

Ground Investigation



www.geotechnics.co.uk



STOCKPORT INTERCHANGE

Factual Report

for
Transport for Greater Manchester

Engineer : WSP UK Limited

Project Number PN194052

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

STOCKPORT INTERCHANGE

for
Transport for Greater Manchester

Engineer :
WSP UK Limited

Project No:
PNI94052
February 2020

LIST OF CONTENTS

	Page No
1.0 INTRODUCTION	1
2.0 OBJECT AND SCOPE OF THE INVESTIGATION	1
3.0 PRESENTATION	1
4.0 THE SITE	1
4.1 Location	1
4.2 Description	1
4.3 Site Geology	1
4.4 Hydrogeology	2
5.0 PROCEDURE	2
5.1 Commissioning	2
5.2 General	2
5.3 Dynamic Sample Boreholes with Rotary Follow-on	2
5.4 Dynamic Sample Boreholes	3
5.5 Trial Pits	3
5.6 Instrumentation and Monitoring	3
6.0 LABORATORY TESTING	4
6.1 Geotechnical	4
6.2 Contamination	4

APPENDICES

APPENDIX 1	Site Location Plan
APPENDIX 2	Dynamic Sample/Rotary Follow-on Borehole Records
APPENDIX 3	Rock Core Photographs
APPENDIX 4	Dynamic Sample Borehole Records
APPENDIX 5	Trial Pit Records
APPENDIX 6	Trial Pit Photographs
APPENDIX 7	Monitoring Results
APPENDIX 8	Laboratory Test Results - Geotechnical
APPENDIX 9	Laboratory Test Results - Contamination
APPENDIX 10	Exploratory Hole Location Plan
APPENDIX 11	Investigation Techniques and General Notes

STOCKPORT INTERCHANGE

Project No: PNI94052
February 2020

1.0 INTRODUCTION

A geotechnical and geo-environmental investigation was undertaken by Geotechnics Limited at the site of proposed development works at the existing Stockport Bus Interchange. 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.

This investigation follows an earlier investigation of the site, carried out for the Client by Geotechnics Limited in 2015 to the instructions of AECOM Limited. That investigation formed the basis of a Factual Report (Ref: PNI53428), issued in March 2016.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of this investigation was to obtain further 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 10 of this report. Attention is drawn to the General Notes and Investigation Procedures presented in Appendix II 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 Wood Street northwards to the River Mersey and from Swaine Street eastwards to Mersey Square. The approximate Ordnance Survey National Grid Reference for the centre of the site is SJ 892 902 and an extract from the relevant 1:50,000 Scale O.S. Map is included as Appendix I.

4.2 Description

The site is irregular in shape with maximum dimensions of approximately 120m (north-west to south-east) and 220m (north-east to south-west). The River Mersey bounds the northernmost part of the site. Ground levels across the site generally fall towards the river, such that levels fall from around 47mOD on Wood Street to around 42mOD on the banks of the River Mersey.

The site comprises Stockport Bus Station which remained operational at the time of the investigation works. The A6 Wellington Road crosses the easternmost part of the site on a viaduct which trends roughly north-west to south-east. Beyond this viaduct lies the primarily hard landscaped public open space of Mersey Square. The River Mersey flows in culvert below Mersey Square.

The Site is bounded to the north by the River Mersey, to the east/south-east by Mersey Square and Wood Street and to the west by Swaine Street.

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 Glacial Till (recorded on the map as Boulder Clay).

Towards the River Mersey, River Terrace Deposits are indicated (recorded on the map as First Terrace).

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-north-west to south-south-east trending fault is shown approximately 150m west of Swaine Street, the strata to the east of this fault being downthrown. The conjectured trace of a second fault is shown approximately 200m to the east of the site. This fault trends roughly parallel to the other fault and the strata to the east are again 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 9th January 2020, shows the Glacial Till to be classed as a Secondary (undifferentiated) Aquifer. The River Terrace Deposits are shown to be classed as a Secondary A Aquifer whilst 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 10.

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

Three (3 No.) boreholes (numbered BH301, BH302A and BH302B), up to 120mm in diameter, were sunk utilising a combination of dynamic sampling and rotary coring techniques to depths ranging between 6.90m (BH302A) and 25.10m (BH301) below ground level. Borehole 302A was terminated at a depth of 6.90m below ground level due to poor core recovery and the rig was moved to a revised location (BH302B). A fourth borehole (BH302) was terminated within the inspection pit on encountering a concrete obstruction and the rig was moved to a revised location (BH302A). The work was carried out between 11th and 21st November 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 3.80m (BH302A) and 4.00m (BH301 and BH302B) below ground level. The drilling equipment used in the

rotary sections of the boreholes on this particular contract utilised water 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.

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. Where water was added it has been noted on the Borehole Records.

The boreholes were backfilled with bentonite on completion and the surface reinstated with concrete.

5.4 Dynamic Sample Boreholes

Seven (7 No.) Dynamic Sample Boreholes (numbered WS301 to WS305, WS301A and WS302A) were undertaken at the site to depths ranging between 0.45m (WS301) and 5.22m (WS305) below ground level. WS301 and WS302 were both terminated on encountering obstructions and the rig was moved to revised locations WS301A and WS302A, respectively. The work was carried out between 11th and 14th 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 WS301A, WS303 and WS305 (see Section 5.5). The other boreholes were backfilled with bentonite and their inspection pits were filled with arisings.

5.5 Trial Pits

Four (4 No.) Trial Pits (numbered TP301 to TP304) were each excavated to a depth of 1.20m below ground level using hand tools on 15th 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)
WS301A	1.00 to 2.50
WS303	1.00 to 3.00
WS305	1.00 to 4.00

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

On each of the monitoring visits a record of the groundwater level in the standpipes was obtained. 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 CH₄, O₂, CO₂, along with (ppm) H₂S, 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

6 No. Water Content Determination

BS EN ISO 17892-4:2016

1 No. Particle Size Distribution Determination – Sieving Method

BS EN ISO 17892-8:2018

3 No. Unconsolidated Undrained Triaxial Test

BS EN ISO 17892-12:2018

5 No. Determination of Liquid and Plastic Limits

BS 1377:1990

Test No.	Test Description
Part 3	
5.3, 5.5	5 No. Sulphate Analysis - Water Extract
9.5	5 No. pH Determination

ISRM Testing Methods

85 No. Point Load Determination

The following testing was carried out at the laboratories of Derwentside Environmental Testing

Services Limited (UKAS Accredited Laboratory, Number 2139).

1 No. Asbestos Screen

1 No. Soluble Sulphate

1 No. pH

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

ASTM Testing Methods

5 No. Uniaxial Compressive Strength Determination

15 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.

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



© Crown Copyright Reserved, OS License Number: 100020449

STOCKPORT INTERCHANGE
for
Transport for Greater Manchester

GEOTECHNICS
geotechnical and geoenvironmental specialists

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 Mexecon 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

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
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)	

BOREHOLE RECORD - Dynamic Sampler and Rotary

Project **STOCKPORT INTERCHANGE GROUND INVESTIGATION** Engineer **WSP** Borehole **BH301**
 Project No **PN194052**

Client **WSP** National Grid Coordinates **389226.0 E 390150.7 N** Ground Level **45.37 m OD**

Sampling			Properties			Strata		Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (F)	Description	Depth	Legend	Level m OD	
0.20- 1.00	B					MADE GROUND: Red block paving.	G.L.		45.37	
0.20	D					MADE GROUND: Black fine to coarse sand.	0.10		45.27	
0.20	ES						0.15		45.22	
0.50	D					MADE GROUND: Grey concrete.	0.30		45.07	
0.50	ES									
1.00- 1.20	B					MADE GROUND: Brown very sandy slightly clayey angular to subangular fine to coarse gravel of limestone. (Sub base). Below 0.60m, greyish brown.	1.00		44.37	
1.10	D									
1.10	ES									
1.20- 1.50	B	(ADDED)			S15	MADE GROUND: Medium dense brown mottled grey gravelly silty fine to medium sand. Gravel is angular to subangular fine to coarse of siltstone, sandstone and limestone.	1.50		43.87	
1.20	D									
1.20- 1.65	D									
1.50- 1.70	B									
1.70	ES									
1.90- 2.20	B					MADE GROUND: Brown slightly clayey fine to coarse sand with some rootlets (Relict Topsoil). At 1.70m, pocket of angular to subangular fine to coarse gravel of coal. Below 1.80m, brown mottled red.	1.90		43.47	
2.00	D									
2.00	ES									
2.10	HV		Av=106	16						
2.20- 2.70	B					MADE GROUND: Firm to stiff light yellowish brown mottled grey very sandy CLAY with some rootlets.	2.20		43.17	
2.20	D									
2.20- 2.65	D	(ADDED)			S25	Medium dense light yellowish brown mottled grey slightly silty fine to medium SAND.	2.70		42.67	
2.50	D									
2.50	ES									
2.70- 3.20	B					Firm to stiff grey mottled orange slightly sandy CLAY with many rootlets. Below 3.20m, grading to slightly sandy clayey silt.	3.60		41.77	
3.00	D									
3.10	HV		Av=51	8.7						
3.20- 3.65	UT	3.20	120	21		Light grey slightly silty fine to medium SAND.	3.80		41.57	
3.65- 3.80	D						4.00		41.37	
3.80- 4.00	D					Extremely weak reddish brown fine to coarse grained SANDSTONE. (Recovered as sand and gravel).				
3.80	D									
4.00- 4.11	#	3.20 (ADDED)			S50/31					
Core Run/Depth (Core Dia/Time)						Continued by Rotary techniques General		Detail		
4.00- 5.00 (92mm)	3.20 (ADDED)	98	0.29	71	(4)	Very weak to weak reddish brown fine to coarse grained SANDSTONE with occasional horizontal to subhorizontal black bands (up to 10mm thick). Discontinuities are horizontal to subhorizontal, very closely to closely spaced, occasionally medium spaced, undulating, smooth, clean.	Between 5.00-6.30m, no recovery.			
4.73- 4.85	83	0.04								
5.00- 6.50 (92mm)	3.20 (ADDED)	13	0.09	0	(NR)		Between 6.50-7.10m, no recovery.			
5.00- 5.09	7	0.01								
6.50- 7.50 (92mm)	3.20 (ADDED)	38	0.05	0	(NR)					
6.50- 6.59	20	0.01			C50/16					
7.50- 7.50	3.20 (ADDED)	78	0.13	23	(NI)		Between 7.30-7.50m, recovered as gravel.			
7.50- 7.59	49	0.02								
7.97- 8.09	C				(10)					
8.50- 9.50 (92mm)	3.20 (ADDED)	36	0.13	23	(8)		At 8.20m, subhorizontal black band (10mm thick).			
8.50- 8.59	36	0.05			C50/17					
8.60- 8.70	C									
9.50-10.50 (92mm)	3.20 (ADDED)	35	0.07	0	(NR)					
9.50- 9.58	23	0.03			C50/9					

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	JB/SW	G.I.			11/11/19	08:00						Possible inflows masked by drilling flush.
4.00	0.10	Dynamic Sampler	JB/SW	2.65	2.20	DRY	11/11/19	18:00						
25.10	0.09	Rotary Core	JB/SW	2.65	2.20	DRY	12/11/19	08:00						
				10.70	3.20	4.80	12/11/19	18:00						
				10.70	3.20	4.20	13/11/19	08:00						
				20.10	3.20	7.40	13/11/19	18:00						

Remarks Inspection pit hand excavated to 1.20m depth and no services were found.
 ABSES 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: bentonite seal up to 1.20m, arisings up to 0.20m, concrete up to ground level.
 Flush: 4.00-6.50m, Water, 100% returns; 6.50-8.50m, Water, 80% returns; 8.50-10.50m, Water, 70% returns; 10.50-11.50m, Water, 80% returns; 11.50-14.50m, Water, 70% returns; 14.50-15.50m, Water, 50% returns; 15.50-16.50m, Water, 100% returns; 16.50-17.50m, Water, 70% returns; 17.50-20.00m, Water, 60% returns; 20.00-20.50m, Water, 50% returns; 20.50-23.50m, Water, 100% returns; 23.50-25.00m, Water, 50% return.
 Logged in accordance with BS930:2015

Logged by **PC**
 Figure **1 of 3**
 23/01/2020


geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION Engineer WSP Borehole BH301 Project No PN194052
 Client WSP National Grid Coordinates 389226.0 E 390150.7 N Ground Level 45.37 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 (F)	Description General	Description Detail	Depth	Legend	Level m OD
					(17)					
10.50-11.50 (92mm)	3.20 (ADDED)	75	0.20	56	(NI)		Between 10.50-10.80m, many non-intact bands, recovered as gravel. Below 10.80m, discontinuities are horizontal to subhorizontal, closely to medium spaced, planar occasionally undulating, smooth, clean. Between 11.50-11.70m, subhorizontal black bands (up to 5mm thick). Between 12.10-12.30m, subhorizontal black bands (up to 5mm thick). Between 13.00-20.50m, many non-intact bands, recovered as gravel. Below 13.00m, discontinuities are horizontal to subhorizontal, extremely closely to very closely spaced, planar, rough, clean. Between 20.00-20.50m, no recovery.			
10.50-10.59	3.20 (ADDED)	70	0.03		C50/16					
10.60-10.70		C			(8)					
11.50-13.00 (92mm)	3.20 (ADDED)	92	0.29	80						
11.79-11.90		89	0.06		(5)					
13.00-14.50 (92mm)	3.20 (ADDED)	23	0.11	7						
14.22-14.38		17	0.04		(14)					
14.50-15.50 (92mm)	3.20 (ADDED)	7	0.07	0						
14.50-14.60	3.20 (ADDED)	7	0.07		C50/21					
15.50-16.50 (92mm)	3.20 (ADDED)	33	0.03	0						
15.50-15.59	3.20 (ADDED)	3	0.01		(>30) C50/19					
16.50-17.50 (92mm)	3.20 (ADDED)	43	0.13	13						
16.70-16.82		22	0.01		(12)					
16.50-16.61	3.20 (ADDED)	C			C50/32					
17.50-18.50 (92mm)	3.20 (ADDED)	9	0.06	0						
17.50-17.59	3.20 (ADDED)	6	0.01		(11) C50/13					
18.50-19.50 (92mm)	3.20 (ADDED)	14	0.01	0						
18.50-18.60	3.20 (ADDED)	0	0.01		C50/21 (>30)					
19.50-20.00 (92mm)	3.20 (ADDED)	76	0.08	0						
19.50-19.60	3.20 (ADDED)	28	0.01		C50/29					
19.90-19.99		C								

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
				20.10	3.20	8.30	14/11/19	08:00						
				25.10	8.50	8.50	14/11/19	18:00						

Remarks 

Symbols and abbreviations are explained on the accompanying key sheet.
 All dimensions are in metres. Logged in accordance with BS5930:2015

Logged by PC
 Figure 2 of 3
 23/01/2020




BOREHOLE RECORD - Dynamic Sampler and Rotary

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION Engineer WSP Borehole BH301 Project No PN194052
 Client WSP National Grid Coordinates 389226.0 E 390150.7 N Ground Level 45.37 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
20.00-20.50 (92mm)	3.20 (ADDED)	0			(NR)					
20.00-20.10	3.20 (ADDED)				C50/27		Below 20.50m, discontinuities are horizontal to subhorizontal, closely spaced occasionally very closely spaced, planar, rough, clean. Some extremely weak bands.			
20.50-21.00 (92mm)	3.20 (ADDED)	84	0.21	42	(5)					
20.74-20.82		66	0.02		C50/9					
20.50-20.58	3.20 (ADDED)	C								
21.00-22.00 (92mm)	3.20 (ADDED)	100	0.20	68	(NI)		Between 21.70-22.00m, sand infill in discontinuities. Between 22.00-22.70m, no recovery.			
21.00-21.20		82	0.02		(NR)					
22.00-23.50 (92mm)	3.20 (ADDED)	50	0.17	18	(10)		Below 22.70m, discontinuities are horizontal, very closely to closely spaced, undulating, rough, clean.			
22.00-22.10		50	0.04							
22.00-22.10		C								
23.50-25.00 (92mm)	3.20 (ADDED)	54	0.29	38	(NR)		Between 23.50-24.15m, no recovery.			
23.50-23.61	3.20 (ADDED)	52	0.04		C50/30					
23.78-23.89		C			(12)					
24.50-24.68		C					Below 24.50m, discontinuities are horizontal, closely to medium spaced, planar, rough, clean.			
24.87-25.00		C			(4)					
25.00-25.10	3.20 (ADDED)				C50/20	End of Borehole		25.10		20.27

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 PC
 Figure 3 of 3
 23/01/2020



TRIAL PIT RECORD

Inspection Pit

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Engineer WSP

Trial Pit **BH302**
Project No PN194052

Client WSP

National Grid Coordinates 389218.9 E
390142.5 N

Ground Level 45.64 m OD

Samples and Tests				Strata		Scale 1:50	
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.00- 0.30	B			<p>MADE GROUND: Black tarmacadam.</p> <hr/> <p>MADE GROUND: Pinkish brown sandy slightly clayey angular to subangular fine to coarse gravel of limestone and sandstone. (Sub base).</p> <p>Below 0.15m, greyish brown.</p> <p>At 0.30m, blue geotextile.</p> <hr/> <p>MADE GROUND: Light greyish brown sandy slightly clayey angular to subangular fine to coarse gravel of limestone and sandstone. (Sub base).</p> <p>At 0.60m, concrete obstruction.</p> <p style="text-align: center;">End of Excavation</p>	G.L.		45.64
0.20	ES				0.10		45.54
0.30- 0.60	B				0.30		45.34
0.50	ES				0.60		45.04

Excavation				Groundwater		
Plant	Hand tools.	Width (B)	0.40	Depth Observed	Depth of Pit	Details
Date	11/11/2019	Length (C)	0.40			None encountered.
Shoring	None.	Date Backfilled	11/11/2019			
Stability	stable during excavation.					

Remarks Inspection pit hand excavated to 0.60m 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.
 Inspection Pit terminated at 0.60m depth on encountering a concrete obstruction - rig was moved to BH302A.
 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 PC
Figure 1 of 1
23/01/2020

BOREHOLE RECORD - Dynamic Sampler and Rotary

Project	STOCKPORT INTERCHANGE GROUND INVESTIGATION	Engineer	WSP	Borehole	BH302A
				Project No	PN194052
Client	WSP	National Grid Coordinates	389219.8 E 390145.1 N	Ground Level	45.47 m OD

Sampling			Properties			Strata		Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (F)	Description	Depth	Legend	Level m OD	
0.20- 0.80	B					MADE GROUND: Red block paving.	G.L.		45.47	
0.20	D					MADE GROUND: Grey concrete.	0.10		45.37	
0.50	ES						0.20		45.27	
0.50	ES					MADE GROUND: Grey very sandy angular to subangular medium to coarse gravel of limestone. (Sub base).				
0.80- 1.00	B						0.80		44.67	
1.00- 1.20	B					MADE GROUND: Loose brown mottled red gravelly fine to medium sand. Gravel is angular to subangular fine to coarse of sandstone, limestone, concrete and brick fragments.				
1.00	D					Below 1.00m, sand includes ash.				
1.00	ES									
1.10	D									
1.20- 1.60	B									
1.20- 1.65	D									
1.60- 1.80	B									
1.70	ES									
1.90- 2.20	B					Firm grey mottled orange slightly gravelly sandy CLAY with some rootlets. Gravel is subangular to subrounded fine to medium of siltstone and sandstone.	1.90		43.57	
2.00	ES					Below 2.20m, grading to slightly gravelly sandy clayey silt.				
2.20- 2.80	D									
2.20- 2.65	UT	2.20	74	8.6	11					
2.80- 3.00	D						2.80		42.67	
3.00	D					Grey mottled orange clayey fine to medium SAND.				
3.00	ES						3.10		42.37	
						Stiff to very stiff greyish brown mottled orange slightly sandy CLAY with some decayed rootlets.				
3.60	D					Below 3.40m, grey mottled orange.				
3.60	ES									
3.80- 4.25	D						3.80		41.67	
Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (F)	Continued by Rotary techniques General		Detail		
3.80- 4.80 (92mm)	3.80 (ADDED)	73	0.31	46	(20)	Extremely weak reddish brown fine to coarse grained SANDSTONE.			4.25	
4.30- 4.43		55	0.02		(4)	(Recovered as sand and gravel).				
					(NR)					
4.80- 5.80 (92mm)	3.80 (ADDED)	0				Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.		Between 4.80-6.80m, no recovery.		
4.80- 4.89	3.80					Discontinuities are horizontal and subhorizontal, closely spaced, planar, rough with occasional sand infill.				
5.80- 6.30 (92mm)	3.80 (ADDED)	0								
5.80- 5.90	3.80									
6.30- 6.80 (92mm)	3.80 (ADDED)	0								
6.30- 6.41	3.80					End of Borehole				
6.80- 6.90	3.80								38.57	

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	JB/SW	G.I.			15/11/19	08:00						Possible inflows masked by drilling flush.
3.80	0.10	Dynamic Sampler	JB/SW	6.90	6.00	4.20	15/11/19	18:00						
6.90	0.09	Rotary Core	JB/SW											

Remarks Inspection pit hand excavated to 1.20m depth and no services were found. Logged by PC
 ABS sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub. Figure 1 of 1
 Borehole terminated at 6.90m depth due to poor core recovery - the rig was moved to BH302B. 23/01/2020
 Backfill details from base of hole: bentonite seal up to 0.20m, concrete up to ground level.
 Flush: 3.80-6.80m, Water, 100% return.

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 and Rotary

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION **Engineer** WSP **Borehole** BH302B
Client WSP **National Grid Coordinates** 389219.2 E 390145.7 N **Project No** PN194052
Ground Level 45.47 m OD

Sampling		Properties			Strata		Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (F)	Description	Depth	Legend	Level m OD
0.20- 0.80	B					MADE GROUND: Red block paving. MADE GROUND: Grey concrete.	G.L. 0.10 0.20		45.47 45.37 45.27
0.80- 1.20	B					MADE GROUND: Light grey very sandy angular to subangular medium to coarse gravel of limestone. (Sub base).	0.80		44.67
1.20- 1.70	B					MADE GROUND: Medium dense dark brown mottled red very gravelly slightly silty fine to medium sand with a low cobble content. Gravel is subangular to subrounded fine to coarse of siltstone, sandstone, ash and brick fragments.			
1.20- 1.65	D	(DRY)			S15		1.70		43.77
1.70- 2.00	B						2.00		43.47
2.00- 2.20	D								
2.20- 2.80	UT		85	12		MADE GROUND: Firm brown slightly gravelly sandy clay. Gravel is angular to subrounded fine to coarse of siltstone, sandstone, coal and brick fragments.			
2.60- 2.80	D					Firm grey mottled orange slightly gravelly sandy CLAY with some fine rootlets. Gravel is subangular to subrounded fine to medium of sandstone and quartzite. Below 2.20m, grading to slightly gravelly sandy clayey silt.			
2.80- 3.10	D						2.80		42.67
2.80- 3.25	D	(DRY)			S17		3.10		42.37
3.10- 3.40	B								
3.30- 3.30	D					Medium dense grey mottled orange clayey fine to medium SAND.			
3.30- 3.30	HV		Av=79	21					
3.40- 4.00	B								
3.60- 3.60	D								
3.70- 3.70	HV		Av=63			Stiff light brown mottled orange slightly sandy CLAY with some decayed rootlets. Below 3.40m, grey mottled orange.			
3.80- 4.00	D	(DRY)			S50/15		4.00		41.47
3.80- 3.89	D								
							4.25		41.22
Core Run/Depth (Core Dia/Time)		Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (F)	Continued by Rotary techniques General		Detail
4.00- 4.50 (102mm)	4.00	100	0.15	76	(8)	(NI)	Extremely weak reddish brown fine to coarse grained SANDSTONE. (Recovered as sand and gravel).		
4.15- 4.26	(ADDED)	100	0.05						
4.50- 5.50 (102mm)	4.00	58	0.13	13	(NR)	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE with occasional clasts of quartzite. Discontinuities are horizontal to subhorizontal, very closely to closely spaced, planar and undulating, rough with some sand and gravel infill (up to 10mm thick).	Between 4.75-4.90m, non-intact. Between 5.50-7.00m, no recovery.		
4.50- 4.65	(ADDED)	27	0.01						
4.65- 4.78	(ADDED)	C							
5.50- 6.50 (102mm)	4.00	0							
5.50- 5.59	(ADDED)				C50/19				
6.50- 7.00 (102mm)	4.00	0			C50/23				
6.50- 6.60	(ADDED)								
7.00- 8.00 (102mm)	7.00	0			C50/29				
7.00- 7.10	(ADDED)								
8.00- 9.00 (102mm)	7.00	0			C50/16	(NI)			
8.00- 8.09	(ADDED)								
9.00-10.00 (102mm)	7.00	75	0.22	22	C50/22 (16)		Below 9.20m, discontinuities are closely to medium spaced with some sand and gravel infill.		
9.00- 9.10	(ADDED)	44	0.05						
9.74- 9.90	(ADDED)	C							
9.90-10.00	(ADDED)	C							

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	JB/SW	G.I.			18/11/19	08:00						Possible inflows masked by drilling flush.
4.00	0.10	Dynamic Sampler	JB/SW	2.20		DRY	18/11/19	18:00						
25.00	0.12	Rotary Core	JB/SW	2.20		DRY	19/11/19	08:00						
				7.20	4.00	ADDED	19/11/19	18:00						
				7.20	4.00	ADDED	20/11/19	08:00						
				16.00	7.00	7.20	20/11/19	18:00						

Remarks Inspection pit hand excavated to 1.20m depth and no services were found. Logged by PC
 ABS sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub. Figure 1 of 3
 Backfill details from base of hole: bentonite seal up to 0.20m, concrete up to ground level. 23/01/2020
 Flush: 4.00-5.50m, Water, 100% returns; 5.50-7.00m, Water, 60% returns; 7.00-9.00m, Water, 70% returns; 9.00-10.00m, Water, 60% returns; 10.00-11.00m, Water, 70% returns; 11.00-12.00m, Water, 80% returns; 12.00-16.00m, Water, 70% returns; 16.00-19.50m, Water, 80% returns; 19.50-20.50m, Water, 70% returns; 20.50-25.00m, Water, 100% return.

All dimensions are in metres. Logged in accordance with BS5930:2015

BOREHOLE RECORD - Dynamic Sampler and Rotary

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Engineer WSP

Borehole Project No BH302B PN194052


Client WSP

National Grid Coordinates 389219.2 E 390145.7 N

Ground Level 45.47 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 (F)	Description General	Description Detail	Depth	Legend	Level m OD
10.00-11.00 (102mm)	7.00 (ADDED)	53	0.35	35	(NR)	C50/15 (10) (3)	Below 11.00m, very weak to weak. Between 11.45-11.60m, non-intact. Below 12.20m, discontinuities are extremely closely spaced. Below 12.45m, discontinuities are very closely to closely spaced. Below 14.40m, some black staining on fracture surfaces. Between 15.85-15.95m, band of very weak mudstone. Between 15.90-17.50m, non-intact. Between 18.30-18.50m, micaceous. Between 18.50-19.50m, non-intact Between 19.50-19.90m, no recovery.			
10.00-10.09 (ADDED)	7.00 (ADDED)	43	0.08							
10.64-10.80		C								
11.00-12.00 (102mm)	7.00 (ADDED)	90	0.27	38	(3)					
11.00-11.08 (ADDED)	7.00 (ADDED)	70	0.04		C50/9					
11.39-11.47		C			(11)					
12.00-13.00 (102mm)	7.00 (ADDED)	100	0.18	59	(5)					
12.00-12.13		72	0.02		(48)					
12.00-12.09 (ADDED)	7.00 (ADDED)	C			C50/13					
12.70-12.83		C			(10)					
13.00-14.50 (102mm)	7.00 (ADDED)	82	0.21	40	(NR)	(14)				
13.43-13.52		C								
14.00-14.20		C			(4)					
14.50-16.00 (102mm)	7.00 (ADDED)	96	0.17	30	(10)					
15.00-15.10		C			(28)	(7)				
15.28-15.45		C								
15.73-15.87		C			(14)					
16.00-17.50 (102mm)	7.50 (ADDED)	0			(NI)	(>50)				
17.50-18.50 (102mm)	7.50 (ADDED)	22	0.08	0	(NI)	C50/21				
17.50-17.60 (ADDED)	7.50 (ADDED)	15	0.05							
18.40-18.50		C			(20)					
18.50-19.50 (102mm)	7.50 (ADDED)	0			(NI)	C50/24				
18.50-18.60 (ADDED)	7.50 (ADDED)									
19.50-20.50 (102mm)	7.50 (ADDED)	60	0.06	0	(NR)	C50/17				
19.50-19.57		25	0.03							
19.50-19.59 (ADDED)	7.50 (ADDED)	C								

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
				16.00	7.00	8.20	21/11/19	08:00						
				20.70	7.50	6.30	21/11/19	18:00						
				20.50	7.50	3.10	22/11/19	08:00						
				25.00	25.00	4.20	22/11/19	18:00						


Remarks 

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres. Logged in accordance with BS5930:2015

Logged by PC

Figure 2 of 3
23/01/2020




BOREHOLE RECORD - Dynamic Sampler and Rotary

Project **STOCKPORT INTERCHANGE GROUND INVESTIGATION** Engineer **WSP** Borehole **BH302B**
 Project No **PN194052**
 Client **WSP** National Grid Coordinates **389219.2 E 390145.7 N** Ground Level **45.47 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
20.47-20.50		C			(>50)					
20.50-21.50 (102mm)	7.50 (ADDED)	0					Between 20.50-23.50m, non-intact			
20.50-20.59	7.50 (ADDED)				C50/17					
21.50-22.50 (102mm)	21.50 (ADDED)	0								
21.50-21.61	21.50 (ADDED)				(NI) C50/33					
22.50-23.50 (102mm)	22.50 (ADDED)	0								
22.50-22.60	22.50 (ADDED)				C50/28					
23.50-25.00 (102mm)	23.50 (ADDED)	97	0.20	34	(13)		Below 23.80m, discontinuities are very closely to closely spaced.			
23.50-23.58		65	0.02				Between 24.10-24.35m, vertical discontinuity, stepped, rough.			
23.50-23.61	23.50 (ADDED)	C			C50/31 (6)		Below 24.60m, extremely weak. Some sand and gravel infill in discontinuities.			
23.84-23.93		C			(6)					
24.00-24.13		C			(NI)					
					(>50)					
25.00-25.10	25.00 (ADDED)				C50/24	End of Borehole		25.00		20.47


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 **PC**
 Figure **3 of 3**
 23/01/2020



Fieldwork Results - SPT Results Summary

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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		
BH301	1.20	44.17	S	-	7	5	5	4	3	3	15		*					
BH301	2.20	43.17	S	-	7	6	7	5	7	6	25			*				
BH301	4.00	41.37	S	-	25		50/31				50/31							∨
BH301	6.50	38.87	C	-	25		50/16				50/16							∨
BH301	7.50	37.87	C	-	25		50/11				50/11							∨
BH301	8.50	36.87	C	-	25		50/17				50/17							∨
BH301	9.50	35.87	C	-	25		50/9				50/9							∨
BH301	10.50	34.87	C	-	25		50/16				50/16							∨
BH301	14.50	30.87	C	-	25		50/21				50/21							∨
BH301	15.50	29.87	C	-	25		50/19				50/19							∨
BH301	16.50	28.87	C	-	25		50/32				50/32							∨
BH301	17.50	27.87	C	-	25		50/13				50/13							∨
BH301	18.50	26.87	C	-	25		50/21				50/21							∨
BH301	19.50	25.87	C	-	25		50/29				50/29							∨
BH301	20.00	25.37	C	-	25		50/27				50/27							∨
BH301	20.50	24.87	C	-	25		50/9				50/9							∨
BH301	23.50	21.87	C	-	25		50/30				50/30							∨
BH301	25.00	20.37	C	-	25		50/20				50/20							∨
Driller			James Boyd				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005											
Hammer No.			6457 (6)															
Energy Ratio, Er (%)			66.00															
Calibration Date			01/08/2019															

-/- 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 STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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	
BH302A	1.20	44.27	S	-	4	4	2	3	2	1	8	*					
BH302A	3.80	41.67	S	-	1	1	2	13	16	17	48						*
BH302A	4.80	40.67	C	-	25		50/17				50/17						∇
BH302A	5.80	39.67	C	-	25		50/22				50/22						∇
BH302A	6.30	39.17	C	-	25		50/31				50/31						∇
BH302A	6.80	38.67	C	-	25		50/26				50/26						∇
Driller			James Boyd				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005										
Hammer No.			6457 (6)														
Energy Ratio, Er (%)			66.00														
Calibration Date			01/08/2019														

-/- 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 STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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		
BH302B	1.20	44.27	S	-	4	4	4	5	3	3	15		*					
BH302B	2.80	42.67	S	-	5	4	3	4	4	6	17		*					
BH302B	3.80	41.67	S	-	25		50/15				50/15							∨
BH302B	5.50	39.97	C	-	25		50/19				50/19							∨
BH302B	6.50	38.97	C	-	25		50/23				50/23							∨
BH302B	7.00	38.47	C	-	25		50/29				50/29							∨
BH302B	8.00	37.47	C	-	25		50/16				50/16							∨
BH302B	9.00	36.47	C	-	25		50/22				50/22							∨
BH302B	10.00	35.47	C	-	25		50/15				50/15							∨
BH302B	11.00	34.47	C	-	25		50/9				50/9							∨
BH302B	12.00	33.47	C	-	25		50/13				50/13							∨
BH302B	17.50	27.97	C	-	25		50/21				50/21							∨
BH302B	18.50	26.97	C	-	25		50/24				50/24							∨
BH302B	19.50	25.97	C	-	25		50/17				50/17							∨
BH302B	20.50	24.97	C	-	25		50/17				50/17							∨
Driller			James Boyd				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005											
Hammer No.			6457 (6)															
Energy Ratio, Er (%)			66.00															
Calibration Date			01/08/2019															

-/- 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

Rock Core Photographs

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH301 1.20m - 3.20m



BH301 4.00m - 8.50m

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH301 8.50m - 12.50m



BH301 12.50m - 20.50m

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH301 20.50m - 23.00m



BH301 23.00m - 25.00m

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH302A 1.20m - 3.80m



BH302A 3.80m - 4.80m

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH302B 1.20m - 3.80m



BH302B 4.00m - 9.00m

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH302B 9.00m - 11.00m



BH302B 11.00m - 13.00m

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH302B 13.00m - 15.00m



BH302B 15.00m - 19.50m

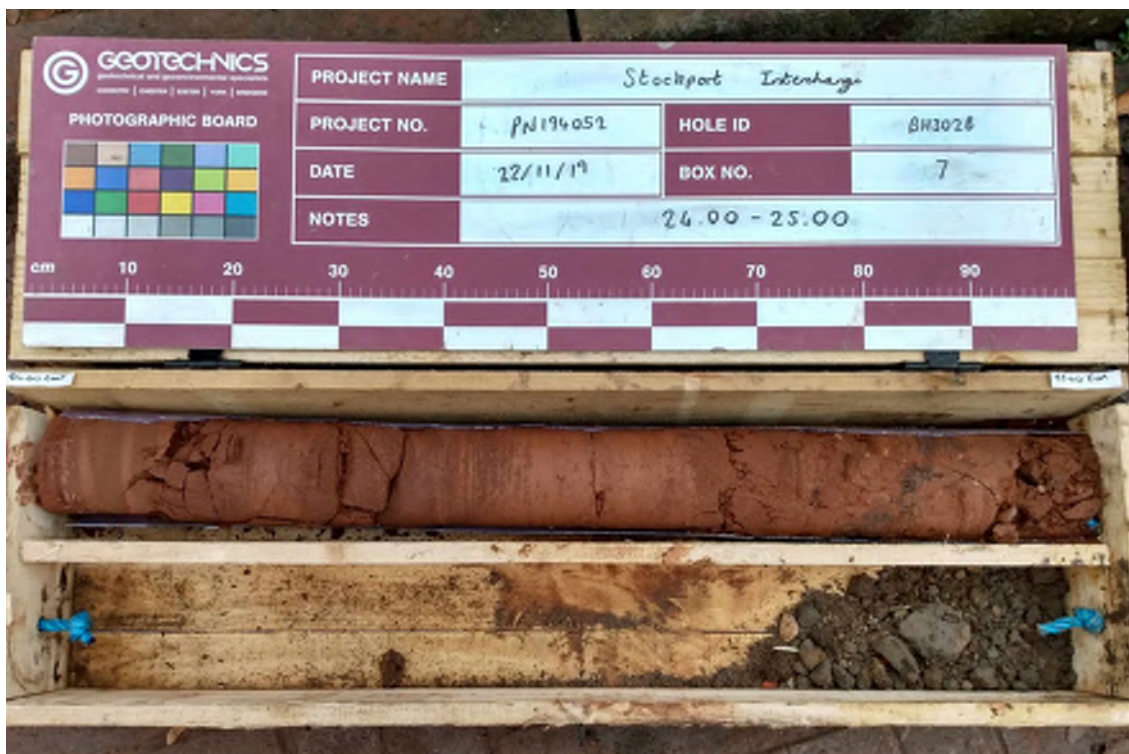
PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



BH302B 19.50m - 24.00m



BH302B 24.00m - 25.00m

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 Mexecon 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

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
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)	

BOREHOLE RECORD - Dynamic Sampler

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION


Engineer WSP

Borehole Project No **WS301**
PN194052

Client WSP

National Grid Coordinates 389178.0 E
390264.8 N

Ground Level 42.95 m OD

Sampling			Properties		Strata		Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	Description		Depth	Legend	Level m OD
0.20	ES				Grass over TOPSOIL: Dark brown slightly gravelly clayey fine to coarse sand with some rootlets. Gravel is angular to subangular fine to medium of ceramic, glass and brick fragments. MADE GROUND: Dark brown gravelly slightly clayey fine to coarse sand. Gravel is angular to subangular fine to coarse of sandstone, slag, concrete and brick fragments. MADE GROUND: Greyish yellow concrete. At 0.45m, obstruction. End of Borehole		G.L.		42.95
0.40	ES						0.10		42.85
							0.40		42.55
							0.45		42.50


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
0.45	0.40	Inspection Pit	GM/MM	G.I. 0.45		DRY	11/11/19 11/11/19	08:00 18:00						None encountered.

Remarks Inspection pit hand excavated to 0.45m depth and no services were found.
 ABS sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
 Inspection Pit terminated at 0.45m depth on encountering an obstruction - the rig was moved to WS301A.
 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
 23/01/2020



BOREHOLE RECORD - Dynamic Sampler

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION Engineer WSP Borehole Project No WS301A PN194052
 Client WSP National Grid Coordinates 389178.5 E 390265.4 N Ground Level 42.91 m OD

Sampling			Properties			Strata			Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD		
0.20	D					Grass over TOPSOIL: Dark brown slightly gravelly clayey fine to coarse sand with some rootlets. Gravel is angular to subangular fine to coarse of concrete and brick fragments.	G.L.		42.91		
0.20	ES				0.10		42.81				
0.40	ES				0.40		42.51				
0.50- 1.20	B				1.20		41.71				
1.00	D				MADE GROUND: Dark brown mottled orange gravelly slightly clayey fine to coarse sand with a low cobble content of bricks. Gravel is angular to subangular fine to coarse of concrete and brick fragments. Sand includes ash.	1.20		41.71			
1.00	ES			S4							
1.20- 1.65	D				MADE GROUND: Yellow sandy angular to subangular fine to coarse gravel of limestone. Between 0.40-1.20m, concrete foundation encountered - inspection pit extended 0.20m to east.	1.20		41.71			
1.50- 1.70	D			S4							
1.90	ES			S23							
2.00- 2.45	D				MADE GROUND: Very loose to loose dark brown mottled orange gravelly slightly clayey fine to coarse sand. Gravel is angular to subangular fine to coarse of clinker, slag, coal, concrete and brick fragments. Sand includes ash. Below 1.80m, low cobble content of bricks. Below 2.00m, medium dense. Between 2.20-2.40m, band of soft slightly gravelly clay.	1.20		41.71			
2.00	D			S23							
2.50- 2.95	D			S23							
2.50	ES				At 3.44m, obstruction - probable cobble.	3.44		39.47			
3.00- 3.44				S50/290							
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.I.			11/11/19	08:00						None encountered.
3.44	0.10	Dynamic Sampler	GM/MM	3.44		DRY	11/11/19	18:00						

Remarks Inspection pit hand excavated to 1.20m depth and no services were found. ABS sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub. Borehole terminated at a depth of 3.44m on encountering an obstruction - probable cobble. A 50mm standpipe was installed to 2.50m with a geowrapped slotted section from 1.00m to 2.50m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 2.50m, 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

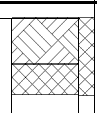
Logged by MM
 Figure 1 of 1
 23/01/2020





BOREHOLE RECORD - Dynamic Sampler

Project **STOCKPORT INTERCHANGE GROUND INVESTIGATION** Engineer **WSP** Borehole Project No **WS302** PN194052

Client **WSP** National Grid Coordinates **389190.5 E 390272.5 N** Ground Level **42.94 m OD**

Sampling			Properties		Strata		Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	Description		Depth	Legend	Level m OD
					Grass over TOPSOIL: Dark brown slightly gravelly fine to coarse sand with some rootlets. Gravel is angular to subangular fine to coarse of glass, concrete and brick fragments. MADE GROUND: Yellow sandy angular to subangular fine to coarse gravel of limestone. At 0.50m, concrete obstruction. End of Borehole		G.L. 0.30 0.50		42.94 42.64 42.44


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
0.50	0.40	Inspection Pit	GM/MM	G.I. 0.50		DRY	11/11/19 11/11/19	08:00 18:00						None encountered.

Remarks  Inspection pit hand excavated to 0.50m depth and no services were found.
 Inspection Pit terminated at 0.50m depth on encountering a concrete obstruction - the rig was moved to WS302A.
 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 by **MM**
 Figure **1 of 1**
 23/01/2020

Logged in accordance with BS5930:2015



BOREHOLE RECORD - Dynamic Sampler

Project **STOCKPORT INTERCHANGE GROUND INVESTIGATION** Engineer **WSP** Borehole **WS302A** Project No **PN194052**

Client **WSP** National Grid Coordinates **389191.4 E 390272.0 N** Ground Level **42.96 m OD**

Sampling			Properties			Strata			Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD		
0.20	ES					Grass over TOPSOIL: Dark brown gravelly slightly clayey fine to coarse sand with some rootlets. Gravel is angular to subangular fine to coarse of glass, concrete and brick fragments.	G.L.		42.96		
0.30- 0.80	B						0.30		42.66		
0.50	ES										
0.80- 1.20	B					MADE GROUND: Yellow sandy angular to subangular fine to coarse gravel of limestone.	0.80	42.16			
1.00	ES										
1.20- 1.65	D				S22	MADE GROUND: Reddish brown gravelly slightly clayey fine to coarse sand. Gravel is subangular fine to coarse of limestone and brick fragments. Sand includes ash.					
1.90	D										
2.00- 2.50	D										
2.00	ES	2.00			S37						
2.00- 2.45	D										
2.50- 2.70	D										
3.00	ES	2.00			S50/210	At 3.00m, obstruction - probable cobble.					
3.00- 3.36						End of Borehole	3.36	39.60			


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		G.I.			11/11/19	08:00						None encountered.
3.36	0.10	Dynamic Sampler	GM/MM	3.36		DRY	11/11/19	18:00						

Remarks Inspection pit hand excavated to 1.20m depth and no services were found.
 ABS sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
 Dynamic Sample Borehole terminated at 3.36m depth on encountering an obstruction - probable cobble.
 A 50mm gas monitoring pipe 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
 23/01/2020



BOREHOLE RECORD - Dynamic Sampler

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION Engineer WSP Borehole Project No WS303 PN194052

Client WSP National Grid Coordinates 389176.7 E 390248.2 N Ground Level 43.00 m OD


Sampling			Properties			Strata		Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD	
0.00- 0.30	B					Grass over TOPSOIL: Dark brown gravelly slightly clayey fine to coarse sand with some rootlets. Gravel is subangular to subrounded fine to coarse of glass, metal, concrete and brick fragments.	G.L.		43.00	
0.20	ES				0.30		42.70			
0.30- 1.20	B				1.20		41.80			
0.30	D									
0.50	ES									
1.00	D				S6 MADE GROUND: Loose dark brown mottled orange slightly gravelly clayey fine to coarse sand. Gravel is angular to subangular fine to medium of brick fragments.	2.00- 2.45		40.50		
1.00	ES					2.00- 2.50				
1.20- 1.80	B					2.50- 2.80				
1.20- 1.65	D									
1.20	D				S2 Below 2.00m, very loose.	3.00- 3.45		39.20		
2.00- 2.45	D	2.00				3.00- 3.80				
2.00- 2.50	D									
2.50- 2.80	D				S17	3.00		38.93		
3.00- 3.45	D	2.00				4.00- 4.07				
3.00- 3.80	D				S25/25	3.80		38.93		
3.00	ES					4.07				
3.80	ES				S25/25	4.00- 4.07		38.93		
4.00- 4.07	D	2.00								
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.I.			11/11/19	08:00						None encountered.
4.07	0.10	Dynamic Sampler	GM/MM	4.07		DRY	11/11/19	18:00						

Remarks Inspection pit hand excavated to 1.20m depth and no services were found. ABS sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub. Dynamic Sample Borehole terminated at 4.07m depth on encountering an obstruction - probable cobble. 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: bentonite seal up to 3.00m, 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
23/01/2020



BOREHOLE RECORD - Dynamic Sampler

Project **STOCKPORT INTERCHANGE GROUND INVESTIGATION** Engineer **WSP** Borehole Project No **WS304** PN194052

Client **WSP** National Grid Coordinates **389196.6 E 390260.6 N** Ground Level **42.67 m OD**


Sampling			Properties			Strata			Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD		
0.20	D					Grass over TOPSOIL: Dark brown gravelly slightly clayey fine to coarse sand with some rootlets. Gravel is angular to subangular fine to coarse of glass and brick fragments.	G.L.		42.67		
0.20	ES				0.30		42.37				
0.30- 0.80	B				0.80		41.87				
0.50	ES										
0.80- 1.20	B				S2	MADE GROUND: Yellow mottled dark brown sandy angular to subangular fine to coarse gravel of limestone. Low subangular cobble content of limestone.					
1.00	D										
1.00	ES										
1.20- 1.65	D				S1/450	MADE GROUND: Very loose red sandy angular to subangular fine to coarse gravel of brick fragments.					
1.20- 2.00	ES										
2.00- 2.45	D				S1/450	Between 2.50-3.00m, sand includes ash. Gravel includes slag and clinker.					
2.00- 3.00	ES										
3.00- 3.04					S25/20	End of Borehole	3.04		39.63		

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.I.			11/11/19	08:00						None encountered.
3.04	0.10	Dynamic Sampler	GM/MM	3.04		DRY	11/11/19	18:00						

Remarks Inspection pit hand excavated to 1.20m depth and no services were found.
 ABS sample = 1 x 60ml amber glass jar, 2 x 258ml amber glass jars and 1 x 1L plastic tub.
 A 50mm gas monitoring pipe 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**
 23/01/2020



BOREHOLE RECORD - Dynamic Sampler

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION Engineer WSP Borehole Project No WS305 PN194052
 Client WSP National Grid Coordinates 389302.8 E 390302.7 N Ground Level 43.79 m OD


Sampling			Properties			Strata			Scale 1:50		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD		
0.20- 0.25	B					MADE GROUND: Grey concrete paving slab.	G.L.		43.79		
0.20	D						0.05		43.74		
0.20	ES					MADE GROUND: Yellow sandy angular to subangular fine gravel of limestone.	0.10		43.69		
0.25- 1.00	B						0.25		43.54		
0.50	ES					MADE GROUND: Reddish brown sandy angular to subangular fine to coarse gravel of mudstone.					
1.00	D										
1.00	ES					MADE GROUND: Medium dense black gravelly slightly clayey fine to coarse sand with a low cobble content of mudstone and brick. Gravel is angular to subrounded fine to coarse of mudstone, sandstone, coal, slag, clinker and brick fragments. Sand includes ash.					
1.20- 1.65	D	(DRY)			S17	Between 0.60-0.75m, concrete with steel reinforcing bar (3mm diameter). Below 2.00m, cobbles absent.					
1.50- 2.00	B										
2.00- 2.50	B										
2.00- 2.45	D	(DRY)			S11						
2.00	ES										
2.50- 3.00	D										
3.00- 3.45	D	(DRY)			S8	Below 3.00m, loose.					
3.00- 3.50	D										
3.00	ES										
3.50- 4.00	B										
4.00- 4.45	D	(DRY)			S8						
4.00	ES										
4.50- 5.00	D						4.50		39.29		
5.00- 5.22	D	(DRY)			S50/65	Very dense reddish brown fine to coarse SAND.					
						End of Borehole	5.22		38.57		

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		G.I.			14/11/19	08:00						None encountered.
5.22	0.10	Dynamic Sampler	GM/MM GM/MM	5.22		DRY	14/11/19	18:00						

Remarks Inspection pit hand excavated to 1.20m depth and no services were found.
 ABS 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 1.00m to 4.00m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 4.00m, 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
 23/01/2020



Fieldwork Results - SPT Results Summary

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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	
WS301A	1.20	41.71	S	-	1	2	1	-	1	2	4	*					
WS301A	2.00	40.91	S	-	2	6	6	5	4	8	23		*				
WS301A	3.00	39.91	S	-	11	10	9	8	12	21/65	50/290						>
Driller			Gary Martin				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005										
Hammer No.			110.96														
Energy Ratio, Er (%)			73.00														
Calibration Date			15/01/2019														

-/- 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 STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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
WS302A	1.20	41.76	S	-	6	4	8	5	4	5	22		*			
WS302A	2.00	40.96	S	-	7	10	10	10	10	7	37			*		
WS302A	3.00	39.96	S	-	8	10	14	16	20/60		50/210					>
Driller			Gary Martin				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005									
Hammer No.			110.96													
Energy Ratio, Er (%)			73.00													
Calibration Date			15/01/2019													

-/- 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 STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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	
WS303	1.20	41.80	S	-	3	2	2	1	2	1	6	*					
WS303	2.00	41.00	S	-	1	1	1	-	1	-	2	*					
WS303	3.00	40.00	S	-	1	2	5	4	4	4	17		*				
WS303	4.00	39.00	S	-	25/45		25/25				25/25						>
Driller			Gary Martin				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005										
Hammer No.			110.96														
Energy Ratio, Er (%)			73.00														
Calibration Date			15/01/2019														

-/- 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 STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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	
WS304	1.20	41.47	S	-	4	4	1	-	1	-	2	*					
WS304	2.00	40.67	S	-	1	-	-	-	-	-	1/450	*					
WS304	3.00	39.67	S	-	25/20		25/20				25/20						>
Driller			Gary Martin				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005										
Hammer No.			110.96														
Energy Ratio, Er (%)			73.00														
Calibration Date			15/01/2019														

-/- 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 STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

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	
WS305	1.20	42.59	S	-	1	2	2	4	5	6	17		*				
WS305	2.00	41.79	S	-	5	5	3	3	3	2	11	*					
WS305	3.00	40.79	S	-	3	2	3	2	2	1	8	*					
WS305	4.00	39.79	S	-	3	2	1	1	2	4	8	*					
WS305	5.00	38.79	S	-	3	7	50/65				50/65						>
Driller			Gary Martin				Remarks Equipment checked and calibration carried out in accordance with BS EN ISO 22476-3: 2005										
Hammer No.			110.96														
Energy Ratio, Er (%)			73.00														
Calibration Date			15/01/2019														

-/- 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 Mexecon 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 (mm)
()	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
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)	

TRIAL PIT RECORD

Inspection Pit

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Engineer WSP

Trial Pit Project No **TP301**
PN194052

Client WSP

National Grid Coordinates 389286.3 E
390268.2 N

Ground Level 43.57 m OD

Samples and Tests				Strata		Scale 1:50	
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.10- 0.25	B			MADE GROUND: Black tarmacadam.	G.L.		43.57
0.20	D				0.10		43.47
0.20	ES			MADE GROUND: Yellow sandy angular to subangular fine to coarse gravel of limestone. (Sub base).	0.20		43.37
0.25- 1.20	B						
0.50	ES			MADE GROUND: Dark brown mottled brown gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of slag, clinker, concrete and brick fragments. Sand includes ash.			
1.00	D						
1.00	ES			End of Excavation	1.20		42.37

Excavation				Groundwater		
Plant	Hand tools.	Width (B)	0.30	Depth Observed	Depth of Pit	Details
Date	15/11/2019	Length (C)	0.80			None encountered.
Shoring	None.	Date Backfilled	15/11/2019			
Stability	stable during excavation.					

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. Top of concrete footing exposed at 1.20m below ground level. Footing projects 0.25m from face of wall. Underside of footing not proven. Top of brick substructure (possible manhole) exposed at 0.40m depth. Collared pipe also exposed in trial pit.

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
23/01/2020

TRIAL PIT RECORD

Inspection Pit

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Engineer WSP

Trial Pit TP302
Project No PN194052

Client WSP

National Grid Coordinates 389287.8 E
390259.6 N

Ground Level 43.64 m OD

Samples and Tests				Strata		Scale 1:50	
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.10- 0.25	B			MADE GROUND: Black tarmacadam.	G.L.		43.64
0.20	D				0.10		43.54
0.20	ES			MADE GROUND: Yellow sandy angular to subangular fine to coarse gravel of limestone. (Sub base).	0.25		43.39
0.25- 1.20	B						
0.50	ES			MADE GROUND: Dark brown gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of coal, slag, clinker, ceramic, plastic, concrete and brick fragments. Sand includes ash.			
1.00	D						
1.00	ES			End of Excavation	1.20		42.44

Excavation				Groundwater		
Plant	Hand tools.	Width (B)	0.40	Depth Observed	Depth of Pit	Details
Date	15/11/2019	Length (C)	0.80			None encountered.
Shoring	None.	Date Backfilled	15/11/2019			
Stability	stable during excavation.					

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. Top of concrete footing exposed at 0.80m below ground level. Footing projects 0.25m from face of wall. Footing continues to at least 1.20m depth. Underside of footing not proven.

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
23/01/2020

TRIAL PIT RECORD

Inspection Pit

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Engineer WSP

Trial Pit TP303
Project No PN194052

Client WSP

National Grid Coordinates 389310.9 E
390277.1 N

Ground Level 44.16 m OD

Samples and Tests				Strata		Scale 1:50	
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.10- 0.20	B			MADE GROUND: Black tarmacadam.	G.L.		44.16
0.20	D				0.10		44.06
0.20	ES			MADE GROUND: Yellow sandy angular to subangular fine to coarse gravel of limestone. (Sub base).	0.25		43.91
0.25- 1.00	B						
0.50	ES			MADE GROUND: Dark brown slightly gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of concrete and brick fragments. Sand includes ash.			
1.00	D						
1.00	ES			At 0.25m, concrete footing.	1.20		42.96
				End of Excavation			

Excavation				Groundwater		
Plant	Hand tools.	Width (B)	0.40	Depth Observed	Depth of Pit	Details
Date	15/11/2019	Length (C)	0.90			None encountered.
Shoring	None.	Date Backfilled	15/11/2019			
Stability	stable during excavation.					

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. Top of concrete footing exposed at 0.25m below ground level. Footing projects 0.55m from face of wall, increasing to 0.75m from face of wall at 1.20m below ground level. Underside of footing not proven.

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
23/01/2020

TRIAL PIT RECORD

Inspection Pit

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Engineer WSP

Trial Pit TP304
Project No PN194052

Client WSP

National Grid Coordinates 389305.4 E
390281.2 N

Ground Level 43.95 m OD

Samples and Tests				Strata		Scale 1:50	
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.10- 0.20	B			MADE GROUND: Black tarmacadam.	G.L.		43.95
0.10	D			MADE GROUND: Yellow sandy angular to subangular fine to coarse gravel of limestone. (Sub base).	0.10		43.85
0.10	ES				0.20		43.75
0.25- 1.20	B			MADE GROUND: Black gravelly fine to coarse sand with a low cobble content. Gravel is angular to subangular fine to coarse of slag, clinker and brick fragments. Sand includes ash.	1.20		42.75
0.50	ES						
1.00	D			End of Excavation			
1.00	ES						

Excavation				Groundwater		
Plant	Hand tools.	Width (B)	0.50	Depth Observed	Depth of Pit	Details
Date	15/11/2019	Length (C)	0.80			None encountered.
Shoring	None.	Date Backfilled	15/11/2019			
Stability	stable during excavation.					

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.
 Top of concrete footing exposed at 0.20m below ground level. Footing projects 0.20m from face of wall. Footing continues to at least 1.20m depth. Underside of footing not proven.

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
23/01/2020

APPENDIX 6
Trial Pit Photographs

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP301 (I)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP301 (2)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP301 (3)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP302 (I)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP302 (2)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP302 (3)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP303 (I)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP303 (2)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP303 (3)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP304 (I)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP304 (2)

PHOTOGRAPHS

Project Number : PNI94052

Project : STOCKPORT INTERCHANGE



TP304 (3)

APPENDIX 7

Monitoring Results

FIELDWORK - Water Level Monitoring

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No PN194052

Client WSP

Sheet No 1

Borehole		WS301A		WS302A		WS303		WS304		WS305			
Instrument (dia. mm)		S (50mm)		G (50mm)		S (50mm)		G (50mm)		S (50mm)			
Depth to Base (m)		2.50		3.00		3.00		3.00		4.00			
Filter Zone (m)		1.00-2.50		1.00-3.00		1.00-3.00		1.00-3.04		1.00-4.00			
Level		42.91 m OD		42.96 m OD		43.00 m OD		42.67 m OD		43.79 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		DRY		DRY		DRY		DRY			
17 Jan 2020		DRY		DRY		DRY		DRY		DRY			
21 Jan 2020		DRY		DRY		DRY		DRY		DRY			
28 Jan 2020		DRY		DRY		DRY		DRY		DRY			
12 Feb 2020		DRY		DRY		DRY		DRY		DRY			

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

GEOTECHNICS
geotechnical and geoenvironmental specialists

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

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
WS301A	2.50	DRY	2.72	0.0	0.0	0.3	0.3	20.7	
WS302A	3.00	DRY	2.77	0.0	0.0	0.2	0.2	20.9	
WS303	3.00	DRY	3.00	0.0	0.0	0.8	0.8	20.6	
WS304	3.00	DRY	2.68	0.0	0.0	0.5	0.5	20.8	
WS305	4.00	DRY	4.10	0.0	0.0	0.7	0.7	20.7	

Remarks

 geotechnics

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

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
WS301A	2.50	20.7	0	0	0	0	0.0	0.0	
WS302A	3.00	20.9	0	0	0	0	0.0	0.0	
WS303	3.00	19.3	0	0	0	0	0.0	0.0	
WS304	3.00	20.8	0	0	0	0	0.0	0.0	
WS305	4.00	20.3	0	0	0	0	0.0	0.0	

Remarks



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

Slight

Moderate

Heavy

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
WS301A	2.50	1016	
WS302A	3.00	1016	
WS303	3.00	1016	
WS304	3.00	1016	
WS305	4.00	1014	

Remarks



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

Date

17/01/2020


Client WSP

Sheet No.

1 (1 of 3)

Equipment Used									
GI Infra Red Gas Analyser		MK1	<input type="checkbox"/>	MK2	<input type="checkbox"/>	GA2000	<input type="checkbox"/>	Other GA5000;	
Weather / Site Conditions									
Wind		Still	<input type="checkbox"/>	Light	<input checked="" type="checkbox"/>	Moderate	<input type="checkbox"/>	Strong	<input type="checkbox"/>
Cloud Cover		None	<input type="checkbox"/>	Slight	<input type="checkbox"/>	Cloudy	<input type="checkbox"/>	Overcast	<input checked="" type="checkbox"/>
Precipitation		Dry	<input type="checkbox"/>	Slight	<input checked="" type="checkbox"/>	Moderate	<input type="checkbox"/>	Heavy	<input type="checkbox"/>
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
WS301A	2.50	DRY	2.60	0.2	0.2	0.3	0.3	20.7	
WS302A	3.00	DRY	2.72	0.2	0.2	0.2	0.1	20.3	
WS303	3.00	DRY	2.30	0.2	0.2	0.4	0.1	20.4	
WS304	3.00	DRY	2.62	0.2	0.2	0.4	0.1	20.5	
WS305	4.00	DRY	4.02	0.2	0.2	0.8	0.1	20.6	

Remarks



Form 002/3

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

Date

17/01/2020


Client WSP

Sheet No.

1 (2 of 3)

Equipment Used									
GI Infra Red Gas Analyser		MK1 <input type="checkbox"/>		MK2 <input type="checkbox"/>		GA2000 <input type="checkbox"/>			
Other GA5000;									
Weather / Site Conditions									
Wind		Still <input type="checkbox"/>		Light <input checked="" type="checkbox"/>		Moderate <input type="checkbox"/>		Strong <input type="checkbox"/>	
Cloud Cover		None <input type="checkbox"/>		Slight <input type="checkbox"/>		Cloudy <input type="checkbox"/>		Overcast <input checked="" type="checkbox"/>	
Precipitation		Dry <input type="checkbox"/>		Slight <input checked="" type="checkbox"/>		Moderate <input type="checkbox"/>		Heavy <input type="checkbox"/>	
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
WS301A	2.50	20.7	0	0	0	0	0.0	0.0	
WS302A	3.00	20.3	0	0	0	0	0.0	0.0	
WS303	3.00	19.1	0	0	0	0	0.0	0.0	
WS304	3.00	20.3	0	0	0	0	0.0	0.0	
WS305	4.00	20.3	0	0	0	0	0.1	0.1	

Remarks



Form 002/3

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

Slight

Moderate

Heavy

Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
WS301A	2.50	1006	
WS302A	3.00	1006	
WS303	3.00	1006	
WS304	3.00	1006	
WS305	4.00	1006	

Remarks



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

Date

21/01/2020


Client WSP

Sheet No.

1 (1 of 3)

Equipment Used									
GI Infra Red Gas Analyser		MK1	<input type="checkbox"/>	MK2	<input type="checkbox"/>	GA2000	<input type="checkbox"/>	Other GA5000;	
Weather / Site Conditions									
Wind		Still	<input type="checkbox"/>	Light	<input checked="" type="checkbox"/>	Moderate	<input type="checkbox"/>	Strong	<input type="checkbox"/>
Cloud Cover		None	<input type="checkbox"/>	Slight	<input type="checkbox"/>	Cloudy	<input checked="" type="checkbox"/>	Overcast	<input type="checkbox"/>
Precipitation		Dry	<input checked="" type="checkbox"/>	Slight	<input type="checkbox"/>	Moderate	<input type="checkbox"/>	Heavy	<input type="checkbox"/>
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
WS301A	2.50	DRY	2.60	0.2	0.2	0.3	0.3	20.0	
WS302A	3.00	DRY	2.72	0.2	0.2	0.2	0.2	19.9	
WS303	3.00	DRY	2.94	0.2	0.1	1.0	1.0	20.1	
WS304	3.00	DRY	2.62	0.2	0.2	0.7	0.7	20.2	
WS305	4.00	DRY	4.03	0.1	0.1	0.8	0.8	20.4	

Remarks



Form 002/3

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

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
WS301A	2.50	19.8	0	0	0	0	0.0	0.0	
WS302A	3.00	19.9	0	0	0	0	0.0	0.0	
WS303	3.00	19.3	0	0	0	0	0.0	0.0	
WS304	3.00	19.5	0	0	0	0	0.0	0.0	
WS305	4.00	19.9	0	0	0	0	0.0	0.0	

Remarks



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

Date

21/01/2020

Client WSP

Sheet No.

1 (3 of 3)

Equipment Used			
GI Infra Red Gas Analyser	MK1 <input type="checkbox"/>	MK2 <input type="checkbox"/>	GA2000 <input type="checkbox"/>
Other GA5000;			
Weather / Site Conditions			
Wind	Still <input type="checkbox"/>	Light <input checked="" type="checkbox"/>	Moderate <input type="checkbox"/> Strong <input type="checkbox"/>
Cloud Cover	None <input type="checkbox"/>	Slight <input type="checkbox"/>	Cloudy <input checked="" type="checkbox"/> Overcast <input type="checkbox"/>
Precipitation	Dry <input checked="" type="checkbox"/>	Slight <input type="checkbox"/>	Moderate <input type="checkbox"/> Heavy <input type="checkbox"/>
Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
WS301A	2.50	1035	
WS302A	3.00	1035	
WS303	3.00	1036	
WS304	3.00	1036	
WS305	4.00	1035	
Remarks			



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

Date

28/01/2020

Client WSP

Sheet No.

1 (1 of 3)

Equipment Used									
GI Infra Red Gas Analyser		MK1 <input type="checkbox"/>		MK2 <input type="checkbox"/>		GA2000 <input type="checkbox"/>			
Other GA5000;									
Weather / Site Conditions									
Wind		Still <input type="checkbox"/>		Light <input type="checkbox"/>		Moderate <input checked="" type="checkbox"/>		Strong <input type="checkbox"/>	
Cloud Cover		None <input type="checkbox"/>		Slight <input type="checkbox"/>		Cloudy <input checked="" type="checkbox"/>		Overcast <input type="checkbox"/>	
Precipitation		Dry <input type="checkbox"/>		Slight <input checked="" type="checkbox"/>		Moderate <input type="checkbox"/>		Heavy <input type="checkbox"/>	
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
WS301A	2.50	DRY	2.60	0.2	0.2	0.2	0.2	20.5	
WS302A	3.00	DRY	2.72	0.2	0.2	0.2	0.2	20.6	
WS303	3.00	DRY	2.93	0.2	0.2	1.0	1.0	20.6	
WS304	3.00	DRY	2.62	0.2	0.2	0.5	0.5	20.7	
WS305	4.00	DRY	4.02	0.2	0.2	0.7	0.7	20.5	

Remarks

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

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
WS301A	2.50	20.5	0	0	0	0	0.0	0.0	
WS302A	3.00	20.6	0	0	0	0	0.0	0.0	
WS303	3.00	19.4	0	0	0	0	0.0	0.0	
WS304	3.00	20.6	0	0	0	0	0.0	0.0	
WS305	4.00	20.1	0	0	0	0	0.1	0.1	

Remarks



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

Date

28/01/2020

Client WSP

Sheet No.

1 (3 of 3)

Equipment Used			
GI Infra Red Gas Analyser	MK1 <input type="checkbox"/>	MK2 <input type="checkbox"/>	GA2000 <input type="checkbox"/>
Other GA5000;			
Weather / Site Conditions			
Wind	Still <input type="checkbox"/>	Light <input type="checkbox"/>	Moderate <input checked="" type="checkbox"/> Strong <input type="checkbox"/>
Cloud Cover	None <input type="checkbox"/>	Slight <input type="checkbox"/>	Cloudy <input checked="" type="checkbox"/> Overcast <input type="checkbox"/>
Precipitation	Dry <input type="checkbox"/>	Slight <input checked="" type="checkbox"/>	Moderate <input type="checkbox"/> Heavy <input type="checkbox"/>
Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
WS301A	2.50	987	
WS302A	3.00	987	
WS303	3.00	988	
WS304	3.00	988	
WS305	4.00	987	

Remarks	 <small>Form 002/3</small>
---------	--

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

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
WS301A	2.50	DRY	2.60	0.2	0.2	0.2	0.2	20.7	
WS302A	3.00	DRY	2.72	0.1	0.1	0.2	0.2	21.1	
WS303	3.00	DRY	2.93	0.1	0.0	0.8	0.8	21.2	
WS304	3.00	DRY	2.61	0.0	0.0	0.3	0.3	21.1	
WS305	4.00	DRY	4.02	0.1	0.1	0.5	0.5	19.2	

Remarks



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

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

Moderate

Strong

Cloud Cover

None

Slight

Cloudy

Overcast

Precipitation

Dry

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
WS301A	2.50	20.7	0	0	0	0	0.0	0.0	
WS302A	3.00	21.1	0	0	0	0	0.0	0.0	
WS303	3.00	20.5	0	0	0	0	0.0	0.0	
WS304	3.00	20.9	0	0	0	0	0.0	0.0	
WS305	4.00	19.2	0	0	0	0	0.3	0.3	

Remarks



FIELDWORK - Insitu Gas Monitoring - Daily Record

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No

PN194052

Date

12/02/2020

Client WSP

Sheet No.

1 (3 of 3)

Equipment Used			
GI Infra Red Gas Analyser	MK1 <input type="checkbox"/>	MK2 <input type="checkbox"/>	GA2000 <input type="checkbox"/>
Other GA5000;			
Weather / Site Conditions			
Wind	Still <input type="checkbox"/>	Light <input checked="" type="checkbox"/>	Moderate <input type="checkbox"/> Strong <input type="checkbox"/>
Cloud Cover	None <input type="checkbox"/>	Slight <input checked="" type="checkbox"/>	Cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Precipitation	Dry <input checked="" type="checkbox"/>	Slight <input type="checkbox"/>	Moderate <input type="checkbox"/> Heavy <input type="checkbox"/>
Borehole	Depth to Base (m)	Barometric Pressure (mBars)	Remarks
WS301A	2.50	1007	
WS302A	3.00	1007	
WS303	3.00	1008	
WS304	3.00	1008	
WS305	4.00	1007	

Remarks	 Form 002/3
---------	---

APPENDIX 8

Laboratory Test Results - Geotechnical

Laboratory Test Certificate

Form REP008 Rev 3

Issued To	Geotechnics Ltd The Geotechnical Centre Unit 1B, Borders Industrial Estate River Lane, Saltney Chester CH4 8RJ	Date of issue	21/01/2020
		Issue No.	1
		Client Ref. No.	-
		Samples / Material Source	
		Samples Recv'd	06/01/20 & 09/01/20
Testing Start Date	06/01/2020	Sample State	As received
Testing Complete	21/01/2020	Sampled by	Geotechnics Limited
Comments	BS 1377-3:1990 is considered out of date and has been replaced. Rock Moisture Content performed according In-House procedure, not to IRSM accredited Method		
Project No	PN194052		
Project Name	STOCKPORT INTERCHANGE GROUND INVESTIGATION		

Summary of Tests

Standard	Test Description	Test Quantity	UKAS
BS EN ISO 17892-1:2014	Water Content	6	Yes
BS EN ISO 17892-12:2018 Cl. 5.3 & 5.5	Liquid Limit and Plastic Limit	5	Yes
BS EN ISO 17892-8:2018	Shear Strength by Unconsolidated Undrained Triaxial Test - Single Stage	3	Yes
BS 1377-3:1990 Cl. 5.4 & 5.5 (Standard withdrawn)	Sulphate Analysis - Ground Water	5	Yes
BS 1377-3:1990 Cl. 9.0 (Standard withdrawn)	pH	5	Yes
ISRM Suggested Method (1985)	Point Load Strength of Rock	36	Yes
BS EN ISO 17892-4:2016 Cl. 5.2	Particle Size Distribution by Sieving Method	1	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.



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

Classification and Strength

Symbol	C - Clay (0 - containing organic matter) Plasticity	M - Silt L - Low I - Intermediate H - High V - Very High E - Extremely High
I_p	Plasticity Index	
%	% retained on 425 μ m sieve, shown under I_p value	
w_L	Liquid Limit	
w_p	Plastic Limit	
NP	Non-Plastic	
NAT	Sample tested in natural state	
w	Water Content	
ρ_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/cm^2)
	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 STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

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) ³ 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
BH301	2.00 (2.00)	D	N77867	Firm to stiff light yellowish brown mottled grey very sandy CLAY with some rootlets.					15.9						
BH301	3.20- 3.65 (3.20- 3.25)	UT	N77869	Stiff high strength grey mottled orange slightly sandy clayey SILT with rootlets.		(1%)	25	NP	8.7 21.4 <10.9>	SS	1.82	60	239	120	120
BH302A	2.20- 2.65 (2.20)	UT	N77870	Firm medium strength grey mottled orange slightly gravelly sandy clayey SILT.		(2%)	23	NP	11.0 8.6 <7.8>	SS	1.94	40	147	74	74
BH302A	3.60 (3.60)	D	N77872	Stiff greyish brown mottled orange slightly sandy CLAY.	CI	22 (0%)	43	21	22.7						
BH302B	2.20- 2.80 (2.20- 2.25)	UT	N77874	Firm high strength grey mottled orange slightly gravelly sandy clayey SILT.		(3%)	22	NP	 11.8 <8.6>	SS	1.92	40	170	85	85
BH302B	3.30 (3.30)	D	N77876	Stiff light brown mottled orange slightly sandy CLAY.	CL	15 (0%)	33	18	21.2						


Remarks  NST - Not suitable for Test
 For Standards followed see Laboratory Test Certificate
 ^ Rock water content test
 QUT Water Contents: <Failure Zone>, [After test]

LABORATORY RESULTS - Atterberg Limit

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

Sample					Results							
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Test Type	Point Data		Sym- bol	p %	>425 sieve µm	w _L %	w _p %
						Cone Pene.	Water % (Factor)					
BH301	3.20- 3.65 (3.20)	UT	N77869	Stiff high strength grey mottled orange slightly sandy clayey SILT with rootlets.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					1%	25	NP
BH302A	2.20- 2.65 (2.20)	UT	N77870	Firm medium strength grey mottled orange slightly gravelly sandy clayey SILT.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					2%	23	NP
BH302A	3.60 (3.60)	D	N77872	Stiff greyish brown mottled orange slightly sandy CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			Cl	22	0%	43	21
BH302B	2.20- 2.80 (2.20)	UT	N77874	Firm high strength grey mottled orange slightly gravelly sandy clayey SILT.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve					3%	22	NP
BH302B	3.30 (3.30)	D	N77876	Stiff light brown mottled orange slightly sandy CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	15	0%	33	18

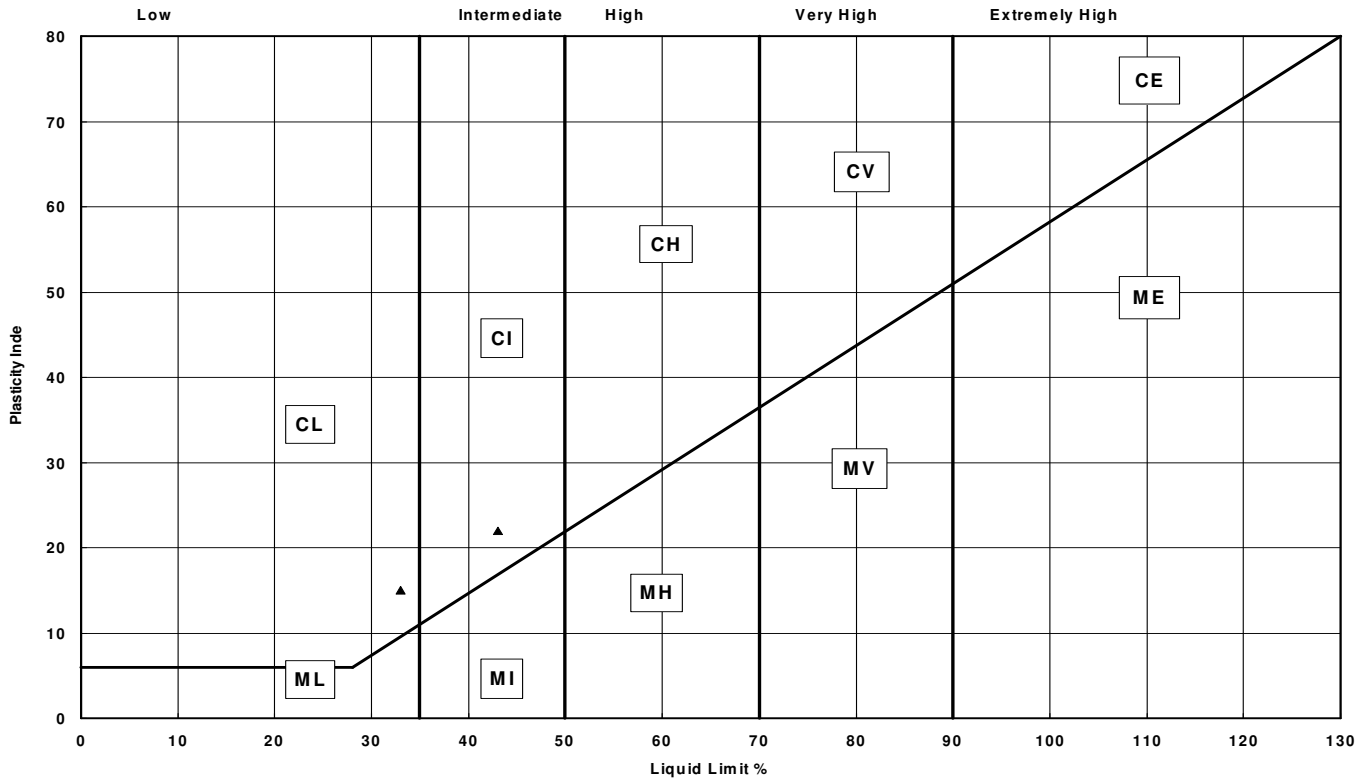
Remarks 

LABORATORY RESULTS - Classification Chart

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT for all items tested



Soil Type	Plasticity Characteristics
C Clay	L Low I Intermediate
M Silt	H High V Very High E Extremely High

Table of Soil Types and Plasticity Characteristics from BS 5930 : 1999

Remarks


21/01/2020

LABORATORY RESULTS - Chemical Analysis

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

Sample					Sulphate			pH	Organic Content %	Loss on Ignition %	Chloride		
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	In Soil		In Water g/l				In Soil		
					Acid Soluble %	Water Soluble g/l					Acid Soluble %	Water Soluble g/l	In Water g/l
BH301	3.00 (3.00)	D	N77868	Firm to stiff grey mottled orange slightly sandy CLAY.		0.165 (0.20)		6.87					
BH302A	3.00 (3.00)	D	N77871	Grey mottled orange clayey fine to medium SAND.		0.082 (0.10)		5.30					
BH302A	3.80-4.25 (3.80-4.25)	D	N77873	Reddish brown SAND and GRAVEL (Sandstone).		0.031 (0.04)		7.50					
BH302B	2.60-2.80 (2.60-2.80)	D	N77875	Firm grey mottled orange slightly gravelly sandy CLAY.		0.130 (0.16)		4.75					
WS305	0.25-1.00 (0.25-1.00)	B	N77877	MADE GROUND: Black clayey sand and gravel.		0.228 (0.27)		10.40					

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

LABORATORY RESULTS - Particle Size Distribution

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Hole: WS305

Sample Depth: 0.25-1.00m

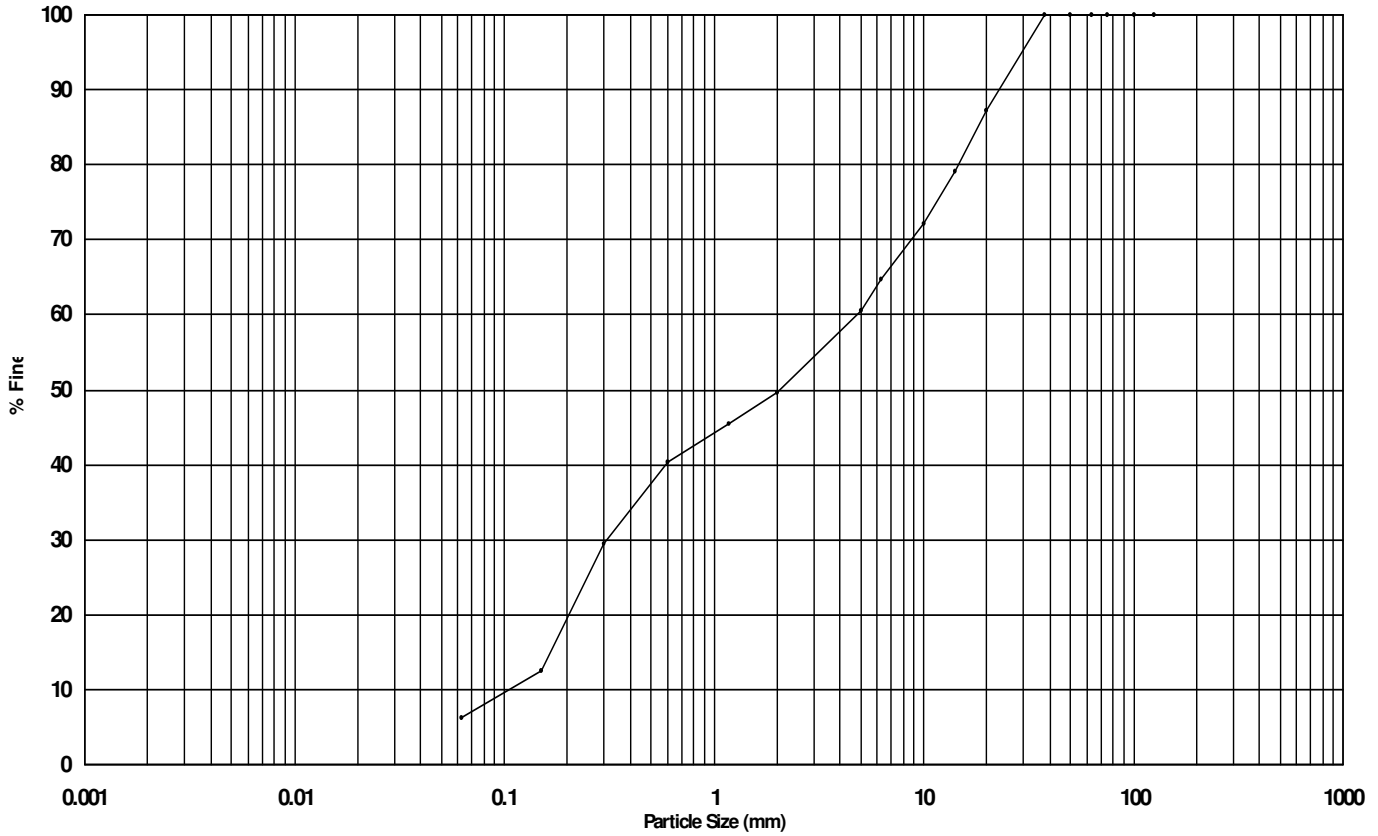
Project No: PN194052

Sample Type: B

Sample Ref: N77877

Sample Description

MADE GROUND: Black clayey sand and gravel.



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

Classification	% of each
SILT (including CLAY)	6
SAND	44
GRAVEL	50
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	87
14 mm	79
10 mm	72
6.3 mm	65
5 mm	60
2 mm	50
1.18 mm	45
600 μm	40
300 μm	29
150 μm	12

Size	% Finer
63 μm	6

Uniformity Coefficient	
45.18	
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

21/01/2020

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Hole BH301

Sample Depth 3.20-3.65m

Project No: PN194052

Sample Type UT

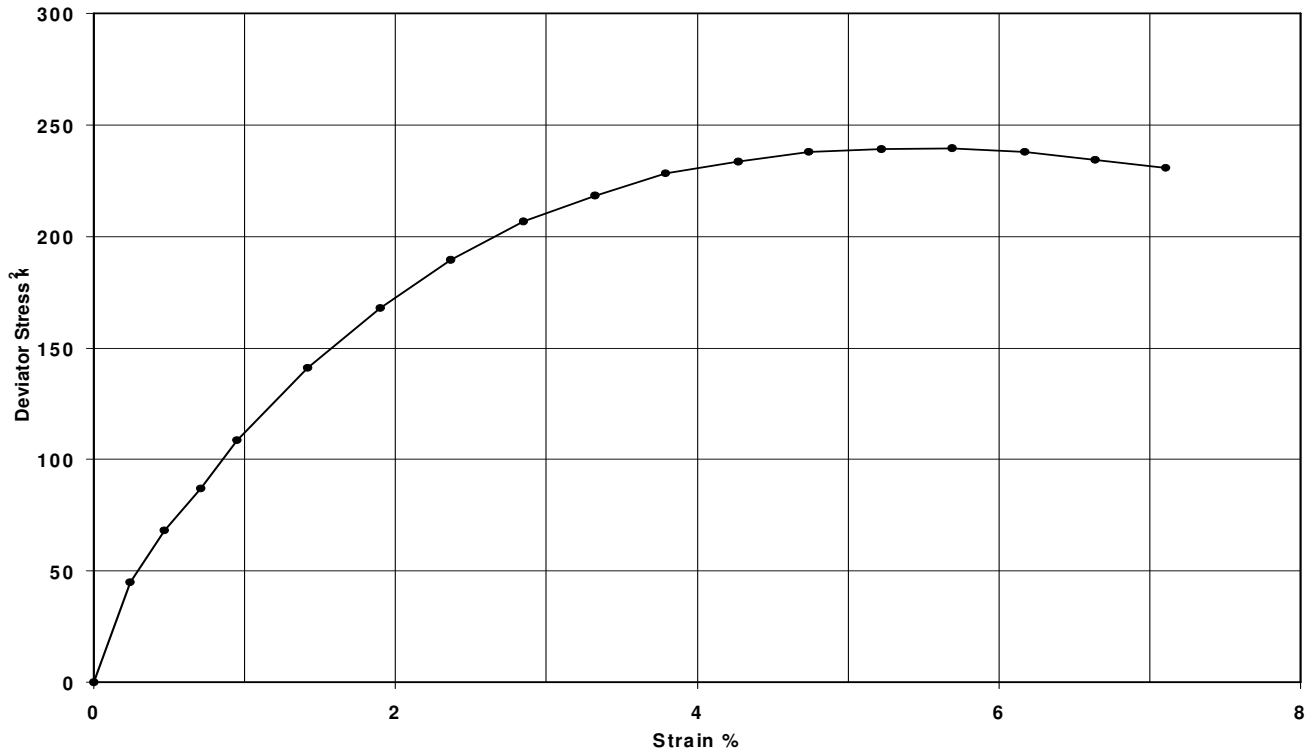
Sample Ref N77869

Sample Description

The following samples were combined to perform this test:

Stiff high strength grey mottled orange slightly sandy clayey SILT with rootlets.

BS EN ISO 17892-8:2018



	Stage 1	Stage 2	Stage 3	Strain %	Corrected Deviator Stress kN/m ²	Strain %	Corrected Deviator Stress kN/m ²
Sample Condition	Undisturbed			0.2	44.9		
Orientation of sample	Vertical			0.5	68.2		
Initial Diameter (mm)	102.70			0.7	87.0		
Initial Length (mm)	210.86			0.9	108.6		
Initial Water Content (%)	21.4			1.4	141.1		
Initial Bulk Density (Mg/m ³)	1.82			1.9	167.7		
Initial Dry Density (Mg/m ³)	1.50			2.4	189.4		
Particle Density (Mg/m ³)	2.65 Assumed			2.8	206.6		
Cell Pressure (kPa)	60			3.3	218.2		
'Specimen Height' at start of Shearing Stage (mm)	210.26			3.8	228.5		
Membrane Thickness/Correction (mm/kPa)				4.3	233.5		
Rate of Strain (%/min)	2.0			4.7	237.9		
Corrected Deviator Stress (kPa)	239			5.2	239.1		
Undrained Shear Strength (kPa)	120			5.7	239.5		
Strain at Failure (%)	5.7			6.2	237.8		
Failure Zone Water Content (%)	10.9			6.6	234.4		
Water Content (after test) (%)				7.1	230.8		
Mode of Failure	Brittle						

Remarks 

21/01/2020

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Hole BH301

Sample Depth 3.20-3.65m

Project No: PN194052

Sample Type UT

Sample Ref N77869



Remarks 

21/01/2020

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Hole BH302A

Sample Depth 2.20-2.65m

Project No: PN194052

Sample Type UT

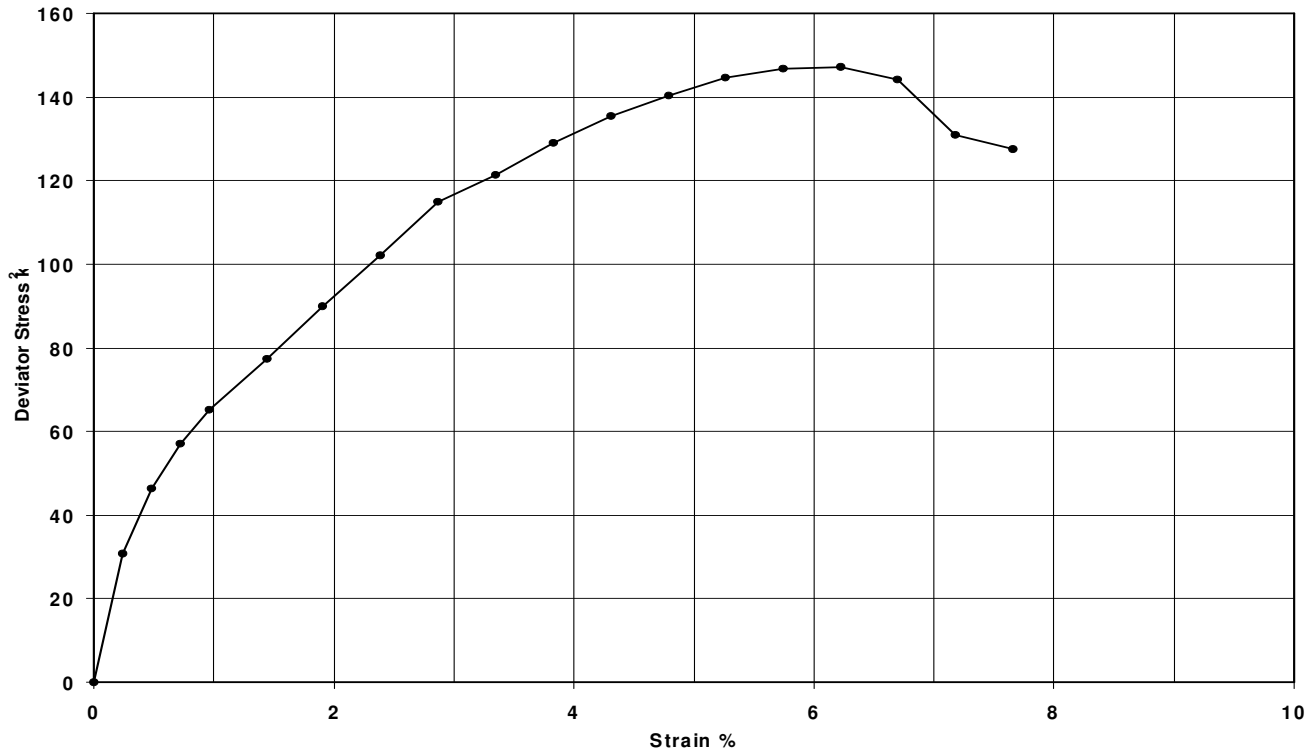
Sample Ref N77870

Sample Description

The following samples were combined to perform this test:

Firm medium strength grey mottled orange slightly gravelly sandy clayey SILT.

BS EN ISO 17892-8:2018



	Stage 1	Stage 2	Stage 3	Strain %	Corrected Deviator Stress kN/m ²	Strain %	Corrected Deviator Stress kN/m ²
Sample Condition	Undisturbed			0.2	30.7		
Orientation of sample	Vertical			0.5	46.4		
Initial Diameter (mm)	102.01			0.7	57.1		
Initial Length (mm)	208.95			1.0	65.1		
Initial Water Content (%)	8.6			1.4	77.3		
Initial Bulk Density (Mg/m ³)	1.94			1.9	90.0		
Initial Dry Density (Mg/m ³)	1.79			2.4	102.2		
Particle Density (Mg/m ³)	2.65 Assumed			2.9	115.0		
Cell Pressure (kPa)	40			3.4	121.4		
'Specimen Height' at start of Shearing Stage (mm)	208.66			3.8	129.0		
Membrane Thickness/Correction (mm/kPa)				4.3	135.3		
Rate of Strain (%/min)	2.0			4.8	140.3		
Corrected Deviator Stress (kPa)	147			5.3	144.7		
Undrained Shear Strength (kPa)	74			5.7	146.9		
Strain at Failure (%)	6.2			6.2	147.2		
Failure Zone Water Content (%)	7.8			6.7	144.3		
Water Content (after test) (%)				7.2	131.0		
Mode of Failure	Brittle			7.7	127.6		

Remarks 

21/01/2020

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Hole BH302A

Sample Depth 2.20-2.65m

Project No: PN194052

Sample Type UT

Sample Ref N77870



Remarks 

21/01/2020

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Hole BH302B

Sample Depth 2.20-2.80m

Project No: PN194052

Sample Type UT

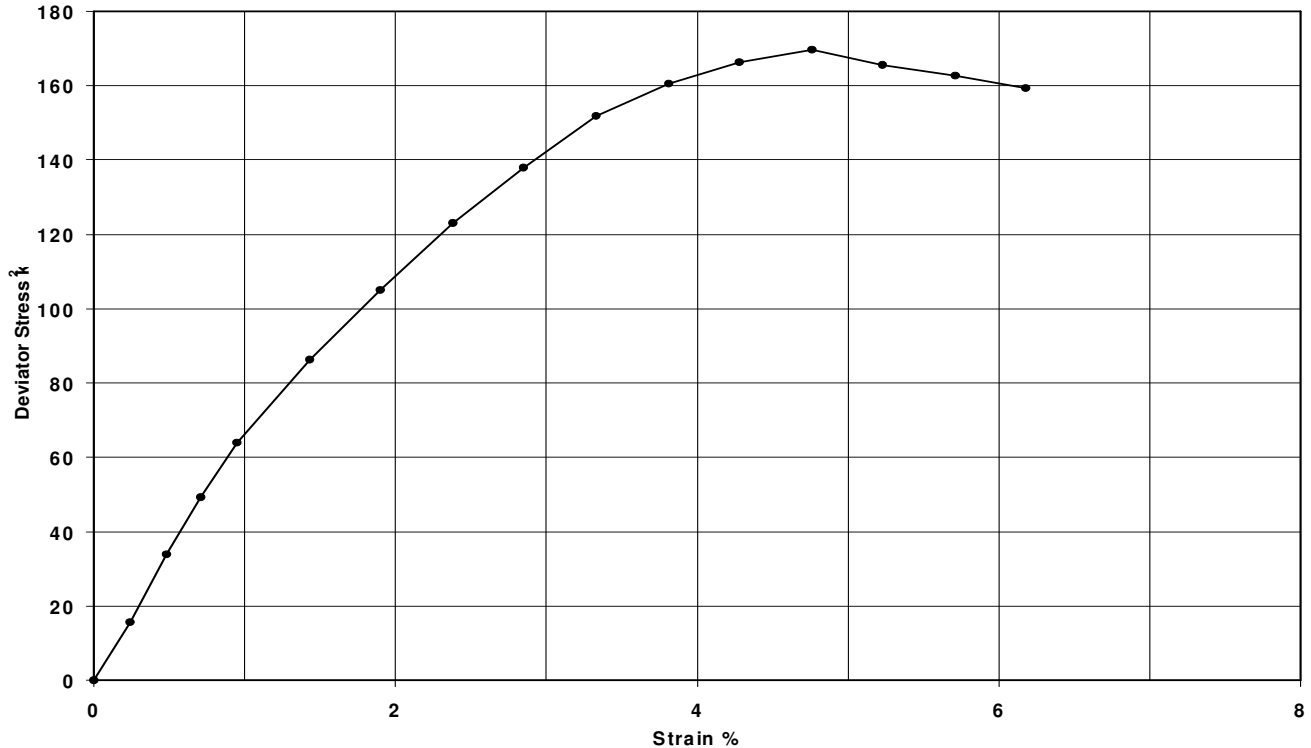
Sample Ref N77874

Sample Description

The following samples were combined to perform this test:

Firm high strength grey mottled orange slightly gravelly sandy clayey SILT.

BS EN ISO 17892-8:2018



	Stage 1	Stage 2	Stage 3	Strain %	Corrected Deviator Stress kN/m ²	Strain %	Corrected Deviator Stress kN/m ²
Sample Condition	Undisturbed			0.2	15.6		
Orientation of sample	Vertical			0.5	33.9		
Initial Diameter (mm)	103.08			0.7	49.2		
Initial Length (mm)	210.21			1.0	63.9		
Initial Water Content (%)	11.8			1.4	86.3		
Initial Bulk Density (Mg/m ³)	1.92			1.9	105.0		
Initial Dry Density (Mg/m ³)	1.72			2.4	123.1		
Particle Density (Mg/m ³)	2.65 Assumed			2.9	137.8		
Cell Pressure (kPa)	40			3.3	151.9		
'Specimen Height' at start of Shearing Stage (mm)	210.13			3.8	160.4		
Membrane Thickness/Correction (mm/kPa)				4.3	166.3		
Rate of Strain (%/min)	2.0			4.8	169.6		
Corrected Deviator Stress (kPa)	170			5.2	165.6		
Undrained Shear Strength (kPa)	85			5.7	162.6		
Strain at Failure (%)	4.8			6.2	159.4		
Failure Zone Water Content (%)	8.6						
Water Content (after test) (%)							
Mode of Failure	Brittle						

Remarks 

21/01/2020

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: STOCKPORT INTERCHANGE GROUND INVESTIGATION

Hole BH302B

Sample Depth 2.20-2.80m

Project No: PN194052

Sample Type UT

Sample Ref N77874



Remarks 

21/01/2020


GEOTECHNICS

LABORATORY RESULTS - Point Load Strength Determination

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

Sample					w %	W mm	D mm	Fail Load kN	Test Type/ Direction	De mm	De ² mm ²	Is MN/m ²	F	Is ₅₀ MN/m ²
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description										
BH301	4.73- 4.85 (4.73- 4.85)	C	N78004	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	11.0	86	85	0.15	D/PL	85.00	7225	0.021	1.270	0.027
						85	51	0.19	A/PD	74.29	5519	0.034	1.195	0.041
						85	46	0.15	A/PD	70.56	4978	0.030	1.168	0.035
BH301	5.00- 5.09 (5.00- 5.09)	C	N78005	Very weak reddish brown fine to coarse grained SANDSTONE.	9.8	85	79	0.40	A/PD	92.47	8550	0.047	1.319	0.061
BH301	7.97- 8.09 (7.97- 8.09)	C	N78006	Very weak reddish brown fine to coarse grained SANDSTONE.	13.6	86	86	0.84	D/PL	86.00	7396	0.113	1.276	0.144
						86	62	0.95	A/PD	82.39	6789	0.140	1.252	0.176
						86	48	0.56	A/PD	72.50	5256	0.106	1.182	0.125
BH301	8.60- 8.70 (8.60- 8.70)	C	N78007	Very weak reddish brown fine to coarse grained SANDSTONE.	13.5	85	85	0.32	D/PL	85.00	7225	0.044	1.270	0.056
						85	51	0.42	A/PD	74.29	5519	0.076	1.195	0.091
						85	50	0.47	A/PD	73.56	5411	0.086	1.190	0.102
BH301	10.60- 10.70 (10.60- 10.70)	C	N78008	Very weak reddish brown fine to coarse grained SANDSTONE.	16.1	85	85	0.48	D/PL	85.00	7225	0.066	1.270	0.084
						85	81	0.77	A/PD	93.63	8766	0.088	1.326	0.116
						85	76	0.65	A/PD	90.69	8225	0.080	1.307	0.104
BH301	11.79- 11.90 (11.79- 11.90)	C	N78009	Very weak reddish brown fine to coarse grained SANDSTONE.	16.5	86	86	0.27	D/PL	86.00	7396	0.036	1.276	0.046
						86	62	0.66	A/PD	82.39	6789	0.097	1.252	0.122
						86	57	0.45	A/PD	79.00	6241	0.072	1.229	0.088
BH301	14.22- 14.38 (14.22- 14.38)	C	N78010	Very weak reddish brown fine to coarse grained SANDSTONE.	13.7	86	86	0.46	D/PL	86.00	7396	0.062	1.276	0.079
						86	71	0.65	A/PD	88.17	7774	0.084	1.291	0.108
						86	57	0.54	A/PD	79.00	6241	0.086	1.229	0.106
BH301	16.70- 16.82 (16.70- 16.82)	C	N78011	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	13.9	85	85	0.18	D/PL	85.00	7225	0.024	1.270	0.031
						85	69	0.35	A/PD	86.41	7468	0.046	1.279	0.059
						85	53	0.17	A/PD	75.74	5736	0.029	1.206	0.035
BH301	19.90- 19.99 (19.90- 19.99)	C	N78012	Very weak reddish brown fine to coarse grained SANDSTONE.	12.6	86	81	0.63	A/PD	94.18	8869	0.071	1.330	0.095
BH301	20.74- 20.82 (20.74- 20.82)	C	N78013	Very weak reddish brown fine to coarse grained SANDSTONE.	11.8	86	68	0.53	A/PD	86.29	7446	0.071	1.278	0.091
BH301	21.00- 21.20 (21.00- 21.20)	C	N78014	Very weak reddish brown fine to coarse grained SANDSTONE.	12.0	86	86	0.48	D/PL	86.00	7396	0.065	1.276	0.082
						86	86	0.38	D/PL	86.00	7396	0.052	1.276	0.066
						86	79	0.65	A/PD	93.01	8650	0.076	1.322	0.100
						86	71	0.71	A/PD	88.17	7774	0.091	1.291	0.118

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


GEOTECHNICS
 geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Point Load Strength Determination

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

Sample					w %	W mm	D mm	Fail Load kN	Test Type/ Direction	De mm	De ² mm ²	Is MN/m ²	F	Is ₅₀ MN/m ²		
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description												
BH301	22.00-	C	N78015	Very weak reddish brown fine to coarse grained SANDSTONE.	10.8	85	84	0.26	D/PL	84.00	7056	0.037	1.263	0.047		
	22.10							84	51	0.28	A/PD	73.85	5455	0.051	1.192	0.061
	(22.00- 22.10)							84	49	0.20	A/PD	72.39	5241	0.038	1.181	0.045
BH301	23.78-	C	N78016	Very weak reddish brown fine to coarse grained SANDSTONE.	9.4	85	85	0.45	D/PL	85.00	7225	0.062	1.270	0.078		
	23.89							85	58	0.52	A/PD	79.23	6277	0.083	1.230	0.102
	(23.78- 23.89)							85	57	0.50	A/PD	78.54	6169	0.081	1.225	0.100
BH301	24.50-	C	N78017	Very weak reddish brown fine to coarse grained SANDSTONE.	13.7	80	79	0.32	D/PL	79.00	6241	0.052	1.229	0.063		
	24.68							79	73	0.56	A/PD	85.69	7343	0.076	1.274	0.097
	(24.50- 24.68)							79	72	0.58	A/PD	85.10	7242	0.081	1.270	0.102
BH301	24.87-	C	N78018	Very weak reddish brown fine to coarse grained SANDSTONE.	13.0	85	83	0.24	D/PL	83.00	6889	0.035	1.256	0.044		
	25.00							83	56	0.33	A/PD	76.93	5918	0.055	1.214	0.067
(24.87- 25.00)																
BH302A	4.30-	C	N78019	Very weak reddish brown fine to coarse grained SANDSTONE.	9.5	100	64	0.26	A/PD	90.27	8149	0.032	1.305	0.042		
	4.43							100	65	0.35	A/PD	90.97	8276	0.043	1.309	0.056
(4.30- 4.43)																
BH302B	4.15-	C	N78020	Extremely weak reddish brown fine to coarse grained SANDSTONE.	12.5	100	61	0.19	A/PD	88.13	7767	0.024	1.291	0.032		
	4.26							100	52	0.16	A/PD	81.37	6621	0.024	1.245	0.030
(4.15- 4.26)																
BH302B	4.50-	C	N78021	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	12.6	100	100	0.17	D/PL	100.00	10000	0.017	1.366	0.023		
	4.65							100	61	0.26	A/PD	88.13	7767	0.034	1.291	0.044
	(4.50- 4.65)							100	59	0.31	A/PD	86.67	7512	0.041	1.281	0.053
BH302B	4.65-	C	N78022	Extremely weak reddish brown fine to coarse grained SANDSTONE.	10.2	100	89	0.18	A/PD	106.45	11332	0.016	1.405	0.023		
	4.78															
(4.65- 4.78)																
BH302B	9.74-	C	N78023	Extremely weak reddish brown fine to coarse grained SANDSTONE.	14.5	100	100	0.14	D/PL	100.00	10000	0.014	1.366	0.019		
	9.90							100	66	0.18	A/PD	91.67	8403	0.021	1.314	0.028
	(9.74- 9.90)							100	58	0.23	A/PD	85.93	7385	0.031	1.276	0.040
BH302B	9.90-	C	N78024	Extremely weak reddish brown fine to coarse grained SANDSTONE.	13.6	90	66	0.07	I/R	86.97	7563	0.009	1.283	0.012		
	10.00							70	47	0.08	I/R	64.72	4189	0.020	1.123	0.023
(9.90- 10.00)																
BH302B	10.64-	C	N78025	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	12.0	100	96	0.12	D/PL	96.00	9216	0.013	1.341	0.018		
	10.80							96	64	0.71	A/PD	88.45	7823	0.090	1.293	0.117
	(10.64- 10.80)							96	64	0.83	A/PD	88.45	7823	0.106	1.293	0.136

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


GEOTECHNICS
 geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Point Load Strength Determination

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

Sample					w %	W mm	D mm	Fail Load kN	Test Type/ Direction	De mm	De ² mm ²	Is MN/m ²	F	Is ₅₀ MN/m ²
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description										
BH302B	11.39- 11.47 (11.39- 11.47)	C	N78026	Very weak reddish brown fine to coarse grained SANDSTONE.	14.3	100	70	0.79	A/PD	94.41	8913	0.088	1.331	0.118
BH302B	12.00- 12.13 (12.00- 12.13)	C	N78027	Very weak reddish brown fine to coarse grained SANDSTONE.	13.2	100 100 100	100 91 57	0.63 0.89 0.52	D/PL A/PD A/PD	100.00 107.64 85.19	10000 11586 7257	0.063 0.077 0.071	1.366 1.412 1.271	0.087 0.109 0.091
BH302B	12.70- 12.83 (12.70- 12.83)	C	N78028	Very weak reddish brown fine to coarse grained SANDSTONE.	13.1	100 101 101	101 79 49	0.33 0.71 0.45	D/PL A/PD A/PD	101.00 100.79 79.38	10201 10159 6301	0.032 0.070 0.071	1.372 1.371 1.231	0.044 0.096 0.087
BH302B	13.43- 13.52 (13.43- 13.52)	C	N78029	Very weak reddish brown fine to coarse grained SANDSTONE.	12.5	100	72	0.73	A/PD	95.75	9167	0.080	1.340	0.107
BH302B	14.00- 14.20 (14.00- 14.20)	C	N78030	Very weak reddish brown fine to coarse grained SANDSTONE.	15.2	100 100 100 100	100 100 74 59	0.69 0.32 0.92 0.75	D/PL D/PL A/PD A/PD	100.00 100.00 97.07 86.67	10000 10000 9422 7512	0.069 0.032 0.098 0.100	1.366 1.366 1.348 1.281	0.094 0.044 0.132 0.128
BH302B	15.00- 15.10 (15.00- 15.10)	C	N78031	Very weak reddish brown fine to coarse grained SANDSTONE.	12.9	100	76	0.67	A/PD	98.37	9677	0.069	1.356	0.094
BH302B	15.28- 15.45 (15.28- 15.45)	C	N78032	Very weak reddish brown fine to coarse grained SANDSTONE.	15.5	100 100 100	100 77 47	0.34 0.89 0.49	D/PL A/PD A/PD	100.00 99.01 77.36	10000 9804 5984	0.034 0.090 0.082	1.366 1.360 1.217	0.046 0.123 0.100
BH302B	15.73- 15.87 (15.73- 15.87)	C	N78033	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	15.2	100 100 100	100 89 69	0.36 0.56 0.24	D/PL A/PD A/PD	100.00 106.45 93.73	10000 11332 8785	0.036 0.049 0.028	1.366 1.405 1.327	0.049 0.069 0.037
BH302B	18.40- 18.50 (18.40- 18.50)	C	N78034	Extremely weak reddish brown fine to coarse grained SANDSTONE.	13.7	95	74	0.14	A/PD	94.61	8951	0.016	1.332	0.021
BH302B	19.50- 19.57 (19.50- 19.57)	C	N78035	Very weak reddish brown fine to coarse grained SANDSTONE.	29.5	95	59	0.32	A/PD	84.48	7137	0.045	1.266	0.057
BH302B	20.47- 20.50 (20.47- 20.50)	C	N78036	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	13.5	90 60	43 36	0.15 0.13	I/R I/R	70.20 52.44	4927 2750	0.031 0.049	1.165 1.022	0.036 0.050


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

GEOTECHNICS
 geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Point Load Strength Determination

Project STOCKPORT INTERCHANGE GROUND INVESTIGATION

Project No: PN194052

Sample					w %	W mm	D mm	Fail Load kN	Test Type/ Direction	De mm	De ² mm ²	Is MN/m ²	F	Is ₅₀ MN/m ²
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description										
BH302B	23.50- 23.58 (23.50- 23.58)	C	N78037	Very weak reddish brown fine to coarse grained SANDSTONE.	10.8	100	79	0.44	A/PD	100.29	10059	0.044	1.368	0.060
BH302B	23.84- 23.93 (23.84- 23.93)	C	N78038	Very weak reddish brown fine to coarse grained SANDSTONE.	10.5	100 100 100	101 58 47	0.69 0.67 0.55	D/PL A/PD A/PD	101.00 85.93 77.36	10201 7385 5984	0.067 0.091 0.092	1.372 1.276 1.217	0.093 0.116 0.111
BH302B	24.00- 24.13 (24.00- 24.13)	C	N78039	Extremely weak to very weak reddish brown fine to coarse grained SANDSTONE.	11.1	100 100 100	100 70 59	0.25 0.57 0.35	D/PL A/PD A/PD	100.00 94.41 86.67	10000 8913 7512	0.025 0.064 0.047	1.366 1.331 1.281	0.034 0.085 0.060
<p>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</p>														



Certificate of Analysis

Certificate Number 20-00353

13-Jan-20

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

Our Reference 20-00353

Client Reference PN194052

Order No AUTH-OL24059

Contract Title Stockport Interchange

Description 2 Soil samples.

Date Received 09-Jan-20

Date Started 09-Jan-20

Date Completed 13-Jan-20

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

A handwritten signature in black ink, appearing to read 'A Fenwick'.

Adam Fenwick
Contracts Manager



2139

Summary of Chemical Analysis

Soil Samples

Our Ref 20-00353
 Client Ref PN194052
 Contract Title Stockport Interchange

Lab No	1621220
Sample ID	WS305
Depth	2.00-2.45
Other ID	
Sample Type	D
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
pH	DETSC 2008#		pH	11.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	270

Summary of Asbestos Analysis Soil Samples

Our Ref 20-00353

Client Ref PN194052

Contract Title Stockport Interchange

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1621219	WS305 0.25-1.00	SOIL	NAD	none	Jordan Eadington

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 20-00353

Client Ref PN194052

Contract Stockport Interchange

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1621219	WS305 0.25-1.00 SOIL		PT 1L		
1621220	WS305 2.00-2.45 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic 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

LABORATORY TEST CERTIFICATE

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

Certificate No : 20/019 - 01
To : Thomas Birch
Client : Geotechnics Limited
Unit 1B, Borders Industrial Park
River Lane
Saltney
Chester
CH4 8RJ

Tel: 0141 774 4032

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

Dear Sirs,

LABORATORY TESTING OF ROCK

Introduction

We refer to samples taken from Stockport Interchange 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 : PN194052 - Stockport Interchange 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

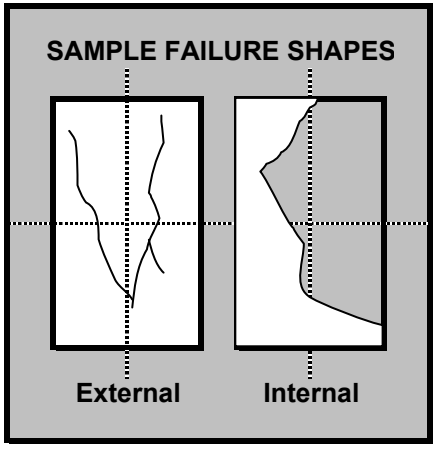
Remarks;

Approved for Issue

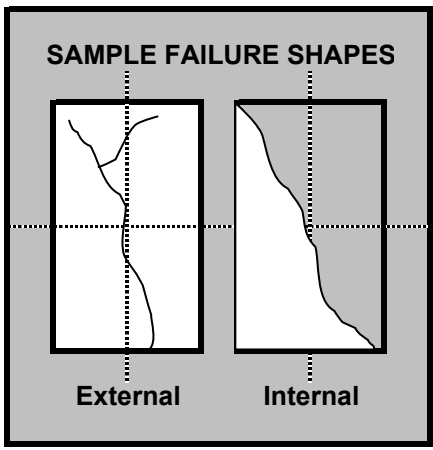
T McLelland (Director)

Date 03/02/2020

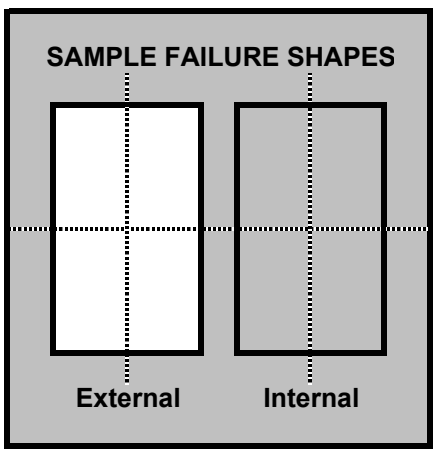


BOREHOLE		BH301	 <p style="text-align: center;">SAMPLE FAILURE SHAPES</p> <p style="text-align: center;">External Internal</p>
SAMPLE		C	
DEPTH	m	10.97-11.06	
SAMPLE DIAMETER	mm	84.44	
SAMPLE HEIGHT	mm	151.40	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.1	
TEST DURATION	min.sec	8.01	
DATE OF TESTING		31/01/2020	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	38.5	
UNCONFINED COMPRESSIVE STRENGTH	MPa	6.9	
WATER CONTENT (ISRM Suggested Methods)	%	14.3	
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³	2.18	
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³	1.91	

Test specimen does not meet specified length / diameter ratio requirements

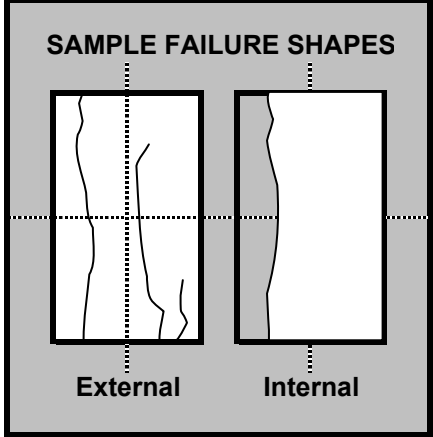
BOREHOLE		BH301	 <p style="text-align: center;">SAMPLE FAILURE SHAPES</p> <p style="text-align: center;">External Internal</p>
SAMPLE		C	
DEPTH	m	12.50-12.80	
SAMPLE DIAMETER	mm	85.81	
SAMPLE HEIGHT	mm	154.39	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.1	
TEST DURATION	min.sec	7.33	
DATE OF TESTING		31/01/2020	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	41.0	
UNCONFINED COMPRESSIVE STRENGTH	MPa	7.1	
WATER CONTENT (ISRM Suggested Methods)	%	11.9	
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³	2.17	
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³	1.94	

Test specimen does not meet specified length / diameter ratio requirements

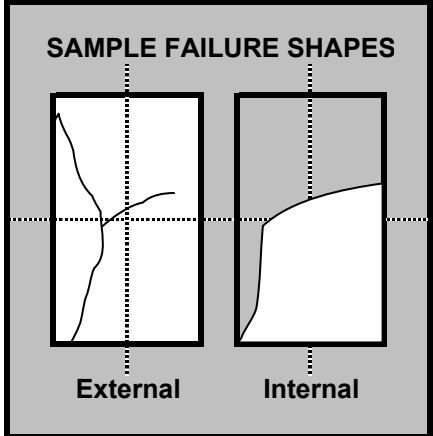
BOREHOLE			 <p style="text-align: center;">SAMPLE FAILURE SHAPES</p> <p style="text-align: center;">External Internal</p>
SAMPLE			
DEPTH	m		
SAMPLE DIAMETER	mm		
SAMPLE HEIGHT	mm		
TEST CONDITION			
RATE OF LOADING	kN/s		
TEST DURATION	min.sec		
DATE OF TESTING			
LOAD FRAME USED			
LOAD DIRECTION WITH 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

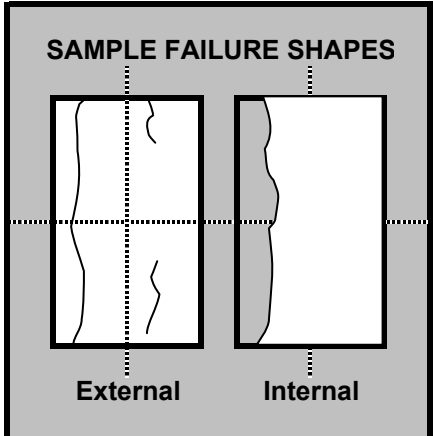
SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

BOREHOLE		BH302B	SAMPLE FAILURE SHAPES
SAMPLE		C	
DEPTH	m	11.00-11.28	
SAMPLE DIAMETER	mm	100.42	
SAMPLE HEIGHT	mm	160.17	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.1	
TEST DURATION	min.sec	8.31	
DATE OF TESTING		31/01/2020	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	38.9	
UNCONFINED COMPRESSIVE STRENGTH	MPa	4.9	
WATER CONTENT (ISRM Suggested Methods)	%	12.3	
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³	2.11	
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³	1.88	

Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		BH302B	SAMPLE FAILURE SHAPES
SAMPLE		C	
DEPTH	m	13.52-13.74	
SAMPLE DIAMETER	mm	100.49	
SAMPLE HEIGHT	mm	127.94	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.1	
TEST DURATION	min.sec	7.12	
DATE OF TESTING		31/01/2020	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	39.0	
UNCONFINED COMPRESSIVE STRENGTH	MPa	4.9	
WATER CONTENT (ISRM Suggested Methods)	%	16.4	
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³	2.10	
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³	1.80	

Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		BH302B	SAMPLE FAILURE SHAPES
SAMPLE		C	
DEPTH	m	24.37-24.54	
SAMPLE DIAMETER	mm	100.06	
SAMPLE HEIGHT	mm	97.77	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.1	
TEST DURATION	min.sec	6.07	
DATE OF TESTING		31/01/2020	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	40.3	
UNCONFINED COMPRESSIVE STRENGTH	MPa	5.1	
WATER CONTENT (ISRM Suggested Methods)	%	13.7	
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³	2.11	
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³	1.85	

Test specimen does not meet specified length / diameter ratio requirements

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)
BH301	C	4.14-4.48	As Received	D	85.39	85.39	85.39	0.14	0.02	0.02
				A	85.39	74.70	51.32	0.38	0.07	0.08
				A	85.39	73.82	50.12	0.27	0.05	0.06
	C	20.50-20.74	As Received	D	85.22	85.22	85.22	0.25	0.03	0.04
				A	85.22	69.29	44.25	0.14	0.03	0.03
				A	85.22	73.38	49.63	0.14	0.03	0.03
	C	24.58-24.87	As Received	D	77.83	77.83	77.83	0.05	0.01	0.01
				A	7.83	23.14	53.72	0.15	0.29	0.20
				A	77.83	78.50	62.18	0.32	0.05	0.06

NOTE: N/M - Not measured

NOTE: A dash (-) signifies that scale did not register a reading

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

Mean Is(50) - Axial tests	0.08
Mean Is(50) - Diametrical tests	0.03
la(50)	3.09

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)
BH302A	C	3.98-4.30	As Received	D	104.81	104.81	104.81	0.14	0.01	0.02
				A	104.81	79.17	46.97	0.08	0.01	0.02
				A	104.81	75.91	43.18	0.10	0.02	0.02

NOTE: N/M - Not measured

NOTE: A dash (-) signifies that scale did not register a reading

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

Mean Is(50) - Axial tests	0.02
Mean Is(50) - Diametrical tests	0.02
la(50)	1.08

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)
BH302B	C	10.80-11.00	As Received	D	85.15	85.15	85.15	0.12	0.02	0.02
				A	85.15	64.41	38.27	0.21	0.05	0.06
				A	85.15	66.76	41.11	0.26	0.06	0.07

NOTE: N/M - Not measured

NOTE: A dash (-) signifies that scale did not register a reading

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

Mean Is(50) - Axial tests	0.06
Mean Is(50) - Diametrical tests	0.02
Ia(50)	2.99

Tested in accordance with ISRM (2007)

SUMMARY OF POINT LOAD TEST RESULTS

APPENDIX 9

Laboratory Test Results - Contamination



DETS

Certificate of Analysis

Certificate Number 19-23460

28-Nov-19

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

Our Reference 19-23460

Client Reference PN194052

Order No (not supplied)

Contract Title Stockport Interchange GI

Description 8 Soil samples, 4 Leachate samples.

Date Received 19-Nov-19

Date Started 19-Nov-19

Date Completed 28-Nov-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



Summary of Chemical Analysis

Soil Samples

Our Ref 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Lab No	1599589	1599590	1599591	1599592	1599593	1599594
Sample ID	WS301A	WS301A	WS302A	WS302A	WS303	WS303
Depth	1.00	2.50	0.20	1.00	0.20	3.00
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	11/11/19	11/11/19	11/11/19	11/11/19	11/11/19	11/11/19
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	3.0	5.8	6.3	18	11	3.9
Barium	DETSC 2301#	1.5	mg/kg	47	100	130	630	160	50
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2	0.3	0.5	0.8	0.5	0.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	0.1	0.2	0.5	0.4	0.2
Chromium	DETSC 2301#	0.15	mg/kg	4.6	6.6	12	19	24	9.2
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	10	15	31	71	48	23
Lead	DETSC 2301#	0.3	mg/kg	16	13	64	300	100	32
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	0.11	0.06	< 0.05
Nickel	DETSC 2301#	1	mg/kg	4.0	12	12	18	15	9.4
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	5.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	6.2	9.7	22	23	33	12
Zinc	DETSC 2301#	1	mg/kg	19	23	66	160	81	43
Inorganics									
pH	DETSC 2008#		pH	11.7	7.5	9.7	8.0	10.4	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.1	0.7	0.3	< 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	%	< 0.5			4.9	3.9	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	10	46	44	27	110	41
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	1.2	1.3
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	3.9	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	71	< 3.4	25	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	76	< 10	26	< 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	< 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	1.4	< 0.5	0.9	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	12	< 0.6	5.2	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	190	< 1.4	68	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	200	< 10	74	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	280	< 10	100	< 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

Summary of Chemical Analysis

Soil Samples

Our Ref 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Lab No	1599589	1599590	1599591	1599592	1599593	1599594
Sample ID	WS301A	WS301A	WS302A	WS302A	WS303	WS303
Depth	1.00	2.50	0.20	1.00	0.20	3.00
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	11/11/19	11/11/19	11/11/19	11/11/19	11/11/19	11/11/19
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	0.81	< 0.01
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.1	2.9	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	3.4	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	0.5	12	0.4	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.4	15	0.3	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.3	< 0.1	3.5	85	1.7	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	1.1	37	0.5	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.4	< 0.1	5.7	140	2.7	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	0.4	< 0.1	5.3	180	2.5	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	2.3	76	1.2	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	2.6	81	1.3	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	2.1	46	1.2	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	1.1	25	0.6	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	2.8	71	1.4	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	1.8	37	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	0.4	8.0	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	1.8	37	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	2.6	< 1.6	32	860	14	< 1.6
Phenols									
Phenol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	0.58	< 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	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-cresol	DETSC 3451*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	1.6	< 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



Summary of Chemical Analysis

Soil Samples

Our Ref 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Lab No	1599589	1599590	1599591	1599592	1599593	1599594
Sample ID	WS301A	WS301A	WS302A	WS302A	WS303	WS303
Depth	1.00	2.50	0.20	1.00	0.20	3.00
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	11/11/19	11/11/19	11/11/19	11/11/19	11/11/19	11/11/19
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 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Lab No	1599595	1599596
Sample ID	WS304	WS304
Depth	0.50	2.00-3.00
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	11/11/19	11/11/19
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	5.6	3.1
Barium	DETSC 2301#	1.5	mg/kg	47	35
Beryllium	DETSC 2301#	0.2	mg/kg	0.3	< 0.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	6.1	6.8
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	5.6
Lead	DETSC 2301#	0.3	mg/kg	42	11
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	4.9	3.3
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	8.4	5.9
Zinc	DETSC 2301#	1	mg/kg	33	8.9
Inorganics					
pH	DETSC 2008#		pH	9.4	9.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
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	25	35
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	2.4	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	11	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	130	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	140	< 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	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	0.6	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	14	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	210	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	220	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	360	< 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

Summary of Chemical Analysis Soil Samples

Our Ref 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Lab No	1599595	1599596
Sample ID	WS304	WS304
Depth	0.50	2.00-3.00
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	11/11/19	11/11/19
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	0.7	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.2	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	1.2	0.1
Pyrene	DETSC 3301	0.1	mg/kg	1.3	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.7	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.8	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.9	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.4	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	1.2	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	1.0	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.2	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	1.2	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	10	< 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

Summary of Chemical Analysis Soil Samples

Our Ref 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Lab No	1599595	1599596
Sample ID	WS304	WS304
Depth	0.50	2.00-3.00
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	11/11/19	11/11/19
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

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Sample Id WS301A 1.00

Sample Numbers 1599589 1599597 1599598

Date Analysed 27/11/2019

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	< 0.5
DETSC 2003# Loss On Ignition	%	1.3
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	2.6
DETSC 2008# pH	pH Units	11.7
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	13	2.4	0.026	0.042
DETSC 2306 Barium as Ba	3.7	7.6	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	0.04	< 0.03	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	3.2	0.8	< 0.02	< 0.1
DETSC 2306 Copper as Cu	8.3	1.3	0.017	0.025
DETSC 2306 Mercury as Hg	0.02	< 0.01	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	78	3.4	0.16	0.16
DETSC 2306 Nickel as Ni	0.9	1.5	< 0.02	< 0.1
DETSC 2306 Lead as Pb	3.1	0.59	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	0.87	0.33	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.47	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	2.3	37	0.005	0.311
DETSC 2055 Chloride as Cl	1600	760	< 20	< 100
DETSC 2055* Fluoride as F	210	< 100	0.42	0.36
DETSC 2055 Sulphate as SO4	6900	1400	< 20	< 100
DETSC 2009* Total Dissolved Solids	66000	27000	132	336.4
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	9900	3200	19.8	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information

DETSC 2008 pH	7.2	7.8
DETSC 2009 Conductivity uS/cm	93.9	39.2
* Temperature*	18	17

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.123

Stage 1

Volume of Leachant L2*	0.24
Volume of Eluate VE1*	0.21

Stage 2

Volume of Leachant L8*	0.987
Volume of Eluate VE2*	0.927

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

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 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Sample Id WS304 2.00-3.00

Sample Numbers 1599596 1599599 1599600

Date Analysed 28/11/2019

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	< 0.5
DETSC 2003# Loss On Ignition	%	0.80
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	9.6
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	2.4	0.51	0.005	< 0.01
DETSC 2306 Barium as Ba	19	11	0.04	0.12
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	2	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.8	0.4	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	0.03	0.02	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	64	12	0.13	0.21
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1
DETSC 2306 Lead as Pb	1.2	0.53	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	0.44	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.29	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	3	2.3	0.006	0.024
DETSC 2055 Chloride as Cl	1600	620	< 20	< 100
DETSC 2055* Fluoride as F	190	490	0.38	4.39
DETSC 2055 Sulphate as SO4	45000	1800	90	< 100
DETSC 2009* Total Dissolved Solids	120000	28000	240	435.2
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	5300	2100	10.6	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information

DETSC 2008 pH	7.5	7.8
DETSC 2009 Conductivity uS/cm	174	39.6
* Temperature*	17	18

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.122

Stage 1

Volume of Leachant L2*	0.226
Volume of Eluate VE1*	0.206

Stage 2

Volume of Leachant L8*	0.977
Volume of Eluate VE2*	0.917

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

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 19-23460

Client Ref PN194052

Contract Title Stockport Interchange GI

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1599589	WS301A 1.00	SOIL	NAD	none	Lee Kerridge
1599591	WS302A 0.20	SOIL	NAD	none	Lee Kerridge
1599594	WS303 3.00	SOIL	NAD	none	Lee Kerridge
1599595	WS304 0.50	SOIL	NAD	none	Lee Kerridge

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 19-23460
 Client Ref PN194052
 Contract Stockport Interchange GI

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1599589	WS301A 1.00 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599590	WS301A 2.50 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599591	WS302A 0.20 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599592	WS302A 1.00 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599593	WS303 0.20 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599594	WS303 3.00 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599595	WS304 0.50 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599596	WS304 2.00-3.00 SOIL	11/11/19	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days), VOC (7 days)	
1599597	WS301A 1.00 LEACHATE	11/11/19	GJ 250ml, GJ 60ml, PT 1L		
1599598	WS301A 1.00 LEACHATE	11/11/19	GJ 250ml, GJ 60ml, PT 1L		
1599599	WS304 2.00-3.00 LEACHATE	11/11/19	GJ 250ml, GJ 60ml, PT 1L		
1599600	WS304 2.00-3.00 LEACHATE	11/11/19	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.

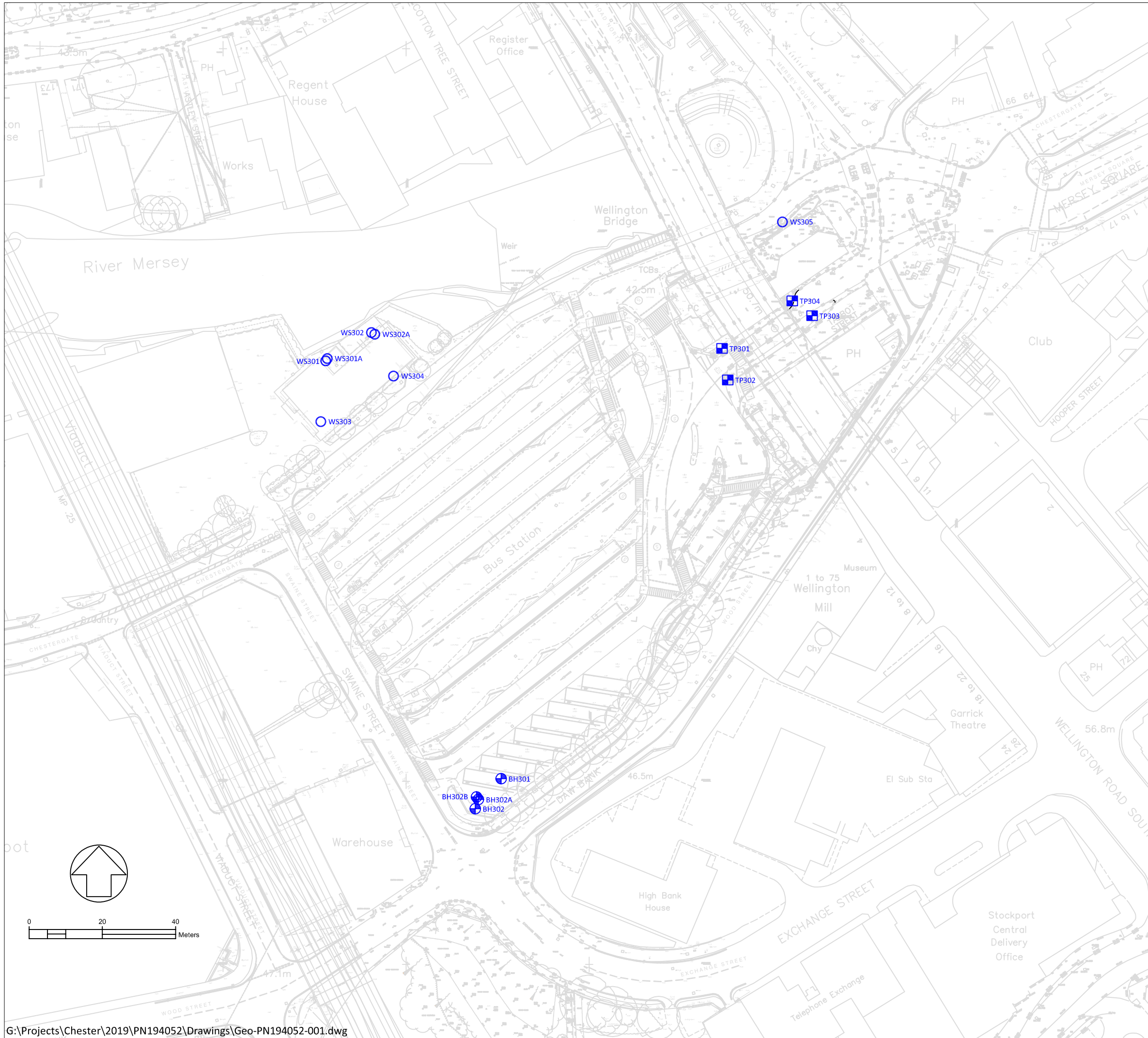
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

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
Exploratory Hole Location Plan



- Key**
- Borehole
 - Trial Pit
 - Dynamic Sample Borehole

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
BH301	389226.0	390150.7	45.37
BH302	389218.9	390142.5	45.64
BH302A	389219.8	390145.1	45.47
BH302B	389219.2	390145.7	45.47
TP301	389286.3	390268.2	43.57
TP302	389287.8	390259.6	43.64
TP303	389310.9	390277.1	44.16
TP304	389305.4	390281.2	43.95
WS301	389178.0	390264.8	42.95
WS301A	389178.5	390265.4	42.91
WS302	389190.5	390272.5	42.94
WS302A	389191.4	390272.0	42.96
WS303	389176.7	390248.2	43.00
WS304	389196.6	390260.6	42.67
WS305	389302.8	390302.7	43.79

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
 Email: mail@geotechnics.co.uk
 www.geotechnics.co.uk

Engineer:
 WSP UK Limited

Client:
 Transport for Greater Manchester

Project:
 Stockport Interchange

Drawing Title:
 Exploratory Hole Location Plan

Scale: I:1000@A3
Date: January 2020

Project No: PNI 94052
File Name: Geo-PNI94052-001(1)

APPENDIX II

Investigation Techniques and General Notes

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.

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.