick. Gravel is subangular to rounded fine to coarse of mudstone and brick fragments.			
0.20	D								
0.20	ES								
0.50	ES								
0.60- 1.20	B						0.60		56.10
1.00	D					MADE GROUND: Loose black gravelly fine to coarse sand of ash. Gravel is subangular to subrounded fine to coarse of sandstone, clinker and slag.			
1.00	ES								
1.20- 1.80	B								
1.20- 1.65	D	(DRY)			S6				
1.80- 2.00	D			27			1.80		54.90
2.00- 2.80	B					Very soft yellowish brown slightly sandy CLAY with pockets of sandy silt.			
2.00- 2.45	D	(DRY)		32	S3				
2.00	ES								
2.80- 3.00	D			15					
3.00- 3.80	B					Below 3.00m, soft.			
3.00- 3.45	D	(DRY)			S7				
3.80- 4.00	D						3.80		52.90
4.00- 4.45	D	(DRY)			S50/ 295	Very dense reddish brown mottled black and yellow sandy angular to subangular fine to coarse GRAVEL of sandstone.			
							4.70		52.00

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (FI)	Continued by Rotary techniques General	Detail
4.70- 6.20 (102mm)	(ADDED)	26 0		0	(NR)	Reddish brown, light brown, grey and dark grey silty SAND and GRAVEL with a medium to high cobble content of various lithologies. Gravel is subrounded to rounded fine to coarse of various lithologies.	
					(NI)		
6.20- 7.70 (102mm)	4.85 (ADDED)	26 0		0	(NR)		
					(NI)		
7.70- 8.70 (102mm)	4.85 (ADDED)	100 70	0.20 0.06	46		Extremely weak to weak reddish brown fine to coarse grained SANDSTONE. Discontinuities are horizontal to subvertical, extremely closely to closely spaced, planar, smooth.	
7.70- 7.82	4.85 (ADDED)				S50/40		
7.75- 7.85		C			(9)		
8.61- 8.70		C					
8.70- 9.20 (102mm)	4.85 (ADDED)	80 40	0.10 0.10	40	(NR)		
					(NI)		
9.14- 9.20		C			(3)		
9.20-10.70 (102mm)	4.85 (ADDED)	26 0		0	(NR)		

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	JB/SW
4.70	0.10	Dynamic Sampler	JB/SW
18.24	0.12	Rotary Core	SL/CW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			27/11/19	08:00
1.20		DRY	27/11/19	18:00
1.20		DRY	28/11/19	08:00
7.70	4.85	ADDED	28/11/19	18:00
7.70	4.85	6.50	29/11/19	08:00
18.24	4.85	ADDED	29/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					Possibly masked by drilling flush.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
A 50mm standpipe was installed to 10.00m with a geowrapped slotted section from 4.00m to 10.00m with upright lockable protective cover. Backfill details from base of hole: bentonite seal up to 10.00m, gravel filter up to 4.00m, bentonite seal up to 0.20m, concrete up to ground level.
Flush: 4.70-18.20m, Foam, 100% return.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 2**

06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler and Rotary

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH304**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389237.8** E **390058.9** N

Ground Level **56.70** m OD

Scale 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N (FI)	Description General	Description Detail	Depth	Legend	Level m OD
					(NI)					
10.70-12.20 (102mm)	4.85 (ADDED)	86 60	0.23 0.07	40	(12)					
10.70-10.83	4.85 (ADDED)				C50/60					
10.80-10.93		C			(8)					
11.84-11.90		C			(NI)					
12.20-13.70 (102mm)	4.85 (ADDED)	47 26	0.15 0.06	22						
12.26-12.36		C			(NR)					
					(10)					
13.64-13.70		C			(NR)					
13.70-15.20 (102mm)	4.85 (ADDED)	73 60	0.22 0.03	58						
13.70-13.79	4.85 (ADDED)				C50/40					
					(5)					
14.88-15.06		C								
15.20-16.70 (102mm)	4.85 (ADDED)	60 26	0.22 0.03	15	(NR)					
15.62-15.78		C								
					(NI)					
					(10)					
16.63-16.70		C								
16.70-18.20 (102mm)	4.85 (ADDED)	47 7	0.10 0.10	7	(NR)					
16.70-16.80	4.85 (ADDED)				C50/35					
17.56-17.66		C			(11)					
17.90-18.03		C								
								18.24		38.46
18.20-18.24	4.85 (ADDED)				C50/20	End of Borehole				

Drilling				Progress					Groundwater					
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **2 of 2**
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geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH305**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389244.5** E **390046.6** N

Ground Level **59.13** m OD

Scale 1:50

Sampling			Properties			Strata			
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
0.00- 0.50	B					**TOPSOIL: Dark brown slightly clayey fine to coarse sand with some rootlets.**	G.L.		59.13
0.50	D					**MADE GROUND: Dark brown gravelly slightly clayey fine to coarse sand with a high cobble content. Gravel is angular to subangular fine to coarse including concrete. At 1.20m, concrete obstruction.**	0.50		58.63
1.20- 1.35	D	(DRY)			S50/75				
						End of Borehole	1.35		57.78

Boring				Progress					Groundwater					
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.20	0.40	Inspection Pit	SL/CR	G.L.			02/12/19	08:00						None encountered.
1.35	0.10	Dynamic Sampler	SL/CR	1.35		DRY	02/12/19	18:00						

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
Borehole terminated at 1.35m depth on encountering a concrete obstruction - rig was moved to BH305A.
Backfill details from base of hole: arisings up to ground level.

Logged by **MM**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH305A**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389246.2** E **390044.8** N

Ground Level **59.24** m OD

Scale 1:50

Sampling			Properties		Strata			
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	Description	Depth	Legend	Level m OD
						G.L.		59.24
					TOPSOIL: Dark brown slightly gravelly clayey fine to coarse sand with a low cobble content. Gravel is angular to subangular fine to coarse including sandstone and brick fragments. Some rootlets.	0.40		58.84
					MADE GROUND: Dark brown gravelly slightly clayey fine to coarse sand with a high cobble content. Gravel is angular to subrounded fine to coarse including sandstone and brick fragments.	1.00		58.24
					MADE GROUND: Grey concrete.	1.10		58.14
					End of Borehole			

Boring				Progress					Groundwater					
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.10	**0.40**	**Inspection Pit**	**SL/CR**	**G.L.** **1.10**		**DRY**	**02/12/19** **02/12/19**	**08:00** **18:00**						**None encountered.**

Remarks

Inspection pit hand excavated to 1.10m depth and no services were found.
Inspection Pit terminated at 1.10m depth on encountering a concrete obstruction - rig was moved to BH305B.
No samples were retrieved from the Inspection Pit.
Backfill details from base of hole: arisings up to ground level.

Logged by **MM**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH305B**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389246.3** E **390043.6** N

Ground Level **59.39** m OD

Scale 1:50

Sampling			Properties		Strata			
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	Description	Depth	Legend	Level m OD
					TOPSOIL: Dark brown slightly clayey fine to coarse sand with some rootlets.	**G.L.**		**59.39**
					MADE GROUND: Dark brown gravelly slightly clayey fine to coarse sand with a high cobble content. Gravel is subangular to rounded fine to coarse including sandstone, concrete and brick fragments. At 0.80m, obstruction - possible concrete.	**0.50**		**58.89**
					End of Borehole	**0.80**		**58.59**

Boring				Progress					Groundwater					
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.80	**0.40**	**Inspection Pit**	**SL/CR**	**G.L.** **0.80**		**DRY**	**02/12/19** **02/12/19**	**08:00** **18:00**						**None encountered.**

Remarks

Inspection pit hand excavated to 0.80m depth and no services were found.
Inspection Pit terminated at 0.80m depth due to the presence of an obstruction (possible concrete) - rig was moved to BH305C.
No samples were retrieved from the Inspection Pit.
Backfill details from base of hole: arisings up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
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geotechnics

BOREHOLE RECORD – Dynamic Sampler and Rotary

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH305C**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389243.7** E **390048.5** N

Ground Level **58.93** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (FI)	Description	Depth	Legend	Level m OD
							G.L.		58.93
0.50	D					TOPSOIL: Dark brown gravelly slightly clayey fine to coarse sand with a low cobble content. Gravel is angular to rounded fine to coarse of sandstone and brick fragments. Some rootlets.	0.50		58.43
0.50	ES								
						MADE GROUND: Firm dark brown mottled black and orange slightly sandy gravelly clay with a low cobble content. Gravel is subangular to rounded fine to coarse of mudstone, sandstone, coal, slag, concrete and brick fragments.			
1.00	D								
1.00	ES								
1.20- 2.20	B								
1.20- 1.65	D	(DRY)			S10				
1.50	D								
2.00	ES								
2.20- 3.20	B								
2.20- 2.65	D	(DRY)			S10				
2.50	D								
3.00	ES								
3.20- 4.20	B						3.20		55.73
3.20- 3.65	D	(DRY)		5.7	S12	Firm becoming stiff brownish yellow slightly sandy CLAY with some bands of silt.			
3.50	D								
4.00	ES								
4.20- 5.20	B								
4.20- 4.65	D	(DRY)		27	S20				
4.50	D								
5.20- 5.40	B								
5.20- 5.65	D	(DRY)			S15		5.40		53.53
5.40- 6.40	B					Medium dense brownish yellow gravelly silty fine to coarse SAND. Gravel is subrounded to rounded fine to medium of sandstone.			
5.50	D								
6.20- 6.65	D	(DRY)			S49				
							6.40		52.53
6.50- 6.95	D					Dense brown very sandy subrounded to rounded fine to coarse GRAVEL of sandstone.	6.65		52.28
6.50	D								

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (FI)	Continued by Rotary techniques General	Detail		
					(NR)				
6.65- 7.20 (102mm)	6.50 (ADDED)	42 0		0	(NI)	Brown very sandy subrounded to rounded fine to coarse GRAVEL of sandstone.			
7.20- 7.90 (102mm)	6.50 (ADDED)	0			(NR)				
						Stiff yellowish brown slightly gravelly sandy CLAY with a medium cobble content. Gravel is angular to subrounded fine to coarse of sandstone.		7.80	51.13
7.90- 9.40 (102mm)	6.50 (ADDED)	86 53	0.32 0.10	53				7.90	51.03
7.90- 8.07	6.50 (ADDED)				S50/18				
8.31- 8.40		C			(NI)				
					(15)	Extremely weak reddish brown fine to coarse grained SANDSTONE, recovered as sand and gravel.			
9.24- 9.30		C			(NI)				
9.40-10.90 (102mm)	6.50 (ADDED)	66 60	0.20 0.06	53	(NR)	Extremely weak to weak reddish brown fine to coarse grained SANDSTONE. Discontinuities are horizontal to			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	SL/CR
6.65	0.10	Dynamic Sampler	SL/CR
19.90	0.12	Rotary Core	SL/CR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			03/12/19	08:00
6.50	6.50	ADDED	03/12/19	18:00
6.50	6.50	DRY	04/12/19	08:00
16.90	6.50	ADDED	04/12/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					Possible inflows masked by drilling flush.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
Borehole terminated at 19.90m depth due to instability of the rotary drilling rig.
A 50mm standpipe was installed to 15.00m with a geowrapped slotted section from 6.00m to 15.00m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 15.00m, gravel filter up to 6.00m, bentonite seal up to 0.20m, concrete up to ground level.
Flush: 6.50-19.90m, Foam, 100% return.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 2**
06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler and Rotary

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP** Borehole **BH305C**
Project No **PN194054**

Client **WSP** National Grid Coordinates **389243.7** E **390048.5** N Ground Level **58.93** m OD

Drilling | Properties/Sampling | Strata | Scale 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N (FI)	Description General	Description Detail	Depth	Legend	Level m OD
					(7)	subhorizontal, very closely to closely spaced, planar, smooth.				
10.58-10.75		C								
10.90-12.40 (102mm)	6.50 (ADDED)	93 66	0.21 0.09	26	(NR) (NI)					
11.53-11.63		C			(7)					
11.73-11.90		C			(3)					
					(NI)					
12.40-13.90 (102mm)	6.50 (ADDED)	13 0		0						
12.40-12.49		C			(NR)					
					(NI)					
13.90-15.40 (102mm)	6.50 (ADDED)	86 56	0.25 0.04	36	(NR)					
13.90-13.97	6.50 (ADDED)				S50/24					
13.95-14.05		C			(13)					
14.84-14.90		C								
					(NI)					
15.40-16.90 (102mm)	6.50 (ADDED)	73 73	0.35 0.06	69	(NR)					
15.65-15.80		C			(6)					
16.78-16.90		C								
16.90-18.40 (102mm)	6.50 (ADDED)	100 83	0.31 0.05	73	(18)					
17.55-17.67		C			(NR)					
18.40-19.90 (102mm)	6.50 (ADDED)	90 66	0.25 0.05	50						
18.40-18.56		C			(11)					
					(NI)					
					(11)			19.90		39.03
19.76-19.90		C				End of Borehole				

Drilling

Depth	Hole Dia	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **2 of 2**
06/02/2020

geotechnics

BOREHOLE RECORD - Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **BH306**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389269.8** E **390017.7** N

Ground Level **66.61** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		66.61
0.20- 0.40	B					MADE GROUND: Black tarmacadam.	0.10		66.51
0.20	D					MADE GROUND: Sandstone block paving.	0.20		66.41
0.20	ES						0.40		66.21
0.60- 1.20	B					MADE GROUND: Yellow fine to medium sand.	0.60		66.01
1.00	D					MADE GROUND: Sandstone block paving.			
1.00	ES					MADE GROUND: Yellowish brown slightly silty fine to coarse sand.			
1.20- 1.80	B						1.20		65.41
1.20- 1.65	D	(DRY)			S11	MADE GROUND: Firm reddish brown slightly sandy clay.			
2.00- 2.80	B						2.00		64.61
2.00- 2.20	D					Firm dark grey mottled black slightly sandy SILT with occasional pockets of silty sand. Organic odour.			
2.00	ES								
2.20- 2.65	D	(DRY)		36	S9				
3.00- 3.80	B								
3.00- 3.20	D								
3.00	ES								
3.20- 3.65	D	(DRY)		27	S11				
4.00- 4.80	B								
4.00- 4.20	D								
4.20- 4.65	D	4.20 (WET)			S21		4.20		62.41
						Medium dense yellowish brown clayey fine to coarse SAND.			
5.00- 5.80	B						5.00		61.61
5.00- 5.20	D					Stiff yellowish brown slightly sandy CLAY with occasional pockets of silt.			
5.20- 5.65	D	4.20 (WET)		28	S21				
6.00- 6.20	D								
6.20- 6.65	D	4.20 (WET)		28	S23				
7.00- 7.30	D	4.20 (WET)		9.0	S50/ 150				
						Stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone.	7.20		59.41
8.50- 8.71	D	4.20 (WET)			S50/ 135	Extremely weak reddish brown fine to coarse grained SANDSTONE. (Recovered as sand and gravel).	8.20		58.41
						End of Borehole	8.71		57.90

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	SL/CR
6.20	0.10	Dynamic Sampler	SL/CR
8.71	0.18	Rotary Open Hole	SL/CR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			06/12/19	08:00
4.65		DRY	06/12/19	18:00
4.65		DRY	09/12/19	08:00
8.71		3.60	07/12/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	In Mins	Depth Sealed	Remarks on Groundwater
4.20					Seepage - no rise.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
Dynamic sampling techniques stopped at 6.20m depth due to refusal. Borehole subsequently continued using Rotary Open Hole drilling techniques.
A 50mm standpipe was installed to 8.50m with a geowrapped slotted section from 2.00m to 8.50m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 2.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**

06/02/2020

geotechnics

Fieldwork Results - SPT Results Summary

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
BH303	0.30	50.34	S	-	10	15/50	27	23/35			50/110	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
BH304	1.20	55.50	S	-	2	3	2	2	1	1	6	*
BH304	2.00	54.70	S	-	2	2	1	-	1	1	3	*
BH304	3.00	53.70	S	-	1	2	1	1	1	4	7	*
BH304	4.00	52.70	S	-	8	9	12	13	14	11/70	50/295	>
BH304	7.70	49.00	S	-	23	2/5	50/40				50/40	>
BH304	10.70	46.00	C	-	25/70		50/60				50/60	>
BH304	13.70	43.00	C	-	25/50		50/40				50/40	>
BH304	16.70	40.00	C	-	25/60		50/35				50/35	>
BH304	18.20	38.50	C	-	25/20		50/20				50/20	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
BH305	1.20	57.93	S	-	10		50				50/75	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
BH305C	1.20	57.73	S	-	3	3	1	4	3	2	10	*
BH305C	2.20	56.73	S	-	1	1	2	2	3	3	10	*
BH305C	3.20	55.73	S	-	3	2	3	3	3	3	12	*
BH305C	4.20	54.73	S	-	2	3	2	4	6	8	20	*
BH305C	5.20	53.73	S	-	2	2	3	3	4	5	15	*
BH305C	6.20	52.73	S	-	4	8	10	10	14	15	49	*
BH305C	7.90	51.03	S	-	8	11	50/18				50/18	>
BH305C	13.90	45.03	S	-	25/50		50/24				50/24	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
BH306	1.20	65.41	S	-	2	3	3	3	3	2	11	*
BH306	2.20	64.41	S	-	2	2	2	3	2	2	9	*
BH306	3.20	63.41	S	-	1	-	2	3	3	3	11	*
BH306	4.20	62.41	S	-	2	3	4	5	6	6	21	*
BH306	5.20	61.41	S	-	3	4	4	5	5	7	21	*
BH306	6.20	60.41	S	-	4	4	4	5	6	8	23	*
BH306	7.00	59.61	S	-	11	15	25	25			50/150	>
BH306	8.50	58.11	S	-	25		25	25/60			50/135	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

APPENDIX 3

Core Photographs

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH303 1.20 - 3.20m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH303 3.20 - 4.70m

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH303 4.70 - 7.70m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH303 7.70 - 10.70m

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH303 10.70 - 13.70m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH303 13.70 - 15.20m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH304 4.70 - 8.70m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH304 8.70 - 11.70m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH304 11.70 - 15.20m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH304 15.20 - 18.20m

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH305C 6.50 - 9.40m

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH305C 9.40 - 11.90m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH305C 11.90 - 14.90m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH305C 14.90 - 16.90m

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

BH305C 16.90 - 19.90m

APPENDIX 4

Dynamic Sample Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecone Probe Test
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content

(All other strengths from undrained triaxial testing)

S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/- (mm)	Total blows/penetration
( )	Extrapolated value

Groundwater

Water Strike

Depth Water Rose To

Instrumentation

Seal

Filter

Seal

Strata — Legend

Made Ground Granular

Made Ground Cohesive

Topsoil

Cobbles and Boulders

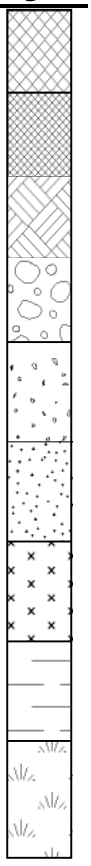
Gravel

Sand

Silt

Clay

Peat



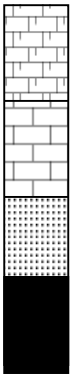
Note: Composite soil types shown by combined symbols

Chalk

Limestone

Sandstone

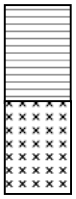
Coal



Strata, Continued

Mudstone

Siltstone

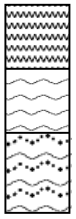


Metamorphic Rock

Fine Grained

Medium Grained

Coarse Grained

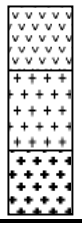


Igneous Rock

Fine Grained

Medium Grained

Coarse Grained



Backfill Materials

Arisings

Bentonite Seal

Concrete

Fine Gravel Filter

General Fill

Gravel Filter

Grout

Sand Filter

Tarmacadam

Rotary Core

RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
FRACTURE SPACING (m)	Maximum Minimum
NI	Non-intact core
NR	No core recovery
AZCL	Assumed zone of core loss

(where core recovery is unknown it is assumed to be at the base of the run)

GEOTECHNICS

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS306**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389219.5** E **390109.3** N

Ground Level **48.65** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		48.65
0.00- 0.80	B					Grass over MADE GROUND: Dark brown slightly gravelly fine to coarse sand with a low cobble content. Gravel is angular fine to medium of concrete and brick fragments. Some rootlets.			
0.20	D								
0.20	ES								
0.50	ES								
							0.80		47.85
1.00	D					Reddish brown fine to coarse SAND. At 1.20m, very dense.			
1.20- 1.61	D				S50/ 260	At 1.61m, refusal.			
						End of Borehole	1.61		47.04

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
1.61	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			19/11/19	08:00
1.61		DRY	19/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 1.61m depth due to refusal.
Backfill details from base of hole: bentonite seal up to 0.50m, arisings up to ground level.

Logged by **MM**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS307**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389204.3** E **390091.6** N

Ground Level **53.58** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		53.58
0.00- 0.50	B					**TOPSOIL: Dark brown fine to medium sand with rootlets.**	0.10		53.48
0.20	D								
0.20	ES								
0.50- 1.20	B					**MADE GROUND: Soft yellowish brown gravelly fine to coarse sand including ash. Gravel is angular to subrounded fine to coarse of mudstone, sandstone, limestone and brick fragments.**			
0.50	ES								
1.00	D								
1.00	ES								
1.20- 1.90	B								
1.20- 1.65	D				S6				
1.90- 2.00	D					**Below 2.00m, firm.**			
2.00- 2.50	B								
2.00- 2.45	D				S12				
2.00	ES								
2.30- 3.00	D						2.50		51.08
2.50- 2.60	D					**Reddish brown fine to coarse SAND.**			
3.00- 3.15	#				S50/30	**At 3.00m, very dense. At 3.15m, refusal.**	3.15		50.43
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
3.15	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			15/11/19	08:00
3.15		DRY	15/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 3.15m depth due to refusal.
A 50mm standpipe was installed to 3.00m with a geowrapped slotted section from 1.00m to 3.00m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS308**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389239.2** E **390092.2** N

Ground Level **50.12** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		50.12
0.00- 0.50	B					Grass over MADE GROUND: Dark brown/black, locally mottled red, slightly gravelly fine to medium sand with rootlets. Gravel is angular to rounded fine to coarse of mudstone, sandstone, limestone, quartzite and occasional brick fragments.			
0.20	D								
0.20	ES								
0.50- 1.20	B								
0.50	ES								
1.00	D								
1.00	ES								
1.20- 1.50	B						1.20		48.92
1.20- 1.65	D				S26	MADE GROUND: Medium dense brown gravelly fine to coarse sand. Gravel is angular to subrounded fine to coarse of limestone and brick fragments.	1.40		48.72
1.40- 1.57	D				S50/60		1.65		48.47
						Very dense reddish brown fine to coarse SAND. At 1.65m, refusal.			
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
1.65	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			15/11/19	08:00
1.65		DRY	15/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 1.65m depth due to refusal.
Backfill details from base of hole: bentonite seal up to 0.50m, arisings up to ground level.

Logged by **MM**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS309**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389221.7** E **390077.7** N

Ground Level **54.61** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		54.61
0.00- 0.50	B					Grass over MADE GROUND: Dark brown/black fine to coarse sand with some rootlets and occasional angular fine to medium gravel of limestone, quartzite, clinker, slate, pottery and brick fragments. At 0.50m, retaining wall encountered in western wall of inspection pit.			
0.20	D								
0.20	ES								
0.50- 1.20	B								
0.50	ES								
1.00	D								
1.00	ES								
1.20- 1.50	B						1.20		53.41
1.20- 1.65	D				S8	MADE GROUND: Soft to firm brown slightly sandy slightly gravelly clay. Gravel is angular to subrounded fine to coarse of sandstone and brick fragments.			
1.50	D								
1.50	ES								
1.80- 2.12	D				S50/ 170	Very dense reddish brown fine to coarse SAND. At 2.12m, refusal.	1.80		52.81
							2.12		52.49
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
2.12	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			19/11/19	08:00
2.12		DRY	19/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 2.12m depth due to refusal.
A 50mm standpipe was installed to 1.80m with a geowrapped slotted section from 1.00m to 1.80m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS310**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389250.4** E **390079.9** N

Ground Level **50.81** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		50.81
0.00- 0.25	B					MADE GROUND: Light grey sandy angular to subangular fine to coarse gravel of limestone.	0.25		50.56
0.20	D								
0.20	ES								
0.25- 1.00	B					MADE GROUND: Reddish brown slightly gravelly slightly silty fine to coarse sand. Gravel is subangular to subrounded fine to coarse of sandstone and brick fragments.			
0.50	ES								
1.00	D						1.00		49.81
1.00- 1.44	D	(DRY)			S50/ 285	Very dense reddish brown fine to coarse SAND.			
1.00	ES					At 1.44m, refusal.			
						End of Borehole	1.44		49.37

Boring

Depth	Hole Dia	Technique	Crew
1.00	0.40	Inspection Pit	GM/MM
1.44	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			13/11/19	08:00
1.44		DRY	13/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.00m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 1.44m depth due to refusal.
Backfill details from base of hole: bentonite seal up to 1.20m, arisings up to ground level.

Logged by **MM**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS311**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389231.9** E **390058.8** N

Ground Level **57.65** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		57.65
0.00- 0.50	B					**TOPSOIL: Dark brown fine to coarse sand with some rootlets.**			
0.20	D					**Between ground level and 1.20m, retaining wall present in side of inspection pit.**	0.50		57.15
0.20	ES								
0.50- 1.20	B					**MADE GROUND: Firm yellowish orange mottled black slightly sandy gravelly clay with a low cobble content. Gravel is angular to subangular fine to coarse of sandstone, coal, slag, concrete and brick fragments.**			
0.50	ES								
1.00	D								
1.00	ES								
1.20- 1.80	B								
1.20- 1.65	D				S10	**Between 0.50-0.70m, plastic and waste materials.**			
1.80- 2.00	D			28					
2.00- 2.50	B					**Between 2.00-2.45m, stiff.**			
2.00- 2.45	D				S21				
2.00	ES								
2.80- 3.00	D								
3.00- 3.45	D				S10				
3.00	ES								
3.80- 4.00	D			23		**Between 3.80-4.00m, grading to slightly sandy slightly gravelly clayey silt.**			
4.00- 4.45	D				S9				
4.00	ES								
4.50- 4.89	#				S50/ 235	**At 4.89m, refusal.**			
						End of Borehole	4.89		52.76

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
4.89	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			19/11/19	08:00
4.89		DRY	19/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 4.89m depth due to refusal.
A 50mm standpipe was installed to 4.50m with a geowrapped slotted section from 1.00m to 4.50m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS312**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389244.2** E **390064.5** N

Ground Level **53.48** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		53.48
						Vegetation over TOPSOIL: Soft dark brown very sandy clay with some rootlets.	0.40		53.08
0.40- 1.20	B					Stiff greyish orange sandy CLAY.			
0.50	ES								
1.00	D								
1.00	ES								
1.20- 1.50	B								
1.20- 1.65	D			7.9	S21				
1.50- 2.00	D								
2.00- 2.50	B					Between 2.00-2.45m, firm.			
2.00- 2.45	D			9.2	S9				
2.00	ES								
2.50- 3.00	D								
3.00- 3.50	B						3.00		50.48
3.00- 3.14	D				S50/30	Very dense reddish brown fine to coarse SAND. At 3.14m, refusal.	3.14		50.34
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
3.14	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			22/11/19	08:00
3.14		DRY	22/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 3.14m depth due to refusal.
A 50mm standpipe was installed to 3.00m with a geowrapped slotted section from 1.00m to 3.00m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS313**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389285.4** E **390073.7** N

Ground Level **51.80** m OD

Scale 1:50

Sampling			Properties			Strata			
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		51.80
0.00- 0.25	B					MADE GROUND: Light grey sandy angular to subangular fine to coarse gravel of limestone.	0.25		51.55
0.20	D								
0.20	ES								
0.25- 1.00	B					MADE GROUND: Reddish brown slightly gravelly slightly silty fine to coarse sand. Gravel is subangular to subrounded fine to coarse of sandstone and brick fragments.			
0.50	ES								
1.00	D								
1.00	ES								
1.20- 1.40	B								
1.20- 1.55	D	(DRY)			S50/ 195	Very dense reddish brown fine to coarse SAND. At 1.55m, refusal.	1.30		50.50
							1.55		50.25
						End of Borehole			

Boring				Progress					Groundwater					
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.20	0.40	Inspection Pit	GM/MM	G.L.			15/11/19	08:00						None encountered.
1.55	0.10	Dynamic Sampler	GM/MM	1.55		DRY	15/11/19	18:00						

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 1.55m depth due to refusal.
Backfill details from base of hole: bentonite seal up to 1.20m, arisings up to ground level.

Logged by **MM**

Figure **1 of 1**

06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS314**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389261.1** E **390029.7** N

Ground Level **62.71** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		62.71
0.00- 0.80	B					TOPSOIL: Dark brown slightly gravelly fine to coarse sand with rootlets. Gravel is subangular to subrounded fine to coarse of sandstone and brick fragments.			
0.20	ES								
0.50	ES								
0.80- 1.20	B						0.80		61.91
1.00	ES					Soft reddish brown slightly gravelly CLAY. Gravel is subrounded to rounded fine of mudstone.			
1.20- 1.90	B								
1.20- 1.65	D			15	S6				
1.90- 2.00	D					Below 2.00m, firm.			
2.00- 2.45	D				S11				
2.00- 2.20	D			19					
2.20- 3.00	B								
							2.80		59.91
3.00- 3.42	D				S50/ 265	Very dense reddish brown fine to coarse SAND. At 3.42m, refusal - possible sandstone bedrock.			
							3.42		59.29
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
3.42	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			14/11/19	08:00
3.42		DRY	14/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 3.42m depth due to refusal (possible bedrock) - rig was moved to WS314A.
A 50mm standpipe was installed to 3.00m with a geowrapped slotted section from 1.00m to 3.00m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite seal up to 0.40m, concrete up to 0.20m, tarmacadam up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
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geotechnics

BOREHOLE RECORD - Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS314A**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389259.7** E **390029.6** N

Ground Level **62.59** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		62.59
0.00- 0.50	B					Grass over MADE GROUND: Dark brown/black slightly gravelly fine to coarse sand with some rootlets. Gravel is angular to rounded fine to coarse of mudstone, sandstone, quartzite and occasional brick fragments.			
0.20	D								
0.20	ES								
0.50- 1.20	B								
0.50	ES								
1.00	D								
1.00	ES								
1.20- 1.90	B						1.20		61.39
1.20- 1.65	D			16	S8	Soft to firm reddish brown slightly gravelly CLAY. Gravel is subrounded to rounded fine of mudstone.			
2.00- 2.45	D			19	S12	Below 2.00m, firm.			
2.20- 3.00	B								
3.00- 3.29	D				S50/ 140	Very dense reddish brown fine to coarse SAND. At 3.29m, refusal.	2.80		59.79
3.00- 3.20	D						3.29		59.30
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
3.29	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			14/11/19	08:00
3.29		DRY	14/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 3.29m depth due to refusal.
Backfill details from base of hole: bentonite seal up to 0.50m, arisings up to ground level.

Logged by **MM**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS315**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389272.2** E **390053.9** N

Ground Level **54.12** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		54.12
0.00- 0.30	B					Grass over MADE GROUND: Dark brown gravelly slightly clayey fine to coarse sand with some rootlets. Gravel is angular to subangular fine to coarse of sandstone, glass and brick fragments.	0.30		53.82
0.20- 1.00	D								
0.20	ES								
0.30- 1.20	B					MADE GROUND: Dark brown slightly gravelly sandy clay with a low cobble content. Gravel is angular to subangular fine to coarse of metal, glass and brick fragments.			
0.50	ES								
1.00	ES								
1.20- 1.50	B						1.20		52.92
1.20- 1.65	D			12	S12	Firm yellowish brown sandy SILT.			
1.50- 2.00	D								
2.00- 2.50	B					Below 2.00m, stiff.			
2.00- 2.45	D			6.9	S20				
2.00	ES								
2.50- 3.00	D								
3.00- 3.40	D				S50/ 250	Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is rounded fine to medium of sandstone. At 3.40m, refusal.	3.00		51.12
							3.40		50.72
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
3.40	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			22/11/19	08:00
3.40		DRY	22/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Dynamic Sample Borehole terminated at 3.40m depth due to refusal.
A 50mm standpipe was installed to 3.00m with a geowrapped slotted section from 1.00m to 3.00m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
06/02/2020

geotechnics

BOREHOLE RECORD - Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS316**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389291.7** E **390049.9** N

Ground Level **58.60** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		58.60
0.00- 0.40	B					Grass over TOPSOIL: Brown gravelly slightly clayey fine to coarse sand with roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone, sandstone, glass and brick fragments.	0.20		58.40
0.20	D						0.40		58.20
0.20	ES								
0.40- 1.20	B								
0.50	ES								
						MADE GROUND: Soft to firm orangish brown sandy gravelly clay with a low cobble content of sandstone and brick. Gravel is angular to subangular fine to coarse of sandstone, glass, metal and brick fragments.			
1.00	D								
1.00	ES								
1.20- 1.50	B								
1.20- 1.65	D				S33				
1.50- 2.00	D					MADE GROUND: Very stiff orangish brown mottled black sandy gravelly clay. Gravel is angular to subangular fine to coarse of clinker, slag, timber, concrete and brick fragments. Between 2.00-2.45m, firm.			
2.00- 2.50	B								
2.00- 2.45	D				S13				
2.00	ES								
2.50- 3.00	D								
3.00- 3.50	B						3.00		55.60
3.00- 3.45	D			11	S13	Firm grey slightly sandy slightly gravelly SILT. Gravel is angular to subangular fine to medium of sandstone and limestone.			
3.00	ES								
3.50- 4.00	D			16		Between 3.50-4.00m, some bands of clay.			
4.00- 4.50	B					Between 4.00-4.45m, soft to firm.			
4.00- 4.45	D				S8				
4.50- 5.00	D								
5.00- 5.45	D			16	S18	Below 5.00m, stiff.			
						End of Borehole	5.45		53.15

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
5.45	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			21/11/19	08:00
5.45		DRY	21/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
Dynamic Sample Borehole location benched at 0.50m below ground level - borehole advanced using modular sampling rig.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
A 50mm standpipe was installed to 4.00m with a geowrapped slotted section from 3.00m to 5.00m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 5.00m, gravel filter up to 3.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **MM**

Figure **1 of 1**
06/02/2020

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS317**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389292.7** E **390030.4** N

Ground Level **64.22** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		64.22
0.10- 0.25	B					MADE GROUND: Black tarmacadam.	0.05		64.17
0.20	D								
0.20	ES					MADE GROUND: Yellow sandy angular to subangular fine to medium gravel of limestone. (Sub base).	0.25		63.97
0.40- 1.20	B								
0.50	ES					MADE GROUND: Yellowish grey concrete.	0.35		63.87
1.00	D					Loose brown gravelly slightly clayey fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.			
1.00	ES								
1.20- 1.80	B								
1.20- 1.65	D				S9	Between 0.75-0.85m, high cobble content of sandstone and concrete.			
1.80- 2.00	D								
2.00- 2.80	B								
2.00- 2.45	D				S7				
2.00	ES								
							2.30		61.92
2.80- 3.00	D					Loose orangish yellow slightly silty fine to medium SAND.			
3.00- 3.80	B								
3.00- 3.45	D				S2	Between 3.00-3.45m, very loose.			
3.00	ES								
						Below 3.50m, dark grey, silty. Slight organic odour.			
3.80- 4.00	D								
4.00- 4.45	D				S9				
4.50- 5.00	D								
5.00- 5.45	#				S6				
						End of Borehole	5.45		58.77

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/MM
5.45	0.10	Dynamic Sampler	GM/MM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			18/11/19	08:00
5.45		DRY	18/11/19	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
A 50mm standpipe was installed to 2.00m with a geowrapped slotted section from 1.00m to 2.00m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 2.00m, gravel filter up to 1.00m, bentonite seal up to 0.20m, concrete up to ground level.

Logged by **MM**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

BOREHOLE RECORD – Dynamic Sampler

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Borehole **WS318**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389328.8** E **390049.0** N

Ground Level **61.83** m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	Strata Description	Depth	Legend	Level m OD
						G.L.		61.83
0.15- 0.40	B				MADE GROUND: Grey concrete paving slab.	0.08		61.75
0.20	D				MADE GROUND: Grey gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of sandstone.	0.12		61.71
0.20	ES				MADE GROUND: Brown mottled grey very sandy angular to subangular fine to coarse gravel of limestone and sandstone. At 0.35m, orange plastic ducting.	0.40		61.43
					MADE GROUND: Black tarmacadam. At 0.45m, concrete obstruction.	0.45		61.38
					End of Borehole			

Boring Depth	Hole Dia	Technique	Crew	Progress Depth of Hole	Depth Cased	Depth to Water	Date	Time	Groundwater Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.45	0.40	Inspection Pit	PC/GM	G.L.			20/11/19	08:00						None
				0.45		DRY	20/11/19	18:00						encountered.

Remarks

Inspection Pit terminated at 0.45m depth on encountering buried services and a concrete obstruction.
ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
Backfill details from base of hole: arisings up to ground level.

Logged by **PC**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

Fieldwork Results - SPT Results Summary

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
WS306	1.20	47.45	S	-	4	4	4	8	15	23/35	50/260	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
WS307	1.20	52.38	S	-	1	-	2	1	2	1	6	*
WS307	2.00	51.58	S	-	2	2	3	3	3	3	12	*
WS307	3.00	50.58	S	-	12	13/40	50/30				50/30	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
WS308	1.20	48.92	S	-	3	3	6	6	4	10	26	*
WS308	1.40	48.72	S	-	13	12/30	50/60				50/60	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
WS309	1.20	53.41	S	-	1	2	2	2	2	2	8	*
WS309	1.80	52.81	S	-	11	12	17	20	13/20		50/170	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
WS310	1.00	49.81	S	-	3	5	9	11	15	15/60	50/285	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N'
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		10 20 30 40 50
WS311	1.20	56.45	S	-	1	1	3	5	1	1	10	*
WS311	2.00	55.65	S	-	4	5	5	5	6	5	21	*
WS311	3.00	54.65	S	-	2	2	2	2	2	4	10	*
WS311	4.00	53.65	S	-	1	2	3	1	2	3	9	*
WS311	4.50	53.15	S	-	6	9	10	18	18	4/10	50/235	A

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
WS312	1.20	52.28	S	-	4	4	5	5	5	6	21	*
WS312	2.00	51.48	S	-	4	3	3	3	1	2	9	*
WS312	3.00	50.48	S	-	13	12/35	50/30				50/30	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
WS313	1.20	50.60	S	-	2	5	13	20	17/45		50/195	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
WS314	1.20	61.51	S	-	1	2	1	2	1	2	6	*
WS314	2.00	60.71	S	-	2	1	2	3	3	3	11	*
WS314	3.00	59.71	S	0	5	8	10	14	15	11/40	50/265	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
WS314A	1.20	61.39	S	-	1	1	1	2	2	3	8	*
WS314A	2.00	60.59	S	-	2	2	2	3	3	4	12	*
WS314A	3.00	59.59	S	-	7	7	12	38/65			50/140	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
WS315	1.20	52.92	S	-	2	1	3	3	3	3	12	*
WS315	2.00	52.12	S	-	4	5	5	5	4	6	20	*
WS315	3.00	51.12	S	-	3	4	8	8	20	14/25	50/250	>

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N'
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		10 20 30 40 50
WS316	1.20	57.40	S	-	2	2	2	9	13	9	33	*
WS316	2.00	56.60	S	-	2	4	5	4	3	1	13	*
WS316	3.00	55.60	S	-	1	3	3	3	3	4	13	*
WS316	4.00	54.60	S	-	2	1	1	2	2	3	8	*
WS316	5.00	53.60	S	-	4	4	4	4	5	5	18	*

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No** PN194054

Client WSP

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
WS317	1.20	63.02	S	-	2	2	3	2	2	2	9	*
WS317	2.00	62.22	S	-	1	1	2	2	2	1	7	*
WS317	3.00	61.22	S	-	2	1	-	1	-	1	2	*
WS317	4.00	60.22	S	-	2	2	1	3	2	3	9	*
WS317	5.00	59.22	S	-	3	2	1	1	2	2	6	*

Remarks
In accordance with BS EN ISO22476-3:2005

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

APPENDIX 5

Trial Pit Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecone Probe Test
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content

(All other strengths from undrained triaxial testing)

S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/- (mm)	Total blows/penetration
( )	Extrapolated value

Groundwater

Water Strike

Depth Water Rose To

Instrumentation

Seal

Filter

Seal

Strata — Legend

Made Ground Granular

Made Ground Cohesive

Topsoil

Cobbles and Boulders

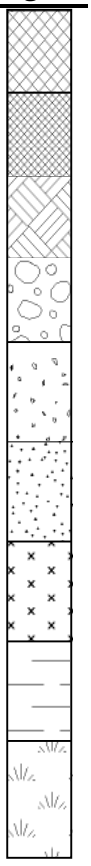
Gravel

Sand

Silt

Clay

Peat



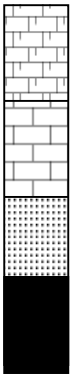
Note: Composite soil types shown by combined symbols

Chalk

Limestone

Sandstone

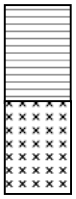
Coal



Strata, Continued

Mudstone

Siltstone

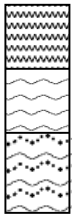


Metamorphic Rock

Fine Grained

Medium Grained

Coarse Grained

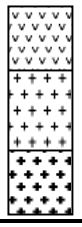


Igneous Rock

Fine Grained

Medium Grained

Coarse Grained



Backfill Materials

Arisings

Bentonite Seal

Concrete

Fine Gravel Filter

General Fill

Gravel Filter

Grout

Sand Filter

Tarmacadam

Rotary Core

RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
FRACTURE SPACING (m)	Maximum Minimum
NI	Non-intact core
NR	No core recovery
AZCL	Assumed zone of core loss

(where core recovery is unknown it is assumed to be at the base of the run)

GEOTECHNICS

TRIAL PIT RECORD *Trial Pit*

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Trial Pit **TP01**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389288.7** E **390034.3** N

Ground Level **62.66** m OD

Scale 1:50

Samples and Tests				Strata			
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
					G.L.		62.66
0.00- 0.30	B			MADE GROUND: Dark brown mottled black slightly silty fine to medium sand with some roots and rootlets. Some fragments of plastic.			
0.20	D						
0.20	ES				0.30		62.36
0.30- 0.90	B		mc=9.8%	MADE GROUND: Brown gravelly silty fine to coarse sand with some rootlets. Gravel is subrounded to rounded fine to coarse of siltstone and sandstone.			
0.50	D						
0.50	ES						
0.90- 1.10	B			Below 0.50m, occasional pockets of ash and coal fragments.			
1.00	D				1.10		61.56
1.00	ES						
1.10- 1.60	B		mc=8.3%	At 0.90m, large pocket of ash and coal debris (up to 1.00m thick). Gravel includes brick fragments. Low cobble content of brick.			
1.50	D						
1.50	ES						
1.60- 2.10	B						
2.10- 2.30	B			MADE GROUND: Orangish brown gravelly silty fine to coarse sand. Gravel is subangular to rounded fine to medium of siltstone and sandstone.	2.10		60.56
2.30- 2.60	B						
2.50	D			Below 2.00m, occasional pockets of stiff brown sandy clay.			
2.50	ES				2.60		60.06
				POSSIBLE MADE GROUND: Dark grey mottled orange clayey fine to medium sand with some rootlets.			
				End of Excavation			

Excavation

Plant **3T Tracked Excavator**
Date **19/11/2019**
Shoring **None.**
Stability **Stable during excavation.**

Width (B) **0.65**
Length (C) **2.80**
Date Backfilled **19/11/2019**

Groundwater

Depth Observed	Depth of Pit	Details
		None encountered.

Remarks **ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.**

Logged by **PC**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

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TRIAL PIT RECORD *Trial Pit*

Project **EXCHANGE SQUARE GROUND INVESTIGATION** Engineer **WSP**

Trial Pit **TP02**
Project No **PN194054**

Client **WSP**

National Grid Coordinates **389273.5** E **390031.9** N

Ground Level **62.50** m OD

Samples and Tests

Depth	Type	Stratum No	Results
0.00- 0.30	B		
0.20	D		
0.20	ES		
0.30- 0.70	B		mc=12%
0.50	D		
0.50	ES		
0.70- 1.00	B		
0.90	D		
0.90	ES		
1.30- 1.70	B		
1.50	D		
1.50	ES		
1.70- 2.30	B		mc=20%
2.00	D		
2.00	ES		
2.30- 2.70	B		
2.50	D		
2.50	ES		

Strata

Scale 1:50

Description	Depth	Legend	Level m OD
	G.L.		62.50
MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand. Gravel is angular to subrounded fine to coarse of siltstone, plastic and metal.	0.30		62.20
MADE GROUND: Orangish brown gravelly silty fine to coarse sand with occasional pockets of firm brown clay. Gravel is subangular to subrounded fine to coarse of various lithologies. **Below 0.30m, frequent pockets of clayey fine to medium sand and pockets of clay.**	1.30		61.20
MADE GROUND: Firm orangish brown mottled grey and black sandy clay.	1.70		60.80
MADE GROUND: Grey mottled orange very clayey fine to coarse sand with occasional pockets of clay.			
Soft to firm thinly laminated grey slightly sandy CLAY with occasional lenses of sand.	2.30		60.20
End of Excavation	2.70		59.80

Excavation

Plant **3T Tracked Excavator**
Date **19/11/2019**
Shoring **None.**
Stability **Stable during excavation.**

Width (B) **0.65**
Length (C) **2.80**
Date Backfilled **19/11/2019**

Groundwater

Depth Observed	Depth of Pit	Details
		None encountered.

Remarks **ES sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.**

Logged by **PC**

Figure **1 of 1**
06/02/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

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APPENDIX 6

Trial Pit Photographs

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

TP01 Pit (1)

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

TP01 Pit (2)

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

TP01 Spoil

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

TP02 Pit (1)

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

TP02 Pit (2)

PHOTOGRAPHS

Project Number : PN194054

Project : EXCHANGE SQUARE, STOCKPORT

TP02 Spoil

APPENDIX 7

Monitoring Results

FIELDWORK - *Water Level Monitoring*

Project EXCHANGE SQUARE GROUND INVESTIGATION

Project No PN194054

Client WSP

Sheet No 1

Borehole		BH303		BH304		BH305C		BH306		WS307		WS309	
Instrument (dia. mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)	
Depth to Base (m)		10.00		10.00		15.00		8.50		3.00		1.80	
Filter Zone (m)		2.00-10.00		4.00-10.00		6.00-15.00		2.00-8.71		1.00-3.15		1.00-2.12	
Level		50.64 m OD		56.70 m OD		58.93 m OD		66.61 m OD		53.58 m OD		54.61 m OD	
Date	Time	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level
8 Jan 2020		7.52	*43.12*	9.89	*46.81*	13.56	*45.37*	Car over		DRY		DRY	
9 Jan 2020								3.88	*62.73*				
17 Jan 2020		7.47	*43.17*	9.45	*47.25*	13.53	*45.40*			DRY		DRY	
21 Jan 2020		7.54	*43.10*	9.88	*46.82*	13.63	*45.30*	3.88	*62.73*	DRY		DRY	
28 Jan 2020		7.43	*43.21*	DRY		13.50	*45.43*	Car over		DRY		DRY	
29 Jan 2020								2.93	*63.68*				
12 Feb 2020		7.48	*43.16*	8.69	*48.01*	13.56	*45.37*	3.87	*62.74*	DRY		DRY	

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

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FIELDWORK - *Water Level Monitoring*

Project EXCHANGE SQUARE GROUND INVESTIGATION

Project No PN194054

Client WSP

Sheet No 2

Borehole		WS311		WS312		WS314		WS315		WS316		WS317	
Instrument (dia. mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)	
Depth to Base (m)		4.50		3.00		3.00		3.00		4.00		2.00	
Filter Zone (m)		1.00-4.89		1.00-3.14		1.00-3.42		1.00-3.40		3.00-5.00		1.00-2.00	
Level		57.65 m OD		53.48 m OD		62.71 m OD		54.12 m OD		58.60 m OD		64.22 m OD	
Date	Time	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level
8 Jan 2020		DRY		2.93	*50.55*	1.94	*60.77*	2.12	*52.00*	3.21	*55.39*	DRY	
17 Jan 2020		DRY		2.89	*50.59*	1.82	*60.89*	2.10	*52.02*	2.13	*56.47*	DRY	
21 Jan 2020		DRY		2.90	*50.58*	1.82	*60.89*	1.96	*52.16*	2.88	*55.72*	DRY	
28 Jan 2020		DRY		2.89	*50.59*	1.87	*60.84*	2.40	*51.72*	2.66	*55.94*	DRY	
12 Feb 2020		DRY		2.88	*50.60*	1.80	*60.91*	2.06	*52.06*	2.87	*55.73*	DRY	

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **08/01/2020**

Client **WSP**

Sheet No. **1 (1 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Remarks
BH303	**10.00**	**7.52**	**10.27**	**0.2**	**0.2**	**0.2**	**0.2**	**20.1**	
BH304	**10.00**	**9.89**	**9.98**	**0.2**	**0.2**	**0.1**	**0.1**	**20.2**	
BH305C	**15.00**	**13.56**	**14.80**	**0.2**	**0.2**	**3.7**	**3.7**	**20.3**	
BH306	**8.50**	**Car over**		**-**	**-**	**-**	**-**	**-**	**Car over borehole**
WS307	**3.00**	**DRY**	**2.80**	**0.0**	**0.0**	**1.8**	**1.8**	**19.3**	
WS309	**1.80**	**DRY**	**1.95**	**0.0**	**0.0**	**1.7**	**1.7**	**20.2**	
WS311	**4.50**	**DRY**	**1.82**	**0.0**	**0.0**	**0.2**	**0.1**	**21.2**	
WS312	**3.00**	**2.93**	**3.00**	**0.0**	**0.0**	**0.6**	**0.6**	**21.6**	
WS314	**3.00**	**1.94**	**3.10**	**0.0**	**0.0**	**4.8**	**4.8**	**18.7**	
WS315	**3.00**	**2.12**	**2.81**	**0.0**	**0.0**	**0.2**	**0.1**	**21.7**	
WS316	**4.00**	**3.21**	**3.97**	**0.2**	**0.1**	**0.8**	**0.7**	**20.9**	
WS317	**2.00**	**DRY**	**1.94**	**0.0**	**0.0**	**3.9**	**3.9**	**21.2**	**Top open on arrival.**

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **08/01/2020**

Client **WSP**

Sheet No. **1 (2 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide (Peak) (ppm)	Hydrogen Sulphide (Steady) (ppm)	Carbon Monoxide (Peak) (ppm)	Carbon Monoxide (Steady) (ppm)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
BH303	**10.00**	**20.1**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
BH304	**10.00**	**20.2**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
BH305C	**15.00**	**13.6**	**0**	**0**	**4**	**4**	**0.0**	**0.0**	
BH306	**8.50**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**Car over borehole**
WS307	**3.00**	**18.8**	**0**	**0**	**0**	**0**	**0.1**	**0.1**	
WS309	**1.80**	**19.5**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS311	**4.50**	**21.2**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS312	**3.00**	**21.4**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS314	**3.00**	**17.2**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS315	**3.00**	**21.7**	**0**	**0**	**0**	**0**	**0.1**	**0.1**	
WS316	**4.00**	**20.9**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS317	**2.00**	**16.7**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**Top open on arrival.**

Remarks

geotechnics

Form 002/3

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **08/01/2020**

Client **WSP**

Sheet No. **1 (3 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
BH303	**10.00**	**1015**	
BH304	**10.00**	**1015**	
BH305C	**15.00**	**1015**	
BH306	**8.50**	**1015**	**Car over borehole**
WS307	**3.00**	**1015**	
WS309	**1.80**	**1015**	
WS311	**4.50**	**1015**	
WS312	**3.00**	**1015**	
WS314	**3.00**	**1015**	
WS315	**3.00**	**1015**	
WS316	**4.00**	**1014**	
WS317	**2.00**	**1014**	**Top open on arrival.**

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **09/01/2020**

Client **WSP**

Sheet No. **1 (1 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still ☐	Light ☐	Moderate [x]	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy [x]	Overcast ☐
Precipitation	Dry [x]	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Remarks
BH306	**8.50**	**3.88**	**8.50**	**0.2**	**0.2**	**4.9**	**4.9**	**20.6**	

Remarks

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Form 002/3

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **09/01/2020**

Client **WSP**

Sheet No. **1 (2 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still ☐	Light ☐	Moderate [x]	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy [x]	Overcast ☐
Precipitation	Dry [x]	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide (Peak) (ppm)	Hydrogen Sulphide (Steady) (ppm)	Carbon Monoxide (Peak) (ppm)	Carbon Monoxide (Steady) (ppm)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
BH306	**8.50**	**12.9**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	

Remarks

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Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **09/01/2020**

Client **WSP**

Sheet No. **1 (3 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still ☐	Light ☐	Moderate ☒	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☒	Overcast ☐
Precipitation	Dry ☒	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
BH306	**8.50**	**997**	

Remarks

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Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **17/01/2020**

Client **WSP**

Sheet No. **1 (1 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Remarks
BH303	**10.00**	**7.47**	**10.27**	**0.2**	**0.2**	**0.1**	**0.1**	**20.4**	
BH304	**10.00**	**9.45**	**9.90**	**0.2**	**0.2**	**0.1**	**0.1**	**20.5**	
BH305C	**15.00**	**13.53**	**14.83**	**0.3**	**0.2**	**3.6**	**0.1**	**20.7**	
BH306	**8.50**			**-**	**-**	**-**	**-**	**-**	**Car over the borehole location**
WS307	**3.00**	**DRY**	**2.74**	**0.20**	**0.20**	**2.7**	**0.1**	**20.7**	
WS309	**1.80**	**DRY**	**1.88**	**0.2**	**0.2**	**2.7**	**0.1**	**20.5**	
WS311	**4.50**	**DRY**	**1.75**	**0.2**	**0.2**	**2.0**	**0.2**	**20.6**	
WS312	**3.00**	**2.89**	**2.95**	**0.2**	**0.2**	**0.90**	**0.10**	**20.60**	
WS314	**3.00**	**1.82**	**3.04**	**0.2**	**0.2**	**5.1**	**0.1**	**20.7**	
WS315	**3.00**	**2.10**	**2.77**	**0.2**	**0.2**	**0.1**	**0.1**	**20.9**	
WS316	**4.00**	**2.13**	**3.77**	**0.3**	**0.2**	**2.9**	**0.1**	**20.8**	
WS317	**2.00**	**DRY**	**1.89**	**0.2**	**0.2**	**3.6**	**0.1**	**20.7**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **17/01/2020**

Client **WSP**

Sheet No. **1 (2 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide (Peak) (ppm)	Hydrogen Sulphide (Steady) (ppm)	Carbon Monoxide (Peak) (ppm)	Carbon Monoxide (Steady) (ppm)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
BH303	10.00	20.3	0	0	0	0	0.0	0.0	
BH304	10.00	20.5	0	0	0	0	0.0	0.0	
BH305C	15.00	14.3	0	0	0	0	-1.0	-1.0	
BH306	8.50	-	-	-	-	-	-	-	Car over the borehole location
WS307	3.00	18.8	0	0	0	0	0.1	0.1	
WS309	1.80	18.5	0	0	0	0	0.0	0.0	
WS311	4.50	18.2	0	0	0	0	0	0.0	
WS312	3.00	20.10	0	0	0	0	0.0	0.0	
WS314	3.00	16.0	0	0	0	0	0.0	0.0	
WS315	3.00	20.8	0	0	0	0	0.0	0.0	
WS316	4.00	19.6	0	0	0	0	0.0	0.0	
WS317	2.00	16.9	0	0	0	0	0.2	0.2	

Remarks

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Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **17/01/2020**

Client **WSP**

Sheet No. **1 (3 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
BH303	**10.00**	**1001**	
BH304	**10.00**	**1002**	
BH305C	**15.00**	**1001**	
BH306	**8.50**	**1003**	**Car over the borehole location**
WS307	**3.00**	**1003**	
WS309	**1.80**	**1003**	
WS311	**4.50**	**1003**	
WS312	**3.00**	**1004**	
WS314	**3.00**	**1002**	
WS315	**3.00**	**1002**	
WS316	**4.00**	**1003**	
WS317	**2.00**	**1002**	

Remarks

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Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **21/01/2020**

Client **WSP**

Sheet No. **1 (1 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	x	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Remarks
BH303	**10.00**	**7.54**	**10.28**	**0.2**	**0.1**	**0.3**	**0.3**	**20.1**	
BH304	**10.00**	**9.88**	**9.92**	**0.1**	**0.1**	**0.1**	**0.1**	**20.4**	
BH305C	**15.00**	**13.63**	**14.83**	**0.2**	**0.2**	**3.4**	**3.4**	**20.4**	
BH306	**8.50**	**3.88**	**8.58**	**0.2**	**0.2**	**11.2**	**11.2**	**19.9**	
WS307	**3.00**	**DRY**	**2.73**	**0.1**	**0.1**	**2.7**	**2.7**	**19.8**	
WS309	**1.80**	**DRY**	**1.88**	**0.1**	**0.1**	**2.6**	**2.6**	**19.6**	
WS311	**4.50**	**DRY**	**1.75**	**0.2**	**0.2**	**0.3**	**0.3**	**19.6**	
WS312	**3.00**	**2.90**	**2.95**	**0.1**	**0.1**	**0.9**	**0.9**	**20.5**	
WS314	**3.00**	**1.82**	**3.03**	**0.1**	**0.1**	**4.8**	**4.8**	**20.4**	
WS315	**3.00**	**1.96**	**2.77**	**0.1**	**0.1**	**0.1**	**0.1**	**20.6**	
WS316	**4.00**	**2.88**	**3.78**	**0.2**	**0.2**	**2.0**	**2.0**	**20.5**	
WS317	**2.00**	**DRY**	**1.88**	**0.1**	**0.1**	**5.0**	**5.0**	**20.4**	

Remarks

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Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **21/01/2020**

Client **WSP**

Sheet No. **1 (2 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	x	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide (Peak) (ppm)	Hydrogen Sulphide (Steady) (ppm)	Carbon Monoxide (Peak) (ppm)	Carbon Monoxide (Steady) (ppm)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
BH303	**10.00**	**20.1**	**0**	**0**	**0**	**0**	**0.3**	**0.3**	
BH304	**10.00**	**20.3**	**0**	**0**	**0**	**0**	**0.1**	**0.1**	
BH305C	**15.00**	**14.5**	**0**	**0**	**0**	**3**	**0.1**	**0.1**	
BH306	**8.50**	**2.1**	**0**	**0**	**0**	**0**	**0.1**	**0.1**	
WS307	**3.00**	**18.2**	**0**	**0**	**0**	**0**	**0.1**	**0.1**	
WS309	**1.80**	**18.2**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS311	**4.50**	**19.6**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS312	**3.00**	**20.1**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS314	**3.00**	**15.4**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS315	**3.00**	**20.6**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS316	**4.00**	**19.9**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS317	**2.00**	**13.9**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	

Remarks

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Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **21/01/2020**

Client **WSP**

Sheet No. **1 (3 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still ☐	Light ☒	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☒	Overcast ☐
Precipitation	Dry ☒	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
BH303	**10.00**	**1033**	
BH304	**10.00**	**1033**	
BH305C	**15.00**	**1033**	
BH306	**8.50**	**1033**	
WS307	**3.00**	**1034**	
WS309	**1.80**	**1034**	
WS311	**4.50**	**1034**	
WS312	**3.00**	**1033**	
WS314	**3.00**	**1032**	
WS315	**3.00**	**1032**	
WS316	**4.00**	**1031**	
WS317	**2.00**	**1031**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **28/01/2020**

Client **WSP**

Sheet No. **1 (1 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	☐	Slight	x	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Remarks
BH303	10.00	7.43	10.27	0.2	0.2	0.2	0.2	19.9	
BH304	10.00	DRY	9.10	0.2	0.2	3.2	3.2	19.9	
BH305C	15.00	13.50	14.83	0.2	0.2	2.7	2.7	19.9	
BH306	8.50	Car over		-	-	-	-	-	Car over
WS307	3.00	DRY	2.74	0.2	0.2	2.8	2.8	20.1	
WS309	1.80	DRY	1.89	0.2	0.2	2.7	2.7	20.1	
WS311	4.50	DRY	1.75	0.2	0.2	1.3	1.3	20.2	
WS312	3.00	2.89	2.94	0.2	0.2	2.4	2.4	20.2	
WS314	3.00	1.87	3.04	0.2	0.2	5.3	5.3	20.3	
WS315	3.00	2.40	2.77	0.2	0.2	1.8	1.8	20.2	
WS316	4.00	2.66	2.90	0.3	0.3	3.9	3.9	20.2	
WS317	2.00	DRY	1.89	0.2	0.2	5.3	5.3	20.4	

Remarks

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Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **28/01/2020**

Client **WSP**

Sheet No. **1 (2 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	☐	Slight	x	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide (Peak) (ppm)	Hydrogen Sulphide (Steady) (ppm)	Carbon Monoxide (Peak) (ppm)	Carbon Monoxide (Steady) (ppm)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
BH303	10.00	19.9	0	0	0	0	0.0	0.0	
BH304	10.00	18.2	0	0	0	0	0.0	0.0	
BH305C	15.00	16.4	0	0	0	0	0.0	0.0	
BH306	8.50	-	-	-	-	-	-	-	Car over
WS307	3.00	18.1	0	0	0	0	0.0	0.0	
WS309	1.80	18.1	0	0	0	0	0.0	0.0	
WS311	4.50	19.4	0	0	0	0	0.1	0.1	
WS312	3.00	18.7	0	0	0	0	0.0	0.0	
WS314	3.00	15.4	0	0	0	0	0.0	0.0	
WS315	3.00	19.4	0	0	0	0	0.1	0.1	
WS316	4.00	18.7	0	0	0	0	0.1	0.1	
WS317	2.00	14.0	0	0	0	0	0.0	0.0	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **28/01/2020**

Client **WSP**

Sheet No. **1 (3 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	☐	Slight	x	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
BH303	**10.00**	**986**	
BH304	**10.00**	**986**	
BH305C	**15.00**	**986**	
BH306	**8.50**	**986**	**Car over**
WS307	**3.00**	**986**	
WS309	**1.80**	**986**	
WS311	**4.50**	**986**	
WS312	**3.00**	**986**	
WS314	**3.00**	**985**	
WS315	**3.00**	**986**	
WS316	**4.00**	**985**	
WS317	**2.00**	**985**	

Remarks

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FIELDWORK - Insitu Gas Monitoring - Daily Record

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **29/01/2020**

Client **WSP**

Sheet No. **1 (1 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	☐	Slight	x	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Remarks
BH306	**8.50**	**2.93**	**8.60**	**0.2**	**0.2**	**4.1**	**4.1**	**20.4**	

Remarks

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Form 002/3

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **29/01/2020**

Client **WSP**

Sheet No. **1 (2 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	☐	Slight	x	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide (Peak) (ppm)	Hydrogen Sulphide (Steady) (ppm)	Carbon Monoxide (Peak) (ppm)	Carbon Monoxide (Steady) (ppm)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
BH306	**8.50**	**14.3**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	

Remarks

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Form 002/3

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **29/01/2020**

Client **WSP**

Sheet No. **1 (3 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate ☐	Strong	☐
Cloud Cover	None	☐	Slight	x	Cloudy ☐	Overcast	☐
Precipitation	Dry	☐	Slight	x	Moderate ☐	Heavy	☐

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
BH306	**8.50**	**998**	

Remarks

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Form 002/3

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **12/02/2020**

Client **WSP**

Sheet No. **1 (1 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Remarks
BH303	**10.00**	**7.48**	**10.27**	**0.1**	**0.0**	**1.1**	**1.1**	**21.2**	
BH304	**10.00**	**8.69**	**9.10**	**0.1**	**0.0**	**0.2**	**0.2**	**21.5**	
BH305C	**15.00**	**13.56**	**14.84**	**0.1**	**0.1**	**3.2**	**3.2**	**21.6**	
BH306	**8.50**	**3.87**	**8.60**	**0.1**	**0.0**	**12.1**	**12.1**	**21.8**	
WS307	**3.00**	**DRY**	**2.74**	**0.1**	**0.0**	**2.5**	**2.5**	**21.2**	
WS309	**1.80**	**DRY**	**1.89**	**0.1**	**0.0**	**1.0**	**1.0**	**21.4**	
WS311	**4.50**	**DRY**	**1.75**	**0.1**	**0.0**	**1.2**	**1.2**	**21.6**	
WS312	**3.00**	**2.88**	**2.94**	**0.0**	**0.0**	**1.9**	**1.9**	**21.8**	
WS314	**3.00**	**1.80**	**3.03**	**0.1**	**0.0**	**5.2**	**5.2**	**21.6**	
WS315	**3.00**	**2.06**	**2.78**	**0.0**	**0.0**	**3.2**	**3.2**	**21.8**	
WS316	**4.00**	**2.87**	**2.90**	**0.2**	**0.1**	**6.0**	**3.4**	**21.8**	
WS317	**2.00**	**DRY**	**1.88**	**0.1**	**0.0**	**2.1**	**2.1**	**21.5**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **12/02/2020**

Client **WSP**

Sheet No. **1 (2 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide (Peak) (ppm)	Hydrogen Sulphide (Steady) (ppm)	Carbon Monoxide (Peak) (ppm)	Carbon Monoxide (Steady) (ppm)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
BH303	**10.00**	**19.0**	**0**	**0**	**0**	**0**	**0.1**	**0.1**	
BH304	**10.00**	**21.5**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
BH305C	**15.00**	**16.5**	**0**	**0**	**2**	**1**	**0.0**	**0.0**	
BH306	**8.50**	**0.8**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS307	**3.00**	**19.0**	**0**	**0**	**0**	**0**	**0.1**	**0.1**	
WS309	**1.80**	**20.3**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS311	**4.50**	**20.1**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS312	**3.00**	**20.8**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS314	**3.00**	**16.3**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	
WS315	**3.00**	**20.2**	**0**	**0**	**0**	**0**	**0.2**	**0.2**	
WS316	**4.00**	**19.9**	**0**	**0**	**1**	**0**	**0**	**0.0**	
WS317	**2.00**	**19.3**	**0**	**0**	**0**	**0**	**0.0**	**0.0**	

Remarks

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Form 002/3

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **EXCHANGE SQUARE GROUND INVESTIGATION**

Project No **PN194054**

Date **12/02/2020**

Client **WSP**

Sheet No. **1 (3 of 3)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **GA5000;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	x	Cloudy	☐	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
BH303	**10.00**	**1006**	
BH304	**10.00**	**1006**	
BH305C	**15.00**	**1005**	
BH306	**8.50**	**1005**	
WS307	**3.00**	**1006**	
WS309	**1.80**	**1006**	
WS311	**4.50**	**1006**	
WS312	**3.00**	**1006**	
WS314	**3.00**	**1005**	
WS315	**3.00**	**1006**	
WS316	**4.00**	**0.0**	
WS317	**2.00**	**1005**	

Remarks

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APPENDIX 8

Laboratory Test Results - Geotechnical

Laboratory Test Certificate

Issued To	Geotechnics Ltd The Geotechnical Centre Unit 1B, Borders Industrial Estate River Lane, Saltney Chester CH4 8RJ	**Date of issue**	06/02/2020
		Issue No.	2
		Client Ref. No.	-
		Samples / Material Source	
		Samples Recv'd	31/01/2020
Testing Start Date	31/01/2020	Sample State	As received
Testing Complete	06/02/2020	Sampled by	Geotechnics Limited
Comments	Issue 2 superseedes issue 1 - Additional testing		
Project No	PN194054		
Project Name	EXCHANGE SQUARE GROUND INVESTIGATION		

Summary of Tests

Standard	Test Description	Test Quantity	UKAS
BS EN ISO 17892-1:2014	Water Content	27	Yes
BS EN ISO 17892-12:2018 Cl. 5.3 & 5.5	Liquid Limit and Plastic Limit	11	Yes
BS EN ISO 17892-4:2016 Cl. 5.2	Particle Size Distribution by Sieving Method	6	Yes
BS EN ISO 17892-3:2015 Cl. 5.1	Particle Density by Fluid Pycnometer	4	Yes
BS 1377-3:1990 Cl. 5.4 & 5.5 (Standard withdrawn)	Sulphate Analysis - Ground Water	15	Yes
BS 1377-3:1990 Cl. 9.0 (Standard withdrawn)	pH	15	Yes
ISRM Suggested Method (1985)	Point Load Strength of Rock	41	Yes
BS 1377-4:1990 Cl. 3.3	2.5 kg Rammer Dry Density/Moisture Content Relationship (Compaction)	4	Yes

Note: Any descriptions, opinions or interpretations are outside the scope of UKAS accreditation.
The results within this report relate only to the samples tested and received from the client.

UKAS TESTING 1365

Test Results checked and approved for issue.
Signed for and on behalf of Geotechnics Limited

Schiano

Stephane Schiano (Laboratory Testing Manager)

GEOTECHNICS
geotechnical and geoenvironmental specialists
203 Torrington Avenue, Tile Hill,
Coventry, CV4 9UT

DATA SHEET - Laboratory Test Symbols

Classification and Strength

Symbol	**C - Clay**	**M - Silt**
	(0 - containing organic matter)	
	Plasticity	L - Low
		I - Intermediate
		H - High
		V - Very High
		E - Extremely High
Ip	Plasticity Index	
%	% retained on 425 µm sieve, shown under Ip value	
w_L	Liquid Limit	
w_P	Plastic Limit	
NP	Non-Plastic	
NAT	Sample tested in natural state	
w	Water Content	
P_d	Particle Density	
Test	**Quick undrained triaxial tests**	
	SS	Single stage - 102mm diameter.
	S3	Single stage - set of 3 38mm diameter.
	MS	Multistage - 102mm diameter.
	D	Drained Test
	HV	Hand Vane
	PP	Pocket Penetrometer (kg/cm²)
	NST	Not suitable for test
γ_b	Bulk Density	
σ_3	Triaxial Cell Pressure	
$\sigma_1 - \sigma_3$	Deviator Stress	
##	Excessive Strain	
c_u	Undrained Cohesion	
c	Cohesion Intercept	
ϕ	Angle of Shearing Resistance	
Linear Shrink	Linear Shrinkage	
Stab add-	Stabiliser which is added	

Consolidation

m_v	Coefficient of Volume Compressibility
c_{v50}	Coefficient of Consolidation - Log t
c_{v90}	Coefficient of Consolidation - $\sqrt{t}$

Rock

UF	Unacceptable Failure

Chemical Analysis

Acid Soluble	Total sulphate in specimen, expressed as SO_3 %, value in brackets expressed as SO_4 %
Water Soluble	Soluble sulphate in 2:1 water : soil extract, expressed as SO_3 g/l, value in brackets expressed as SO_4 g/l
In Water	Sulphate content of groundwater, expressed as SO_3 g/l, value in brackets expressed as SO_4 g/l
pH	pH value
Organic content	Organic content expressed as a percentage of dry weight
Chloride	Chloride Ion content expressed as a percentage of dry weight

MCV, Compaction, CBR

MCV	Moisture Condition Value at natural water content
MCC	Moisture Condition Calibration
CCV	Chalk Crushing Value

Compaction

Type	2.5	= 2.5 kg Rammer
	4.5	= 4.5 kg Rammer
	V	= Vibrating Hammer
γ_b	Bulk Density	
γ_d	Dry Density	

CBR California Bearing Ratio

Type	2.5	= Test on Specimen Recompacted using 2.5 kg Rammer
	4.5	= As above but using 4.5 kg Rammer
	V	= As above but using Vibrating Hammer
	M	= Test on open drive mould specimen cut in field
	S	= Soaked Specimen
Top	CBR at top of mould	
Bottom	CBR at bottom of mould	
ND	None Detected	
*	In the Sample Description denotes a laboratory only description	

LABORATORY RESULTS - Classification and Strength

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					Classification					Strength					
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Symbol	I_p (>425) %	w_L %	w_p %	w (p_d) %	Test	γ_b (γ_d) Mg/m^3	σ_3 kN/m^2	$\sigma_1-\sigma_3$ kN/m^2	c_u kN/m^2	c_{Avg} kN/m^2
BH304	1.80-2.00 (1.80)	D	N77879	Very soft yellowish brown slightly sandy slightly gravelly clayey SILT.		(36%)	39	NP	26.7						
BH304	2.00-2.45 (2.00)	D	N77880	Very soft yellowish brown slightly sandy CLAY.					32.2						
BH304	2.80-3.00 (2.80)	D	N77881	Soft yellowish brown slightly sandy clayey SILT.		(5%)	22	NP	15.5						
BH305C	3.20-3.65 (3.20)	D	N77884	Firm brownish yellow sandy clayey SILT. (See Test Remarks Sheet for further information)		(62%)	26	NP	5.7						
BH305C	4.20-4.65 (4.20)	D	N77886	Firm to stiff brownish yellow slightly sandy CLAY.					27.2						
BH306	2.20-2.65 (2.20)	D	N77890	Firm dark grey slightly sandy SILT.		(22%)	31	NP	35.7						
BH306	3.20-3.65 (3.20)	D	N77892	Firm dark grey slightly sandy SILT.					26.9						
BH306	5.20-5.65 (5.20)	D	N77895	Stiff yellowish brown slightly sandy clayey SILT.		(2%)	32	NP	27.9						
BH306	6.20-6.65 (6.20)	D	N77897	Stiff yellowish brown slightly sandy CLAY.					28.3						
BH306	7.00-7.30 (7.00)	D	N77898	Stiff yellowish brown slightly sandy CLAY.					9.0						
TP01	0.30-0.90 (0.30)	B	N77900	MADE GROUND: Brown gravelly very silty fine to coarse sand.					9.8 (2.62)						
TP01	1.10-1.60 (1.10)	B	N77901	MADE GROUND: Orangish brown gravelly silty fine to coarse sand.					8.3 (2.65)						
TP02	0.30-0.70 (0.30)	B	N77902	MADE GROUND: Orangish brown gravelly silty fine to coarse sand.					11.6 (2.66)						
TP02	1.70-2.30 (1.70)	B	N77903	MADE GROUND: Grey and orange gravelly very clayey fine to coarse sand.					20.4 (2.62)						

Remarks NST - Not suitable for Test
For Standards followed see Laboratory Test Certficate
w% - ^ = Rock water content test; x = Aggregate moisture content test
QUT Water Contents: <Failure Zone>, [After test]

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LABORATORY RESULTS - Classification and Strength

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					Classification					Strength					
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Symbol	I_p (>425) %	w_L %	w_p %	w (p_d) %	Test	γ_b (γ_d) Mg/m^3	σ_3 kN/m^2	$\sigma_1-\sigma_3$ kN/m^2	c_u kN/m^2	c_{Avg} kN/m^2
WS311	1.80-2.00 (1.80)	D	N78449	MADE GROUND: Soft yellowish orange mottled black slightly sandy slightly gravelly clay.	CL	15 (29%)	30	15	27.9						
WS311	3.80-4.00 (3.80)	D	N78450	MADE GROUND: Firm yellowish orange mottled black slightly sandy slightly gravelly clayey silt.		(19%)	39	NP	22.5						
WS312	1.20-1.65 (1.20)	D	N77904	Stiff greyish orange sandy CLAY. (See Test Remarks Sheet for further information)		NST (56%)			7.9						
WS312	2.00-2.45 (2.00)	D	N77906	Firm greyish orange sandy CLAY.					9.2						
WS314	1.20-1.65 (1.20)	D	N77907	Soft reddish brown slightly gravelly CLAY.					15.0						
WS314	2.00-2.20 (2.00)	D	N77908	Firm reddish brown CLAY.	CL	16 (0%)	31	15	18.6						
WS314A	1.20-1.65 (1.20)	D	N77909	Soft to firm reddish brown slightly gravelly CLAY.					15.8						
WS314A	2.00-2.45 (2.00)	D	N77910	Firm reddish brown slightly gravelly CLAY.	CI	20 (4%)	40	20	19.2						
WS315	1.20-1.65 (1.20)	D	N77911	Firm yellowish brown sandy SILT.		(29%)	18	NP	11.8						
WS315	2.00-2.45 (2.00)	D	N77912	Stiff yellowish brown sandy SILT.					6.9						
WS316	3.00-3.45 (3.00)	D	N77913	Firm grey slightly sandy slightly gravelly SILT.					10.8						
WS316	3.50-4.00 (3.50)	D	N77914	Firm grey slightly sandy slightly gravelly silty CLAY.	CL	10 (10%)	26	16	15.9						
WS316	5.00-5.45 (5.00)	D	N77915	Stiff grey slightly sandy slightly gravelly SILT.					15.8						

Remarks NST - Not suitable for Test
For Standards followed see Laboratory Test Certficate
w% - ^ = Rock water content test; x = Aggregate moisture content test
QUT Water Contents: <Failure Zone>, [After test]

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LABORATORY RESULTS - Atterberg Limit

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					Results							
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Test Type	Point Data		Sym-bol	Ip %	>425 sieve µm	w_L %	w_p %
						Cone Pene.	Water % (Factor)					
BH304	1.80-2.00 (1.80)	D	N77879	Very soft yellowish brown slightly sandy slightly gravelly clayey SILT.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					36%	39	NP
BH304	2.80-3.00 (2.80)	D	N77881	Soft yellowish brown slightly sandy clayey SILT.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					5%	22	NP
BH305C	3.20-3.65 (3.20)	D	N77884	Firm brownish yellow sandy clayey SILT. Test Remark: 1-point cone	Fall Cone 1pt with increasing water content, cone type: 80g/30, washed over 425um sieve	20.3 19.9	24.16 24.10 (1.057)			62%	26	NP
BH306	2.20-2.65 (2.20)	D	N77890	Firm dark grey slightly sandy SILT.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					22%	31	NP
BH306	5.20-5.65 (5.20)	D	N77895	Stiff yellowish brown slightly sandy clayey SILT.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					2%	32	NP
WS311	1.80-2.00 (1.80)	D	N78449	MADE GROUND: Soft yellowish orange mottled black slightly sandy slightly gravelly clay.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	15	29%	30	15
WS311	3.80-4.00 (3.80)	D	N78450	MADE GROUND: Firm yellowish orange mottled black slightly sandy slightly gravelly clayey silt.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					19%	39	NP
WS312	1.20-1.65 (1.20)	D	N77904	Stiff greyish orange sandy CLAY. Test Remark: Not suitable for testing due to sample type.	Not suitable for Test							
WS314	2.00-2.20 (2.00)	D	N77908	Firm reddish brown CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	16	0%	31	15

Remarks

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LABORATORY RESULTS - Atterberg Limit

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					Results							
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Test Type	Point Data: Cone Pene.	Point Data: Water % (Factor)	Sym-bol	Ip %	>425 sieve µm	w_L %	w_p %
WS314A	2.00-2.45 (2.00)	D	N77910	Firm reddish brown slightly gravelly CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CI	20	4%	40	20
WS315	1.20-1.65 (1.20)	D	N77911	Firm yellowish brown sandy SILT.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					29%	18	NP
WS316	3.50-4.00 (3.50)	D	N77914	Firm grey slightly sandy slightly gravelly silty CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	10	10%	26	16

Remarks

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LABORATORY RESULTS - Chemical Analysis

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					Sulphate			pH	Organic Content %	Loss on Ignition %	Chloride		
					In Soil						In Soil		
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Acid Soluble %	Water Soluble g/l	In Water g/l				Acid Soluble %	Water Soluble g/l	In Water g/l
BH304	1.80-2.00 (1.80-2.00)	D	N77879	Very soft yellowish brown slightly sandy slightly gravelly clayey SILT.		0.119 (0.14)		7.05					
BH304	2.00-2.45 (2.00-2.45)	D	N77880	Very soft yellowish brown slightly sandy CLAY.		0.082 (0.10)		7.32					
BH304	3.00-3.45 (3.00-3.45)	D	N77882	Soft yellowish brown slightly sandy CLAY.		0.044 (0.05)		7.32					
BH304	4.00-4.45 (4.00-4.45)	D	N77883	Reddish brown sandy fine to coarse GRAVEL.		0.035 (0.04)		7.37					
BH305C	3.50 (3.50)	D	N77885	Firm brownish yellow slightly sandy CLAY.		0.082 (0.10)		7.71					
BH305C	4.50 (4.50)	D	N77887	Stiff brownish yellow slightly sandy CLAY.		0.022 (0.03)		7.10					
BH305C	6.20-6.65 (6.20-6.65)	D	N77889	Brownish yellow slightly gravelly slightly silty fine to coarse SAND.		0.045 (0.05)		7.02					
BH306	3.00-3.20 (3.00-3.20)	D	N77891	Firm dark grey slightly sandy SILT.		0.414 (0.50)		4.67					
BH306	4.00-4.20 (4.00-4.20)	D	N77894	Firm dark grey slightly sandy SILT.		0.053 (0.06)		7.45					
BH306	6.00-6.20 (6.00-6.20)	D	N77896	Stiff yellowish brown slightly sandy CLAY.		0.030 (0.04)		7.90					
BH306	8.50-8.71 (8.50-8.71)	D	N77899	Reddish brown SAND and GRAVEL (Sandstone).		0.023 (0.03)		7.30					

Remarks For Standards followed please see Laboratory Test Certificate
Sulphate reported as SO3, results in brackets reported as SO4

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LABORATORY RESULTS - Chemical Analysis

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					Sulphate			pH	Organic Content	Loss on Ignition	Chloride		
					In Soil						In Soil		
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Acid Soluble %	Water Soluble g/l	In Water g/l		%	%	Acid Soluble %	Water Soluble g/l	In Water g/l
TP01	0.30-0.90 (0.30-0.90)	B	N77900	MADE GROUND: Brown gravelly very silty fine to coarse sand.		0.038 (0.05)		4.98					
WS312	1.50-2.00 (1.50-2.00)	D	N77905	Stiff greyish orange sandy CLAY.		0.049 (0.06)		7.67					
WS314	1.20-1.65 (1.20-1.65)	D	N77907	Soft reddish brown slightly gravelly CLAY.		0.029 (0.03)		5.58					
WS316	3.50-4.00 (3.50-4.00)	D	N77914	Firm grey slightly sandy slightly gravelly silty CLAY.		0.046 (0.06)		6.31					

Remarks For Standards followed please see Laboratory Test Certificate
Sulphate reported as SO3, results in brackets reported as SO4

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LABORATORY RESULTS - MCV, Compaction, CBR

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					MCV		Compaction					CBR				
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	MCV	w %	Type	w (Opt) %	ρ_d Mg/m^3	γ_b Mg/m^3	γ_d (Max) Mg/m^3	Type	Top CBR %	Top w %	Bottom CBR %	Bottom w %
TP01	0.30-0.90 (0.30-0.90)	B	N77900	MADE GROUND: Brown gravelly very silty fine to coarse sand.			2.5kg	(7.8) 11.1* 2.3 4.7 6.9 15.2	2.62 m	*2.06 1.84 1.92 2.00 2.03	(1.88) *1.86 1.80 1.83 1.87 1.76					
TP01	1.10-1.60 (1.10-1.60)	B	N77901	MADE GROUND: Orangish brown gravelly silty fine to coarse sand.			2.5kg	(9.5) 3.8 6.0 8.0* 13.0 15.1 17.9	2.65 m	1.86 1.97 *2.10 2.17 2.08 1.96	(1.97) 1.80 1.86 *1.95 1.92 1.81 1.67					
TP02	0.30-0.70 (0.30-0.70)	B	N77902	MADE GROUND: Orangish brown gravelly silty fine to coarse sand.			2.5kg	(10.0) 12.8* 4.5 6.6 10.6 16.6	2.66 m	*2.12 1.91 1.98 2.13 1.98	(1.93) *1.88 1.83 1.86 1.92 1.70					
TP02	1.70-2.30 (1.70-2.30)	B	N77903	MADE GROUND: Grey and orange gravelly very clayey fine to coarse sand.			2.5kg	(12.0) 19.5* 9.6 15.4 3.3 11.0	2.62 m	*2.02 2.01 2.07 1.78 2.05	(1.86) *1.69 1.84 1.79 1.72 1.84					

Remarks

Particle Density - a=assumed, m=measured
w% - * = at natural moisture content; x = aggregate moisture content
# = stabilised, see relevant test plot for details
NST = Not suitable for Test
For Standards followed see Laboratory Test Certficate

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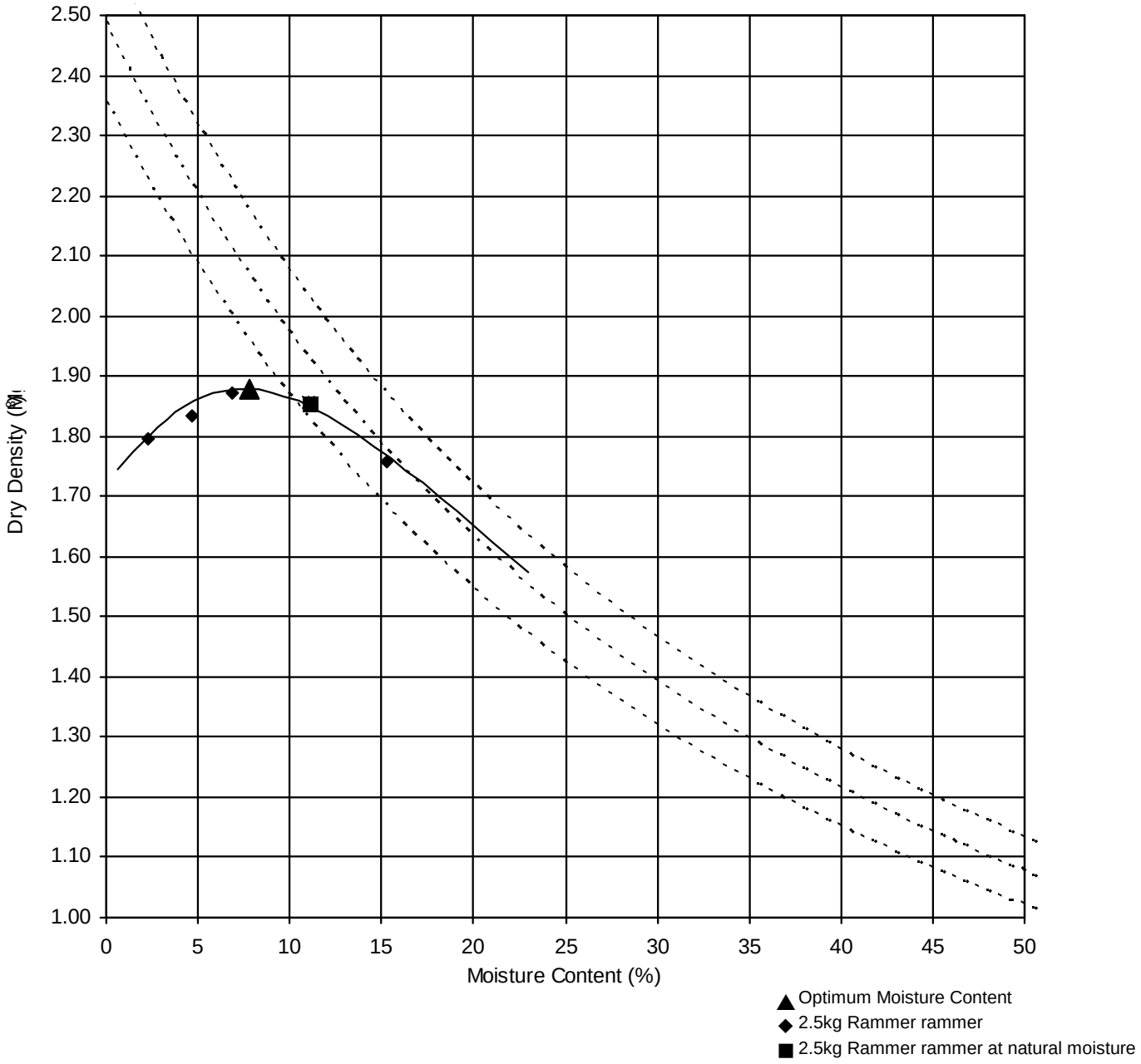
LABORATORY RESULTS - Compaction

Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	TP01
Sample Depth	0.30-0.90m
Sample Type	B
Sample Ref	N77900



Optimum Moisture Content	7.8	
Maximum Dry Density	1.88	Mg/m^3
Particle Density	2.62 (Meas)	Mg/m^3
Preparation	Single Sample 2.5kg Rammer	

Particles retained on	37.5mm	0 %
	20mm sieve	2 %
Description	MADE GROUND: Brown gravelly very silty fine to coarse sand.	

Remarks BS1377 Part 4 1990 : Clause 3.3 and 3.4

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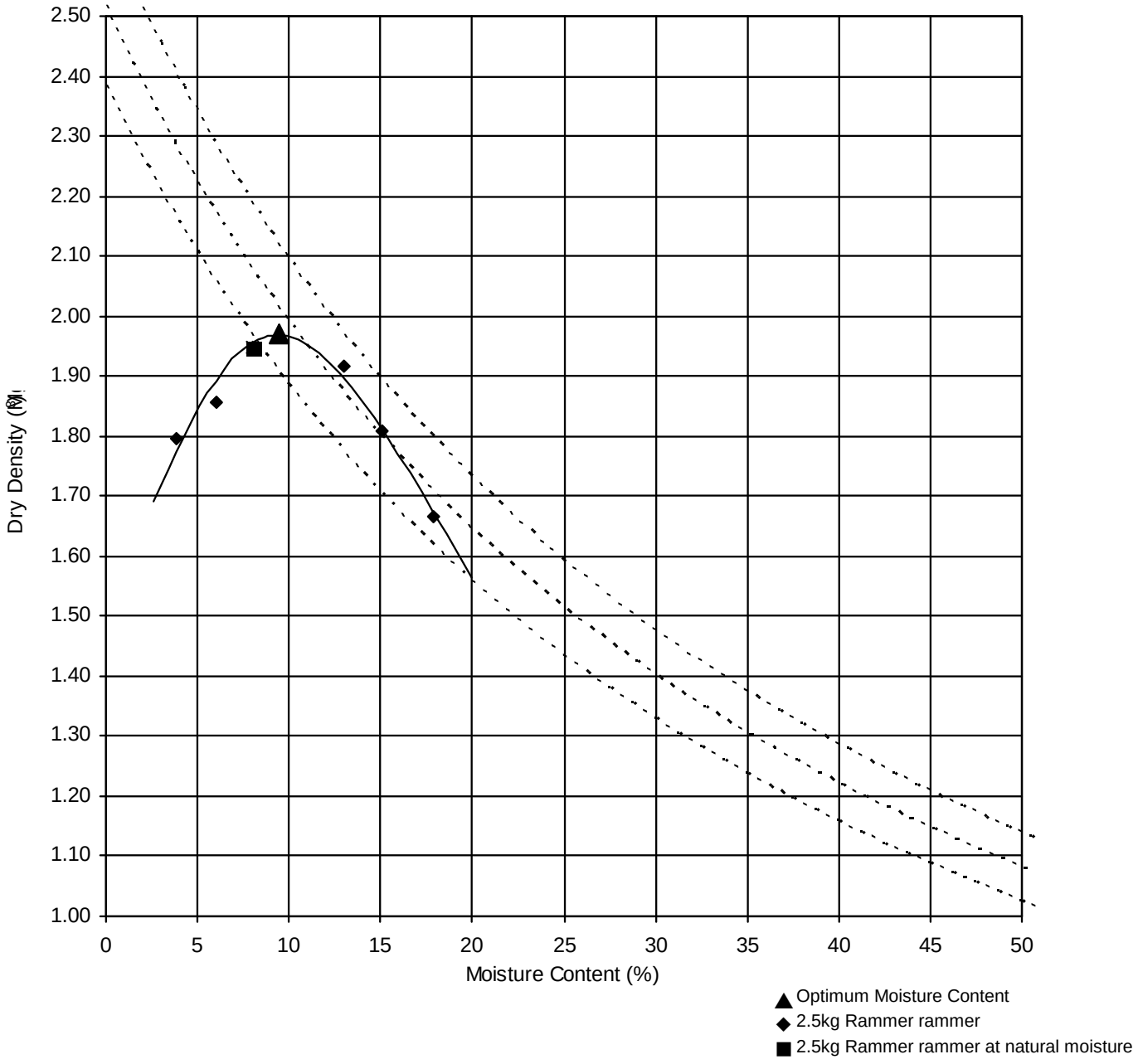
LABORATORY RESULTS - Compaction

Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	TP01
Sample Depth	1.10-1.60m
Sample Type	B
Sample Ref	N77901



Optimum Moisture Content	9.5	
Maximum Dry Density	1.97	Mg/m^3
Particle Density	2.65 (Meas)	Mg/m^3
Preparation	Single Sample 2.5kg Rammer	

Particles retained on	37.5mm	0 %
	20mm sieve	2 %
Description	MADE GROUND: Orangish brown gravelly silty fine to coarse sand.	

Remarks BS1377 Part 4 1990 : Clause 3.3 and 3.4

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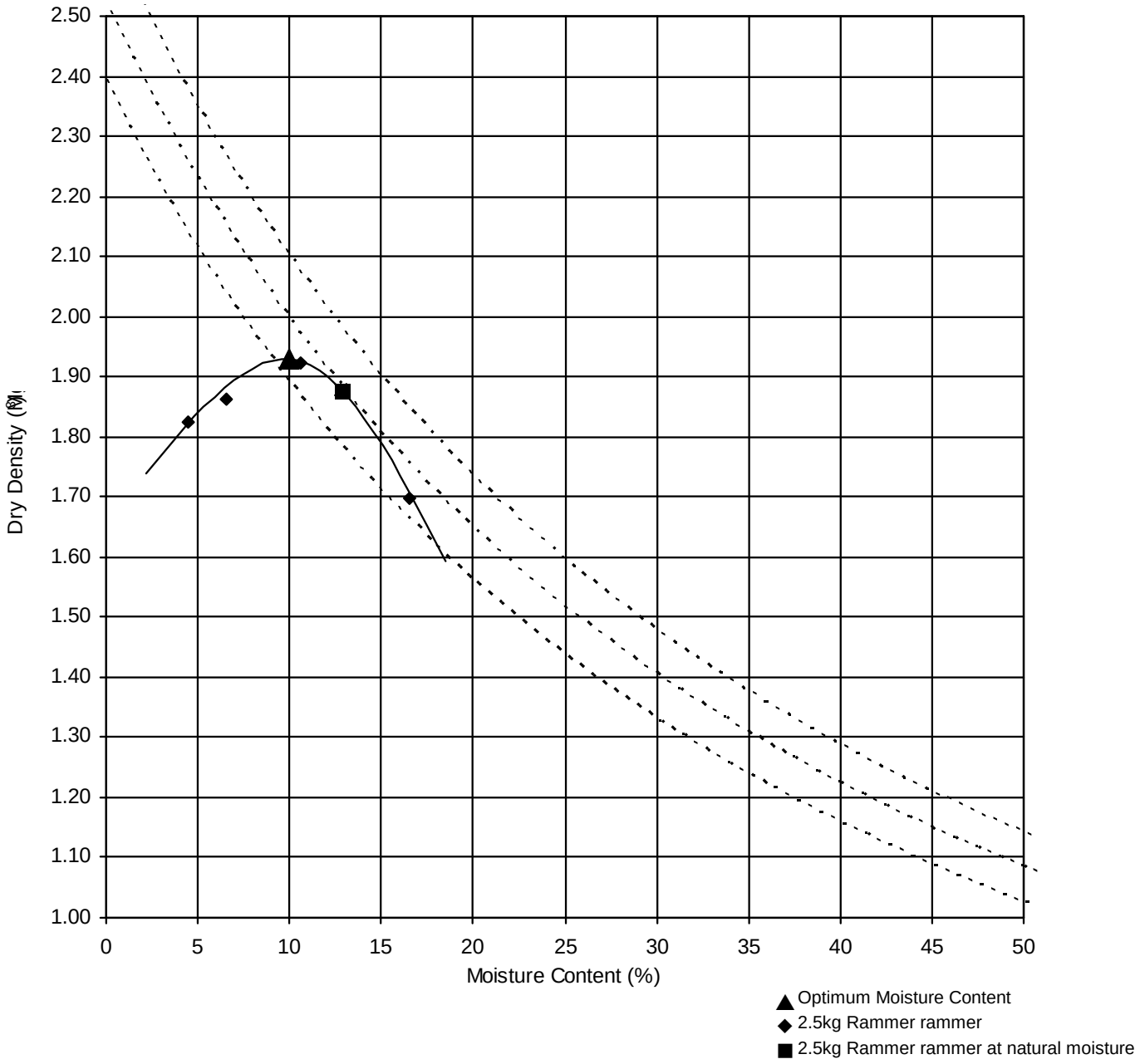
LABORATORY RESULTS - Compaction

Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	TP02
Sample Depth	0.30-0.70m
Sample Type	B
Sample Ref	N77902



Optimum Moisture Content	10.0	
Maximum Dry Density	1.93	Mg/m^3
Particle Density	2.66 (Meas)	Mg/m^3
Preparation	Single Sample 2.5kg Rammer	

Particles retained on	37.5mm	0 %
	20mm sieve	2 %
Description	MADE GROUND: Orangish brown gravelly silty fine to coarse sand.	

Remarks BS1377 Part 4 1990 : Clause 3.3 and 3.4

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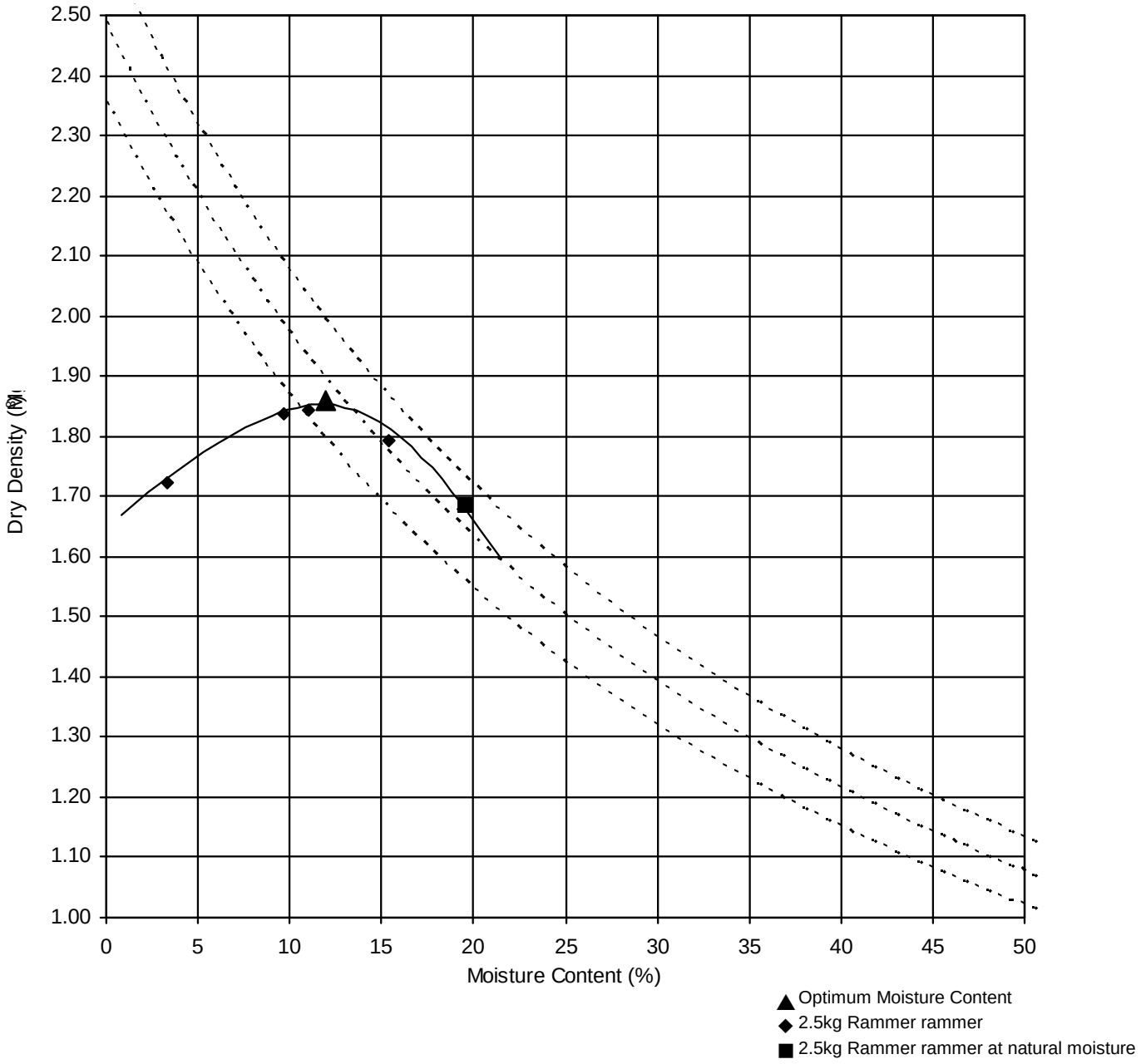
LABORATORY RESULTS - *Compaction*

Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	TP02
Sample Depth	1.70-2.30m
Sample Type	B
Sample Ref	N77903



Optimum Moisture Content	12.0	
Maximum Dry Density	1.86	Mg/m^3
Particle Density	2.62 (Meas)	Mg/m^3
Preparation	Single Sample 2.5kg Rammer	

Particles retained on	37.5mm	0 %
	20mm sieve	0 %
Description	MADE GROUND: Grey and orange gravelly very clayey fine to coarse sand.	

Remarks BS1377 Part 4 1990 : Clause 3.3 and 3.4

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LABORATORY RESULTS - Particle Size Distribution

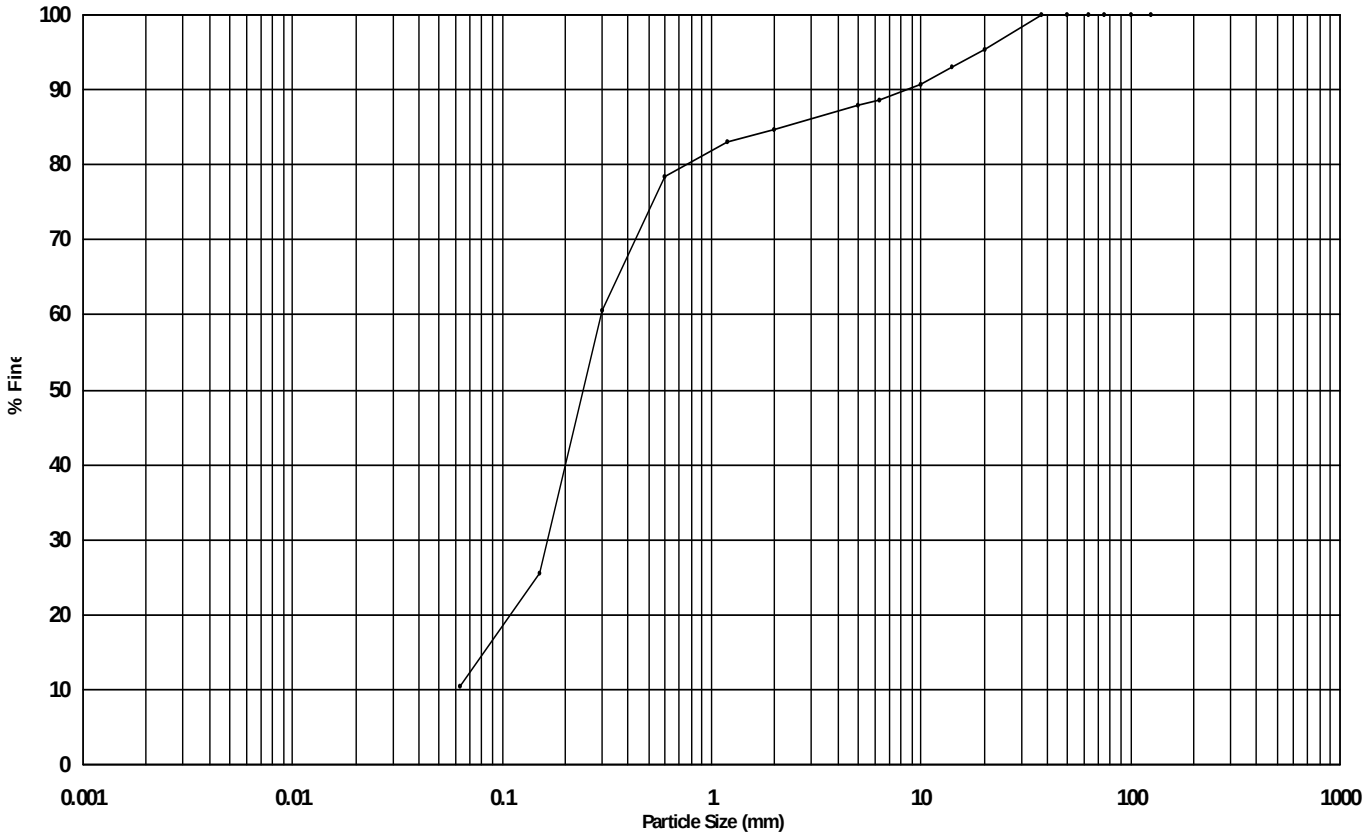
Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	BH305C
Sample Depth	5.40-6.40m
Sample Type	B
Sample Ref	N77888

Sample Description

Brownish yellow gravelly silty fine to coarse SAND.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	11
SAND	74
GRAVEL	15
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	95
14 mm	93
10 mm	91
6.3 mm	89
5 mm	88
2 mm	85
1.18 mm	83
600 µm	78
300 µm	60
150 µm	25

Size	% Finer
63 µm	11

Uniformity Coefficient
Not Available
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

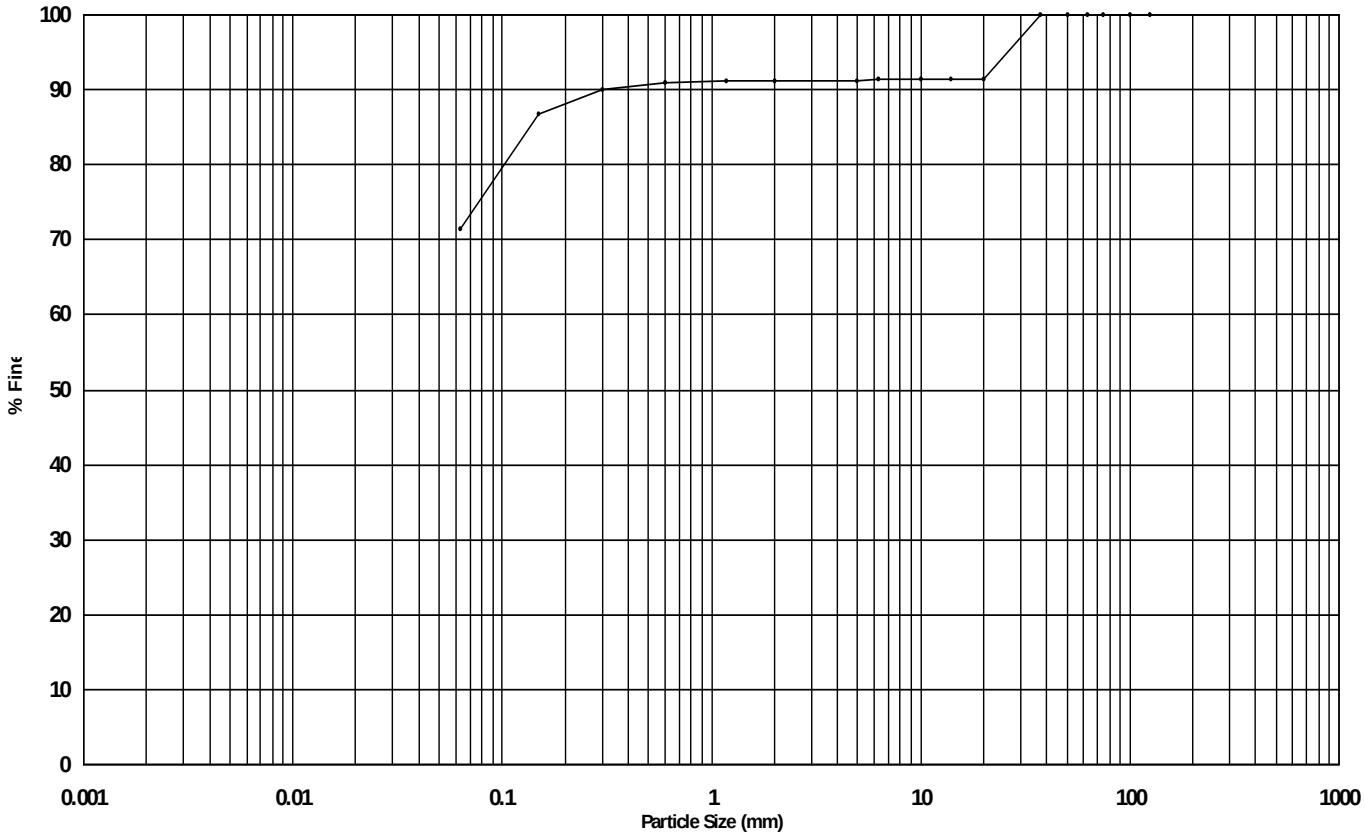
Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	BH306
Sample Depth	4.00-4.80m
Sample Type	B
Sample Ref	N77893

Sample Description

Firm dark grey slightly sandy slightly gravelly SILT.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	72
SAND	19
GRAVEL	9
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	91
14 mm	91
10 mm	91
6.3 mm	91
5 mm	91
2 mm	91
1.18 mm	91
600 µm	91
300 µm	90
150 µm	87

Size	% Finer
63 µm	72

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - *Particle Size Distribution*

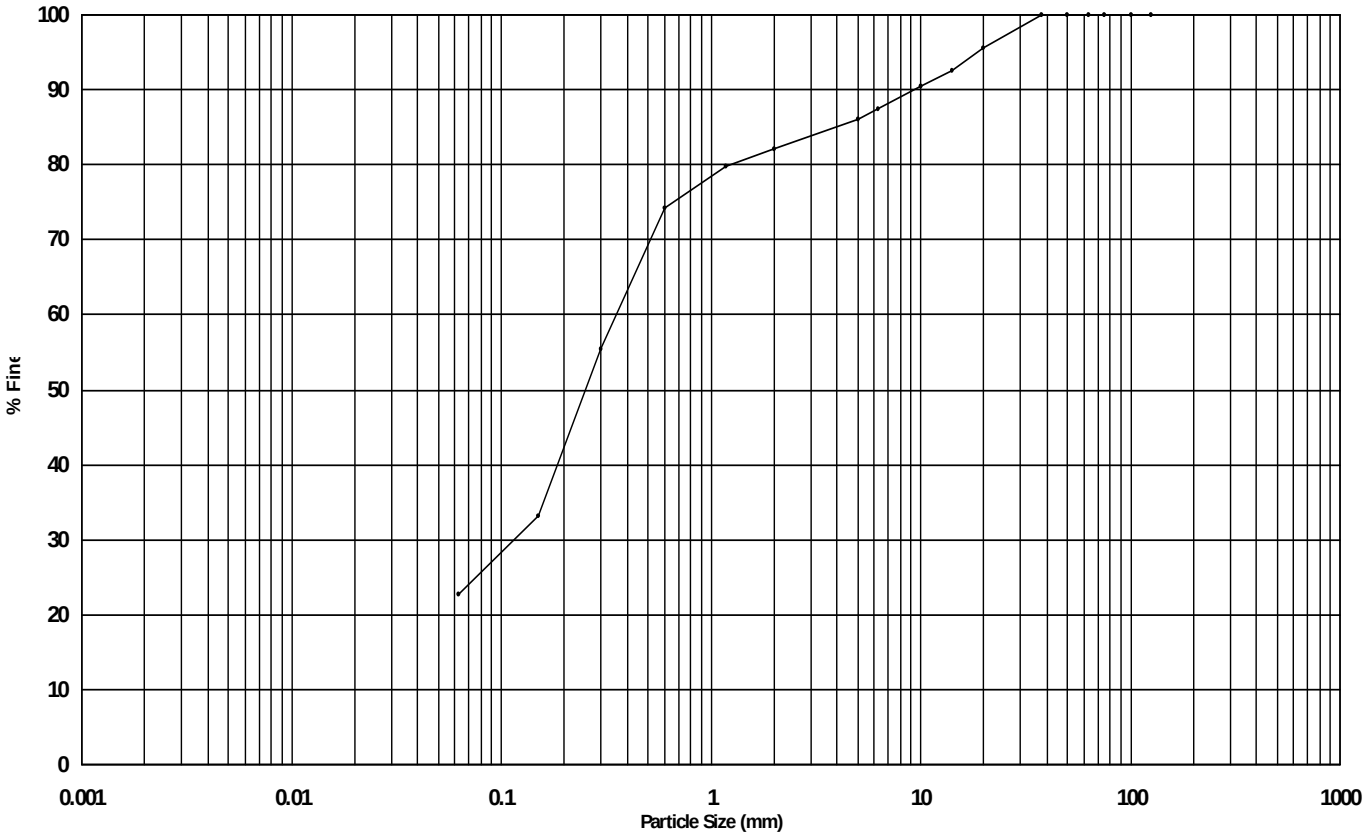
Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole TP01
Sample Depth 0.30-0.90m
Sample Type B
Sample Ref N77900

Sample Description

MADE GROUND: Brown gravelly very silty fine to coarse sand.



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	23
SAND	59
GRAVEL	18
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	96
14 mm	93
10 mm	90
6.3 mm	87
5 mm	86
2 mm	82
1.18 mm	80
600 µm	74
300 µm	55
150 µm	33

Size	% Finer
63 µm	23

Uniformity Coefficient
Not Available
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - *Particle Size Distribution*

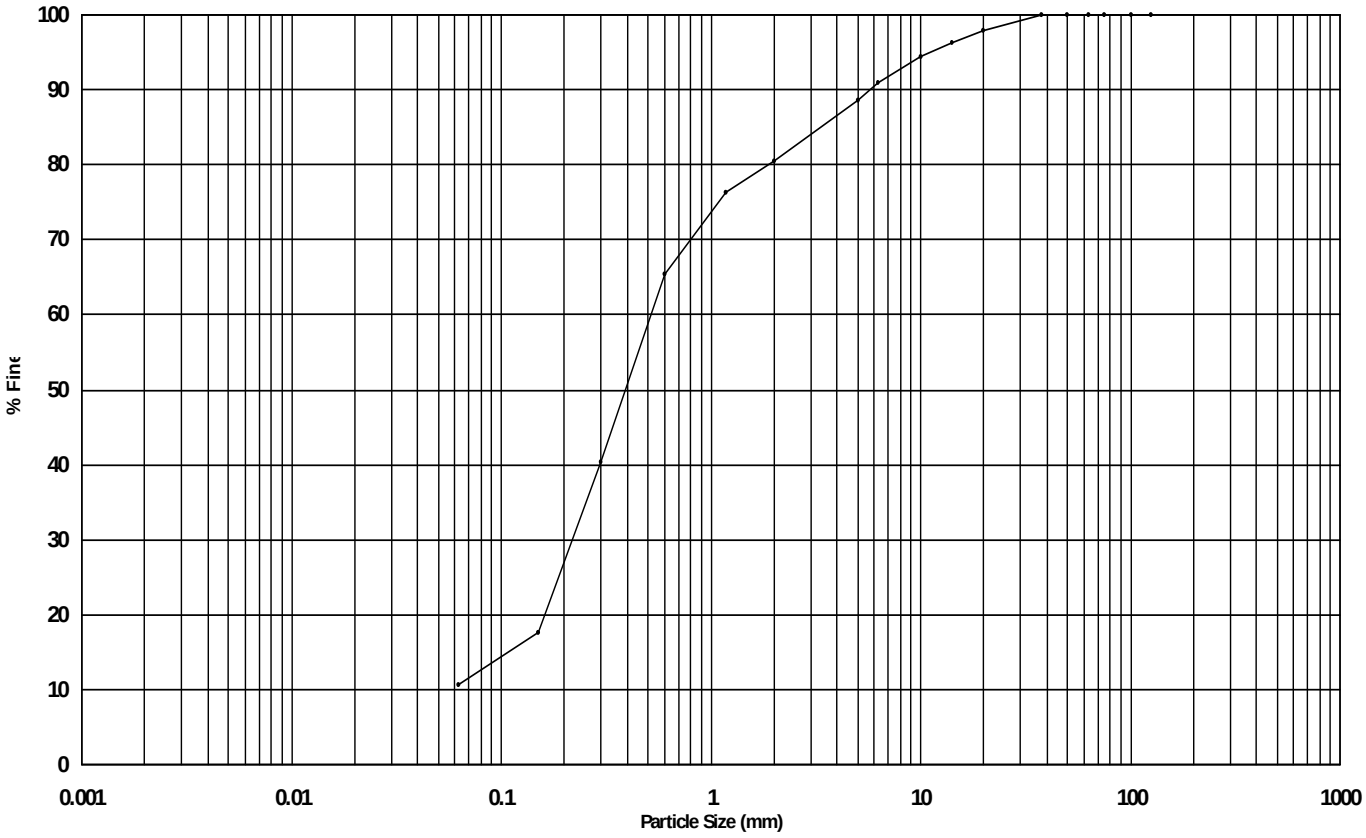
Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	TP01
Sample Depth	1.10-1.60m
Sample Type	B
Sample Ref	N77901

Sample Description

MADE GROUND: Orangish brown gravelly silty fine to coarse sand.



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	11
SAND	70
GRAVEL	19
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	98
14 mm	96
10 mm	94
6.3 mm	91
5 mm	89
2 mm	81
1.18 mm	76
600 µm	65
300 µm	40
150 µm	18

Size	% Finer
63 µm	11

Uniformity Coefficient
Not Available
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - *Particle Size Distribution*

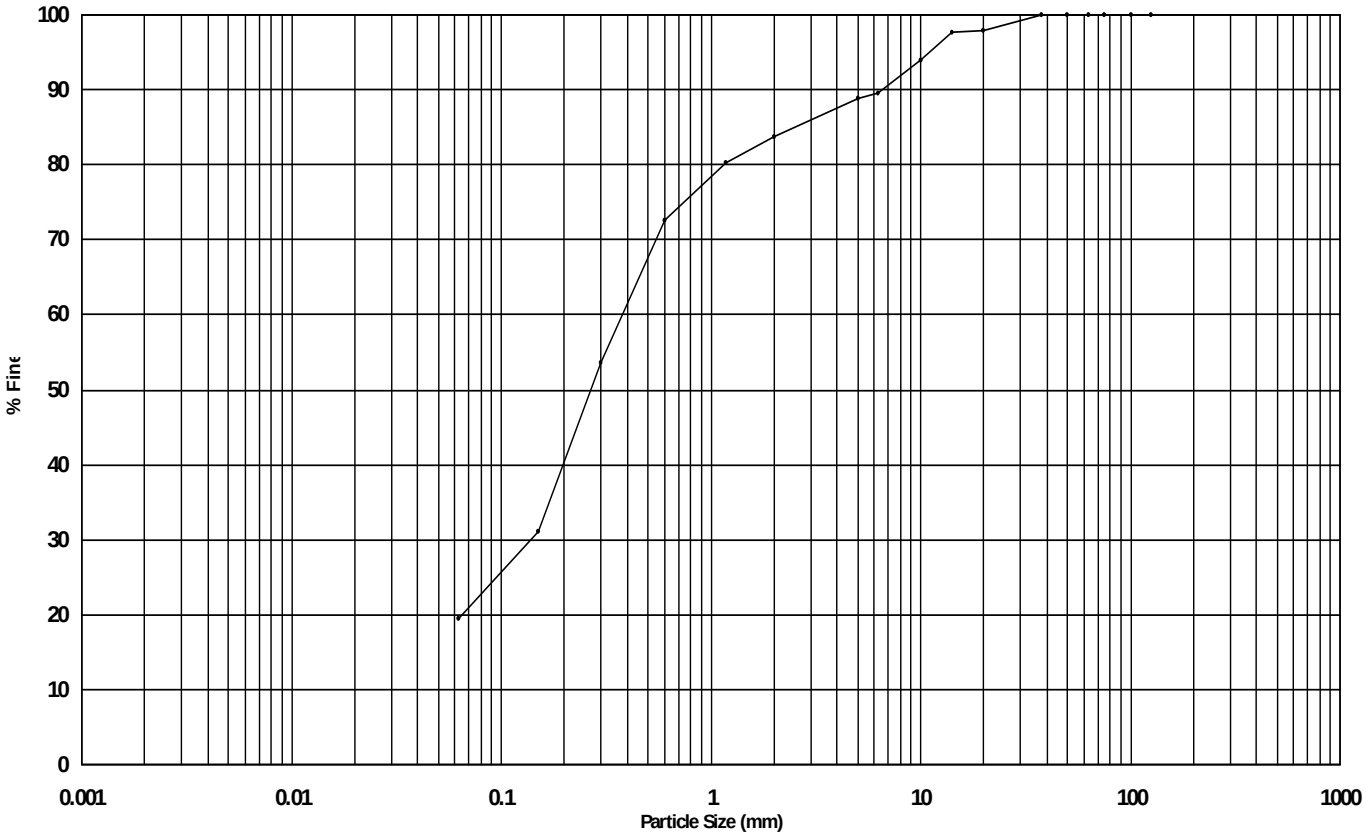
Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole TP02
Sample Depth 0.30-0.70m
Sample Type B
Sample Ref N77902

Sample Description

MADE GROUND: Orangish brown gravelly silty fine to coarse sand.



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	20
SAND	64
GRAVEL	16
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	98
14 mm	98
10 mm	94
6.3 mm	90
5 mm	89
2 mm	84
1.18 mm	80
600 µm	73
300 µm	54
150 µm	31

Size	% Finer
63 µm	20

Uniformity Coefficient
Not Available
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - *Particle Size Distribution*

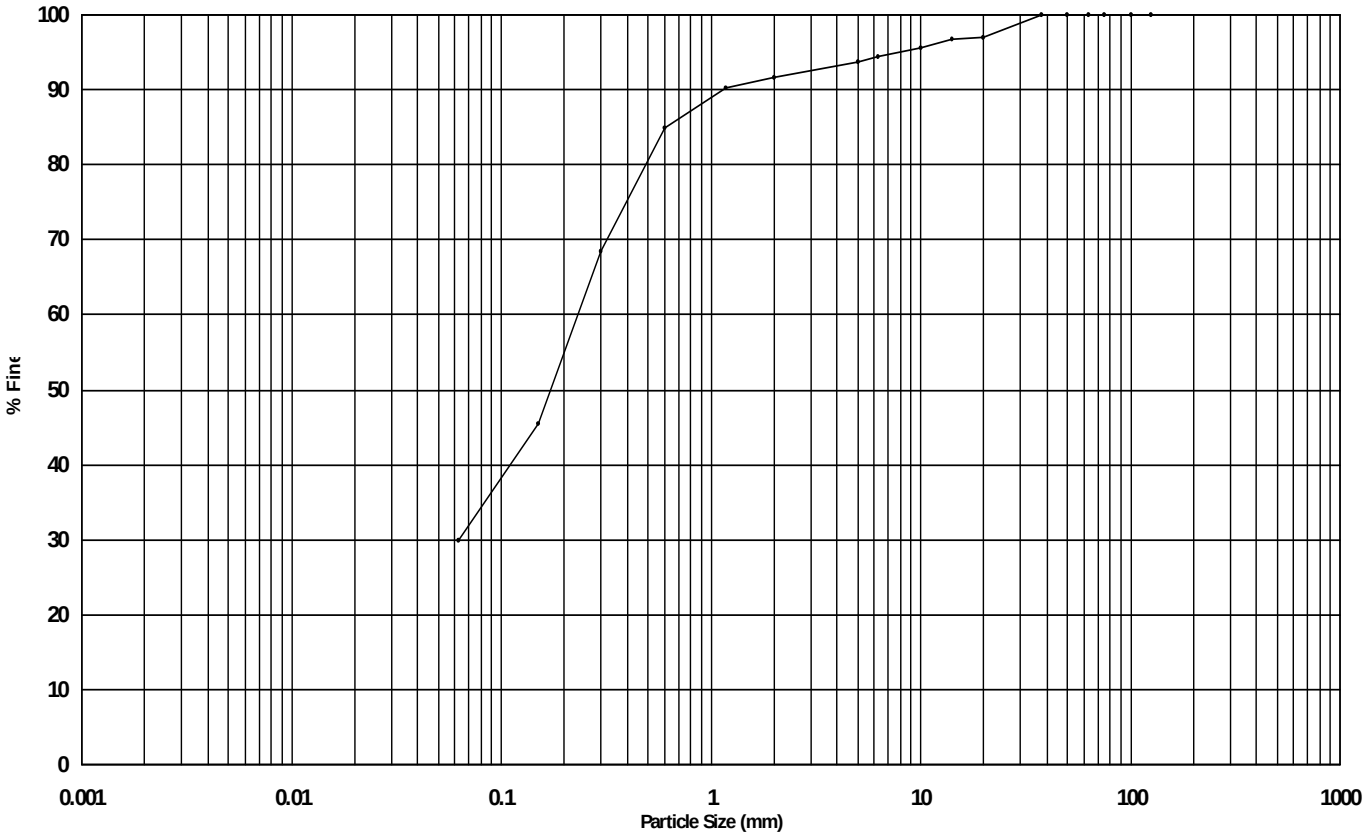
Project: EXCHANGE SQUARE GROUND INVESTIGATION

Project No: PN194054

Hole	TP02
Sample Depth	1.70-2.30m
Sample Type	B
Sample Ref	N77903

Sample Description

MADE GROUND: Grey and orange gravelly very clayey fine to coarse sand.



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	30
SAND	62
GRAVEL	8
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	97
14 mm	97
10 mm	96
6.3 mm	95
5 mm	94
2 mm	92
1.18 mm	90
600 µm	85
300 µm	68
150 µm	45

Size	% Finer
63 µm	30

Uniformity Coefficient
Not Available
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Point Load Strength Determination

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					w	W	D	Fail Load	Test Type/ Direction	De	De^2	Is	F	Is_{50}
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	%	mm	mm	kN		mm	mm^2	MN/m^2		MN/m^2
BH303	1.56-1.64 (1.56-1.64)	C	N78040	Extremely weak reddish brown fine to coarse grained SANDSTONE.	10.0	90	79	0.24	A/PD	95.15	9053	0.027	1.336	0.035
BH303	2.05-2.17 (2.05-2.17)	C	N78041	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	10.7	100 101 101	101 71 45	0.12 0.54 0.36	D/PL A/PD A/PD	101.00 95.55 76.07	10201 9130 5787	0.011 0.059 0.062	1.372 1.338 1.208	0.016 0.079 0.075
BH303	2.60-2.67 (2.60-2.67)	C	N78042	Very weak reddish brown fine to coarse grained SANDSTONE.	10.3	98	69	0.38	A/PD	92.79	8610	0.044	1.321	0.058
BH303	3.70-3.82 (3.70-3.82)	C	N78043	Very weak reddish brown fine to coarse grained SANDSTONE.	9.6	101 101 101	101 70 51	0.60 0.74 0.52	D/PL A/PD A/PD	101.00 94.88 80.98	10201 9002 6558	0.059 0.082 0.079	1.372 1.334 1.242	0.081 0.109 0.098
BH303	4.56-4.70 (4.56-4.70)	C	N78044	Very weak reddish brown fine to coarse grained SANDSTONE.	7.5	101 101 101	101 76 75	0.97 1.30 0.89	D/PL A/PD A/PD	101.00 98.86 98.21	10201 9773 9645	0.095 0.133 0.092	1.372 1.359 1.355	0.130 0.180 0.125
BH303	5.45-5.57 (5.45-5.57)	C	N78045	Very weak reddish brown fine to coarse grained SANDSTONE.	11.2	100 101 101	101 62 59	0.43 0.54 0.52	D/PL A/PD A/PD	101.00 89.29 87.10	10201 7973 7587	0.042 0.068 0.069	1.372 1.298 1.284	0.058 0.088 0.088
BH303	6.44-6.55 (6.44-6.55)	C	N78046	Extremely weak reddish brown fine to coarse grained SANDSTONE.	9.2	95 95	60 55	0.18 0.14	A/PD A/PD	85.19 81.56	7257 6653	0.025 0.021	1.271 1.246	0.032 0.027
BH303	7.27-7.55 (7.27-7.55)	C	N78047	Very weak reddish brown fine to coarse grained SANDSTONE.	10.3	100 101 101 101	101 101 88 81	0.41 0.40 0.64 0.45	D/PL D/PL A/PD A/PD	101.00 101.00 106.38 102.06	10201 10201 11317 10416	0.041 0.039 0.056 0.043	1.372 1.372 1.405 1.379	0.056 0.054 0.079 0.060
BH303	8.10-8.13 (8.10-8.13)	C	N78048	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.8	96	39	0.13	A/PD	69.04	4767	0.027	1.156	0.032
BH303	8.45-8.50 (8.45-8.50)	C	N78049	Extremely weak reddish brown fine to coarse grained SANDSTONE.	6.1	85 55	57 41	0.08 0.04	I/R I/R	78.54 53.58	6169 2871	0.013 0.015	1.225 1.032	0.016 0.015
BH303	9.60-9.70 (9.60-9.70)	C	N78050	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.1	100 99 99	99 56 54	0.01 0.07 0.10	D/PL A/PD A/PD	99.00 84.02 82.50	9801 7059 6807	0.001 0.010 0.015	1.360 1.263 1.253	0.002 0.013 0.019

Remarks

Test Type D - Diametral, A - Axial, I - Lump or Irregular Test
Direction PL - parallel to planes of weakness, R - Random or unknown orientation, PD - perpendicular to planes of weakness
Fail Load UF - unacceptable failure
For Standards followed see Laboratory Test Certificate

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LABORATORY RESULTS - Point Load Strength Determination

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					w	W	D	Fail Load	Test Type/ Direction	De	De^2	Is	F	Is_{50}
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	%	mm	mm	kN		mm	mm^2	MN/m^2		MN/m^2
BH303	10.50-10.62 (10.50-10.62)	C	N78051	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.0	100 101 101	107 69 59	0.05 0.08 0.06	D/PL A/PD A/PD	107.00 94.20 87.10	11449 8873 7587	0.005 0.009 0.008	1.408 1.330 1.284	0.007 0.012 0.011
BH303	11.50-11.59 (11.50-11.59)	C	N78052	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.4	100	89	0.24	A/PD	106.45	11332	0.021	1.405	0.030
BH303	12.43-12.51 (12.43-12.51)	C	N78053	Extremely weak reddish brown fine to coarse grained SANDSTONE.	13.9	100	68	0.15	A/PD	93.05	8658	0.018	1.323	0.023
BH303	13.34-13.45 (13.34-13.45)	C	N78054	Extremely weak reddish brown fine to coarse grained SANDSTONE.	11.8	98	78	0.19	A/PD	98.65	9733	0.019	1.358	0.026
BH303	14.40-14.54 (14.40-14.54)	C	N78055	Very weak reddish brown fine to coarse grained SANDSTONE.	13.3	100 99	99 77	0.59 0.59	D/PL A/PD	99.00 98.52	9801 9706	0.061 0.061	1.360 1.357	0.082 0.083
BH304	7.75-7.85 (7.75-7.85)	C	N78056	Very weak reddish brown fine to coarse grained SANDSTONE.	10.8	100	57	0.34	A/PD	85.19	7257	0.047	1.271	0.060
BH304	8.61-8.70 (8.61-8.70)	C	N78057	Extremely weak reddish brown fine to coarse grained SANDSTONE.	10.6	100	79	0.00	A/PD	100.29	10059	0.000	1.368	0.000
BH304	9.14-9.20 (9.14-9.20)	C	N78058	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.0	100	59	0.07	A/PD	86.67	7512	0.009	1.281	0.012
BH304	10.80-10.93 (10.80-10.93)	C	N78059	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.7	100	78	0.12	A/PD	99.66	9931	0.012	1.364	0.016
BH304	11.84-11.90 (11.84-11.90)	C	N78060	Very weak reddish brown fine to coarse grained SANDSTONE.	11.8	100	79	0.59	A/PD	100.29	10059	0.058	1.368	0.080
BH304	12.26-12.36 (12.26-12.36)	C	N78061	Very weak reddish brown fine to coarse grained SANDSTONE.	11.9	100	83	0.79	A/PD	102.80	10568	0.075	1.383	0.103

Remarks

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LABORATORY RESULTS - Point Load Strength Determination

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					w	W	D	Fail Load	Test Type/ Direction	De	De^2	Is	F	Is_{50}
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	%	mm	mm	kN		mm	mm^2	MN/m^2		MN/m^2
BH304	13.64-13.70 (13.64-13.70)	C	N78062	Very weak reddish brown fine to coarse grained SANDSTONE.	10.5	100	64	0.41	A/PD	90.27	8149	0.051	1.305	0.066
BH304	14.88-15.06 (14.88-15.06)	C	N78063	Very weak reddish brown fine to coarse grained SANDSTONE.	11.9	100	100	0.51	D/PL	100.00	10000	0.051	1.366	0.069
						100	88	0.79	A/PD	105.85	11205	0.071	1.401	0.099
						100	57	0.49	A/PD	85.19	7257	0.068	1.271	0.086
BH304	15.62-15.78 (15.62-15.78)	C	N78064	Very weak reddish brown fine to coarse grained SANDSTONE.	15.9	95	93	0.26	D/PL	93.00	8649	0.030	1.322	0.040
						93	79	0.52	A/PD	96.72	9354	0.056	1.346	0.075
BH304	16.63-16.70 (16.63-16.70)	C	N78065	Extremely weak reddish brown fine to coarse grained SANDSTONE.	14.8	100	68	0.24	A/PD	93.05	8658	0.028	1.323	0.037
BH304	17.56-17.66 (17.56-17.66)	C	N78066	Very weak reddish brown fine to coarse grained SANDSTONE.	12.9	100	95	0.62	D/PL	95.00	9025	0.069	1.335	0.092
						95	59	0.80	A/PD	84.48	7137	0.112	1.266	0.141
						95	49	0.62	A/PD	76.99	5927	0.105	1.214	0.127
BH304	17.90-18.03 (17.90-18.03)	C	N78067	Very weak reddish brown fine to coarse grained SANDSTONE.	12.4	90	88	0.53	D/PL	88.00	7744	0.068	1.290	0.088
						88	68	0.70	A/PD	87.29	7619	0.092	1.285	0.119
						88	59	0.70	A/PD	81.31	6611	0.106	1.245	0.131
BH305C	8.31-8.40 (8.31-8.40)	C	N78068	Very weak reddish brown fine to coarse grained SANDSTONE.	11.7	100	89	0.71	A/PD	106.45	11332	0.062	1.405	0.088
BH305C	9.24-9.30 (9.24-9.30)	C	N78069	Very weak reddish brown fine to coarse grained SANDSTONE.	10.8	100	60	0.70	A/PD	87.40	7639	0.092	1.286	0.118
BH305C	10.58-10.75 (10.58-10.75)	C	N78070	Very weak reddish brown fine to coarse grained SANDSTONE.	10.4	100	98	0.53	D/PL	98.00	9604	0.055	1.354	0.075
						98	66	0.83	A/PD	90.75	8235	0.101	1.308	0.131
						98	54	0.52	A/PD	82.09	6738	0.077	1.250	0.096
BH305C	11.53-11.63 (11.53-11.63)	C	N78071	Very weak reddish brown fine to coarse grained SANDSTONE.	10.0	100	100	0.38	D/PL	100.00	10000	0.038	1.366	0.051
						100	52	0.40	A/PD	81.37	6621	0.061	1.245	0.076
						100	50	0.29	A/PD	79.79	6366	0.045	1.234	0.055
BH305C	11.73-11.90 (11.73-11.90)	C	N78072	Very weak reddish brown fine to coarse grained SANDSTONE.	10.4	100	100	0.41	D/PL	100.00	10000	0.041	1.366	0.056
						100	85	0.71	A/PD	104.03	10823	0.065	1.391	0.091
						100	68	0.79	A/PD	93.05	8658	0.091	1.323	0.121

Remarks

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Direction PL - parallel to planes of weakness, R - Random or unknown orientation, PD - perpendicular to planes of weakness
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LABORATORY RESULTS - Point Load Strength Determination

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample					w	W	D	Fail Load	Test Type/ Direction	De	De^2	Is	F	Is_{50}
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	%	mm	mm	kN		mm	mm^2	MN/m^2		MN/m^2
BH305C	12.40-12.49 (12.40-12.49)	C	N78073	Very weak reddish brown fine to coarse grained SANDSTONE.	9.9	100	81	0.55	A/PD	101.55	10313	0.053	1.376	0.073
BH305C	13.95-14.05 (13.95-14.05)	C	N78074	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.1	95	89	0.29	A/PD	103.76	10765	0.027	1.389	0.038
BH305C	14.84-14.90 (14.84-14.90)	C	N78075	Very weak reddish brown fine to coarse grained SANDSTONE.	15.6	100	65	0.34	A/PD	90.97	8276	0.041	1.309	0.053
BH305C	15.65-15.80 (15.65-15.80)	C	N78076	Very weak reddish brown fine to coarse grained SANDSTONE.	13.8	100 98 98	98 85 68	1.00 1.12 0.84	D/PL A/PD A/PD	98.00 102.99 92.11	9604 10606 8485	0.104 0.106 0.099	1.354 1.384 1.317	0.140 0.146 0.130
BH305C	16.78-16.90 (16.78-16.90)	C	N78077	Very weak reddish brown fine to coarse grained SANDSTONE.	15.5	100 100 100	100 59 60	0.77 0.78 0.83	D/PL A/PD A/PD	100.00 86.67 87.40	10000 7512 7639	0.077 0.103 0.108	1.366 1.281 1.286	0.105 0.132 0.139
BH305C	17.55-17.67 (17.55-17.67)	C	N78078	Very weak reddish brown fine to coarse grained SANDSTONE.	13.4	95 94 94	94 63 59	0.56 0.84 0.75	D/PL A/PD A/PD	94.00 86.83 84.03	8836 7540 7061	0.063 0.112 0.106	1.329 1.282 1.263	0.084 0.143 0.134
BH305C	18.40-18.56 (18.40-18.56)	C	N78079	Very weak reddish brown fine to coarse grained SANDSTONE.	11.2	100 100 100	100 91 70	1.06 1.67 1.14	D/PL A/PD A/PD	100.00 107.64 94.41	10000 11586 8913	0.106 0.144 0.128	1.366 1.412 1.331	0.145 0.204 0.170
BH305C	19.76-19.90 (19.76-19.90)	C	N78080	Very weak reddish brown fine to coarse grained SANDSTONE.	17.2	100 99	99 91	0.31 0.53	D/PL A/PD	99.00 107.10	9801 11471	0.031 0.046	1.360 1.409	0.043 0.065

Remarks

Test Type D - Diametral, A - Axial, I - Lump or Irregular Test
Direction PL - parallel to planes of weakness, R - Random or unknown orientation, PD - perpendicular to planes of weakness
Fail Load UF - unacceptable failure
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LABORATORY RESULTS - Test Remarks

Project EXCHANGE SQUARE GROUND INVESTIGATION **Project No:** PN194054

Sample				Laboratory Remark
Hole	Depth (Specimen Depth) m	Type	Sample Ref	
BH305C	3.20-3.65 (3.20-3.65)	D	N77884	Atterberg Limit Test - 1-point cone
WS312	1.20-1.65 (1.20-1.65)	D	N77904	Atterberg Limit Test - Not suitable for testing due to sample type.

Remarks

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LABORATORY TEST CERTIFICATE

10 Queenslie Point
Queenslie Industrial Estate
120 Stepps Road
Glasgow
G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org
Website: www.mattest.org

Certificate No : **20/020 - 01**

To : **Thomas Birch**

Client : **Geotechnics Limited**
Unit 1B, Borders Industrial Park
River Lane
Saltney
Chester
CH4 8RJ

Dear Sirs,

LABORATORY TESTING OF ROCK

Introduction

We refer to samples taken from Exchange Square GI and delivered to our laboratory on 08th January 2020.

Material & Source

Sample Reference	:	See Report Plates
Sampled By	:	Client
Sampling Certificate	:	Not Supplied
Location	:	See Report Plates
Description	:	Rock Cores
Date Sampled	:	Not Supplied
Date Tested	:	08th January 2020 Onwards
Source	:	PN194054 - Exchange Square GI

Test Results;

As Detailed On Page 2 to Page 6 inclusive

Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks;

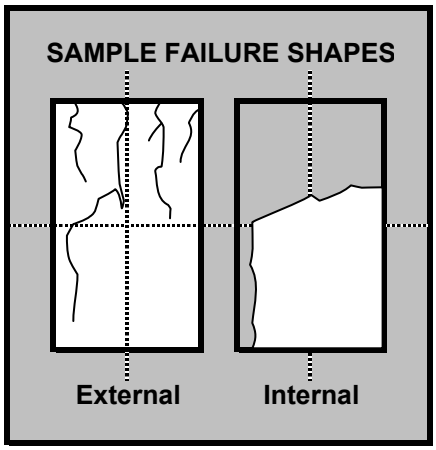
Approved for Issue

Date 03/02/2020

T McLelland (Director)

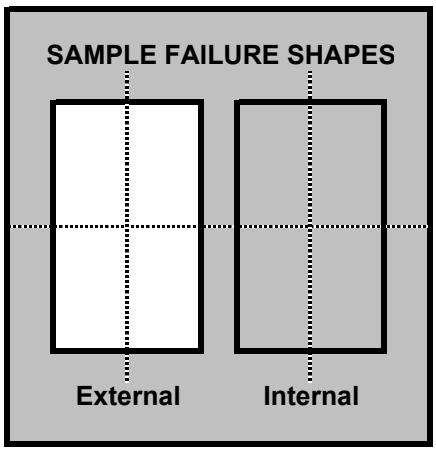
2643

BOREHOLE		**BH303**
SAMPLE		**C**
DEPTH	m	**12.66-12.92**
SAMPLE DIAMETER	mm	**100.49**
SAMPLE HEIGHT	mm	**128.48**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**2.05**
DATE OF TESTING		**31/01/2020**
LOAD FRAME USED		**2000kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**9.2**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**1.2**
WATER CONTENT (ISRM Suggested Methods)	%	**9.4**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.32**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.12**

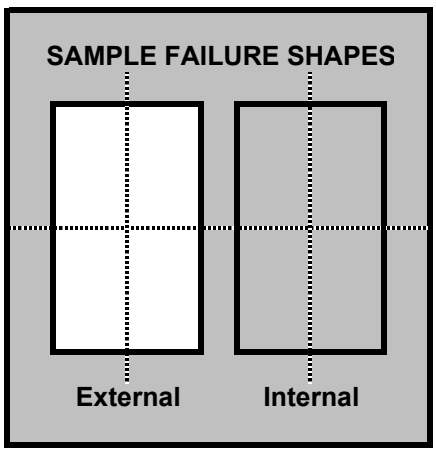


Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



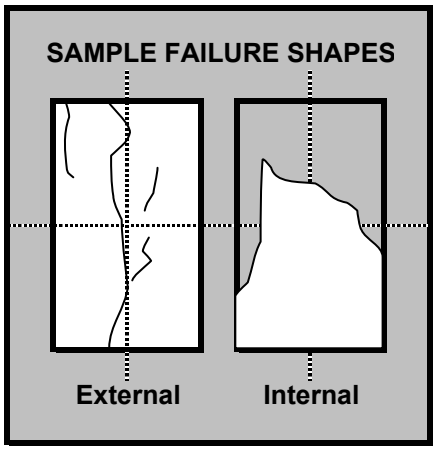
BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



Tested in accordance with ASTM D7012 - 14

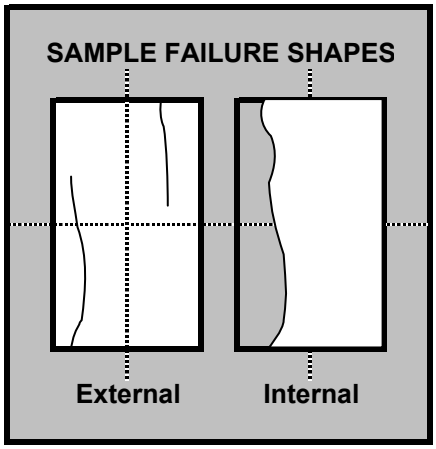
SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

BOREHOLE		**BH305C**
SAMPLE		**C**
DEPTH	m	**8.40-8.62**
SAMPLE DIAMETER	mm	**99.19**
SAMPLE HEIGHT	mm	**171.20**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**7.55**
DATE OF TESTING		**31/01/2020**
LOAD FRAME USED		**2000kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**35.1**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**4.5**
WATER CONTENT (ISRM Suggested Methods)	%	**12.2**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.07**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**1.84**



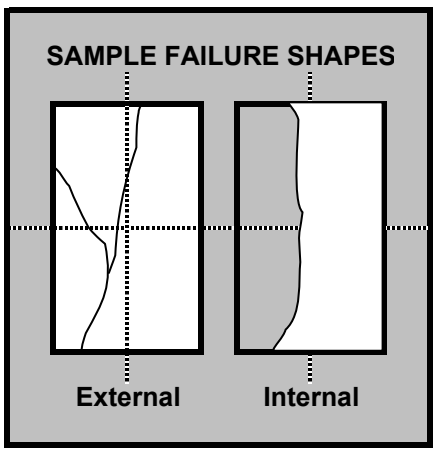
Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		**BH305C**
SAMPLE		**C**
DEPTH	m	**11.90-12.10**
SAMPLE DIAMETER	mm	**99.07**
SAMPLE HEIGHT	mm	**176.89**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**7.34**
DATE OF TESTING		**31/01/2020**
LOAD FRAME USED		**2000kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**29.4**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**3.8**
WATER CONTENT (ISRM Suggested Methods)	%	**10.3**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.06**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**1.87**



Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		**BH305C**
SAMPLE		**C**
DEPTH	m	**14.90-15.12**
SAMPLE DIAMETER	mm	**98.05**
SAMPLE HEIGHT	mm	**188.19**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**6.46**
DATE OF TESTING		**31/01/2020**
LOAD FRAME USED		**2000kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**31.0**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**4.1**
WATER CONTENT (ISRM Suggested Methods)	%	**12.4**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.18**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**1.94**

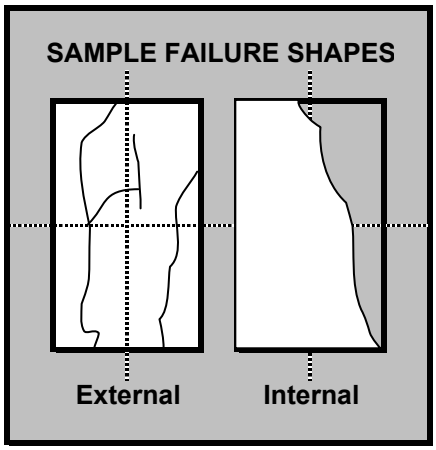


Test specimen does not meet specified length / diameter ratio requirements

Tested in accordance with ASTM D7012 - 14

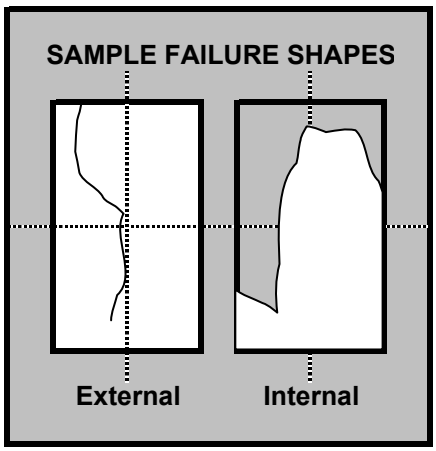
SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

BOREHOLE		**BH305C**
SAMPLE		**C**
DEPTH	m	**17.83-18.03**
SAMPLE DIAMETER	mm	**100.21**
SAMPLE HEIGHT	mm	**157.29**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**9.34**
DATE OF TESTING		**31/01/2020**
LOAD FRAME USED		**2000kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**64.4**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**8.2**
WATER CONTENT (ISRM Suggested Methods)	%	**14.4**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.19**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**1.92**



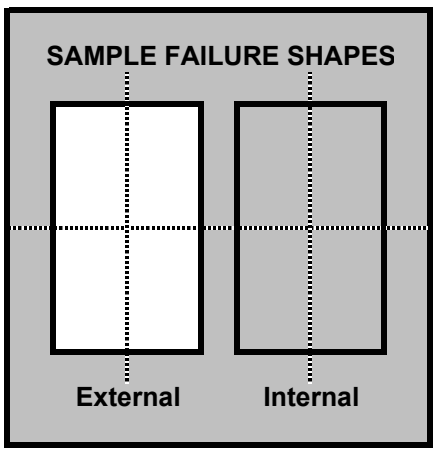
Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		**BH305C**
SAMPLE		**C**
DEPTH	m	**19.16-19.40**
SAMPLE DIAMETER	mm	**100.28**
SAMPLE HEIGHT	mm	**169.60**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**7.50**
DATE OF TESTING		**31/01/2020**
LOAD FRAME USED		**2000kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**33.2**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**4.2**
WATER CONTENT (ISRM Suggested Methods)	%	**13.0**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.14**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**1.90**



Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



Tested in accordance with ASTM D7012 - 14

SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

BOREHOLE	SAMPLE	DEPTH (m)	MOISTURE CONTENT (%)	TYPE OF TEST * (see below)	CORE DIAMETER (mm)	EQUIVALENT DIAMETER (mm)	PLATEN SEPARATION (mm)	FAILURE LOAD (kN)	Is (MPa)	Is(50) (MPa)
BH303	C	2.20-2.39	As Received	D	99.31	99.31	99.31	0.16	0.02	0.02
				A	99.31	71.12	40.00	0.06	0.01	0.01
				A	99.31	72.98	42.12	0.07	0.01	0.02
	C	5.27-5.45	As Received	D	100.10	100.10	100.10	0.07	0.01	0.01
				A	100.10	88.69	61.71	0.30	0.04	0.05
				A	100.10	86.07	58.13	0.25	0.03	0.04
	C	9.42-9.60	As Received	D	100.36	100.36	100.36	0.08	0.01	0.01
				A	100.36	73.35	42.10	0.10	0.02	0.02
				A	100.36	69.78	38.11	0.09	0.02	0.02
	C	13.70-13.88	As Received	D	100.15	100.15	100.15	0.07	0.01	0.01
				A	100.15	79.99	50.18	0.13	0.02	0.03
				A	100.15	79.46	49.51	0.15	0.02	0.03

NOTE: N/M - Not measured
NOTE: A dash (-) signifies that scale did not register a reading

* I = IRREGULAR TEST
D = DIAMETRAL TEST
A = AXIAL TEST

Mean Is(50) - Axial tests	0.03
Mean Is(50) - Diametrical tests	0.01
Ia(50)	2.16

Tested in accordance with ISRM (2007)

SUMMARY OF POINT LOAD TEST RESULTS

BOREHOLE	SAMPLE	DEPTH (m)	MOISTURE CONTENT (%)	TYPE OF TEST * (see below)	CORE DIAMETER (mm)	EQUIVALENT DIAMETER (mm)	PLATEN SEPARATION (mm)	FAILURE LOAD (kN)	Is (MPa)	Is(50) (MPa)
BH304	C	11.23-11.46	As Received	D	99.58	99.58	99.58	0.05	0.00	0.01
				A	99.58	71.62	40.45	0.02	0.00	0.01
				A	99.58	69.51	38.11	0.04	0.01	0.01
	C	14.19-14.40	As Received	D	99.13	99.13	99.13	0.13	0.01	0.02
				A	99.13	90.65	65.10	0.21	0.03	0.03
				A	99.13	86.46	59.22	0.29	0.04	0.05

NOTE: N/M - Not measured
NOTE: A dash (-) signifies that scale did not register a reading

* I = IRREGULAR TEST
D = DIAMETRAL TEST
A = AXIAL TEST

Mean Is(50) - Axial tests	0.02
Mean Is(50) - Diametrical tests	0.01
Ia(50)	1.97

Tested in accordance with ISRM (2007)

SUMMARY OF POINT LOAD TEST RESULTS

APPENDIX 9

Laboratory Test Results - Contamination (Soil)

Certificate of Analysis

Certificate Number 19-24411-1

24-Jan-20

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference 19-24411-1

Client Reference PN194054

Order No (not supplied)

Contract Title Exchange Square, Stockport

Description 4 Soil samples, 4 Leachate samples.

Date Received 29-Nov-19

Date Started 29-Nov-19

Date Completed 24-Jan-20

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 19-24411, amendments.**

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

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Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Stockport

Sample ID	Depth	Lab No	Completed	Matrix Description
TP01	0.5	1605649	06/12/2019	Dark brown sandy CLAY including odd rootlets
TP01	2.5	1605650	06/12/2019	Dark brown, sandy CLAY including odd rootlets
TP02	1.5	1605651	06/12/2019	Brown sandy CLAY including odd rootlets
TP02	2	1605652	06/12/2019	Dark brown sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Stockport

			Lab No	1605649	1605650	1605651	1605652
			Sample ID	TP01	TP01	TP02	TP02
			Depth	0.50	2.50	1.50	2.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	19/11/19	19/11/19	19/11/19	19/11/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	6.4	26	9.7	12
Barium	DETSC 2301#	1.5	mg/kg	89	120	160	150
Beryllium	DETSC 2301#	0.2	mg/kg	0.5	0.9	0.6	0.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.2	1.1	0.2	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.3	0.1	0.1
Chromium	DETSC 2301#	0.15	mg/kg	15	10	16	15
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	32	110	17	21
Lead	DETSC 2301#	0.3	mg/kg	31	170	14	23
Mercury	DETSC 2325#	0.05	mg/kg	0.11	0.65	< 0.05	0.06
Nickel	DETSC 2301#	1	mg/kg	19	21	19	17
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	20	24	19	18
Zinc	DETSC 2301#	1	mg/kg	61	67	45	42
Inorganics							
pH	DETSC 2008#		pH	6.6	5.0	7.0	7.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	0.7	< 0.1	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	1.6	14	1.0	1.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	55	670	39	45

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis

Soil Samples

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Stockport

			Lab No	1605649	1605650	1605651	1605652
			Sample ID	TP01	TP01	TP02	TP02
			Depth	0.50	2.50	1.50	2.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	19/11/19	19/11/19	19/11/19	19/11/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	6.6	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	19	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	92	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	120	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	240	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	240	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis

Soil Samples

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Stockport

			Lab No	1605649	1605650	1605651	1605652
			Sample ID	TP01	TP01	TP02	TP02
			Depth	0.50	2.50	1.50	2.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	19/11/19	19/11/19	19/11/19	19/11/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	2.7	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	2.8	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	13	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	11	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.1	61	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	14	0.2	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.2	72	0.2	0.1
Pyrene	DETSC 3301	0.1	mg/kg	0.4	72	< 0.1	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	33	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	36	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	23	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	13	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	31	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	18	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	3.2	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	22	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	430	< 1.6	< 1.6
Phenols							
Phenol	DETSC 3451*	0.01	mg/kg	< 0.01	0.02	0.06	< 0.01
4-Chloro-3-methylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	0.08	< 0.01
p-cresol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	0.08	< 0.01
2,6-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,6-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis

Soil Samples

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Stockport

			Lab No	1605649	1605650	1605651	1605652
			Sample ID	TP01	TP01	TP02	TP02
			Depth	0.50	2.50	1.50	2.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	19/11/19	19/11/19	19/11/19	19/11/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
VOCs							
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis

Soil Samples

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Stockport

			Lab No	1605649	1605650	1605651	1605652
			Sample ID	TP01	TP01	TP02	TP02
			Depth	0.50	2.50	1.50	2.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	19/11/19	19/11/19	19/11/19	19/11/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Exchange Square, Stockport
Sample Id TP01 2.50
Sample Numbers 1605650 1605653 1605654
Date Analysed 06/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	14	3	5	6
DETSC 2003# Loss On Ignition	%	16	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	430	100	n/a	n/a
DETSC 2008# pH	pH Units	5.0	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.55	0.33	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	16	33	0.03	0.3	20	100	300
DETSC 2306 Cadmium as Cd	1.3	1	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.31	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	5.4	3	0.011	0.034	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	43	39	0.09	0.4	0.4	10	40
DETSC 2306 Lead as Pb	0.18	0.26	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.54	0.35	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.56	0.33	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	370	380	0.74	3.785	4	50	200
DETSC 2055 Chloride as Cl	12000	10000	24	103	800	15,000	25,000
DETSC 2055* Fluoride as F	110	160	0.22	1.53	10	150	500
DETSC 2055 Sulphate as SO4	46000	38000	92	391.9	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	230000	190000	460	1959.5	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	4600	2400	< 10	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.1	6.7
DETSC 2009 Conductivity uS/cm	324	265
* Temperature*	17	18

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.113

Stage 1

Volume of Leachant L2*	0.199
Volume of Eluate VE1*	0.168

Stage 2

Volume of Leachant L8*	0.903
Volume of Eluate VE2*	0.833

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Exchange Square, Stockport
Sample Id TP02 1.50
Sample Numbers 1605651 1605655 1605656
Date Analysed 06/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.0	3	5	6
DETSC 2003# Loss On Ignition	%	3.3	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	1400	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	7.0	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.43	0.4	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	22	4.7	0.04	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	0.07	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.28	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	< 0.4	< 0.4	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	2.3	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.14	0.14	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.23	0.18	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	24	1.6	0.048	0.053	4	50	200
DETSC 2055 Chloride as Cl	4200	910	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	170	< 100	0.34	0.28	10	150	500
DETSC 2055 Sulphate as SO4	12000	2400	24	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	29000	9800	58	129.6	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	5800	2200	11.6	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.1	7.1
DETSC 2009 Conductivity uS/cm	41.1	14
* Temperature*	18	18

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.119

Stage 1

Volume of Leachant L2*	0.216
Volume of Eluate VE1*	0.195

Stage 2

Volume of Leachant L8*	0.948
Volume of Eluate VE2*	0.888

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Summary of Asbestos Analysis

Soil Samples

Our Ref 19-24411-1
Client Ref PN194054
Contract Title Exchange Square, Stockport

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1605649	TP01 0.50	SOIL	NAD	none	Rebecca Burgess
1605650	TP01 2.50	SOIL	NAD	none	Rebecca Burgess
1605651	TP02 1.50	SOIL	NAD	none	Rebecca Burgess

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 19-24411-1
Client Ref PN194054
Contract Exchange Square, Stockport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1605649	TP01 0.50 SOIL	19/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1605650	TP01 2.50 SOIL	19/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1605651	TP02 1.50 SOIL	19/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1605652	TP02 2.00 SOIL	19/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1605653	TP01 2.50 LEACHATE	19/11/19	GJ 250ml, GJ 60ml, PT 1L		
1605654	TP01 2.50 LEACHATE	19/11/19	GJ 250ml, GJ 60ml, PT 1L		
1605655	TP02 1.50 LEACHATE	19/11/19	GJ 250ml, GJ 60ml, PT 1L		
1605656	TP02 1.50 LEACHATE	19/11/19	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number 19-24415

06-Dec-19

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference 19-24415

Client Reference PN194054

Order No (not supplied)

Contract Title Stockport Inter

Description 6 Soil samples, 4 Leachate samples.

Date Received 29-Nov-19

Date Started 29-Nov-19

Date Completed 06-Dec-19

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-24415
Client Ref PN194054
Contract Title Stockport Inter

Sample ID	Depth	Lab No	Completed	Matrix Description
WS318	0.2	1605662	06/12/2019	Dark brown gravelly, clayey SAND
WS305	3	1605663	06/12/2019	Dark brown gravelly SAND (Possible made ground - brick)
WS308	1	1605664	06/12/2019	Dark brown clayey SAND
WS307	0.5	1605665	06/12/2019	Dark brown clayey SAND
WS307	2	1605666	06/12/2019	Dark brown gravelly SAND
BH302A	1.7	1605667	06/12/2019	Dark brown gravelly, clayey SAND (Possible made ground - brick)

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24415
Client Ref PN194054
Contract Title Stockport Inter

			Lab No	1605662	1605663	1605664	1605665	1605666	1605667
			Sample ID	WS318	WS305	WS308	WS307	WS307	BH302A
			Depth	0.20	3.00	1.00	0.50	2.00	1.70
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	3.9	20	12	8.4	7.5	16
Barium	DETSC 2301#	1.5	mg/kg	36	140	150	58	54	69
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2	2.0	0.5	0.8	0.8	0.6
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	0.9	< 0.2	0.3	0.3	0.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.2	1.6	0.2	0.3	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	4.3	11	16	13	21	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	150	120	59	53	17	64
Lead	DETSC 2301#	0.3	mg/kg	25	120	160	45	19	59
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.38	0.12	0.12	< 0.05	0.10
Nickel	DETSC 2301#	1	mg/kg	4.9	23	13	15	20	12
Selenium	DETSC 2301#	0.5	mg/kg	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	5.2	39	16	20	30	23
Zinc	DETSC 2301#	1	mg/kg	49	91	230	53	54	34
Inorganics									
pH	DETSC 2008#		pH	8.2	8.0	7.9	8.2	7.9	7.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.3	< 0.1	< 0.1	0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%		11	2.4	2.7		4.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	34	82	20	23	21	120
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	1.8	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	2.1	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	4.0	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	76	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	84	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	4.7	6.0	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	8.7	12	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	16	38	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	150	58	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	170	110	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	260	110	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24415
Client Ref PN194054
Contract Title Stockport Inter

			Lab No	1605662	1605663	1605664	1605665	1605666	1605667
			Sample ID	WS318	WS305	WS308	WS307	WS307	BH302A
			Depth	0.20	3.00	1.00	0.50	2.00	1.70
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	0.3	29	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	3.0	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	1.0	33	0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	0.7	25	0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	3.9	130	0.6	0.2	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.9	24	0.2	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	4.3	110	0.7	0.2	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	4.4	110	0.7	0.3	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	1.9	45	0.4	0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	2.1	49	0.4	0.2	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	1.3	30	0.2	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.7	16	0.2	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	1.8	42	0.4	0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	1.0	23	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.2	6.3	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	1.2	27	< 0.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	26	700	4.0	< 1.6	< 1.6	< 1.6
Phenols									
Phenol	DETSC 3451*	0.01	mg/kg	< 0.10	1.3	< 0.01	< 0.01	< 0.01	< 0.01
4-Chloro-3-methylphenol	DETSC 3451*	0.01	mg/kg	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.10	1.1	< 0.01	< 0.01	< 0.01	< 0.01
p-cresol	DETSC 3451*	0.01	mg/kg	< 0.10	1.6	< 0.01	< 0.01	< 0.01	< 0.01
2,6-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01
2,6-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01
VOCs									
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24415
Client Ref PN194054
Contract Title Stockport Inter

			Lab No	1605662	1605663	1605664	1605665	1605666	1605667
			Sample ID	WS318	WS305	WS308	WS307	WS307	BH302A
			Depth	0.20	3.00	1.00	0.50	2.00	1.70
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-24415
Client Ref PN194054
Contract Title Stockport Inter

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1605662	WS318 0.20	SOIL	NAD	none	Colin Patrick
1605664	WS308 1.00	SOIL	NAD	none	Colin Patrick
1605665	WS307 0.50	SOIL	NAD	none	Colin Patrick
1605667	BH302A 1.70	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-24415
Client Ref PN194054
Contract Title Stockport Inter
Sample Id WS308 1.00

Sample Numbers 1605664 1605668 1605669
Date Analysed 06/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.4	3	5	6
DETSC 2003# Loss On Ignition	%	4.0	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	4.0	100	n/a	n/a
DETSC 2008# pH	pH Units	7.9	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	1.8	1	0.004	0.011	0.5	2	25
DETSC 2306 Barium as Ba	16	9.4	0.03	0.1	20	100	300
DETSC 2306 Cadmium as Cd	0.06	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.4	0.52	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	6.1	1.5	0.012	0.022	2	50	100
DETSC 2306 Mercury as Hg	0.02	0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	1.7	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	4.6	1.8	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	1.7	0.39	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.46	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	7.7	5.9	0.015	0.062	4	50	200
DETSC 2055 Chloride as Cl	3500	1000	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	450	130	0.9	1.78	10	150	500
DETSC 2055 Sulphate as SO4	4300	1700	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	76000	21000	152	291.8	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	10000	2900	20	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.7	6.9
DETSC 2009 Conductivity uS/cm	109	29.5
* Temperature*	18	18

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.120

Stage 1

Volume of Leachant L2*	0.219
Volume of Eluate VE1*	0.178

Stage 2

Volume of Leachant L8*	0.957
Volume of Eluate VE2*	0.907

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-24415
Client Ref PN194054
Contract Title Stockport Inter
Sample Id WS307 2.00

Sample Numbers 1605666 1605670 1605671
Date Analysed 06/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	< 0.5	3	5	6
DETSC 2003# Loss On Ignition	%	1.7	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	7.9	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.35	0.28	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	1.7	0.71	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.4	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.6	< 0.4	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.17	< 0.09	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.8	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	9.6	2.6	0.019	0.038	4	50	200
DETSC 2055 Chloride as Cl	4700	1300	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	8800	1600	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	47000	10000	94	162.7	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	5500	5600	11	55.8	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8	7
DETSC 2009 Conductivity uS/cm	66.7	14.9
* Temperature*	18	18

Mass of Sample Kg*	0.120
Mass of dry Sample Kg*	0.116

Stage 1

Volume of Leachant L2*	0.227
Volume of Eluate VE1*	0.196

Stage 2

Volume of Leachant L8*	0.925
Volume of Eluate VE2*	0.864

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Information in Support of the Analytical Results

Our Ref 19-24415
Client Ref PN194054
Contract Stockport Inter

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1605662	WS318 0.20 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	
1605663	WS305 3.00 SOIL		GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	
1605664	WS308 1.00 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), ANC (1095 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Loss on Ignition (730 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), PCB (30 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), EPH/TPH (14 days), VOC (7 days)	
1605665	WS307 0.50 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	

Information in Support of the Analytical Results

Our Ref 19-24415
Client Ref PN194054
Contract Stockport Inter

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1605666	WS307 2.00 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), ANC (1095 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Loss on Ignition (730 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), PCB (30 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), EPH/TPH (14 days), VOC (7 days)	
1605667	BH302A 1.70 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	
1605668	WS308 1.00 LEACHATE		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied	
1605669	WS308 1.00 LEACHATE		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied	
1605670	WS307 2.00 LEACHATE		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied	
1605671	WS307 2.00 LEACHATE		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number 19-24561

06-Dec-19

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference 19-24561

Client Reference PN194054

Order No (not supplied)

Contract Title Exchange Square Stockport GI

Description 2 Soil samples.

Date Received 02-Dec-19

Date Started 02-Dec-19

Date Completed 06-Dec-19

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24561
Client Ref PN194054
Contract Title Exchange Square Stockport GI

			Lab No	1606490	1606491
			Sample ID	WS312	WS315
			Depth	2.00	0.20
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	22/11/19	22/11/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	7.3	11
Barium	DETSC 2301#	1.5	mg/kg	70	130
Beryllium	DETSC 2301#	0.2	mg/kg	0.5	0.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.9
Chromium	DETSC 2301#	0.15	mg/kg	15	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	16	29
Lead	DETSC 2301#	0.3	mg/kg	9.8	220
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.11
Nickel	DETSC 2301#	1	mg/kg	19	9.4
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.2
Vanadium	DETSC 2301#	0.8	mg/kg	19	17
Zinc	DETSC 2301#	1	mg/kg	39	81
Inorganics					
pH	DETSC 2008#		pH	8.2	8.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	0.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	< 0.5	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	16	56
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	0.02	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	0.02	0.02
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	0.02	0.02
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24561
Client Ref PN194054
Contract Title Exchange Square Stockport GI

			Lab No	1606490	1606491
			Sample ID	WS312	WS315
			Depth	2.00	0.20
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	22/11/19	22/11/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6
Phenols					
Phenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
4-Chloro-3-methylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
2,4-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
2,4-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
p-cresol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
2,6-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
2,6-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
2,4,6-Trichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01
VOCs					
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24561
Client Ref PN194054
Contract Title Exchange Square Stockport GI

			Lab No	1606490	1606491
			Sample ID	WS312	WS315
			Depth	2.00	0.20
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	22/11/19	22/11/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-24561
Client Ref PN194054
Contract Title Exchange Square Stockport GI

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1606490	WS312 2.00	SOIL	NAD	none	Joanne Luscombe
1606491	WS315 0.20	SOIL	NAD	none	Joanne Luscombe

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 19-24561
Client Ref PN194054
Contract Exchange Square Stockport GI

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1606490	WS312 2.00 SOIL	22/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1606491	WS315 0.20 SOIL	22/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Certificate of Analysis

Certificate Number 19-24723

11-Dec-19

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference 19-24723

Client Reference PN194054

Order No (not supplied)

Contract Title Stockport Interchange - Exchange Square

Description 12 Soil samples, 8 Leachate samples.

Date Received 04-Dec-19

Date Started 04-Dec-19

Date Completed 11-Dec-19

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square

			Lab No	1607332	1607333	1607334	1607335	1607336	1607337
			Sample ID	WS316	WS316	WS306	WS309	WS309	WS310
			Depth	0.20	2.00	0.50	0.20	1.50	0.50
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	20/11/19	20/11/19	20/11/19	13/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	35	20	23	27	4.9	21
Barium	DETSC 2301#	1.5	mg/kg	150	480	300	150	43	48
Beryllium	DETSC 2301#	0.2	mg/kg	0.8	0.7	0.7	1.2	0.5	0.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.9	0.4	0.3	0.7	0.3	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.8	3.3	7.0	0.6	0.2	0.2
Chromium	DETSC 2301#	0.15	mg/kg	41	23	24	22	18	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	100	160	250	200	14	13
Lead	DETSC 2301#	0.3	mg/kg	160	850	950	160	23	14
Mercury	DETSC 2325#	0.05	mg/kg	0.37	0.40	0.28	0.50	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	26	20	17	31	22	12
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	26	22	21	35	24	14
Zinc	DETSC 2301#	1	mg/kg	120	570	760	290	77	49
Inorganics									
pH	DETSC 2008#		pH	5.9	7.9	8.1	6.3	6.6	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.5	0.5	1.2	0.7	< 0.1	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%		2.2	2.2		< 0.5	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	47	14	21	32	98	31
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	0.02	< 0.01	0.10	1.1	0.46	0.47
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	0.03	< 0.01	0.03	0.03	0.03
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	0.02	0.06	0.01	0.08	0.10
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	5.9	1.7	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	0.8	< 0.5	8.9	4.0	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	5.3	< 0.6	9.1	6.4	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	18	< 1.4	11	19	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	24	< 10	35	31	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	24	< 10	35	33	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square

			Lab No	1607332	1607333	1607334	1607335	1607336	1607337
			Sample ID	WS316	WS316	WS306	WS309	WS309	WS310
			Depth	0.20	2.00	0.50	0.20	1.50	0.50
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	20/11/19	20/11/19	20/11/19	13/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.3	0.1	< 0.1	0.2	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	0.5	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	2.0	0.3	0.2	1.4	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.6	< 0.1	< 0.1	0.4	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	3.9	0.6	0.4	2.4	< 0.1	0.1
Pyrene	DETSC 3301	0.1	mg/kg	4.1	0.6	0.4	2.6	< 0.1	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	1.8	0.3	0.3	1.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	2.0	0.3	0.2	1.3	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	1.3	0.2	0.2	1.3	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.8	0.1	0.2	0.5	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	1.8	0.4	0.3	1.2	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	1.0	0.2	0.2	0.7	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	0.2	0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	1.2	0.2	0.2	0.7	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	22	3.5	3.1	14	< 1.6	< 1.6
Phenols									
Phenol	DETSC 3451*	0.01	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-Chloro-3-methylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dimethylphenol	DETSC 3451*	0.01	mg/kg	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-cresol	DETSC 3451*	0.01	mg/kg	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,6-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,6-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
VOCs									
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square

			Lab No	1607332	1607333	1607334	1607335	1607336	1607337
			Sample ID	WS316	WS316	WS306	WS309	WS309	WS310
			Depth	0.20	2.00	0.50	0.20	1.50	0.50
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	20/11/19	20/11/19	20/11/19	13/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square

			Lab No	1607338	1607339	1607340	1607341	1607342	1607343
			Sample ID	WS310	WS311	WS311	WS313	WS314	WS314
			Depth	1.00	1.00	4.00	1.00	0.50	1.00
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	13/11/19	20/11/19	20/11/19	13/11/19	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	11	11	9.5	18	20	26
Barium	DETSC 2301#	1.5	mg/kg	420	230	79	59	220	250
Beryllium	DETSC 2301#	0.2	mg/kg	0.6	0.6	0.5	0.4	1.1	1.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	0.3	0.4	0.3	0.7	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	1.0	0.5	0.3	0.2	1.0	0.5
Chromium	DETSC 2301#	0.15	mg/kg	17	14	12	13	17	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	36	26	25	12	140	160
Lead	DETSC 2301#	0.3	mg/kg	97	70	35	16	190	190
Mercury	DETSC 2325#	0.05	mg/kg	0.08	0.07	0.08	< 0.05	2.0	2.7
Nickel	DETSC 2301#	1	mg/kg	17	14	16	12	23	24
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	1.2	0.6	1.1	0.8
Vanadium	DETSC 2301#	0.8	mg/kg	21	19	17	13	28	35
Zinc	DETSC 2301#	1	mg/kg	97	81	95	47	180	130
Inorganics									
pH	DETSC 2008#		pH	7.7	7.9	7.6	7.9	6.0	5.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.2	< 0.1	0.2	0.1	1.8	3.0
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%				< 0.5		
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	25	22	17	39	31	47
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	0.66	< 0.01	0.87
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	0.02	0.03	0.02	0.02	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	0.05	0.01	0.01	0.02	0.06	0.10
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	4.0
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	3.3
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square

			Lab No	1607338	1607339	1607340	1607341	1607342	1607343
			Sample ID	WS310	WS311	WS311	WS313	WS314	WS314
			Depth	1.00	1.00	4.00	1.00	0.50	1.00
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	13/11/19	20/11/19	20/11/19	13/11/19	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	0.1	< 0.1	< 0.1	0.2	0.2
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	1.0	< 0.1	< 0.1	0.3	0.6
Acenaphthene	DETSC 3301	0.1	mg/kg	0.5	0.7	< 0.1	< 0.1	0.6	0.6
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	0.4	< 0.1	< 0.1	0.6	0.6
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	1.3	< 0.1	< 0.1	4.1	4.7
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	1.8	< 0.1	< 0.1	0.8	0.9
Fluoranthene	DETSC 3301	0.1	mg/kg	0.2	19	0.1	< 0.1	6.8	7.9
Pyrene	DETSC 3301	0.1	mg/kg	0.2	24	0.1	< 0.1	6.6	7.4
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	10	< 0.1	< 0.1	2.7	3.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	10	< 0.1	< 0.1	3.5	4.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.1	6.4	< 0.1	< 0.1	2.2	2.7
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.1	4.0	< 0.1	< 0.1	1.5	1.6
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.1	10	< 0.1	< 0.1	2.8	3.3
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.2	5.3	< 0.1	< 0.1	1.4	1.9
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	1.3	< 0.1	< 0.1	0.2	0.3
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.1	5.8	< 0.1	< 0.1	1.8	2.0
PAH Total	DETSC 3301	1.6	mg/kg	1.9	100	< 1.6	< 1.6	36	42
Phenols									
Phenol	DETSC 3451*	0.01	mg/kg	0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01
4-Chloro-3-methylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	0.04	0.02
p-cresol	DETSC 3451*	0.01	mg/kg	0.01	< 0.01	< 0.01	< 0.01	0.07	0.02
2,6-Dimethylphenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,6-Dichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
VOCs									
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square

			Lab No	1607338	1607339	1607340	1607341	1607342	1607343
			Sample ID	WS310	WS311	WS311	WS313	WS314	WS314
			Depth	1.00	1.00	4.00	1.00	0.50	1.00
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	13/11/19	20/11/19	20/11/19	13/11/19	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square
Sample Id WS316 2.00

Sample Numbers 1607333 1607344 1607345
Date Analysed 11/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.2	3	5	6
DETSC 2003# Loss On Ignition	%	4.20	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	3.5	100	n/a	n/a
DETSC 2008# pH	pH Units	7.9	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	25	16	0.05	0.174	0.5	2	25
DETSC 2306 Barium as Ba	180	25	0.36	0.5	20	100	300
DETSC 2306 Cadmium as Cd	0.54	0.11	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.36	0.62	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.9	2.2	0.006	0.023	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	5.7	1	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.14	0.85	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.55	0.55	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	68	12	0.136	0.21	4	50	200
DETSC 2055 Chloride as Cl	120000	8800	240	266.5	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	9400	3100	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	350000	36000	700	864	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	5900	3800	11.8	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.1	6.6
DETSC 2009 Conductivity uS/cm	501	51.5
* Temperature*	17	17

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.115

Stage 1

Volume of Leachant L2*	0.206
Volume of Eluate VE1*	0.185

Stage 2

Volume of Leachant L8*	0.922
Volume of Eluate VE2*	0.862

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square
Sample Id WS309 1.50

Sample Numbers 1607336 1607346 1607347
Date Analysed 11/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	< 0.5	3	5	6
DETSC 2003# Loss On Ignition	%	2.30	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	6.6	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.18	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	11	1.6	0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	0.06	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	< 0.25	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.7	< 0.4	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	1	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.09	< 0.09	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	14	4.2	0.028	0.058	4	50	200
DETSC 2055 Chloride as Cl	7400	1300	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	55000	5800	110	139	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	110000	19000	220	339.8	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	4200	< 2000	< 10	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.2	6.4
DETSC 2009 Conductivity uS/cm	152	27.1
* Temperature*	17	17

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.118

Stage 1

Volume of Leachant L2*	0.225
Volume of Eluate VE1*	0.195

Stage 2

Volume of Leachant L8*	0.948
Volume of Eluate VE2*	0.897

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

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WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square
Sample Id WS310 0.50

Sample Numbers 1607337 1607348 1607349
Date Analysed 11/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	< 0.5	3	5	6
DETSC 2003# Loss On Ignition	%	1.30	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	7.9	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.33	0.35	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	17	13	0.03	0.14	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.65	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1.3	0.9	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	1.6	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.54	0.38	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.93	0.28	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	< 1.3	< 1.3	< 0.002	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	1600	780	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	440	110	0.88	1.68	10	150	500
DETSC 2055 Sulphate as SO4	7700	1600	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	82000	44000	164	506.9	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	4500	2800	< 10	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8	7.6
DETSC 2009 Conductivity uS/cm	117	63.1
* Temperature*	17	17

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.122

Stage 1

Volume of Leachant L2*	0.235
Volume of Eluate VE1*	0.214

Stage 2

Volume of Leachant L8*	0.973
Volume of Eluate VE2*	0.923

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WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square
Sample Id WS311 1.00

Sample Numbers 1607339 1607350 1607351
Date Analysed 10/12/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.0	3	5	6
DETSC 2003# Loss On Ignition	%	2.90	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	340.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	100.0	100	n/a	n/a
DETSC 2008# pH	pH Units	7.9	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.93	0.45	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	8.6	4.1	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.78	0.26	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	5.1	1.2	0.01	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	3.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.6	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.97	0.33	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.47	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.33	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	3.7	7	0.007	0.065	4	50	200
DETSC 2055 Chloride as Cl	3600	1000	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	340	< 100	0.68	0.55	10	150	500
DETSC 2055 Sulphate as SO4	7800	1400	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	94000	20000	188	319.2	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	14000	2800	28	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.2	7.2
DETSC 2009 Conductivity uS/cm	135	28
* Temperature*	17	18

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.122

Stage 1

Volume of Leachant L2*	0.227
Volume of Eluate VE1*	0.197

Stage 2

Volume of Leachant L8*	0.979
Volume of Eluate VE2*	0.928

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Summary of Asbestos Analysis
Soil Samples

Our Ref 19-24723
Client Ref PN194054
Contract Title Stockport Interchange - Exchange Square

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1607332	WS316 0.20	SOIL	NAD	none	Colin Patrick
1607333	WS316 2.00	SOIL	NAD	none	Colin Patrick
1607334	WS306 0.50	SOIL	NAD	none	Colin Patrick
1607335	WS309 0.20	SOIL	NAD	none	Colin Patrick
1607336	WS309 1.50	SOIL	NAD	none	Colin Patrick
1607337	WS310 0.50	SOIL	NAD	none	Colin Patrick
1607339	WS311 1.00	SOIL	NAD	none	Colin Patrick
1607341	WS313 1.00	SOIL	NAD	none	Colin Patrick
1607342	WS314 0.50	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 19-24723
Client Ref PN194054
Contract Stockport Interchange - Exchange Square

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1607332	WS316 0.20 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	
1607333	WS316 2.00 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), ANC (1095 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Loss on Ignition (730 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), PCB (30 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), EPH/TPH (14 days), VOC (7 days)	
1607334	WS306 0.50 SOIL	20/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1607335	WS309 0.20 SOIL	20/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1607336	WS309 1.50 SOIL	20/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1607337	WS310 0.50 SOIL	13/11/19	GJ 250ml, GJ 60ml, PT 1L	Aliphatics/Aromatics (14 days), BTEX (14 days), Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days), EPH/TPH (14 days), VOC (7 days)	
1607338	WS310 1.00 SOIL	13/11/19	GJ 250ml, GJ 60ml, PT 1L	Aliphatics/Aromatics (14 days), BTEX (14 days), Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	
1607339	WS311 1.00 SOIL	20/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1607340	WS311 4.00 SOIL	20/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1607341	WS313 1.00 SOIL	13/11/19	GJ 250ml, GJ 60ml, PT 1L	Aliphatics/Aromatics (14 days), BTEX (14 days), Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	
1607342	WS314 0.50 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	

Information in Support of the Analytical Results

Our Ref 19-24723
Client Ref PN194054
Contract Stockport Interchange - Exchange Square

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1607343	WS314 1.00 SOIL		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied, Anions 2:1 (365 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Mercury (365 days), ICP WS Boron (365 days), Metals ICP (365 days), Metals ICP Prep (365 days), Kone Cr6 (1095 days), Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Phenols MS (365 days), Cyanide/Mono pHoh (14 days), VOC (7 days)	
1607344	WS316 2.00 LEACHATE		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied	
1607345	WS316 2.00 LEACHATE		GJ 250ml, GJ 60ml, PT 1L	Sample date not supplied	
1607346	WS309 1.50 LEACHATE	20/11/19	GJ 250ml, GJ 60ml, PT 1L		
1607347	WS309 1.50 LEACHATE	20/11/19	GJ 250ml, GJ 60ml, PT 1L		
1607348	WS310 0.50 LEACHATE	13/11/19	GJ 250ml, GJ 60ml, PT 1L		
1607349	WS310 0.50 LEACHATE	13/11/19	GJ 250ml, GJ 60ml, PT 1L		
1607350	WS311 1.00 LEACHATE	20/11/19	GJ 250ml, GJ 60ml, PT 1L		
1607351	WS311 1.00 LEACHATE	20/11/19	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

APPENDIX 10

Laboratory Test Results - Contamination (Groundwater)

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Geotechnics
Unit 1B
Borders Industrial Park
River Lane
Chester
Cheshire
CH4 8RJ

Attention :	Colin Dodd
Date :	31st January, 2020
Your reference :	PN194054
Our reference :	Test Report 20/1035 Batch 1
Location :	Exchange Square, Stockport
Date samples received :	24th January, 2020
Status :	Final report
Issue :	1

Eight samples were received for analysis on 24th January, 2020 of which seven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Paul Boden BSc
Senior Project Manager

Client Name: Geotechnics
Reference: PN194054
Location: Exchange Square, Stockport
Contact: Colin Dodd
EMT Job No: 20/1035

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

EMT Sample No.	1-4	5-8	9-11	12-15	16-19	20-23	24-27				LOD/LOR	Units	Method No.
Sample ID	BH303	BH304	BH305	BH306	WS314	WS315	WS316						
Depth													
COC No / misc													
Containers	V P G	V P G	V P	V P G	V P G	V P G	V P G						
Sample Date	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020						
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020						
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5				<2.5	ug/l	TM30/PM14
Dissolved Boron	59	47	44	67	114	40	72				<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5				<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	<7	<7	<7				<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5	<5				<5	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	2	<2	2	8	3	12				<2	ug/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM30/PM14
Dissolved Zinc #	5	3	5	10	12	<3	24				<3	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	5.0	<0.1	0.1	<0.1	<0.1				<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.013	<0.013	0.291	<0.013	<0.013	<0.013	<0.013				<0.013	ug/l	TM4/PM30
Acenaphthene #	<0.013	<0.013	0.535	<0.013	0.015	<0.013	<0.013				<0.013	ug/l	TM4/PM30
Fluorene #	<0.014	<0.014	1.018	<0.014	<0.014	<0.014	<0.014				<0.014	ug/l	TM4/PM30
Phenanthrene #	<0.011	0.013	1.361	<0.011	0.028	<0.011	<0.011				<0.011	ug/l	TM4/PM30
Anthracene #	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013				<0.013	ug/l	TM4/PM30
Fluoranthene #	<0.012	0.022	0.098	<0.012	0.029	<0.012	<0.012				<0.012	ug/l	TM4/PM30
Pyrene #	<0.013	0.041	0.170	<0.013	0.035	<0.013	<0.013				<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.015	<0.015	0.017	<0.015	<0.015	<0.015	<0.015				<0.015	ug/l	TM4/PM30
Chrysene #	<0.011	<0.011	0.031	<0.011	0.015	<0.011	<0.011				<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.018	<0.018	0.018	<0.018	0.018	<0.018	<0.018				<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016				<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011				<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011				<0.011	ug/l	TM4/PM30
PAH 16 Total #	<0.195	<0.195	8.539	<0.195	0.240	<0.195	<0.195				<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01				<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	75	77	82	82	82	78	79				<0	%	TM4/PM30
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1				<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5	<5	<5				<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	7	<1	<1	<1	<1				<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	55	<2	<2	<2	<2				<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	73	<1	<1	<1	<1				<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	106	104	113	105	89	88	91				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	111	111	117	110	96	92	95				<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Geotechnics
Reference: PN194054
Location: Exchange Square, Stockport
Contact: Colin Dodd
EMT Job No: 20/1035

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-4	5-8	9-11	12-15	16-19	20-23	24-27				LOD/LOR	Units	Method No.
Sample ID	BH303	BH304	BH305	BH306	WS314	WS315	WS316						
Depth													
COC No / misc													
Containers	V P G	V P G	V P	V P G	V P G	V P G	V P G						
Sample Date	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020						
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020						
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	52	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	386	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	193	<5	<5	<5	<5				<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	850	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	1160	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	320	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10	2961	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	128	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	454	<5	<5	<5	<5				<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	620	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	480	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	1682	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	4643	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15				<0.15	mg/l	TM26/PM0
Sulphate as SO4 #	58.1	65.5	78.5	54.0	126.6	66.8	94.7				<0.5	mg/l	TM38/PM0
Free Cyanide #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	mg/l	TM89/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.04	<0.03	<0.03	0.70	0.04	<0.03	7.38				<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006				<0.006	mg/l	TM38/PM0
Sulphide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	mg/l	TM107/PM0
pH #	7.58	7.51	7.85	7.21	7.08	7.35	6.89				<0.01	pH units	TM73/PM0

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Geotechnics
Reference: PN194054
Location: Exchange Square, Stockport
Contact: Colin Dodd
EMT Job No: 20/1035

VOC Report : **Liquid**

EMT Sample No.	1-4	5-8	9-11	12-15	16-19	20-23	24-27					
Sample ID	BH303	BH304	BH305	BH306	WS314	WS315	WS316					
Depth												
COC No / misc												
Containers	V P G	V P G	V P	V P G	V P G	V P G	V P G					
Sample Date	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water					
Batch Number	1	1	1	1	1	1	1					
Date of Receipt	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020					
VOC MS												
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1				<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5	<5	<5	<5				<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Chloroform #	<2	<2	10	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5	<5	<5				<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	7	<1	<1	<1	<1				<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	55	<2	<2	<2	<2				<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	73	<1	<1	<1	<1				<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4				<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	7	<3	<3	<3	<3				<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	45	<3	<3	<3	<3				<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	79	<3	<3	<3	<3				<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	7	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Naphthalene	<2	<2	11	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3				<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	106	104	113	105	89	88	91				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	111	111	117	110	96	92	95				<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Geotechnics

Reference: PN194054

Location: Exchange Square, Stockport

Contact: Colin Dodd

Matrix : Liquid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
20/1035	1	BH305		9-11	EPH	Sample received in inappropriate container

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/1035

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/1035

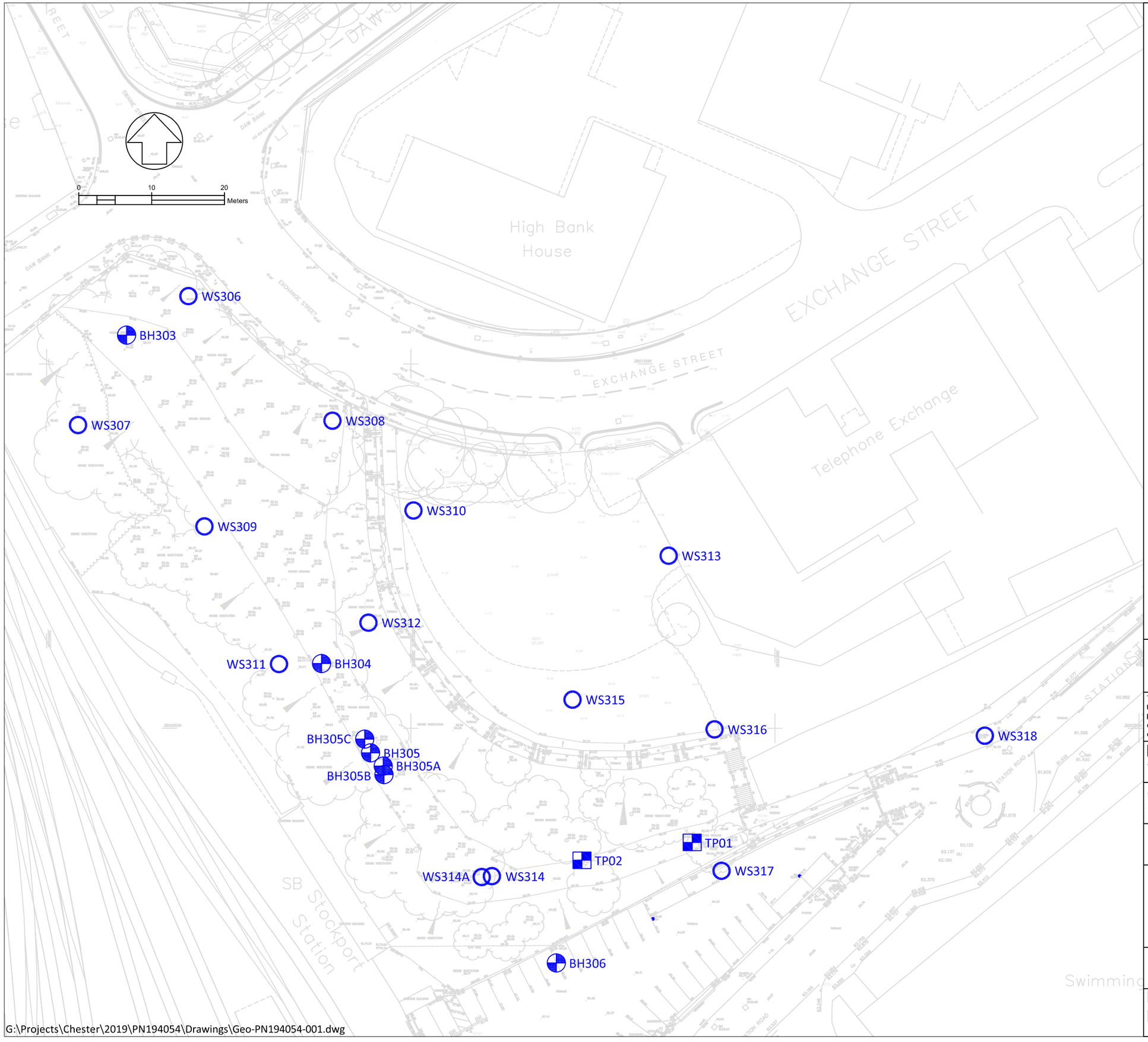
Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

EMT Job No: 20/1035

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.				

APPENDIX 11

Exploratory Hole Location Plan



Key

- Borehole
- Dynamic Sample Borehole
- Trial Pit

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
BH303	389210.98	390103.96	50.6
BH304	389237.76	390058.89	56.7
BH305	389244.48	390046.63	59.1
BH305A	389246.23	390044.81	59.2
BH305B	389246.32	390043.64	59.4
BH305C	389243.68	390048.51	58.9
BH306	389269.79	390017.73	66.6
TP101	389288.65	390034.34	62.7
TP102	389273.51	390031.89	62.5
WS306	389219.47	390109.30	48.7
WS307	389204.32	390091.62	53.6
WS308	389239.25	390092.21	50.1
WS309	389221.68	390077.70	54.6
WS310	389250.38	390079.89	50.8
WS311	389231.91	390058.81	57.6
WS312	389244.19	390064.49	53.5
WS313	389285.41	390073.68	51.8
WS314	389261.15	390029.71	62.7
WS314A	389259.75	390029.58	62.6
WS315	389272.22	390053.93	54.1
WS316	389291.72	390049.86	58.6
WS317	389292.68	390030.45	64.2
WS318	389328.83	390048.98	61.8

GEOTECHNICS
geotechnical and geoenvironmental specialists
The Geotechnical Centre,
Unit 1, Borders Industrial Park,
River Lane, Saltney,
Chester
CH4 8RJ
Phone: 01244 671117
Fax: 01224 671122
E:mail mail@geotechnics.co.uk
www.geotechnics.co.uk

Engineer:
WSP UK Limited

Client:
Transport for Greater Manchester

Project:
Exchange Square , Stockport

Drawing Title:
Exploratory Hole Location Plan

Scale: 1:500@A3

Date:
January 2020

Project No:
PN194054

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APPENDIX 12

Investigation Techniques and General Notes

INVESTIGATION TECHNIQUES

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the UK, summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the simplest yet most effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a back-acting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the trial pits will not have been provided with temporary side support during their construction. Under such circumstances, entrance into the pit is not permitted and hence observations will have been made from the ground surface and samples taken from the excavator bucket.

Where access for personnel is required to allow close observation of the exposed strata, the taking of samples and the carrying out of in situ tests, the sides of the trial pits (Observation Pits in BS 5930:2015) will be made safe using temporary supports or the sides battered back to a stable angle. Some limited access to such Trial Pits (Observation Pits) at depths less than 1m may be allowed in stable conditions or where the sides are benched or battered back to a safe angle.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of in situ test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

The light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well-established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for later removal off site and licensed disposal or, if permitted by the Client, use as backfill. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at the surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.10 metre. The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, in situ Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in denser strata. Small disturbed samples are obtained throughout.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface. Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core type and/or techniques used will depend on the ground conditions. Where open hole rotary drilling is employed, descriptions of strata result from examination at the surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained.

DYNAMIC SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. It was previously called window or windowless sampling. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This was superseded by the use of a thin-walled plastic liner to retrieve the soil sample from within a sampler (windowless sampling) which has a solid wall. Line diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine mounted and the drive tubes are typically in 1m lengths. Depending on the type of rig used, the hole formed can be cased to prevent collapse of the borehole sides. Where the type of rig does not allow the insertion of casing, the success of this technique can be limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 10m can be achieved in suitable circumstances depending on the rig type but depths of 5m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Dynamic Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, in situ test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the Highways Agency to provide a profile of CBR values over a range of depths.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dip meter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.

GENERAL NOTES

1. *The report is prepared for the exclusive use of the Client named in the document and copyright subsists with Geotechnics Limited. Prior written permission must be obtained to reproduce all or part of the report. It is prepared on the understanding that its contents are only disclosed to parties directly involved in the current investigation, preparation and development of the site.*

2. *Further copies may be obtained with the Client's written permission, from Geotechnics Limited with whom the master copy of the document will be retained.*

3. *The report and/or opinion is prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to Geotechnics Limited at that time. Re-consideration will be necessary should those details change. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Geotechnics Limited.*

4. *The assessment of the significance of the factual data, where called for, is provided to assist the Client and their Engineer and/or Advisers in the preparation of their designs.*

5. *The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.*

6. *Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.*

7. *The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.*

8. *The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses and Parts of BS EN ISO 17892 and BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.*

9. *Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.*

10. *Any unavoidable variations from specified procedures are identified in the report.*

11. *Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated*

12. *All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid understanding and assimilation for design purposes. Where all details are required, these can be made available.*

13. *Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.*

14. *The Code of Practice for Ground Investigations – BS 5930:2015 calls for man-made soils to be described as Anthropogenic Ground with soils placed in an un-controlled manner classified as Made Ground and soils placed in a controlled manner as Fill. In view of the difficulty in always accurately determining the origin of man-made soils in exploratory holes, Geotechnics Limited classify such materials as Made Ground. Where soils can be clearly identified as being placed in a controlled manner then further classification of the soils as Fill has been added to the Exploratory Hole Records.*

15. *Classification of man-made soils is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for man-made soils that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.*

16. *The classification of materials as Topsoil is generally based on visual description and should not be interpreted to mean that the material so described complies with the criteria for Topsoil used in BS 3882:2015. Specific testing would be necessary where such a definition is a requirement.*

17. *Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.*

18. *Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.*

19. *Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. Typically they are based on serviceability criteria taking account of an assessment of the shear strength and/or density data obtained by the investigation. The foundations should be designed in accordance with the good practice embodied in BS 8004:2015 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.*

20. *Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.*

21. *The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.*

8 First Street
Manchester
M15 4RP

wsp.com