ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 28 Castle Of Ipsden Estate Peter Hall Cholsey Road Wallingford Oxfordshire OX10 9PG Tel: 01491 201445 Fax: 01491 201443
Regional Office: Unit 20, Deanside Development Centre, Eastern Way, Bury, Lancashire BL9 7TJ Tel: 0161 764 4030 Fax: 01772 735283

GAS MONITORING RESULTS

Monitoring Point	Date and Time	Weather Conditions	Temperature (°C)	Construction Details (Depth, Pipe, Slot)	Ground Level (mAOD)	Water Depth (m bgl)	Reduced Water Level (mAOD)	Flow Rate (l/hr)	Diff Pressure (kPa)	Atm Pressure (kPa)	Methane % v/v (P)	Methane % v/v (S)	Methane % LEL (P)	Methane % LEL (S)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (S)	Oxygen % v/v (P)	Oxygen % v/v (S)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
BH005	30/02/2020 16:10	Fair	4	21.50m 50mm SP	33.42	5.30	28.12	3.0	-0.01	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.1	20.1	<1.0	<1.0	
BH007	05/05/2020 10:20	Sunny	6	21.50m 50mm SP	33.42	5.75	28.17	3.0	-0.02	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.2	20.2	20.3	<1.0	<1.0	
BH007	17/01/2020 11:20	Rain	9	3.60m 50mm SP	34.68	6.07	28.61	0.0	0.05	1000	<0.1	<0.1	<2.0	<2.0	0.3	0.5	20.6	20.6	<1.0	<1.0	
BH007	06/03/2020 12:48	Sunny	6	13.60m 50mm SP	34.68	6.27	28.41	0.0	-0.10	1030	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.6	20.6	<1.0	<1.0	
BH007	20/02/2020 15:20	Fair	4	13.60m 50mm SP	34.68	6.20	28.48	0.0	-0.08	100	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.3	20.3	<1.0	<1.0	
BH007	06/03/2020 12:30	Sunny	6	13.60m 50mm SP	34.68	6.10	28.58	0.0	-0.08	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.3	20.4	<1.0	<1.0	
BH008	17/01/2020 11:50	Rain	9	6.50m 50mm SP	34.05	Wet at Tip		0.0	-0.03	1000	<0.1	<0.1	<2.0	<2.0	0.5	0.5	20.2	20.2	<1.0	<1.0	
BH008	06/03/2020 13:20	Sunny	6	6.50m 50mm SP	34.05	5.51	28.54	0.0	0.01	1030	<0.1	<0.1	<2.0	<2.0	0.4	0.5	20.1	20.1	<1.0	<1.0	
BH008	20/02/2020 15:24	Fair	4	6.50m 50mm SP	34.05	5.50	28.55	0.0	0.00	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.4	20.4	<1.0	<1.0	
BH008	06/03/2020 12:40	Sunny	6	6.50m 50mm SP	34.05	5.50	28.55	0.0	0.04	1001	<0.1	<0.1	<2.0	<2.0	0.1	<0.1	20.5	20.5	<1.0	<1.0	
BH009	17/01/2020 12:10	Rain	9	7.00m 50mm SP	34.20	Dry		0.0	-0.02	1000	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.6	20.6	<1.0	<1.0	

See attached Calibration Certificate for Model No. and any other details. SP = Standpipe - SPIE = Standpipe Piezometer - (P) = Peak - (S) = Steady - (D) = Decline.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester		AGS Contract No :- NW1588
Date of Issue :- 06/03/2020	Page No. :- 3 of 6	Checked By :-	Approved By :- LC
			Certificate No. :- MUN/NW1588/3

ID Manchester - Chartered Institute of Building - Limited Scope - 6b0202b6b14e30 - 81.154.246.72
CONFIDENTIAL
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 389

ID Manchester - Chantelle Campbell - Bellwood Carbon - 6/30/2020 8:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 390

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5 Stanley Industrial Estate, Station Rd, Cramlington, Northumberland, NE23 1WP Tel: 01670 737 737 Fax: 01670 737 738
Regional Office: Unit 5D Glenmore Business Centre, Salem Wharf, Plymouth, PL1 5BL Tel: 01752 785 310 Fax: 01752 785 312

GAS MONITORING RESULTS

Location No. / Grid	Date and Time	Weather Conditions	Temperature °C	Depth and Type of Well	Ground Level (mAOD)	Water Strike (mBGL)	Recharged Water Level (mBGL)	Flow Tends (l/hr)	Diff Pressure (mbar)	ATM Pressure (mbar)	Methane % v/v (P)	Methane % v/v (S)	Methane % LEL (P)	Methane % LEL (S)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (S)	Oxygen % v/v (D)	Oxygen % v/v (S)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
BH009	06/02/2020 10:41	Sunny	5	1.70m 50mm SP	84.26	Dry		0.0	-0.02	1030	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.7	20.7	<1.0	<1.0	
BH009	20/02/2020 16:30	Wet	7	1.70m 50mm SP	84.26	Dry		0.0	-0.02	1001	<0.1	<0.1	<2.0	<2.0	0.1	<0.1	20.7	20.8	<1.0	<1.0	
BH009	06/03/2020 10:50	Sunny	5	1.70m 50mm SP	84.26	Wet at Tip		0.0	-0.05	1001	<0.1	<0.1	<2.0	<2.0	0.1	<0.1	20.4	20.5	<1.0	<1.0	
BH011	17/01/2020 12:40	Rain	9	13.00m 50mm SP	84.05	7.40	28.65	0.0	0.05	1000	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.8	20.8	<1.0	<1.0	
BH011	06/02/2020 14:50	Sunny	7	13.00m 50mm SP	84.05	5.66	28.40	0.0	0.07	1029	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.7	20.7	<1.0	<1.0	
BH011	20/02/2020 17:05	Fair	4	13.00m 50mm SP	84.05	5.70	28.35	0.0	0.04	1000	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.8	20.7	<1.0	<1.0	
BH011	06/03/2020 11:15	Sunny	5	13.00m 50mm SP	84.05	5.50	28.45	0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.5	20.5	<1.0	<1.0	
BH012A	17/01/2020 13:30	Rain	8	6.00m 50mm SP	38.27	Wet at Tip		0.0	-0.04	1000	<0.1	<0.1	<2.0	<2.0	0.6	0.1	20.5	20.6	<1.0	<1.0	
BH012A	06/02/2020 15:00	Sunny	7	6.00m 50mm SP	38.27	5.28	32.29	0.0	0.04	1029	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.6	20.[illegible]	<1.0	<1.0	
BH012A	20/02/2020 15:50	Fair	9	6.00m 50mm SP	38.27	Wet at Tip		0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.2	20.2	<1.0	<1.0	
BH017A	06/03/2020 10:26	Sunny	5	6.00m 50mm SP	38.27	Wet at Tip		0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.4	0.2	20.2	20.0	<1.0	<1.0	

See attached Calibration Certificate for Model No, and any other details. SP = Standpipe - SPIE = Standpipe Piezometer (P) = Peak - (S) = Steady - (D) = Decline

Contract Title :- Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 05/03/2020	Page No :- 4 of 6	Checked By :-	Approved By :- LC
			Certificate No. :- MCN/NW1588/4

ID Manchester - Contact Campbell Brailsford Stokes - 16/01/2020 14:30:54 - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 391

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 4 Riverside Park, Station Road, Cheadle, Cheshire, SK8 2RA Tel: 0161 428 1070 Fax: 0161 428 1071
Regional Office: Unit 20 Business Development Centre, Bond Street, Macclesfield, SK11 6SR Tel: 01625 619 338 Fax: 01625 619 339

GAS MONITORING RESULTS

Monitoring Point	Date and Time	Weather Condition	Atmospheric Pressure	Borehole Construction	Ground Level (mAOD)	Water Depth (mBGL)	Response Zone Water Level (mAOD)	Flow Rate (l/hr)	Tap Pressure (mbar)	ATM Pressure Range (mbar)	Methane % v/v (P)	Methane % v/v (S)	Methane % LEL (P)	Methane % LEL (S)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (S)	Oxygen % v/v (P)	Oxygen % v/v (S)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
BH013	15/01/2020 15:50	Rain	6	16.50m 50mm SP	33.98	6.30	27.68	0.2	0.50	999	<0.1	<0.1	<2.0	<2.0	0.5	0.5	20.3	20.3	1	<1.0	
BH013	06/02/2020 15:10	Sunny	7	16.50m 50mm SP	33.98	6.40	27.68	0.1	-0.09	1023	<0.1	<0.1	<2.0	<2.0	0.6	0.6	20.3	20.3	<1.0	<1.0	
BH013	20/02/2020 15:15	Fair	4	16.50m 50mm SP	33.98	6.40	27.68	0.0	-0.06	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.8	20.8	<1.0	<1.0	
BH013	05/03/2020 09:30	Sunny	6	16.50m 50mm SP	33.98	6.30	27.78	0.0	-0.04	1001	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.8	20.8	<1.0	<1.0	
DB001	17/01/2020 12:20	Rain	0	4.00m 50mm SP	34.22	Wet at Tip		0.0	-0.04	1000	<0.1	<0.1	<2.0	<2.0	0.4	0.4	20.2	20.2	<1.0	<1.0	
DB001	06/02/2020 14:06	Sunny	6	4.00m 50mm SP	34.22	3.17	31.05	0.0	0.27	1029	<0.1	<0.1	<2.0	<2.0	0.3	0.2	20.4	20.4	<1.0	<1.0	
DB001	20/02/2020 16:40	Fair	4	4.00m 50mm SP	34.22	3.05	31.17	0.0	0.12	1001	<0.1	<0.1	<2.0	<2.0	0.4	0.4	20.5	20.4	<1.0	<1.0	
DB001	05/03/2020 11:30	Sunny	6	4.00m 50mm SP	34.22	3.00	31.22	0.0	0.09	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.2	20.2	<1.0	<1.0	
DB002	17/01/2020 12:30	Rain	0	9.00m 50mm SP	34.29	9.20	25.09	0.0	-0.08	1000	<0.1	<0.1	<2.0	<2.0	0.6	0.6	20.1	20.1	<1.0	<1.0	
DB002	06/02/2020 14:30	Sunny	6	9.00m 50mm SP	34.29	5.51	28.78	0.0	0.16	1029	<0.1	<0.1	<2.0	<2.0	0.5	0.5	20.1	20.1	<1.0	<1.0	
DB002	20/02/2020 16:50	Fair	4	9.00m 50mm SP	34.29	5.45	28.84	0.0	0.04	1001	<0.1	<0.1	<2.0	<2.0	0.4	0.4	20.3	20.3	<1.0	<1.0	

See attached Calibration Certificate for Model No. and any other details. SP = Standpipe - SPIE = Standpipe Piezometer. (P) = Peak - (S) = Steady - (D) = Decline.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester		AEG Contract No :- NW1588
Date of Issue :- 06/03/2020	Page No :- 5 of 6	Checked By :-	Approved By :- LC	Certificate No. :- MON/NW1588/5

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 392

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 35 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RX Tel: 0191 387 1500 Fax: 0191 388 4718
Regional Office: Unit 28 Business Development Centre, Lancaster Road, Preston, PR1 1HT Tel: 01772 735 300 Fax: 01772 735 999

GAS MONITORING RESULTS

Monitoring Point	Date and Time	Weather Condition	Temperature °C	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Flow Range (l/m)	Diff Pressure (+ve)	A.I.M Pressure Range (mbar)	Methane % v/v		Methane % LEL		Carbon Dioxide % v/v		Oxygen % v/v		Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
											(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)			
BH102	06/03/2020 09:05	Sunny	6	6.90m 50mm SP	34.08	5.40	28.68	0.0	0.06	100	<0.1	<0.1	<2.0	<2.0	0.8	0.8	20.4	20.4	<1.0	<1.0	

See attached Calibration Certificate for Model No. and any other details. SP = Standpipe - SPIC = Standpipe Piezometer. (P) = Peak - (S) = Steady - (D) = Decline.

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester		AEG Contract No :- NW1588
Date of Issue :- 06/03/2020	Page No. :- 6 of 6	Checked By :-	Approved By :- LC	Certificate No. :- MON/NW1588/6

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 393

CERTIFICATION OF CALIBRATION

4533

Date Of Calibration: 21-Feb-2019

Certificate Number: G506065_2/22573

Issued by: QED Environmental Systems Ltd.

Customer: **Lombard North Central Plc**
Royal Bank of Scotland The Gemini Building 24-25 St Andrew Square
Edinburgh EH2 1AF UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G506065

UKAS Accredited results:

Methane (CH_4)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.8	0.41
15.0	14.8	0.64
49.9	49.3	0.94

Carbon Dioxide (CO_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.9	0.43
15.0	14.8	0.70
50.1	50.1	1.1

Oxygen (O_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
21.0	21.1	0.31

All concentrations are molar.

CH_4, CO_2 readings recorded at : 33.1 °C ± 2.5 °C

O2 readings recorded at : 22.8 °C ± 2.5 °C

Barometric Pressure : 1013 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance (s): IGC Instance:N/A

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1498734

ID Manchester - Christine Campbell - Brunswood Systems - 6/30/2020 2:14:30 PM - 81.152.249.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 394

CERTIFICATION OF CALIBRATION

4633

Date Of Calibration: 21-Feb-2019

Certificate Number: G506065_2/22573

Issued by: QED Environmental Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	Instrument Reading
1013	1013

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO	497	507
H_2S	257	257

Internal Flow	
Applied (l/hr)	Instrument Reading (l/hr)
5	5.2
10	10.3

Date of Issue: 25-Feb-2019 Approved by Signatory

Dawn Hemings

Laboratory Inspection

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd, Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales, 1893734

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2021 2:14:30 PM 81.151.24.172

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 395

In-situ Test Report Certificate

IN-SITU TESTING ENCLOSURES

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 396

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella G Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham DH2 2RJ - Tel: 0191 3874705 Fax: 0191 3874716
Regional Office: Unit 130 Business Development Centre, Canon Wharf, Blackburn, BB1 5BL – Tel: 01254 503200 Fax: 01254 962 500

IN-SITU TESTING REPORT CERTIFICATE

1367

Contract Title: ID Manchester Preliminary Ground Investigation

AEG Reference: NW1588

Client Address: University of Manchester

I certify that *In-situ* testing was carried out on the above contract in accordance with techniques outlined in BS 1377: 1990: Part 9 or other appropriate standards as quoted, and the following results given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages.

For and on behalf of Allied Exploration & Geotechnics Limited

☐ Nick Vater (Managing Director)

☑ Kerry Wade (Technical Manager)

Signed _____ Date: 15 April 2020

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation

ID Manchester - Christine Campbell - Brentwood S Tech - 6/30/2020 2:14:30 PM - 194.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 397

IN-SITU TESTING REPORT CERTIFICATE

ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Test Report Certificate	N/A		2
1	Standard Penetration Test Results (SPT)	Yes	BS 1377 Part 9 1990	29
-	Hand Shear Vane Test Results	No		-
-	Variable Head Permeability Test Results	No	BS 5930 1999 Section 4	-
2	*In-situ* Water Quality Parameter Test Results	No		4
-	Density by Sand Replacement Method	Yes	BS 1377 Part 9 1990	-
-	Density by Core Cutter Method	Yes	BS 1377 Part 9 1990	-
-	Determination of the Vane Shear Strength (Down the Hole)	Yes	BS 1377 Part 9 1990	-
-	Shallow Pad (skip) Load Test Results	No	BS 1377 Part 9 1990	-
-	Determination of the California Bearing Ratio	Yes	BS 1377 Part 9 1990	-
-	Plate Loading Test Results	No	BS 1377 Part 9 1990	-
-	Apparent Resistivity of Soil	No	BS 1377 Part 9 1990	-
-	Redox Potential of Soil	No	BS 1377 Part 9 1990	-
-	Determination of the Soil Infiltration Rate for Soakaway Design	No	BRE Digest 365:1991	-

ID Manchester - Christine Campbell - Bluntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 398

Standard Penetration Test Results

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

ID Manchester - Christine Campbell - Burntwood SciTech (6/30/2020 2:14:30 PM GMT - 81.154.246.72)

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 399

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5a Clarke Nuttall Industrial Estate, Alpha Rd, Chester le Street, Co. Durham, DH3 3RG. Tel: 0191 492 4100 Fax: 0191 492 4113
Regional Office: Unit 2C Lakeside Development Centre, Forrest Park, Blackburn, BB1 5DL. Tel: 01772 [illegible] Fax: 01772 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Top of Hole Level (mAOD)	Water Depth (Strike)	Rod Length	SPT Hammer Ref.	Energy Ratio (%)	SEATING DRIVE: Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Total Pen (mm)	Total Blows (No.)	TEST DRIVE: Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Blows/mm	Total Pen (mm)	Total Blows (No.)	Rod Length Corr. (%)	Energy Ratio Corr. (%)	'N' (1000)/Blow	SPT 'N' Value	Shear Value (Mod.) (kPa)	Shoe or Core	Remarks
	(m)	(m)	(m)		(%)	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	mm	No.						SPT	
BH101	2.00 (30.31)	Dry (1.80)	2.00	AT-02	54	75	2	75	2	150	4	75	2	75	2	75	2	70	300	6	0.80	0.90	37.50	6	6	S	
BH201	3.00 (29.31)	Dry (2.80)	3.00	AT-02	54	75	2	75	2	150	4	75	2	75	2	75	2	75	300	10	0.72	0.90	30.00	10	6	S	
BH301	4.00 (28.81)	Dry (3.80)	4.00	AT-02	54	75	2	75	2	150	4	75	10	75	15	75	15	25	250	50	0.76	0.90	0.60	-	-	S	
BH401	5.00 (32.81)	Dry (4.80)	5.00	AT-02	54	75	6	75	11	150	17	75	20	25	30				100	50	0.80	0.90	2.00	-	-	S	
BH501	5.50 (32.81)	Dry (5.30)	5.50	AT-02	54	75	15	50	13	125	28	75	20	50	25				175	50	0.80	0.90	2.50	-	-	S	
BH601	0.50 (32.81)	0.50 (0.50)	0.50	AT-05	78	75	20	75	40	150	60	20	60						20	60	0.96	1.17	0.33	-	-	S	
BH02	12.50 (25.31)	0.00 (12.50)	12.50	ATH05	78	75	26	75	73	150	99	10	27						10	27	1.00	1.17	0.37	-	-	S	
BH02	15.50 (22.31)	0.00 (15.50)	15.50	ATH05	78	30	25			30	25	30	100						30	100	1.00	1.17	0.30	-	-	S	
BH03	[illegible] (21.97)	Dry (1.70)	[illegible]	ATH05	55	75	5	75	5	150	9	75	5	75	7	75	6	75	6	300	24	0.67	0.82	12.50	24	15	C	
BH04	2.70 (30.61)	Dry (2.70)	2.70	ATH05	55	75	3	75	3	150	12	75	3	75	12	75	20	14	10	239	50	0.90	0.95	4.79	-	-	C	

N.B. Please refer to site plan/borehole records for additional information and corresponding Exploratory Hole record for sampling details. *Uncorrected and corrected SPT'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 15/04/2020	Page No. :- 1 of 11	Checked By :- LC	Approved By :- KW
Certificate No :- SPT/NW1588/1			

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood Geotech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 400

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2 Fields Farm Barn, Fields Farm Lane, Longridge, PR3 3BD. Tel: 01772 785 940 Fax: 01772 785 941
Registered Office: Unit 10 Business Development Centre, Simonstone, BB12 7BL. Tel: 01282 777 709 Fax: 01282 776 395

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	S.P.T. Hammer Ref.	Energy Ratio %	BEAT ADVANCE: Pen mm	BEAT ADVANCE: Blows No.	TEST DRIVE: 1st Pen mm	1st Blows No.	2nd Pen mm	2nd Blows No.	3rd Pen mm	3rd Blows No.	4th Pen mm	4th Blows No.	5th Pen mm	5th Blows No.	Total Pen mm	Total Blows No.	Rod Length Corr. Ce	Energy Ratio Corr. Cr	Pen (mm/Blow)	SPT 'N' Value	SPT 'N' Value (Corr.)	Soil Type	Remarks
BH002	3.70 (29.67)	Dry (3.70)	4.70	ATH01	65	38	25											75	50	0.75	0.93	0.67	-	-	S	
BH002	4.00 (29.37)	Dry (4.00)	4.00	ATH01	65	12	50											14	100	0.75	0.93	0.67	-	-	S	
BH003	3.70 (29.95)	Dry (3.70)	4.70	ATH01	65	75	3	75	5	150	8	75	5	75	6	75	7	75	14	300	35	0.67	0.93	0.34	29	19	C	
BH003	4.70 (29.40)	Dry (4.70)	4.70	ATH01	65	75	0	75	5	150	12	75	8	75	7	75	4	75	4	300	28	0.71	0.93	0.00	15	10	C	
BH003	4.70 (29.40)	Dry (3.70)	4.70	ATH01	65	75	1	75	0	150	-	75	5	75	8	75	17	75	9	300	37	0.79	0.93	0.51	37	25	C	
BH005	4.70 (27.90)	Dry (4.70)	4.70	ATH01	65	75	6	75	3	150	14	75	11	75	15	32	25			182	81	0.79	0.93	0.87	-	-	S	
BH005	5.00 (27.60)	Dry (5.00)	5.00	ATH01	65	38	25			38	25	38	30							150	80	0.81	0.93	0.59	-	-	S	
BH007	5.40 (27.70)	Dry (5.40)	5.40	ATH01	65	38	50			38	50	38	100							150	100	0.82	0.93	0.22	-	-	S	
BH004	3.40 (32.83)	Dry (3.20)	3.40	ATH01	80	75	4	75	6	150	12	75	14	75	10	75	8	43	7	300	39	0.60	1.00	0.08	39	26	S	
BH004	3.90 (32.22)	Dry (3.90)	3.90	ATH01	80	75	3	75	4	150	7	75	4	75	2	75	5	60	3	300	14	0.68	1.00	0.43	10	10	S	

NOTE: Please refer to Interpretive Report for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented for the attached graphics. Not relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 15/04/2020	Page No :- 2 of 11	Checked By :- LC	Approved By :- [signature]
Certificate No. :- SPT/NW1588/2			UKAS TESTING 1367

ID Manchester - Christabel Blumwood (eTech - 6/30/2020 2:14:30 PM - 81.154.246.72
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 401
CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Tel: 0151 [illegible] Fax: 0151 [illegible]
Regional Office: [illegible] Tel: 01772 [illegible] Fax: 01772 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (m below Ground Level)	Water Depth (Below GL)	Rod Length	Split Barrel Ref.	Energy Ratio (%)	SEAT N-2 DRIVE						TEST DRIVE										Total Corr. Factor Cr	Energy Ratio Corr. Cr	Fully Corr. 'N'	SPT 'N' Value	SPT 'N' Value (Corr.) N60	Stratum Code	Remarks
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.						SC	
BH004	3.00 (3.22)	Dry (4.82)	4.00	ATH07	82	75	3	75	4	150	7	75	4	75	8	75	10	75	11	300	33	0.72	1.00	5.09	35	33	S	
BH004	4.50 (5.22)	Dry (3.79)	4.50	ATH07	82	75	5	75	12	150	17	35	22	75	16	50	11			300	50	0.78	1.00	4.68	-	-	S	
BH004	5.00 (5.72)	Dry (4.82)	5.00	ATH07	82	75	7	75	8	150	15	75	19	75	31	0	6			150	30	0.80	1.00	3.00	-	-	S	
BH004	6.00 (6.72)	Dry (5.82)	6.00	ATH07	82	75	5	75	8	150	13	75	10	75	8	75	15	75	12	300	45	0.84	1.00	8.98	48	36	C	
BH004	7.50 (8.22)	7.12 (7.50)	7.50	ATH07	82	75	9	75	12	150	30	75	18	75	27	0	5			150	30	0.88	1.00	3.00			C	
BH004	8.00 (8.72)	7.45 (7.50)	8.00	ATH07	82	25	21			50	25	40	50							40	50	0.92	1.00	0.50	-	-	S	
BH004	8.75 (9.47)	8.20 (8.75)	8.75	ATH08	78	50	25			80	25	68	30							68	30	0.96	1.17	0.98	-	-	S	
BH004	9.50 (9.72)	9.00 (9.50)	9.50	ATH08	78	40	15			80	25	38	50							38	50	0.98	1.17	0.73	-	-	S	
BH004	11.00 (11.22)	9.00 (11.50)	11.00	ATH08	78	30	25			80	25	30	50							30	50	1.00	1.17	0.60	-	-	S	
BH004	14.00 (14.22)	9.00 (14.50)	14.00	ATH08	78	30	25			80	25	25	50							25	50	1.00	1.17	0.50	-	-	S	

NOTE: Please refer to calculation sheets for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester		AEG Contract No :- NW1588
Date of Issue :- 15/04/2020	Page No. :- 3 of 11	Checked By :- LC	Approved By :-	Certificate No. :- SPT/NW1588/3

UKAS 1367

ID Manchester - Christine Campbell - Buntwood SciTech - 6301082020 14:30:04 - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 402

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Clyde Gateway Business Centre, Kelvin Way, Crossmyloof, Glasgow, G73 1XU. Tel: 0141 202 4120 Fax: 0141 202 4713
Regional Office: Unit 22 Business Development Centre, Eastern Green, Hednesford, WS12 5RD. Tel: 01543 420 820 Fax: 01543 420 888

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth / Reduced Level	Water Strike (Casing)	Rig / Method	SPT Hammer No.	Energy Ratio E$_r$	SEATING DRIVE						TEST DRIVE										Total Weight Corr.	Energy Ratio Corr.	N$_{60}$ Value	SPT 'N' Value (Corr.)	SHANP Value (Corr.)	Scale of Core	Remarks
	m	m	m		%	Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	+/- mm	Blows No.	Total Pen mm	Total Blows No.							
BH005	1.00 (30.92)	Dry (1.50)	1.50	ATHC1	74	75	8	75	10	150	18	75	27	22	23					97	50	0.00	0.92	1.84			S	
BH005	2.50 (29.42)	Dry (1.50)	3.50	ATHC1	74	75	3	75	4	150	7	75	5	75	5	75	6	75	3	300	20	0.70	0.92	16.00	20	15	C	
BH005	3.50 (28.42)	Dry (1.40)	3.50	ATHC1	74	50	25			50	25	48	50							48	50	0.75	0.92	0.96	-	-	S	
BH005	3.50 (28.02)	Dry (1.40)	3.50	ATHC1	74	32	50			82	50	30	100							30	100	0.74	0.92	0.50	-	-	S	
BH005	4.90 (26.42)	Dry (1.40)	4.90	ATHC1	74	38	100			88	100											1.00	0.92		-	-	S	
BH006	0.00 (32.67)	Dry (1.40)	1.40	ATHC1	74	75	8	50	17	125	25	10	50							10	50	0.00	1.00	2.00			C	
BH007	1.50 (30.16)	Dry (1.50)	1.50	ATHC1	74	75	3	75	4	150	8	75	2	75	3	75	3	75	3	300	16	0.99	0.92	18.75	16	10	C	
BH007	2.50 (29.16)	Dry (1.50)	3.50	ATHC1	74	75	3	75	4	150	7	75	4	75	4	75	4	75	2	300	20	0.97	0.92	16.00	20	13	S	
BH007	3.50 (28.16)	Dry (1.50)	3.50	ATHC1	74	75	3	75	2	150	7	75	4	75	5	75	6	75	2	300	18	0.96	0.92	18.75	18	11	S	
BH007	4.50 (28.16)	Dry (1.50)	4.50	ATHC1	74	75	10	75	5	150	24	75	2	75	2	75	5	75	3	300	10	0.95	0.92	9.00	10	7	C	

N.B. Please refer to calculation sheets for additional information and corresponding Dynamic Cone Penetrometer tested for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :-	Client :-	AEG Contract No :-
ID Manchester Preliminary Ground Investigation	University of Manchester	NW1588

Date of Issue :-	Page No. :-	Checked By :-	Aproved By :-	Certificate No. :-
15/04/2020	4 of 11	LC	KW	SPT/NW1588/4

UKAS TESTING 1367

ID Manchester - Christine Campbell, Brentwood SciTech - 6430620 - 81154246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 403

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 20 Bridge Hill Industrial Estate, Driffield, East Yorkshire, YO25 5TG Tel: 01377 256 381 Fax: 01377 256 848
Regional Office: Unit 10 Business Development Centre, Eastern Way, Bury St Edmunds, IP32 7AB Tel: 01284 766 161 Fax: 01284 766 848

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Depth) m	Rod Length m	SPT Hammer Ref	Energy Ratio %	BEAT / DRIVE 1 Pen mm	1 Blows No.	2 Pen mm	2 Blows No.	Total Pen mm	Total Blows No.	TEST DRIVE 1 Pen mm	1 Blows No.	2 Pen mm	2 Blows No.	3 Pen mm	3 Blows No.	4 Pen mm	4 Blows No.	Total Pen mm	Total Blows No.	End Legrin Corr. C_n	Energy Ratio Corr. C_E	Fen (mm/Blow)	SPT'N' Value	SPT'N' Value ('Corr.') N_{60}	Shear Vane kPa	Remarks
BH007	6.50 (29.18)	Dry (6.50)	6.50	AT-01	65	75	2	75	4	150	4	75	3	75	2	75	2	75	2	300	10	0.98	0.97	30.00	10	9	8	
BH007	7.20 (27.48)	Dry (7.20)	7.20	AT-01	65	23	25			50	25	61	50							61	50	0.80	0.82	1.22	-	-	6	
BH007	7.50 (27.18)	Dry (7.50)	7.50	AT-01	65	21	50			71	50	99	100							99	100	0.90	0.92	0.99	-	-	5	
BH007	9.00 (25.68)	0.00 (12.18)	9.00	AT-01	65	25	25			50	25	50	50							100	50	1.00	1.02	0.50	-	-	3	
BH007	12.00 (23.18)	0.00 (12.18)	12.00	AT-01	65	30	25			55	25	40	50							90	50	1.00	1.02	0.50	-	-	3	
BH008	1.00 (27.68)	0.00 (1.50)	1.50	AT-01	65	0	2	75	4	150	7	75	4	75	3	75	3	75	3	300	13	0.68	0.69	18.75	10	10	6	
BH008	2.50 (26.18)	0.00 (2.50)	2.50	AT-01	65	75	2	75	5	150	7	75	5	75	4	75	4	75	3	300	16	0.70	0.72	18.75	10	10	6	
BH008	3.50 (25.68)	Dry (3.50)	3.50	AT-01	65	75	3	75	4	150	7	75	5	75	3	75	3	75	4	300	15	0.74	0.92	17.65	12	11	6	
BH008	4.50 (24.68)	Dry (4.50)	4.50	AT-01	65	75	2	75	1	150	3	75	2	75	1	75	2	75	1	300	6	0.75	0.92	50.00	6	6	6	
BH008	5.50 (23.68)	Dry (5.50)	5.50	AT-01	65	75	-	75	-	150	2	75	2	75	3	75	2	75	2	300	9	0.82	0.95	33.33	9	7	5	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphics plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW/1588	
Date of Issue :- 15/04/2020	Page No :- 5 of 11	Checked By :- LC	Approved By :-
Certificate No. :- SPT/NW1588/5			

UKAS 1367

ID Manchester - Christine Campbell - Plumwood Scotch - 6390820214 - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 404

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 12B Eden Park Industrial Estate, Penrith, Cumbria, CA11 9BD. Tel: 01768 867 450 Fax: 01768 867 451
Regional Office: Unit 1 Ordnance Park, Marsh Parade, Newton Heath, Manchester, M40 5GL. Tel: 0161 681 3777 Fax: 0161 785 9985

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Top of Hole Level mOD	Water Strike (Casing)	Hole Length	SPT Hammer Ref.	Energy Ratio E$_r$	SEATING DRIVE Pen	SEATING DRIVE Blows	TEST DRIVE 1 Pen	TEST DRIVE 1 Blows	TEST DRIVE 2 Pen	TEST DRIVE 2 Blows	TEST DRIVE 3 Pen	TEST DRIVE 3 Blows	TEST DRIVE 4 Pen	TEST DRIVE 4 Blows	TEST DRIVE 5 Pen	TEST DRIVE 5 Blows	TEST DRIVE 6 Pen	TEST DRIVE 6 Blows	Total Pen	Total Blows	Pen Length Corr. Cp	Energy Ratio Corr. Ce	Uncorrected N Value	SPT'N' Value	SPTN Value (Open Hole)	Stream Core	Remarks
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.						S/C	
BH005	5.20 (37.35)	Dry (6.20)	6.20	ATH01	83	46	28			6	25	44	50									450	60	0.85	0.92	0.69			S	
BH006	3.50 (37.65)	Dry (6.50)	6.50	ATH01	83	40	50			20	50	82	100									450	100	0.85	0.92	0.81			S	
BH008	1.70 (39.50)	Dry (7.50)	7.70	ATH01	83	15	4	75	5	150	9	75	5	75	4	75	5	75	6	300	20	0.85	0.92	15.03	20	11	S	
BH009	3.70 (41.50)	Dry (7.70)	7.70	ATH01	83	15	8	75	5	150	7	75	5	75	6	75	6	75	7	300	23	0.85	0.92	13.04	23	11	S	
BH010	3.70 (39.40)	Dry (7.70)	7.70	ATH01	83	75	8	75	5	150	7	75	6	75	5	75	5	75	14	300	37	0.75	0.92	25.1	37	26	S	
BH011	4.50 (29.60)	Dry (8.50)	8.50	ATH01	83	75	17	75	25	80	42	0	25							6	25	0.75	0.92	0.24			S	
BH012	4.50 (29.40)	Dry (8.50)	8.50	ATH01	83	39	50			36	50	15	100							15	100	0.75	0.92	0.68	-	-	S	
BH013	1.70 (32.35)	Dry (1.70)	1.70	ATH01	83	75	12	75	5	150	20	75	10	75	9	75	9	75	11	450	59	0.85	0.92	7.23	39	23	C	
BH014	3.70 (31.35)	Dry (3.70)	3.70	ATH01	83	75	7	75	5	150	12	75	5	75	5	75	5	75	7	300	23	0.85	0.92	13.04	20	15	C	
BH015	3.70 (30.35)	Dry (3.70)	3.70	ATH01	83	75	5	75	5	150	7	75	5	75	4	75	5	75	4	300	17	0.85	0.92	11.55	17	12	S	

NOTE: Please refer to calculation sheet(s) for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N' values are presented in accordance with the requirements of BS EN ISO 22476-3:2005

Contract Title :-	Client :-	AEG Contract No :-
ID Manchester Preliminary Ground Investigation	University of Manchester	NW1588

Date of Issue :-	Page No :-	Checked By :-	Approved By :-	Certificate No. :-
15/04/2020	5 of 11	LC	KW	SPT/NW1588/6

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 1588 - 20-21 - 81-154-246-72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 405

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]
Tel: 0161 367 4710
Tel: 0772 735 [illegible] Fax: 01772 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reference Level) m	Water Level (Casing) m	Hole Depth m	SPT Hammer Ref.	Energy Ratio E_r %	SEATING DRIVE Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.	TEST DRIVE Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.	Rod Length Corr. C_R	Energy Ratio Corr. C_E	Pen. compaction	SPT 'N' Value	SPT 'N' Value (Corr.) N_60	Shear Strength kPa	Remarks
BH011	4.70 (26.38)	Dry (4.70)	4.70	ATHD1	68	75	3	75	2	150	5	75	5	75	5	75	6	75	9	300	25	0.79	0.92	12.00	25	16	5	
BH011	5.50 (25.58)	Dry (5.50)	5.50	ATHD1	68	25	25			50	25	11	50							11	50	0.82	0.92	8.27		-	5	
BH011	6.20 (27.48)	Dry (6.20)	6.20	ATHD1	68	25	25			25	25	18	50							18	50	0.85	0.92	0.90	-	-	5	
BH011	6.50 (27.55)	Dry (6.50)	6.50	ATHD1	68	33	50			35	50	22	100							22	100	0.86	0.92	0.92	-		5	
BH012A	1.70 (28.57)	Dry (1.70)	1.70	ATHD1	68	75	3	75	2	150	4	75	5	75	1	75	2	75	4	300	10	0.67	0.92	33.00	10	6	5	
BH012A	2.70 (28.57)	Dry (2.70)	2.70	ATHD1	68	75	3	75	2	150	5	75	2	75	5	75	3	75	2	300	12	0.71	0.92	25.00	12	7	5	
BH012A	3.70 (28.57)	Dry (3.70)	3.70	ATHD1	68	75	2	75	3	150	5	75	5	75	1	75	1	75	2	300	7	0.75	0.92	42.86	7	5	5	
BH012A	4.70 (28.57)	Dry (4.70)	4.70	ATHD1	68	75	3	75	4	150	7	75	7	75	2	75	2	75	3	300	11	0.79	0.92	27.27	11	8	5	
BH012A	6.50 (28.77)	Dry (6.50)	6.50	ATHD1	68	75	2	75	3	150	5	75	5	75	5	75	5	75	5	300	10	0.86	0.92	30.00	10	8	5	
BH012A	8.00 (28.27)	Dry (8.00)	8.00	ATHD1	68	75	2	75	4	150	6	75	9	75	9	75	8	75	5	300	19	0.93	0.92	15.79	19	17	5	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphics plot relative to each Exploratory Hole.

Contract Title :- D Manchester Preliminary Ground Investigation		Client :- University of Manchester	AEG Contract No :- NW1588
Date of Issue :- 15/04/2020	Page No. :- 7 of 11	Checked By :- LC	Approved By :- [signature]	Certificate No. :- SPT/NW1588/7

UKAS TESTING 1367

ID Manchester - Christine Campbell - Plymouth SciTech - 6360202 - 14/01/2021 - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 406

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 20 Suffolk Industrial Estate, Peter Hill, Dewsbury, West Yorkshire, WF12 9DQ Tel: (01924) 467 [illegible] Fax: (01924) 467 [illegible]
Regional Office: Unit 10, Kinsale Development Centre, Kincraig Road, Blackpool, Lancashire, FY2 0JU Tel: (01253) [illegible] Fax: (01253) 6[illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth / Instrumented Length (ft)	Water Depth / Casing (m)	Rod Length (m)	SPT Hammer Ref.	Energy Ratio E_r (%)	SEATING DRIVE Pen. (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Total Pen. (mm)	Total Blows (No.)	TEST DRIVE 1st (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Total Pen. (mm)	Total Blows (No.)	Rod Length Corr. C_R	Energy Ratio Corr. C_E	Pen. mm/Blow	SPTN Value	SPTV Value (Corr.) $(N_1)_{60}$	Shear or Core (S/C)	Remarks
BH012A	32.50 (27.77)	Dry (10.66)	10.50	ATH01	65	44	25			44	25	0	50							0	50	1.00	0.97	0.00			S	
BH012A	32.50 (27.47)	Dry (10.66)	10.50	ATH01	65	17	52			17	52	0	100							5	100	1.00	0.93	0.05	-	-	S	
BH013	3.70 (3.38)	Dry (1.10)	1.70	ATH01	65	15	4	75	4	150	8	75	5	75	6	75	11	75	10	300	34	0.97	0.92	8.82	34	31	C	
BH013	3.70 (3.38)	Dry (2.10)	2.70	ATH01	65	75	9	75	11	150	20	75	4	75	5	75	6	75	5	300	21	0.71	0.97	14.29	21	14	C	
BH013	3.70 (3.38)	Dry (3.10)	3.70	ATH01	65	75	2	75	2	150	4	75	5	75	7	75	7	75	5	300	24	0.75	0.92	12.50	28	21	C	
BH013	4.70 (3.38)	Dry (4.10)	4.70	ATH01	65	75	3	75	5	150	8	75	5	75	4	75	5	75	3	300	17	0.79	0.92	17.65	17	12	C	
BH013	9.00 (27.08)	Damp (6.00)	9.00	ATH01	65	75	3	75	4	150	7	75	6	75	5	75	5	75	7	300	23	0.84	0.92	13.00	20	16	C	
BH013	7.50 (25.56)	Damp (7.50)	7.50	ATH01	65	75	2	75	2	150	4	75	5	75	4	75	5	75	5	300	19	0.90	0.92	15.79	16	13	C	
BH012	8.20 (26.08)	Damp (8.00)	8.00	ATH01	65	36	25			36	25	0	50							9	50	0.93	0.92	5.56	-	-	S	
BH012	9.00 (24.08)	Damp (8.00)	9.00	ATH01	65	17	25			17	25	11	50							14	50	0.95	0.92	0.00			S	

*OTL: Please refer to calibration certificate for additional information and corresponding exploratory hole record for sampling details. Uncorrected and corrected SPTV values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester	AEG Contract No :- NW1588
Date of Issue :- 15/04/2020	Page No. :- 8 of 11	Checked By :- LC	Approved By :- [signature]
			Certificate No. :- SPT/NW1588/8

UKAS TESTING 1357

ID Manchester - Christopher Campbell - Brentwood Site Lab - 6360820 - 14/04/2020 - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 407

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Sheffield Business Park, Europa Link, Sheffield S9 1XU. Tel: 0114 261 1010 Fax: 0114 261 1011
Regional Office: Unit 23 Alpha Development Centre, Eaton Wood Close, Derby DE23 4BL. Tel: 01332 813 813 Fax: 01332 813 814

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Ground Level)	Water Depth (Casing)	Hole Diameter	SPT Hammer Ref.	Energy Ratio (%)	SEATING DRIVE 1st 150mm						TEST DRIVE 2nd 150mm										Rod Length Corr. Ks	Energy Ratio Corr. Kr	Blows/mm	SPT 'N' Value	SPT 'N' Value (Corr.) Ncor	Shear Vane	Remarks
	m	m	m		%	mm	Blows No.	mm	Blows No.	Total Pen mm	Total Blows No.	Pen mm	Blows No.	mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Power	Total Pen mm	Total Blows No.						S/C	
BH07	10.40 (25.08)	Casing (10.40)	10.40	ATH01	65	21	50			21	50	12	100								12	100	1.00	0.92	0.12	-	-	S	
BH07	10.50 (32.68)	Casing (10.50)	10.50	ATH01	65	16	50			16	50	6	100								6	100	1.00	0.92	0.06			S	
BH013	13.50 (19.50)	6.00 (13.50)	13.50	ATH05	70	30	25			30	25	50	100								50	100	1.00	1.17	1.50	-	-	S	
BH013	18.50 (15.00)	0.00 (18.50)	18.50	ATH05	70	30	25			30	25	25	100								25	100	1.00	1.17	0.25	-	-	S	
BH014	1.20 (34.87)	Dry (1.00)	1.20	ATH02	64	75	4	75	5	150	9	75	4	75	5	75	3	75	3		300	23	0.65	0.90	15.01	23	13	S	
BH014	2.50 (33.57)	Dry (1.80)	2.50	ATH02	64	75	-	75	3	150	3	75	3	75	3	75	3	75	3		300	12	0.65	0.90	25.02	12	7	S	
BH014	3.00 (32.07)	Dry (2.80)	3.00	ATH02	64	75	2	75	3	150	5	75	3	75	3	75	4	75	4		300	14	0.72	0.90	25.03	14	9	S	
BH014	4.00 (31.07)	Dry (3.80)	4.00	ATH02	64	75	3	75	4	150	7	75	-	75	3	75	4	75	4		300	17	0.78	0.90	17.65	17	12	S	
BH014	5.00 (30.07)	Dry (4.80)	5.00	ATH02	64	75	4	75	10	150	14	75	13	75	13	75	5	75	5		300	27	0.86	0.90	8.11	27	27	S	
BH014	6.00 (29.71)	Dry (5.80)	6.00	ATH02	64	75	5	75	4	150	9	75	2	75	5	75	4	75	5		300	18	0.92	0.90	16.67	18	14	S	

NOTE: Please refer to calibration certificate for additional information and conversion of Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graph(s) to be read Exploratory Hole

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester	AEG Contract No :- NW1588
Date of Issue :- 15/04/2020	Page No :- 9 of 11	Checked By :- LC	Approved By :- KW	Certificate No. :- SPT/NW1588/9

UKAS TESTING 1367

ID Manchester - Christie Campbell Blythwood Square (630268) 2020-04-30 14:30:54 - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 408

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Sidings Ind Estate, Felton, Northumberland, NE65 9PQ Tel: 01665 [illegible] Fax: 01665 [illegible]
Regional Office: [illegible] Tel: 01772 [illegible] Fax: 01772 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3; 2005)

Exploratory Hole No.	Top of Hole Reduced Level (m)	Water Depth (Cased) (m)	Total Depth (m)	SPT Hammer Ref.	Energy Ratio (%)	SEATING DRIVE: Pen (mm)	SEATING DRIVE: Blows (No.)	TEST DRIVE: Pen (mm)	TEST DRIVE: Blows (No.)	Total Pen (mm)	Total Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Total Pen (mm)	Total Blows (No.)	Rod Length Corr. (%)	Energy Ratio Corr. (%)	Pen to 1st Flow	SPT 'N' Value	SPT 'N' Value (Corr. Flo)	Shear Vane (kPa)	Remarks
BH01	7.50 (25.62)	Dry (7.50)	7.50	ATH02	58	75	6	70	11	150	17	75	14	75	22	50	14			200	50	0.50	0.90	4.00		-	S	
BH04	9.50 (31.17)	0.62 (3.60)	9.50	ATH02	58	75	4	75	9	150	13	75	10	75	11	75	11	75	14	300	45	0.46	0.90	1.50	46	46	D	
BH07	8.50 (25.62)	0.91 (3.00)	8.50	ATH02	58	75	7	75	11	150	18	75	14	75	20	50	16			100	50	0.98	0.90	6.50	-	-	S	
BH08	10.00 (25.7)	0.77 (9.80)	10.00	ATH02	58	75	10	37	15	112	25	75	27	50	33					125	50	1.10	0.90	7.50		-	S	
DS03*	9.50 (32.02)	Dry (2.20)	9.50	ATH01	55	75	1	75	0	150	1	75	1	75	1	75	1	75	1	300	4	0.36	0.92	75.00	4	3	S	
DS05*	9.50 (31.02)	1.68 (3.20)	9.50	ATH01	55	75	1	75	1	150	2	75	6	75	7	75	6	75	6	300	25	0.72	0.92	12.00	25	17	S	
DS07*	9.50 (29.72)	5.19 (4.50)	9.50	ATH01	55	75	5	75	5	150	10	75	6	75	5	75	4	75	6	300	21	0.70	0.92	12.50	24	17	S	
DS09*	7.50 (24.22)	2.11 (7.00)	7.50	ATH01	55	75	11	75	19	150	30	11	50							11	50	0.68	0.92	0.30	-	-	D	
DS10*	9.00 (25.62)	5.11 (7.00)	9.00	ATH01	55	75	13	75	16	150	30	11	50							11	50	0.84	0.92	0.70	-	-	D	
DS02*	9.50 (24.97)	2.15 (7.50)	9.50	ATH01	55	47	50			47	50											0.87	0.92	-	-	-	D	

NOTE: Please refer to calculation sheets for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester	AEG Contract No :- NW1588
Date of Issue :- 15/04/2020	Page No. :- 10 of 17	Checked By :- LC	Approved By :- KW
			Certificate No. :- SPT/NW1588/10

UKAS 1367

ID Manchester - Christopher Campbell - Braintwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 409

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Block 3 Hillhouse Int. Estate, Picton Rd., Blackpool FY4 4BS Tel: 01253 767470 Fax: 01253 761616
Regional Office: Unit 20 Business Development Centre, Lower Philips Road, Blackburn, BB1 5BJ Tel: 01254 295300 Fax: 01254 295301

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level)	Water Depth (Casing)	Hole Length	SPT Hammer Ref.	Energy Ratio (E_r)	SEATING DRIVE Pen	SEATING DRIVE Blows	SEATING DRIVE Pen	SEATING DRIVE Blows	SEATING DRIVE Total Pen	SEATING DRIVE Total Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Total Pen	TEST DRIVE Total Blows	Rod Length Corr. C_R	Energy Ratio Corr. C_E	Pen (mm)/Blow	SPTN Value (Corr.) N	SPTN Value (Corr.) N60	Strata Comp.	Remarks
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.							
TP01	0.50 (0.50)	Dry (2.70)	2.20	ATH01	55	68	10			35	50											0.89	0.92				S	
TP02	3.50 (30.00)	Dry (3.50)	3.00	ATH01	55	15	5	75	1	150	15	75	5	75	11	75	12	75	17	300	77	0.71	0.92	0.39	47	32	S	
TP03	5.10 (28.89)	4.70 (5.40)	5.40	ATH01	55	27	50			27	50											0.82	0.92		-	-	C	
TP04	5.40 (28.59)	5.70 (5.40)	5.40	ATH01	55	44	50			44	50											0.86	0.92		-	-	C	
TP05	7.40 (26.59)	6.30 (7.40)	7.40	ATH01	55	68	50			68	50											0.99	0.92		-	-	C	
TP06	9.40 (24.59)	7.30 (9.40)	9.40	ATH01	55	75	50	75	35	150	50	10	14							>0	14	0.94	0.92	0.71	-	-	C	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole notes for sampling details. Uncorrected and corrected SPTN values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 15/04/2020	Page No. :- 11 of 11	Checked By :- LC	Approved By :- KW
Certificate No. :- SPT/NW1588/11			

UKAS 1367

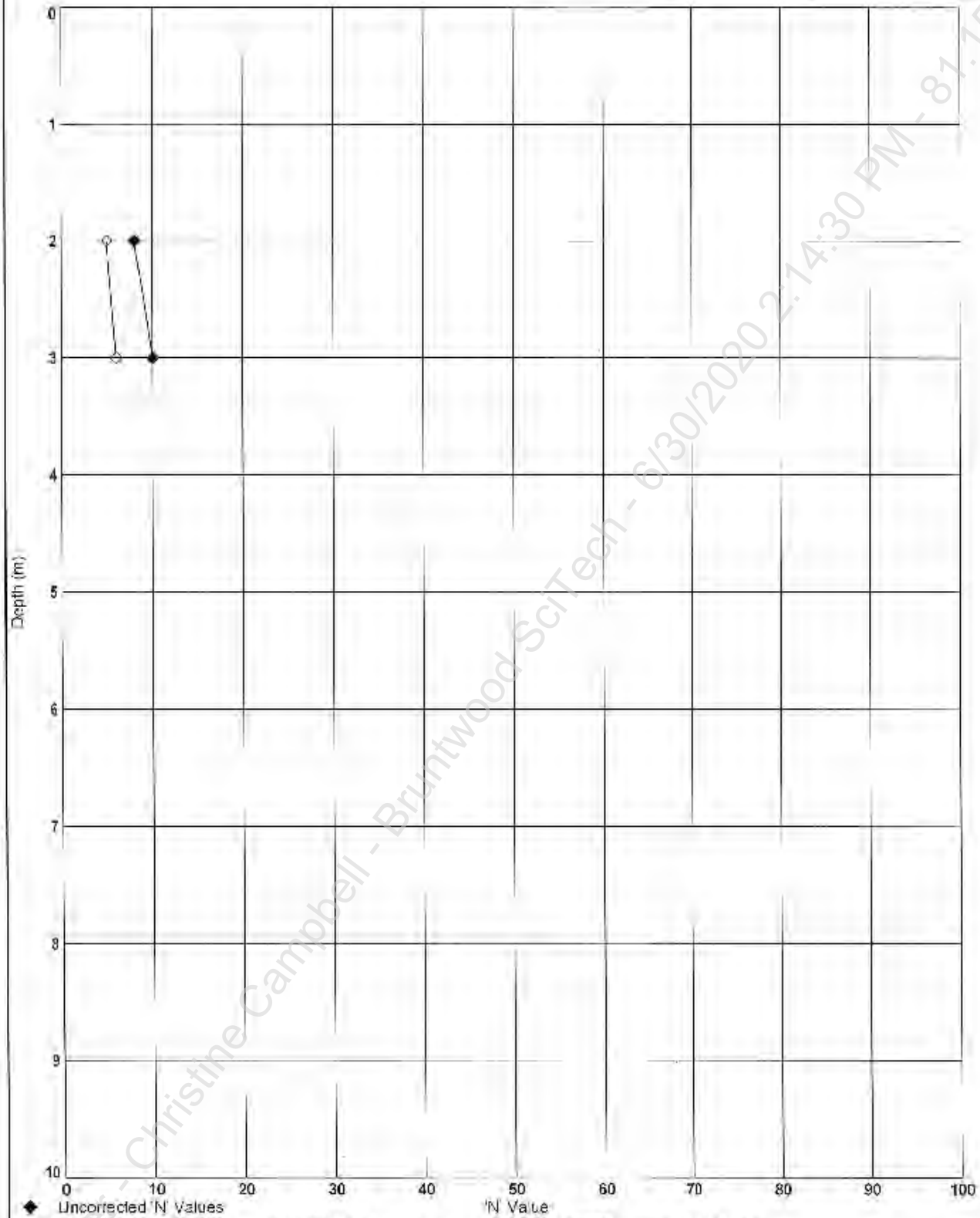
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 410

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office, Unit 25 Sixth Avenue Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2UG Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office, Unit 28 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL Tel: 01772 735 300 Fax: 01772 735 599

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH001



◆ Uncorrected 'N' Values
◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :-	Client :-
ID Manchester Preliminary Ground Investigation	University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH001	Operator :- L. Selkirk
Checked By :- LC	Approved By :- KW	AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

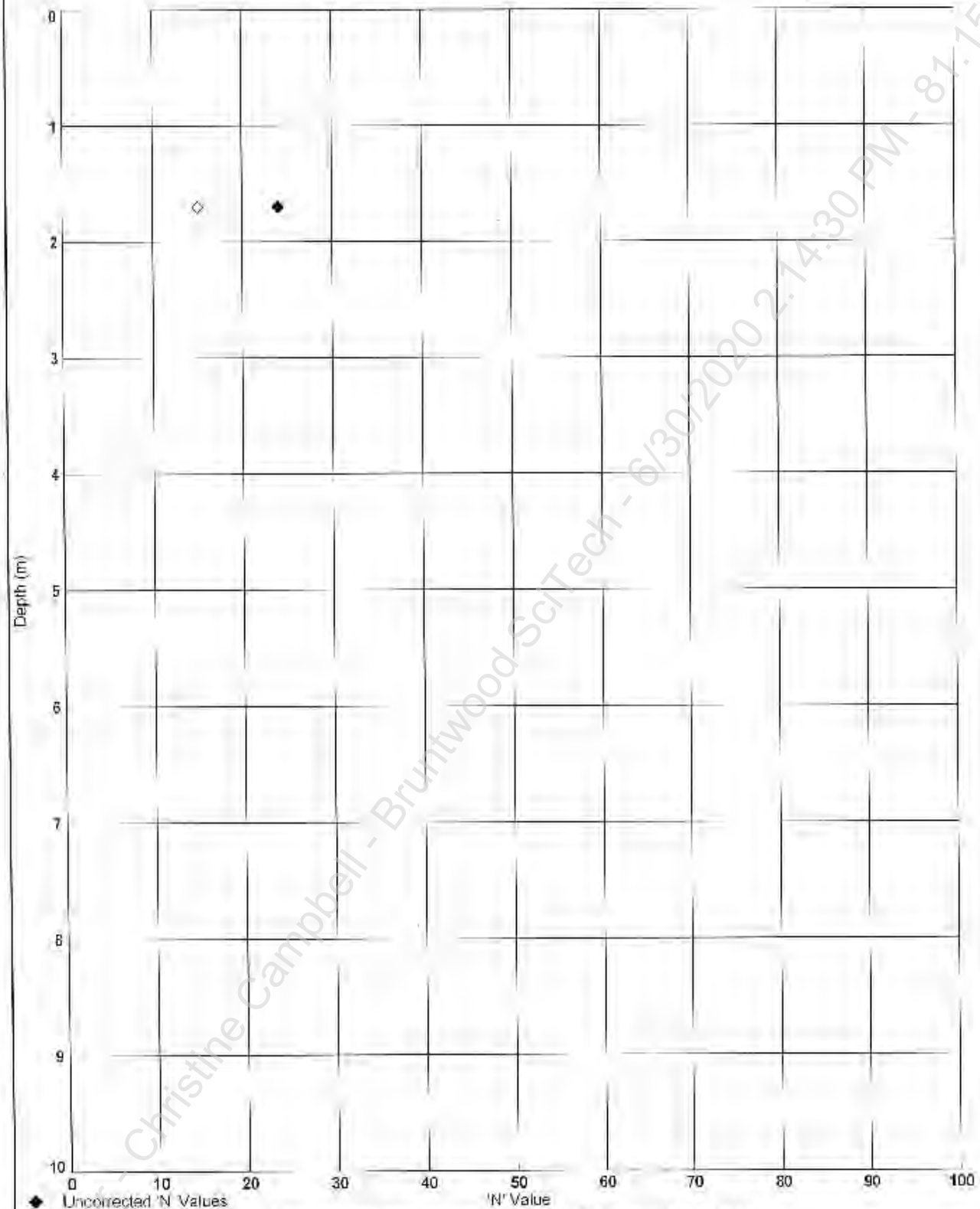
CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 411

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office, Regional Office
Unit 20 Alpha Bit Industrial Estate, Pellon Lane, Chester-le-Street, Co. Durham, DH2 1AD
Unit 21 Business Development Centre, Eastern Way, Blackburn, BB1 5EL
Tel: 0191 387 1400 Fax: 0191 387 1401
Tel: 01772 735 303 Fax: 01772 735 555

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH002



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH002	Operator :- M. Snaith
Checked By :- LC	Approved By :- RW	AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72
CONFIDENTIAL

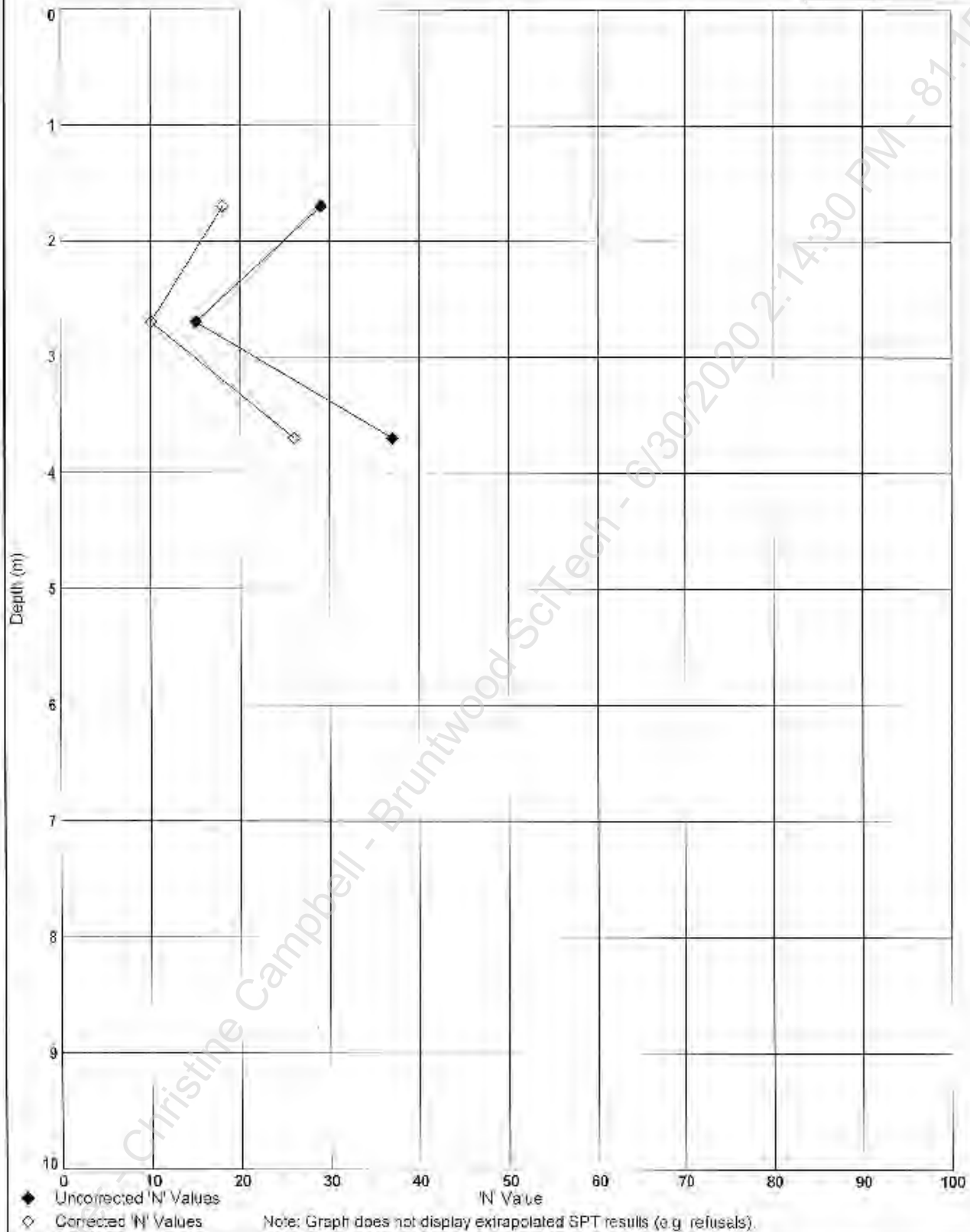
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 412

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 26 Scott Hall Industrial Estate, Acton Rd, Chorley, Lancashire, PR6 0HG Tel: 01257 267 470 Fax: 01257 267 471
Regional Office: Unit 26 Business Development Centre, Exeter Street, Blackburn, BB1 3BJ Info@allied-exploration.co.uk Fax: 01772 786 999

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH003



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH003
Checked By :- LC	Approved By :- KW
Operator :- M. Snaith	AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

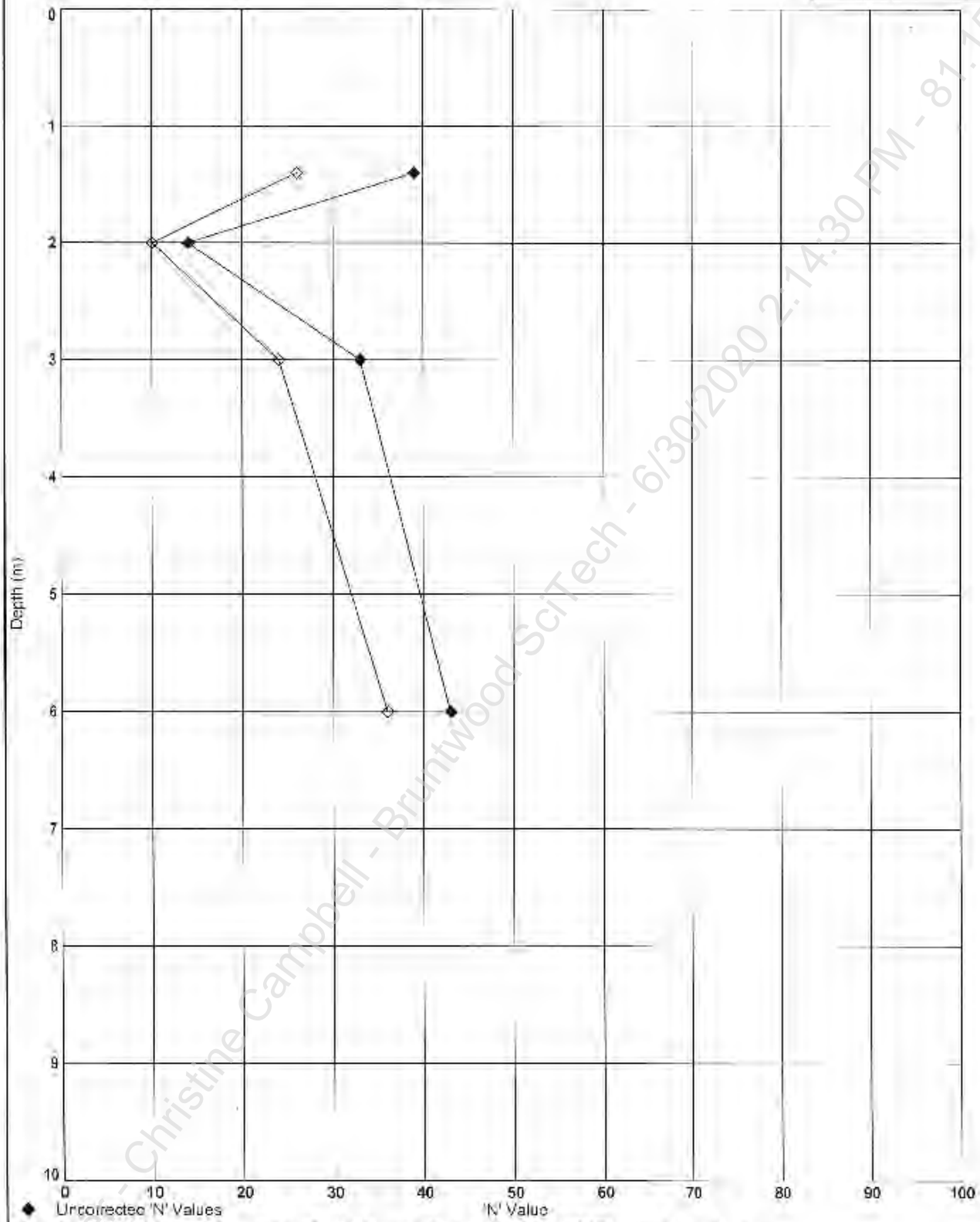
CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 413

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RX Tel: 0191 377 4700 Fax: 0191 377 4710
Regional Office: Unit 29, Business Development Centre, Stanley Wharf, Rawtenstall, BB4 8BT Tel: 01772 735 990 Fax: 01772 735 995

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH004



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH004
Operator :- P.B/P.D	
Checked By :- LC	Approved By :-
AEG Contract No. :- NW1588	

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

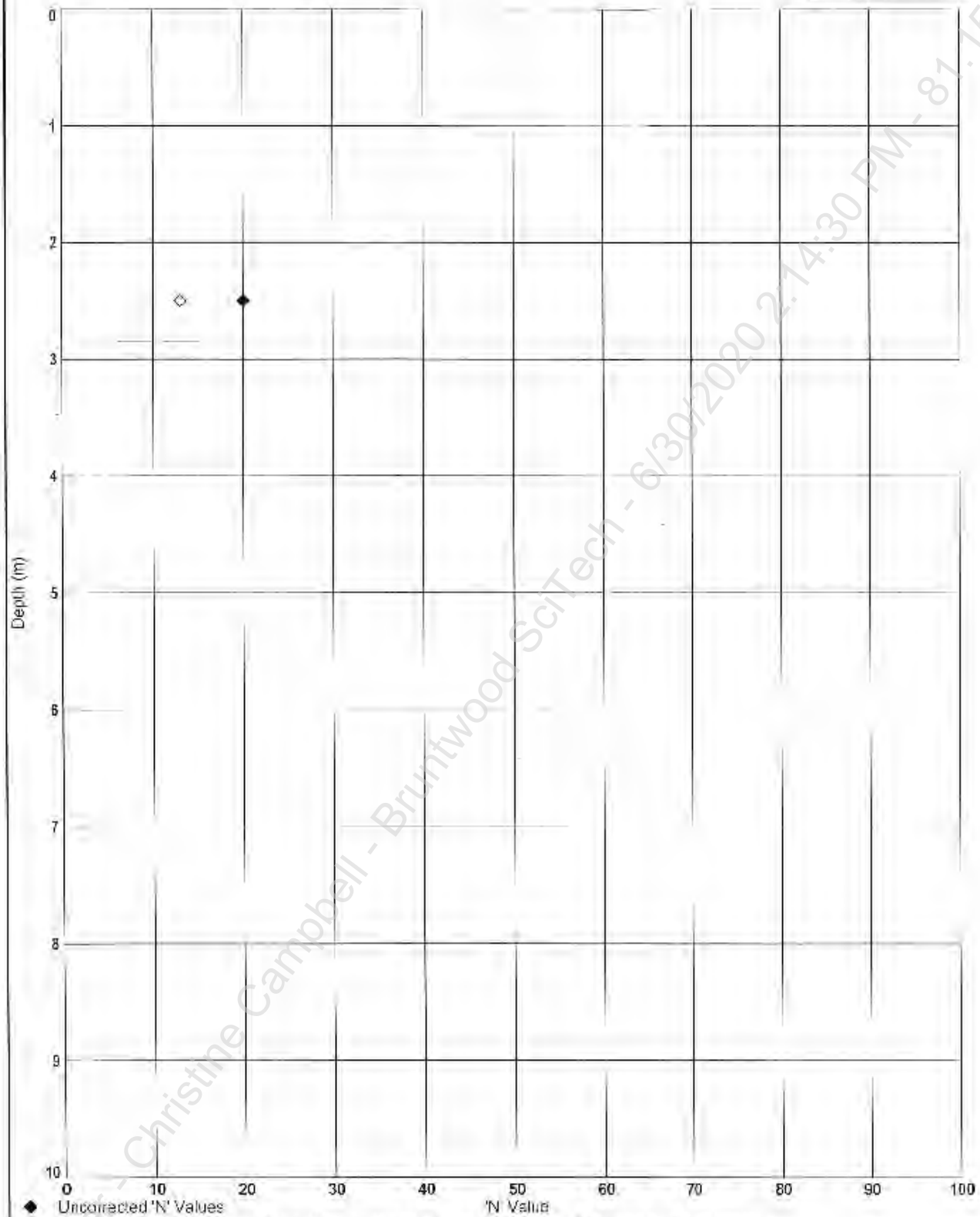
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 414

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Units 25 Sykes Green Industrial Estate, Peton Fell, Chesterle Street, Co. Durham, DH2 3RS Tel: 0191 492 1400 Fax: 0191 492 1410
Regional Office: Unit 20 Business Development Centre, Fulwood Wharf, Preston, PR2 9YL Tel: 01772 736 900 Fax: 01772 736 909

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH005



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-	Client :-
ID Manchester Preliminary Ground Investigation	University of Manchester

Date of issue :-	Certificate No :-	Operator :-
15/04/2020	SPT/NW1588/Graph/BH005	KR/P D
Checked By :-	**Approved By :-**	**AEG Contract No :-**
LC	KW	NW1588

UKAS TESTING 1367

ID Manchester_Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

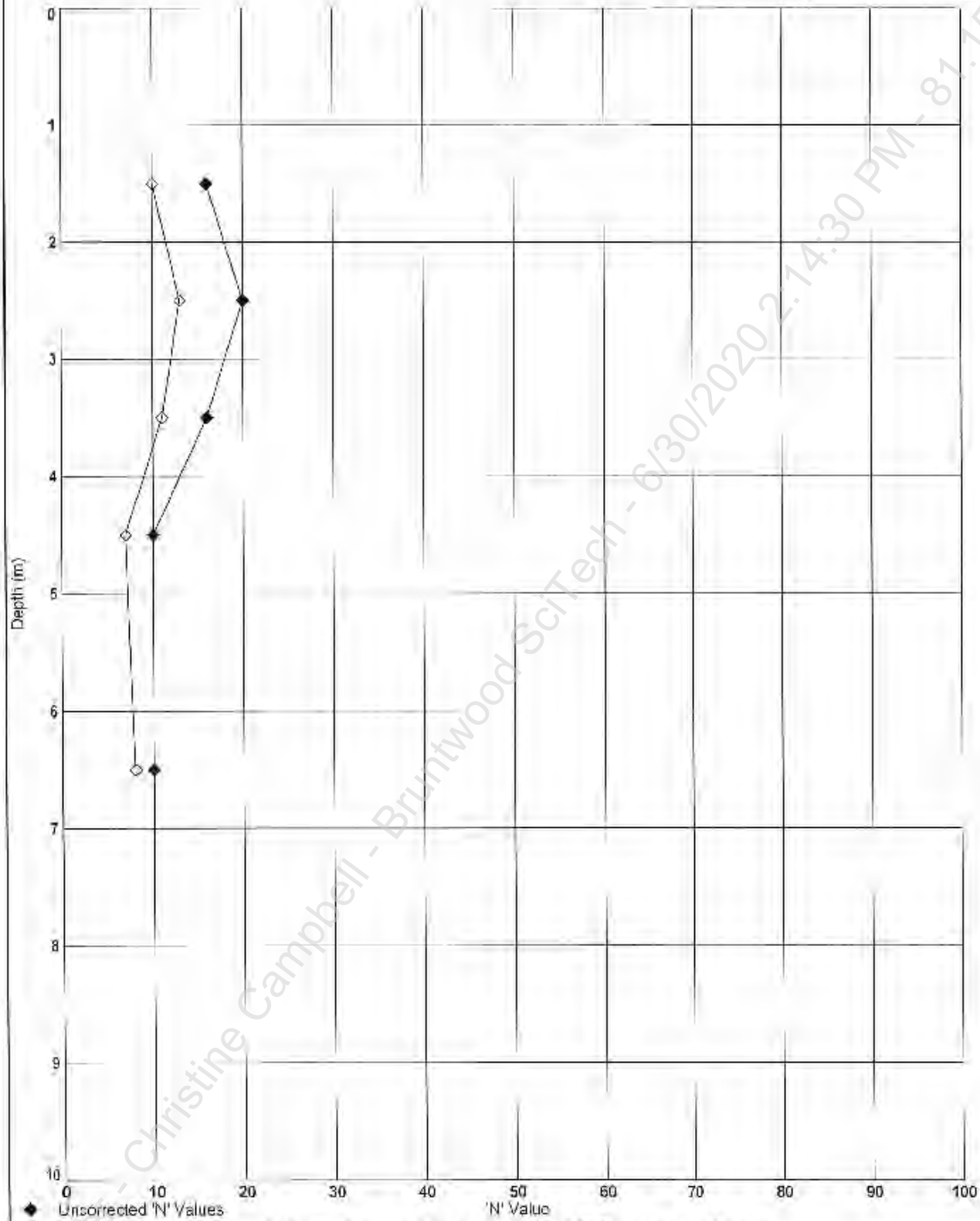
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 415

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2c Wells Gt Industrial Estate, Felton Rd, Cheshire Street, Ce Division, DH2 2RG
Regional Office: Unit 3C Business Development Centre, Point 5 Wharf, Rawtenstall, BB4 8PL
Tel: 01772 735 300 Fax: 01772 735 599

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH007



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- D Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH007
Operator :- K Rogerson	
Checked By :- LC	Approved By :-
AFG Contract No :- NW1588	

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 416

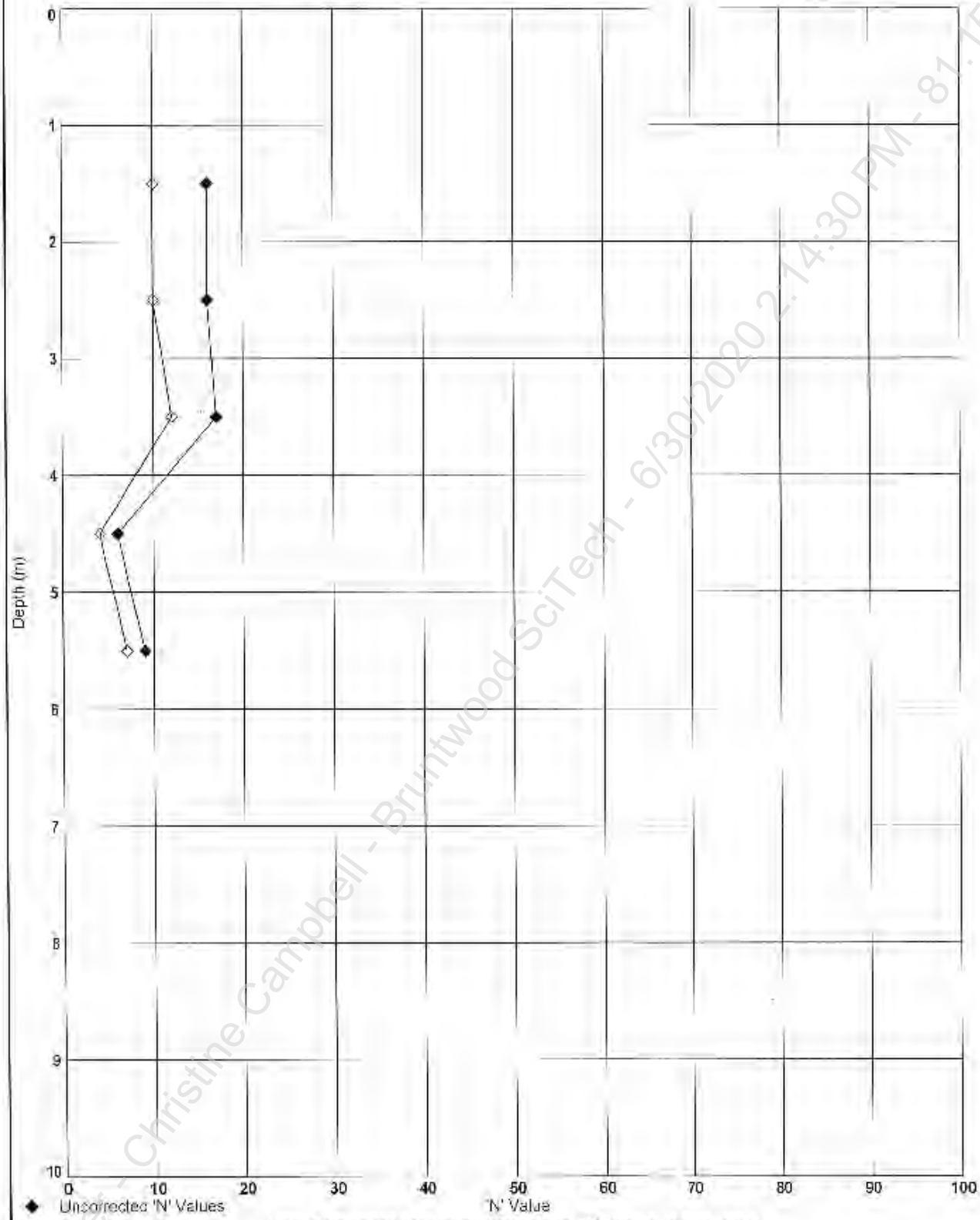
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Eaton Gill Industrial Estate, Rotton Fell, Chester-le-Street, Co. Durham, DH2 2RS Tel: 0191 389 4700 Fax: 0191 389 4717
Regional Office: Unit 23 Business Development Centre, Lytham Road, Blackpool, FY1 6JX Tel: 01772 735 300 Fax: 01772 735 500

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH008



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester

Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH008	Operator :- K. Rogerson
Checked By :- LC	Approved By :- KW	AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

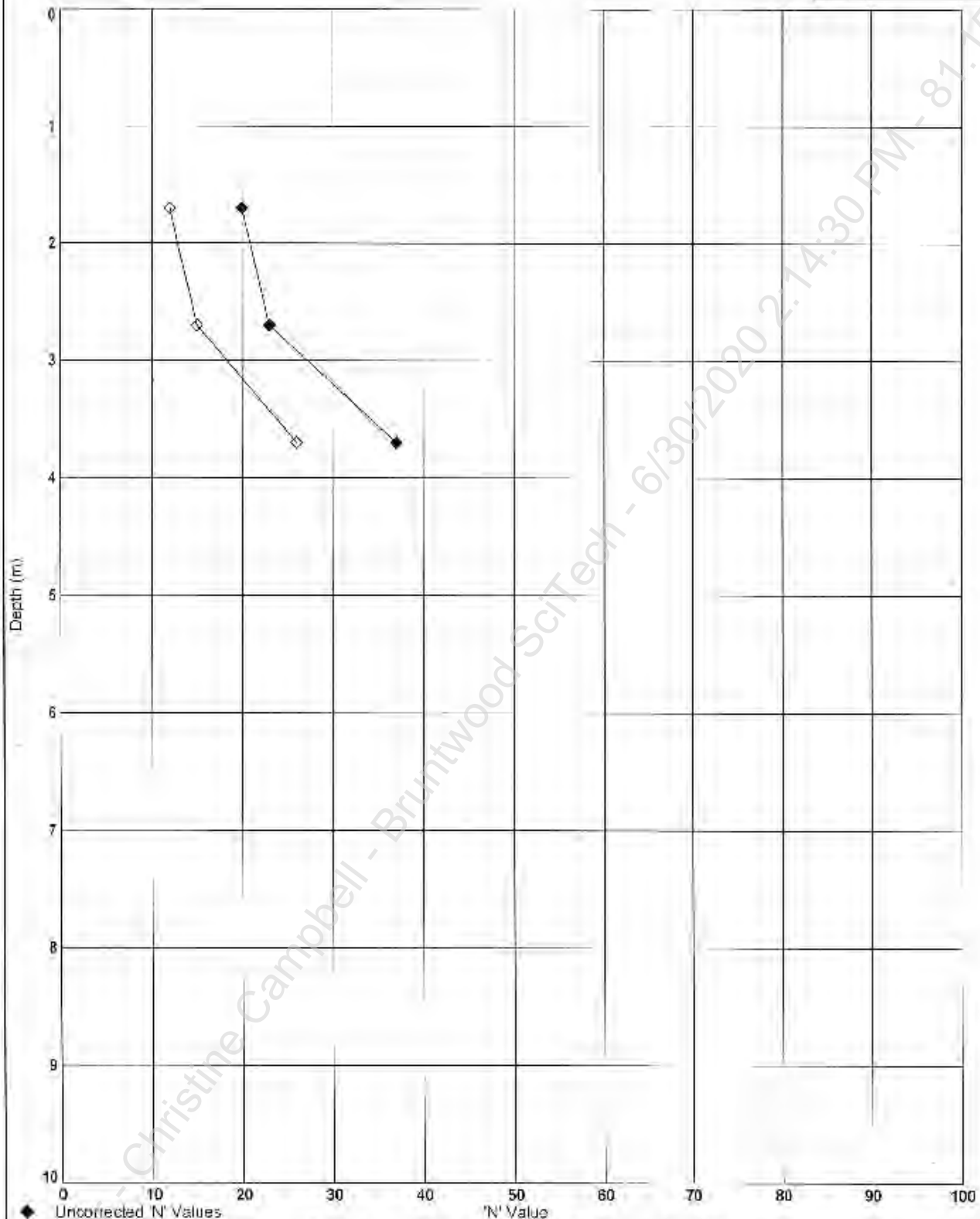
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 417

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cl Industrial Estate (Main Ent), Chester le Street, Co Durham DH2 2RB Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23 Business Development Centre, Bath Wharf, Blackburn BB1 5BL Tel: 01772 745 411 Fax: 01772 745 469

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH009



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :-
D Manchester Preliminary Ground Investigation

Client :-
University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH009	Operator :- M. Smith	UKAS TESTING 1367
Checked By :- LC	Approved By :- KW	AEG Contract No. :- NW1588	

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

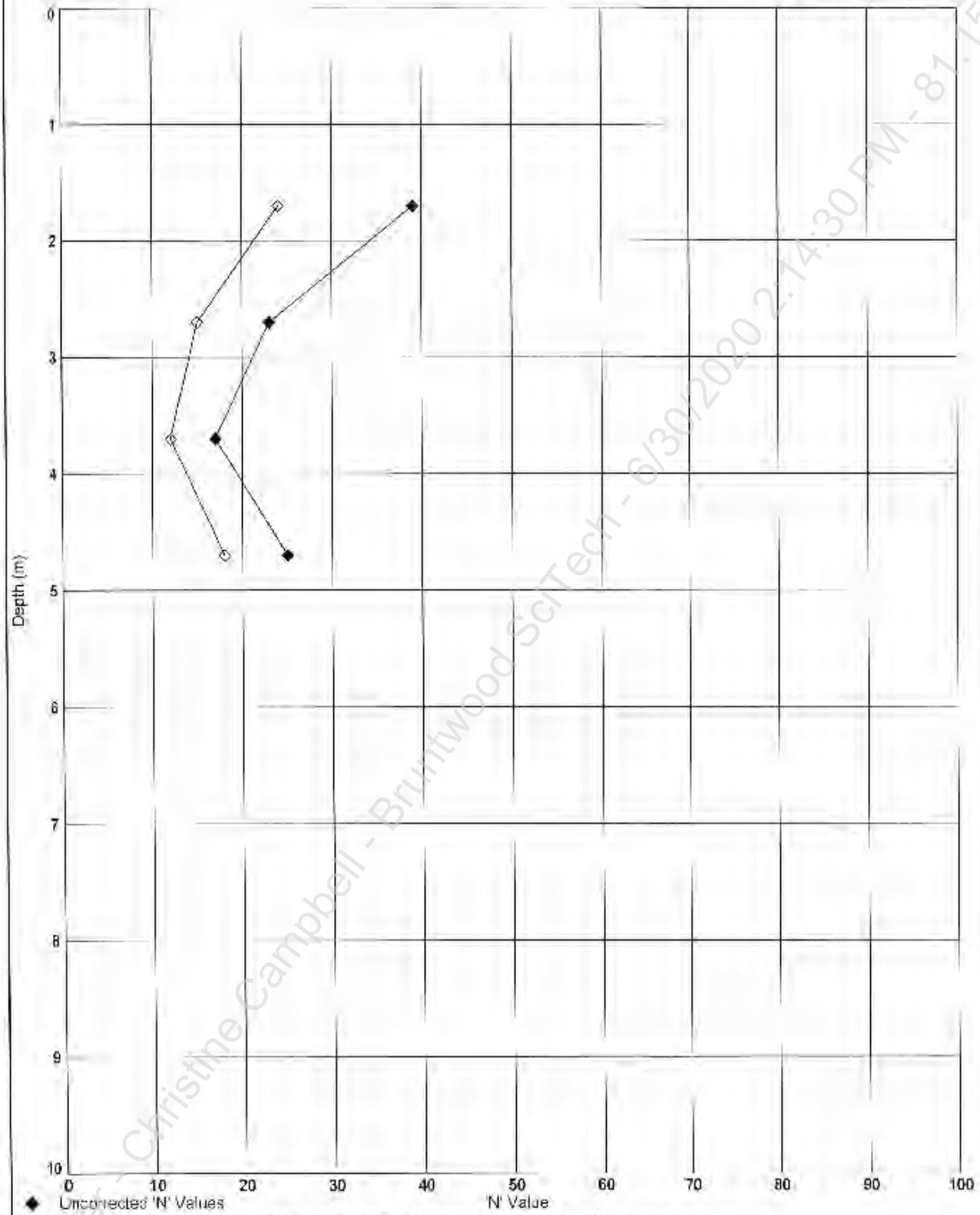
CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 418

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham DH2 2RX Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 2BL Tel: 01772 335 911 Fax: 01772 335 993

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH011



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH011
Operator :- M.S/J.M	
Checked By :- LC	Approved By :-
AEG Contract No :- NW1588	UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72
CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 419

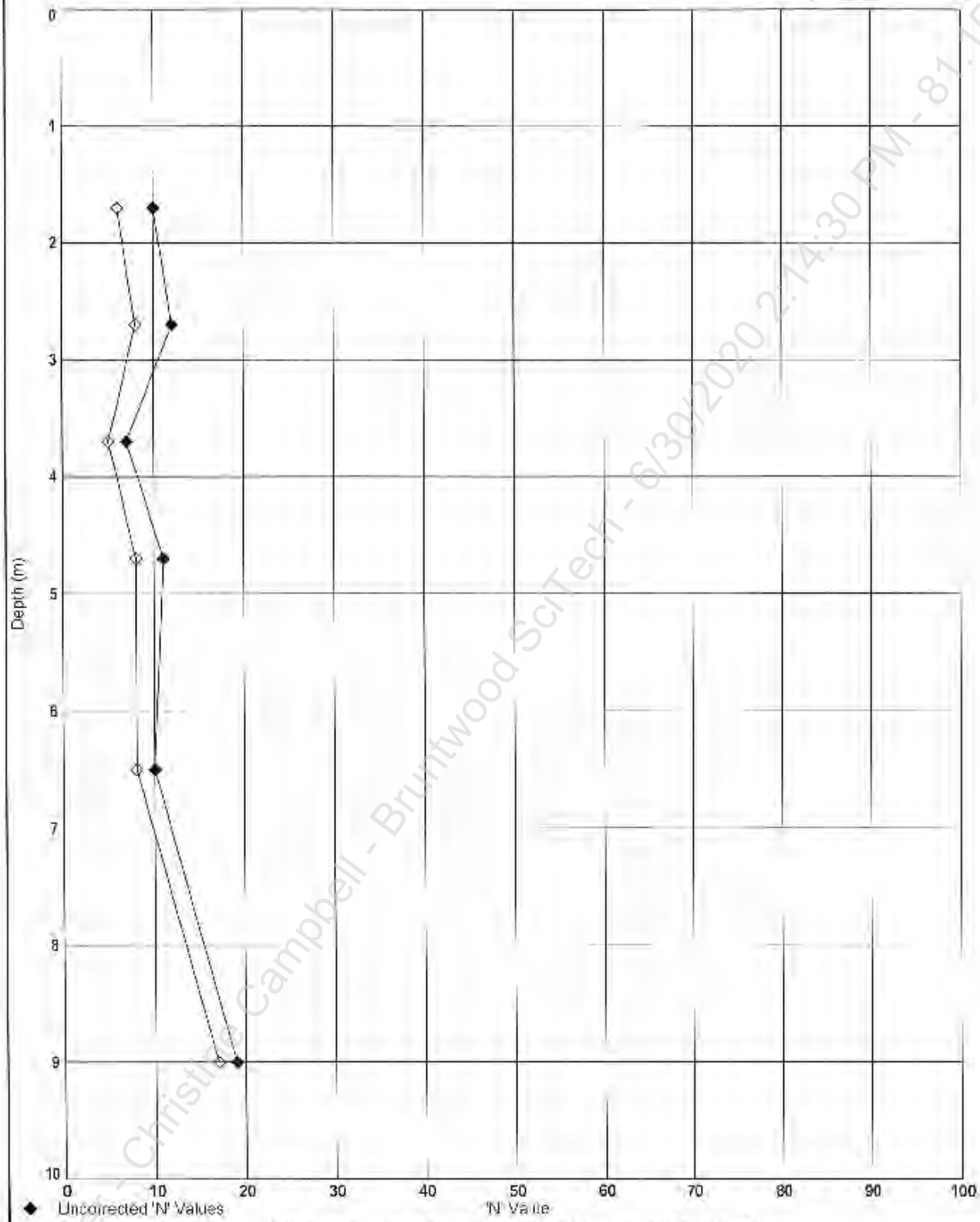
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Scott Grf Industrial Estate, Felton Fell, Chester-le-Street, Co. Durham, DH2 3RG Tel: 0191 387 4130 Fax: 0191 387 4131
Regional Office: Unit 20 Rural Development Centre, Tarporley Wood Lane, Cheshire, CW6 9BA Tel: 01772 736 300 Fax: 01772 736 202

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.

BH012A



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :-	Client :-
ID Manchester Preliminary Ground Investigation	University of Manchester

Date of issue :-	Certificate No :-	Operator :-
15/04/2020	SPT/NW1588/Graph/BH012A	M. Snaith
Checked By :-	**Approved By :-**	**AEG Contract No. :-**
LC	KW	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

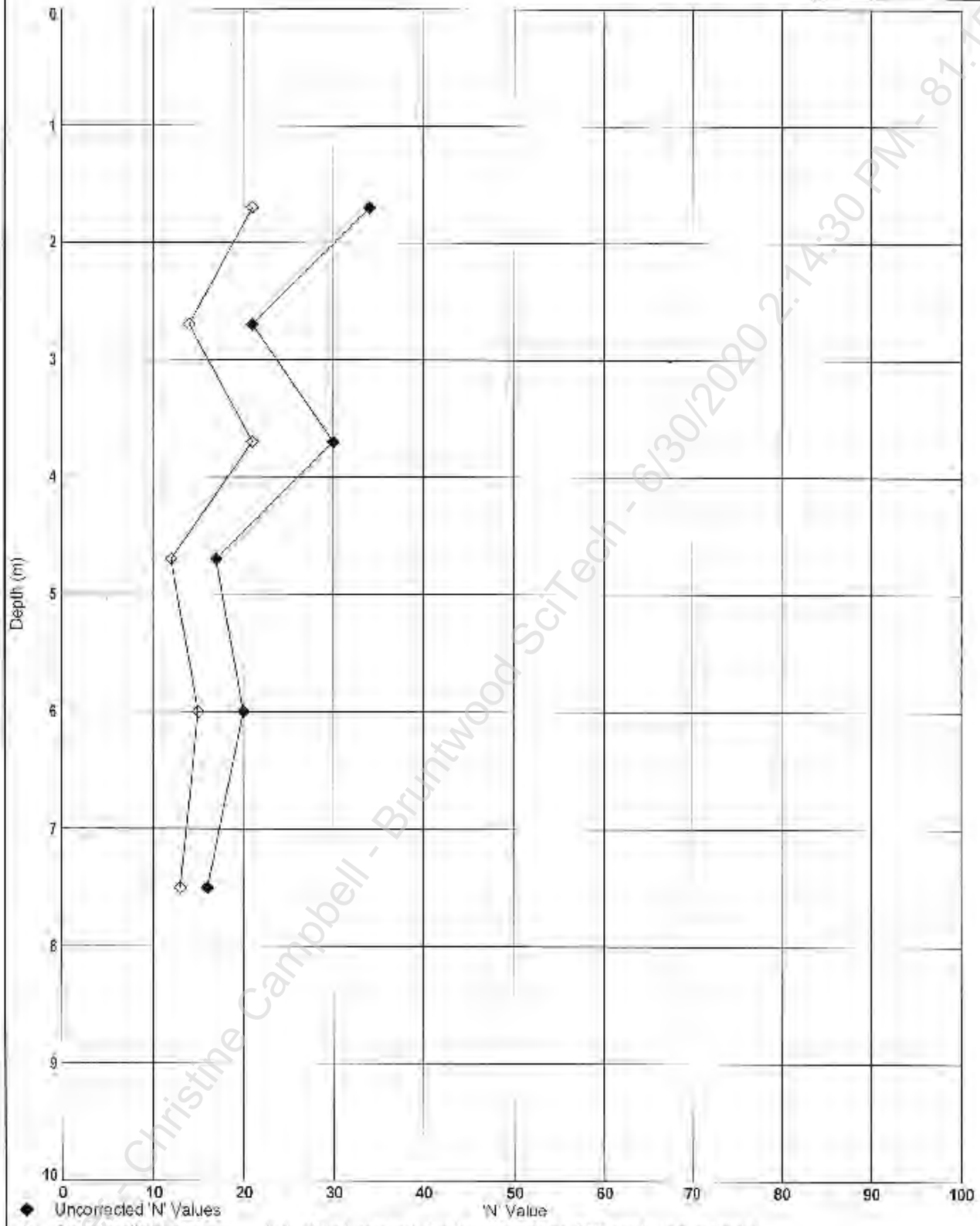
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 420

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 28 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG Tel: 0191 387 4701 Fax: 0191 387 0116
Unit 20, Business Development Centre, Swan Wharf, Blackburn, BB1 5UL Tel: 01772 735 302 Fax: 01772 735 312

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH013



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester

Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH013	Operator :- M.S/P.D	UKAS TESTING 1367
Checked By :- LC	Approved By :- AW	AEG Contract No. :- NW1588	

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

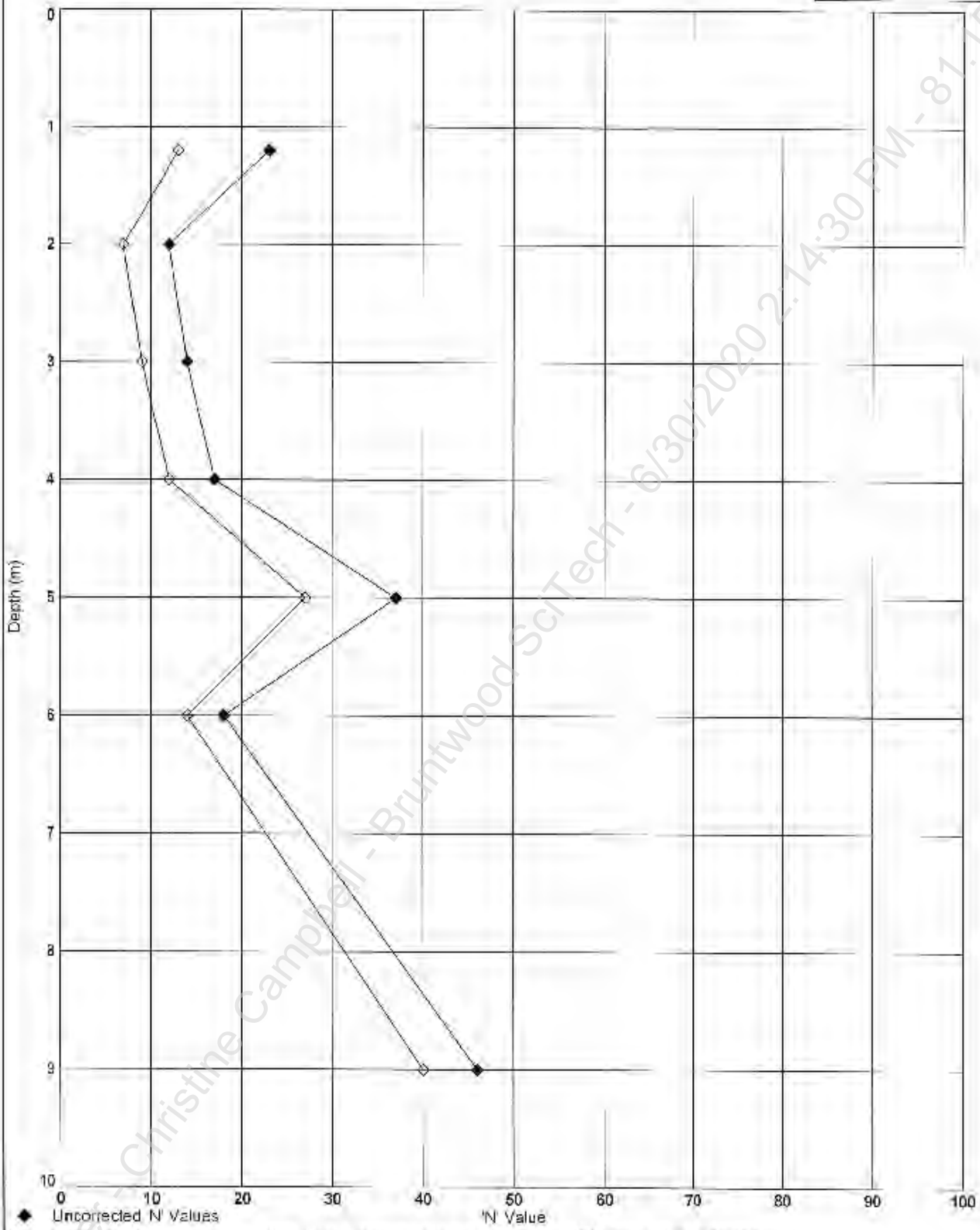
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 421

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Wells Bill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG Tel: 0191 387 4733 Fax: 0191 387 4773
Regional Office: Unit 20 Business Development Centre, Euxton West, Chorley, PR7 6GL Tel: 01772 736 300 Fax: 01772 736 593

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH014



Contract Title :-
ID Manchester Preliminary Ground Investigation

Client :-
University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH014	Operator :- L. Selkirk	
Checked By :- LC	Approved By :-	AEG Contract No. :- NW1588	UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

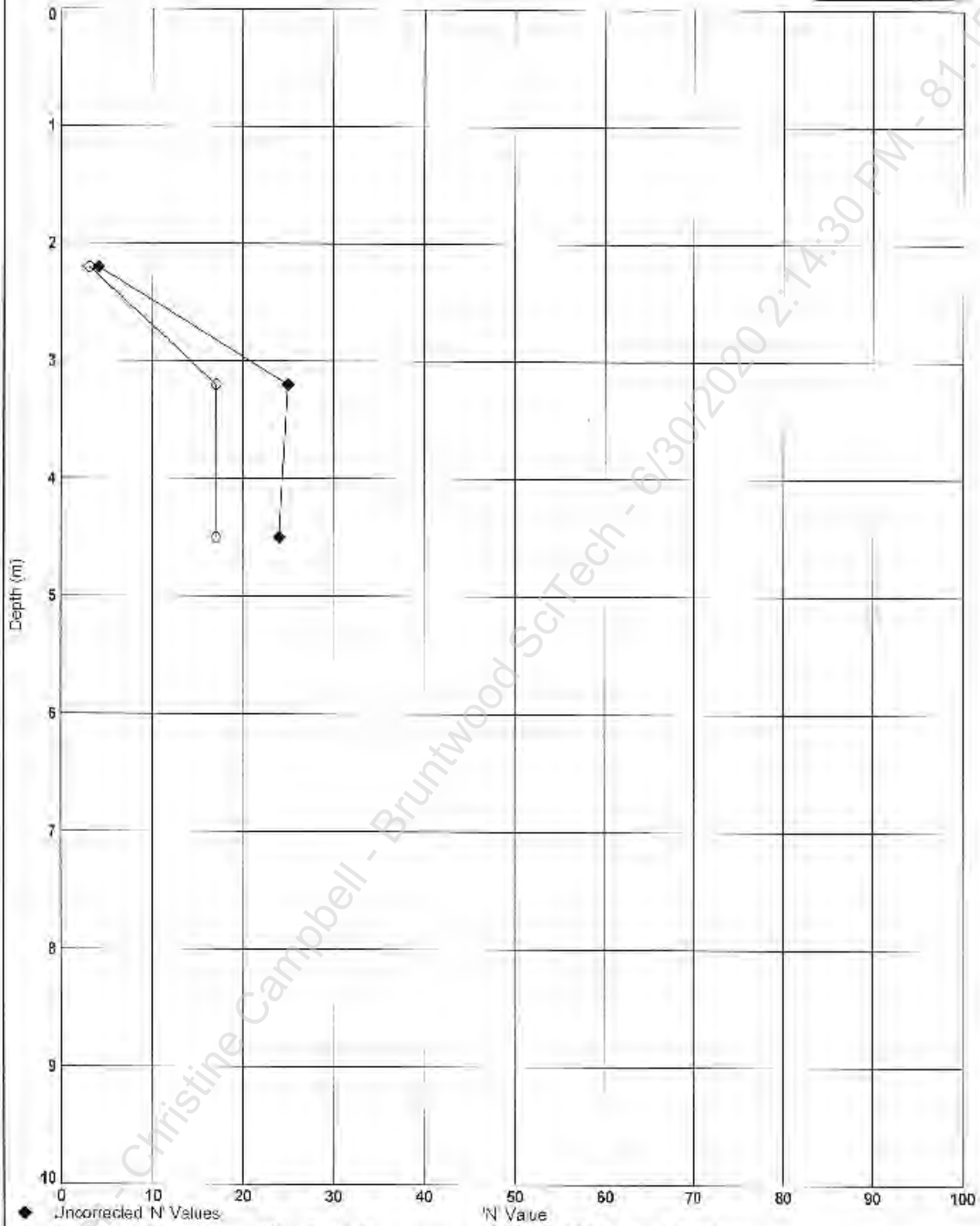
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 422

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Swalwell Industrial Estate, Fellon Rd, Chester-le-Street, Co. Durham DH2 1BG Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Darwen Vale, Blackburn BB1 8B. Tel: 01772 735 300, Fax: 01772 735 599

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
DS001



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/DS001
Checked By :- LC	Approved By :-

Operator :- E. Bacon

AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

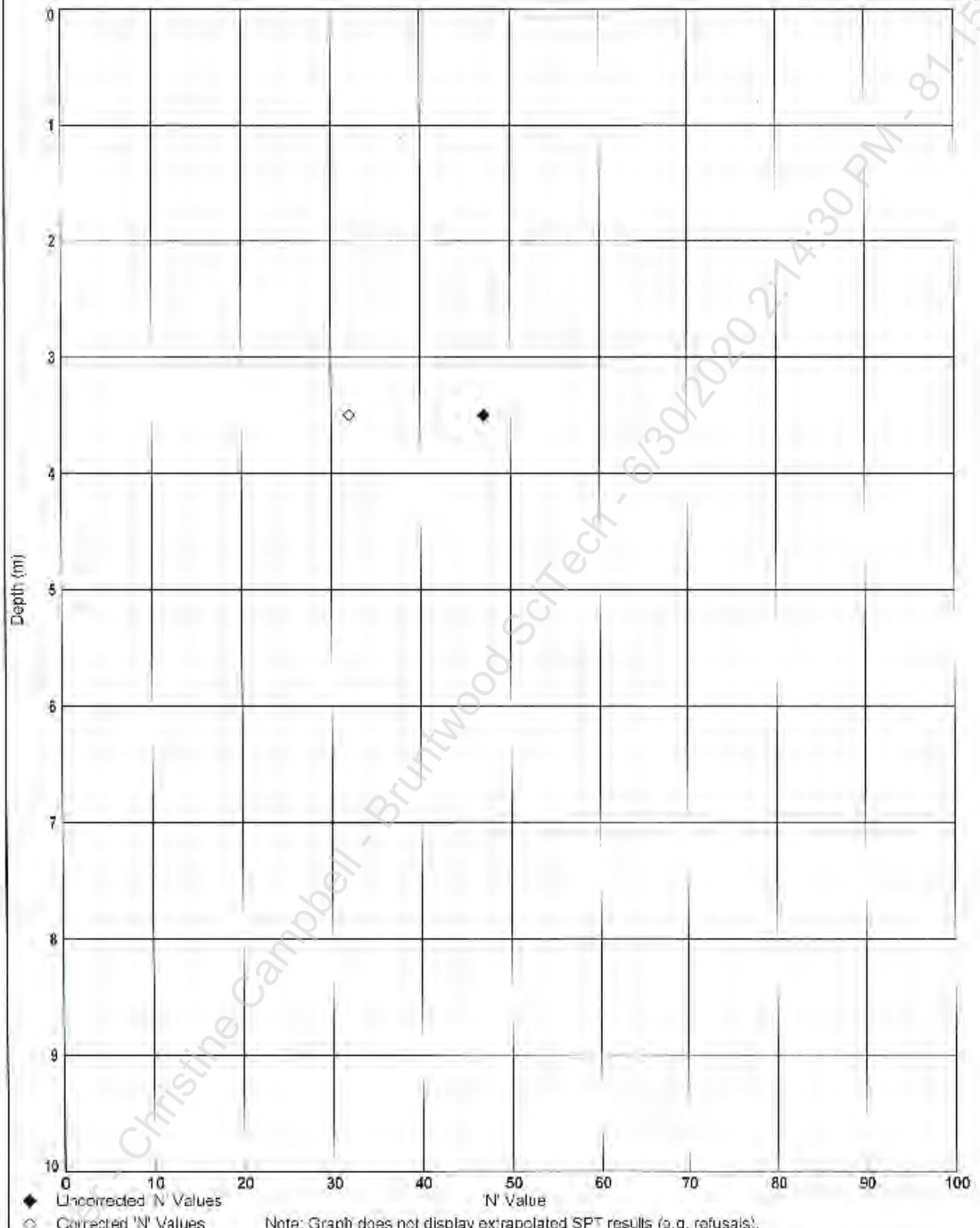
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 423

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 26 Ends Of Pictorial Fibres, Tilton Rd, Chester-le-Street, Co Durham, DH2 1RE Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eastern Way, Bluebourn, BB1 5BL Tel: 01772 765300 Fax: 01772 765 999

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
DS002



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW/1588/Graph/DS002
Operator :- J. Moyle	
Checked By :- LC	Approved By :-
AEG Contract No :- NW1588	

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brantwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 424

Allied Exploration & Geotechnics Ltd.

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Ref:	ATH01
Test Date:	02/08/2019
Report Date:	07/08/2019
File Name:	ATH01.spt
Test Operator:	BP

QUALITY CONTROL CHECKED 07 AUG 2019

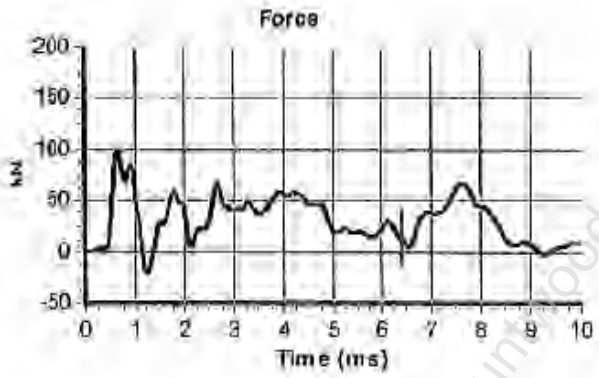
Instrumented Rod Data

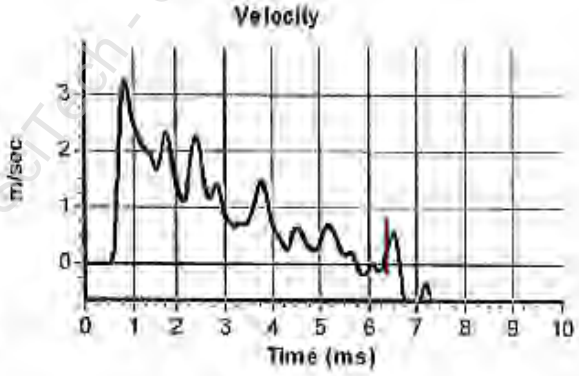
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

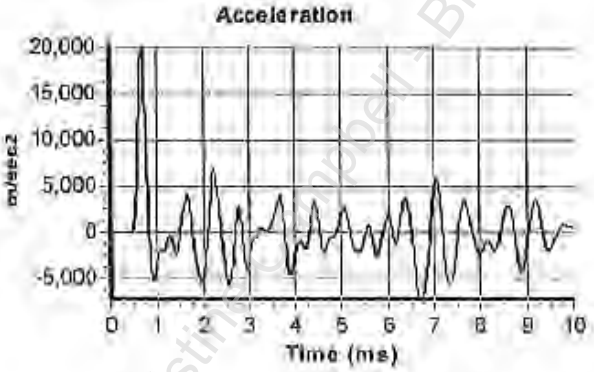
SPT Hammer Information

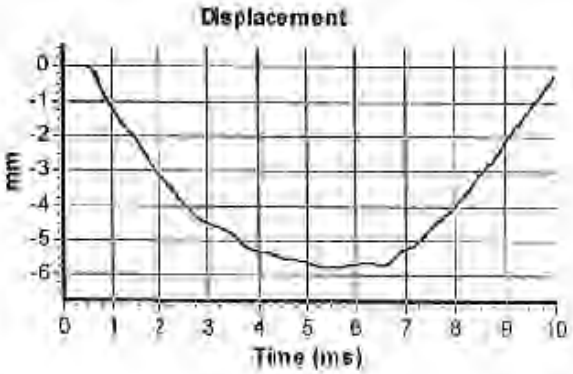
Hammer Mass m (kg):	63.8
Falling Height h (mm):	761
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	262

Energy Ratio E_r (%): 55

B Proctor

Signed: Brian Proctor

Title: Technician

The recommended calibration interval is 12 months

SPTANN ver. 1.92 All rights reserved, Testconsult ©2010

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 425

Allied Exploration & Geotechnics Ltd.

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Ref:	ATH02
Test Date:	27/06/2019
Report Date:	28/06/2019
File Name:	ATH02.spt
Test Operator:	BP

QUALITY CONTROL CHECKED 28 JUN 2019

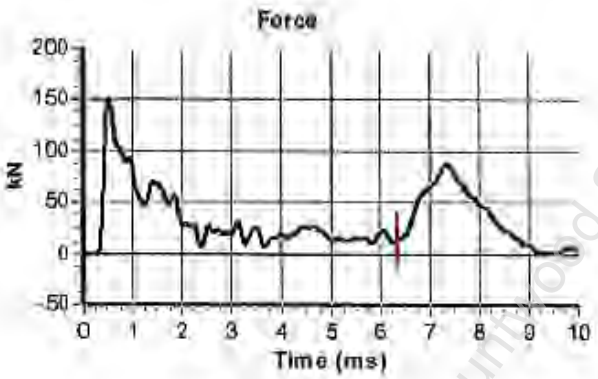
Instrumented Rod Data

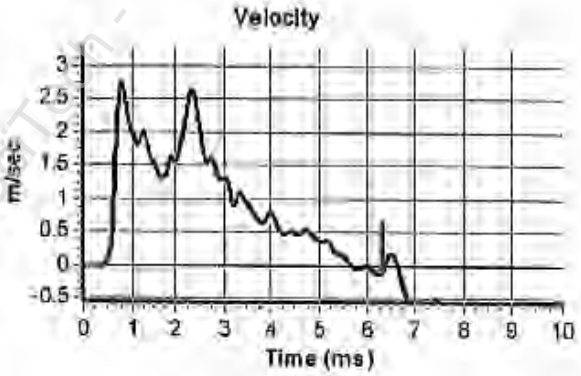
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

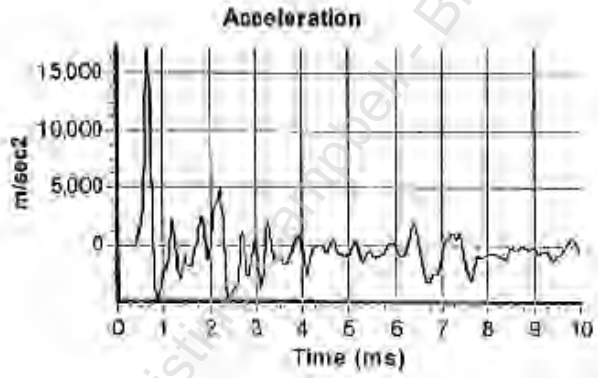
SPT Hammer Information

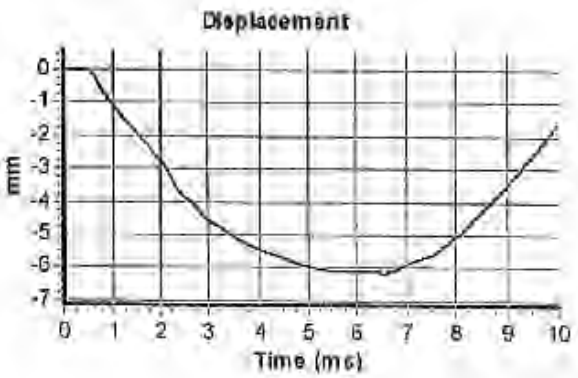
Hammer Mass m (kg):	63.7
Falling Height h (mm):	765
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	970
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	257

Energy Ratio E_r (%): 54

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

SPTMAN ver.1.92 All rights reserved, Testconsult ©2010

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 426

Allied Exploration & Geotechnics Ltd.

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	ATH05
Test Date:	07/08/2019
Report Date:	07/08/2019
File Name:	ATH05.spt
Test Operator:	BP

QUALITY CONTROL CHECKED 07 AUG 2019

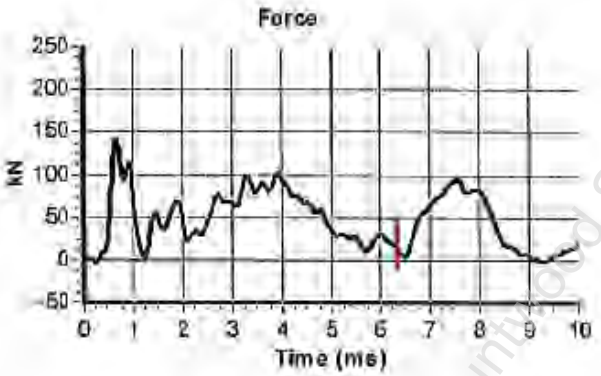
Instrumented Rod Data

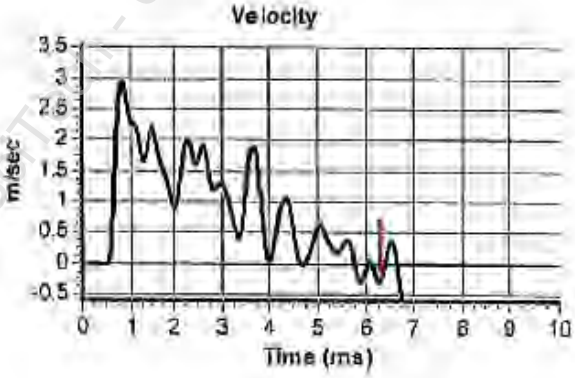
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

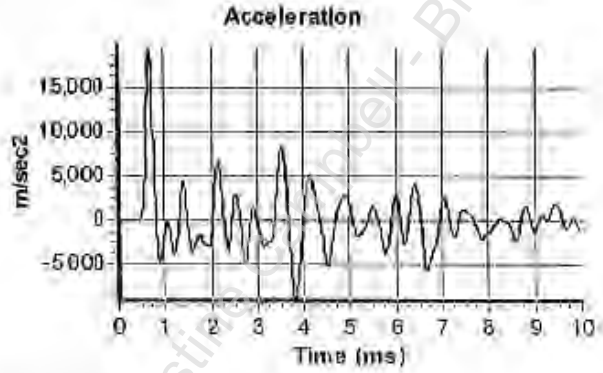
SPT Hammer Information

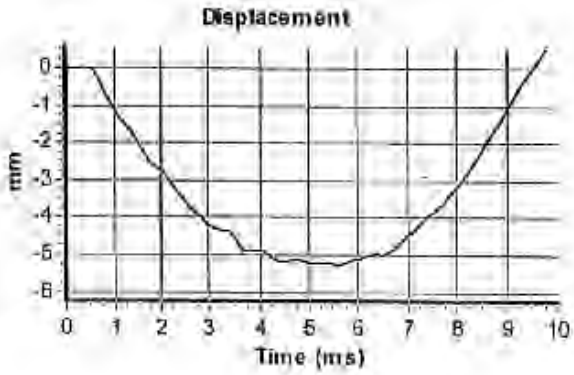
Hammer Mass m (kg):	63.5
Falling Height h (mm):	756
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	329

Energy Ratio E_r (%): 70

B Proctor

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

SPTMAN ver.1.92 All rights reserved. Testconsult ©2010

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 427

Allied Exploration & Geotechnics Ltd.

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	ATH07
Test Date:	12/02/2019
Report Date:	12/02/2019
File Name:	ATH07.spt
Test Operator:	BP

QUALITY CONTROL CHECKED
13 FEB 2019
Signed

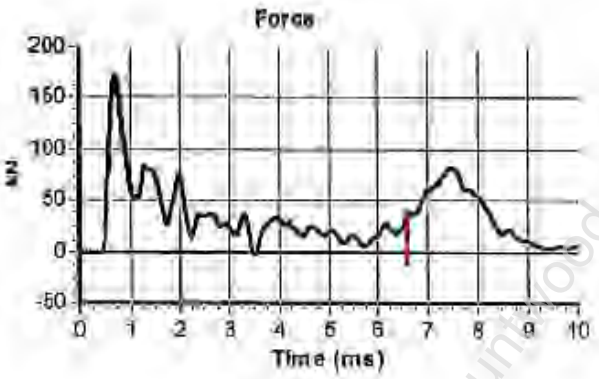
Instrumented Rod Data

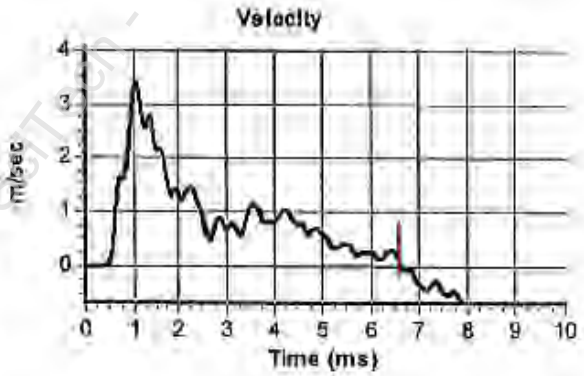
Diameter d_r (mm):	67
Wall Thickness t_r (mm):	8.7
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	6469
Accelerometer No.2:	11938

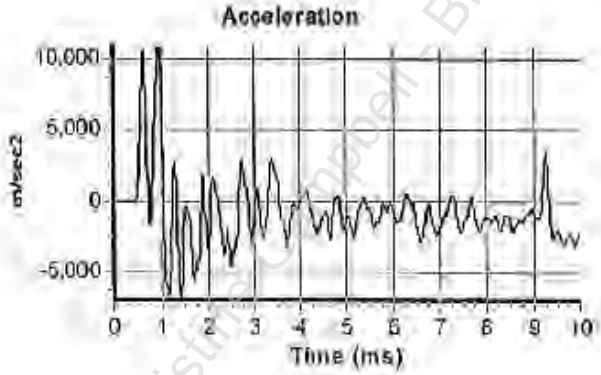
SPT Hammer Information

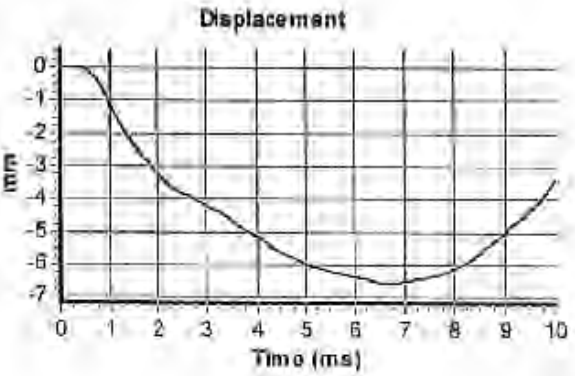
Hammer Mass m (kg):	63.2
Falling Height h (mm):	763
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	1593
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	283

Energy Ratio E_r (%): 60

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

SPTMAN Ver: 1.92 All rights reserved. Testconsult ©2010

ID Manchester - Christine Campbell - Brunswood Site Ten - 6/30/2020 2:14:30 PM 81.109.246.72

CONFIDENTIAL

LABORATORY TESTING ENCLOSURES

Laboratory Report Certificate

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 429

ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 25 Rivers Gill Industrial Estate, Consett, Co. Durham, DH8 6RG. Tel: 0191 3514000 Fax: 0191 3674710
Regional Office: Unit 20, Burnside Development Centre, Carnforth, Lancashire, LA5 9FP. Tel: 01772 705 330 Fax: 01772 705 339

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	15/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Fair (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH013	15:00:00	9.06	1190.7	0.72	256.0	25.10
	15:03:00	11.52	1072.0	0.70	263.0	22.40
	15:06:00	11.88	1061.1	0.69	267.1	23.50
	15:09:00	11.94	1059.2	0.69	271.6	23.50
	15:12:00	11.94	1064.9	0.69	278.5	23.41
	15:15:00	11.96	1084.2	0.71	291.7	23.20

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	University of Manchester

Checked By:	Approved By:	
LC	KW	
Date Issued: 22/01/2020	Page No. : 1 of 1	AEG Contract No.: NW1588

ID Manchester Preliminary Ground Investigation 81.154.246.72 15/01/2020 21:44:30 PM

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 430

ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 35 Sir Bj Sill Industrial Estate, Potter Hill, Chesterle-Street, Co. Durham, DH2 2NU - Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23, Business Development Centre, Forest Street, Blackburn, BB1 3BB - Tel: 01254 264 342 Fax: 01772 258 522

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	16/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Rain (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH001	15:49:00	12.81	859.7	0.56	173.7	74.83
	15:52:00	13.21	860.9	0.56	192.9	63.28
	15:55:00	13.35	860.1	0.56	215.2	63.21
	15:58:00	13.42	859.4	0.56	225.5	62.96
	16:01:00	13.51	858.2	0.56	230.8	61.84
	16:05:00	13.61	855.0	0.56	247.7	61.02

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:		Client:	
ID Manchester Preliminary Ground Investigation		University of Manchester	
Checked By: LC		Approved By: KW	
Date Issued: 22/01/2020	Page No: 1 of 1	AEG Contract No. : NW1583	

ID Manchester Ground Investigation 16/01/2020 2:44:30 PM 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 431

ALLIED EXPLORATION GEOTECHNICS LIMITED

[illegible]

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	17/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Rain (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH004	09:02:00	12.00	1167.1	0.78	127.2	15.68
	09:05:00	16.69	1097.0	0.71	94.5	2.15
	09:08:00	16.93	1076.9	0.70	88.2	1.58
	09:13:00	16.94	1089.3	0.71	96.5	1.79
	09:16:00	16.96	1098.4	0.71	106.9	1.93
	09:19:00	16.94	1099.3	0.71	124.1	1.90
BH007	11:29:00	14.62	679.4	0.44	105.8	4.58
	11:32:00	15.73	688.9	0.45	226.6	1.94
	11:38:00	15.71	686.6	0.45	252.5	1.76
	11:43:00	15.68	688.4	0.45	282.5	1.66
	11:46:00	15.69	682.5	0.44	296.3	2.02
	11:49:00	15.75	685.4	0.44	306.7	1.68
BH011	13:01:00	10.19	1187.5	0.79	52.3	11.86
	13:04:00	12.23	1329.2	0.86	89.7	2.85
	13:07:00	12.76	1337.5	0.90	142.7	1.94
	13:09:00	12.73	1368.6	0.89	168.3	1.89
	13:11:00	12.75	1371.1	0.89	180.6	1.95

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	University of Manchester

Checked By: LC	Approved By: KW	
Date Issued: 22/01/2020	Page No.: 1 of 1	AEG Contract No.: NW1588

ID Manchester - Christine Shelley-Brunswood (SciTech - 6/30/2020 2:44:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 432

ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 25 Stella G Enterprise Estate, Palma Mill, Chester Street, St. Helens, WA9 3BS. Tel 0161 351 4700 Fax 0161 351 4710
Regional Office: Unit 20, Business Development Centre, Forrest Street, Blackburn, BB1 5QL. Tel: 01772 205 330 Fax: 01772 705 989

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	17/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Rain (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH005	13:46:00	14.34	257.3	0.17	352.3	1.55
	13:49:00	14.54	256.3	0.17	256.3	1.28
	13:59:00	13.56	187.5	0.12	453.1	1.70
	14:02:00	14.49	182.9	0.12	445.7	1.19
	14:05:00	14.67	178.5	0.12	445.9	1.22
	14:08:00	14.67	172.4	0.11	451.1	1.18
	14:11:00	14.67	167.6	0.11	455.2	1.39

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:		Client:	
ID Manchester Preliminary Ground Investigation		University of Manchester	
Checked By: LC		Approved By: KW	
Date Issued: 22/01/2020	Page No: 1 of 1	AEG Contract No. : NW1588	

ID Manchester Ground Investigation 81.154.246.72 01/30/2020 2:44:30 PM

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 433

In-situ Water Quality Parameter Test Results

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 434

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 20 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 3874700 Fax: 0191 3874710
Registered Office: Unit 20 Business Development Centre, Bersham Road, Blackburn, BB1 5BL - Tel: 01722 735 800 Fax: 01722 715 999

LABORATORY REPORT CERTIFICATE

UKAS TESTING 1367

Contract Title: ID Manchester Preliminary Ground Investigation

AEG Reference: NW1588

Client Address: University of Manchester

We certify that Laboratory testing was carried out on samples from the above contract in accordance with techniques outlined in BS 1377: 1990, BS EN ISO 17892 or other appropriate standards as quoted. The samples were received from October 2019 and the following results, given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages

For and on behalf of Allied Exploration & Geotechnics Limited

- ☐ Nick Vater (Managing Director)
- ☐ Kevin Warriner (HSE & Quality Director)
- ☑ Michelle Selkirk (Laboratory Manager)

Signed _____ Date: 22 January 2020

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation

Please note the material was derived from samples taken outside the control of the laboratory

ID Manchester - Christine Campbell - Brightwood Scheme - 30/1/2020 2:14:30 PM - 194.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 435

LABORATORY REPORT CERTIFICATE

ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Laboratory Report Certificate	N/A		3
1	Sample Description Sheets	N/A		4
2	Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	2
2	Plasticity Index and Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	2
3	Particle Size Distribution Sieving	Yes	BS 1377 Part 2 1990	39
3	Particle Size Distribution Sedimentation	No	BS 1377 Part 2 1990	17
4	Determination of Total Sulphur, Sulphate and pH (Tested externally)	No	See DETS certificates	12
5	Determination of Dry Density/Moisture Content Relationship	Yes	BS 1377 Part 4 1990	4
6	Determination of One Dimensional Consolidation Properties	Yes	BS 1377 Part 5 1990	2
7	Consolidated Undrained Shear Strength in Triaxial Cell with Measurement of Pore Pressure	No	BS 1377 Part 8 1990	4
8	Moisture Content of Rock	Yes	ISRM 1981	1
9	Determination of Point Load Index (Some tested externally)	Yes	ISRM 1985	12
10	Determination of Unconfined Compressive Strength (Tested externally)	No	ISRM 1985	1

ID Manchester - Christine Campbell - Brimwood SoTech - 6/8/2021 2:30 PM - 84.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 436

LABORATORY REPORT CERTIFICATE

ABBREVIATIONS

All the abbreviations used on the laboratory certificates are given below:

Br	Brittle	**PSD**	Particle Size Distrioution by sieve analysis
C	Compound	**SB**	Shear Box
CBR	California Bearing Ratio	**SED**	Sedimentation Analysis
CDT	Consolidated Drained Triaxial	**SO4**	Sulphate (total, water extract, groundwater)
CL	Chloride content (water or soil)	**CP2**	Dry Density/Moisture Content 2.5kg rammer
US	Unsuitable sample for test	**CP4**	As above using 4.5kg rammer
UUT	Undrained Unconsolidated Triaxial	**CPV**	As above using vibrating hammer
HSV	Vane Test	**CUT**	Consolidated Undrained Triaxial
IS	Insufficient sample for test	**R**	Remoulded
LOI	Loss On Ignition	**U**	Undisturbed
M	Multi-stage testing	**MC**	Moisture Content
MCV	Moisture Content Value	**PL**	Point Load
NAT	Natural preparation method	**NMC**	Natural (or as received) moisture content
P	Plastic	**PFH**	Permeability Falling Head Method
OED	Oedometer	**PTXL**	Permeability in Triaxial Cell
OMC	Optimum Moisture Content	**ORG**	Organic content
B	Large disturbed (bulk) sample	**PD**	Particle Density (SG)
J	Small disturbed (jar) sample	**PI**	Liquid limit, plastic limit and plasticity index

Typical Mode of Failure for Triaxial Testing



ID Manchester\Christine.Campbell - Brunswood Scheme - 6/3/2012 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 437

LABORATORY TESTING ENCLOSURE 1

Sample Description Sheets

ID Manchester - Christine Campbell - Bruntwood SciTech 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 438

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Eldon Court, Eldon Way, Crossways Business Park, Dartford, DA2 6QL - Tel: 01322 292 666 Fax: 01322 292 667
Regional Office: Unit 2, Lakeside Business Park, Swan Valley, Northampton, NN4 9BT - Tel: 01604 767 822 Fax: 01604 767 823

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH001	0.50	B5	MADE GROUND (Brown slightly sandy slightly gravelly clay of intermediate plasticity. Gravel includes brick fragments).	MC PI PSD SED
BH001	1.20	U10	MADE GROUND (Soft and firm brown slightly sandy slightly gravelly clay with pockets of gravelly sand with a low cobble content. Cobble of brick).	CUT US for OED
BH001	1.65	J11	MADE GROUND (Brown slightly sandy slightly gravelly clay. Gravel includes brick fragments)	BRE
BH001	2.00	J13	MADE GROUND (Brown slightly sandy gravelly clay of intermediate plasticity)	MC PI
BH001	3.00	B17	MADE GROUND (Brown sandy slightly gravelly clay of low plasticity. Gravel includes brick and ceramic fragments).	MC PI PSD SED
BH001	4.30	J22	MADE GROUND (Brown slightly sandy slightly gravelly clay of intermediate plasticity. Gravel includes brick fragments)	MC PI
BH001	5.00	B24	Red brown clayey slightly gravelly SAND with clay pockets.	MC PSD SED
BH001	5.50	J25	Red brown SAND with clay pockets	BRE
BH001	12.50	J26	Red brown slightly gravelly SAND.	BRE
BH002	0.50	B3	MADE GROUND (Brown slightly clayey sandy grave with a medium cobble content. Gravel includes brick fragments)	US for CP2
BH002	1.20	B5	MADE GROUND (Red brown clayey very sandy gravel with a medium cobble content. Gravel includes brick fragments).	MC PSD BRE
BH002	3.70	B13	Brown clayey gravelly SAND.	MC PSD SED
BH003	1.20	B5	MADE GROUND (Brown clayey slightly gravelly sand. Gravel includes brick fragments).	BRE
BH003	1.70	B6	Brown clayey very gravelly SAND with a high cobble content.	MC PSD
BH003	4.70	J15	Brown SAND.	BRE
BH003	4.70	B16	Red brown clayey gravelly SAND.	MC PSD
BH004	0.80	B5	MADE GROUND (Red brown slightly clayey gravelly sand with clay pockets)	BRE
BH004	1.00	B6	MADE GROUND (Brown very clayey gravelly sand. Gravel includes brick fragments. (Clay of low plasticity))	MC PI PSD SED
BH004	2.00	B8	MADE GROUND (Black brown slightly sandy gravelly clay. Gravel includes brick fragments).	CP2
BH004	5.00	B15	MADE GROUND (Brown cobbles with much sandy gravelly clay of low plasticity. Gravel includes brick fragments)	MC PI PSD SED
BH004	5.30	B18	MADE GROUND (Brown slightly clayey gravelly sand. Gravel includes brick fragments)	BRE

Contract Title: ID Manchester Preliminary Ground Investigation

Client: University of Manchester

Signed: MBond

Name:

Page 1 of 1

Date of Issue: 22/01/2020

Certificate No.: SDS/NW1588/1

AGS Contract No.: NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Blomfield Street - 6/30/2020 2:11:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 439

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2F Bell Close Industrial Park, Platford Lane, Low Fell, Gateshead, Tyne & Wear, NE9 6RG. Tel: 0191 487 3737
Regional Office: Unit 5, Burnhall Close, Burnhall Road, Sherburn Village, Durham, DH6 1PX. Tel: 0191 372 0707 Fax: 0191 372 0707

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH004	7.50	B22	MADE GROUND (Brown clayey very gravelly sand with a medium cobble content. Gravel includes tile, wood and brick fragments).	MC PSD
BH005	0.50	J3	MADE GROUND (Brown slightly sandy gravelly clay. Gravel includes brick fragments).	BRE
BH006	0.80	B4	MADE GROUND (Brown very clayey very sandy gravel including brick fragments).	MC PSD SED
BH005	1.50	B7	Brown slightly clayey sandy GRAVEL.	MC CP2
BH005	2.40	B10	Brown clayey very sandy GRAVEL.	MC PSD
BH006	0.40	B3	MADE GROUND (Brown slightly clayey sandy gravel including tile and brick fragments).	U/S for CP2
BH006	1.40	B5	MADE GROUND (Brown clayey slightly sandy gravel including tarmac and brick fragments).	U/S for PSD and SED
BH006A	0.50	J3	MADE GROUND (Brown slightly clayey slightly sandy gravel including brick fragments).	BRE
BH006A	0.80	B4	MADE GROUND (Brown clayey sand and gravel with a high cobble content. Gravel includes tile and brick fragments).	MC PSD SED
BH006B	0.40	B3	MADE GROUND (Red brown clayey very sandy gravel with a medium cobble content).	MC PI(NP) PSD
BH007	0.80	B4	MADE GROUND (Brown clayey sandy gravel with a high cobble content. Gravel includes tile and brick fragments).	MC PSD
BH007	1.20	J6	MADE GROUND (Brown slightly clayey sandy gravel including brick fragments).	BRE
BH007	2.50	B11	MADE GROUND (Brown clayey very sandy gravel including metal and brick fragments). (Clay of low plasticity)	MC PI PSD SED
BH007	4.50	J18	MADE GROUND (Brown clayey slightly gravelly sand. Gravel includes brick fragments).	BRE
BH007	6.50	B20	Brown clayey very gravelly SAND.	MC PSD
BH007	7.20	J22	Red brown slightly clayey SAND.	BRE
BH008	0.60	B3	MADE GROUND (Brown cobbles with much clayey sandy gravel including brick fragments).	MC PSD
BH008	2.10	J6	MADE GROUND (Brown sandy slightly gravelly clay).	BRE
BH008	2.50	B8	MADE GROUND (Brown clayey sand and gravel with a high cobble content. Gravel includes brick fragments).	MC PSD
BH008	4.50	J14	MADE GROUND (Brown sandy slightly gravelly clay).	MC PI(S for 1)
BH008	4.50	B15	MADE GROUND (Brown clayey very sandy gravel with a medium cobble content. Gravel includes brick fragments).	PSD

Contract Title: ID Manchester Preliminary Ground Investigation

Client: University of Manchester

Signed: MBond

Name:

Page 2 of 4

Date of Issue: 22/01/2020

Certificate No: SUNW1588/2

AEG Contract No: NW1588

UKAS TESTING 1387

ID Manchester - Christine Campbell - Burnhall Site Team - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 440

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Registered Office, Unit 2C, Seaview Business Park, Riverside Way, Dundonald, Belfast, BT16 1FT. Tel: 028 9048 1539 Fax: 028 9048 1540

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH008	5.50	J16	Brown sandy slightly gravelly CLAY.	BRE
BH009	0.80	J3	MADE GROUND (Brown slightly clayey gravelly sand).	BRE
BH009	1.00	B4	MADE GROUND (Brown clayey very sandy gravel including brick fragments).	MC PSD
BH009	3.70	B14	Red brown clayey gravelly SAND.	MC PSD
BH011	0.80	B3	MADE GROUND (Brown sandy gravel including concrete and metal fragments).	CP2
BH011	1.20	J5	MADE GROUND (Brown slightly clayey gravelly sand. Gravel includes brick fragments)	BRE
BH011	2.70	B5	MADE GROUND (Brown clayey very sandy gravel with a medium cobble content).	MC PSD
BH011	4.70	B17	Red brown very clayey slightly gravelly SAND.	MC PSD SED
BH011	5.50	J19	Red brown slightly gravelly SAND.	BRE
BH012A	1.70	B8	MADE GROUND (Brown slightly clayey gravelly sand. Gravel includes brick fragments).	BRE
BH012A	3.50	J21	MADE GROUND (Brown slightly sandy slightly gravelly clay of low to intermediate plasticity. Gravel includes brick fragments).	MC PI
BH012A	6.50	B22	MADE GROUND (Brown very clayey very sandy gravel including tile and brick fragments). (Clay of low plasticity).	MC PI PSD SED
BH012A	8.50	U25	MADE GROUND (Brown sand becoming at 5.80m brown silty sand).	OED LS for CUT
BH012A	9.80	B28	MADE GROUND (Brown very clayey slightly gravelly sand)	MC PSD SED
BH012A	10.00	B30	MADE GROUND (Brown slightly clayey slightly gravelly sand. Gravel includes coal fragments)	BRE
BH013	0.80	B3	MADE GROUND (Brown slightly clayey sandy gravel with a high cobble content. Gravel includes brick fragments)	US for CP2
BH013	1.50	B5	MADE GROUND (Brown sandy gravel including brick fragments).	BRE
BH013	1.70	B6	MADE GROUND (Brown clayey very sandy gravel with a high cobble content. Gravel includes slag, wood, glass, ceramic, brick fragments).	MC PSD
BH013	5.20	B15	Brown clayey very gravelly SAND.	MC PSD
BH013	7.00	J20	Brown SAND	BRE
BH014	0.70	B6	MADE GROUND (Brown gravelly sand).	BRE

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :-

Name :-

Page 3 of 4

Date of Issue :- 22/6/2020

Cert Index No :- GD/NW1588/2

AEG Contract No :- NW1588

1367

ID Manchester - Christine Campbell - BruntwoodGeoTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 441

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Tel: 0131 537 4700 Fax: 0131 537 4710
Regional Office: Unit 20, Business Design West Centre, Bankhead Avenue, Edinburgh EH11 4EL. Tel: 0131 [illegible] Fax: 0131 [illegible]

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH014	1.20	B6	MADE GROUND (Brown clayey sandy gravel)	MC PSD
BH014	3.00	B14	MADE GROUND (Black brown clayey very sandy gravel including ash and clinker).	MC PI(NP) PSD
BH014	6.00	B24	Brown clayey slightly gravelly SAND.	MC PSD SED
DS001	0.40	J4	MADE GROUND (Brown clayey sandy gravel including brick fragments)	MC PI(IS for LL)
DS001	0.70	B6	MADE GROUND (Brown clayey very sandy gravel with a high cobble content. Gravel includes brick fragments).	PSD SED BRE
DS002	0.40	B2	MADE GROUND (Brown slightly clayey gravelly sand with occasional pockets of clay of low plasticity).	MC PI
DS002	0.80	B4	MADE GROUND (Brown clayey very sandy gravel including brick and tile fragments)	PSD SED
DS002	1.20	U5	MADE GROUND (Brown slightly clayey sandy gravel including brick fragments).	BRE
TP001	0.80	B4	MADE GROUND (Brown clayey very gravelly sand. Gravel includes brick fragments)	MC PSD SED
TP001	0.60	J5	Brown gravelly SAND	BRE
TP001	1.50	B7	Brown clayey very gravelly SAND	PSD CP?
TP002	1.00	B4	MADE GROUND (Red brown clayey very gravelly sand).	MC PSD
TP002	1.50	J8	MADE GROUND (Brown red gravelly sand)	BRE
TP002	2.50	B10	MADE GROUND (Brown clayey very gravelly sand. Gravel includes slag, glass and brick fragments)	MC PSD
TP003	1.00	B7	Red brown clayey gravelly SAND	MC PSD
TP003	3.00	B12	Red brown clayey gravelly SAND	MC PSD SED

Contract Title :
ID Manchester Preliminary Ground Investigation

Client :
University of Manchester

Signed :

Name

Date of Issue :
22/01/2020

Certificate No :
SD/NW/1588/4

AEG Contract No. :
NW1588

UKAS TESTING
1367

ID Manchester - Christine Campbell - Buntwood SciTech 26/3/2020 11:36 PM - 81.154.246.72

CONFIDENTIAL

LABORATORY TESTING ENCLOSURE 2

Moisture Content/Plasticity Index and Moisture Content

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 443

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Regional Office: Unit 20, Business Development Centre, Bolton Road, Radcliffe, M26 2SP. Tel: 0161 723 2323 Fax: 0161 723 2999

MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH001	5.00	B24	5.00	3.9	22/11/2019	
BH002	1.20	B5	1.20	18.4	22/11/2019	
BH002	3.70	B13	3.70	29.2	26/11/2019	
BH003	1.70	B6	1.70	17.5	22/11/2019	
BH003	4.70	B16	4.70	18.4	26/11/2019	
BH004	7.50	B22	7.50	18.5	28/11/2019	
BH005	0.80	B4	0.80	16.2	02/12/2019	
BH005	1.50	B7	1.50	13.4	29/11/2019	
BH005	2.40	B10	2.40	7.5	29/11/2019	
BH006A	0.80	B4	0.80	15.5	02/12/2019	
BH007	0.60	B4	0.60	14.9	27/11/2019	
BH007	6.50	B20	6.50	17.6	27/11/2019	
BH008	0.60	B3	0.60	16.3	27/11/2019	
BH008	2.50	B8	2.50	19.1	27/11/2019	
BH009	1.00	B4	1.00	12.0	27/11/2019	
BH009	3.70	B14	3.70	15.0	27/11/2019	
BH011	2.70	B9	2.70	18.0	25/11/2019	
BH011	4.70	B17	4.70	14.5	28/11/2019	
BH012A	9.00	B28	9.00	16.3	29/11/2019	
BH013	1.70	B6	1.70	23.3	25/11/2019	

For description of sample please refer to the Laboratory Sample Description Sheet.

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- MSong

Name :-

Date of issue :- 23/01/2020

Cert Folio No :- MC/NW1588/1

AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6/3/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 444

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 18 Blyth Ind Estate, Delta Rd, Cheadle-on-Tyne, NE15 6PS Tel: 0191 267 4700 Fax: 0191 267 4713
Regional Office: Unit 2C, Business Development Centre, Bishop Wilkin, Bradford, BD1 5BY Tel: 01274 735 202 Fax: 01274 735 999

MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH013	6.00	B16	6.00	14.8	25/11/2019	
BH014	1.20	B8	1.20	8.3	25/11/2019	
BH014	6.00	B24	6.00	18.6	25/11/2019	
TP001	0.80	B4	0.80	16.4	26/11/2019	
TP002	1.00	B4	1.00	10.2	25/11/2019	
TP002	2.50	B10	2.50	16.2	22/11/2019	
TP003	1.00	B7	1.00	12.7	25/11/2019	
TP003	3.00	B12	3.00	17.1	25/11/2019	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed: [signature]

Name :-

Page 2 of 2

Date of Issue :- 22/01/2020

Certificate No :- MCH-W1568/2

AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

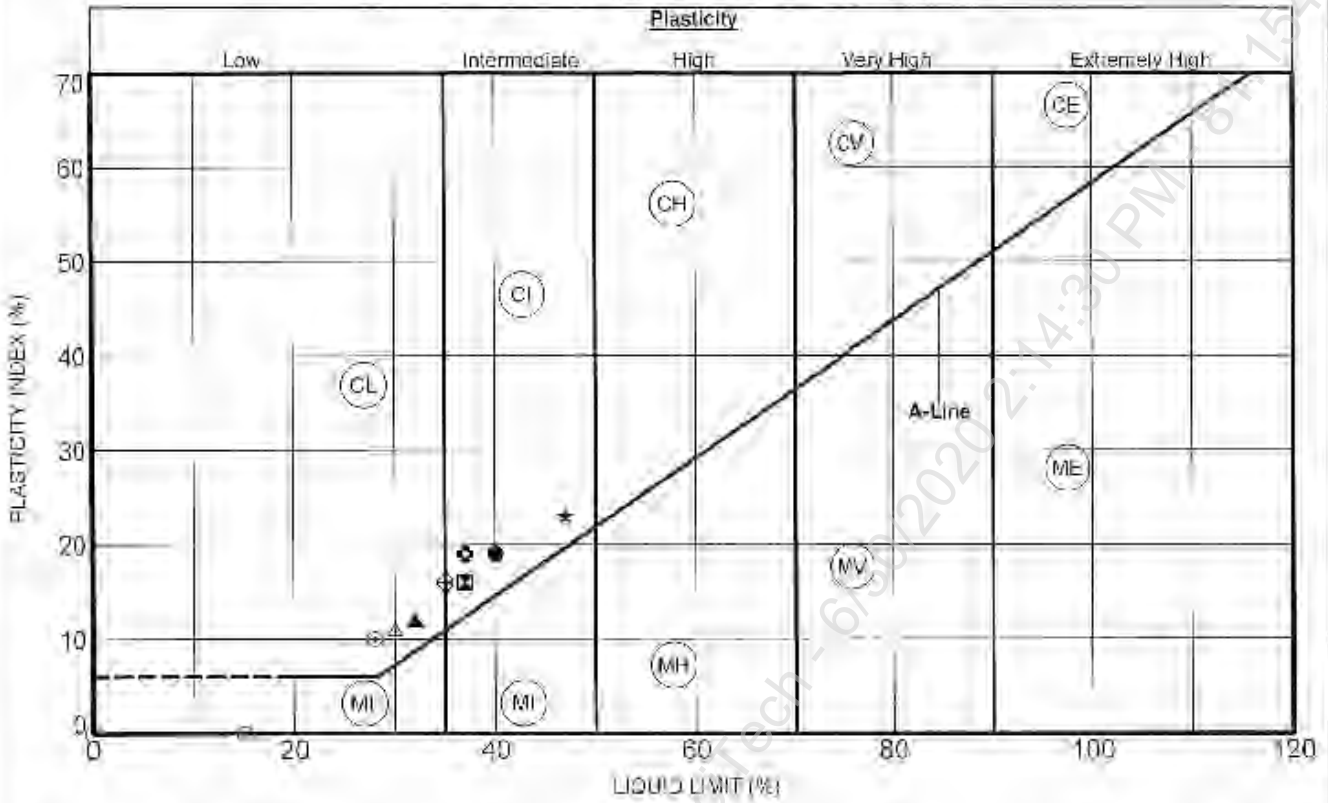
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 445

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Sefton Lee Industrial Estate, Pool Lane, Antrobus, Northwich, Cheshire CW9 6JA. Tel: 01606 891 700 Fax: 01606 891 701
Regional Office: Unit 7, Beaconsfield Industrial Estate, Pool Lane, Wheelock, Sandbach, Cheshire CW11 4TX. Tel: 01270 767 766 Fax: 01270 767 880

ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested	
● BH001	0.50	B8	0.50	40	21	19	0.16	Natural	73.0	24.1	22/11/2019	
■ BH001	2.00	J13	2.00	37	21	16	0.46	Air Dried	54.0	28.3	27/11/2019	#
▲ BH001	3.00	B17	3.00	32	20	12	0.44	Air Dried	75.0	25.3	22/11/2019	#
★ BH001	4.30	J22	4.30	47	24	23	0.17	Natural		27.9	22/11/2019	
⊕ BH004	1.40	B5	1.40	28	18	10	0.33	Natural	73.0	21.3	27/11/2019	
✿ BH004	5.00	B16	5.00	37	18	19	0.35	Air Dried	28.0	24.6	27/11/2019	#
○ BH006B	0.40	B3	0.40	NP	NP	NP		Air Dried	27.0	12.6	02/12/2019	
⊗ BH007	2.50	B11	2.50	30	19	11	0.23	Natural	45.0	21.5	26/11/2019	#
⊛ BH008	4.50	J14	4.50		15			Natural		17.6	26/11/2019	
⊕ BH012A	6.50	J21	6.50	35	19	16	0.11	Natural		20.8	22/11/2019	#

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point LL
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :-

Name :-

Page 1 of 2

Date of Issue :- 22/01/2020

Certificate No :- PI/MG/1568/1

AEG Contract No :- NW1588

UKAS TESTING 1387

ID Manchester - Christine Campbell - Bruntwood Scitech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

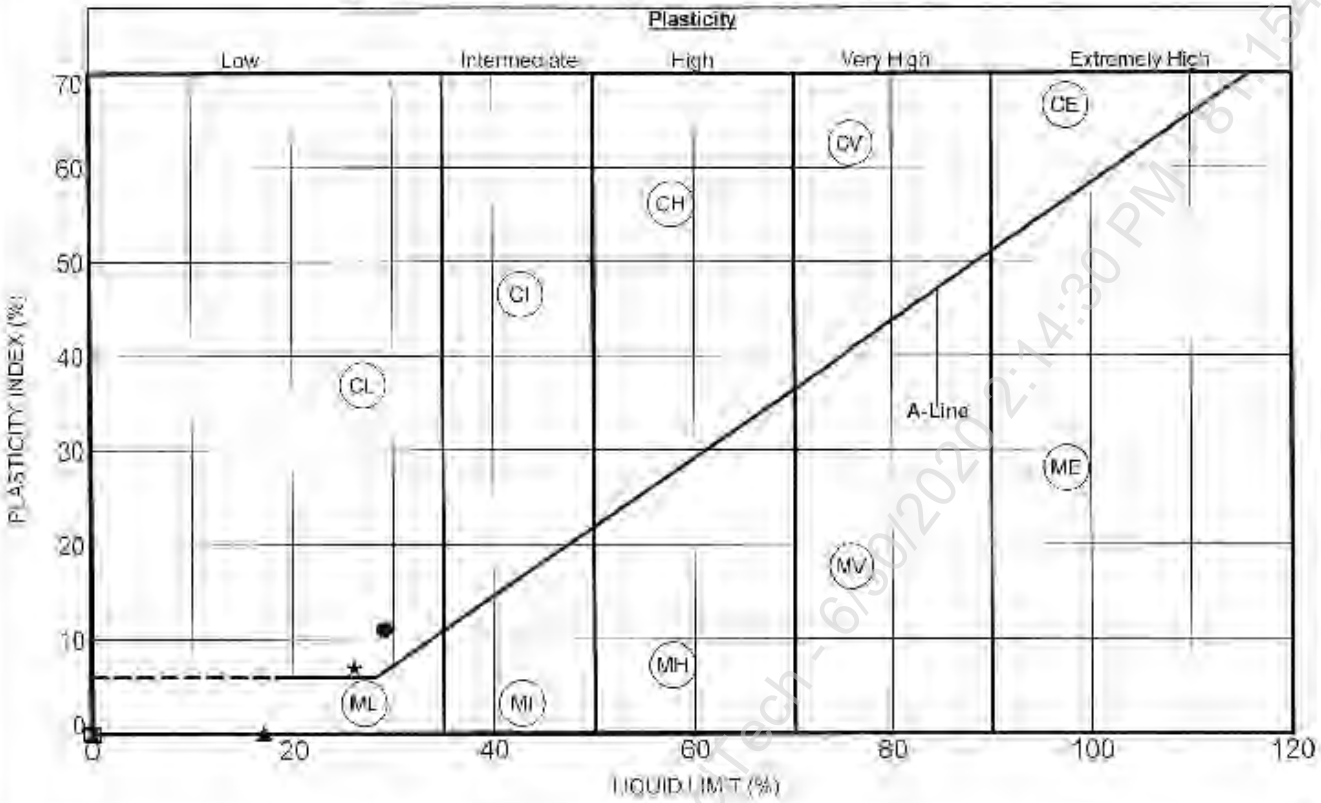
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 446

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 1 Phoenix Court, Hawks Road, Alloa, Clackmannanshire, FK10 2NG - Tel: 01259 [illegible]
Regional Office: 20 Business Development Centre, Lanark Business Park, Lanark, ML11 8SR - Tel: 01555 [illegible]

ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3 & 4.1 to 4.4 & 5 : 1990



Exploratory Hole No	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	IL	Preparation Method	<0.425mm (%)	mc (%)	Date Tested	
● BH012A	6.50	B22	6.50	29	18	11	0.35	Air Dried	49.0	21.8	25/11/2019	#
⊠ BH014	3.00	B14	3.00	NP	NP	NP		Natural	28.0	25.7	22/11/2019	
▲ DS001	0.40	J4	0.40		17			Air Dried	58.0	16.9	09/12/2019	
★ DS002	0.40	B2	0.40	26	19	7	-0.77	Natural		13.6	09/12/2019	

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-	Client :-
ID Manchester Preliminary Ground Investigation	University of Manchester

Signed :- [signature]
Name :-
Page 2 of 2

Date of Issue :- 23/01/2020
Certificate No :- PR/NW1588/1
AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunthwood Solltech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 447

LABORATORY TESTING ENCLOSURE 3

Particle Size Distribution Sieving and Sedimentation

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020, 2:01:30 PM - 81.134.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 448

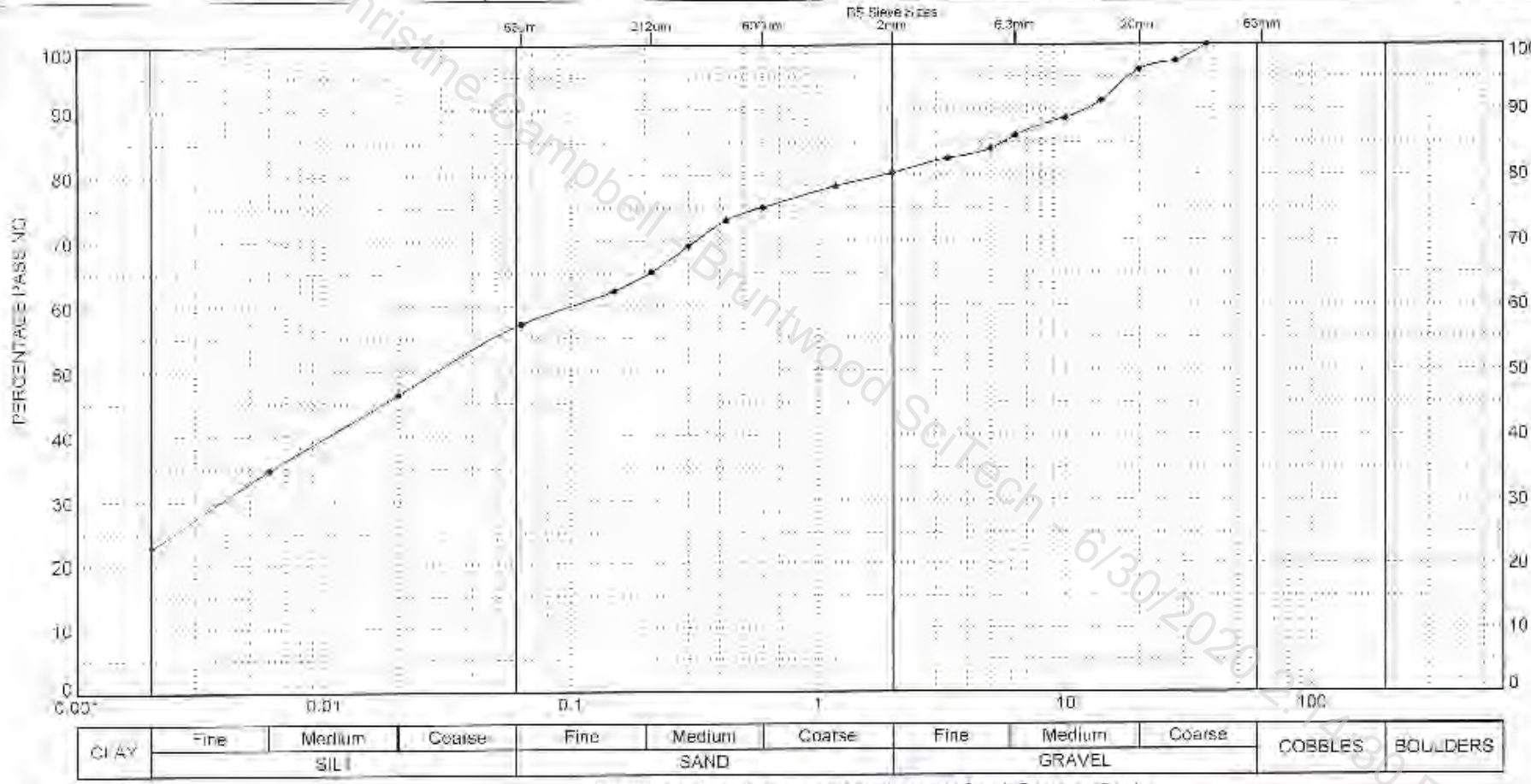
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Swan Hill Industrial Estate, Pelham Hall, Chelmsford, Essex, CM2 6XG Tel: 01621 787 400 Fax: 01621 787 410
Regional Office: Unit 23, Business Development Centre, Eastern Way, Blackburn, BB1 5BL Tel: 01772 735 300 Fax: 01772 735 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH001	Depth (m) :- 0.50	Sample Type & No :- B6	Specific Depth (m) :- 0.50	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	97.4
20	96.1
14	91.3
10	88.7
6.3	86.0
5	84.0
3.35	82.5
2	80.3
1.18	78.3
0.6	75.1
0.425	73.1
0.3	69.2
0.212	65.2
0.15	62.3
0.063	57.2
0.02	46.4
0.006	34.8
0.002	22.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH001/B6/0.50	MSDQ		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunwood SciTech - 6/30/2020 2:46:06 PM - 84.64.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 449

CONFIDENTIAL

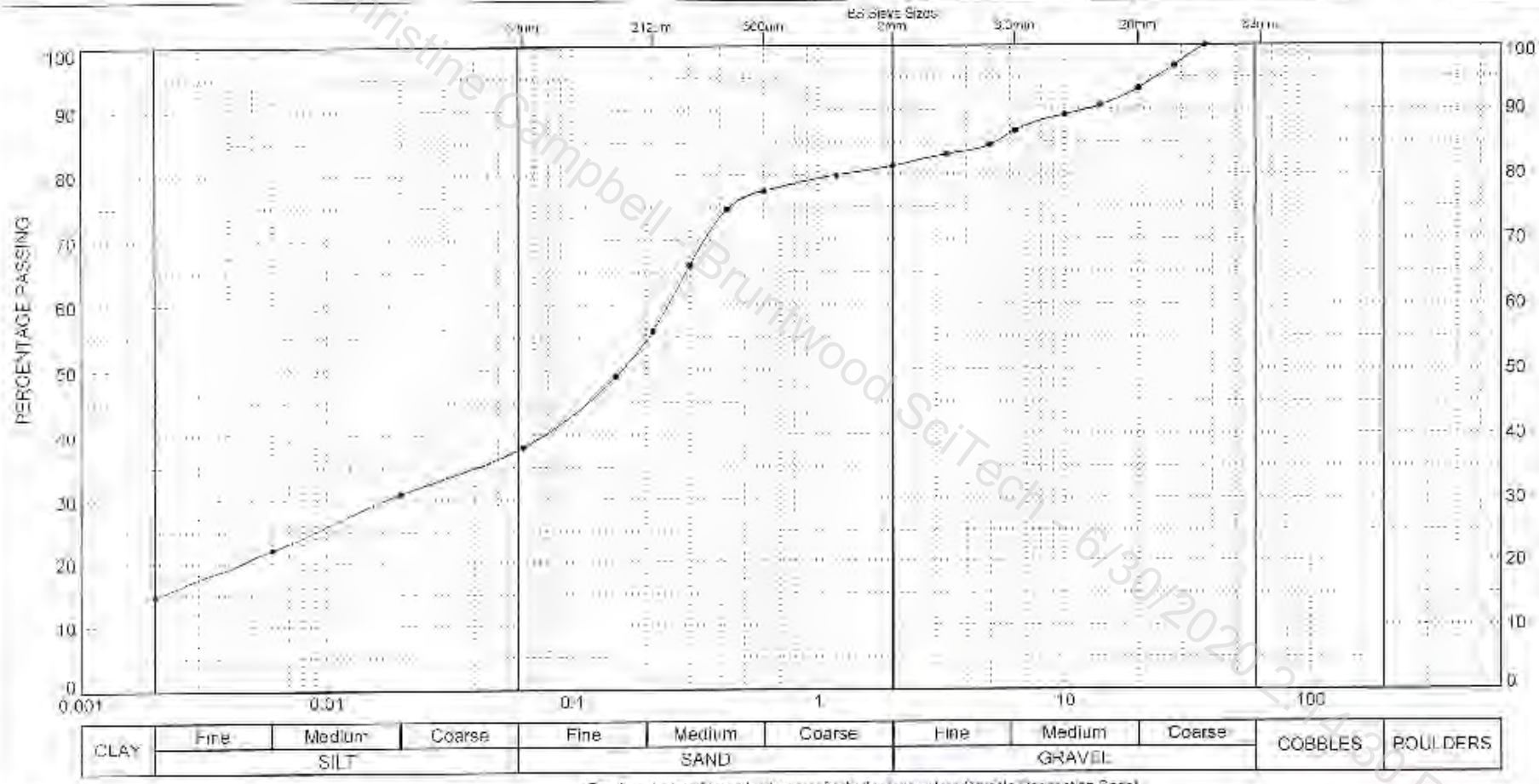
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Sadler Forlong Industrial Estate, Rotary Way, Consett, Co. Durham, DH8 6BP. Tel: 01207 503030 Fax: 01207 505618
Regional Office: Unit 30, Business Quarter, Elliott Way, Basingstoke, RG22 4BF. Tel: 01256 338030 Fax: 01256 338033

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH001	3.00	B17	3.00	22/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	96.8
20	93.3
14	90.6
10	89.2
6.3	86.7
5	84.6
3.35	83.1
2	81.3
1.18	79.9
0.6	77.5
0.425	74.7
0.3	66.1
0.212	56.0
0.15	49.0
0.063	38.1
0.02	30.9
0.006	22.0
0.002	14.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH001/B17/3.00	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

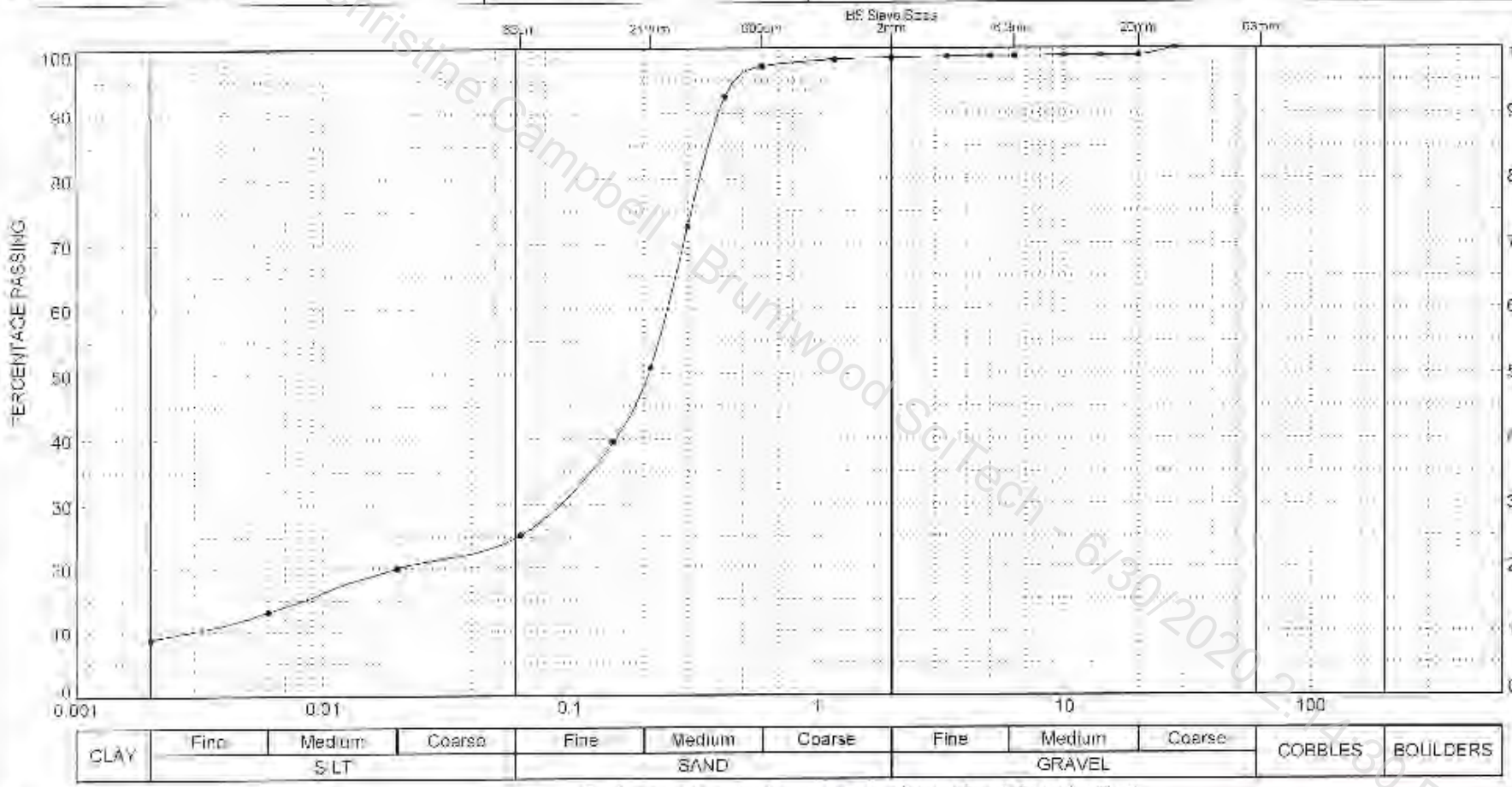
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office : 2 Kidsdale Industrial Estate, Pelham Rd, Gateshead, Co. Durham, DH9 7QG - Tel: 0191 487 4700 Fax: 0191 487 4713
Regional Office : 12 Thornbank Development Centre, Lamor Wood, Barnsley, S81 0BL - Tel: 01772 793300 Fax: 01772 795 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH001	Depth (m) :- 5.00	Sample Type & No :- B24	Specific Depth (m) :- 5.00	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	98.8
14	98.8
10	98.8
6.3	98.7
5	98.7
3.35	98.6
2	98.4
1.18	98.2
0.6	97.2
0.425	92.6
0.3	72.7
0.212	50.9
0.15	39.6
0.063	25.3
0.02	19.9
0.006	13.1
0.002	8.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH001/B24/5.00	MSong		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

CONFIDENTIAL
ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:36 PM - 81.154.246.72
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 450

ID Manchester - Christine Campbell - Brunswood GeoTech - 6/30/2020 2:46:56 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 451

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

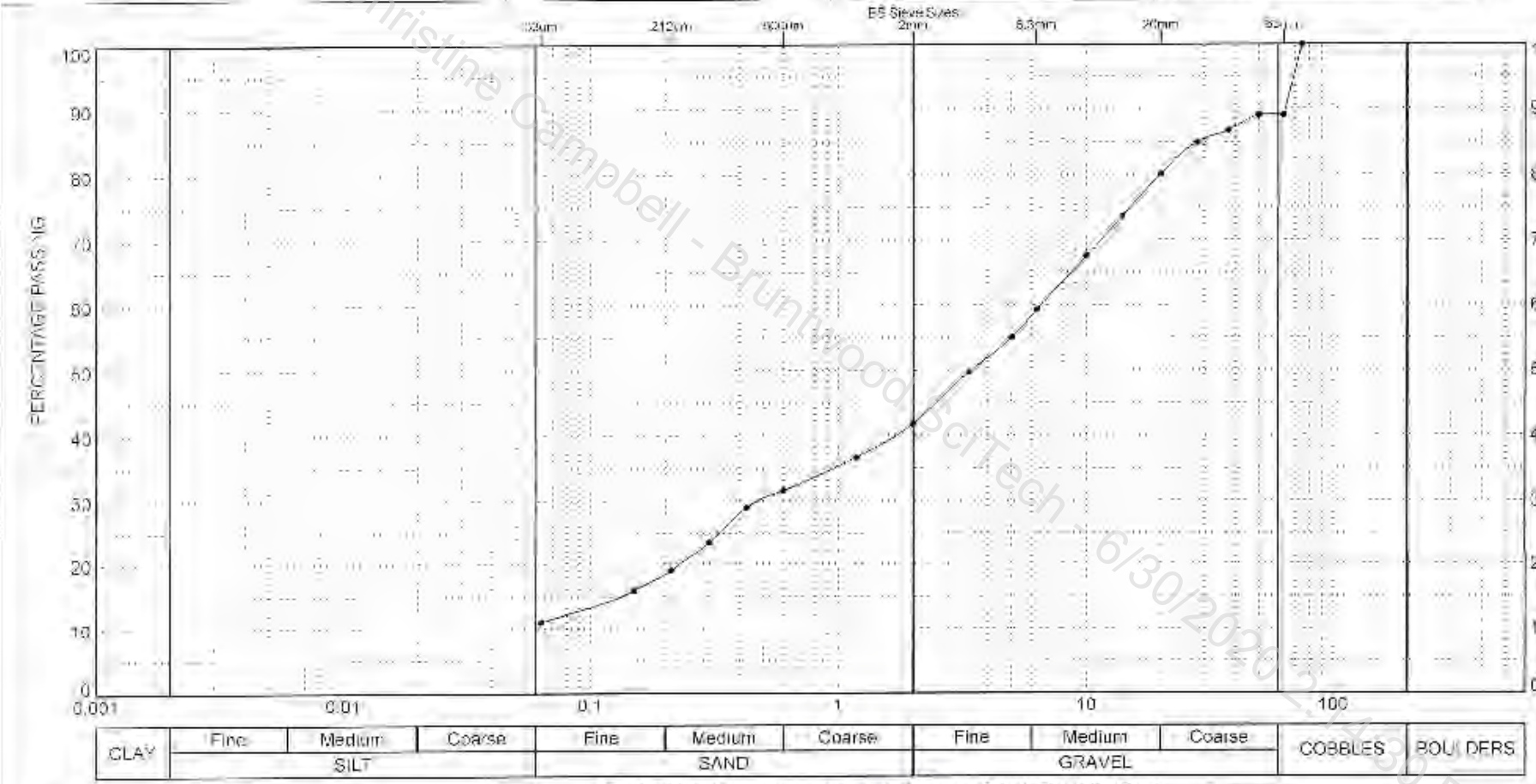
Head Office: Unit 20, Station Road Industrial Estate, Fullerton, Fail Dr Lapwing Street, Co Durham, DH2 2WG Tel: 0191 387 4700 Fax: 0 91 387 4710
Regional Office: Unit 27, Thistle Park Ltd, Bankhead Avenue, Sighthill Industrial Estate, Edinburgh, EH11 4BL Tel: 01772 735 300 Fax: 01772 23 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH002	Depth (m) :- 1.20	Sample Type & No :- B5	Specific Depth (m) :- 1.20	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	89.1
50	89.1
37.5	86.7
28	84.9
20	80.1
14	73.7
10	67.5
6.3	59.3
5	55.0
3.35	49.7
2	41.8
1.18	36.7
0.6	31.6
0.425	29.0
0.3	23.8
0.212	19.1
0.15	16.9
0.063	11.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH002/B5/1.20			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	D Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Arup Mobile SciTech - 6/30/2020 2:14:30 PM - 84.64.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 452

CONFIDENTIAL

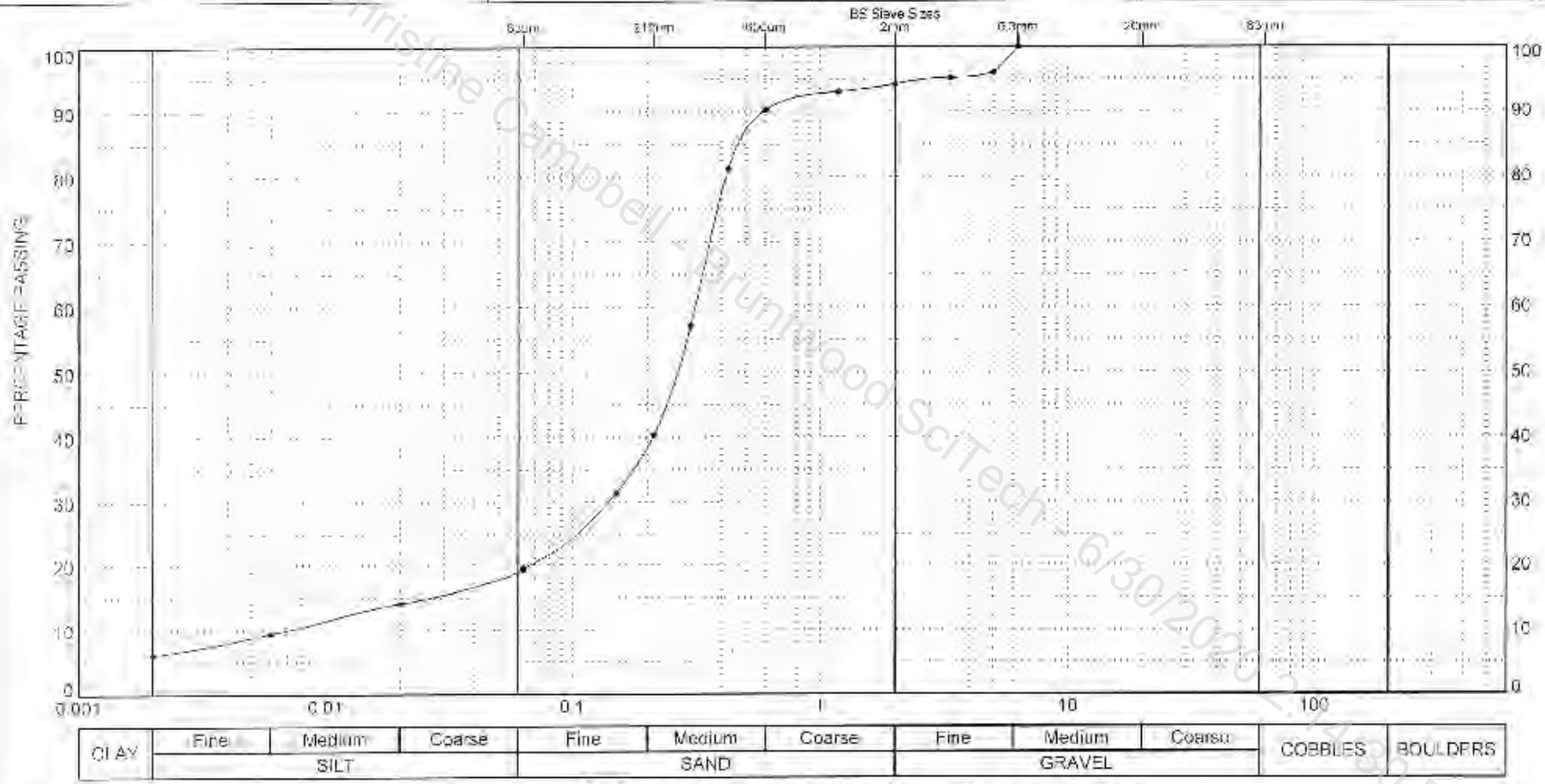
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2A, Alpha 66 Industrial Estate, Pollitt Rd, Chester le Street, Co. Durham, DH2 1RG - Tel: 0191 387 4700 Fax: 0191 387 4712
Regional Office: Unit 20, Business Development Centre, Carron Wharf, Bainsford, FK2 7RS - Tel: 01324 630 300 Fax: 01324 630 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH002	Depth (m) :- 3.70	Sample Type & No :- B13	Specific Depth (m) :- 3.70	Date Tested :- 06/12/2019



Sieve Size (mm)	Passing (%)
6.3	100.0
5	96.1
3.35	95.2
2	94.2
1.18	93.1
0.6	90.3
0.425	81.3
0.3	57.2
0.212	40.4
0.15	31.5
0.063	19.4
0.02	14.1
0.006	9.4
0.002	6.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1586/BH002/B13/3.70	msnp		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1586

UKAS TEST No. 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:11:36 PM - 81.134.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 453

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

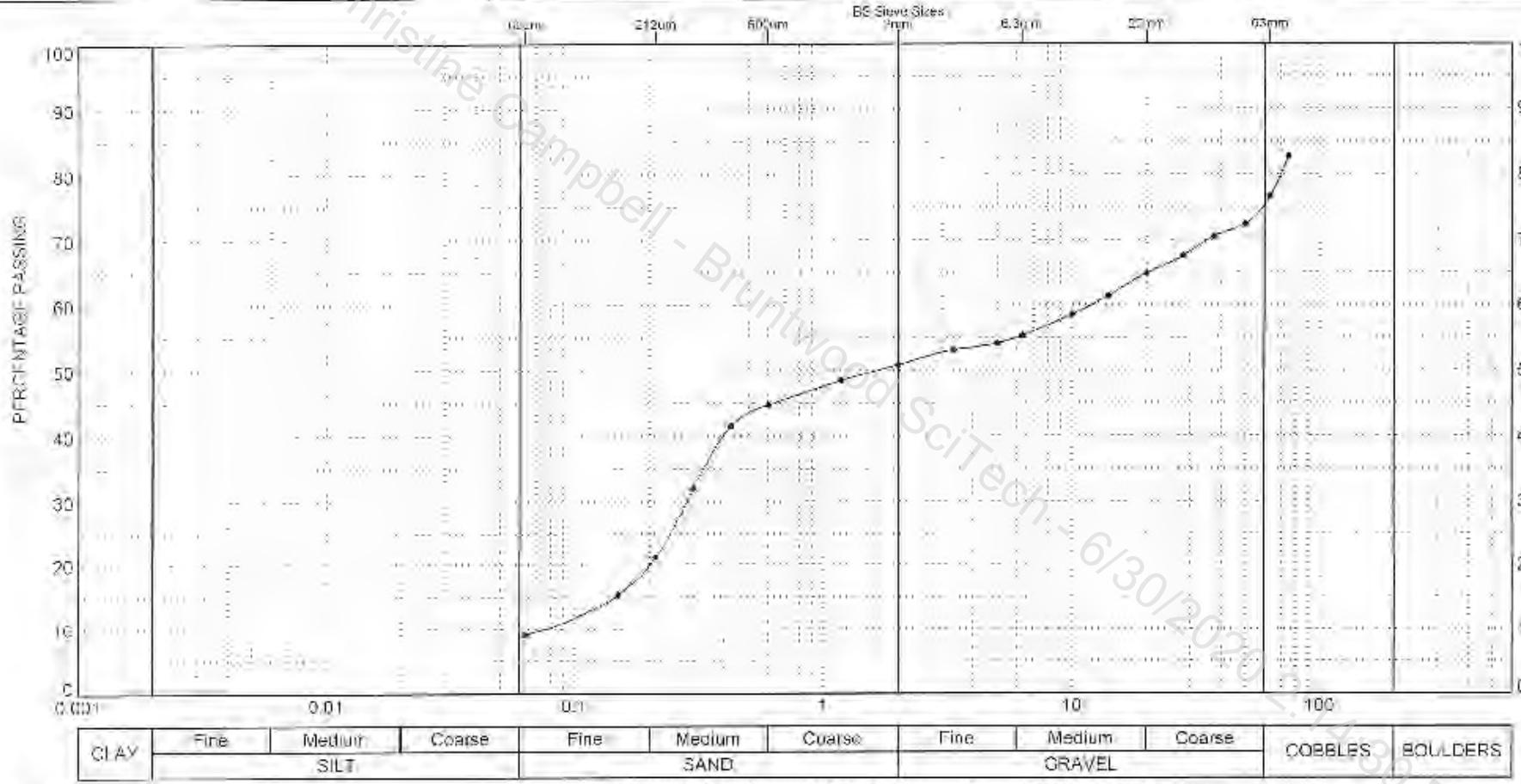
Head Office: Unit 25 Fields Gill Industrial Estate, Penketh, Warrington, Cheshire WA5 2UG. Tel: 01925 727 770 Fax: 01925 727 771
Regional Office: Unit 20, Business Development Centre, Fairclough Street, Bolton BL1 2BJ. Tel: 01204 795 010 Fax: 01204 795 011

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH003	1.70	B6	1.70	22/11/2019



Sieve Size (mm)	Passing (%)
75	82.7
63	76.6
50	72.1
37.5	70.8
28	67.3
20	64.8
14	61.4
10	58.5
6.3	55.3
5	54.1
3.35	53.1
2	50.8
1.18	48.4
0.6	44.7
0.425	41.5
0.3	32.0
0.212	21.2
0.15	15.3
0.063	9.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :	Page 1 of 1
22/01/2020	PSD/NW1588/BH003/B6/1.70	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 2:01:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 454

CONFIDENTIAL

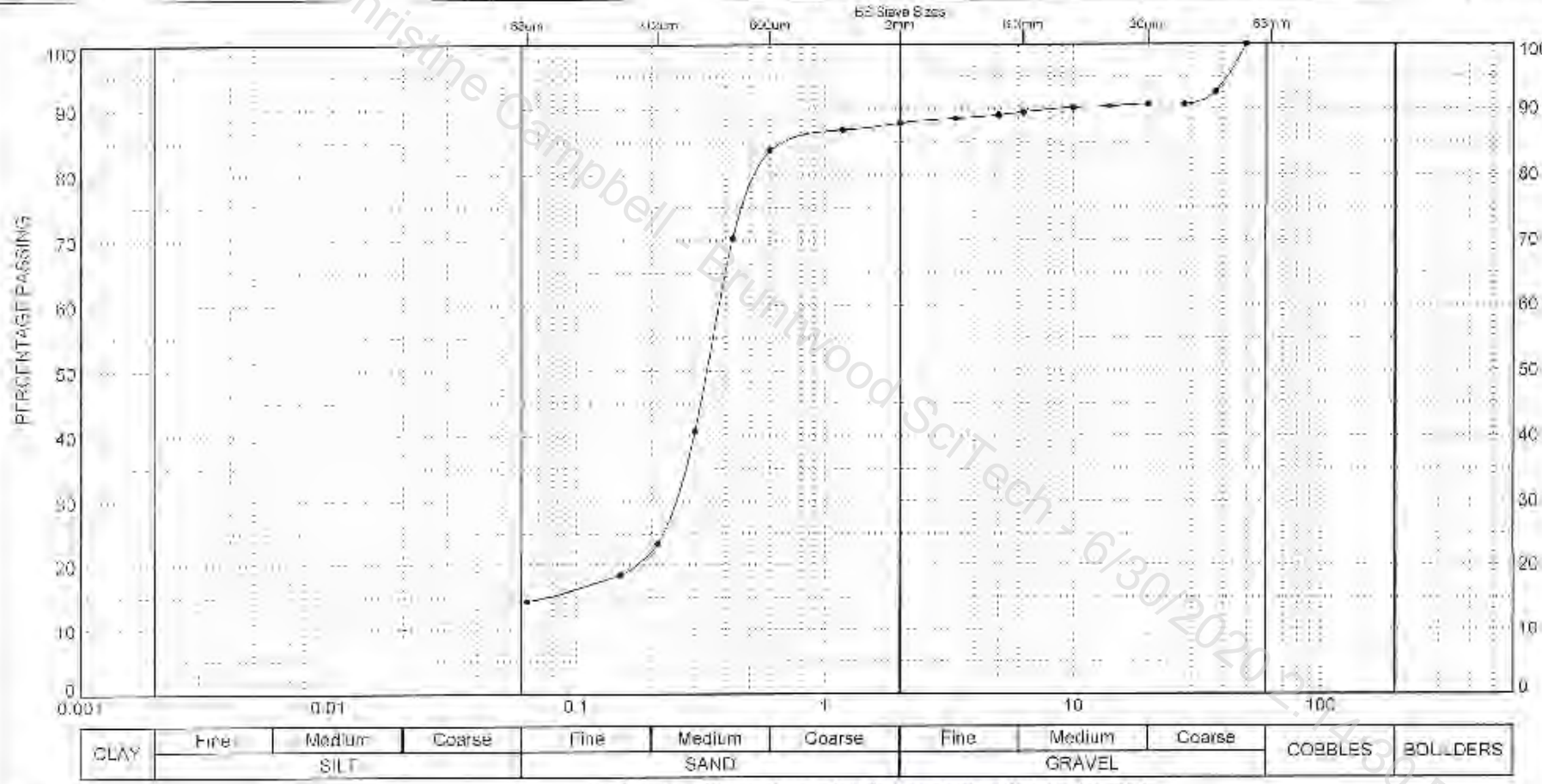
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Sketh Grt Industrial Estate, Auckland Road, Dunston, Gateshead, Co. Durham, DH9 4TQ. Tel: 0191 387 4700 Fax: 0191 387 4773
Regional Office: Unit 23, Parkside Development Centre, Lumley Road, Chester-le-Street, DH3 2SL. Tel: 01772 735 300 Fax: 01772 735 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH003	Depth (m) :- 4.70	Sample Type & No :- B16	Specific Depth (m) :- 4.70	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	92.7
28	90.7
20	90.7
14	90.4
10	90.2
6.3	89.5
5	89.1
3.35	88.5
2	87.9
1.18	86.9
0.6	83.8
0.425	79.3
0.3	40.8
0.212	23.5
0.15	18.5
0.063	14.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
27/07/2020	PSD/NW1588/BH003/B16/4.70			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 2:21:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 455

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

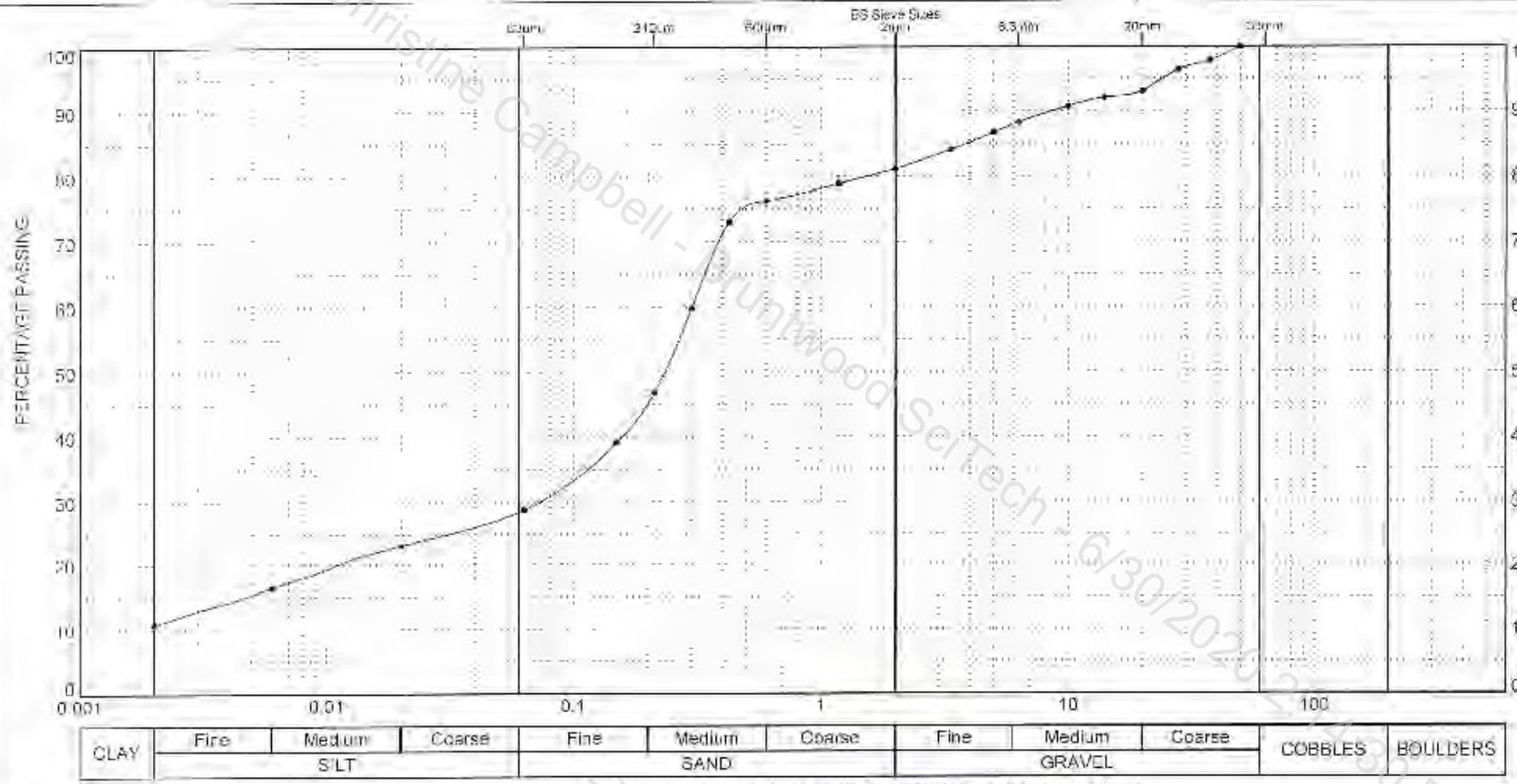
Head Office: Unit 2, Site B, Gil Industrial Estate, Fallin, Nr. Stirling, FK7 7XG. Tel: 01786 817 470 Fax: 01786 817 410
Regional Office: Unit 29, Business Development Centre, Turnhouse Road, Edinburgh, EH12 0NJ. Tel: 0131 539 7555 Fax: 0131 539 7556

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH004	1.40	B5	1.40	27/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	97.7
28	96.4
20	93.1
14	92.1
10	90.7
6.3	88.3
5	86.7
3.35	84.1
2	81.2
1.18	78.9
0.6	76.2
0.425	73.0
0.3	59.8
0.212	46.8
0.15	39.2
0.063	28.8
0.02	26.7
0.006	16.4
0.002	10.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	
22/07/2020	PSD/NW1588/BH004/B5/1.40	MSone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brantwood SoTech - 6/30/2020 2:04:36 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 456

ALLIED EXPLORATION & GEOTECHNICS LIMITED

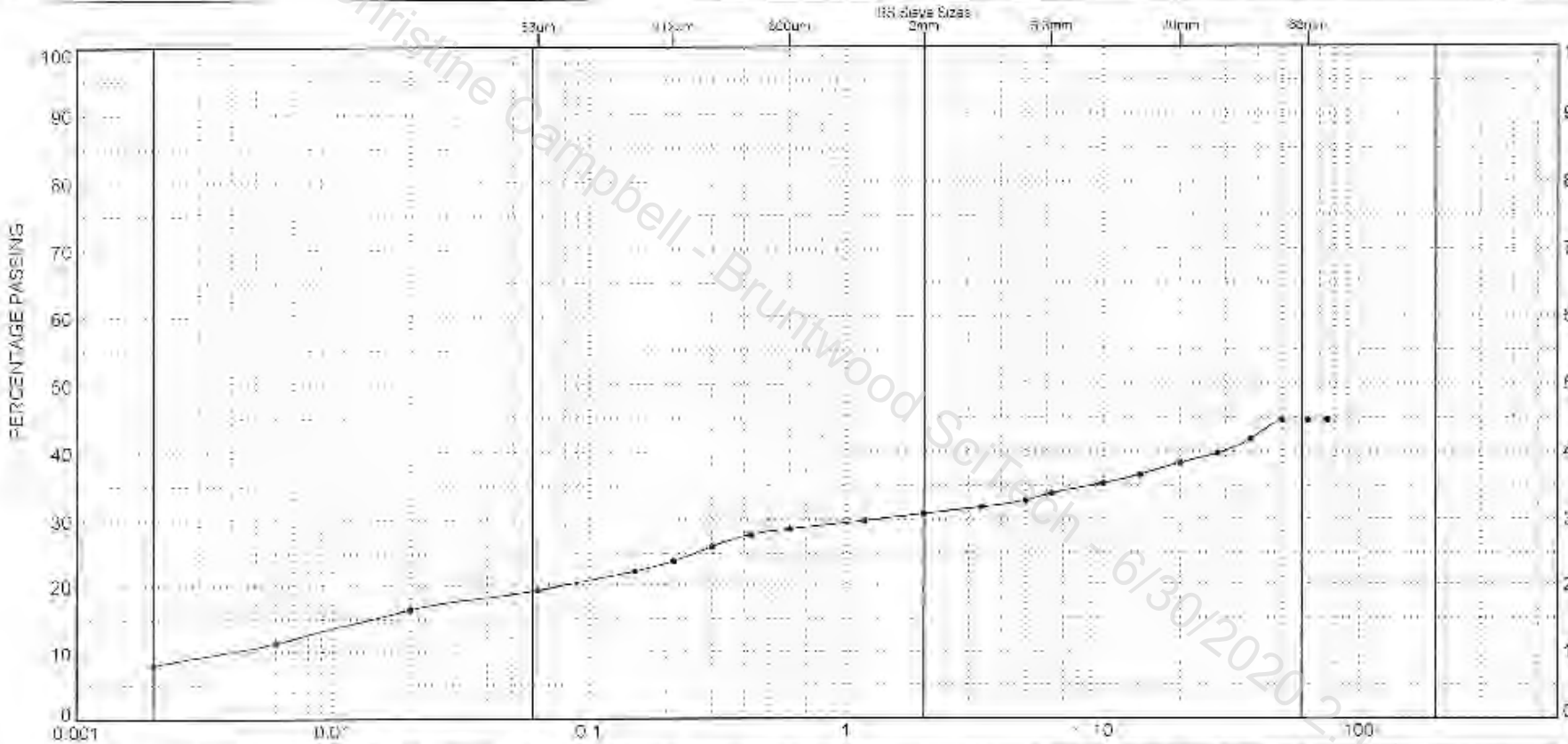
Head Office: Unit 23 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co Durham, DH2 2RG Tel: 0191 387 1733 Fax: 0191 387 1710
Regional Office: Unit 21 Preston Farm Business Centre, Bamber Bridge, Preston, PR5 6QL Tel: 01772 735 560 Fax: 01772 735 599

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH004	Depth (m) :- 5.00	Sample Type & No :- B16	Specific Depth (m) 5.00	Date Tested :- 27/11/2019



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Sieve Size (mm)	Passing (%)
75	44.6
63	44.6
50	44.6
37.5	41.8
28	39.7
20	38.3
14	36.6
10	35.3
6.3	33.8
5	32.8
3.35	31.8
2	30.8
1.18	29.8
0.6	28.6
0.425	27.6
0.3	26.0
0.212	23.9
0.15	22.2
0.063	19.3
0.02	16.3
0.006	11.4
0.002	8.4

For description of sample please refer to the Laboratory Sample Description Sheet.

Date of issue	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH004/B16/5.00			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech , 6/30/2020 2:14:36 PM - 81.134.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 457

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

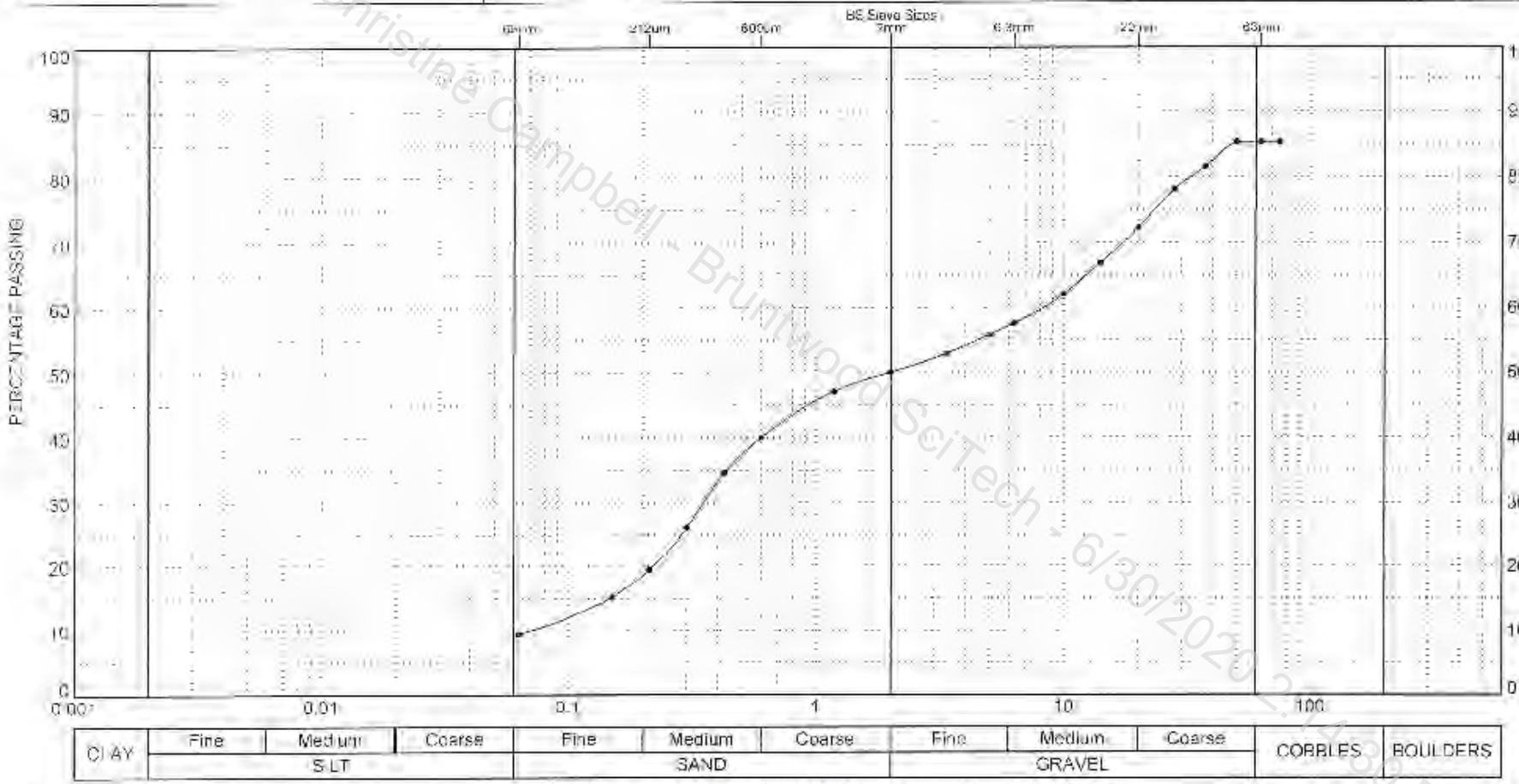
Head Office: Unit 05 Birch Grove Industrial Estate, Heyrod Rd, Chesterfield Street, Ashton-U-Lyne, OL6 7TG - Tel: 0161 367 4700 Fax: 0161 367 4710
Registered Office: Unit 20, Business Development Centre, Lyndon West, Shirebrook, NG20 8RY - Tel: 01623 330 393 Fax: 01623 745 894

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH004	Depth (m) :- 7.50	Sample Type & No :- B22	Specific Depth (m) :- 7.50	Date Tested :- 28/11/2019



Sieve Size (mm)	Passing (%)
75	85.4
63	85.4
50	85.4
37.5	81.7
28	78.2
20	72.3
14	66.9
10	62.1
6.3	57.6
5	55.8
3.35	52.9
2	50.0
1.18	47.1
0.6	40.0
0.425	34.6
0.3	26.2
0.212	19.4
0.15	15.2
0.063	9.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH004/B22/7.50	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood Screech - 6/30/2020 2:11:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 458

CONFIDENTIAL

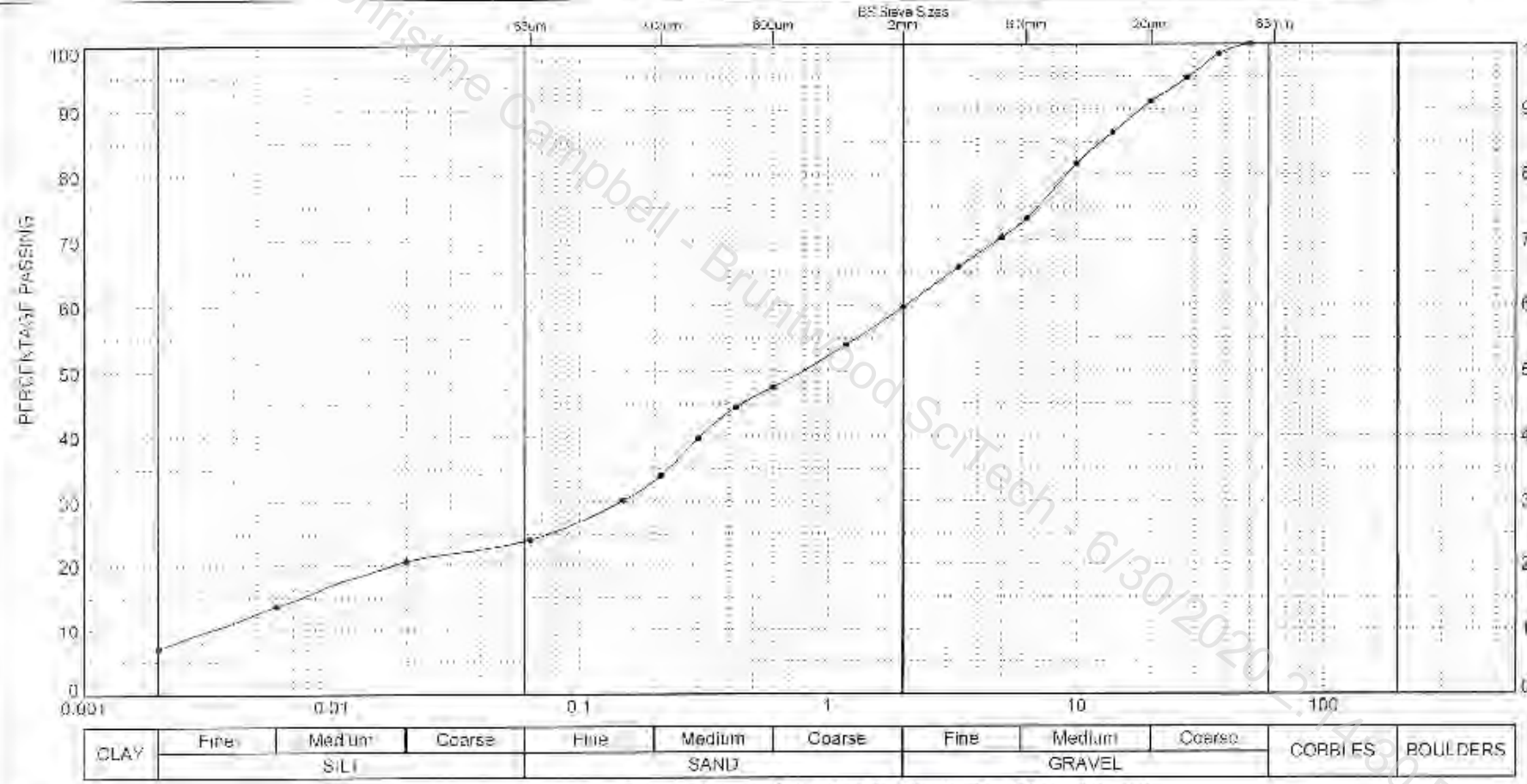
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5, Block G1, Industrial Estate, Pallion, Sunderland, Tyne & Wear, SR4 6SN. Tel: 0191 567 4709 Fax: 0191 567 4713
Regional Office: Unit 2D, Business Development Centre, Forrest Road, Boscastle, PL35 0BL. Tel: 01840 250 111 Fax: 01840 250 888

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH005	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) :- 0.80	Date Tested :- 02/12/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.4
28	94.8
20	91.2
14	86.4
10	81.6
6.3	73.2
5	70.3
3.35	65.8
2	59.7
1.18	54.0
0.6	47.5
0.425	44.5
0.3	39.7
0.212	34.0
0.15	30.2
0.063	24.2
0.02	20.5
0.006	13.6
0.002	7.2

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH005/B4/0.80	MSerd		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood Scitech - 6/30/2020 2:11:30 PM - 81.154.146.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 459

CONFIDENTIAL

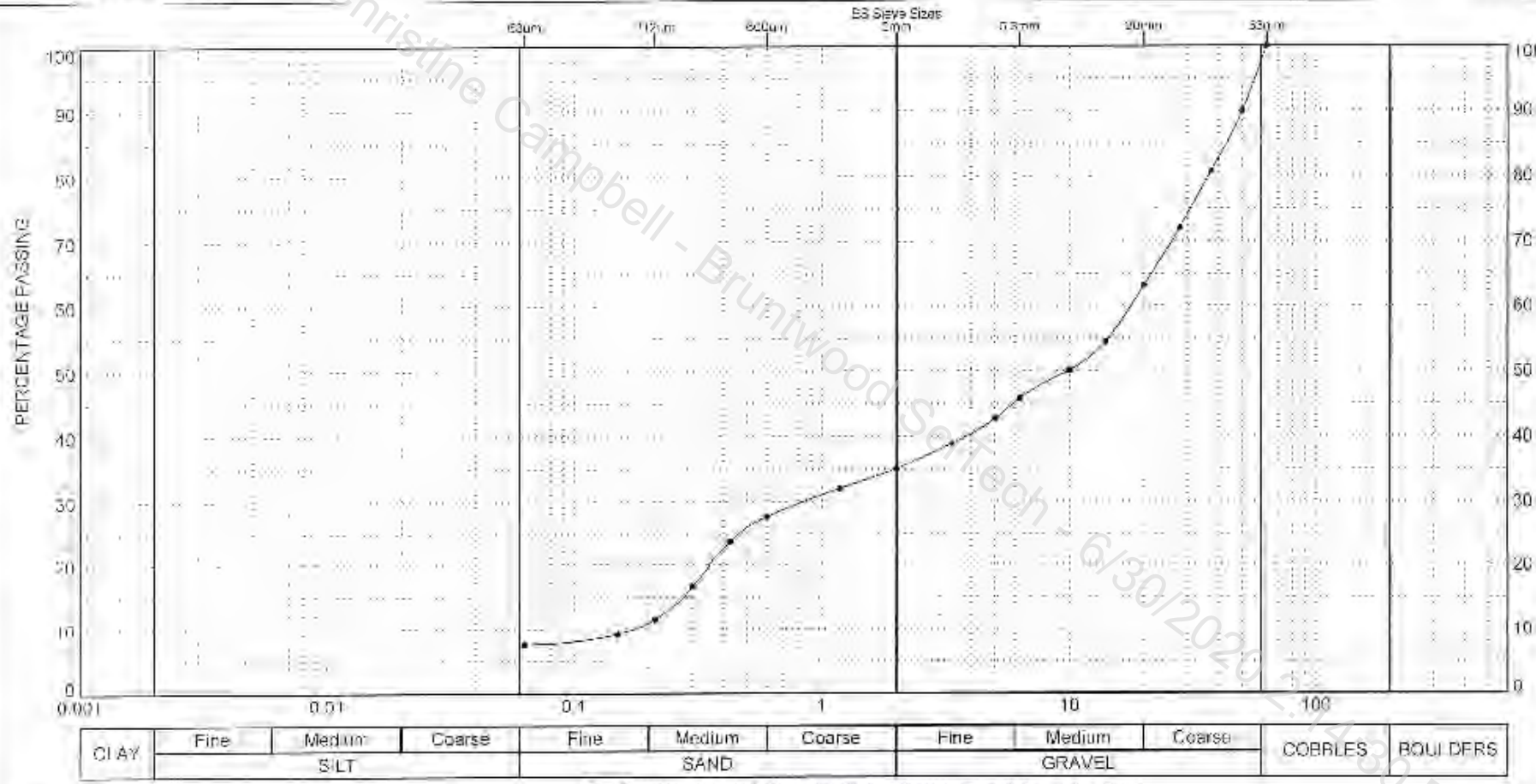
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2a Scotswood Industrial Estate, Tanfield Lea, Stanley, Co. Durham, DH9 9RG. Tel: +44 (0)191 497 4733 Fax: +44 (0)191 497 4710
Regional Office: Unit 2A Business Development Centre, Lower Street, Preston, PR1 1HT. Tel: +44 (0)1772 735 900 Fax: +44 (0)1772 735 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990
(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH005	2.40	B10	2.40	29/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	89.9
37.5	80.8
28	72.1
20	63.2
14	54.5
10	50.1
6.3	45.9
5	42.7
3.35	38.9
2	35.1
1.18	32.0
0.6	27.7
0.425	23.9
0.3	18.5
0.212	11.5
0.15	9.2
0.063	7.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :	Name :-	
22/01/2020	PSD/NW1588/BH005/B10/2.40	MSerq		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University Of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 - 214.30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 460

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

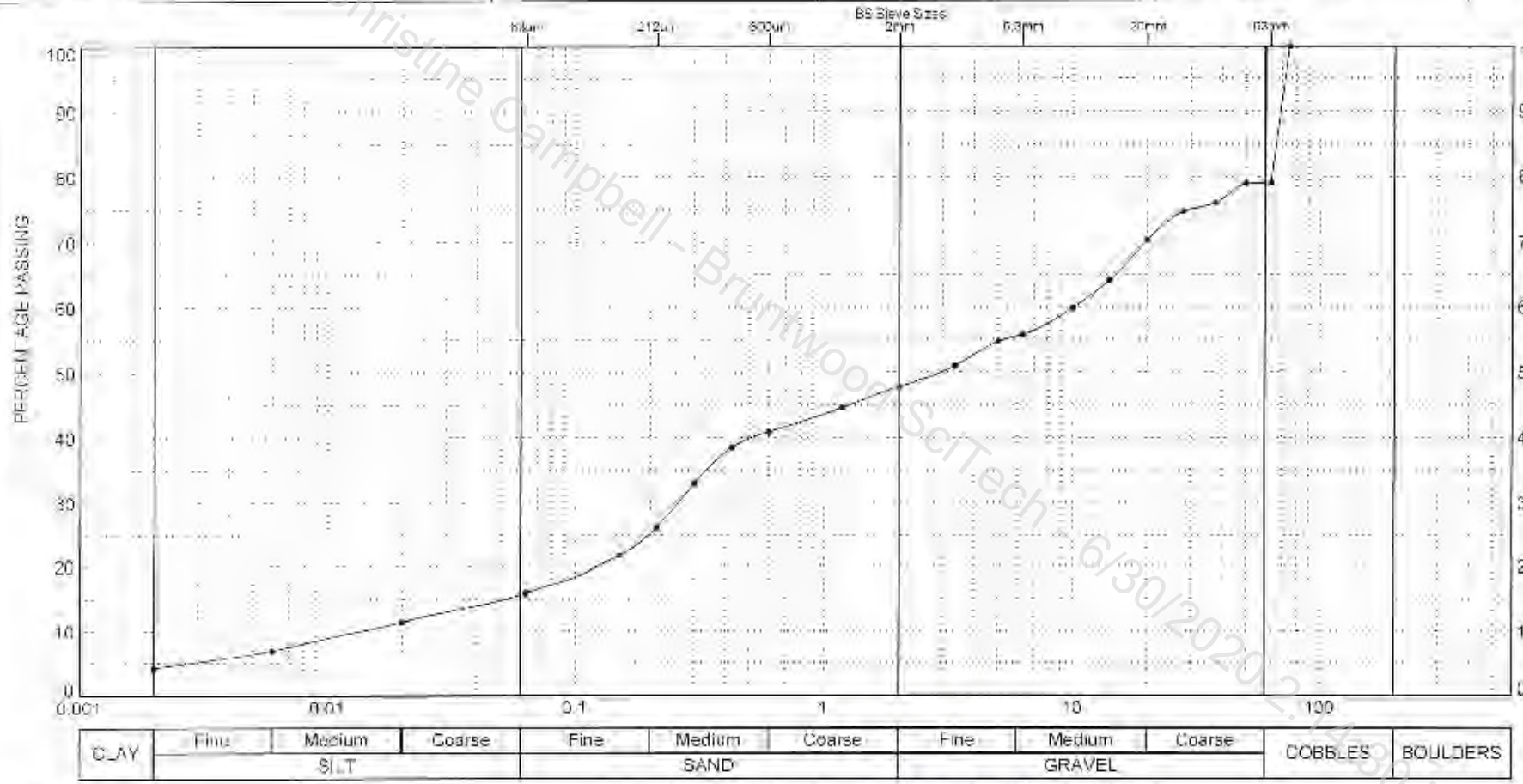
Head Office: Unit 25, Site A, Cliffe Industrial Estate, Potters Fell, Lancaster, Lancashire, LA2 0HS - Tel: 01524 38811 - Fax: 01524 38812
Regional Office: Unit 22, Express Development Centre, Severn Vale, Quedgeley, GL2 4RU - Tel: 01452 728 300 Fax: 01452 728 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No. - BH006A	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) - 0.80	Date Tested - 02/12/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	79.0
50	79.0
37.5	76.0
28	74.7
20	70.3
14	64.1
10	59.9
6.3	55.8
5	54.7
3.35	51.0
2	47.8
1.18	44.6
0.6	40.9
0.425	38.5
0.3	33.0
0.212	26.3
0.15	21.8
0.063	15.8
0.02	11.4
0.006	7.0
0.002	4.2

For description of sample classification see the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH006A/B4/0.80	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1357

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 2:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 461

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

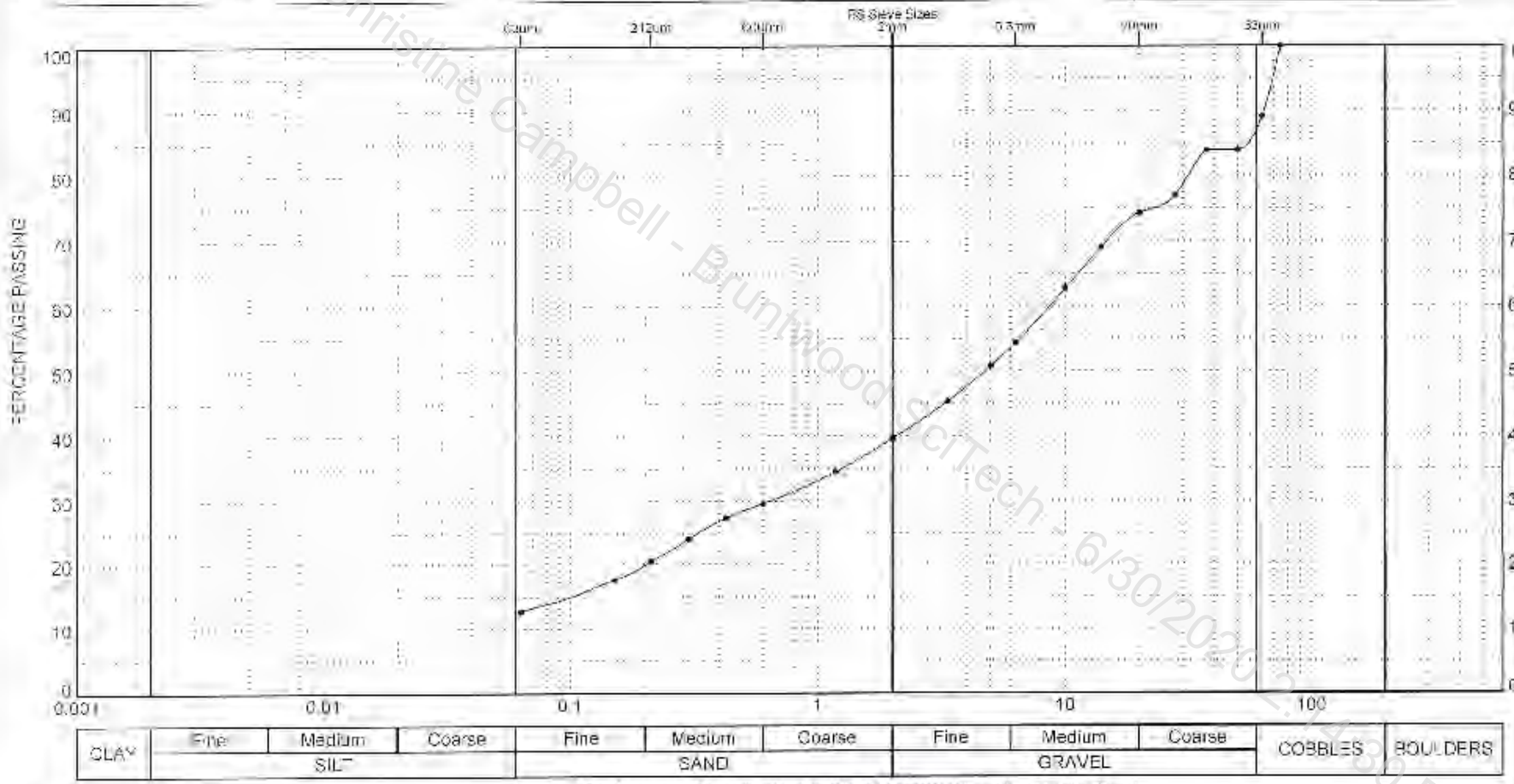
Head Office: Unit 2, Scots Gill Industrial Estate, Tattle Hill, Chester-le-Street, Co Durham, DH2 3RY. Tel: + 44 191 477 4700 Fax: 0 191 387 4710
Regional Office: Unit 29 Business Development Centre, Wharf Blackburn, BB1 3BL - Tel: 01772 734 000 Fax: 01772 [illegible] 899

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH006B	0.40	B3	0.40	02/12/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	89.1
50	88.9
37.5	83.9
28	77.3
20	74.3
14	69.1
10	62.7
6.3	54.4
5	50.8
3.35	45.4
2	39.6
1.18	34.5
0.6	29.6
0.425	27.4
0.3	24.2
0.212	20.4
0.15	17.5
0.063	12.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1598/BH006B/B3/0.40	MSDO		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brynwood SciTech - 6/30/2020 2:14:30 PM - 84.254.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 462

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

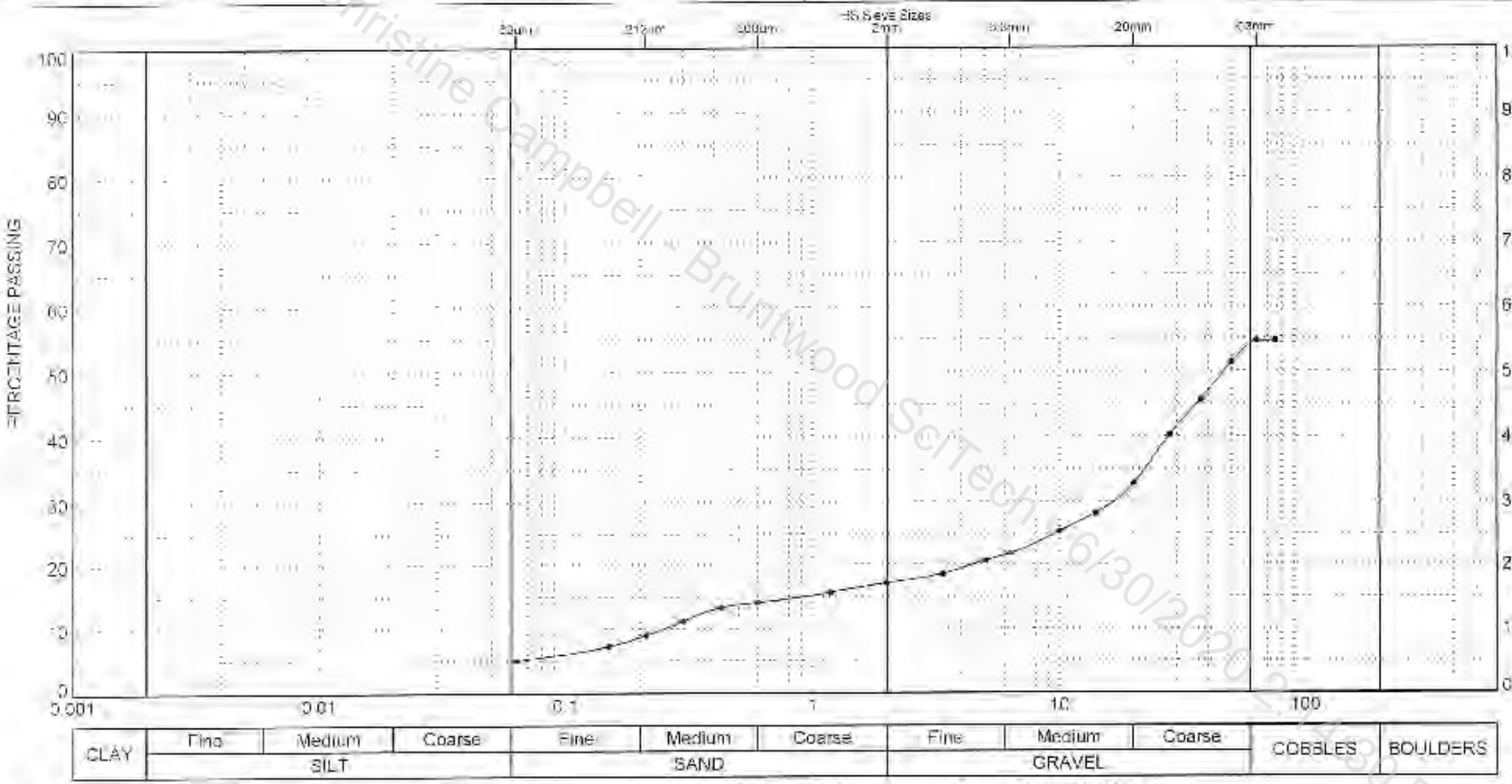
Head Office: Unit 25 Swale Close Industrial Estate, Alpha Road, Chesterfield, S41 9PZ - Tel: 01246 260400 Fax: 01246 260401
Regional Office: Unit 7B, Robocon Development Centre, Lower Wilkinson Way, Blackburn, BB1 3EL - Tel: 01254 295360 Fax: 01254 295361

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH007	0.60	B4	0.60	27/11/2019



Sieve Size (mm)	Passing (%)
75	54.7
63	54.7
50	51.4
37.5	45.7
28	40.3
20	32.8
14	28.2
10	25.4
6.3	21.8
5	20.5
3.35	18.6
2	17.0
1.18	15.6
0.6	14.1
0.425	13.2
0.3	11.2
0.212	8.9
0.15	7.3
0.063	5.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW/1588/BH007/B4/0.60			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:44:36 PM - 81.134.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 463

ALLIED EXPLORATION & GEOTECHNICS LIMITED

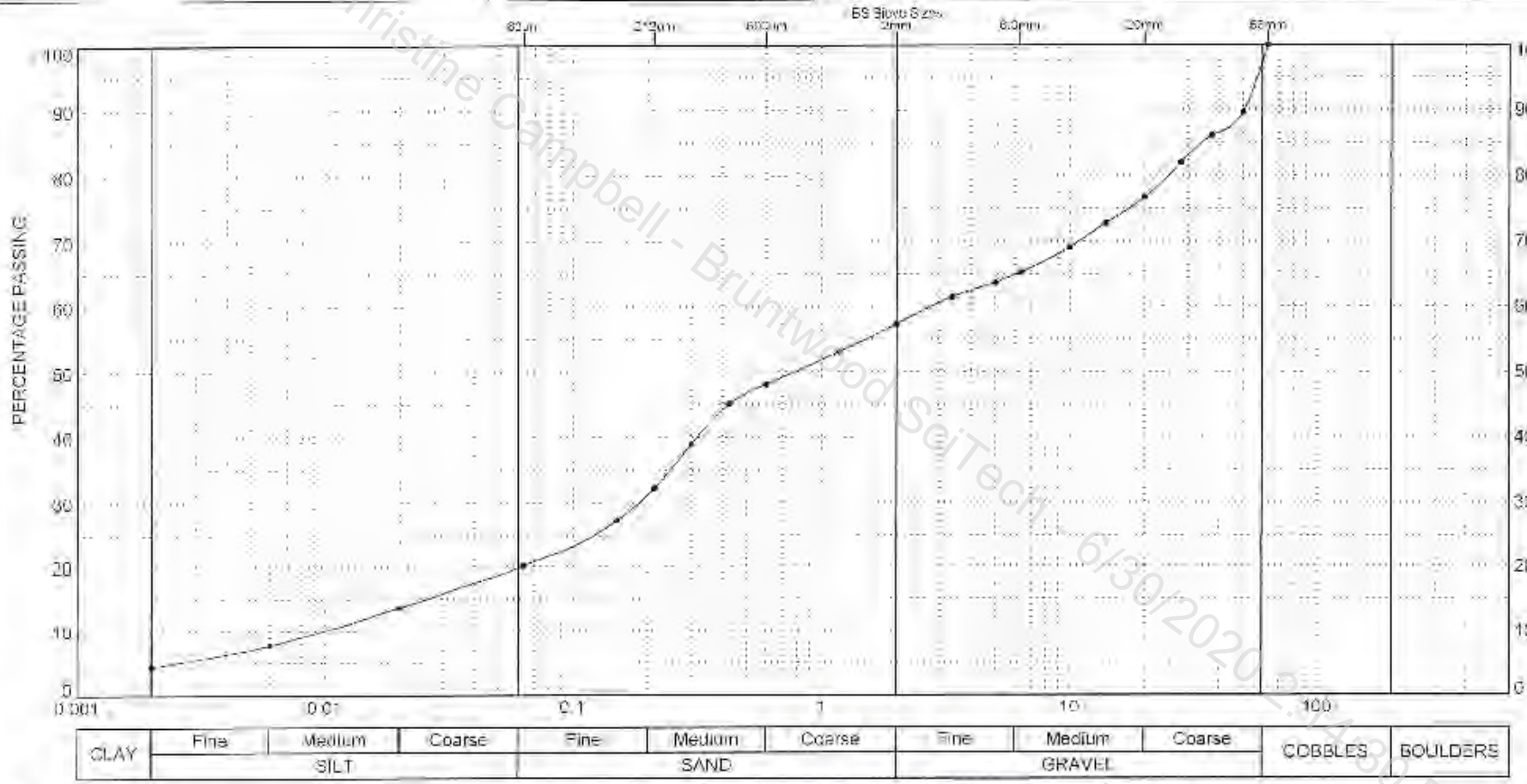
Head Office: Unit 25 Sidings Industrial Estate, Penistone Road, Grenoside, Sheffield, S35 8PQ - Tel: 0114 257 4700 Fax: 0114 257 4719
Regional Office: Unit 2, Business Centre 80, Lancaster Way, Ransomwood, Rainham, RM13 8BL - Tel: 01708 525 300 Fax: 01708 525 668

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No. : BH007	Depth (m) : 2.50	Sample Type & No :- B11	Specific Depth (m) :- 2.50	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	89.7
37.5	86.1
28	82.0
20	78.7
14	72.8
10	69.1
6.3	65.2
5	63.7
3.35	61.5
2	57.3
1.18	53.1
0.6	48.1
0.425	45.1
0.3	39.0
0.212	32.2
0.15	27.3
0.063	20.1
0.02	13.6
0.006	7.8
0.002	4.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH007/B11/2.50	MSeno		
Client :	**Contract Title :-**			**AEG Contract No :-**
University of Manchester	ID Manchester Preliminary Ground Investigation			NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brynnwood SciTech - 6/30/2020 2:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 464

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

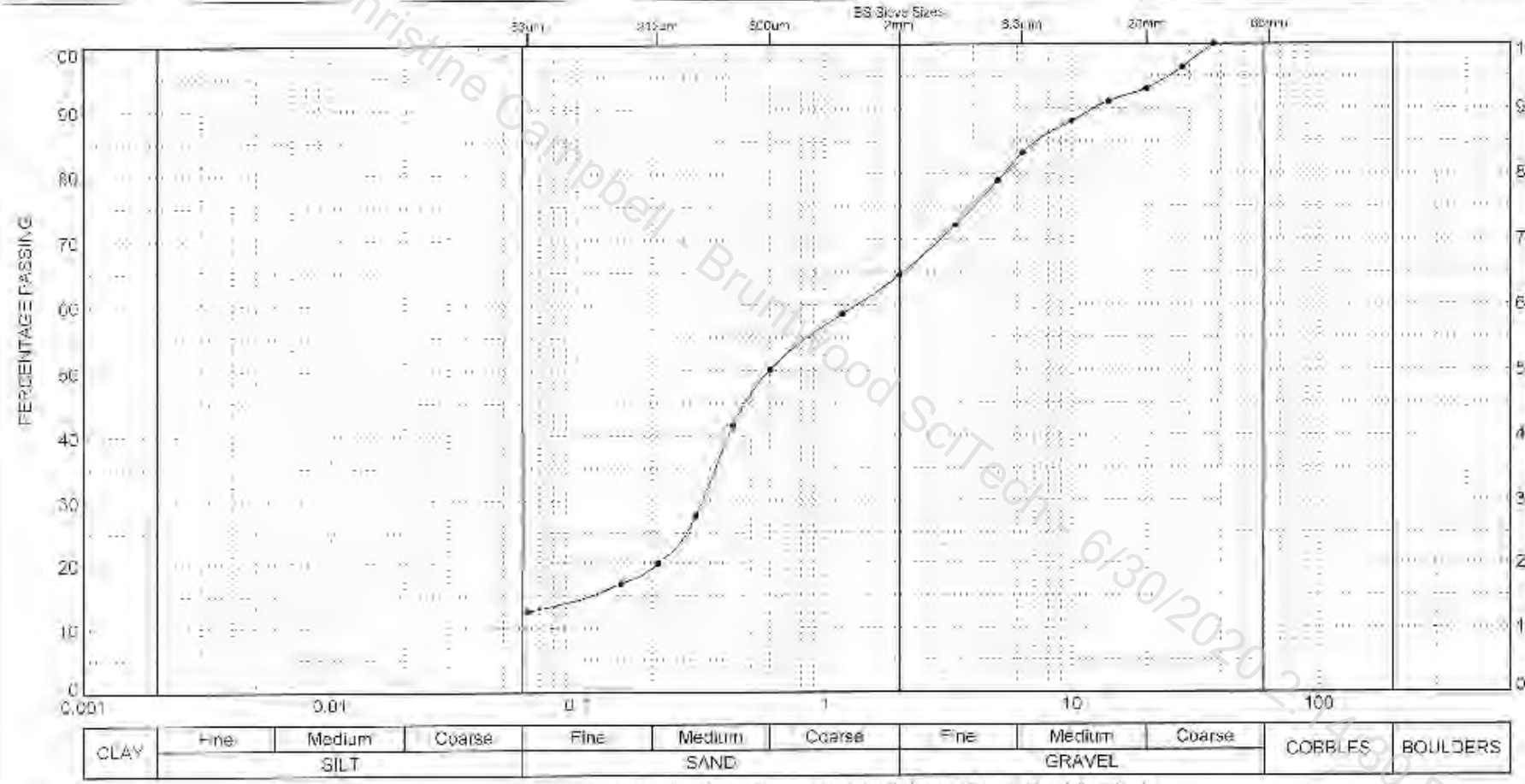
Head Office: Unit 2b Stockton Industrial Estate, Tatton Rd, Chesterton Street, Co Durham, DH2 1RD - Tel: 0191 332 4720 Fax: 0191 567 4710
Regional Office: Unit 4, Rowan Business Centre, Eaton Wood, Flockton, WF4 4BH - Tel: 01772 700700 Fax: 01772 735 888

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH007	6.50	B20	6.50	27/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	96.4
20	93.1
14	91.1
10	88.1
6.3	83.2
5	78.9
3.35	72.1
2	64.5
1.18	58.6
0.6	50.1
0.425	41.6
0.3	27.6
0.212	20.0
0.15	16.7
0.063	12.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH007/B20/6.50			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brynwood SciTech - 5/30/2020 2:14:36 PM - 81.134.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 465

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

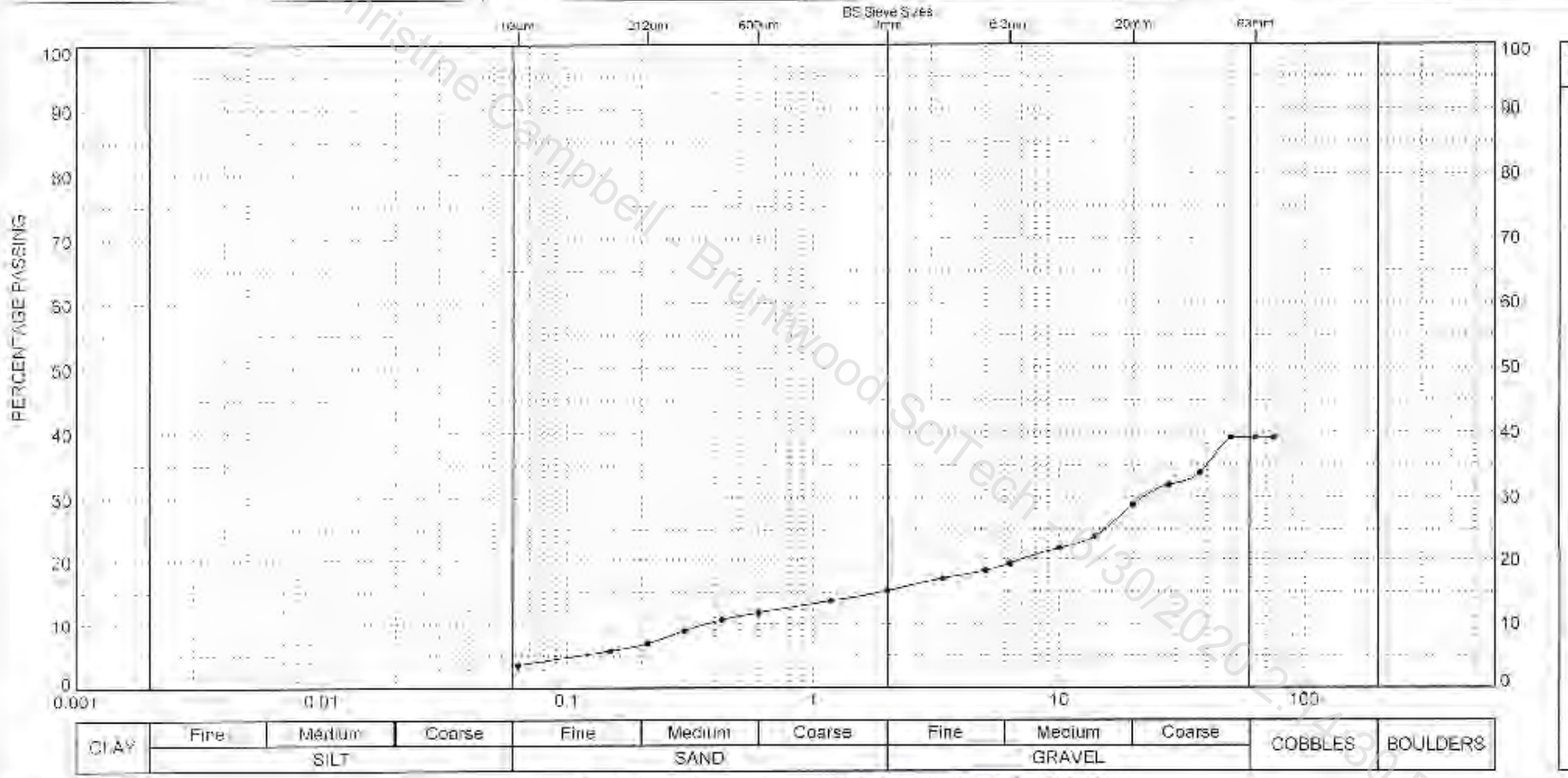
Head Office: Unit 35 Bluebell Industrial estate, Pelton Tel: 0191 387 0700 Fax: 0191 387 0701
Regional Office: Unit 20, Business Development Hub, Barnard Castle, Co. Durham, DL12 8BP Tel: 01833 695 900 Fax: 01833 695 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No. :- BH008	Depth (m) :- 0.60	Sample Type & No :- B3	Specific Depth (m) :- 0.60	Date Tested :- 27/11/2019



Sieve Size (mm)	Passing (%)
75	39.2
63	39.2
50	39.2
37.5	33.8
25	31.9
20	28.9
14	24.0
10	22.0
6.3	19.4
5	18.4
3.35	17.0
2	15.2
1.18	13.6
0.6	11.7
0.425	10.7
0.3	8.9
0.212	7.0
0.15	5.8
0.063	3.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	SD/NW1588/BH005/B3/0.60	MSeno		
Client :-	**Contract Title :-**			**AEG Contract No :-**
University of Manchester	ID Manchester Preliminary Ground Investigation			NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 - 1:46:36 PM - 81.134.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 466

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

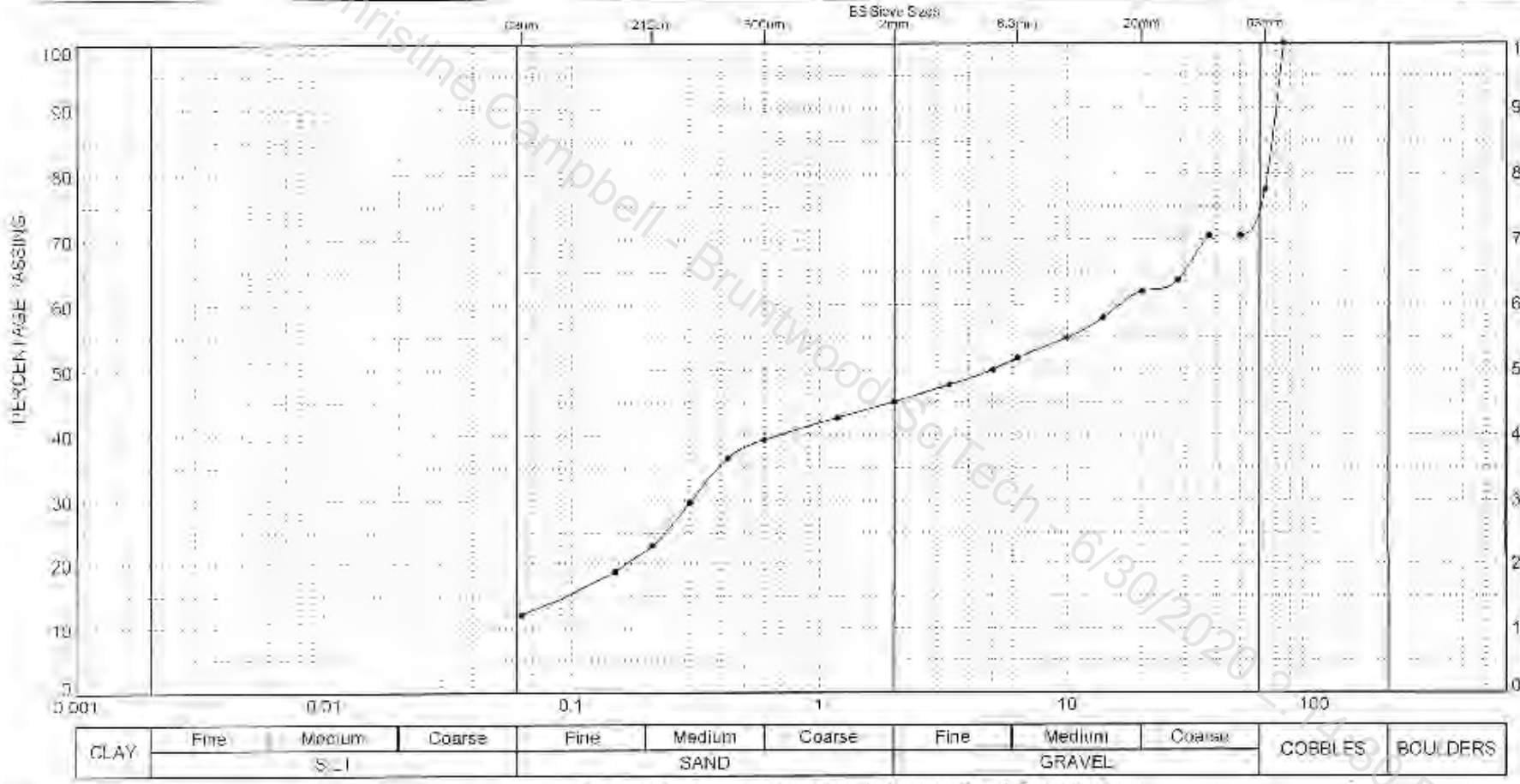
Head Office: Unit 29 Sutton Fields Industrial Estate, Hedon Rd, Hull, HU9 1NJ - Tel: 01482 701 121 Fax: 01482 701 122
Regional Office: Unit 29 Business Development Centre, Bessemer Drive, Stevenage, Herts, SG1 2DX - Tel: 01438 735 777 Fax: 01438 735 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH008	2.50	B8	2.50	27/11/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	77.6
50	70.5
37.5	70.5
28	63.7
20	62.0
14	58.0
10	54.9
6.3	51.8
5	50.0
3.35	47.7
2	45.1
1.18	42.7
0.6	39.3
0.425	36.5
0.3	29.7
0.212	23.1
0.15	18.9
0.063	12.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH008/B8/2.50	mSeal		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TEST NO 1367

ID Manchester - Christine Campbell - Brantwood SciTech - 6/30/2020 2:19:56 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 467

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

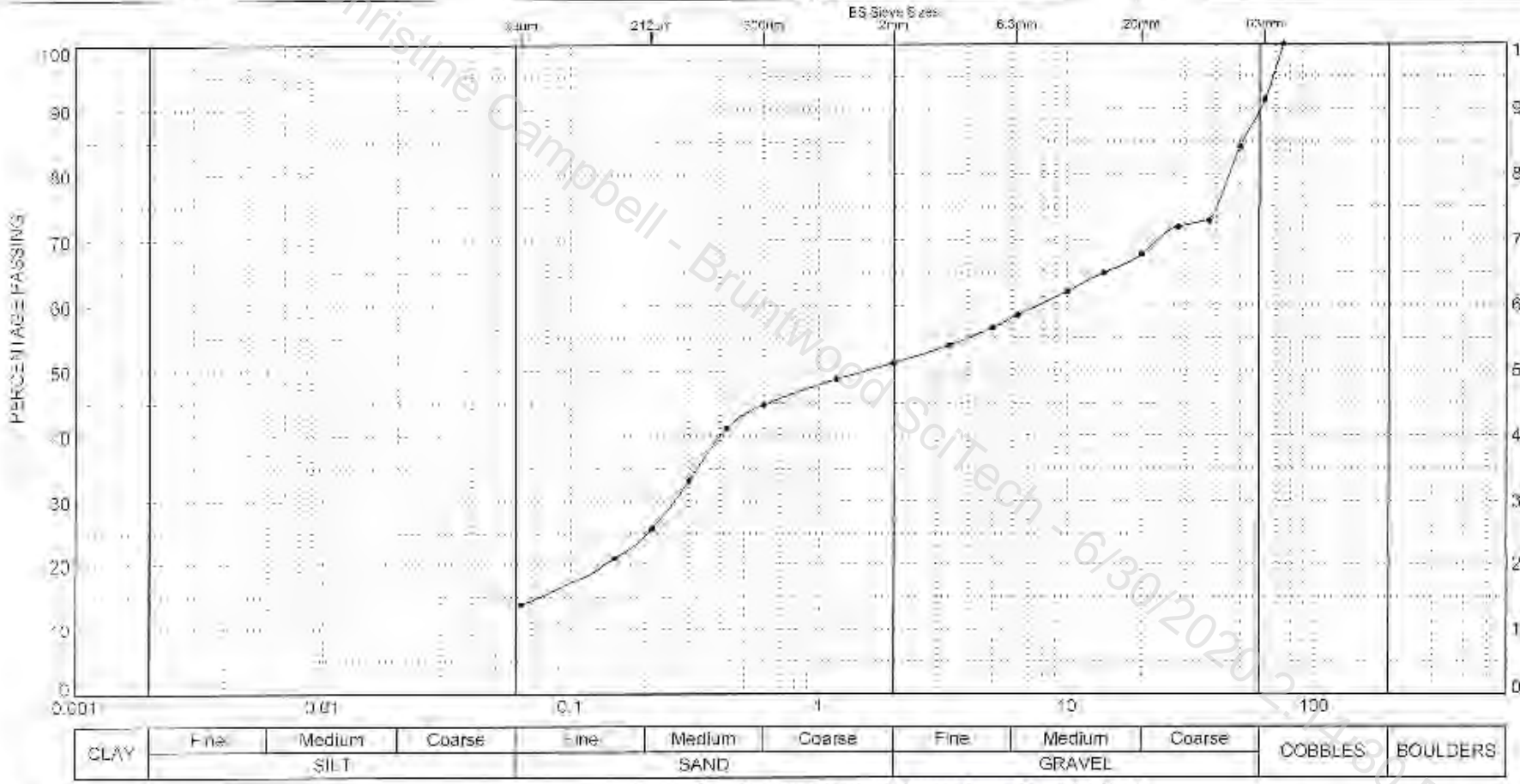
Head Office: Unit 2, Apollo Gate, Ironstone Estate, Tatton Park, Chester-le-Street, Co. Durham, DH2 2AG Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23, Rochdale Enterprise Centre, Sandbrook Way, Rochdale, OL11 1RY Tel: 01706 799 900 Fax: 01706 799 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH008	4.50	B15	4.50	27/11/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	91.4
50	84.2
37.5	72.9
28	71.9
20	67.8
14	64.9
10	62.1
6.3	58.5
5	56.8
3.35	53.9
2	51.2
1.18	48.7
0.6	44.8
0.425	41.2
0.3	33.2
0.212	25.8
0.15	20.9
0.063	13.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH008/B15/4.50	MSone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 468

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

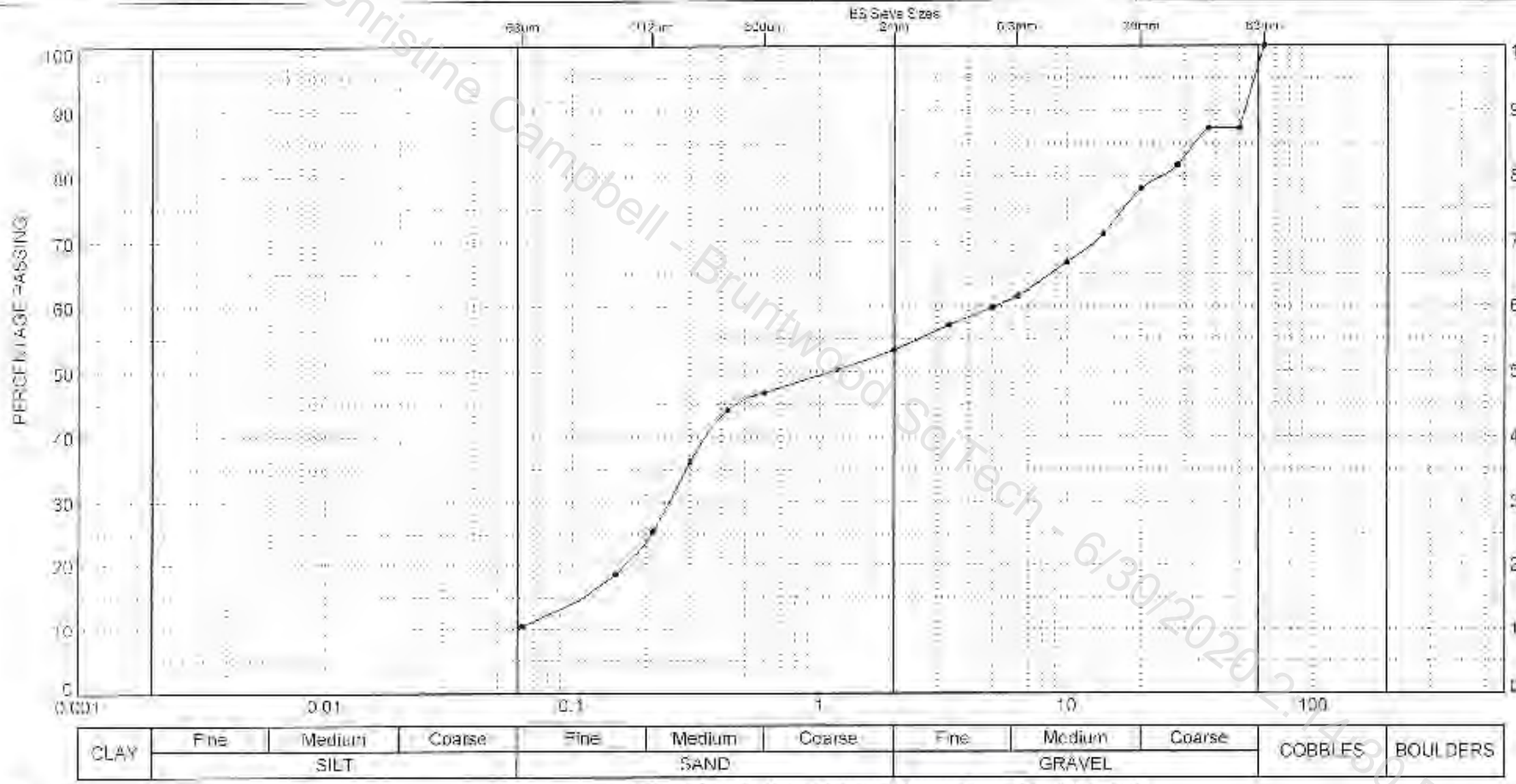
Head Office: Unit 25 Sixth Of Industrial Estate, Alton Rd, Crossens, Southport, PR9 8AG - Tel: 01704 397 470 Fax: 01704 397 470
Regional Office: Unit 20, Business Development Centre, Lower Wyre, Thornton, FY5 5LR - Tel: 01772 736 300 Fax: 01772 736 459

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH009	1.00	B4	1.00	27/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	87.3
37.5	87.3
28	81.7
20	78.1
14	71.1
10	66.8
6.3	61.6
5	59.8
3.35	57.1
2	53.3
1.18	50.3
0.6	46.8
0.425	44.1
0.3	36.2
0.212	25.4
0.15	18.6
0.063	10.5

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH009/B4/1.00	msone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 - 01:46:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 469

CONFIDENTIAL

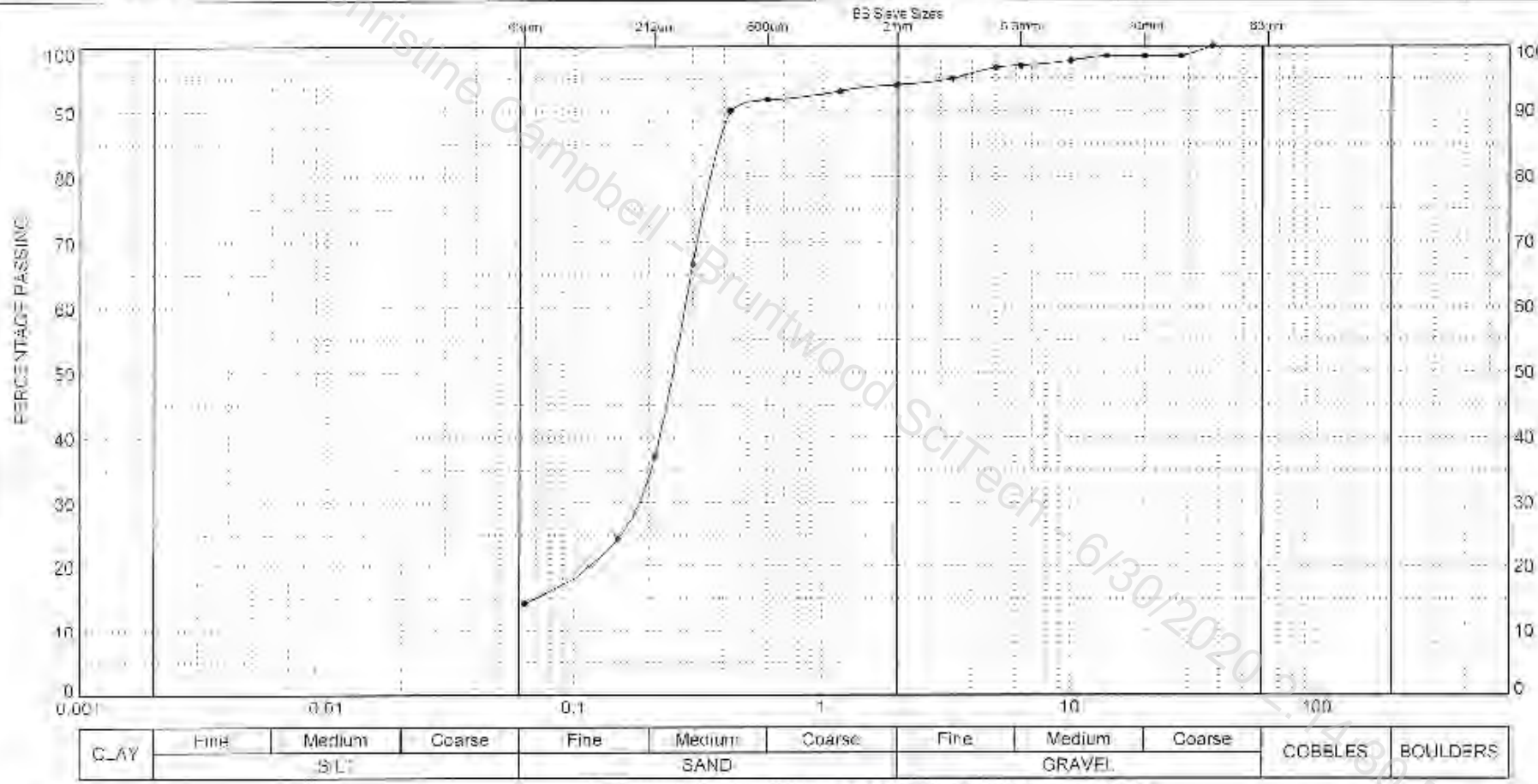
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: No. 2 Stella Grove Industrial Estate, Peterlee, County Durham, SR8 2BA. Tel. 0191 387 4700 Fax: 0191 387 4713
Regional Office: Unit 20, Business Development Centre, Cardiff Road, Barry, CF63 3EL. Tel: 01446 730900 Fax: 01446 733444

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No. - BH009	Depth (m) :- 3.70	Sample Type & No. - B14	Specific Depth (m) :- 3.70	Date Tested - 27/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	98.4
20	98.4
14	98.4
10	97.7
6.3	97.0
5	96.7
3.35	95.0
2	94.0
1.18	93.1
0.6	91.8
0.425	90.1
0.3	86.6
0.212	37.3
0.15	24.5
0.063	14.3

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH009/B14/3.70	MSene		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

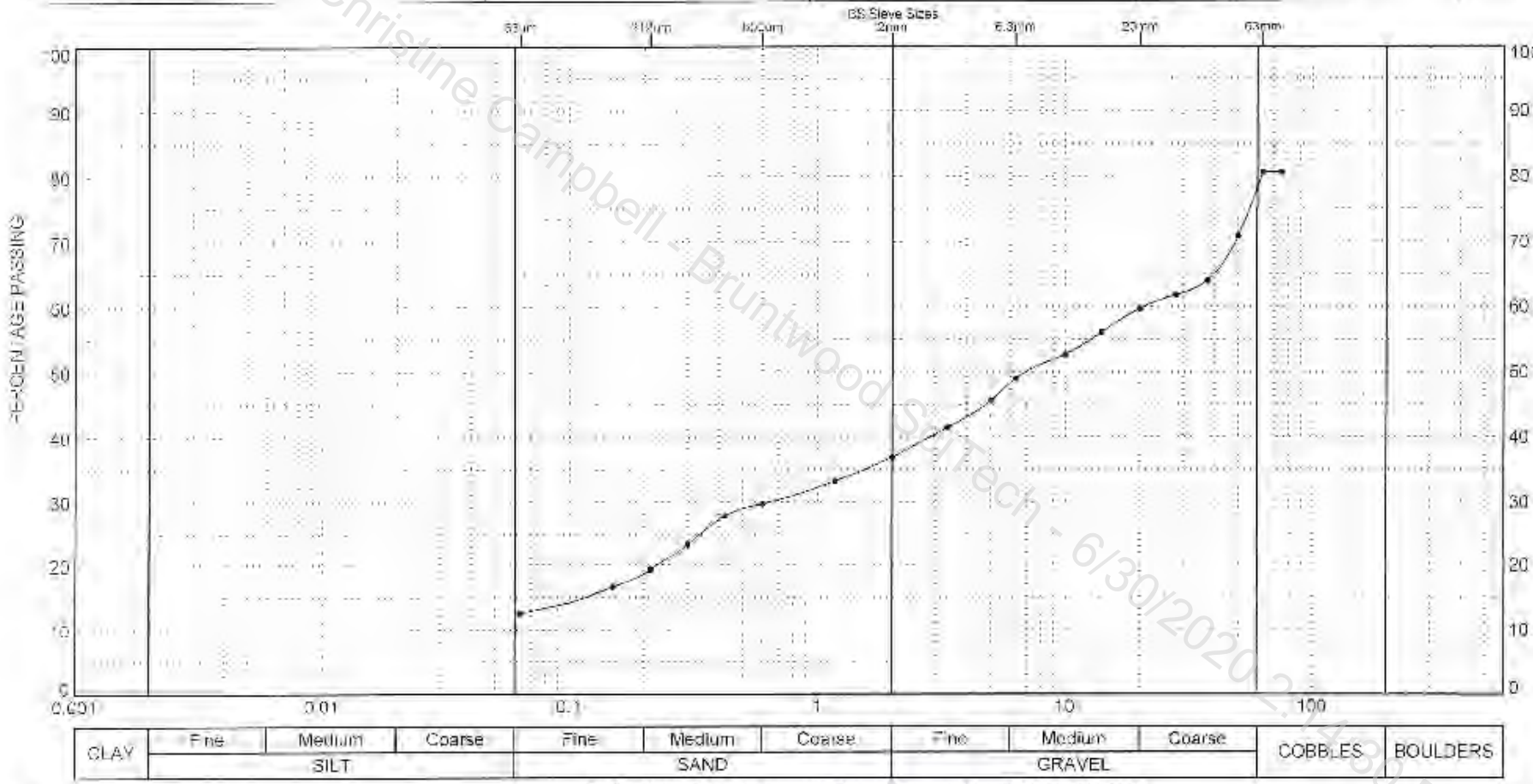
Head Office : 8-10 Eldon Street Industrial Estate, Peterlee, Co. Durham SR8 2RG - Tel: 0191 587 4700 Fax: 0191 587 47 0
Regional Office: Unit 22, Business Development Centre, Turnpike Way, Rochdale, OL11 3DL - Tel: 01706 359 900 Fax: 01706 359 905

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No : BH011	Depth (m) :- 2.70	Sample Type & No : B9	Specific Depth (m) :- 2.70	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
75	80.6
63	80.6
50	70.8
37.5	64.0
28	61.8
20	59.7
14	56.1
10	52.7
6.3	49.0
5	45.6
3.35	41.5
2	36.9
1.18	33.2
0.6	29.7
0.425	27.9
0.3	23.5
0.212	19.3
0.15	16.5
0.063	12.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue : 22/01/2020	Certificate No :- PSD/NW1588/BH011/B9/2.70	Signed :-	Name :-	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

UKAS TESTING 1367

CONFIDENTIAL
ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:36 PM - 81.154.246.72
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 470

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 8:36:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 471

CONFIDENTIAL

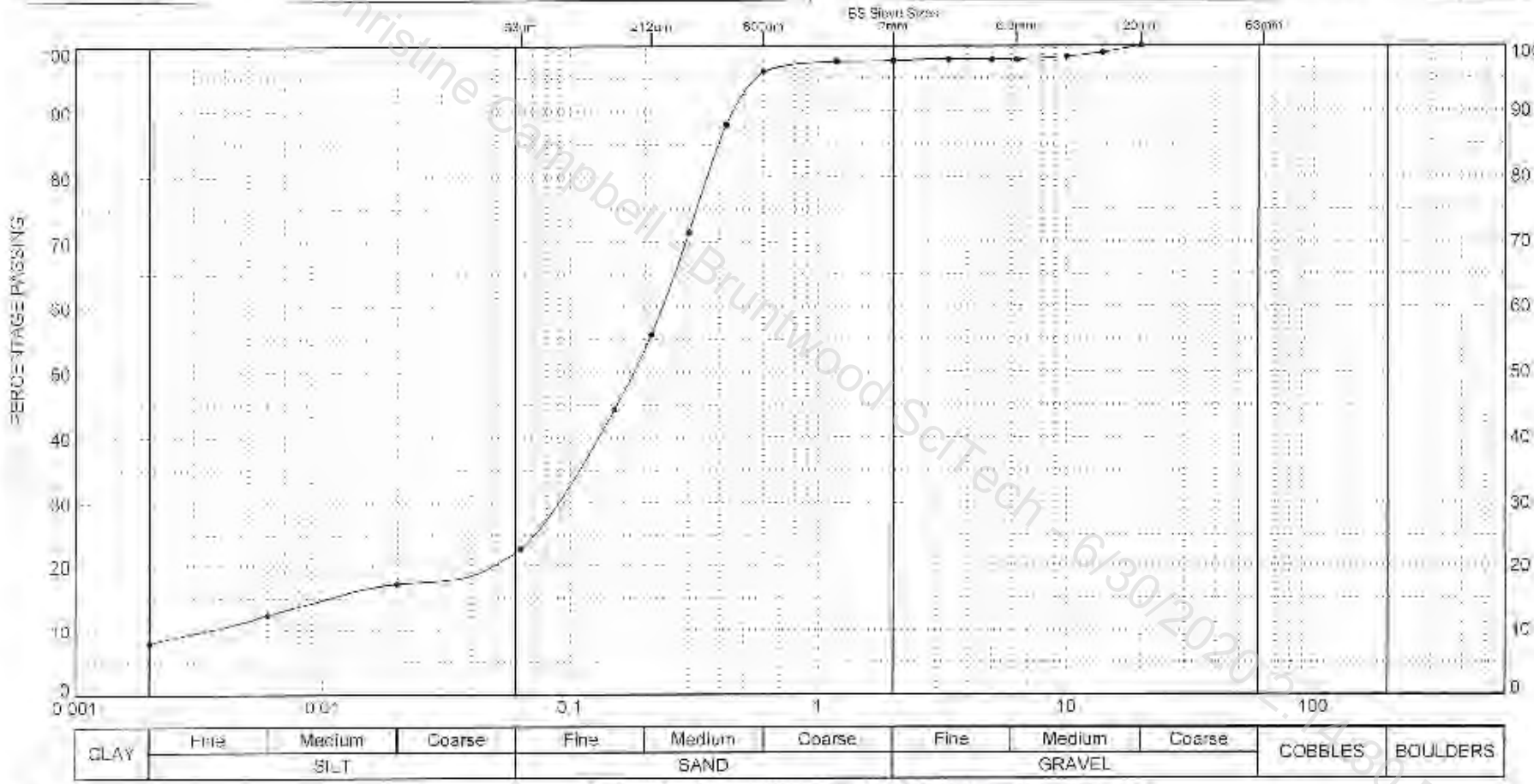
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office :- 9-15 Stella Close Industrial Estate, Patton Fold, Cheadle Hulme, Cheshire, SK8 3QG - Tel: 0161 487 4040 Fax: 0161 487 4049
Regional Office: Unit 2C, Clarence Business Park, Clarence Street, Burnley, Lancashire, BB11 5ES - Tel: 01282 435 111 Fax: 01282 435 222

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH011	4.70	B17	4.70	26/11/2019



Sieve Size (mm)	Passing (%)
20	100.0
14	98.9
10	98.2
6.3	97.8
5	97.8
3.35	97.8
2	97.6
1.18	97.5
0.6	96.1
0.425	88.0
0.3	71.4
0.212	56.7
0.15	44.3
0.063	22.9
0.02	17.1
0.006	12.8
0.002	8.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed	Name :-	
22/01/2020	PSD/NW1588/BH011/B17/4.70	MBone		Page 1 of 1

Client :-	Contract Title :-	AEC Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

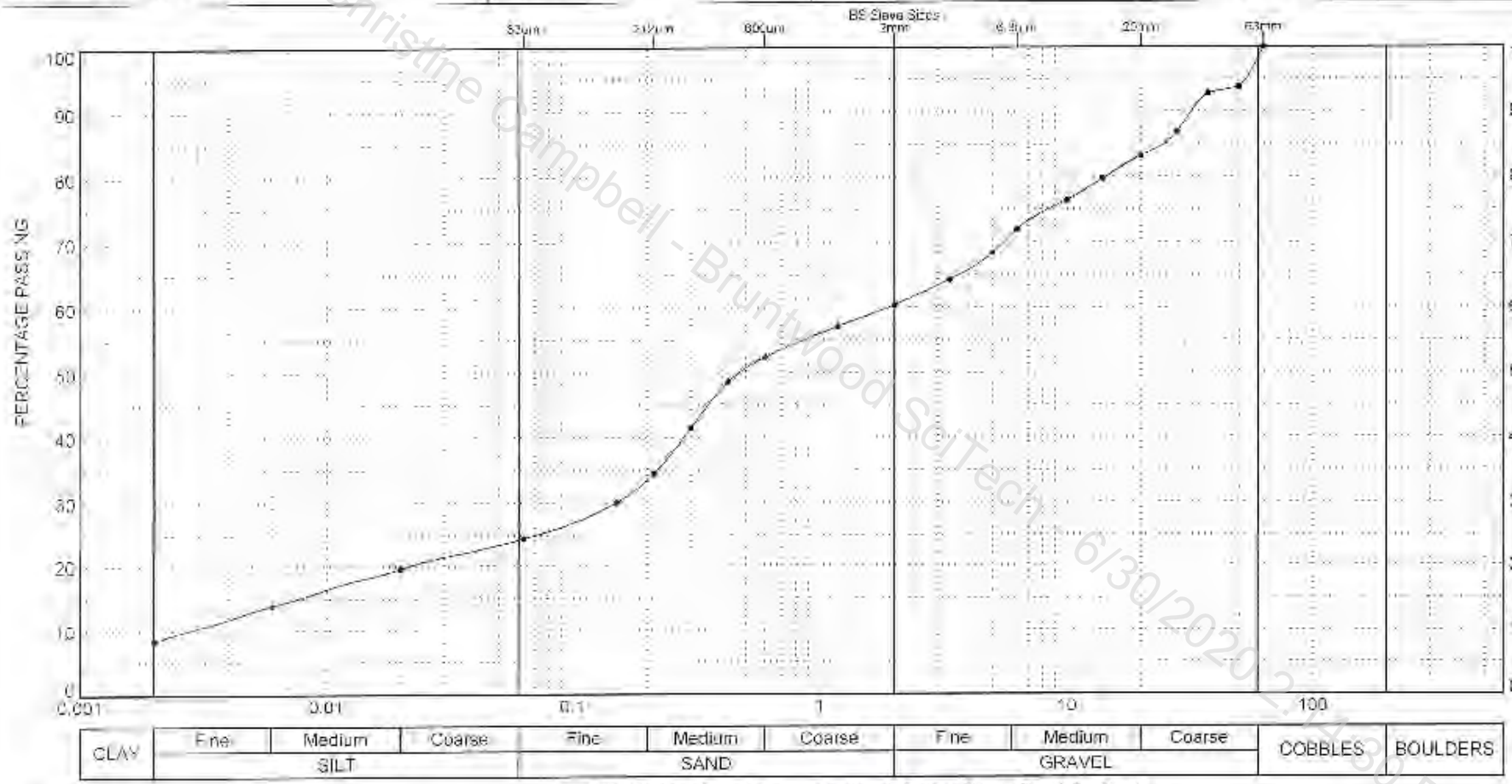
Head Office: Unit 25 Block 30 Thornhill Estate, Rolleston-on-Dove, Staffs, DE13 9AA. Tel: 01283 / 200... Fax: 01283 ...
Regional Office: Unit 20, Business Development Centre, Lower Wharf, Blackburn, BB1 5BL. Tel: 01772 ... Fax: 01772 ...

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH012A	6.50	B22	6.50	25/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	93.7
37.5	92.8
28	86.9
20	83.2
14	79.7
10	75.4
6.3	72.9
5	68.4
3.35	64.3
2	60.4
1.18	57.1
0.6	52.4
0.425	48.6
0.3	41.5
0.212	34.4
0.15	30.0
0.063	24.5
0.02	19.6
0.006	13.9
0.002	8.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH012A/B22/6.50			Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:12:56 PM - 84.254.246.72
CONFIDENTIAL
ID Manchester Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 472

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 7:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 473

CONFIDENTIAL

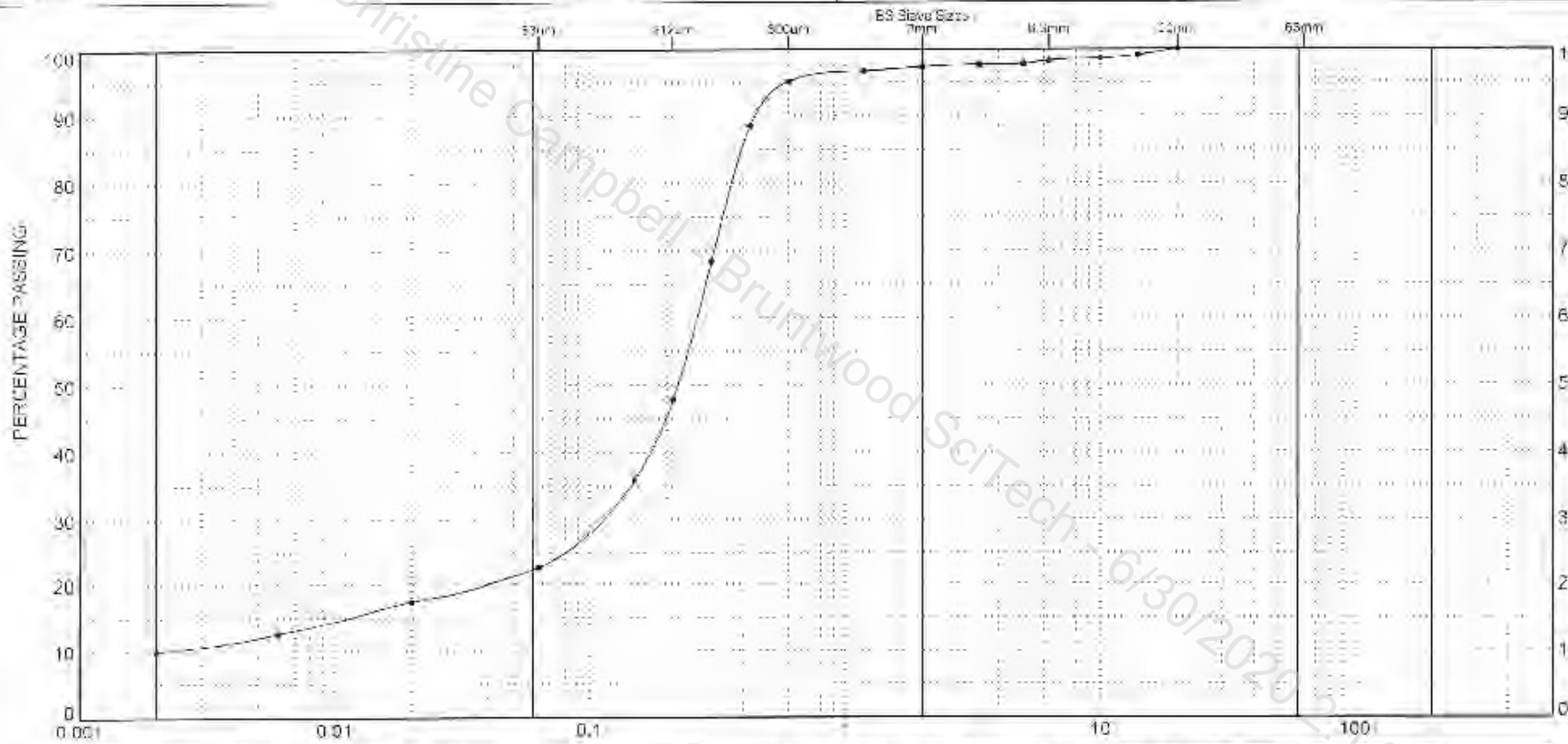
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office, Unit 20 Scots Gill Industrial Estate, Penrith CA11 0FA, Tel: 01768 867777 Fax: 01768 867778
Regional Office, Unit 2, Riverview Development Centre, Station Road, Cleckheaton, BD19 5PN - Tel: 01274 735 300 Fax: 01274 735 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH012A	9.00	B28	9.00	22/11/2019



Sieve Size (mm)	Passing (%)
20	100.0
14	99.0
10	98.5
6.3	98.2
5	97.7
3.35	97.6
2	97.3
1.18	96.8
0.6	95.2
0.425	88.6
0.3	68.4
0.212	47.8
0.15	35.9
0.063	22.8
0.02	17.3
0.006	12.5
0.002	9.9

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH012A/B28/9.00	MSorl		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 474

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

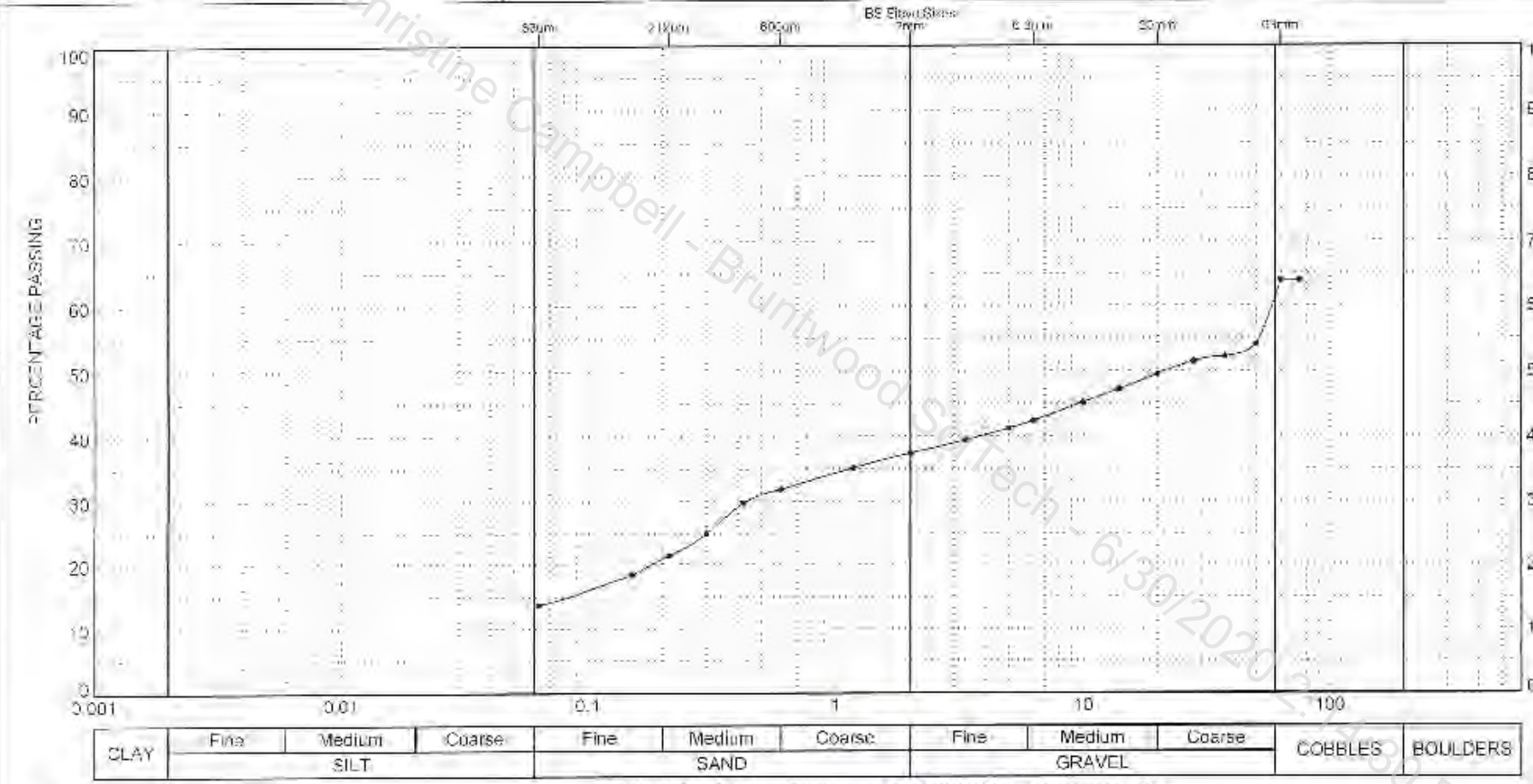
Head Office: Unit 2, Alpha 66 Industrial Estate, Pelton Fell Gateshead Street, Co. Durham, DH2 2RG. Tel: 0191 387 1400 Fax: 0191 387 1410
Regional Office: Unit 23, Business Centre, Tamar Wharf, Blackburn, BB1 3BL. Tel: 01772 795 100 Fax: 01772 795 200

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH013	1.70	B6	1.70	25/11/2019



Sieve Size (mm)	Passing (%)
75	63.9
63	63.9
50	54.1
37.5	52.2
28	51.5
20	49.5
14	47.2
10	45.2
6.3	42.4
5	41.2
3.35	39.4
2	37.4
1.18	35.2
0.6	31.9
0.425	29.8
0.3	25.1
0.212	21.4
0.15	18.5
0.063	13.7

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH013/B6/1.70	MSone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 2:11:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 475

CONFIDENTIAL

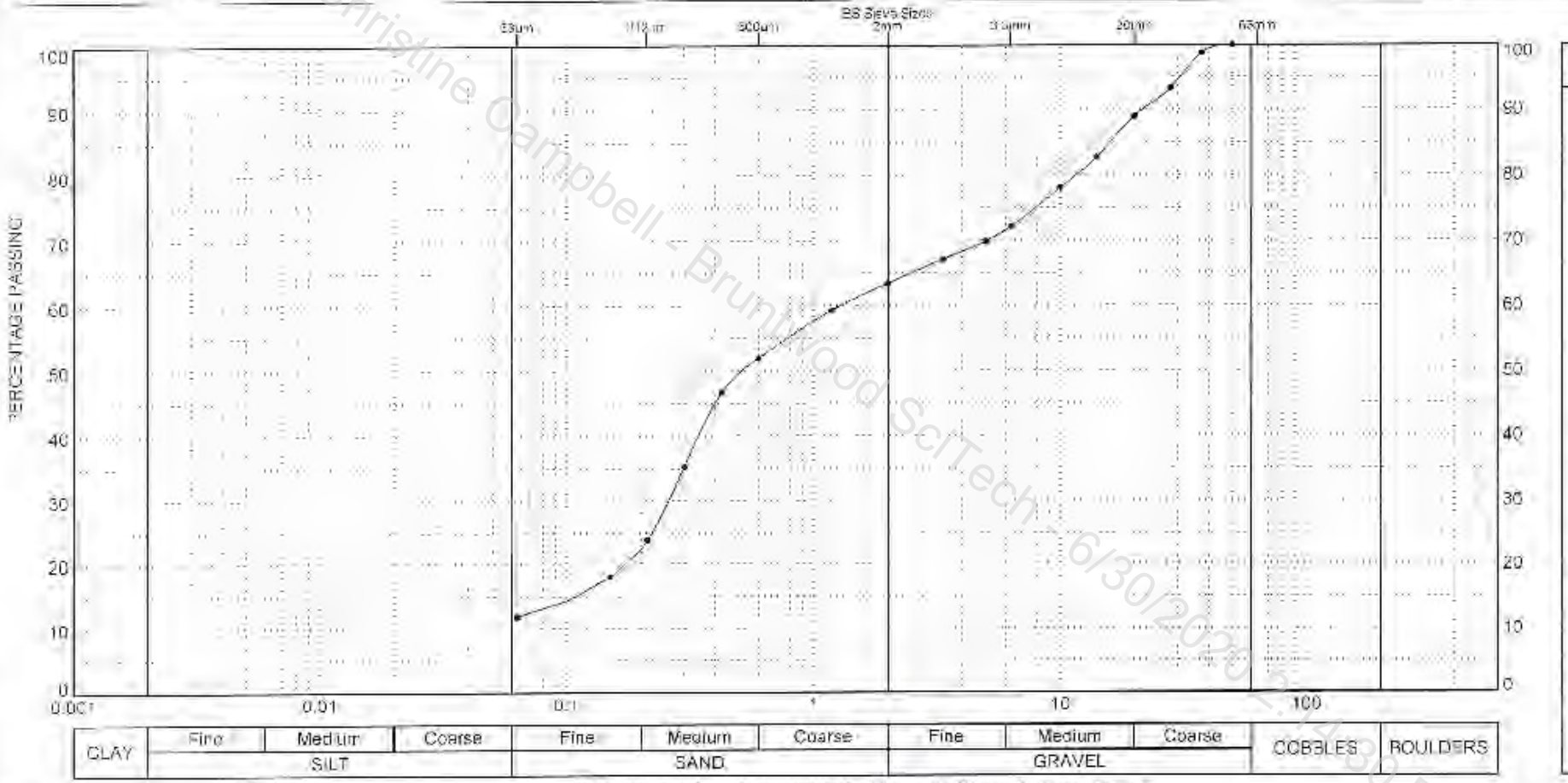
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 35 Wear Bridge Industrial Estate, Pelton Fell, Chester-le-Street, Co Durham, DH2 2UNG. Tel: 0191 387 4710 Fax: 0191 387 4719
Regional Office: Unit 2C, Business Development Centre, Bacon Wood Blackburn, BB1 5QL. Tel: 01772 735 303 Fax: 01772 736 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990
(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH013	Depth (m) :- 6.00	Sample Type & No :- B16	Specific Depth (m) :- 6.00	Date Tested :- 25/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.7
28	93.3
20	89.0
14	82.7
10	78.1
6.3	72.1
5	69.9
3.35	67.1
2	63.4
1.18	59.3
0.6	52.0
0.425	46.7
0.3	35.3
0.212	24.0
0.15	18.1
0.063	11.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue	Certificate No :-	Signed :-	Name :-	Page 1 of 1
27/01/2020	PSD/NW1588/BH013/B16/6.00	MSand		
Client :- University of Manchester	**Contract Title :-** ID Manchester Preliminary Ground Investigation			**AEG Contract No :-** NW1588

UKAS TESTING 1357

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 476

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

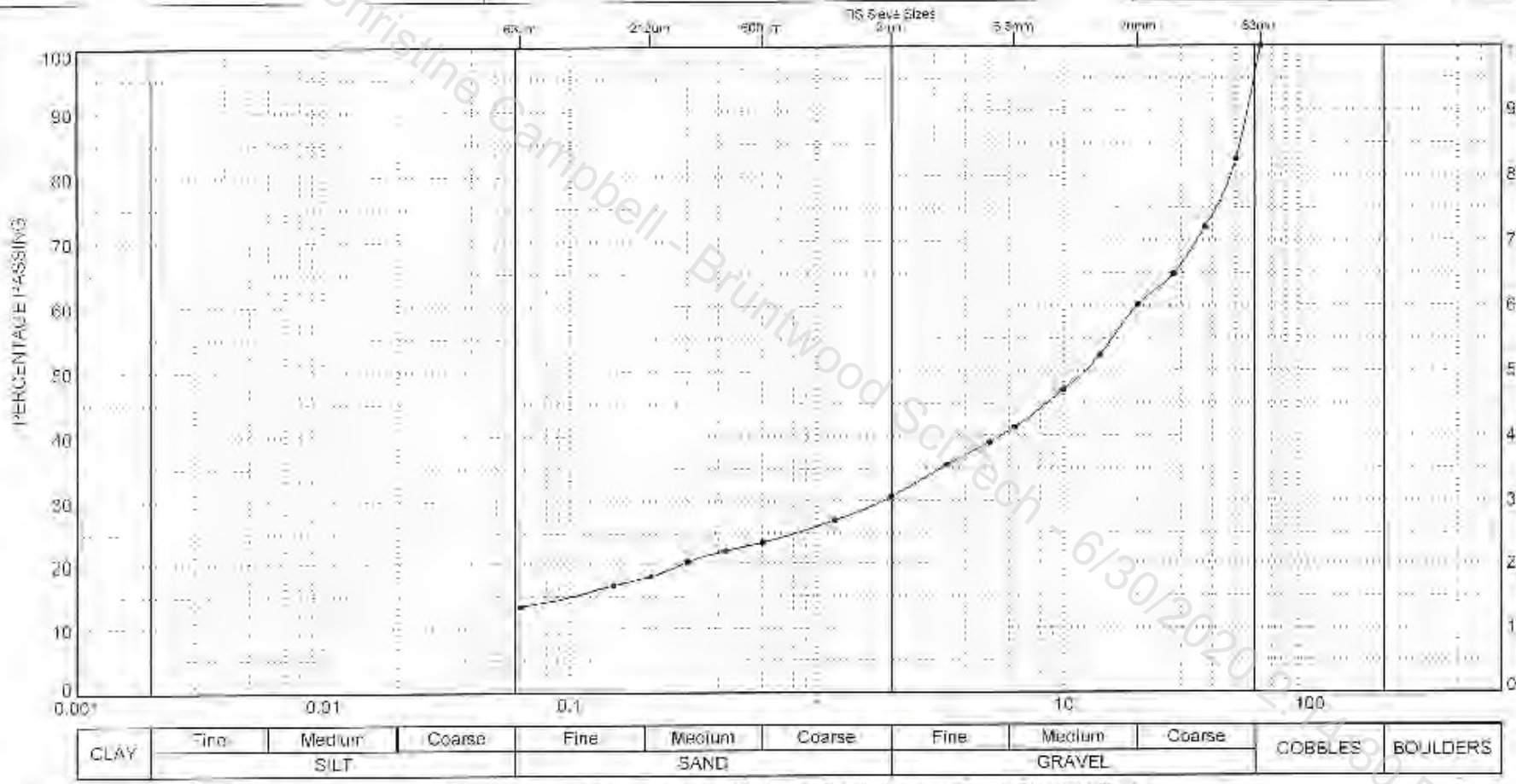
Head Office: Unit 20 Stella Six Industrial Estate, Derby Rd, Chesterfield, Derbyshire, S40 2EX, UK - Tel: 0 1246 200 200 Fax: 0 1246 200 210
Regional Office: Unit 2b, Grosvenor Business Centre, Edgar Wood Close, Bredbury, Stockport, SK6 2SD - Tel: 0 161 406 2000 Fax: 0 161 406 2001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH014	1.20	B8	1.20	25/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	82.5
37.5	72.1
28	64.9
20	60.2
14	52.1
10	47.1
6.3	41.3
5	39.0
3.35	35.5
2	30.6
1.18	27.0
0.6	23.6
0.425	22.2
0.3	20.2
0.212	18.1
0.15	16.5
0.063	13.3

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH014/B8/1.20	mscne		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 477

CONFIDENTIAL

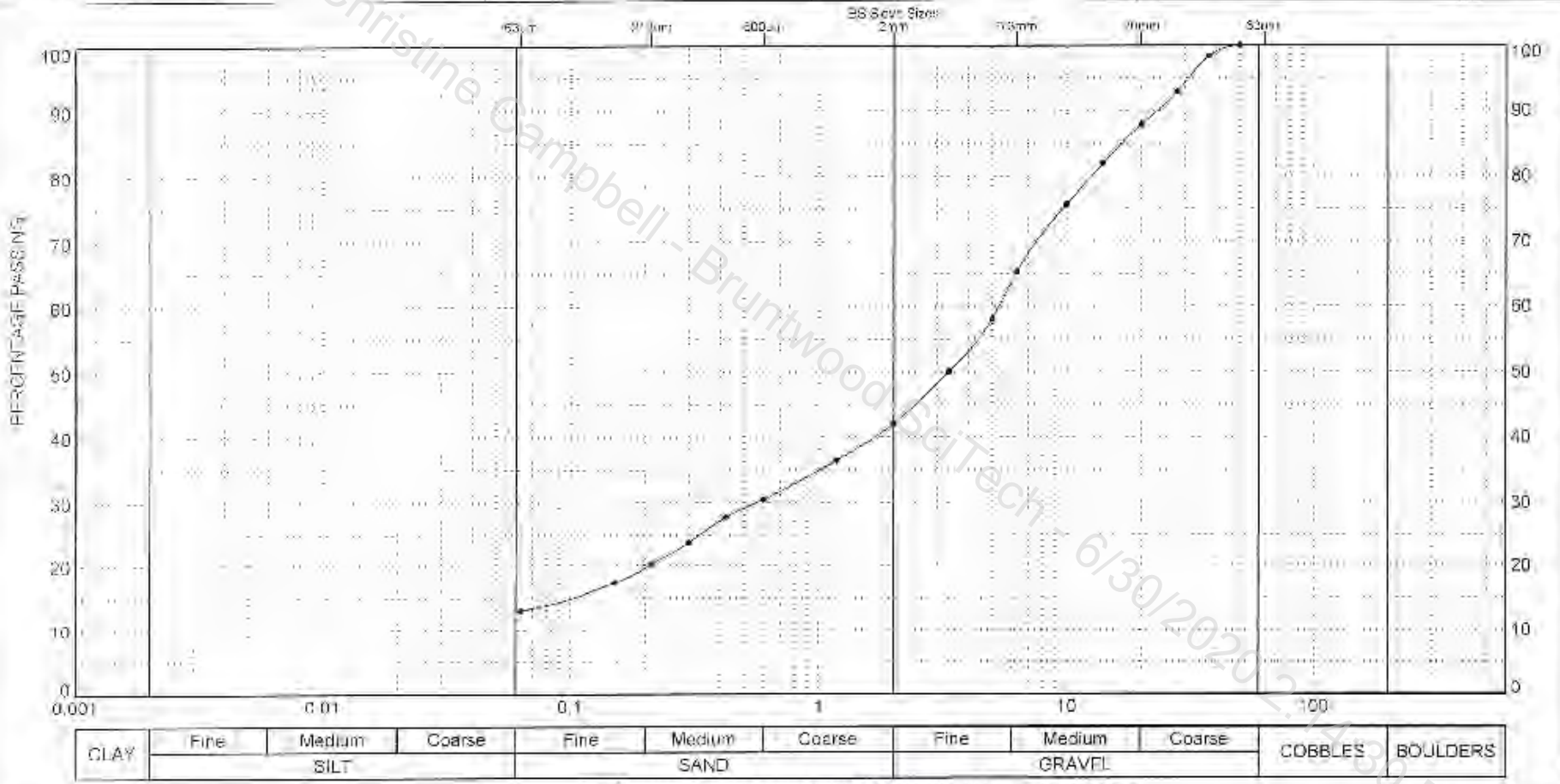
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Eaton Constantia Estate, Penketh, Warrington, Cheshire, WA5 2TG - Tel: 0161 320 4700 Fax: 0161 320 4710
Regional Office: Unit 20, Business Investment Centre, Eccles, Manchester, M30 0BL - Tel: 0161 775 5000 Fax: 0161 775 5001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH014	Depth (m) :- 3.00	Sample Type & No :- B14	Specific Depth (m) :- 3.00	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.3
28	92.9
20	87.9
14	81.9
10	75.7
6.3	65.3
5	58.1
3.35	50.1
2	42.1
1.18	36.5
0.6	30.6
0.425	27.8
0.3	23.9
0.212	20.2
0.15	17.3
0.063	12.9

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW/1588/BH014/B14/3.00	MSeng		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW/1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 6:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 478

CONFIDENTIAL

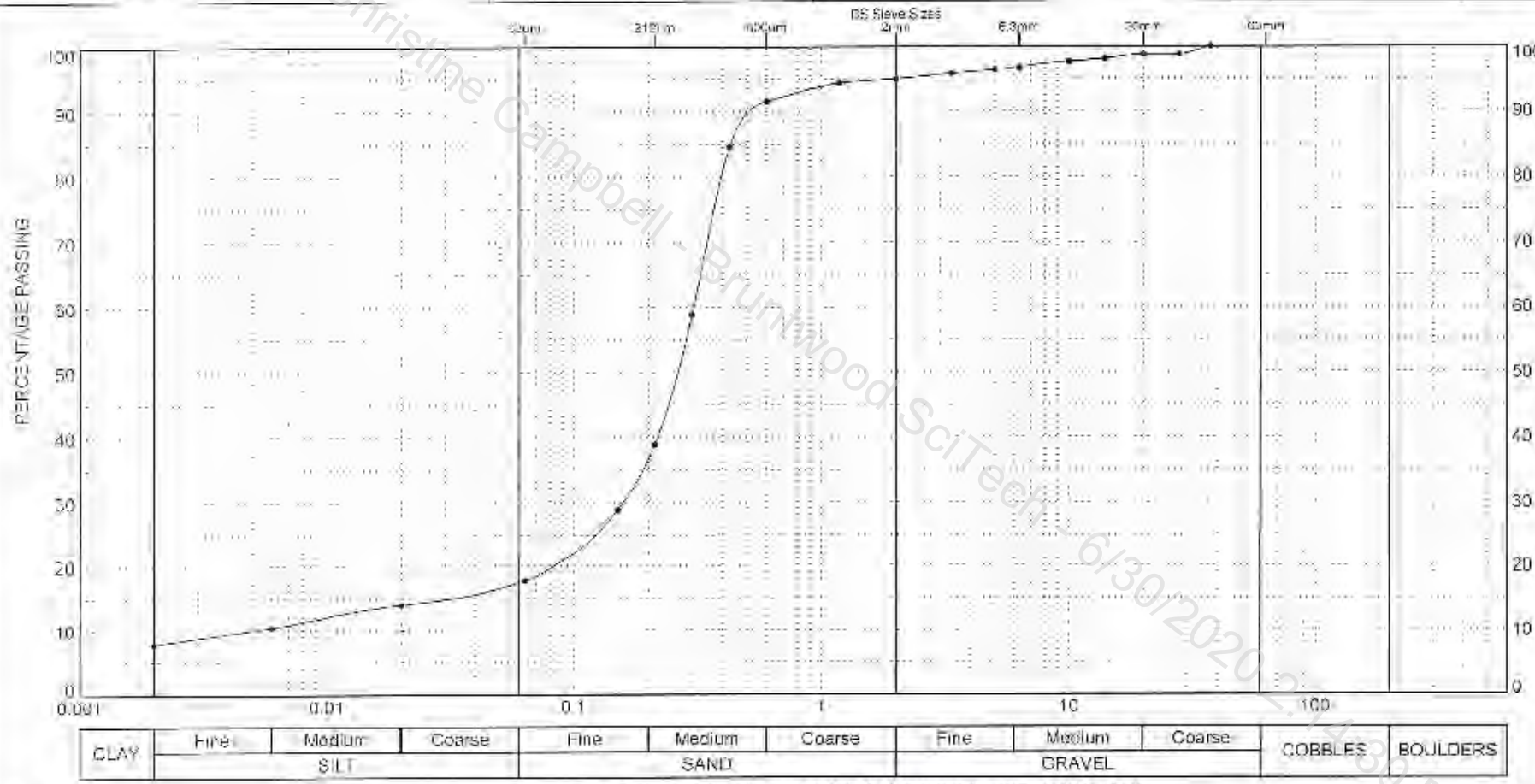
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Viola Grove, Viola Street, Derby, Derbyshire, DE23 8JS. Tel: 01332 387 709 Fax: 01332 387 710
Regional Office: Unit 2, Thornbridge Business Park, Eccleston Road, Ecclesfield, Sheffield, S11 9PE. Tel: 0114 235 9000 Fax: 0114 235 9009

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH014	6.00	B24	6.00	



Sieve Size (mm)	Passing (%)
37.5	100.0
28	98.7
20	98.7
14	98.0
10	97.6
6.3	96.8
5	96.4
3.35	95.9
2	95.0
1.18	94.3
0.6	91.5
0.425	84.6
0.3	58.9
0.212	38.9
0.15	28.9
0.063	17.7
0.02	14.0
0.006	10.5
0.002	7.9

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue	Certificate No :-	Signed :-	Name :-	Page 1 of 1
27/07/2020	PSD/NW/1588/BH014/B24/6.00	mSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:04:36 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 479

ALLIED EXPLORATION & GEOTECHNICS LIMITED

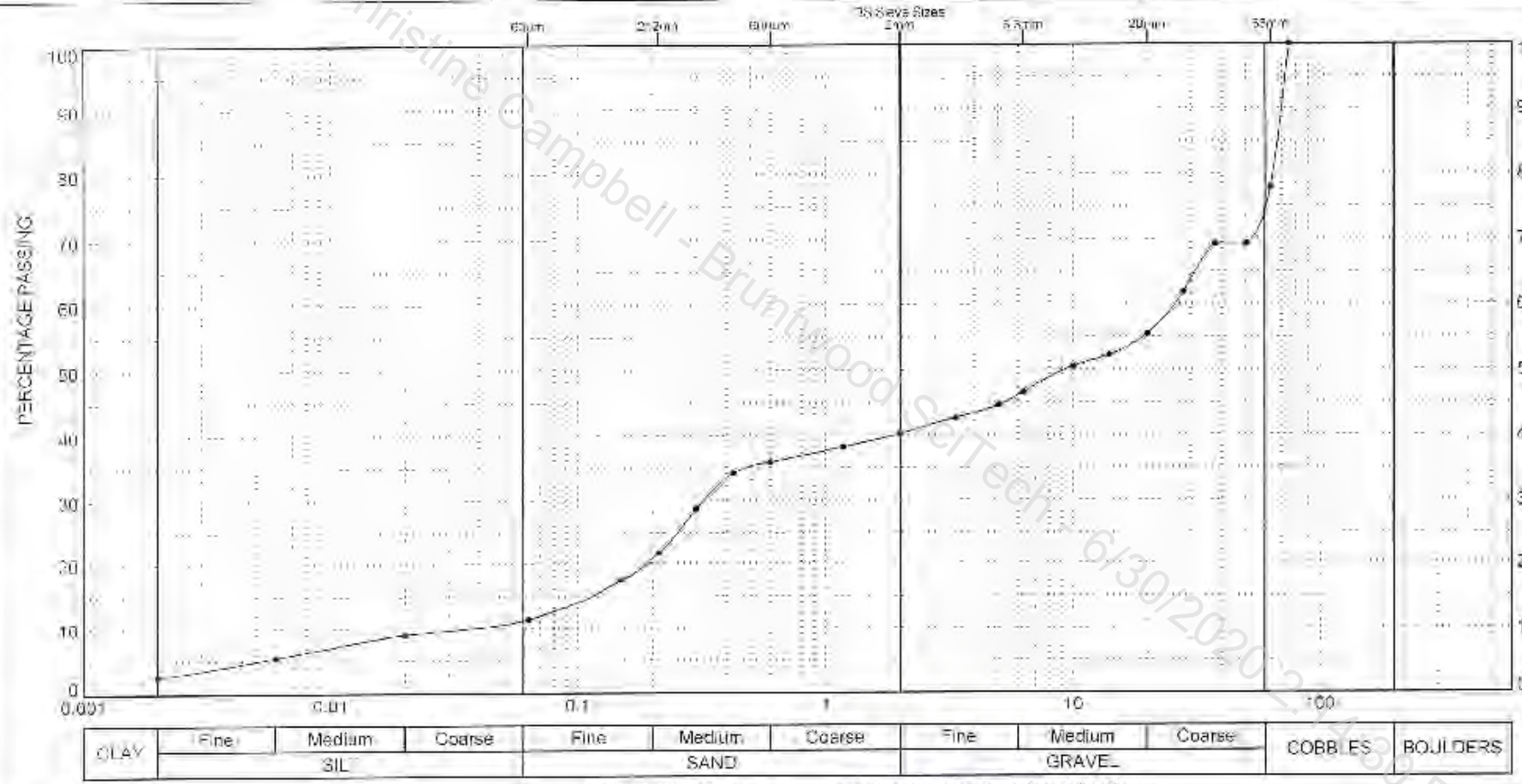
Head Office: Unit 25 Flint's Caravan Estate, Manor Rd, Chester-le-Street, Co. Durham, DH2 3HU. Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 2C, Dukesmead, Interpoint Centre, Eccles, Manchester, M30 0BH. Tel: 0772 730 909 Fax: 01772 751 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- DS001	Depth (m) :- 0.70	Sample Type & No :- B6	Specific Depth (m) :- 0.70	Date Tested :- 10/12/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	77.9
50	69.2
37.5	69.2
28	61.9
20	55.5
14	52.2
10	50.5
6.3	46.6
6	44.6
3.35	42.7
2	40.2
1.18	38.2
0.6	35.9
0.425	34.2
0.3	28.7
0.212	21.7
0.15	17.4
0.063	11.4
0.02	9.0
0.006	5.5
0.002	2.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 22/01/2020	Certificate No :- PSD/NW1588/DS001/B6/0.70	Signed :- MSone	Name :-	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation		AEG Contract No :- NW1588	UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:11:30 PM - 84.164.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 480

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

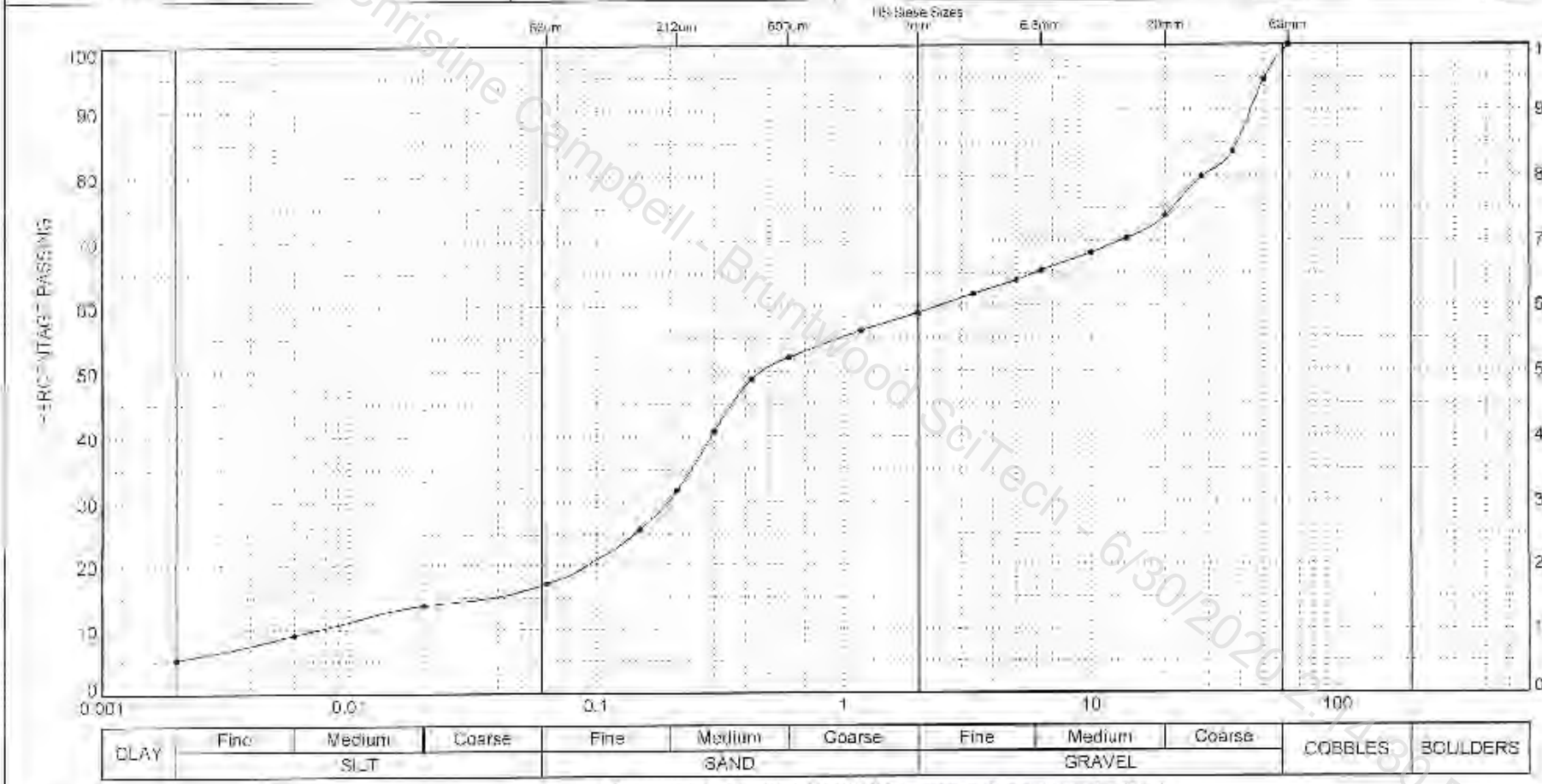
Head Office: Unit 3, Site 9 Gt. Industrial Estate, Pebble Hall, Cheshire Street, Gt. Harwood, BB6 7RG - Tel: 0161 764 4000 Fax: 0871 387 4711
Regional Office: Unit 20, Business Exchange, Eart Centre, Senate Wharf, Bolton, BL1 1RU - Tel: 01772 705 000 Fax: 01772 736 000

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- DS002	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) :- 0.80	Date Tested :- 10/12/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	94.5
37.5	83.7
28	79.8
20	73.8
14	70.4
10	68.1
6.3	65.4
5	63.9
3.35	61.8
2	58.9
1.18	56.2
0.6	52.1
0.425	46.8
0.3	40.8
0.212	31.8
0.15	25.8
0.063	17.0
0.02	13.7
0.006	9.1
0.002	5.3

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/DS002/B4/0.80	msone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brantwood Scitech - 6/30/2020 - 1:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 481

CONFIDENTIAL

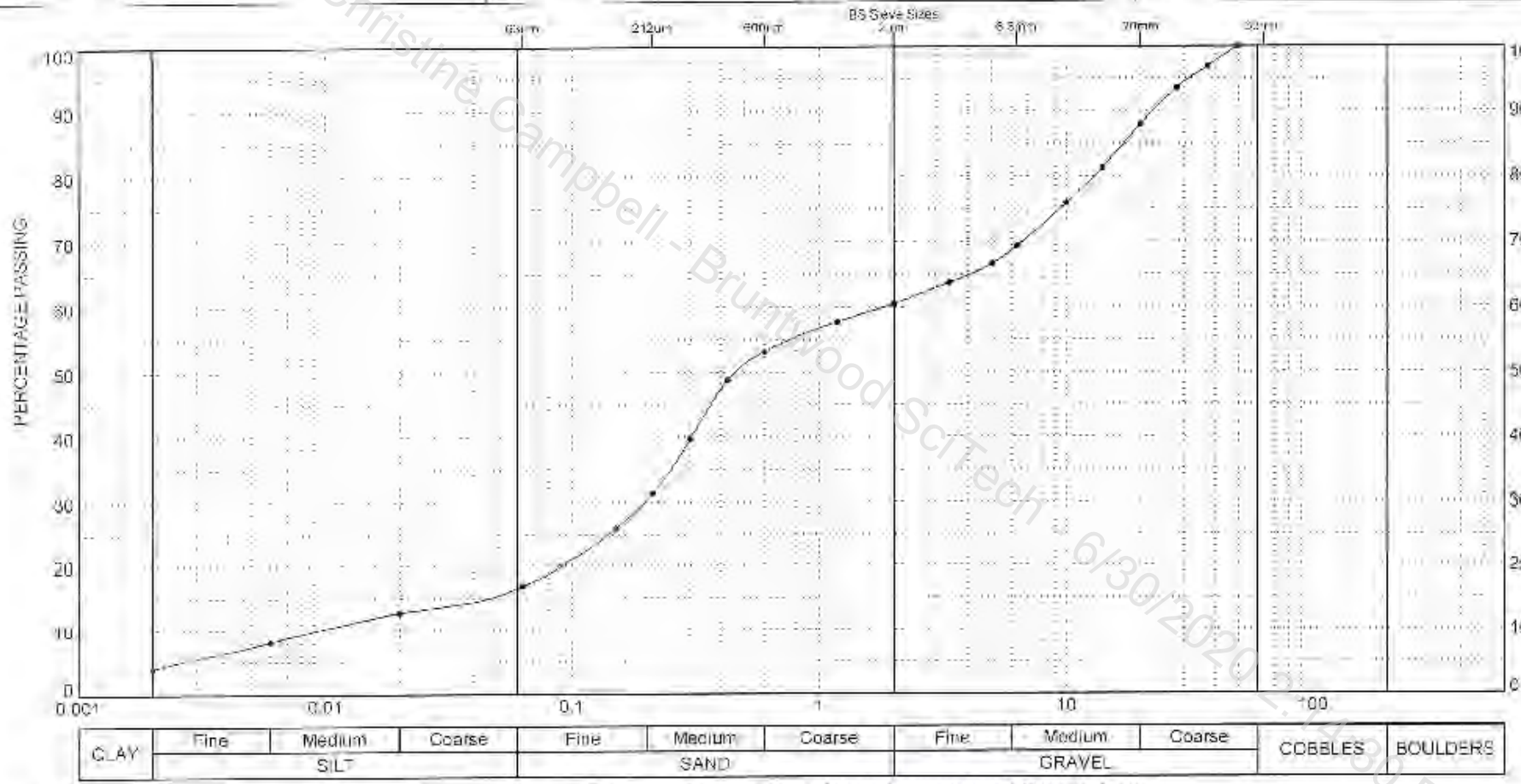
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2B Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 1RS. Tel: 0191 387 1010 Fax: 0191 387 1010
Regional Office: Unit 2A Business Development Centre, Bircham Way, Blackpool, FY1 5DL. Tel: 01772 736 800 Fax: 01772 736 899

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP001	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) :- 0.80	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	96.9
28	93.5
20	88.0
14	81.3
10	75.9
6.3	69.3
5	66.6
3.35	63.7
2	60.5
1.18	57.7
0.6	53.2
0.425	48.8
0.3	39.7
0.212	31.4
0.15	26.0
0.063	16.7
0.02	12.6
0.006	8.2
0.002	4.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP001/B4/0.80	MSCrd		

Client :-	Contract Title	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christina Campbell - Buntwood SoTech - 6/30/2020 2:11:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 482

CONFIDENTIAL

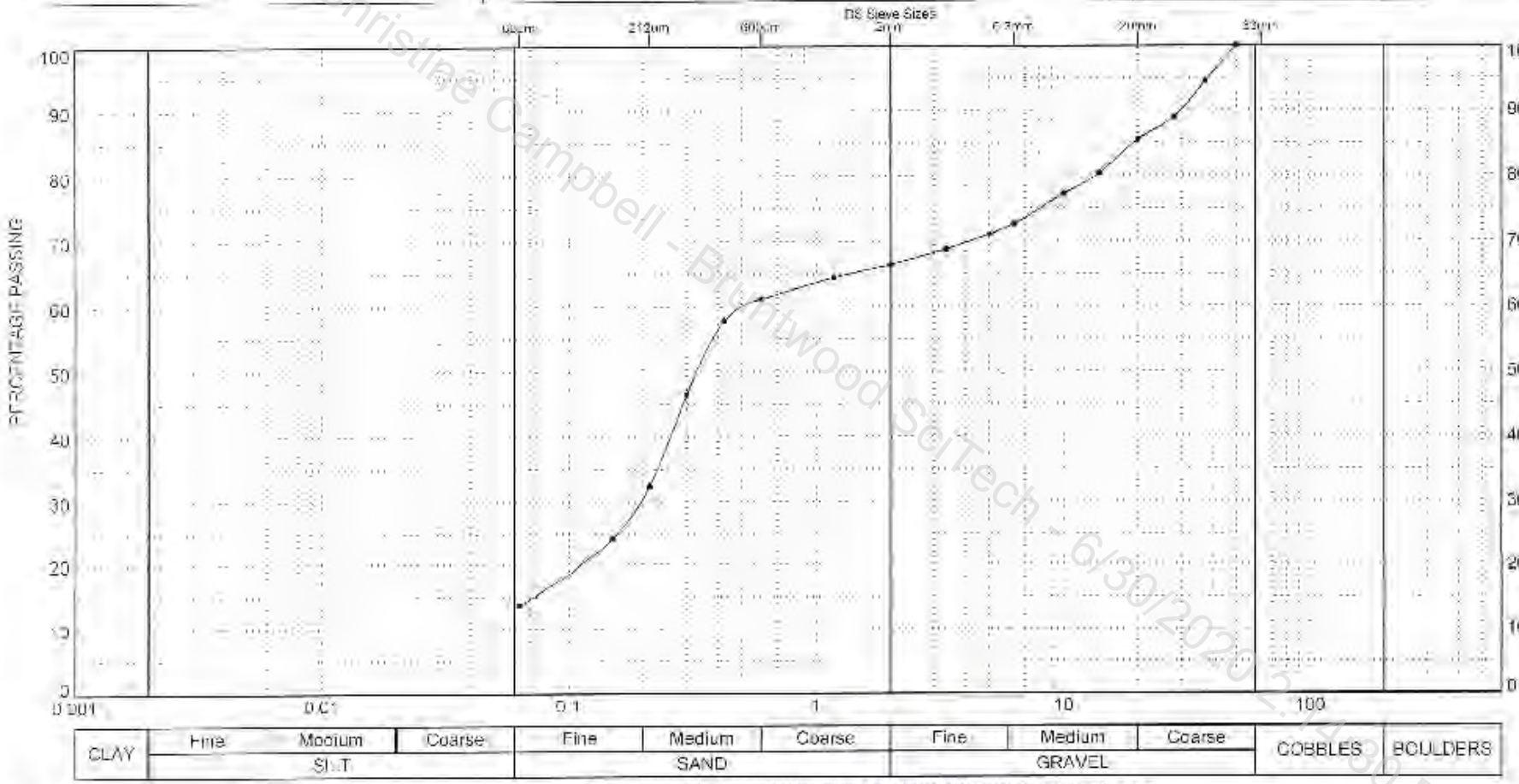
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Flora Gill Industrial Estate, Retford, Nottinghamshire, Durham, DH2 2RS - Tel: 0191 567 4700 Fax: 0191 567 4701
Regional Office: Unit 20, Business Development Centre, Forum Way, Blackburn, BB1 5BJ - Tel: 01772 205 300 Fax: 01772 205 333

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
TP001	1.50	B7	1.50	



Sieve Size (mm)	Passing (%)
50	100.0
37.5	94.5
28	89.0
20	85.5
14	80.4
10	77.2
6.3	72.6
5	71.0
3.35	68.0
2	66.4
1.18	64.4
0.6	61.1
0.425	57.8
0.3	46.4
0.212	32.4
0.15	24.3
0.063	19.7

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP001/B7/1.50	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 84.254.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 483

CONFIDENTIAL

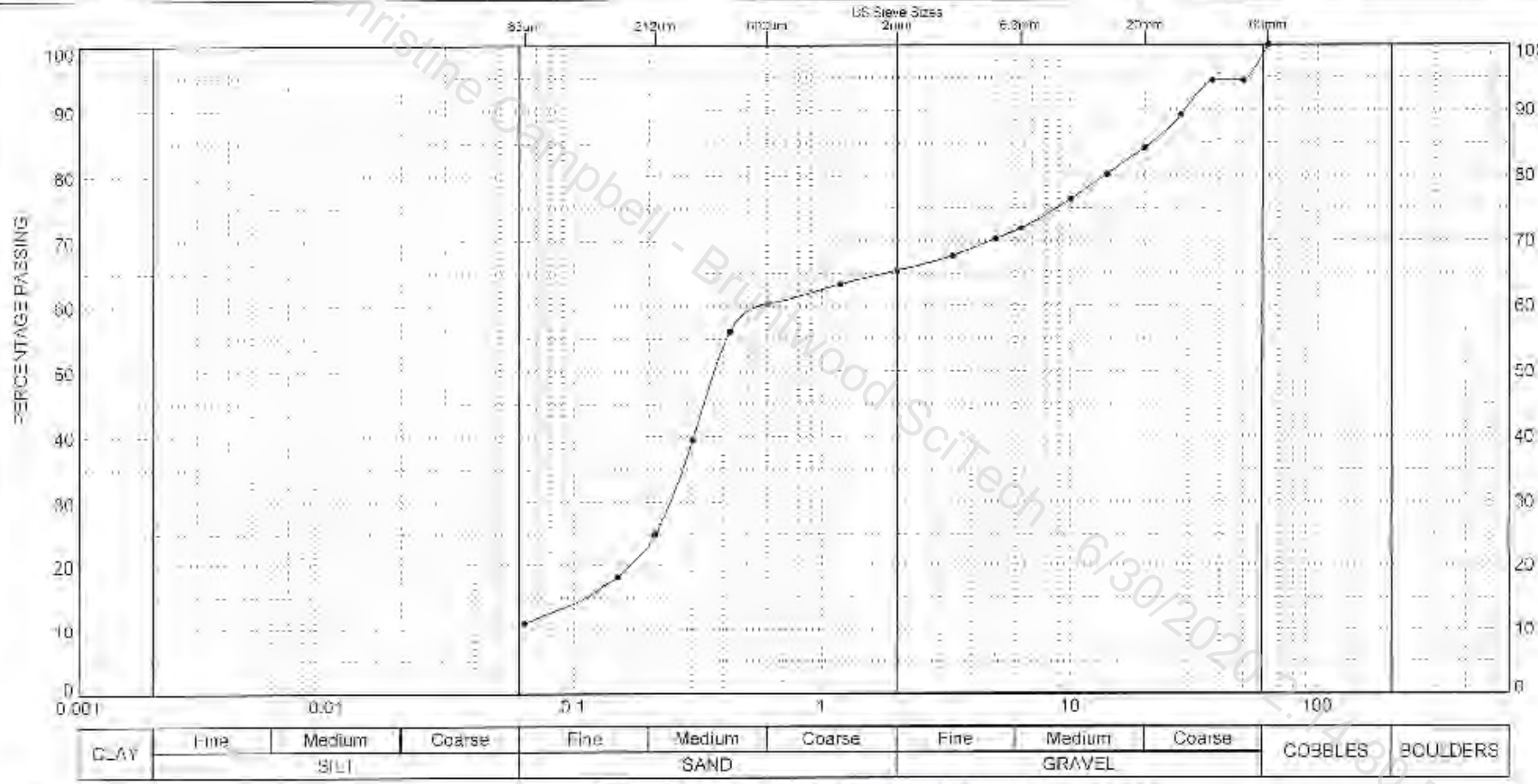
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office :- 9-25 Bilsta Ct, Industrial estate, Petrol Hill, Chester le Street, Co. Durham, DH2 2RS - Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23, Brookes Croston Ind Est, Fallow Field, Accrington, Lancs, BB5 5SL - Tel: 01772 735700 Fax: 01772 735 800

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
TP002	1.00	B4	1.00	25/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	94.5
37.5	94.5
28	89.3
20	84.3
14	80.2
10	76.4
6.3	71.9
5	70.3
3.35	67.7
2	65.4
1.18	63.3
0.6	60.3
0.425	56.1
0.3	39.5
0.212	25.0
0.15	18.2
0.063	11.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP002/B4/1.00			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 484

CONFIDENTIAL

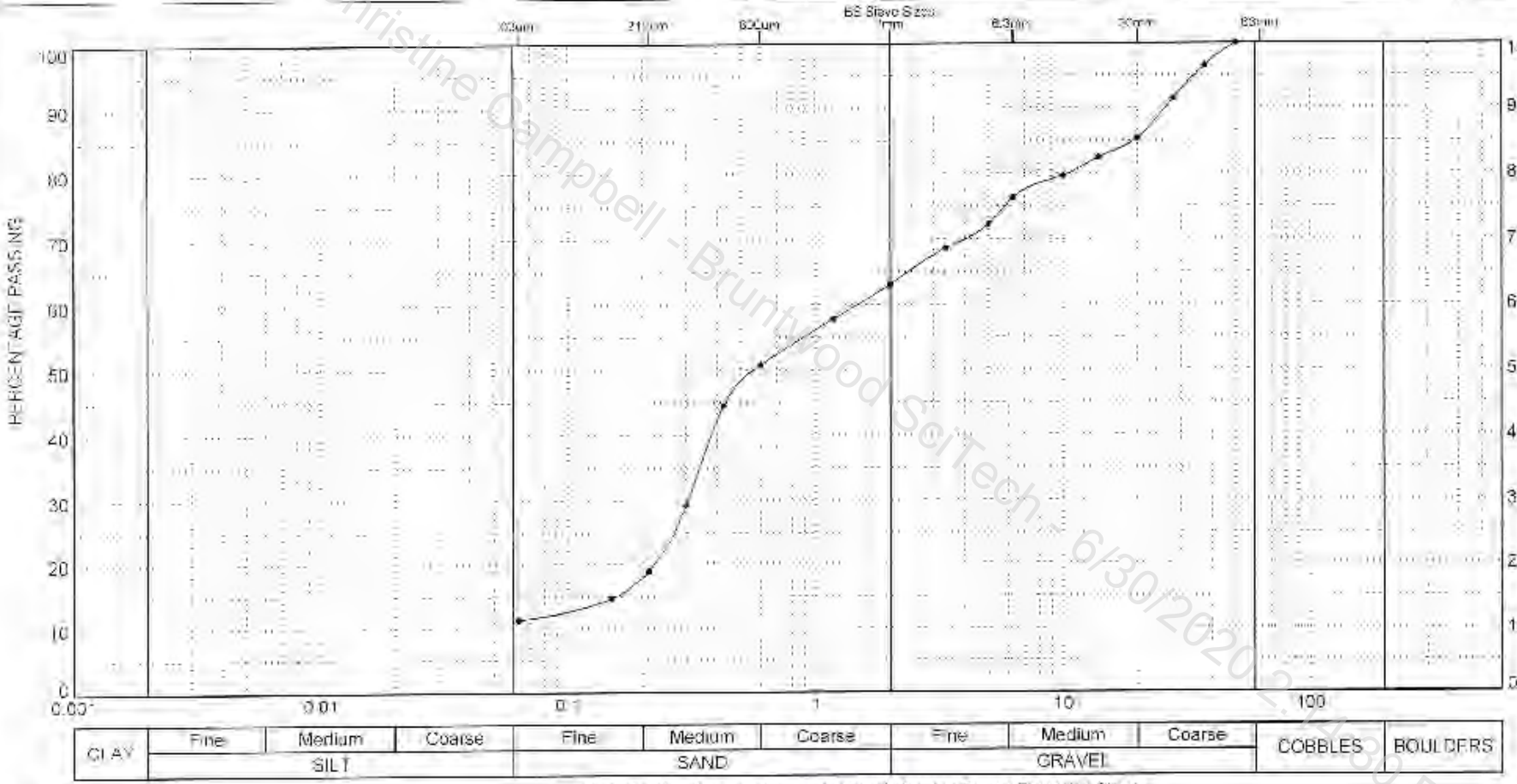
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Road Office: Unit 28 Falcon Cl, Industrial Estate, Irlam, Manchester, Gt. Britain, M44 5EG Tel: (0161) 777 4700 Fax: 0 161 777 4711
Regional Office: Unit 22 Burgess Development Centre, Burgess Road, Blackburn, BB1 5QL Tel: 01772 735 300 Fax: 01772 205 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP002	Depth (m) :- 2.50	Sample Type & No :- B10	Specific Depth (m) :- 2.50	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	96.5
28	91.4
20	85.4
14	82.4
10	79.6
6.3	76.3
5	72.3
3.35	68.6
2	63.1
1.18	57.8
0.6	50.9
0.425	44.5
0.3	29.3
0.212	18.9
0.15	14.7
0.063	11.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP002/B10/2.50	mSene		

Client :-	Contract Title :-	AEC Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 2:11:30 PM - 84.64.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 485

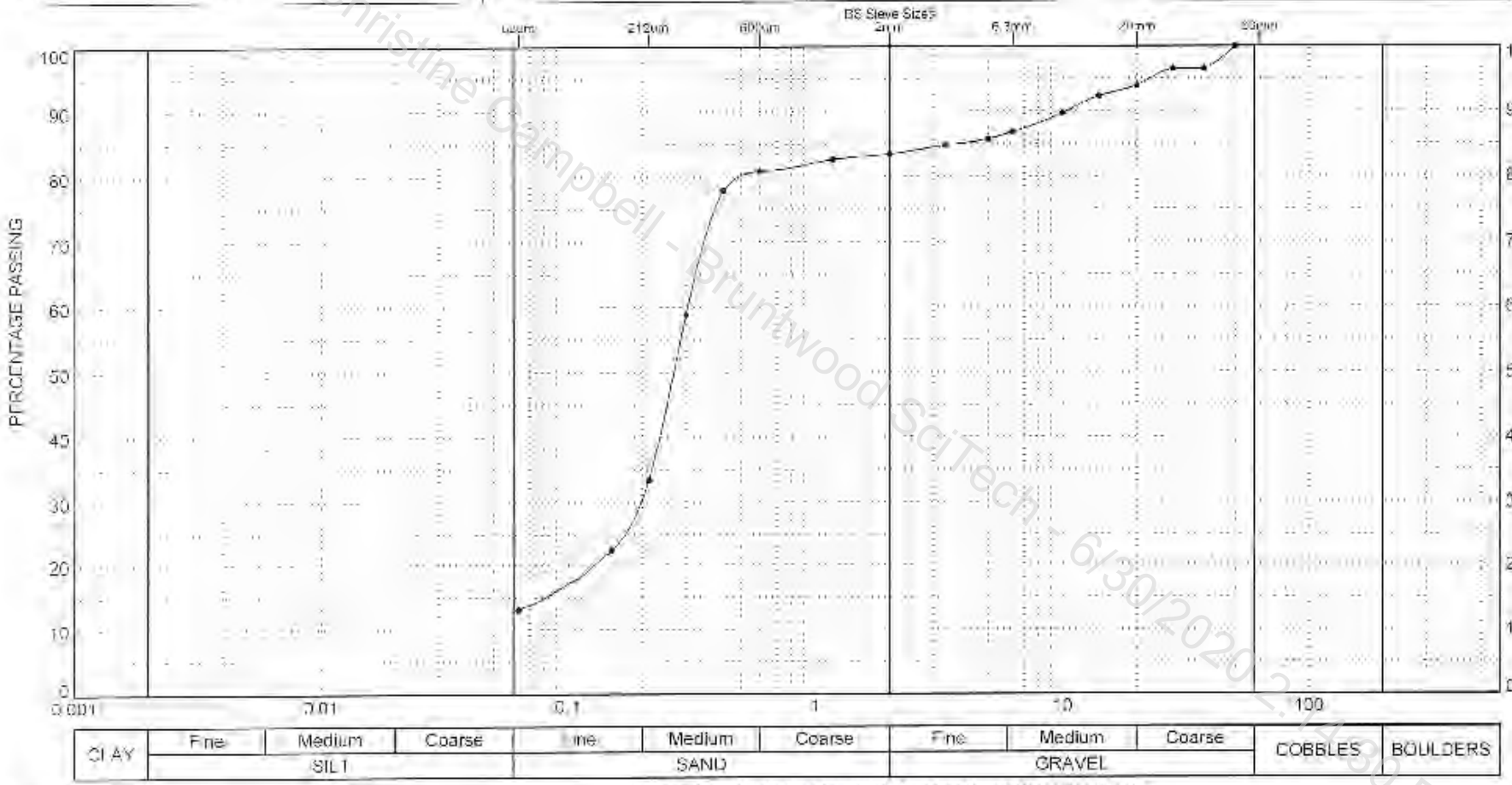
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Hyde Bridge Industrial Estate, Pollitt Street, Glossop, Derbyshire, SK13 8EN - Tel: 0161 367 1200 Fax: 0161 339 0177
Regional Office: Unit 23, Business Development Centre, Carnegie Road, Rhyl, Denbighshire, LL18 2PE - Tel: 01745 345 000 Fax: 01745 335 005

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
TP003	1.00	B7	1.00	25/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	96.5
28	96.5
20	93.9
14	92.3
10	89.7
6.3	86.9
5	85.7
3.35	84.8
2	83.4
1.18	82.6
0.6	80.9
0.425	77.9
0.3	58.8
0.212	33.4
0.15	22.5
0.063	13.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :	Certificate No :	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP003/B7/1.00			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

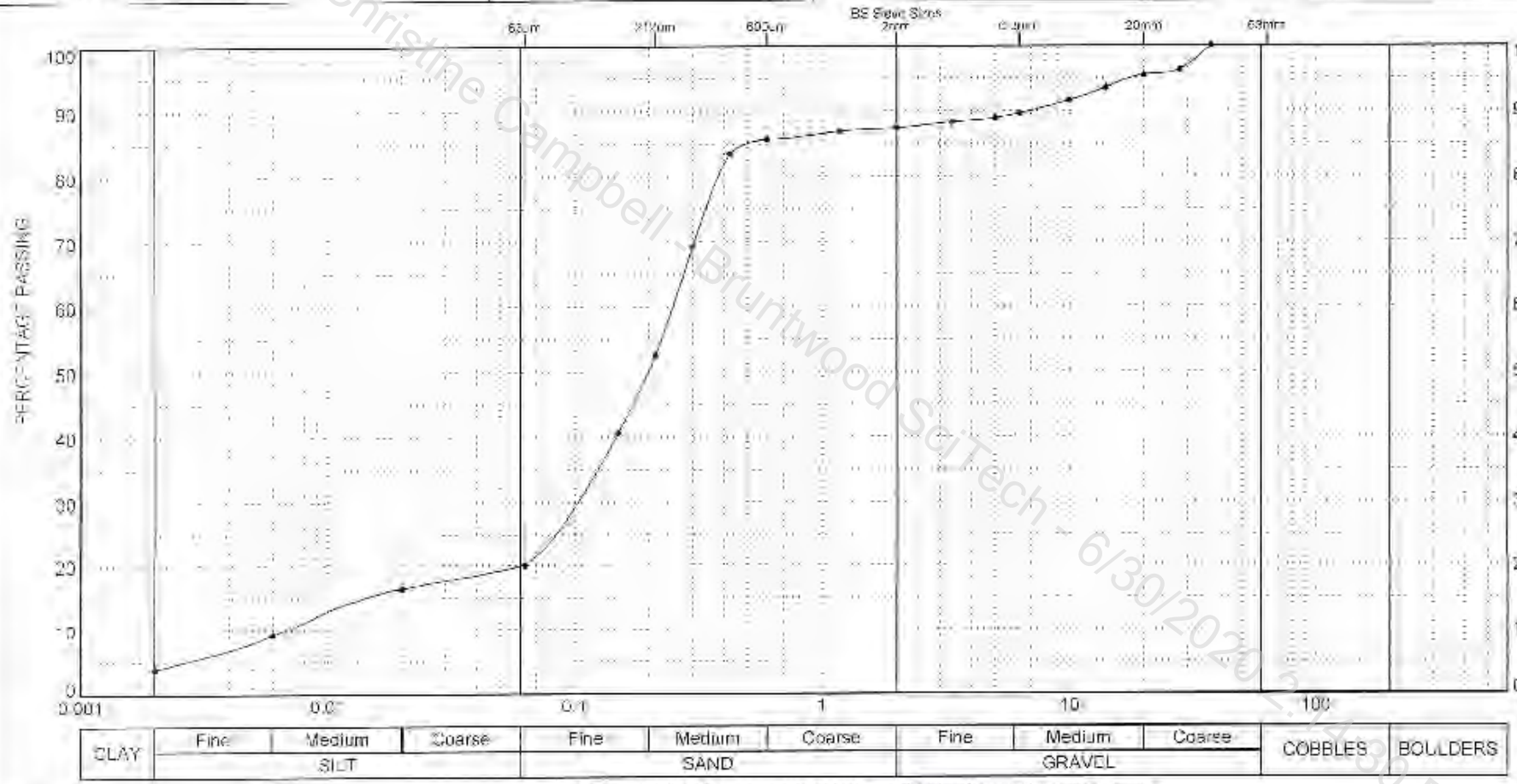
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Slate Office Park, Sandy Lane Industrial Estate, Stockton-on-Tees, Co. Durham, TS21 1RS - Tel: 01740 621000 Fax: 01740 621010
Regional Office: Unit 20, Business Development Centre, Bassett Walk, Blyth, Northumberland, NE24 4AX - Tel: 01670 356000 Fax: 01670 356001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP003	Depth (m) :- 3.00	Sample Type & No :- B12	Specific Depth (m) :- 3.00	Date Tested :- 25/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	96.3
20	96.5
14	93.5
10	91.6
6.3	89.6
5	88.9
3.35	88.3
2	87.4
1.18	86.9
0.6	85.7
0.425	83.5
0.3	69.2
0.212	52.6
0.15	40.7
0.063	20.0
0.02	16.3
0.006	9.2
0.002	3.9

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP003/B12/3.00	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

CONFIDENTIAL
ID Manchester - Christine Campbell - Bluntwood SuTech - 6/30/2020 2:14:36 PM - 81.154.246.72
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 486

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 487

LABORATORY TESTING ENCLOSURE 4

Determination of Total Sulphur, Sulphate and pH

(Tested Externally)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 488

DETS

Certificate of Analysis

Certificate Number 19-24310

04-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-24310

Client Reference NW1588

Order No LA2256

Contract Title ID Manchester Preliminary Ground Investigation

Description 11 Soil samples.

Date Received 28-Nov-19

Date Started 28-Nov-19

Date Completed 04-Dec-19

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

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

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

ID Manchester - Christine Carroll, Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

ID Manchester - Christine Campbell - Blunwood GeoTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

ID Manchester Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 489

Summary of Chemical Analysis

Soil Samples

Our Ref 19-24310
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1605059	1605060	1605061	1605062	1605063	1605064	1605065	1605066	1605067	1605068	1605069
				Sample ID	BH001	BH001	BH002	BH003	BH003	BH0012A	BH013	BH013	BH014	TP001	TP002
				Depth	1.65	5.50	1.20	1.20	1.70	2.70	1.50	8.00	0.70	0.80	1.50
				Other ID	1	25	3	5	15	8	5	20	6	5	8
				Sample Type	J	J	B	B	J	B	B	J	J	J	J
				Sampling Date	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**												
Inorganics															
pH	DETSC 2008#		pH		9.4	8.9	10.3	9.3	10.2	8.3	8.4	8.4	9.5	8.0	9.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		430	22	340	210	160	62	120	31	42	16	40

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

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 490

Information in Support of the Analytical Results

Our Ref 19 24310
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1605059	BH001 1.65 SOIL	27/11/19	PT 1L		
1605060	BH001 3.50 SOIL	27/11/19	PT 1L		
1605061	BH002 1.20 SOIL	27/11/19	PT 500ml		
1605062	BH003 1.20 SOIL	27/11/19	PT 500ml		
1605063	BH003 4.70 SOIL	27/11/19	PT 500ml		
1605064	BH001A 1.70 SOIL	27/11/19	PT 500ml		
1605065	BH013 1.50 SOIL	27/11/19	PT 500ml		
1605066	BH013 3.00 SOIL	27/11/19	PT 500m		
1605067	BH014 0.70 SOIL	27/11/19	PT 500m		
1605068	TP001 0.80 SOIL	27/11/19	PT 500m		
1605069	TP002 1.50 SOIL	27/11/19	PT 500m		

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 QA 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 holding 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 2/5µm sieve, in accordance with BS 1377.
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 moisture Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 25°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 (bulk sample) - 6 months.

ID Manchester - Christine Campbell - Buntwood Geotech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 491

Certificate of Analysis

Certificate Number 19-25093 13-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-25093
Client Reference NW1588
Order No LA2256
Contract Title ID Manchester Preliminary Ground Investigation
Description 10 Soil samples.
Date Received 09-Dec-19
Date Started 09-Dec-19
Date Completed 13-Dec-19
Test Procedures Identified by prefix DETSn (details on request)

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

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2 Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

ID Manchester - Christine Cantrell, Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Summary of Chemical Analysis
Soil Samples

Our Ref 19-25093
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1609600	1609601	1609602	1609603	1609604	1609605	1609607	1609608	1609609	1609610
				Sample ID	BH012A	BH001	BH004	BH007	BH011	BH013	BH004	BH007	BH005	BH006A
				Depth	10.00	8.00-8.30	9.50-11.00	7.50-8.10	7.50-8.50	10.50-12.00	0.00	4.50	0.50	0.50
				Other ID	30						18	18	3	3
				Sample Type	B	C	C	C	C	C	B	J	J	J
				Sampling Date	27/10/19	29/10/19	16/11/19	17/11/19	23/11/19	30/10/19	02/11/19	09/11/19	16/11/19	17/11/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**											
Inorganics														
pH	DETSC 2008#		pH		8.1	8.9	8.2	8.1	7.6	8.4	10.0	10.2	8.4	10.7
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		61	18	59	14	51	21	1100	630	89	710

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

ID Manchester - Christine Campbell - Buntingwood GeoTech - 6/30/2020 2:14:30 PM - 81.154.246.72
CONFIDENTIAL
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 492

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 493

Information in Support of the Analytical Results

Our Ref 19-25093
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1609600	BH01A 10.00 SOI	27/10/19	PT 1L	pH + Conductivity (7 days)	
1609601	BH003 8.00-8.50 SOIL	29/10/19	PT 1L	pH + Conductivity (7 days)	
1609602	BH004 9.50-10.00 SOIL	16/11/19	PT 1L	pH + Conductivity (7 days)	
1609603	BH007 7.50-8.10 SOIL	17/11/19	PT 1L	pH + Conductivity (7 days)	
1609604	BH011 7.50-8.50 SOIL	23/11/19	PT 1L	pH + Conductivity (7 days)	
1609605	BH013 10.00-10.50 SOIL	19/11/19	PT 1L	pH + Conductivity (7 days)	
1609606	BH004 0.80 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1609607	BH004 5.00 SOIL	02/11/19	PT 500ml	pH + Conductivity (7 days)	
1609608	BH007 4.50 SOIL	16/11/19	PT 500ml	pH + Conductivity (7 days)	
1609609	BH005 0.50 SOIL	16/11/19	PT 500ml	pH + Conductivity (7 days)	
1609610	BH005A 0.50 SOIL	17/11/19	PT 500ml	pH + Conductivity (7 days)	

Key: P-Plastic T-Tub G-Glass J-Jar
DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. Therefore 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. The results of the analysis (carried out where applicable) on 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 containers 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 air dried sample. Organics results are corrected for moisture and expressed on an oven dry weight basis.
The Loss on Drying, used to express inorganic analysis on an oven 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 - Enviros, Liquids - 2 weeks, Asbestos (test portion) - 6 months

ID Manchester - Christine Campbell - Brunswick Street - 6/3/2020 2:14:30 PM - 81.154.246.72
CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 494

DETS

Certificate of Analysis

Certificate Number	19-24307
	03-Dec-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-24307
Client Reference	NW1588
Order No	LA2256
Contract Title	ID Manchester Preliminary Ground Investigation
Description	9 Soil samples.
Date Received	28-Nov-19
Date Started	28-Nov-19
Date Completed	03-Dec-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

ID Manchester - Christine Campbell, Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

ID Manchester - Christine Carmichael - Plantwood ScriTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 495

Summary of Chemical Analysis
Soil Samples

Our Ref 19-24307
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1605045	1605046	1605047	1605048	1605049	1605050	1605051	1605052	1605053
			Sample ID	BH001	BH004	BH007	BH007	BH008	BH008	BH009	BH011	BH011
			Depth	12.50	0.80	1.20	7.20	2.10	5.50	0.80	1.20	5.50
			Other ID	28	5	6	22	8	18	3	5	29
			Sample Type	J	B	J	J	J	J	J	J	J
			Sampling Date	29/10/19	21/11/19	08/11/19	09/11/19	10/11/19	10/11/19	09/11/19	09/11/19	09/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**									
Inorganics												
pH	DETSC 2008#		pH	8.3	8.3	10.6	8.3	11.4	7.8	10.7	11.2	8.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	16	80	120	39	120	200	410	120	68

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

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 496

Information in Support of the Analytical Results

Our Ref 19-24307
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1605045	BH001 12.50 SOIL	29/10/19	PT 500ml	pH + Conductivity (7 days)	
1605046	BH004 0.80 SOIL	07/11/19	PT 500m		
1605047	BH007 1.20 SOIL	08/11/19	PT 500m	pH + Conductivity (7 days)	
1605048	BH007 7.20 SOIL	09/11/19	PT 500m	pH + Conductivity (7 days)	
1605049	BH008 2.10 SOIL	10/11/19	PT 500m	pH + Conductivity (7 days)	
1605050	BH008 5.50 SOIL	10/11/19	PT 500m	pH + Conductivity (7 days)	
1605051	BH009 0.80 SOIL	09/11/19	PT 500ml	pH + Conductivity (7 days)	
1605052	BH011 1.20 SOIL	09/11/19	PT 500ml	pH + Conductivity (7 days)	
1605053	BH011 5.50 SOIL	09/11/19	PT 500ml	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. 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 air dried sample, crushing to pass a 2mm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an oven dried sample. Organic results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organic analysis on an oven dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this certificate, samples will be held for the following times prior to disposal:
Soils - 1 month, Liquids - 2 weeks, Asbestos (bulk portion) - 6 months

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 497

DETS

Certificate of Analysis

Certificate Number 19-25586

19-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-25586
Client Reference NW1588
Order No LA2256
Contract Title ID Manchester Preliminary Ground Investigation
Description 5 Soil samples.
Date Received 12-Dec-19
Date Started 12-Dec-19
Date Completed 19 Dec-19
Test Procedures Identified by prefix DETSn (details on request).

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

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

ID Manchester - Christine Campbell, Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

DETS

Summary of Chemical Analysis
Soil Samples

Our Ref 19-25586
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1613155	1613156	1613157	1613158	1613159
			Sample ID	DS001	DS002	BH005	BH005	BH005
			Depth	0.70	1.20	3.50	11.00	19.00
			Other ID	6	5			
			Sample Type	B	U	C	C	C
			Sampling Date	30/11/19	01/12/19	24/11/19	25/11/19	30/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Inorganics								
pH	DETSC 2008#		pH	7.9	7.9	7.8	7.8	7.9
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1400	1800	65	64	68

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/3/2020 2:14:47 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 499

Information in Support of the Analytical Results

Our Ref 19 25586
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1613155	BH001 0.70 SOIL	20/11/19	PT 500ml	pH + Conductivity (7 days)	
1613156	BH002 1.20 SOIL	21/11/19	PT 500ml	pH + Conductivity (7 days)	
1613157	BH005 3.50 SOIL	24/11/19	PT 1L	pH + Conductivity (7 days)	
1613158	BH005 11.00 SOIL	25/11/19	PT 1L	pH + Conductivity (7 days)	
1613159	BH005 19.00 SOIL	30/11/19	PT 1L	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 deviation. 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. Organic 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

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 500

LABORATORY TESTING ENCLOSURE 5

Determination of Dry Density/Moisture Content Relationship

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 501

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Six Business Park, Stella Road, Chester le Street, DH2 1SA. Telephone: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 30, Business Development Centre, Bassett Road, Blackburn, BB1 3BT. Tel: 01254 691441

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 Part 4 1990

Specimen Identification

Exploratory Hole No :- **BH004** Depth (m) :- **2.00** Sample Type & No :- **B8**

Test Method 2.5kg Compaction Single Sample

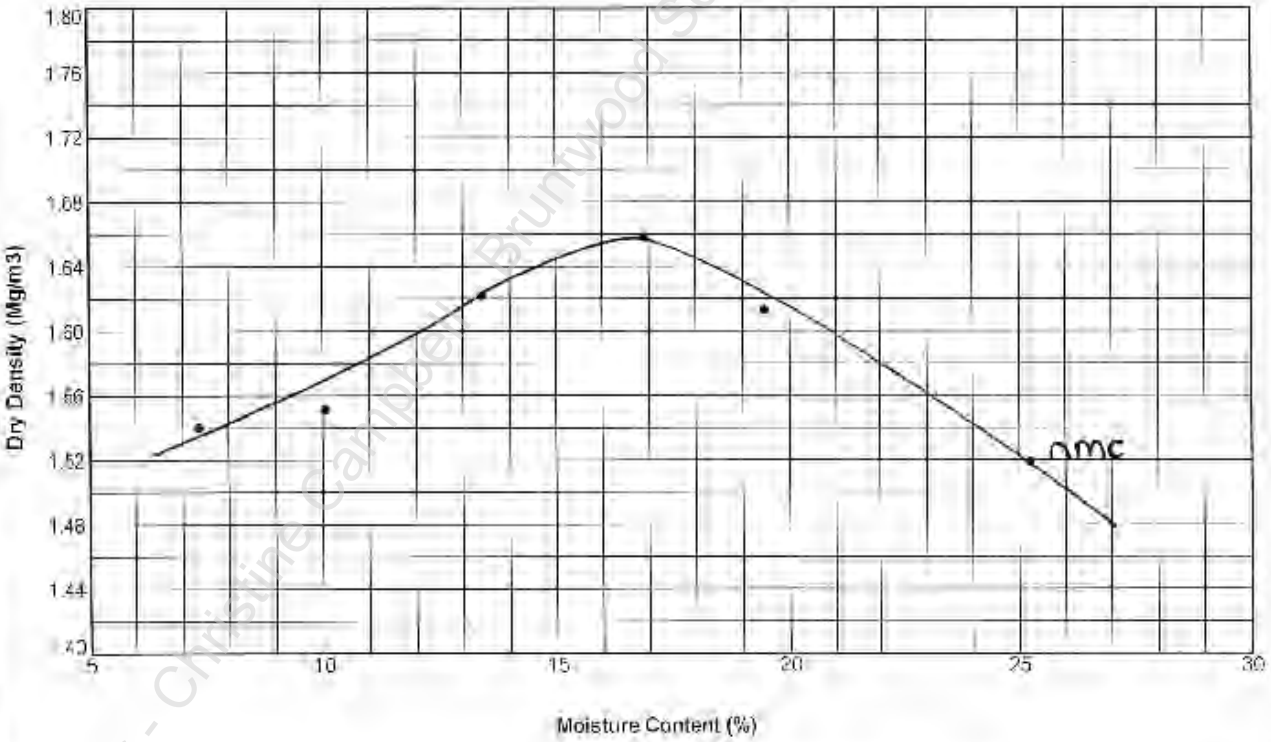
Test Results

Optimum Moisture Content (%) = **16.9** Particle Density (Measured) = **2.60**

Maximum Dry Density (Mg/m3) = **1.66** Retained on 20mm Sieve (%) = **17.3**

Date Tested = **09/12/2019** Retained on 37.5mm Sieve (%) = **9.3**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- Name :- Page 1 of 1

Date of Issue :- 20/01/2020 Certificate No :- COMP/NW1588/1 AGS Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6430/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 502

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 12B Stirling Sth Industrial Estate, Raploch Rd, Cheese Bridge, Stirling, FK7 9RP Tel: 01786 471...
Regional Office: Unit 2, Business Development Centre, Crindal Road, Dundee, DD2 3PB Tel: 01382 735 300 Fax: 01382 735 888

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

Specimen Identification

Exploratory Hole No :- **BH005** Depth (m) :- **1.50** Sample Type & No :- **B7**

Test Method 2.5kg Compaction Single Sample

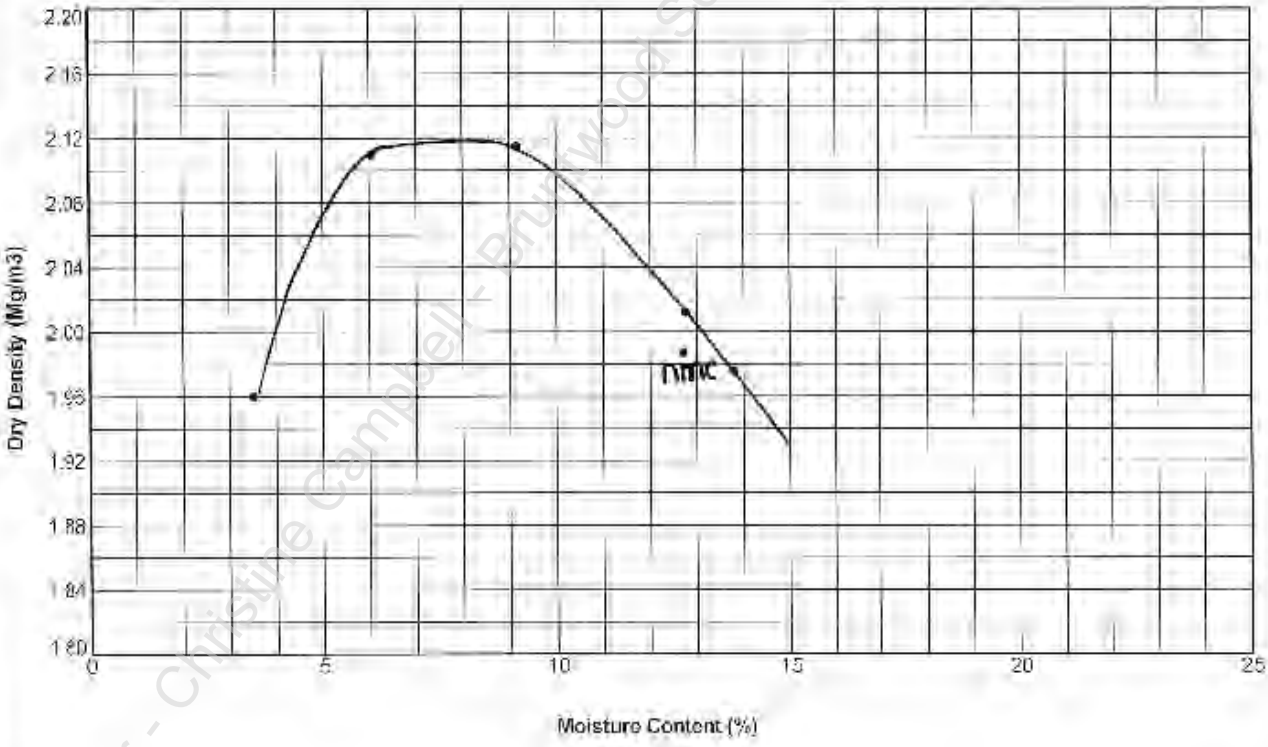
Test Results

Optimum Moisture Content (%) = **8.0** Particle Density (Assumed) = **2.75**

Maximum Dry Density (Mg/m3) = **2.12** Retained on 20mm Sieve (%) = **21.8**

Date Tested = **04/12/2019** Retained on 37.5mm Sieve (%) = **7.9**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- MSone

Name :-

Page 1 of 1

Date of Issue :- 22/01/2020

Certificate No :- GSW/PNW/5687

AEG Contract No :- NW1588

UKAS TESTING 1387

ID Manchester - Christine Campbell - Brynwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 503

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 22 Stoke On Industrial Estate, Dixon Rd, Lowestoft, Suffolk, NR32 3XQ. Tel: 01502 587470 Fax: 01502 587410
Regional Office: Unit 2A, Bluebell Investigation Centre, Sandy Walk, Bradford, BD6 2SE. Tel: 01274 395397 Fax: 01274 395399

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

Specimen Identification

Exploratory Hole No :- **BH011** Depth (m) :- **0.80** Sample Type & No :- **B3**

Test Method 2.5kg Compaction Single Sample

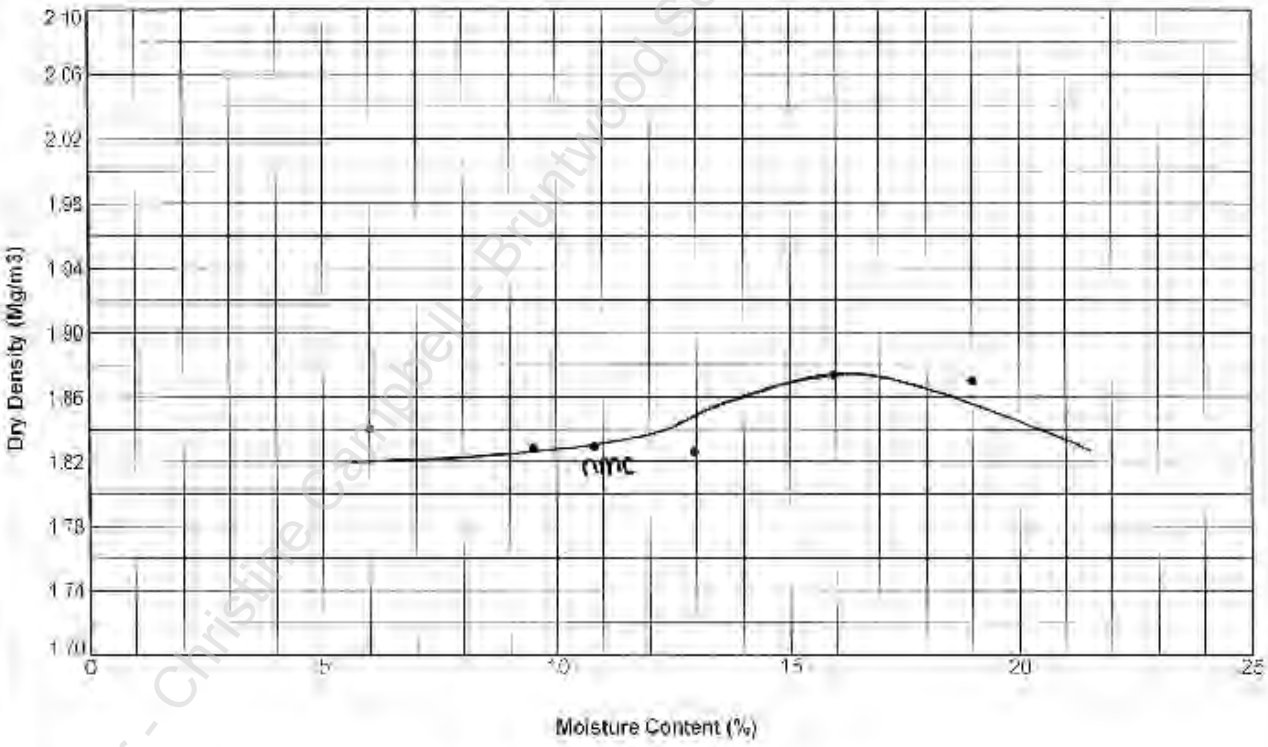
Test Results

Optimum Moisture Content (%) = **16.0** Particle Density (Assumed) = **2.75**

Maximum Dry Density (Mg/m3) = **1.87** Retained on 20mm Sieve (%) = **17.6**

Date Tested = **04/12/2019** Retained on 37.5mm Sieve (%) = **5.0**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- Name :- Page 1 of

Date of Issue :- 22/01/2020 Soil Trade No :- SUM-NW-588/1 AES Contract No. :- NW1588

1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 504

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 12A Bells Sol Industrial Estate Felton Hill, Chesterle Street, Co. Durham DH2 3RS Tel: 0191 492 4700 Fax: 0191 492 4701
Regional Office: Unit 3C, B.A.S.E. Swalwell Trading Centre, Derwent Street, Blaydon, NE21 5DJ Tel: 0191 738 3800 Fax: 0191 738 3801

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 Part 4 1990

Specimen Identification

Exploratory Hole No :- **TP001** Depth (m) :- **1.50** Sample Type & No :- **B7**

Test Method 2.5kg Compaction Single Sample

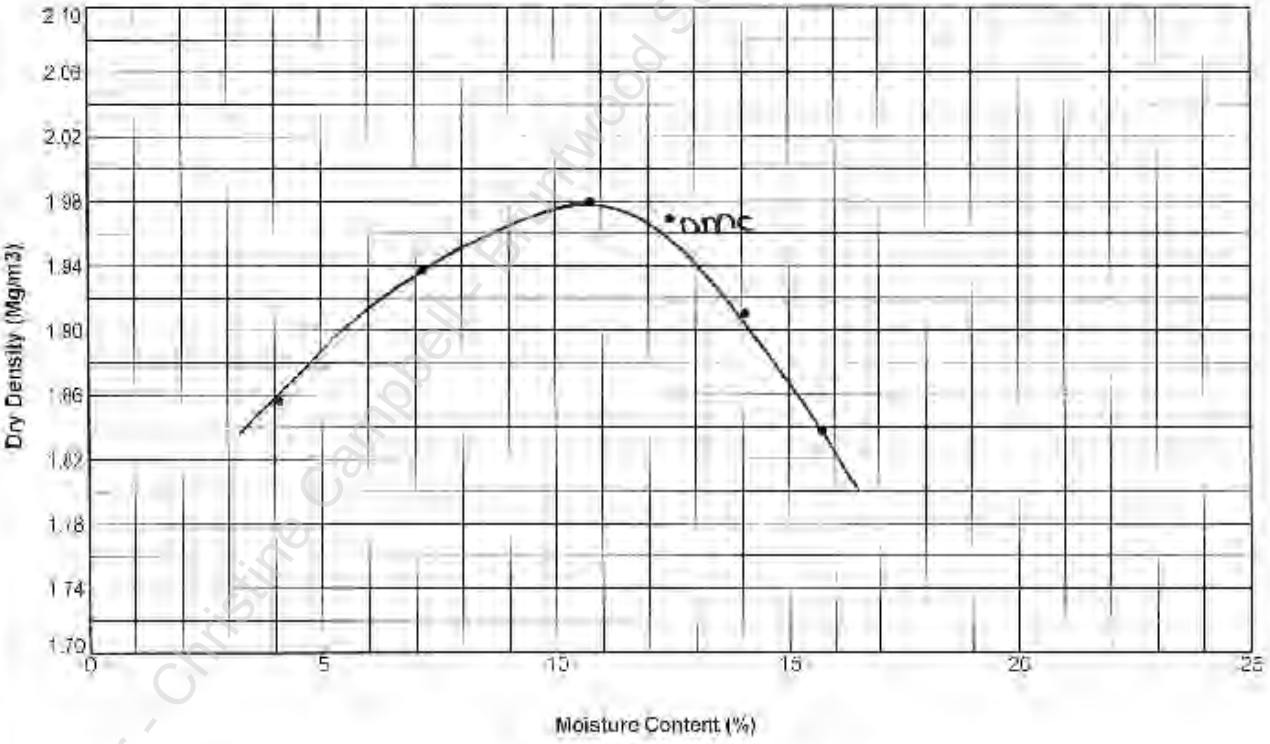
Test Results

Optimum Moisture Content (%) = **10.8** Particle Density (Assumed) = **2.67**

Maximum Dry Density (Mg/m3) = **1.98** Retained on 20mm Sieve (%) = **14.0**

Date Tested = **02/12/2019** Retained on 37.5mm Sieve (%) = **5.0**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- Name :- Page 1 of 1

Date of Issue :- 22/01/2020

Certificate No :- COMP/NW1588/1

AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Fairhurst SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 505

LABORATORY TESTING ENCLOSURE 6

Determination of One Dimensional Consolidation Properties

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

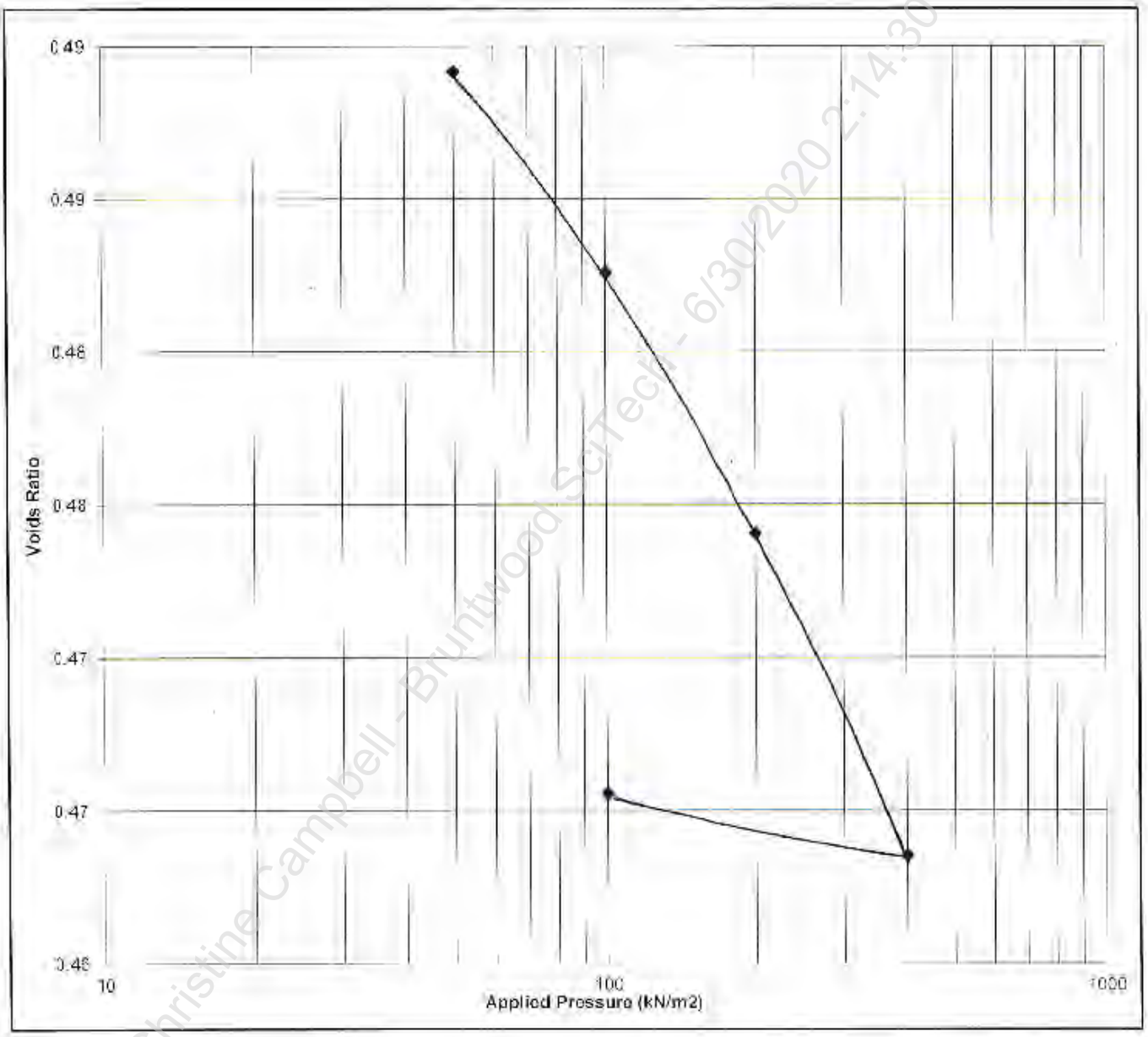
CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 506

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH012A	Sample	U25	Depth	8.50m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth	8.81m



Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	University of Manchester

Signed:	Name:	Page 2 of 2
	M. SELKIRK	

Date of Issue:	Certificate No:	AEG Contract No:
26/11/2019	NW1588/A	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 507

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES

BS 1377 : PART 5 : 1990 ; CLAUSE 3

Exploratory Hole No	**BH012A**	**Sample**	**U25**	**Depth**	**8.50m**
Specimen Type	**Undisturbed**	**Orientation**	**Vertical**	**Specific Depth**	**8.81m**

	INITIAL	FINAL			
Height	18.8	18.2	mm	Particle Density (Assumed)	2.70
Diameter	74.3	74.3	mm		
Moisture Content	17.6	17.4	%	Degree of Saturation (%)	92.9
Wet Density	2.10	2.15	Mg/m^3		
Dry Density	1.79	1.83	Mg/m^3	Test Duration (Days)	6
				Date Tested	18/11/2019

Square Root of Time Fitting Method

Pressure Range kN/m2	Mv m2/MN	Cv m2/yr	Temp C	Voids Ratio
Inital				0.512
0 - 50	0.296	.	22	0.489
50 - 100	0.089	18.38	22	0.483
100 - 200	0.057	18.76	21	0.474
200 - 400	0.036	17.96	22	0.464
400 - 100	0.005	Swelling	22	0.466

For sample description please refer to the Laboratory Sample Description Sheet

Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	**University of Manchester**

Signed:	Name:		
	M. SELKIRK	Page 1 of 2	UKAS TESTING 1357
Date of Issue: 26/11/2019	Certificate No: NW1688/A	AEG Contract No: NW1688	

ID Manchester_Christina Campbell / Bruntwood SciTech 6/5/2020 2:14:30 PM 81.154.240.72

CONFIDENTIAL

LABORATORY TESTING ENCLOSURE 7

Consolidated Undrained Shear Strength in Triaxial Cell with Measurement of Pore Water Pressure

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 509

ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate,
Pelton Fell, Chester le Street, DH2 2RG.

CONSOLIDATED UNDRAINED TRIAXIAL WITH MEASUREMENT OF PORE WATER PRESSURE

B.S. 1377 : Part 8 : 1990 : Clauses 3,4,5,6 and 7

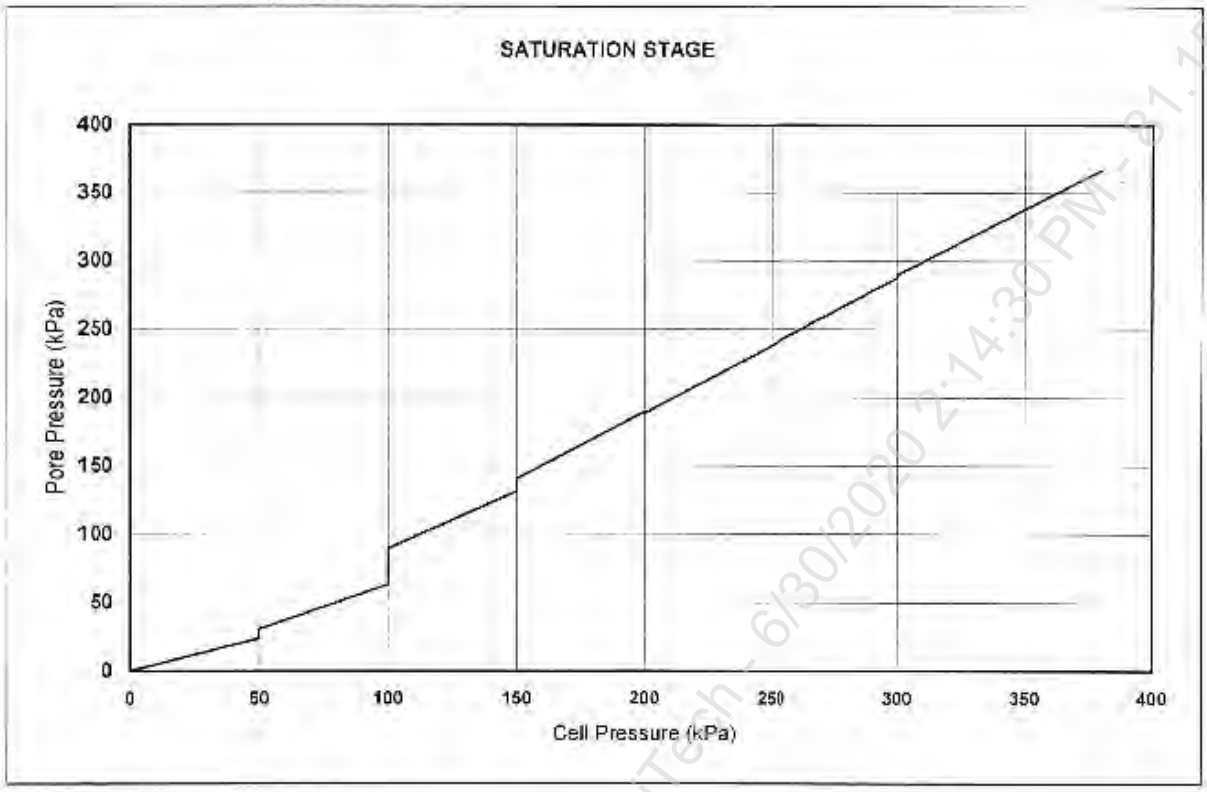
PROJECT No : NW1588 **CLIENT : University of Manchester**
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 **SAMPLE No : U10** **DEPTH (m) : 1.20**

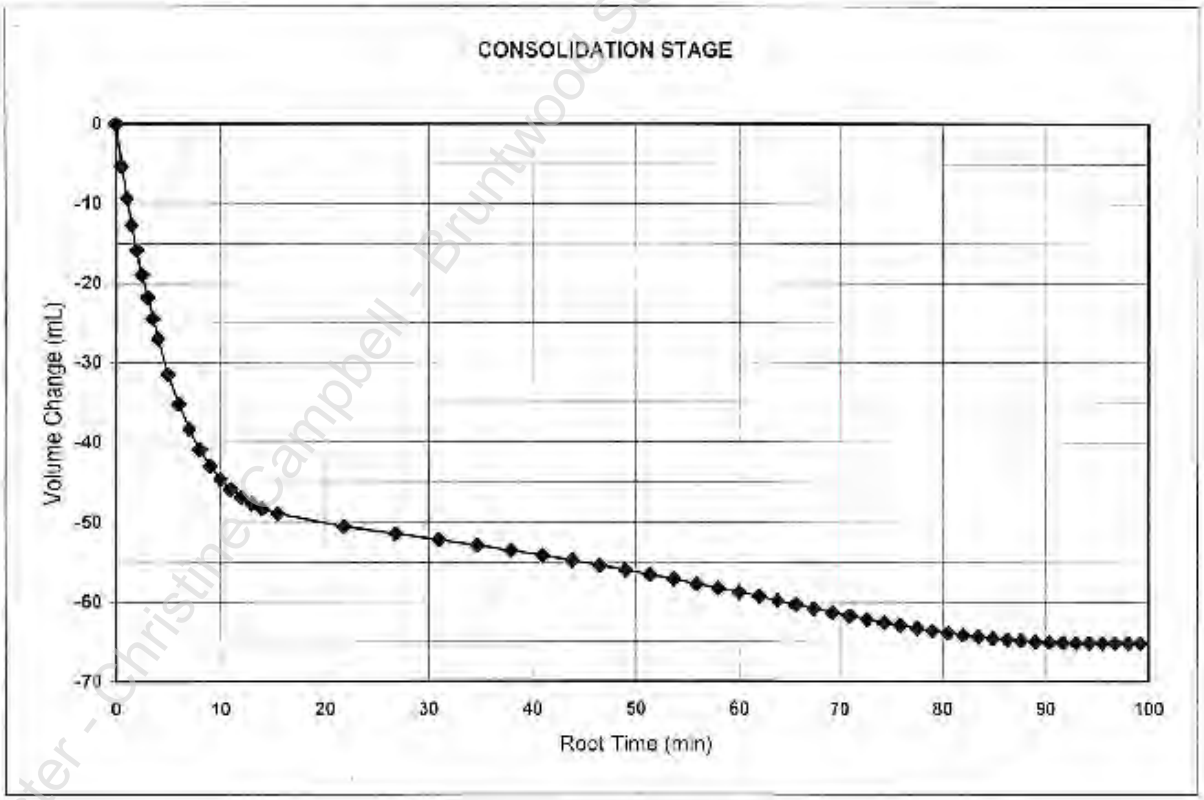
TEST SPECIMEN PREPARATION	Undisturbed	
Depth within original sample	: 1.40m	
Orientation within original sample	:Vertical	
Description	: Please refer to sample description sheet	
TEST SPECIMEN DETAILS	*Stage*	1
Length	*mm*	203.8
Diameter	*mm*	104.3
Moisture Content	*%*	23.8
Bulk Density	*Mg/m^3*	2.00
SATURATION STAGE		
Drainage Conditions	: Both ends and radial boundary	
Final Cell Pressure	*kPa*	380
Final Pore Pressure	*kPa*	300
Final Pore Pressure Parameter B		0.97
Duration	*day(s)*	2
CONSOLIDATION STAGE		
Cell Pressure	*kPa*	380
Back Pressure	*kPa*	300
Effective Pressure	*kPa*	80
Final Pore Pressure	*kPa*	298.9
Duration	*day(s)*	5
SHEARING STAGE		
Cell Pressure	*kPa*	380
Rate of Axial Displacement	*mm/min*	0.00699
Final Moisture Content	*%*	23.0
Final Bulk Density	*Mg/m^3*	1.99
CONDITIONS AT FAILURE	*Criterion*	Maximum stress ratio
Pore Pressure	*kPa*	332
Minor Effective Principal Stress	*kPa*	48
Deviator Stress	*kPa*	110
Major Effective Principal Stress	*kPa*	159
Effective Principal Stress Ratio		3.27
Pore Pressure Parameter A		0.30
Axial Strain	*%*	5.3
Correction applied to Principal Stress	*kPa*	4.4
Duration	*Days*	4

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

PROJECT No : NW1588 **CLIENT : University of Manchester**
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 **SAMPLE No : U10** **DEPTH (m) : 1.20**



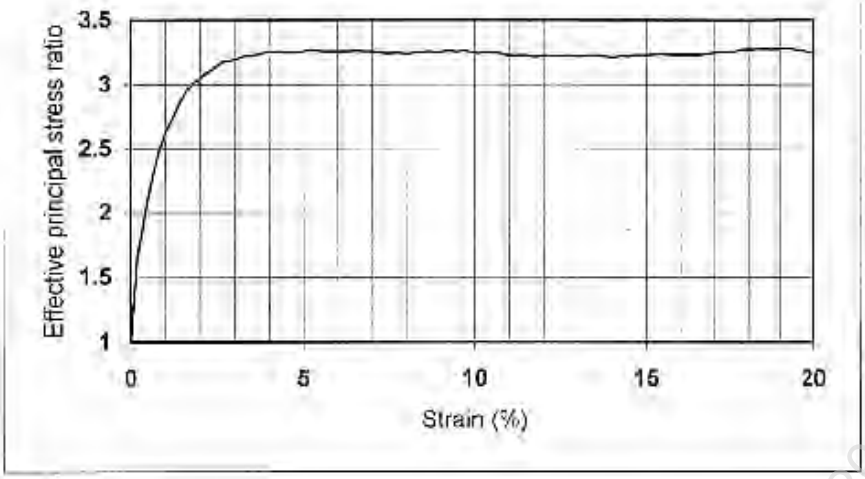


ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 511

PROJECT No : NW1588 **CLIENT : University of Manchester**
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 **SAMPLE No : U10** **DEPTH (m) : 1.20**

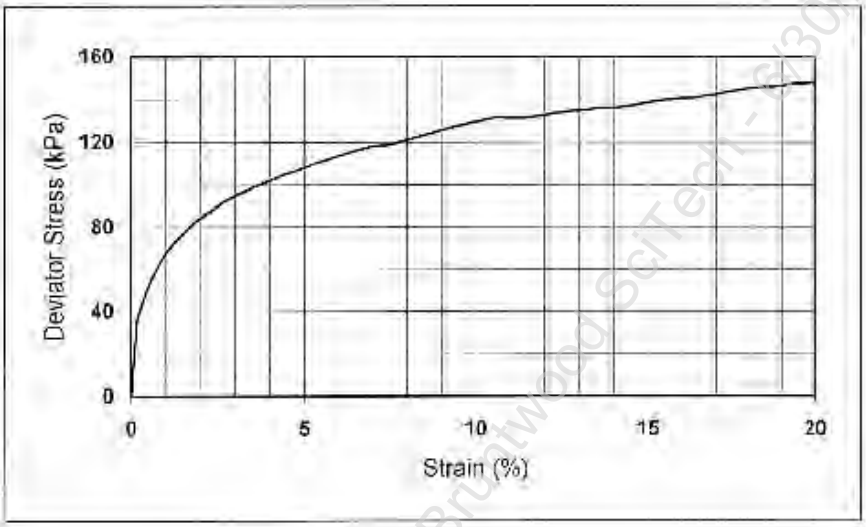


Failure Conditions

Specimen 1

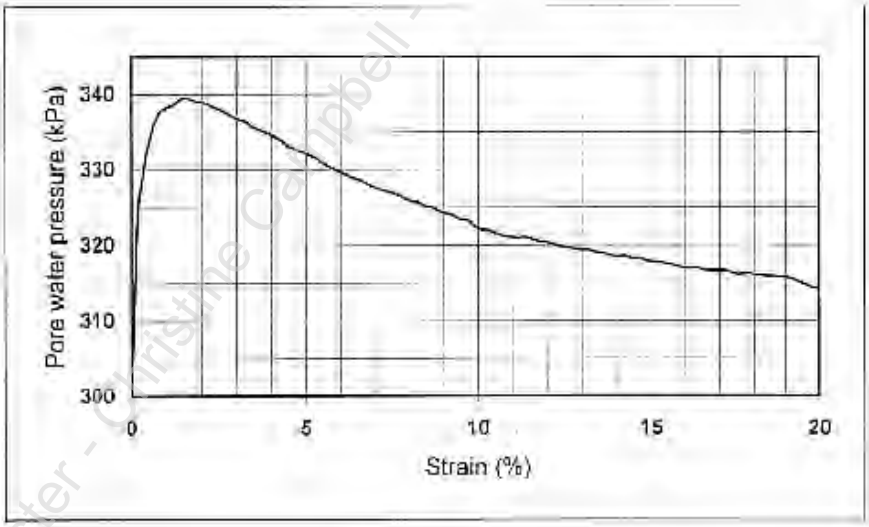
At maximum stress ratio

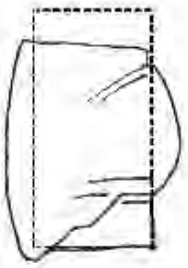
strain	5.33	%
deviator stress	110.2	*kPa*
stress ratio	3.27	



At maximum deviator stress

strain	19.85	%
deviator stress	148.0	*kPa*
stress ratio	3.25	





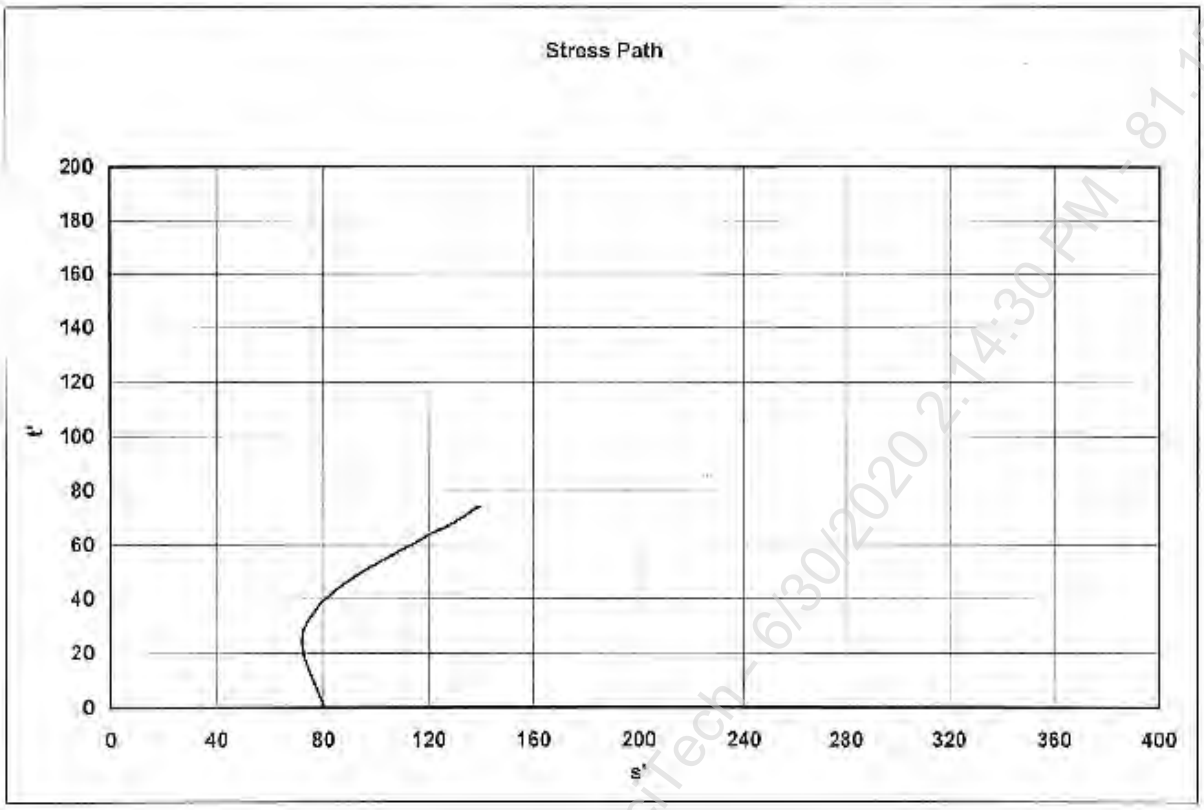
FAILURE MODE

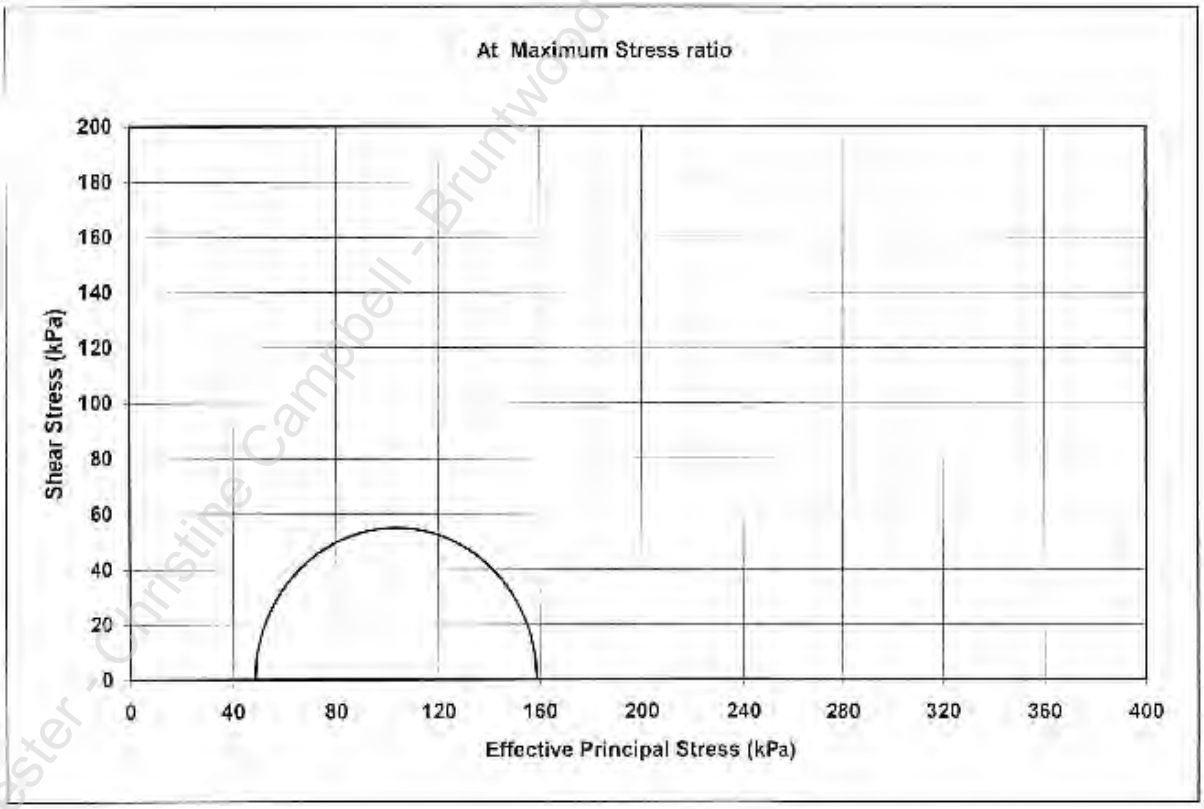
ID Manchester - Christine Campbell - Broadwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 512

PROJECT No : NW1588 CLIENT : University of Manchester
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 SAMPLE No : U10 DEPTH (m) : 1.20





Sheet 4 of 4

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 513

LABORATORY TESTING ENCLOSURE 8

Moisture Content of Rock

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 514

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 25 Stella Building, Stella Close, Off Chester Road, Stretford, Manchester, M32 0RS. Tel: 0161 865 4700 Fax: 0161 865 4701
Regional Office: Unit 16, Burnhead Business Centre, Burnhead Road, Burnhead, Stonehouse, ML9 3QY. Tel: 01698 [illegible]

MOISTURE CONTENT CERTIFICATE

ISRM : 1981

Exploratory Hole No.	Sample Depth (m)	Sample ID	Moisture Content (%)	Date Tested	Remarks
BH001	9.20	C30	12.1	02/12/2019	
BH001	11.84	C32	13.7	02/12/2019	
BH001	14.70	C34	14.7	02/12/2019	
BH004	11.25	C30	15.3	03/12/2019	
BH004	13.20	C32	13.6	04/12/2019	
BH005	9.00	C23	16.0	09/12/2019	
BH005	17.00	C29	15.5	09/12/2019	
BH007	9.15	C27	17.9	03/12/2019	
BH011	8.45	C23	15.3	03/12/2019	
BH011	8.80	C24	15.3	03/12/2019	
BH011	10.00	C25	15.0	03/12/2019	
BH011	11.30	C26	13.4	03/12/2019	
BH011	12.30	C27	12.6	04/12/2019	
BH013	11.80	C26	16.1	02/12/2019	
HC001	0.00	C1	18.0	25/11/2019	
HC002	0.00	C1	17.9	25/11/2019	
HC003	0.00	C1	18.5	25/11/2019	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- MSeal

Name :-

Page 1 of 1

Date of Issue :- 23/12/2019

Certificate No :- RMC/NW/15881

AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood Site Tech_6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

LABORATORY TESTING ENCLOSURE 9

Determination of Point Load Index

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

ID Manchester - Christina Campbell - Brantwood GeoTech - 6/30/2020 2:14:39 PM - 84.254.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 516

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Registered Office: [illegible]

POINT LOAD STRENGTH INDEX

ISRM 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH001	3.20	Diametral	125.3	97.7	0.3	9546.3	0.026	1.352	0.035	Sandstone	02/12/2019
BH001	3.20	Axial	100.2	74.2	1.2	8466.3	0.128	1.349	0.173	Sandstone#	02/12/2019
BH001	3.70	Diametral	127.9	93.2	0.1	8686.2	0.007	1.323	0.009	Sandstone	03/12/2019
BH001	3.70	Axial	99.1	49.1	0.0	6195.3	0.004	1.227	0.004	Sandstone	03/12/2019
BH001	10.50	Diametral	126.3	99.3	0.1	9860.0	0.014	1.352	0.019	Sandstone	03/12/2019
BH001	10.50	Axial	100.1	36.0	0.0	4588.2	0.006	1.146	0.006	Sandstone	03/12/2019
BH001	10.70	Diametral	135.5	94.7	0.1	8980.1	0.012	1.330	0.016	Sandstone	03/12/2019
BH001	10.70	Axial	100.7	44.6	0.3	5775.2	0.055	1.207	0.066	Sandstone	03/12/2019
BH001	11.00	Diametral	98.1	92.6	0.1	8574.8	0.013	1.22	0.017	Sandstone	02/12/2019
BH001	11.50	Axial	99.5	78.9	0.9	9922.8	0.085	1.364	0.12	Sandstone#	02/12/2019
BH001	12.60	Irregular Lump	95.6	85.2	0.7	10370.7	0.067	1.377	0.092	Sandstone#	04/12/2019
BH001	12.70	Irregular Lump	101.8	61.3	0.2	7906.4	0.027	1.296	0.035	Sandstone	04/12/2019
BH001	12.90	Axial	100.3	68.9	0.3	8798.9	0.033	1.327	0.044	Sandstone#	04/12/2019
BH001	13.00	Axial	109.4	68.3	0.4	9597.2	0.038	1.353	0.051	Sandstone	04/12/2019

NOTES :- *Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) I-Too soft to register a reading

Date of Issue :- 22/01/2020	Certificate No :- PUNW1588/1	Signed :-	Name :-	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation		AEG Contract No :- NW1588	

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brentwood GeoTech - 6/30/2020 2:14:39 PM - 84.64.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 517

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5 Bolton St / Lough of Leads, Ripley, Derbyshire, DH5 3RD. Tel: 01773 [illegible] Fax: 01773 [illegible]
Regional Office: Unit 7 Business Centre, [illegible] Road, Barnsley, S63 3JL. Tel: 01226 [illegible] Fax: 01226 [illegible]

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH001	13.60	Diametral	95.7	91.3	0.0	8335.7	0.003	1.311	0.003	Sandstone	04/12/2019
BH001	13.65	Axial	94.5	33.3	0.2	4006.7	0.054	1.112	0.06	Sandstone	04/12/2019
BH001	14.10	Axial	98.9	69.0	0.6	8751.7	0.064	1.325	0.085	Sandstone	02/12/2019
BH001	14.30	Axial	100.5	34.5	0.1	4414.6	0.026	1.138	0.03	Sandstone	02/12/2019
BH001	14.35	Axial	100.9	43.7	0.1	5614.1	0.023	1.12	0.026	Sandstone	02/12/2019
BH001	14.40	Axial	100.6	48.6	0.2	5840.8	0.034	1.21	0.041	Sandstone	02/12/2019
BH001	14.55	Axial	100.5	76.6	0.6	9673.6	0.061	1.356	0.083	Sandstone	02/12/2019
BH001	14.70	Axial	102.0	57.1	0.4	7416.6	0.053	1.277	0.068	Sandstone	02/12/2019
BH001	14.90	Axial	100.1	79.7	0.6	10157.9	0.052	1.371	0.071	Sandstone	02/12/2019
BH001	15.00	Diametral	150.2	94.3	0.1	8892.5	0.005	1.33	0.006	Sandstone	04/12/2019
BH001	15.00	Axial	93.8	57.8	0.6	7344.5	0.079	1.274	0.101	Sandstone	04/12/2019
BH001	15.30	Axial	104.7	86.9	0.4	11529.2	0.035	1.41	0.051	Sandstone	02/12/2019
BH001	15.40	Irregular Lump	100.4	67.7	0.1	8654.3	0.009	1.322	0.012	Sandstone#	04/12/2019
BH004	11.20	Axial	100.2	36.5	0.0	4533.6	0.003	1.143	0.003	Sandstone	03/12/2019

NOTES : +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PLNW/588/2	Signed :-	Name :-	Page 2 of 11
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

UKAS Testing 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

POINT LOAD STRENGTH INDEX

ISRM 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH004	11.25	Irregular Lump	99.4	62.5	0.2	7910.0	0.025	1.296	0.032	Sandstone#	03/12/2019
BH004	11.30	Diametral	127.8	83.4	0.0	6859.6	0.005	1.259	0.006	Sandstone	03/12/2019
BH004	11.30	Axial	100.4	33.9	0.0	4333.5	0.009	1.132	0.01	Sandstone	03/12/2019
BH004	11.45	Diametral	113.1	96.1	0.0	9235.2	0.002	1.342	0.002	Sandstone	03/12/2019
BH004	11.45	Axial	99.3	39.4	0.3	4981.4	0.067	1.168	0.078	Sandstone#	03/12/2019
BH004	11.60	Irregular Lump	112.8	80.2	0.7	11519.4	0.006	1.41	0.008	Sandstone#	03/12/2019
BH004	11.80	Axial	100.4	77.2	0.9	9668.7	0.092	1.362	0.125	Sandstone	03/12/2019
BH004	11.90	Diametral	128.7	91.3	0.1	8335.7	0.014	1.311	0.018	Sandstone	03/12/2019
BH004	11.90	Axial	99.4	50.2	0.2	6378.6	0.03	1.235	0.037	Sandstone#	03/12/2019
BH004	12.00	Axial	99.8	81.0	0.6	10292.6	0.058	1.375	0.08	Sandstone#	04/12/2019
BH004	12.10	Axial	100.2	44.7	0.5	5702.8	0.089	1.204	0.107	Sandstone	04/12/2019
BH004	12.15	Axial	100.4	73.5	1.2	9267.9	0.132	1.343	0.177	Sandstone#	04/12/2019
BH004	12.20	Axial	101.8	43.3	0.6	5690.1	0.102	1.203	0.123	Sandstone	04/12/2019
BH004	12.25	Diametral	100.3	98.8	0.2	9370.2	0.02	1.346	0.027	Sandstone	04/12/2019

NOTES :- Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) I-Too soft to register a reading

Date of Issue :- 22/01/2020	Certificate No :- PI/NW15883	Signed :-	Name :-	Page 3 of 11	
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588	1367

ID Manchester - Christine Campbell - Bramhope - 6/30/2020 2:14:39 PM - 84.64.246.72
CONFIDENTIAL
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 518

ID Manchester - Christie Campbell - Brentwood - GeoTechnics 6/30/2020 2:14:39 PM - 84.134.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 519

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Rook Hill Industrial Estate, Wrotham Road, Meopham, Kent DA13 0AG. Tel: 01474 815810 Fax: 01474 815811
Regional Office: Unit 27 Pioneer Court, Kelvin Way, Bedford, MK41 7PW. Tel: 01234 [illegible] Fax: 01234 [illegible]

POINT LOAD STRENGTH INDEX

ISRM: 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH004	10.25	Axial	100.4	29.4	0.5	3758.3	0.133	1.096	0.146	Sandstone	04/12/2019
BH004	12.42	Axial	104.2	85.0	1.5	11277.1	0.114	1.403	0.16	Sandstone#	04/12/2019
BH004	15.20	Diametral	104.2	96.3	0.1	9273.7	0.005	1.343	0.006	Sandstone	04/12/2019
BH004	13.20	Axial	100.1	55.9	0.7	7124.5	0.102	1.266	0.129	Sandstone	04/12/2019
BH005	9.90	Axial	97.5	69.1	0.3	8575.3	0.04	1.32	0.048	Sandstone#	09/12/2019
BH005	14.10	Diametral	233.1	100.2	0.8	10030.0	0.08	1.37	0.114	Sandstone	09/12/2019
BH005	14.10	Axial	100.4	62.8	0.7	8024.4	0.09	1.3	0.12	Sandstone	09/12/2019
BH005	14.35	Axial	94.7	73.7	1.4	8880.7	0.16	1.33	0.21	Sandstone	09/12/2019
BH005	14.35	Axial	93.4	40.7	0.7	4773.3	0.14	1.16	0.165	Sandstone	09/12/2019
BH005	14.60	Axial	98.3	89.9	2.0	11367.2	0.17	1.41	0.242	Sandstone#	09/12/2019
BH005	14.80	Diametral		99.6	1.4		0.14	1.36	0.19	Sandstone	
BH005	15.00	Diametral	200.2	100.3	1.1	10052.1	0.11	1.37	0.144	Sandstone	09/12/2019
BH005	15.00	Axial	100.5	66.8	1.7	8798.2	0.19	1.33	0.255	Sandstone	09/12/2019
BH005	15.20	Axial	100.4	63.5	0.9	8112.9	0.11	1.3	0.143	Sandstone	09/12/2019

NOTES: Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of Issue: 22/01/2020

Certificate No :- PL/NW1586/4

Signed :-

Name :-

Page 1 of 1

Client :- University of Manchester

Contract Title :- ID Manchester Preliminary Ground Investigation

AEG Contract No :- NW1586

UKAS 1367

ID Manchester - Christine Campbell - Brentwood - GeoTech - 6/5/2020 2:14:39 PM - 84.254.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 520

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 19 Lilac Grove, Eaton Park, Dunswell, Cottingham, HU16 5QR. Tel: 01482 661760 Fax: 01482 661761
Regional Office: Unit 20, Station Yard, Long Lane, Penrith, Cumbria, CA11 9BP. Tel: 01768 210300 Fax: 01768 210301

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH005	15.50	Diametral	150.8	100.1	0.6	10024.0	0.06	1.37	0.102	Sandstone	09/12/2019
BH005	15.80	Axial	100.3	64.4	1.4	5222.4	0.18	1.21	0.220	Sandstone	09/12/2019
BH005	17.02	Diametral	152.4	100.3	1.1	10308.0	0.1	1.37	0.143	Sandstone	09/12/2019
BH005	17.00	Axial	100.2	74.8	1.3	9540.7	0.14	1.35	0.184	Sandstone	09/12/2019
BH005	20.00	Diametral	176.5	100.2	0.8	10036.0	0.08	1.37	0.109	Sandstone	09/12/2019
BH005	20.00	Axial	100.9	86.2	1.5	11065.9	0.14	1.2	0.164	Sandstone	09/12/2019
BH005	20.20	Diametral	144.2	100.5	0.8	10102.3	0.08	1.37	0.104	Sandstone	09/12/2019
BH005	20.20	Axial	100.7	59.8	1.5	7673.2	0.19	1.29	0.25	Sandstone	09/12/2019
BH005	20.30	Diametral	230.9	99.6	0.9	9922.2	0.09	1.35	0.12	Sandstone	09/12/2019
BH005	20.30	Axial	100.3	60.3	0.8	7696.6	0.1	1.29	0.136	Sandstone	09/12/2019
BH005	20.50	Diametral		99.9	2.0		0.2	1.37	0.27	Sandstone	
BH005	21.00	Axial	101.3	49.8	0.7	6427.7	0.1	1.24	0.129	Sandstone	09/12/2019
BH005	21.12	Diametral	148.6	100.2	0.5	10042.0	0.05	1.37	0.068	Sandstone	09/12/2019
BH005	21.12	Axial	100.4	51.4	0.5	6569.4	0.08	1.24	0.098	Sandstone	09/12/2019

NOTES : +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #=Invalid Failure (Did not pass through end points) - Too soft to register a reading

Date of Issue :- 22/01/2020	Certificate No :- PLMW1588/3	Signed :-	Name :-	Page 5 of 11
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AES Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brantwood GeoTech - 6/3/2020 2:14:30 PM - 84.64.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 521

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 27, Ring Six Industrial Estate, Tattenhall Road, Chester le Street, County Durham, DH3 3RD. Tel: 0191 410 4747 Fax: 0191 410 4748
Regional Office: Unit 1, Dalgleish Environmental Centre, Eaton Road, Penrith, CA11 8RL. Tel: 01768 210 474 Fax: 01772 313 985

POINT LOAD STRENGTH INDEX

ISRM: 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH005	21.35	Axial	100.2	68.5	0.3	8739.9	0.04	1.33	0.052	Sandstone	09/12/2019
BH007	6.10	Diametral	117.4	91.5	0.0	8372.3	2.508	1.313	0.035	Sandstone	03/12/2019
BH007	6.10	Axial	38.8	55.2	0.1	6943.9	0.021	1.258	0.026	Sandstone	03/12/2019
BH007	6.30	Axial	98.1	74.4	0.0	9292.9	0.004	1.344	0.005	Sandstone	03/12/2019
BH007	6.50	Axial	100.5	29.9	0.1	3774.8	0.035	1.097	0.038	Sandstone	03/12/2019
BH007	6.55	Axial	100.0	38.7	0.0	4927.4	0.004	1.165	0.004	Sandstone	03/12/2019
BH007	6.60	Diametral	116.3	92.8	0.0	8611.8	0.002	1.321	0.002	Sandstone	03/12/2019
BH007	6.90	Axial	100.5	31.8	0.0	4065.3	0.011	1.117	0.012	Sandstone	03/12/2019
BH007	6.80	Diametral	111.9	67.1	0.2	7566.4	0.023	1.284	0.03	Sandstone	03/12/2019
BH007	6.80	Axial	96.9	53.4	0.2	6717.5	0.028	1.249	0.035	Sandstone	03/12/2019
BH007	9.15	Axial	104.6	39.3	0.2	5234.0	0.029	1.181	0.034	Sandstone/Clay	03/12/2019
BH007	9.60	Axial	98.3	44.1	0.3	5619.5	0.05	1.195	0.06	Sandstone	03/12/2019
BH007	9.65	Diametral	105.2	92.6	0.0	8611.8	0.004	1.321	0.005	Sandstone	03/12/2019
BH007	9.65	Axial	100.1	39.6	0.2	5047.1	0.035	1.171	0.041	Sandstone	03/12/2019

NOTES - Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) ~Too soft to register a reading

Date of issue: 22/01/2020	Certificate No: - PL/NW1588/6	Signed: -	Name: -	Page 6 of 11
Client: - University of Manchester	Contract Title: - Manchester Preliminary Ground Investigation			AEG Contract No: - NW1588

UKAS Testing 1367

ID Manchester - Christine Campbell - Brentwood - SoiTech 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 522

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Depot Road, Unit 7B, Pyle Industrial Estate, Pyle, Bridgend, South Wales, CF33 6RS. Tel: 01656 741268 E-mail: info@allied-eg.co.uk
Registered Office: 2 Acre Business Park, Hatton Heath, Chester, South West Cheshire, CH3 9AX. Tel: 01829 782000 Fax: 01829 782001

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH007	9.20	Axial	100.5	72.4	0.5	9273.6	0.049	1.343	0.066	Sandstone	03/12/2019
BH007	9.30	Diametral	104.6	91.2	0.1	5317.4	0.013	1.311	0.017	Sandstone	03/12/2019
BH007	9.90	Axial	99.3	43.0	0.2	5436.6	0.031	1.191	0.037	Sandstone	03/12/2019
BH007	11.05	Diametra	105.5	95.3	0.2	9082.1	0.021	1.337	0.028	Sandstone	03/12/2019
BH007	11.00	Axial	99.8	41.3	0.1	5248.0	0.015	1.182	0.018	Sandstone	03/12/2019
BH007	13.70	Diametra		99.8	2.1		0.21	1.36	0.29	Sandstone	
BH011	8.45	Axial	99.7	85.4	0.2	10967.8	0.02	1.395	0.028	Sandstone	03/12/2019
BH011	8.50	Axial	96.6	39.7	0.4	4662.9	0.084	1.163	0.098	Sandstone	03/12/2019
BH011	8.60	Axial	99.3	75.6	0.7	9596.2	0.072	1.353	0.097	Sandstone	03/12/2019
BH011	9.17	Diametral	120.5	97.4	0.3	9486.8	0.027	1.35	0.036	Sandstone	03/12/2019
BH011	9.17	Axial	100.0	53.5	1.0	6871.8	0.143	1.253	0.179	Sandstone	03/12/2019
BH011	9.95	Diametral	107.9	97.2	0.3	9447.8	0.036	1.349	0.049	Sandstone	03/12/2019
BH011	9.95	Axial	101.8	36.4	0.3	4718.0	0.07	1.154	0.081	Sandstone	03/12/2019
BH011	9.90	Diametral	103.8	97.2	0.1	9447.8	0.012	1.349	0.016	Sandstone	03/12/2019

NOTES: - Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) I-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW/15887	Signed :-	Name :-	Page 7 of 11
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW/1588

1387

ID Manchester - Christine Campbell - Brentwood GeoTech - 6/30/2020 2:14:38 PM - 84.234.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 523

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2 South Nottinghamshire Estate, Peterhead, Aberdeenshire, AB42 3FS. Tel: 01779 XXXXXX Fax: 01779 XXXXX
Regional Office: Unit 20, Blantyre Specialised Centre, Blantyre, Glasgow, G72 0XX. Tel: 01698 XXXXXX Fax: 01698 XXXXX

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH011	9.60	Axial	101.3	37.0	0.5	4772.2	0.105	1.157	0.176	Sandstone	03/12/2019
BH011	9.65	Diametral	112.7	96.4	0.6	9293.0	0.056	1.344	0.075	Sandstone	03/12/2019
BH011	9.65	Axial	101.5	43.5	0.6	5621.7	0.146	1.2	0.175	Sandstone	03/12/2019
BH011	10.00	Diametral	151.2	92.1	0.3	8482.4	0.033	1.316	0.043	Sandstone	03/12/2019
BH011	10.00	Axial	99.4	41.4	0.3	5239.8	0.059	1.161	0.07	Sandstone	03/12/2019
BH011	11.10	Diametral	104.-	95.4	0.4	9101.2	0.043	1.337	0.058	Sandstone	03/12/2019
BH011	11.10	Axial	100.7	32.9	0.7	4218.5	0.162	1.135	0.182	Sandstone	03/12/2019
BH011	11.30	Irregular Lump	98.5	75.1	1.3	9418.6	0.14	1.346	0.189	Sandstone#	03/12/2019
BH011	12.30	Axial	100.9	71.2	1.6	9147.1	0.179	1.339	0.24	Sandstone	04/12/2019
BH011	12.35	Axial	102.2	36.7	0.5	4775.8	0.095	1.157	0.11	Sandstone	04/12/2019
BH011	12.40	Diametral	106.6	98.7	0.5	9741.7	0.047	1.358	0.064	Sandstone	04/12/2019
BH011	12.40	Axial	101.1	39.3	0.9	5058.9	0.17	1.172	0.199	Sandstone	04/12/2019
BH011	12.50	Diametral	140.2	92.2	0.3	8500.9	0.033	1.317	0.043	Sandstone	04/12/2019
BH011	12.50	Axial	101.1	48.3	0.6	6217.4	0.127	1.228	0.156	Sandstone	04/12/2019

NOTES :- +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) - too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW1588/8	Signed :- mSeve	Name :	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brentwood GeoTech - 6/30/2020 2:54:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 524

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Registered Office: Unit 20, Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RH - Tel: 0191 370 0500 Fax: 0191 388 8740
Regional Office: Unit 2A, Brunel Road, Totnes Industrial Estate, Totnes, Devon, TQ9 5XH - Tel: 01803 867 333 Fax: 01803 865 385

POINT LOAD STRENGTH INDEX

ISRM 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH01	12.75	Diametral	102.6	91.3	0.9	8335.7	0.112	1.311	0.147	Sandstone	04/12/2019
BH01	12.75	Axial	100.7	48.7	0.4	6572.3	0.05	1.234	0.074	Sandstone	04/12/2019
BH 013	10.95	Diametral	103.0	88.7	0.2	8048.1	0.025	1.301	0.035	Sandstone	02/12/2019
BH013	10.95	Axial	98.7	35.7	1.3	4989.1	0.26	1.17	0.298	Sandstone	02/12/2019
BH013	11.00	Diametral	159.1	99.4	0.8	9680.4	0.082	1.352	0.112	Sandstone	02/12/2019
BH013	11.00	Axial	101.1	40.4	0.9	5200.5	0.176	1.179	0.208	Sandstone	02/12/2019
BH013	11.30	Axial	100.7	40.9	0.5	5244.9	0.095	1.181	0.112	Sandstone	02/12/2019
BH013	11.40	Diametral	103.6	99.8	0.6	8611.8	0.064	1.321	0.085	Sandstone	02/12/2019
BH013	11.40	Axial	106.9	43.0	0.5	5852.7	0.085	1.211	0.103	Sandstone	02/12/2019
BH013	11.65	Axial	105.7	63.9	0.9	8193.9	0.109	1.396	0.142	Sandstone	02/12/2019
BH013	11.70	Diametral	129.4	91.0	0.2	8281.0	0.02	1.309	0.026	Sandstone	02/12/2019
BH013	11.70	Axial	99.2	49.4	0.5	6239.5	0.078	1.228	0.096	Sandstone	02/12/2019
BH013	12.00	Diametral	137.4	93.9	0.2	8817.2	0.027	1.328	0.036	Sandstone	04/12/2019
BH013	12.00	Axial	99.2	98.7	0.7	6339.1	0.103	1.233	0.127	Sandstone	04/12/2019

NOTES :- +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation # Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW1588/3	Signed :- MSone	Name :-	Page 9 of 11
Client :- University of Manchester	Contract Title :- 3 Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

1367

ID Manchester - Christin Campbell - Brentwood SciTech 6/3/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 525

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Sherburn Court, Town of Sherburn, Durham Trading Estate, Sherburn Village, Durham, DH6 1PY. Tel: 0191 372 6700 Fax: 0191 372 6701
Regional Office: Unit 23, Business Development Centre, Carrington West, Manchester, M31 4SL. Tel: 0161 775 7777

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No.	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH013	12.40	Diametral	132.6	93.1	0.1	8667.6	0.013	1.323	0.017	Sandstone	04/12/2019
BH013	12.40	Axial	100.6	48.0	0.9	6148.2	0.152	1.224	0.186	Sandstone	04/12/2019
BH013	12.60	Diametral	140.9	92.7	1.2	8593.3	0.138	1.32	0.182	Sandstone	04/12/2019
BH013	12.60	Axial	100.9	41.9	1.0	5382.9	0.191	1.188	0.227	Sandstone	04/12/2019
BH013	14.00	Diametral	103.3	94.2	0.8	8873.6	0.092	1.33	0.122	Sandstone	04/12/2019
BH013	14.00	Axial	97.5	41.8	0.4	5205.1	0.078	1.179	0.092	Sandstone	04/12/2019
BH013	15.40	Diametral	109.9	94.6	0.9	8987.0	0.103	1.304	0.137	Sandstone	04/12/2019
BH013	15.40	Axial	99.2	51.0	1.0	6441.6	0.162	1.237	0.2	Sandstone	04/12/2019
HS001	0.00	Irregular Lump	106.3	46.3	7.0	6266.5	1.117	1.23	1.375	Brick	25/11/2019
HS001	0.35	Irregular Lump	109.2	64.2	0.9	8190.5	0.11	1.306	0.145	Brick#	02/12/2019
HS001	0.70	Irregular Lump	118.4	56.1	1.7	8457.2	0.199	1.315	0.262	Brick	02/12/2019
HS001	0.85	Irregular Lump	156.9	42.9	4.8	10755.1	0.442	1.385	0.614	Brick	02/12/2019
HS001	1.35	Irregular Lump	103.1	29.7	2.0	3898.7	0.512	1.105	0.566	Brick	02/12/2019
HS002	0.00	Irregular Lump	140.1	35.2	1.9	9503.1	0.298	1.24	0.37	Brick#	25/11/2019

NOTES: +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 10 of 11
22/01/2020	PLI/NW1588/19	MSoup		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brantwood SoilTech 6/30/2020 2:14:39 PM - 81.144.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 526

CONFIDENTIAL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2 Rose Cottage Business Park, St. Cuthberts Way, Darlington, DL1 1GB. Tel: 01325 356577 Fax: 01325 356578
Regional Office: Unit 3C, Beaconsfield Business Centre, Forrest Way, Blackpool, FY4 3SL. Tel: 01253 766 Fax: 01772 33

POINT LOAD STRENGTH INDEX

ISRM - 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
HC002	0.50	Irregular Lump	157.1	48.7	2.6	9741.3	0.25	1.358	0.353	Brick	02/12/2019
HC002	0.80	Irregular Lump	76.8	57.9	2.8	5224.6	0.54	1.18	0.639	Brick	02/12/2019
HC002	1.00	Irregular Lump	88.9	49.3	2.1	5580.3	0.361	1.198	0.432	Brick	02/12/2019
HC002	1.30	Irregular Lump	100.9	44.3	2.9	5691.2	0.511	1.203	0.615	Brick#	02/12/2019
HC003	0.00	Irregular Lump	128.6	58.7	8.8	6386.7	1.388	1.234	1.711	Brick	25/11/2019
HC003	0.50	Irregular Lump	108.6	21.9	2.2	3028.2	0.732	1.044	0.764	Brick	25/11/2019
HC003	0.80	Irregular Lump	119.9	29.6	5.2	4397.5	1.176	1.135	1.335	Brick	25/11/2019
HC003	0.00	Irregular Lump	87.3	39.3	2.4	4358.3	0.541	1.134	0.613	Brick	25/11/2019
HC003	0.30	Irregular Lump	80.2	32.9	3.5	3359.5	0.74	1.07	0.789	Brick#	25/11/2019
HC004	0.20	Diametral	128.8	67.2	11.1	45159	2.458	1.142	2.808	Concrete	25/11/2019
HC004	0.20	Diametral	89.8	67.6	10.0	4569.8	2.19	1.145	2.508	Concrete	25/11/2019
HC004	0.28	Axial	86.0	49.8	9.3	5510.1	1.696	1.195	2.026	Concrete	25/11/2019

NOTES :- +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) ~-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW1586/11	Signed :-	Name :-	Page 11 of 11
Client :- University of Manchester	Contract Title :- The University of Manchester Preliminary Ground Investigation			AEG Contract No :- NW1586

UKAS TESTING 1367

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 527

GSTL

Point Load Test

Int. J. Rock Mech. Sci. & Geomech. Abstr. Vol. 22. No. 2. pp. 51 - 60. 1985.

Contract Number	4.7033
Site Name	ID Manchester Preliminary Ground Investigation
Sample Type	Core
Date Tested	06/07/2020

*Please note that GSTL is not accredited for the water content of rock

Hole Reference	Depth (m)		Test Axis		Width	Platen Separation	Failure Load	Equivalent Diameter	Point Load	Size Factor	Point Load Index	Moisture Content	Description	Angle between Plane of Weakness & Core Axis	Type of Assembly (Broken or Complete)
			a-a (D/T)	b-b (D/L)											
BH01	14.00	-	a			99.0	1.97		0.14	1.00	0.15	14.5	SANDSTONE		
BH01	27.55	-	a			93.9	2.85		0.20	1.00	0.21	15.1	SANDSTONE		
BH01	13.00	-	a			93.8	2.10		0.21	1.00	0.24	13.7	SANDSTONE		

Key	Recorded As
Hole Reference	BH01
Depth (m)	14.00 - 14.00
Test Axis	a-a
Platen Separation	99.0mm
Failure Load	1.97 kN
Equivalent Diameter	99mm
Point Load	0.14 MPa
Size Factor	1.00
Point Load Index	0.15 MPa
Moisture Content	14.5 %
Description	SANDSTONE
Angle between Plane of Weakness & Core Axis	
Type of Assembly (Broken or Complete)	B

ID Manchester - Christine Campbell - Burntwood Site Team - 6/30/2020 2:[illegible]0 PM - 81.154.246.72

CONFIDENTIAL

LABORATORY TESTING ENCLOSURE 10

Determination of Unconfined Compressive Strength
(Tested Externally)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

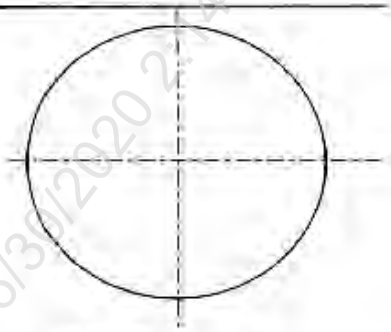
CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 529

Test Report: **Testing concrete in structures. Cored specimens. Taking, examining and testing in compression BS EN 12504-1:2009 & BS EN 12390-3: 2009**

Client:	AEG
Client Ref:	NW1588
Contract Number:	47038
Location	ID Manchester Preliminary Ground Investigation

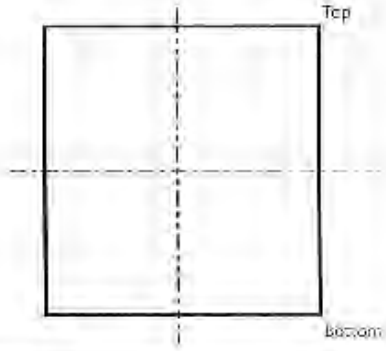
Core Description	Concrete Core
Sample Number	HC004
Maximum aggregate Size (mm)	29
Direction of coring	Unknown
Date cored	Unknown
Date of Test	06/01/2020
Method used for Preparation	Cutting
Condition On Test	Surface Dry
Core Density (kg/m^3)	2310
Density Condition	As received



Vertical re-bar
From Centre (mm) n/a
Horizontal Rebar
From Top (mm) n/a
From Centre (mm) n/a
Re-bar Diameter (mm) n/a

Measurement Dimensions: BS EN 12390-1: 2012

Size of sample Received in Lab (mm)	Diameter	86.1
	Length	238.0
Size of sample tested (mm)	Diameter	86.1
	Length	86.1
Length Diameter ratio of prepared specimen		1.00



Compression: BS EN 12390-3:2009

Compressive Strength N/mm2	25.9
Appearance of concrete and Type of Fracture	Satisfactory
Compaction of concrete, classification of void %	0.5
Any Deviations from the standard Method of Testing [1]	n/a

Remarks:

[1] All the testing was carried out in accordance with BS EN 12390-3: 2009 except as detailed

Technician Responsible [redacted]

For and behalf of GEO Site & Testing Services Ltd

Checked By: [redacted]
Wayne Honey Administrative/Quality Assistant

Date: 9/1/20

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2748

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 530

APPENDIX I

Specialist Chemical Testing

(Tested Externally)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Certificate of Analysis

Certificate Number 20-01032

27-Jan-20

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference	20-01032
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	5 Water samples.
Date Received	20-Jan-20
Date Started	20-Jan-20
Date Completed	27-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 [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

ID Manchester - Christine Chandler - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.164.246.72

CONFIDENTIAL

Summary of Chemical Analysis

Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No				1625617	1625618	1625619	1625620	1625621
Sample ID				BH001	BH004	BH005	BH007	BH011
Depth				9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
Other ID				100	100	100	100	100
Sample Type				EW	EW	EW	EW	EW
Sampling Date				16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
Sampling Time				n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Metals								
Antimony, Dissolved	DETSC 2306	0.17	ug/l	0.25	0.18	0.23	0.18	0.28
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.82	4.7	0.54	15	0.57
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	0.2	< 0.1	0.5
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	0.26	< 0.03	0.38
Calcium, Dissolved	DETSC 2306	0.09	mg/l	43	140	11	83	130
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.63	< 0.25	< 0.25	0.32	1.1
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.0	< 0.4	1.0	< 0.4	0.5
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.21	0.12	0.26	0.31	3100
Manganese, Dissolved	DETSC 2306	0.22	ug/l	780	1900	170	2600	210
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	4.3	1.0	8.6	2.3	3.7
Selenium, Dissolved	DETSC 2306	0.25	ug/l	2.6	1.5	0.87	0.81	2.4
Tin, Dissolved	DETSC 2306*	0.4	ug/l	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	1.3	0.6	1.0	< 0.6	0.9
Zinc, Dissolved	DETSC 2306	1.3	ug/l	7.8	3.9	8.8	13	45
Inorganics								
pH	DETSC 2008		pH	6.7	6.7	6.9	6.8	4.8
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40	1000
Dissolved Organic Carbon	DETSC 2085	2	mg/l	< 2.0	2.3	< 2.0	< 2.0	< 2.0
Hardness	DETSC 2303	0.1	mg/l	170	420	39.6	246	349
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	< 0.015	0.53	0.027	< 0.015	0.31
Chloride	DETSC 2055	0.1	mg/l	26	32	30	24	180
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	2.7	2.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	3.9	< 0.1	< 0.1	7.9	9.7
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

ID Manchester - Christine Carr - 6/3/2020 9:44:49 PM - 81.154.246.72

Summary of Chemical Analysis

Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No				1625617	1625618	1625619	1625620	1625621
Sample ID				BH001	BH004	BH005	BH007	BH011
Depth				9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
Other ID				100	100	100	100	100
Sample Type				EW	EW	EW	EW	EW
Sampling Date				16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
Sampling Time				n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PAHs								
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	4.9	< 0.05	0.42	0.12
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	0.09	< 0.01	0.02	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	0.37	< 0.01	0.36	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	0.01	0.27	< 0.01	0.15	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.01	0.56	< 0.01	0.42	0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.08	< 0.01	0.07	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.10	< 0.01	0.09	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.08	< 0.01	0.07	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	6.4	< 0.20	1.6	< 0.20
Phenols								
Phenols, Total	DETSC 3451*	2	ug/l	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

ID Manchester - Christine Carnegie - Brentwood - 6/2/2020 9:44:49 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 534

Summary of Chemical Analysis
Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1625617	1625618	1625619	1625620	1625621
Sample ID	BH001	BH004	BH005	BH007	BH011
Depth	9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
Other ID	100	100	100	100	100
Sample Type	EW	EW	EW	EW	EW
Sampling Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
VOCs								
Dichlorodifluoromethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Chloromethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Bromomethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Chloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Cis-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	1	< 1
2,2-dichloropropane	DETSC 3432	2	ug/l	< 2	< 2	< 2	< 2	< 2
Bromochloromethane	DETSC 3432	4	ug/l	< 4	< 4	< 4	< 4	< 4
Chloroform	DETSC 3432	1	ug/l	< 1	< 1	1	< 1	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Benzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Trichloroethylene	DETSC 3432*	1	ug/l	< 1	< 1	< 1	1	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Dibromomethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Bromodichloromethane	DETSC 3432	4	ug/l	< 4	< 4	< 4	< 4	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Toluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Chlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
m+p-Xylene	DETSC 3432	2	ug/l	< 2	< 2	< 2	< 2	< 2
o-Xylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Styrene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Bromoform	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Isopropylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 535

Summary of Chemical Analysis
Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1625617	1625618	1625619	1625620	1625621
			Sample ID	BH001	BH004	BH005	BH007	BH011
			Depth	9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
			Other ID	100	100	100	100	100
			Sample Type	EW	EW	EW	EW	EW
			Sampling Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Bromobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
n-propylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
2-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
4-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
sec-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l	< 2	< 2	< 2	< 2	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
n-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
MTBE	DETSC 3432*	1	ug/l	< 1	< 1	< 1	< 1	< 1
SVOCs								
Phenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzyl Alcohol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-chloroisopropyl)ether	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
3&4-Methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-chloroethoxy)methane	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chloro-3-methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorocyclopentadiene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chloronaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
3-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

ID Manchester - Christine Caldwell - Bruntwood SciTech - 6/30/2020 9:44:49 PM - 81.154.246.72

Summary of Chemical Analysis
Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1625617	1625618	1625619	1625620	1625621
			Sample ID	BH001	BH004	BH005	BH007	BH011
			Depth	9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
			Other ID	100	100	100	100	100
			Sample Type	EW	EW	EW	EW	EW
			Sampling Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
4-Nitrophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibenzofuran	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,3,4,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorophenylphenylether	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diphenylamine	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Bromophenylphenylether	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-ethylhexyl)ester	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Pentachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-ethylhexyl)phthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,3,5,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Azobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ID Manchester - Christine Carnegie Bruntwood SciTech - 6/3/2020 2:44:49 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

Information in Support of the Analytical Results

Our Ref 20-01032
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1625617	BH001 9.50-15.50 WATER	16/01/20	GB 1L x3, GV x4, PB 1L		
1625618	BH004 6.06-14.00 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		
1625619	BH005 5.60-21.50 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		
1625620	BH007 6.07-13.60 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		
1625621	BH011 7.40-12.40 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

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.

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

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Certificate of Analysis

Certificate Number 20-00912-1

14-Apr-20

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference	20-00912-1
Client Reference	1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	One Water sample.
Date Received	17-Jan-20
Date Started	17-Jan-20
Date Completed	14-Apr-20
Test Procedures	Identified by prefix DETSn (details on request).

Notes **This report supersedes 20-00912, amendments.**

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

Approved By [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

CONFIDENTIAL

ID Manchester - Christine Comben - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Antimony, Dissolved	DETSC 2306	0.17	ug/l	0.53
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.78
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.04
Calcium, Dissolved	DETSC 2306	0.09	mg/l	140
Chromium, Dissolved	DETSC 2306	0.25	ug/l	9.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.33
Manganese, Dissolved	DETSC 2306	0.22	ug/l	52
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	22
Tin, Dissolved	DETSC 2306*	0.4	ug/l	0.6
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	0.8
Zinc, Dissolved	DETSC 2306	1.3	ug/l	10
Inorganics				
pH	DETSC 2008		pH	7.0
Cyanide, Total	DETSC 2130	40	ug/l	78
Dissolved Organic Carbon	DETSC 2085	2	mg/l	2.6
Hardness	DETSC 2303	0.1	mg/l	405
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.025
Chloride	DETSC 2055	0.1	mg/l	36

ID Manchester - Christine Carroll - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	3.4
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0
PAHs				
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01

ID Manchester - Christine Carroll - Brunswood Limited - 6/30/2020 2:14:30 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Phenols				
Phenols, Total	DETSC 3451*	2	ug/l	< 2.0
VOCs				
Dichlorodifluoromethane	DETSC 3432	1	ug/l	< 1
Chloromethane	DETSC 3432	1	ug/l	< 1
Vinyl Chloride	DETSC 3432	1	ug/l	< 1
Bromomethane	DETSC 3432	1	ug/l	< 1
Chloroethane	DETSC 3432	1	ug/l	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l	< 1
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l	< 1
Cis-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1
2,2-dichloropropane	DETSC 3432	2	ug/l	< 2
Bromochloromethane	DETSC 3432	4	ug/l	< 4
Chloroform	DETSC 3432	1	ug/l	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l	< 1
Benzene	DETSC 3432	1	ug/l	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l	< 1
Trichloroethylene	DETSC 3432*	1	ug/l	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l	< 1
Dibromomethane	DETSC 3432	1	ug/l	< 1
Bromodichloromethane	DETSC 3432	4	ug/l	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1
Toluene	DETSC 3432	1	ug/l	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l	< 1
Dibromochloromethane	DETSC 3432	1	ug/l	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l	< 1
Chlorobenzene	DETSC 3432	1	ug/l	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1
Ethylbenzene	DETSC 3432	1	ug/l	< 1
m+p-Xylene	DETSC 3432	2	ug/l	< 2
o-Xylene	DETSC 3432	1	ug/l	< 1

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

ID Manchester - Christine Cassidy - Brunswood GeoTechnical - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 543

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Styrene	DETSC 3432	1	ug/l	< 1
Bromoform	DETSC 3432	1	ug/l	< 1
Isopropylbenzene	DETSC 3432	1	ug/l	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1
Bromobenzene	DETSC 3432	1	ug/l	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l	< 1
n-propylbenzene	DETSC 3432	1	ug/l	< 1
2-chlorotoluene	DETSC 3432	1	ug/l	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l	< 1
4-chlorotoluene	DETSC 3432	1	ug/l	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l	< 1
sec-butylbenzene	DETSC 3432	1	ug/l	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l	< 1
n-butylbenzene	DETSC 3432	1	ug/l	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l	< 1
MTBE	DETSC 3432*	1	ug/l	< 1
SVOCs				
Phenol	DETSC 3434*	1	ug/l	< 1.0
Aniline	DETSC 3434*	1	ug/l	< 1.0
2-Chlorophenol	DETSC 3434*	1	ug/l	< 1.0
Benzyl Alcohol	DETSC 3434*	1	ug/l	< 1.0
2-Methylphenol	DETSC 3434*	1	ug/l	< 1.0
Bis(2-chloroisopropyl)ether	DETSC 3434*	1	ug/l	< 1.0
3&4-Methylphenol	DETSC 3434*	1	ug/l	< 1.0
Bis(2-chloroethoxy)methane	DETSC 3434*	1	ug/l	< 1.0
2,4-Dimethylphenol	DETSC 3434*	1	ug/l	< 1.0
2,4-Dichlorophenol	DETSC 3434*	1	ug/l	< 1.0
1,2,4-Trichlorobenzene	DETSC 3434*	1	ug/l	< 1.0
4-Chloro-3-methylphenol	DETSC 3434*	1	ug/l	< 1.0
2-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0
Hexachlorocyclopentadiene	DETSC 3434*	1	ug/l	< 1.0

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

ID Planning Ltd - Christine Campbell - Brunswood GeoTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
2,4,6-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0
2,4,5-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0
2-Chloronaphthalene	DETSC 3434*	1	ug/l	< 1.0
2-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0
2,4-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0
3-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0
4-Nitrophenol	DETSC 3434*	1	ug/l	< 1.0
Dibenzofuran	DETSC 3434*	1	ug/l	< 1.0
2,6-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0
2,3,4,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0
Diethylphthalate	DETSC 3434*	1	ug/l	< 1.0
4-Chlorophenylphenylether	DETSC 3434*	1	ug/l	< 1.0
4-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0
Diphenylamine	DETSC 3434*	1	ug/l	< 1.0
4-Bromophenylphenylether	DETSC 3434*	1	ug/l	< 1.0
Hexachlorobenzene	DETSC 3434*	1	ug/l	< 1.0
Bis(2-ethylhexyl)ester	DETSC 3434*	1	ug/l	< 1.0
Pentachlorophenol	DETSC 3434*	1	ug/l	< 1.0
Di-n-butylphthalate	DETSC 3434*	1	ug/l	< 1.0
Butylbenzylphthalate	DETSC 3434*	1	ug/l	< 1.0
Bis(2-ethylhexyl)phthalate	DETSC 3434*	1	ug/l	< 1.0
Di-n-octylphthalate	DETSC 3434*	1	ug/l	< 1.0
1,4-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0
Dimethylphthalate	DETSC 3434*	1	ug/l	< 1.0
1,3-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0
2,3,5,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0
Azobenzene	DETSC 3434*	1	ug/l	< 1.0
Carbazole	DETSC 3434*	1	ug/l	< 1.0
1-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0

ID Manchester - Christine Campbell - Brynwood - Sent To - 6/30/2020 2:14:30 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

CONFIDENTIAL

Information in Support of the Analytical Results

Our Ref 20-00912-1
Client Ref 1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1624853	BH013 5.30-16.50 WATER	16/01/20	GB 1L x3, GV x4, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

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.

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

ID Manchester - Christine Campbell - Bruntwood SciTech - 31/08/2020 2:04:30 PM - 81.154.228.72

CONFIDENTIAL

Certificate of Analysis

Certificate Number 19-25005-1

17-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-25005-1

Client Reference NW1588

Order No CH1547

Contract Title ID Manchester Preliminary Ground Investiagtion

Description 2 Soil samples.

Date Received 06-Dec-19

Date Started 06-Dec-19

Date Completed 17-Dec-19

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

Notes **This report supersedes 19-25005, amendments.**

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

Approved By [redacted]

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
DS001	5	0.6	1608858	13/12/2019	Dark brown gravelly, clayey SAND
DS002	3	0.8	1608859	13/12/2019	Dark brown gravelly, clayey SAND (Possible made ground - brick)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 548

Summary of Chemical Analysis
Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

			Lab No	1608858	1608859
			Sample ID	DS001	DS002
			Depth	0.60	0.80
			Other ID	5	3
			Sample Type	ES	ES
			Sampling Date	30/11/19	01/12/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Asbestos Quantification	DETSC 1102	0		Y	
Metals					
Antimony	DETSC 2301*	1	mg/kg	3.5	260
Arsenic	DETSC 2301#	0.2	mg/kg	32	56
Beryllium	DETSC 2301#	0.2	mg/kg	0.8	1.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	1.0
Cadmium	DETSC 2301#	0.1	mg/kg	1.2	1.2
Chromium	DETSC 2301#	0.15	mg/kg	27	33
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	80	160
Lead	DETSC 2301#	0.3	mg/kg	330	2400
Mercury	DETSC 2325#	0.05	mg/kg	0.37	1.1
Nickel	DETSC 2301#	1	mg/kg	17	26
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	53	330
Vanadium	DETSC 2301#	0.8	mg/kg	28	36
Zinc	DETSC 2301#	1	mg/kg	210	470
Inorganics					
pH	DETSC 2008#		pH	10.7	8.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.6	1.6
Total Organic Carbon	DETSC 2002	0.1	%	1.1	1.8
Petroleum Hydrocarbons					
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
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.16
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.03	0.25
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.30
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.22	2.7
Anthracene	DETSC 3303	0.03	mg/kg	0.04	0.56
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.39	3.4
Pyrene	DETSC 3303#	0.03	mg/kg	0.37	3.2
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.13	1.0
Chrysene	DETSC 3303	0.03	mg/kg	0.18	1.2
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	1.1
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.06	0.44
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.11	0.88
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.06	0.32

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

CONFIDENTIAL

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Summary of Chemical Analysis

Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

			Lab No	1608858	1608859
			Sample ID	DS001	DS002
			Depth	0.60	0.80
			Other ID	5	3
			Sample Type	ES	ES
			Sampling Date	30/11/19	01/12/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.06	0.41
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.8	16
Phenols					
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/3/2020 2:14:30 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Asbestos Analysis

Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1608858	DS001 5 0.60	SOIL	Amosite	Bundle of Amosite	Michael Kay
1608859	DS002 3 0.80	SOIL	NAD	none	Michael Kay

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.

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

Lab No	1608858
Sample ID	DS001
Depth	0.60
Other ID	5
Sample Type	SOIL
Sampling Date	30/11/19
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.001**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na
Breakdown of Gravimetric Analysis (a)			
Mass of Sample		g	564.66
ACMs present*		type	
Mass of ACM in sample		g	
% ACM by mass		%	
% asbestos in ACM		%	
% asbestos in sample		%	
Breakdown of Detailed Gravimetric Analysis (b)			
% Amphibole bundles in sample		Mass %	0.001
% Chrysotile bundles in sample		Mass %	na
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Chrysotile fibres in sample		Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)			
Amphibole fibres		Fibres/g	na
Chrysotile fibres		Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
# denotes deviating sample

ID Manchester - Christine Campbell - Brunswood SciTech - 12/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Information in Support of the Analytical Results

Our Ref 19-25005-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investiagtion

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1608858	DS001 0.60 SOIL	30/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1608859	DS002 0.80 SOIL	01/12/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/5/2020 2:04:30 PM - 81.154.228.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 553

Appendix A - Details of Analysis

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

ID Manchester - Jordaine Campbell - Brimwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Appendix A - Details of Analysis

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

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

ID Manchester - Christine Campbell - Bruntwood SciTech - 03/02/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 555

Certificate of Analysis

Certificate Number	19-23765
	02-Dec-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-23765
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	3 Soil samples.
Date Received	22-Nov-19
Date Started	22-Nov-19
Date Completed	02-Dec-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approv [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

ID Manchester - Chri... - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 556

Summary of Chemical Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1601468	1601469	1601470
Sample ID	BH005	BH006A	BH006B
Depth	1.00	1.00	0.60
Other ID	5	5	4
Sample Type	ES	ES	ES
Sampling Date	16/11/19	17/11/19	17/11/19
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Antimony	DETSC 2301*	1	mg/kg	3.0	9.1	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	35	25	7.8
Beryllium	DETSC 2301#	0.2	mg/kg	1.1	0.8	0.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	1.2	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.8	0.8
Chromium	DETSC 2301#	0.15	mg/kg	25	17	8.2
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	130	76	22
Lead	DETSC 2301#	0.3	mg/kg	110	180	30
Mercury	DETSC 2325#	0.05	mg/kg	0.13	0.39	0.05
Nickel	DETSC 2301#	1	mg/kg	31	19	6.1
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.5
Tin	DETSC 2301	1	mg/kg	13	18	4.7
Vanadium	DETSC 2301#	0.8	mg/kg	35	27	11
Zinc	DETSC 2301#	1	mg/kg	96	130	35
Inorganics						
pH	DETSC 2008#		pH	8.4	9.0	11.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	11	0.5
Total Organic Carbon	DETSC 2002	0.1	%	1.7	1.4	0.4
Petroleum Hydrocarbons						
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
PAHs						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.21	0.05
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.13	0.04
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.11	1.0	0.54
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.33	0.10
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.12	1.5	0.81
Pyrene	DETSC 3303#	0.03	mg/kg	0.12	1.6	0.82
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.05	0.38	0.27
Chrysene	DETSC 3303	0.03	mg/kg	0.05	0.48	0.32
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	0.42	0.24
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.16	0.10
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.32	0.21
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.13	0.10
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.14	0.11
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.47	6.9	3.7

ID Manchester - Christine Campbell - Brunton Miller Criteria - 6/30/2020 4:30 PM - 81.154.246.72

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

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 557

Summary of Chemical Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1601468	1601469	1601470
Sample ID	BH005	BH006A	BH006B
Depth	1.00	1.00	0.60
Other ID	5	5	4
Sample Type	ES	ES	ES
Sampling Date	16/11/19	17/11/19	17/11/19
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Phenols						
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0
VOCs						
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
SVOCs						
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1

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

CONFIDENTIAL

Summary of Chemical Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1601468	1601469	1601470
			Sample ID	BH005	BH006A	BH006B
			Depth	1.00	1.00	0.60
			Other ID	5	5	4
			Sample Type	ES	ES	ES
			Sampling Date	16/11/19	17/11/19	17/11/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	0.2	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	0.1	< 0.1

ID Manchester - Christine Carvell - Drummond Sci Tech - 6/30/2020 4:30 PM - 81.154.246.72

CONFIDENTIAL

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1601468	BH005 5 1.00	SOIL	NAD	none	Michael Kay
1601469	BH006A 5 1.00	SOIL	NAD	none	Michael Kay
1601470	BH006B 4 0.60	SOIL	NAD	none	Michael Kay

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.

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Information in Support of the Analytical Results

Our Ref 19-23765
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1601468	BH005 1.00 SOIL	16/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1601469	BH006A 1.00 SOIL	17/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1601470	BH006B 0.60 SOIL	17/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

ID Manchester - Christine Campbell - Brunswood SciTech 5/5/2020 2:04:30 PM - 81.154.218.72

CONFIDENTIAL

Certificate of Analysis

Certificate Number 19-23099-1

26-Nov-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference	19-23099-1
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	7 Soil samples.
Date Received	13-Nov-19
Date Started	14-Nov-19
Date Completed	26-Nov-19
Test Procedures	Identified by prefix DETSn (details on request).

Notes **This report supersedes 19-23099, amendments.**

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

Approved By

UKAS TESTING
2139

CONFIDENTIAL
ID Manchester - Christine Comben - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 562

Summary of Chemical Analysis
Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1597114	1597115	1597116	1597117	1597118	1597119
			Sample ID	BH007	BH007	BH008	BH008	BH009	BH011
			Depth	1.00	3.30	2.20	5.20	2.60	1.00
			Other ID	5	12	7	17	9	4
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	08/11/19	09/11/19	10/11/19	10/11/19	10/11/19	09/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification	DETSC 1102	0			Y				
Metals									
Antimony	DETSC 2301*	1	mg/kg	< 1.0	2.2	2.9	3.9	1.7	1.5
Arsenic	DETSC 2301#	0.2	mg/kg	7.7	18	22	28	18	12
Beryllium	DETSC 2301#	0.2	mg/kg	0.3	0.6	0.9	0.9	1.0	0.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	0.4	0.5	0.4	0.3	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.4	0.4	0.5	0.7	0.9
Chromium	DETSC 2301#	0.15	mg/kg	11	20	33	29	15	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24	56	65	87	30	32
Lead	DETSC 2301#	0.3	mg/kg	100	140	160	250	120	150
Mercury	DETSC 2325#	0.05	mg/kg	0.07	0.20	0.30	0.41	0.10	0.22
Nickel	DETSC 2301#	1	mg/kg	7.9	16	22	20	11	9.2
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.5	< 0.5	0.9
Tin	DETSC 2301	1	mg/kg	11	16	28	41	15	14
Vanadium	DETSC 2301#	0.8	mg/kg	14	17	29	25	16	15
Zinc	DETSC 2301#	1	mg/kg	36	86	100	130	170	60
Inorganics									
pH	DETSC 2008#		pH	7.9	11.6	9.6	9.2	8.6	11.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.4	0.3	0.3	0.4	0.5	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.6	0.9	2.4	2.1	0.5	0.3
Petroleum Hydrocarbons									
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
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	0.53	0.25	5.7	4.2	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	1.1	< 0.03	0.37	0.16	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.53	0.23	4.2	4.6	< 0.03	0.10
Fluorene	DETSC 3303	0.03	mg/kg	0.38	0.14	3.7	3.6	< 0.03	0.09
Phenanthrene	DETSC 3303#	0.03	mg/kg	5.6	1.4	24	24	0.09	1.6
Anthracene	DETSC 3303	0.03	mg/kg	1.4	0.37	5.7	6.3	< 0.03	0.34
Fluoranthene	DETSC 3303#	0.03	mg/kg	20	1.5	21	21	0.11	1.9
Pyrene	DETSC 3303#	0.03	mg/kg	21	1.4	21	20	0.09	1.8
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	11	0.56	9.6	8.6	0.07	0.78
Chrysene	DETSC 3303	0.03	mg/kg	9.3	0.43	7.3	6.9	0.05	0.73
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	12	0.46	6.4	6.7	0.04	0.69
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	6.9	0.20	3.0	2.8	< 0.03	0.29
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	12	0.43	6.7	6.3	< 0.03	0.59
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	5.0	0.12	1.7	2.0	< 0.03	0.21

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

CONFIDENTIAL

ID Manchester - Christine Campbell - Bluewood Services - 6/30/2020 2:15:30 PM - 81.154.246.72

Summary of Chemical Analysis

Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1597114	1597115	1597116	1597117	1597118	1597119
			Sample ID	BH007	BH007	BH008	BH008	BH009	BH011
			Depth	1.00	3.30	2.20	5.20	2.60	1.00
			Other ID	5	12	7	17	9	4
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	08/11/19	09/11/19	10/11/19	10/11/19	10/11/19	09/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	1.0	< 0.03	0.45	0.36	< 0.03	0.06
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	7.3	0.14	2.3	2.7	< 0.03	0.22
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	110	7.6	120	120	0.45	9.4
Phenols									
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:15:30 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Chemical Analysis
Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1597120
Sample ID	BH011
Depth	3.60
Other ID	11
Sample Type	ES
Sampling Date	09/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
Asbestos Quantification	DETSC 1102	0		
Metals				
Antimony	DETSC 2301*	1	mg/kg	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	16
Beryllium	DETSC 2301#	0.2	mg/kg	1.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.4
Chromium	DETSC 2301#	0.15	mg/kg	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	440
Lead	DETSC 2301#	0.3	mg/kg	290
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05
Nickel	DETSC 2301#	1	mg/kg	17
Selenium	DETSC 2301#	0.5	mg/kg	1.1
Tin	DETSC 2301	1	mg/kg	4.5
Vanadium	DETSC 2301#	0.8	mg/kg	23
Zinc	DETSC 2301#	1	mg/kg	150
Inorganics				
pH	DETSC 2008#		pH	7.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.2
Petroleum Hydrocarbons				
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.04
Pyrene	DETSC 3303#	0.03	mg/kg	0.04
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03

ID Manchester - Christine Campbell - Buro Happold Ltd - 6/30/2020 2:14:30 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Chemical Analysis
Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1597120
Sample ID	BH011
Depth	3.60
Other ID	11
Sample Type	ES
Sampling Date	09/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.12
Phenols				
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Asbestos Analysis

Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1597114	BH007 5 1.00	SOIL	NAD	none	D Wilkinson
1597115	BH007 12 3.30	SOIL	Chrysotile	Chrysotile present as microscopic loose fibrous asbestos debris	D Wilkinson
1597116	BH008 7 2.20	SOIL	NAD	none	D Wilkinson
1597117	BH008 17 5.20	SOIL	NAD	none	D Wilkinson
1597118	BH009 9 2.60	SOIL	NAD	none	D Wilkinson
1597119	BH011 4 1.00	SOIL	NAD	none	D Wilkinson
1597120	BH011 11 3.60	SOIL	NAD	none	D Wilkinson

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.

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1597115
Sample ID	BH007
Depth	3.30
Other ID	12
Sample Type	SOIL
Sampling Date	09/11/19
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.192**
Gravimetric Quantification (a)	DETSC 1102	Mass %	0.192
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	na
Quantification by PCOM (c)	DETSC 1102	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na
Breakdown of Gravimetric Analysis (a)			
Mass of Sample		g	1024.85
ACMs present*		type	Insulation
Mass of ACM in sample		g	2.32
% ACM by mass		%	0.23
% asbestos in ACM		%	85.00
% asbestos in sample		%	0.19
Breakdown of Detailed Gravimetric Analysis (b)			
% Amphibole bundles in sample		Mass %	na
% Chrysotile bundles in sample		Mass %	na
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Chrysotile fibres in sample		Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)			
Amphibole fibres		Fibres/g	na
Chrysotile fibres		Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
# denotes deviating sample

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Information in Support of the Analytical Results

Our Ref 19-23099-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1597114	BH007 1.00 SOIL	08/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597115	BH007 3.30 SOIL	09/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597116	BH008 2.20 SOIL	10/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597117	BH008 5.20 SOIL	10/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597118	BH009 2.60 SOIL	10/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597119	BH011 1.00 SOIL	09/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597120	BH011 3.60 SOIL	09/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

ID Manchester - Christine Campbell - Bhuntwood Solutions - 6/30/2020 2:04:30 PM - 81.154.228.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 569

Certificate of Analysis

Certificate Number	19-22787-1
	26-Nov-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-22787-1
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	7 Soil samples.
Date Received	08-Nov-19
Date Started	08-Nov-19
Date Completed	26-Nov-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 19-22787, extra testing.** 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.

Appr [redacted]

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

ID Manchester - C... Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH002	4	1	1595310	15/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH002	8	2.5	1595311	15/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH004	9	2.3	1595312	15/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH004	17	5.3	1595313	15/11/2019	Dark brown red clayey, very gravelly SAND (Made ground - brick)
BH003	4	1	1595314	15/11/2019	Dark brown gravelly, sandy CLAY
BH003	11	3.5	1595315	15/11/2019	Dark brown gravelly, sandy CLAY
BH006	4	1.2	1595316	15/11/2019	Dark brown gravelly, sandy CLAY

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:49:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 571

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1595310	1595311	1595312	1595313	1595314	1595315
				Sample ID	BH002	BH002	BH004	BH004	BH003	BH003
				Depth	1.00	2.50	2.30	5.30	1.00	3.50
				Other ID	4	8	9	17	4	11
				Sample Type	ES	ES	ES	ES	ES	ES
				Sampling Date	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification	DETSC 1102	0							Y	
Metals										
Antimony	DETSC 2301*	1	mg/kg	1.9	5.8	2.4	2.0	1.4	1.1
Arsenic	DETSC 2301#	0.2	mg/kg	7.7	21	9.4	13	10	8.2
Beryllium	DETSC 2301#	0.2	mg/kg	0.6	1.1	0.5	0.5	0.3	0.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.3	0.7	0.5	0.5	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.4	1.2	0.5	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	14	210	12	20	10	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24	77	120	46	180	110
Lead	DETSC 2301#	0.3	mg/kg	110	150	400	98	88	59
Mercury	DETSC 2325#	0.05	mg/kg	0.05	0.23	0.43	< 0.05	1.6	0.06
Nickel	DETSC 2301#	1	mg/kg	15	30	9.8	13	9.5	8.7
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.3	1.1	0.7	0.9	< 0.5
Tin	DETSC 2301	1	mg/kg	2.6	31	8.2	12	17	11
Vanadium	DETSC 2301#	0.8	mg/kg	21	32	23	18	16	18
Zinc	DETSC 2301#	1	mg/kg	43	100	310	91	74	31
Inorganics										
pH	DETSC 2008#		pH	10.8	8.1	10.8	10.7	11.5	9.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	1.0	0.4	9.0	0.2	0.3
Total Organic Carbon	DETSC 2002	0.1	%	0.4	2.1	0.8	0.5	1.0	0.4
Petroleum Hydrocarbons										
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
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	0.61	< 0.03	< 0.03	3.7
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.10	< 0.03	< 0.03	0.09
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.12	< 0.03	1.2	< 0.03	0.08	2.4
Fluorene	DETSC 3303	0.03	mg/kg	0.09	< 0.03	1.0	< 0.03	0.08	2.5
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.84	0.08	8.5	0.21	0.67	12
Anthracene	DETSC 3303	0.03	mg/kg	0.17	< 0.03	1.4	< 0.03	0.17	3.2
Fluoranthene	DETSC 3303#	0.03	mg/kg	1.5	0.09	9.8	0.30	1.9	9.5
Pyrene	DETSC 3303#	0.03	mg/kg	1.3	0.08	9.8	0.25	1.5	8.8
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.35	< 0.03	3.5	0.09	0.57	2.7
Chrysene	DETSC 3303	0.03	mg/kg	0.51	< 0.03	3.7	0.13	0.74	2.9
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.41	< 0.03	3.6	0.20	1.1	2.4
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	< 0.03	1.4	0.11	0.40	0.77
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.21	< 0.03	2.4	0.05	1.1	1.8
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.13	< 0.03	1.0	0.04	0.53	0.71
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.25	< 0.03	0.11	0.17
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.14	< 0.03	1.2	0.04	0.60	0.81

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

CONFIDENTIAL

ID Manchester - Christine Campbell - Brucklay Geotech - 6/30/2020 - 81.154.246.72

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1595310	1595311	1595312	1595313	1595314	1595315
			Sample ID	BH002	BH002	BH004	BH004	BH003	BH003
			Depth	1.00	2.50	2.30	5.30	1.00	3.50
			Other ID	4	8	9	17	4	11
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	5.9	0.24	49	1.4	9.6	55
Phenols									
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:12:30 PM - 81.154.246.72

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

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 573

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1595316
Sample ID	BH006
Depth	1.20
Other ID	4
Sample Type	ES
Sampling Date	02/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
Asbestos Quantification	DETSC 1102	0		Y
Metals				
Antimony	DETSC 2301*	1	mg/kg	3.2
Arsenic	DETSC 2301#	0.2	mg/kg	20
Beryllium	DETSC 2301#	0.2	mg/kg	1.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.9
Cadmium	DETSC 2301#	0.1	mg/kg	0.7
Chromium	DETSC 2301#	0.15	mg/kg	21
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	100
Lead	DETSC 2301#	0.3	mg/kg	270
Mercury	DETSC 2325#	0.05	mg/kg	0.48
Nickel	DETSC 2301#	1	mg/kg	28
Selenium	DETSC 2301#	0.5	mg/kg	1.5
Tin	DETSC 2301	1	mg/kg	20
Vanadium	DETSC 2301#	0.8	mg/kg	39
Zinc	DETSC 2301#	1	mg/kg	180
Inorganics				
pH	DETSC 2008#		pH	8.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	1.0
Total Organic Carbon	DETSC 2002	0.1	%	3.5
Petroleum Hydrocarbons				
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.29
Anthracene	DETSC 3303	0.03	mg/kg	0.08
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.72
Pyrene	DETSC 3303#	0.03	mg/kg	0.74
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.24
Chrysene	DETSC 3303	0.03	mg/kg	0.30
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.50
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.29
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.18
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.12
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.13

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

CONFIDENTIAL

ID Manchester - Christine Campbell - Brookwood Geotech - 6/30/2020 2:14:30 PM - 81.154.246.72

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1595316
Sample ID	BH006
Depth	1.20
Other ID	4
Sample Type	ES
Sampling Date	02/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	3.6
Phenols				
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1595310	BH002 4 1.00	SOIL	NAD	none	Michael Kay
1595311	BH002 8 2.50	SOIL	NAD	none	Michael Kay
1595312	BH004 9 2.30	SOIL	NAD	none	Michael Kay
1595313	BH004 17 5.30	SOIL	NAD	none	Michael Kay
1595314	BH003 4 1.00	SOIL	Amosite	Small bundle of Amosite	Michael Kay
1595315	BH003 11 3.50	SOIL	NAD	none	Michael Kay
1595316	BH006 4 1.20	SOIL	Amosite	Small bundle of Amosite	Michael Kay

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.

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/10/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 576

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

		Lab No	1595314	1595316
		Sample ID	BH003	BH006
		Depth	1.00	1.20
		Other ID	4	4
		Sample Type	SOIL	SOIL
		Sampling Date	02/11/19	02/11/19
		Sampling Time		
Test	**Method**	**Units**		
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**< 0.001**	**< 0.001**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	<0.001	<0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na
Breakdown of Gravimetric Analysis (a)				
Mass of Sample		g	832.22	886.10
ACMs present*		type		
Mass of ACM in sample		g		
% ACM by mass		%		
% asbestos in ACM		%		
% asbestos in sample		%		
Breakdown of Detailed Gravimetric Analysis (b)				
% Amphibole bundles in sample		Mass %	<0.001	<0.001
% Chrysotile bundles in sample		Mass %	na	na
Breakdown of PCOM Analysis (c)				
% Amphibole fibres in sample		Mass %	na	na
% Chrysotile fibres in sample		Mass %	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)				
Amphibole fibres		Fibres/g	na	na
Chrysotile fibres		Fibres/g	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
# denotes deviating sample

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 577

Information in Support of the Analytical Results

Our Ref 19-22787-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1595310	BH002 1.00 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595311	BH002 2.50 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595312	BH004 2.30 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595313	BH004 5.30 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595314	BH003 1.00 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595315	BH003 3.50 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595316	BH006 1.20 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

ID Manchester - Christine Campbell - Brunswood Sciences - 6/30/2020 2:04:30 PM - 81.154.218.72

CONFIDENTIAL

Appendix A - Details of Analysis

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

ID Manchester - Corinne Campbell - Brynwood SciTech - 21/10/2020 2:14:30 PM - 81 154 28.72

CONFIDENTIAL

Appendix A - Details of Analysis

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

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

ID Manchester - Christine Campbell - Bruntwood SciTech - 07/12/2020 12:14:30 PM - 81.154.28.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 580

Certificate of Analysis

Certificate Number 19-22333-2

10-Jan-20

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference	19-22333-2
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	8 Soil samples.
Date Received	05-Nov-19
Date Started	05-Nov-19
Date Completed	10-Jan-20
Test Procedures	Identified by prefix DETSn (details on request).

Notes **This report supersedes 19-22333-1, amendments.**

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

A [redacted]

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

ID Manchester ine Complex - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-22333-2
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH013	4	1	1592554	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
BH013	11	3.5	1592555	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
BH014	5	0.7	1592556	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
BH014	15	4	1592557	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP001	6	0.8	1592558	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP002	6	1	1592559	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP002	12	2.5	1592560	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP003	9	1	1592561	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/3/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 582

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1592554	1592555	1592556	1592557
			Sample ID	BH013	BH013	BH014	BH014
			Depth	1.00	3.50	0.70	4.00
			Other ID	4	11	5	15
			Sample Type	ES	ES	ES	ES
			Sampling Date	28/10/19	28/10/19	28/10/19	28/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Antimony	DETSC 2301*	1	mg/kg	1.7	1.5	7.4	2.3
Arsenic	DETSC 2301#	0.2	mg/kg	19	7.4	32	13
Beryllium	DETSC 2301#	0.2	mg/kg	0.9	0.6	0.6	0.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	< 0.2	< 0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.5	0.9	0.3
Chromium	DETSC 2301#	0.15	mg/kg	18	11	24	25
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	36	46	430	79
Lead	DETSC 2301#	0.3	mg/kg	51	73	230	82
Mercury	DETSC 2325#	0.05	mg/kg	0.11	0.24	0.17	0.12
Nickel	DETSC 2301#	1	mg/kg	22	13	34	20
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	3.3	8.2	31	16
Vanadium	DETSC 2301#	0.8	mg/kg	29	21	24	27
Zinc	DETSC 2301#	1	mg/kg	75	84	560	110
Inorganics							
pH	DETSC 2008#		pH	8.1	10.8	8.4	8.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	3.5	0.3
Total Organic Carbon	DETSC 2002	0.1	%	0.8	0.9	1.2	0.3

ID Manchester - Christine Campbell_Brumwell_BriTest - 6/30/2020 - 1:30 PM - 81.154.246.72

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

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 583

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1592554	1592555	1592556	1592557
			Sample ID	BH013	BH013	BH014	BH014
			Depth	1.00	3.50	0.70	4.00
			Other ID	4	11	5	15
			Sample Type	ES	ES	ES	ES
			Sampling Date	28/10/19	28/10/19	28/10/19	28/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Petroleum Hydrocarbons							
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	0.20	0.12	0.42	0.04
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06	0.08	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.48	0.26	2.3	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	0.46	0.20	1.4	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	2.9	1.6	13	0.14
Anthracene	DETSC 3303	0.03	mg/kg	0.91	0.46	2.5	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	3.4	2.9	11	0.14
Pyrene	DETSC 3303#	0.03	mg/kg	2.8	2.6	9.9	0.14
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.86	0.84	3.2	0.06
Chrysene	DETSC 3303	0.03	mg/kg	0.78	0.81	3.0	0.06
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.74	0.71	2.8	0.05
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.27	0.25	0.95	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.54	0.54	2.1	0.04
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.20	0.18	0.70	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	0.20	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.24	0.22	0.86	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	15	12	54	0.66
Phenols							
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0

ID Manchester - Christine Carnegie - Brookwood (CTE) - 01/30/2020 - 1:30 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1592558	1592559	1592560	1592561
			Sample ID	TP001	TP002	TP002	TP003
			Depth	0.80	1.00	2.50	1.00
			Other ID	6	6	12	9
			Sample Type	ES	ES	ES	ES
			Sampling Date	28/10/19	29/10/19	29/10/19	28/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Antimony	DETSC 2301*	1	mg/kg	4.8	6.1	3.3	16
Arsenic	DETSC 2301#	0.2	mg/kg	87	44	20	22
Beryllium	DETSC 2301#	0.2	mg/kg	0.7	1.3	0.6	2.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.2	0.9	0.8	0.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3	0.8	0.2
Chromium	DETSC 2301#	0.15	mg/kg	20	22	15	19
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	110	230	100	380
Lead	DETSC 2301#	0.3	mg/kg	300	530	250	370
Mercury	DETSC 2325#	0.05	mg/kg	0.45	1.6	0.67	1.0
Nickel	DETSC 2301#	1	mg/kg	17	32	16	450
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.3	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	20	31	19	96
Vanadium	DETSC 2301#	0.8	mg/kg	31	37	18	61
Zinc	DETSC 2301#	1	mg/kg	140	620	220	92
Inorganics							
pH	DETSC 2008#		pH	8.4	7.7	9.0	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	2.9	1.8	0.3	0.4
Total Organic Carbon	DETSC 2002	0.1	%	1.1	3.6	1.5	4.4

ID Manchester - Christine Campbell_Brumwell@ciTech - 6/30/2020, 1:18:30 PM - 81.154.246.72

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

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 585

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1592558	1592559	1592560	1592561
				Sample ID	TP001	TP002	TP002	TP003
				Depth	0.80	1.00	2.50	1.00
				Other ID	6	6	12	9
				Sample Type	ES	ES	ES	ES
				Sampling Date	28/10/19	29/10/19	29/10/19	28/10/19
				Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Petroleum Hydrocarbons								
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
PAHs								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.05	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.11	0.36	0.06
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.07	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.03	0.19	0.55	0.09
Pyrene	DETSC 3303#	0.03	mg/kg	0.03	0.20	0.55	0.09
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.09	0.20	0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.10	0.21	0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.13	0.20	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	0.07	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.08	0.16	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.08	0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.09	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	1.0	2.6	0.33
Phenols								
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0

ID Manchester - Christine Cameron - Broadwater Golf Club - 6/30/2020 2:18:30 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Asbestos Analysis

Soil Samples

Our Ref 19-22333-2
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1592554	BH013 4 1.00	SOIL	NAD	none	Keith Wilson
1592555	BH013 11 3.50	SOIL	NAD	none	Keith Wilson
1592556	BH014 5 0.70	SOIL	NAD	none	Keith Wilson
1592557	BH014 15 4.00	SOIL	NAD	none	Keith Wilson
1592558	TP001 6 0.80	SOIL	NAD	none	Keith Wilson
1592559	TP002 6 1.00	SOIL	NAD	none	Keith Wilson
1592560	TP002 12 2.50	SOIL	NAD	none	Keith Wilson
1592561	TP003 9 1.00	SOIL	NAD	none	Keith Wilson

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.

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Information in Support of the Analytical Results

Our Ref 19-22333-2
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1592554	BH013 1.00 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592555	BH013 3.50 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592556	BH014 0.70 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592557	BH014 4.00 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592558	TP001 0.80 SOIL	28/10/19	GJ 250ml, GJ 60ml x2, PT 1L x2		
1592559	TP002 1.00 SOIL	29/10/19	GJ 250ml, GJ 60ml x2, PT 500ml x2		
1592560	TP002 2.50 SOIL	29/10/19	GJ 250ml, GJ 60ml x2, PT 500ml x2		
1592561	TP003 1.00 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

ID Manchester - Christine Campbell - Mountwood Mitch - 6/30/2020 2:14:30 PM - 81.154.228.72

CONFIDENTIAL

Appendix A - Details of Analysis

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

ID Manchester - Jordaine Campbell - Brimwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Appendix A - Details of Analysis

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

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

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 590

Certificate of Analysis

Certificate Number 19-22225-1

15-Nov-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-22225-1

Client Reference NW1588

Order No CH1547

Contract Title ID Manchester Preliminary Ground Investigation

Description 4 Soil samples.

Date Received 30-Oct-19

Date Started 04-Nov-19

Date Completed 15-Nov-19

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

Notes This test supersedes 19-22225, additional testing.
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.

Ap [redacted]

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

ID Manchester - Pipeline Consultants - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH001	8	1	1591955	11/11/2019	Dark brown gravelly, sandy CLAY
BH001	15	3	1591956	11/11/2019	Dark brown gravelly, sandy and CLAY (Possible made ground - brick)
BH012A	10	2.6	1591957	11/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH012A	23	7.5	1591958	11/11/2019	Dark brown gravelly, sandy CLAY

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:41:30 PM - 81.154.246.72

CONFIDENTIAL

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1591955	1591956	1591957	1591958
			Sample ID	BH001	BH001	BH012A	BH012A
			Depth	1.00	3.00	2.60	7.50
			Other ID	8	15	10	23
			Sample Type	ES	ES	ES	ES
			Sampling Date	26/10/19	27/10/19	26/10/19	27/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Antimony	DETSC 2301*	1	mg/kg	1.5	1.4	< 1.0	1.2
Arsenic	DETSC 2301#	0.2	mg/kg	9.1	10	6.4	7.2
Beryllium	DETSC 2301#	0.2	mg/kg	0.9	0.7	0.5	0.7
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	1.0	0.7	0.8	1.1
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2	0.1	0.2
Chromium	DETSC 2301#	0.15	mg/kg	23	17	12	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	38	35	23	25
Lead	DETSC 2301#	0.3	mg/kg	39	200	34	42
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.16	0.06	0.09
Nickel	DETSC 2301#	1	mg/kg	30	18	13	18
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	1.5	4.4	5.2	2.5
Vanadium	DETSC 2301#	0.8	mg/kg	29	25	17	25
Zinc	DETSC 2301#	1	mg/kg	60	43	37	48
Inorganics							
pH	DETSC 2008#		pH	8.1	8.4	8.5	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	0.1	< 0.1	0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.7	0.7	0.7	1.2
Petroleum Hydrocarbons							
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.05	0.04	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

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

CONFIDENTIAL

ID Manchester - Christine Campbell - Brunswick BCiTech - 6/3/2020 9:14:31 PM - 81.154.246.72

Summary of Chemical Analysis
Soil Samples

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1591955	1591956	1591957	1591958
			Sample ID	BH001	BH001	BH012A	BH012A
			Depth	1.00	3.00	2.60	7.50
			Other ID	8	15	10	23
			Sample Type	ES	ES	ES	ES
			Sampling Date	26/10/19	27/10/19	26/10/19	27/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10
Phenols							
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:37 PM - 81.154.246.72

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

CONFIDENTIAL

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1591955	BH001 8 1.00	SOIL	NAD	none	Michael Kay
1591956	BH001 15 3.00	SOIL	NAD	none	Michael Kay
1591957	BH012A 10 2.60	SOIL	NAD	none	Michael Kay
1591958	BH012A 23 7.50	SOIL	NAD	none	Michael Kay

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.

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2021 2:14:30 PM - 81.154.248.72

CONFIDENTIAL

Information in Support of the Analytical Results

Our Ref 19-22225-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1591955	BH001 1.00 SOIL	26/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1591956	BH001 3.00 SOIL	27/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1591957	BH012A 2.60 SOIL	26/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1591958	BH012A 7.50 SOIL	27/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

ID Manchester - Christine Campbell - Buntworth SciTech - 6/30/2020 2:14:30 PM - 81.154.218.72

CONFIDENTIAL

Appendix A - Details of Analysis

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

ID Manchester, Jemaine Campbell - Brunswood SciTech - 6/30/2020 2:14:30 PM - 81.154.248.72

CONFIDENTIAL

Appendix A - Details of Analysis

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

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

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/9/2020 2:14:30 PM - 81.154.28.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 598

Quality Control

Quality Systems.

Derwentside Environmental Testing Services employs numerous measures to ensure high levels of confidence in the results produced. Our laboratory has been accredited by the United Kingdom Accreditation Service (UKAS) since its inception and operates in full compliance with the internationally recognised standard ISO17025 and the Environment Agency's MCERTS (Monitoring & Certification Scheme) standard for soils and waters, which provides greater assurance to all parties of the reliability of data from chemical analysis.

To obtain a copy of our full UKAS schedule visit the UKAS website at www.ukas.org and search for our laboratory number 2139.

2139

Proficiency Testing Schemes.

DETS participates in seven external proficiency testing schemes in order to monitor and ensure the continuing quality of analysis. These schemes are:

Internal Quality Control.

DETS runs a strict internal quality control system. A minimum of 5% of all samples that undergo analysis in our laboratories are quality control samples. This way we can ensure a high level of confidence in all of the analytical data produced. In addition, MCERTS accredited tests must meet strict, ongoing limits for precision and bias in order to maintain their accreditation status.

CONFIDENTIAL

ID Manchester - Christina Campbell - Blackwood SciTech - 6/30/2020 2:14:03 PM - 81.154.246.72

SAMPLE HOLDING TIME INFORMATION

Soil

Analyte	Container type	Minimum sample required	Reference	Maximum holding time from sampling	
				pre drying/extraction[1]	post drying/extraction[2]
Ammonium	Glass or plastic	20g	BS ISO18512:2007	1 week	
Anions	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
BTEX	60ml glass jar	Full container	EPA 8260	2 weeks	N/A
Conductivity	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Cyanide	Glass or plastic	20g	EPA 9010B/9012	2 weeks	
Heavy metals	Glass or plastic	10g	BS ISO18512:2007	6 months	30 years
Hexavalent chromium	Glass or plastic	20g	BS ISO18512:2007	1 month	
Loss on ignition	Glass or plastic	10g	BS ISO18512:2007	1 month	
OCP	Glass	20g	BS ISO18512:2007	1 month	
Oil & grease	Glass	20g	EPA 9070/1	1 month	
Organic matter/TOC	Glass or plastic	20g	BS ISO18512:2007	1 month	
PAH	Glass	20g	EPA 8100/8270	2 weeks	6 weeks
PCB	Glass	20g	BS ISO18512:2007	1 month	
pH	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Phenols	Glass	20g	EPA 8270	2 weeks	6 weeks
PRO	60ml glass jar	Full container	EPA 8015	2 weeks	N/A
Sulphide	Glass or plastic	20g	BRE SD1	3 weeks	1 month
SVOC	Glass	20g	EPA 8270	2 weeks	6 weeks
TEM/CEM	Glass	20g	EPA 418.1	2 weeks	6 weeks
Thiocyanate	Glass or plastic	20g	EPA 9251	No special requirement	
Total sulphur	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
TPH (C10-C40)	Glass	20g	EPA 418.1	2 weeks	6 weeks
VOC	60ml glass jar	Full container	EPA 8260	2 weeks	N/A

Sample storage environment 5°C

1. From sampling to extraction
2. Once extracted

ID Manchester - Christine Campbell - Brentwood - 6/30/2020 12:11:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 600

Waters

Analyte	Container type	Min sample required (ml)	Reference	Preservative required	Max holding time until extraction
Alkalinity	Glass or plastic	100	EPA 310.2	none	2 weeks
Ammonium	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	3 weeks
BOD	Glass or plastic	500	EPA 405.1 5120B	none	2 days
BTEX	Glass vial	Full container	Lab validation	none	2 weeks
Chloride	Glass or plastic	20	ISO 5667 3:2012	none	1 month
COD	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	1 month
Conductivity/TDS	Glass or plastic	100	EPA 160.1	none	1 week
Cyanide	Plastic	50	EPA 9012/335.3	Sodium hydroxide	2 weeks
Hexavalent chromium	Glass or plastic	20	ISO 5667 3:2012	none	4 days
Metals	Glass or plastic	20	ISO 5667 3:2012	Nitric acid	1 month
Nitrate	Glass or plastic	20	EPA 353.2	none	2 days
Nitrite	Glass or plastic	20	EPA 600/4 079-020	none	2 days
OCP	Glass	500	EPA 8081A/608	none	1 week
Oil & grease	Glass	500	ISO 5667 3:2012	Hydrochloric acid	1 month
PAH	Glass	500	ISO 5667 3:2012	none	1 week
pH	Glass or plastic	50	Lab validation	none	1 week
PCB	Glass	500	EPA 8082A	none	6 weeks
Phenols	Glass	500	ISO 5667 3:2012	Sulphuric acid	3 weeks
Phosphate	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	1 month
PRO	Glass vial	Full container	EPA 8015	none	2 weeks
Sulphate	Glass or plastic	20	ISO 5667 3:2012	none	1 month
Sulphide	Plastic	50	ISO 5667 3:2012	NaOH/Zinc acetate	1 week
Suspended solids	Glass or plastic	100	EPA 160.2 2540D	none	1 week
SVOC	Glass	500	EPA 8270/625	none	1 week
TOC	Glass or plastic	20	ISO 5667 3:2012	Sulphuric/Phosphoric acid	1 week
TON	Glass or plastic	20	EPA 353.2	none	1 month
TPH/EPH	Glass	500	Lab validation	none	1 weeks
VOC	Glass vial	Full container	Lab validation	none	1 week

Sample storage environment 3°C ± 2°C

ID Manchester - Corstine Campbell - Brentwood Branch - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 601

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETS 036	**Leachate Preparation** **(NRA Method and BS EN 12457 Parts 1-3)**	Leachates are prepared as per the NRA (1994) method and as per BS EN 12457 Parts 1 - 3 one and two stage leachate preparation.	Leaching Test Method for the Assessment of Contaminated Land, Interim Guidance, NRA(1994) BS EN 12457 Part 1,2 & 3	n/a	Not Accredited
DETS 073	**Acid Neutralisation Capacity of Soils and Other Solids**	ANC is a measure of the buffering capacity of soils and other waste materials. The analysis measures the amount of acid required to bring the sample to a fixed pH. The initial pH of the sample extract must be measured before analysis begins. Analysis is performed by the addition of acid in conjunction with pH measurement by pH meter until the specified pH has been reached as indicated by the meter. The result is expressed in mol/kg (dry wt).	Annex B (Preliminary determination of the acid/base consumption) – CEN/TC 292 – WI 292046 – Characterization of waste – Leaching behaviour tests – Acid and Base neutralization capacity test	1.0 mol/kg	Not Accredited
DETS 074	**Low Level PAH by HPLC Fluorescence**	PAH is extracted from one litre of filtered water sample by solid phase extraction. PAH is eluted from the SPE column with DCM evaporated to dryness under nitrogen and redissolved in acetonitrile. Analysis of samples is carried out by HPLC fluorescence.	EPA Method 550 The Analyst 2001, 126:1336-1331 Phenomonex Strata X Application Note for PAH by SPE	0.01ug/L each 5.0 ug/L Total	Not Accredited

ID Manchester - Christine Campbell - Unlimited SoTeer - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 602

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 1001	**Sample Pre-Treatment and Preparation of Solids**	Solid samples are classified and identified. Samples requiring analysis for unstable or volatile determinands are analysed as received. Samples requiring analysis for stable and non-volatile determinands are dried at <30◦C or 50◦C, depending on requirements, for a minimum of 16hrs (overnight). Dried samples are crushed in a jaw crusher, if necessary, and then ground using a mechanical mixer mill and sieved through a 250µm sieve to ensure they are homogenous.	BS1377:1990 – Soils for Civil Engineering Purposes The preparation and pre-treatment of potentially contaminated soils prior to chemical analysis – MEWAM – 2006 – Environment Agency (Updated procedure under preparation)	n/a	Not Accredited
DETSC 1002	**Description of Soil Sample Type**	This method outlines the procedure used to describe soil samples with respect to basic type, predominant colour and inclusions. The procedure is carried out during the sample preparation stage.	BS 5930:Section 6:1999	n/a	Not Accredited
DETSC 1003	**Stone and Glass / Metal / Plastic Content of Soil**	This method outlines the procedure used to determine the Stone and Glass/Metal/Plastic content of soil samples. The procedure is carried out during the sample preparation stage.	BS 3882:2007 BS 1377:1990	0.1%	Not Accredited
DETSC 1004	**Moisture Content/Loss on Drying of Soil**	Loss on drying is determined by loss of mass on drying in an oven set at 28ºC or 50ºC. Moisture content is determined by loss of mass on drying in an oven set at 105ºC. The procedure is carried out during the sample preparation stage.	Practical Environmental Analysis. Radojevic & Bashkin. RSC 1999 BS 1377: Part 2:1990 DETS drying time study	0.1%	Not Accredited
DETSC 1101	**Asbestos - Bulk Analysis**	Samples are examined visually for the presence of asbestos containing materials or asbestos fibres. Suspect fibres are removed from the sample and examined using polarised light microscopy to determine whether they are asbestos fibres. If no asbestos fibres are identified by the method after an adequate length of examination time, and after at least two small pinch samples have been examined, then the sample may be reported as 'NAD' (no asbestos detected).	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005 McCrone W.C., Asbestos Identification (Second Edition), The McCrone Research Institute, 1987 LAB 30, Application of ISO/IEC17025 for Asbestos Sampling and Testing, UKAS, Edition 2, April 2008	n/a	UKAS

ID Manchester - Christine Campbell - Bruntwood - BotTech - 6/30/2026 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 603

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 1102	**Quantification of asbestos in soils, loose aggregates and ballast**	The method of quantification is divided into three procedures: Gravimetric analysis, detailed gravimetric analysis and PCOM analysis. The analysis may be affected by the client's requirements as determined by contract review, and by the nature of the asbestos found in the sample, e.g. whether ACMs are present, and whether fibre bundles large enough to pick out using tweezers are have been found in the sample.	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005 HSG264 Asbestos: The survey guide. HSE Books, 2010. Davies, L. S.T., Wetherill, G. Z., McIntosh, C., McGonagle, C., Addison, J. 1996. Development and validation of an analytical method to determine the amount of asbestos in soils and loose aggregates. HSE Contract Research Report N0. 83/1996. HSE Books	Gravimetric Analysis: 0.01% for 1kg sample Detailed Gravimetric Analysis: 0.001% for 50g sample PCOM Analysis: 0.001%	UKAS
DETSC 1103	**Asbestos Water Absorption Test**	This test involves a sample of the asbestos product being dried and weighed before being immersed in water for a period of time. The sample is then removed from the water and re-weighed. If the amount of water absorbed is <30% by weight, then the sample should be reported as 'Not Licensed'. If ≥30% water is absorbed then the sample should be reported as being 'Licensed', i.e. an asbestos material for which a licence is required to work on.	Work with Materials Containing Asbestos: Approved Code of Practice and Guidance. HSE Books, 2006.	n/a	UKAS
DETSC 2002	**Organic matter content of soil**	The procedure is based upon Walkley and Black's method. Organic matter in soil is oxidised with potassium dichromate in the presence of concentrated sulphuric acid. The excess dichromate is titrated with ferrous sulphate using diphenylamine as an external indicator. The organic matter content is calculated from the amount of dichromate used during the oxidation process based on an empirical relationship.	BS1377 : Part 3 : 1990 Method 3 BS1377 : Part 1 : 1990 BS 3882:2007	0.1%	UKAS MCERTS(Soils)

ID Manchester, Christine Lambert, Arup Wood SciTech, 3/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 604

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

DETSC 2003	**Loss On Ignition**	Soil is ignited at 440C and the amount of sample lost on ignition is determined gravimetrically. Other specified temperatures may be used but are not accredited.	BS1377 : Part 3 : 1990 Method 4 BS1377 : Part 1 : 1990	0.01%	UKAS MCERTS(Soils)
Method Number	**Title**	**Description**	**Reference**	**LOD**	**Accreditation Status**
DETSC 2004	**Sulphate Content of Soil and Water**	The sulphate in the soil is dissolved in dilute hydrochloric acid, or in an aqueous extract having a water:soil ratio of 2:1 and the insoluble residue is removed by filtration. Waters are also filtered prior to analysis. The sulphate in the filtrate is precipitated as barium sulphate which is then filtered, ignited and weighed.	BS1377 : Part 3 : 1990 Method 5 BS1377 : Part 1 : 1990 BRE SD1: 2005 Concrete in Aggressive Ground	**Acid Soluble:** 0.01% **Water Soluble** 100mg/l **Waters** 10mg/l	UKAS MCERTS(Soils)
DETSC 2005	**Carbonate content of soil by Rapid Titration**	The carbonate present in the soil reacts with a known excess of hydrochloric acid liberating carbon dioxide. The acid remaining after the reaction is determined by titration against sodium hydroxide. The result is calculated in terms of the equivalent proportion of carbon dioxide.	BS 1377: Part 1: 1990. BS 1377: Part 3: 1990: Method 5	1%	UKAS
DETSC 2006	**Water Soluble Chloride Content of Soil & Chloride Content of Water**	The chloride in the soil is dissolved in water and the insoluble material is removed by filtration. Waters are filtered before analysis. The chloride is analysed by Mohr's method. The chloride in a neutral solution is titrated against standard silver nitrate using potassium chromate as an indicator. The colour change is from yellow to brick red.	BS1377 : Part 3 : 1990 Method 7.2 BS1377: Part 1: 1990	**Soil:** 0.01% **Water:** 10mg/l	UKAS MCERTS(Soils)
DETSC 2007	**Acid Soluble Chloride Content of Soil and Concrete**	The chloride in the sample is dissolved in nitric acid and the insoluble material is removed by filtration. The dissolved chloride is analysed by Volhard's method. The chloride in solution is precipitated with a known excess of standard silver nitrate. The excess silver nitrate is titrated against standard ammonium thiocyanate using ferric alum as an indicator. The colour change is white to red.	BS1377 : Part 3 : 1990 Method 7.3 BS1377: Part 1: 1990 BS 1881-124:1988	0.01%	UKAS

ID Manchester Christine Campbell - Brunel MetCalTech 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 605

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2008	**pH Value of Soil and Water**	The pH value of a soil suspension in water or a groundwater sample is determined electrometrically using a glass electrode.	BS1377: Part 3: 1990 – Soils for Civil Engineering Purposes – Chemical and Electrochemical Methods	n/a	UKAS (Soils + Waters) MCERTS (Soils + Waters-Trade Effluent only)
DETSC 2009	**Electrical Conductivity of Soil & Water**	The electrical conductance of a soil suspension in water or of a water sample is determined by voltammetry using a conductivity meter. In some cases, the soil may need to be extracted with an aqueous solution of an inorganic salt e.g. the conductivity of topsoil is determined by preparing a suspension of the soil in saturated calcium sulphate.	Standard Methods for the Examination of water and Wastewater Part 2510B 21st Edition 2005 APHA, AWWA, WEF BS3882:2007 Specification for Topsoil	1uS/cm	UKAS
DETSC 2019	**Loose Packed Dry Soil Density**	Dried, ground soil is transferred to a dry, tared measuring cylinder and the volume recorded. The cylinder and its contents are then weighed and the density of the soil calculated.	BS3882:2007 Specification for Topsoil	n/a	Not Accredited

ID Manchester - Christine Campbell - Brunthill SciTech - 6/10/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 606

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2024	**Sulphide in Soil and Water by Iodometry**	Hydrogen sulphide is liberated by acidification of the sample with hydrochloric acid in a steam distillation unit. The hydrogen sulphide produced is carried over with the steam and is absorbed in alkaline zinc acetate. The zinc sulphide produced reacts with iodine formed when iodate-iodide is acidified and the excess iodine titrated with standard thiosulphate.	In House Method based on: Environment Agency The determination of easily liberated sulphide in soils and similar matrices (2010) - Blue Book 228 Method D - The determination of easily liberated sulphide in as received or air-dried samples following acid steam distillation with iodometric titration. Environment Agency The determination of sulphide in waters and associated materials (2007) Draft Method D - The determination of easily liberated sulphide in as received or air-dried samples following phosphoric acid steam distillation with iodometric titration.	**Soils:** 10mg/kg . **Waters:** 250ug/l	**Soils:** UKAS MCERTS(Soils) **Waters:** Not Accredited
DETSC 2030	**Alkalinity in Water**	Alkalinity of a water sample is determined by indicator end point titration with a strong acid from sample pH to pH8.3 (where applicable) and then to pH4.5. From the titres obtained the total alkalinity and concentrations and types of alkalinity present can be calculated.	SCA Method ISBN 0 11 751601 5 The Determination of Alkalinity and Acidity in Water 1981 Instruction Manual for Skalar SP50 Robotic Analyser	20mg/l as CaCO3	UKAS MCERTS(Waters) Trade Effluent only
DETSC 2031	**5 Day Biochemical Oxygen Demand**	The sample, either diluted or undiluted, is placed in a BOD bottle and the initial dissolved oxygen content of the sample is measured using a dissolved oxygen meter. The bottle is placed in an incubator at 20ºC in the dark for 5 days. After this time the bottle is removed and the residual dissolved oxygen content of the sample is measured. The BOD of the sample is calculated from the reduction in the concentration of dissolved oxygen over 5 days.	SCA Method ISBN 0 117522120 5 Day Biochemical Oxygen Demand (BOD5) Second Edition 1988	1 mg/l	UKAS MCERTS(Waters)- Trade Effluent only

ID: Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 607

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2032	**Chemical Oxygen Demand**	Oxidisable substances react with sulphuric acid – potassium dichromate solution in the presence of silver sulphate as a catalyst. Chloride is masked by mercury sulphate. The reduction in the yellow colouration of Cr6+ is evaluated using a spectrophotometer for the low range tubes (LCK 314) whilst the green colouration of Cr3+ is evaluated for the medium and high range tubes (LCK 014 and LCK 114).	Environment Agency The determination of chemical oxygen demand in waters and effluents (2007) Methods for the Examination of Waters and Associated Materials	10 mg/l	UKAS MCERTS(Waters)-Trade Effluent only
DETSC 2033	**Total and Dissolved Organic Carbon in Water**	The term TOC (Total Organic Carbon) is used to describe the total content of organically bound carbon in dissolved and undissolved compounds. The TOC content is expressed in mg/l. If DOC (Dissolved Organic Carbon) is required, samples are filtered through a 0.45µm filter paper prior to analysis. Inorganic carbon is expelled by acidification of the sample. TOC is then determined by digestion of the sample with sulphuric acid and peroxodisulphate. Carbon containing compounds are transformed into carbon dioxide. The carbon dioxide evolves and reacts with an indicator solution. The colour change is measured using a spectrophotometer.	Hach-Lange Technical Instructions: LCK 385, LCK 386, LCK 387	2 mg/l	UKAS
DETSC 2034	**Suspended and Settleable Solids in Water**	Suspended matter is removed from a measured volume of sample by filtration under reduced pressure through a pre-treated, pre-weighed glass fibre filter paper. The paper is washed with deionised water to remove dissolved salts and the total suspended matter is determined gravimetrically after drying at 105 ±5°C Settleable solids are determined by subtracting the solids left in suspension after settlement for 1 hour (or other agreed time) from the total suspended matter in the sample.	SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980	5 mg/l	**Suspended Solids:** UKAS MCERTS(Waters)-Trade Effluent only **Settleable Solids:** Not Accredited

ID Manchester - Christine Campbell - Eastwood & SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 608

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2035	**Total Dissolved Solids in Water**	Water samples are pre-filtered to remove any suspended solids and evaporated in an oven at 180°C. The amount of residual dissolved solids is determined gravimetrically. An estimate of the total dissolved solids can be obtained by measuring the conductivity of the sample. This method is not accredited.	SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980 BS1377: Part 3 : 1990 Section 8	5 mg/l	UKAS
DETSC 2047	**Formaldehyde in Water**	Formaldehyde in soil is extracted in water, with a water to soil ratio of 10:1. The insoluble residue is removed by filtration prior to analysis. Waters are filtered prior to analysis to remove any particulates in suspension. Formaldehyde in the extract or water sample reacts with chromatropic acid-sulphuric acid solution to form a purple coloured complex. The absorbance of the coloured solution is read at 580nm using a suitable visible spectrophotometer.	Formaldehyde by visible absorption spectrophotometry – Method 3500, Issue 2 – NIOSH Manual of Analytical Methods, Fourth edition, August 1994	**Soil:** 0.2mg/kg **Water:** 20µg/l	Not Accredited
DETSC 2048	**Dissolved Oxygen Content of Water**	The dissolved oxygen content of the sample is measured using a dissolved oxygen meter either electrochemically or by fluorescence, or by the titrimetric method developed by Winkler.	SCA Method ISBN 0.11 751442X Dissolved Oxygen in Natural and Waste Waters 1979	0.1 mg/l	Not Accredited
DETSC 2055	**Anions in Water and Aqueous Soil Extracts by Ion Chromatography**	Liquid samples and aqueous soil extracts are filtered through a 0.22µm syringe filter prior to analysis. The filtered samples are injected into an Ion Chromatograph. The anions of interest are separated on the basis of their affinity for the active sites of the column packing material. The separated anions are converted into their highly conductive acid forms and measured by conductivity. The anions are identified on the basis of retention time as compared to standards and quantisation is by measurement of peak area.	Standard Methods for the Examination of Water and Wastewater Section 4110 21st Edition 2005 APHA, AWWA, WEF	**Soil:** 1.0 mg/kg **Water:** 0.1 mg/L	UKAS

ID Manchester - Christine Crundwell Consultant SciTech 06/08/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 609

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2076	**Sulphate and Magnesium Content of 2:1 Aqueous Extract of Soil by ICP-OES**	The sulphate and magnesium in the soil are extracted in an aqueous extract having water: soil ratio of 2:1 and the insoluble material is removed by filtration. The concentrations of sulphate and magnesium in the filtrate are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelengths used for identification and quantification are 181.972nm for sulphate and 285.213nm for magnesium.	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1: 1990 TRL 447 Sulphate Specification for Structural Backfills 2005 BRE SD1:2005 Concrete in Aggressive Ground 2005	10mg/L	**Sulphate:** UKAS MCERTS(Soils) **Magnesium:** Not Accredited
DETSC 2084	**Total Organic Carbon by PrimacATC Analyser**	Soil samples are treated with phosphoric acid to expel any inorganic carbonates. The samples are then heated at high temperature in a continuous flow of air so that any organic carbon is oxidised to carbon dioxide. The gas is then allowed to cool and analysed by an infra-red detector.	PrimacsATC Analyser – User Manual, Skalar	0.47%	MCERTS(Soils)
DETSC 2085	**Total and Dissolved Organic Carbon in Water**	**Direct TOC Analysis** The sample is acidified, stirred and purged to remove the IC before the sample is injected and handled as in the TC Analysis. The sample is filtered before acidification for DOC. **TC Analysis** The sample is injected by an automated septum less rotary port into a high temperature reactor. In the reactor, at a temperature of 750 - 950°C all organic and inorganic carbon is oxidized to the gaseous carbon dioxide (CO2). The catalyst that is present in the reactor catalysis the oxidation to completion. A flow of air transports these oxidation products to the detectors. The oxygen required for reaction is taken from the airflow. The products are led into the non-dispersive infrared detector where the carbon dioxide is determined. The carbon dioxide is measured at a wavelength of 4.2 µm by NDIR detection.	Standard Methods for the Examination of Water and Wastewater Section 5310 B 21st Edition 2005 APHA, AWWA, WEF HMSO Methods for the Examination of Waters and Associated Materials – The Instrumental Determination of Total Organic Carbon and Related Determinands 1995	lmg/l as C	UKAS

ID Manchester - Christine Cartwright - Brunswick SciTech - 6/5/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 610

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2119	**Exchangeable Ammonia in Soil**	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	MAFF/ADAS Reference Book 427 – the Analysis of Agricultural Materials – Method 53, Ammonium, Nitrate and Nitrite-Nitrogen, Potassium Chloride Extractable	0.5mg/kg	UKAS MCERTS(Soils)
DETSC 2120	**Ammonia in Water by Spectrophotometry**	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	Environment Agency Ammonia in Waters 1981 ISBN 0117516139 Methods for the Examination of Waters and Associated Materials	20µg/l	UKAS
DETSC 2121	**Total Kjeldahl Nitrogen Content of Soils and Waters**	The sample is digested with sulphuric acid and a mixture of catalysts to convert organic nitrogen to ammonia. The sample is then distilled under alkaline conditions, and the distilled ammonia is absorbed in sulphuric acid. The ammonia content of the distillate is then determined colorimetrically either using the UV/vis spectrophotometer or the Konelab 60i. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm	The Analysis of Agricultural Materials – MAFF/ADAS Reference Book 427 – HMSO BS 3882: 2007 Specification for topsoil Standard Methods for the Examination of Water and Wastewater Part 4500-N. 21st Edition 2005 APHA, WWA, WEF	**Soil:** 0.01% **Water:** 2mg/l	Not Accredited
DETSC 2123	**Water Soluble Boron in Soil & Boron in Water**	Boron in soil is extracted in boiling saline water. Waters are filtered prior to analysis to remove any particulates in suspension. The water soluble boron in the extract or filtrate reacts with azomethine–H to produce a yellow coloured complex. The resulting colour absorbance is measured at 420nm using a suitable visible spectrophotometer.	SecondSite Property (now National Grid Property Holdings) - Guidance for assessing and managing potential contamination on former gasworks and associated sites (Part I) (Version 3) Method 17.12 The analysis of Agricultural materials MAFF/ADAS – reference book 427	**Soil:** 0.2mg/kg **Water:** 100ug/L	UKAS MCERTS(Soils)

ID Manchester Christine Campbell CampbellChristine@SiacTech 01/07/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 611

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

			HMSO		

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2130	**Cyanides & Monohydric Phenols by Skalar**	Water samples are filtered through a 0.45µm syringe filter and solid samples are extracted with 1M caustic soda prior to analysis on the automated flow analyser. The method determines total cyanide, easily liberated cyanide, complex cyanide, thiocyanate and monohydric phenols	Skalar methods: I295-001 w/r+P7 I295-002 w/r+P7 293-902 w/r+P7 497-001	**Soils mg/kg:** Total & Free CN=0.1, Thio=0.6, Phenol=0.3 **Waters ug/L:** Total CN=40, Free CN=20, Thio=20, Phenol=100	UKAS MCERTS(Soils)
DETSC 2140	**Sugar in Mixing Water for Cement**	Waters are filtered prior to analysis to remove any particulates in suspension. The sugar in the filtrate reacts with phenol and sulphuric acid to produce a yellow-orange coloured complex. The resulting colour absorbance is measured at 490nm using a suitable visible spectrophotometer.	Colorimetric Method for Determination of Sugars and Related Substances MICHEL DUBOIS, K. A. GILLES, J. K. HAMILTON, P. A. REBERS, and FRED SMITH - Division of Biochemistry, University of Minnesota, St. Paul, Minnesota.	10mg/l	Not Accredited
DETSC 2201	**Nitrite in Waters and Leachates by Konelab 60i**	Nitrite is determined colorimetrically using the Konelab60i autoanalyser. The nitrite colour reaction occurs at pH 2.0 to 2.5 by coupling diazotized Sulphanilamide with N-1-naphthyl-ethylenediamine. The absorbance of this compound is measured spectrophotometrically at 520nm.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B – 21st Edition 2005 APHA, AWWA, WEF Aquakem Method Nitrite in Waters Iss No 2 Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981.	0.04mg/l (as N)	UKAS

ID Manchester - Christine Campbell - Brentwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 612

			EPA Method 354.1 Nitrite, spectrophotometric (Approved at 40 CFR Part 136, not approved at Part 141)		

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 613

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2202	**Total Oxidised Nitrogen in Waters and Leachates by Konelab 60i**	Nitrate is reduced to nitrite by hydrazine under alkaline conditions. The total nitrite ions are then reacted with sulphanilamide and N-1-naphthylethylenediamine dihydrochloride under acidic conditions to form a reddish purple azo-dye. The absorbance of this compound is measured spectrophotometrically at 540 nm using the Konelab 60i autoanalyser.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B and Part 4500-NO3 H – 21st Edition 2005 APHA, AWWA, WEF Aquakem Method Total Oxidised Nitrogen. Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981. EPA Method 353.1 Nitrate, Nitrite Colorimetric Automated Hydrazine Reduction (Approved at 40 CFR Part 136, Not approved at Part 141)	0.7mg/l (as N)	UKAS
DETSC 2203	**Hexavalent Chromium in Waters and Leachates by Konelab 60i**	Hexavalent Chromium is determined colorimetrically using the Konelab 60i autoanalyser. Hexavalent chromium reacts with diphenylcarbizide in acid solution and produces a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm.	Standard Methods for the Examination of Water and Wastewater Part 3500-Cr – 21st Edition 2005 APHA, AWWA, WEF USEPA 7196-A Aquakem Method. Hexavalent Chromium	10µg/l	UKAS
DETSC 2204	**Hexavalent Chromium in Soil by Konelab 60i**	Hexavalent Chromium is determined colorimetrically using the Konelab 60i autoanalyser. Hexavalent chromium reacts with diphenylcarbizide in acid solution and produces a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm.	Aquakem Method. Hexavalent Chromium	1mg/kg	Not Accredited

ID Manchester - Christine Campbell, Brentwood SciTech - 6/5/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 614

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2205	**Reactive & Total Phosphorus in Waters and Leachates by Konelab 60i**	Phosphate is determined colorimetrically using the Konelab60i autoanalyser. The orthophosphate ion reacts with ammonium molybdate and antimony potassium tartrate under acidic conditions to form a 12-molybdophosphoric acid complex. The complex is then reduced with ascorbic acid to form a blue heteropoly compound. The absorbance of this compound is measured spectrophotometrically at wavelength 880nm.	Standard Methods for the Examination of Water and Wastewater Part 4500-P E– 21st Edition 2005 APHA, AWWA, WEF Aquakem Method. Phosphate in Waters Issue 2	0.01mg/l	**Reactive Phosphorus:** UKAS MCERTS (Waters-Trade Effluent only) **Total Phosphorus:** Not Accredited
DETSC 2206	**High Level Ammonia in Waters and Leachates by Konelab 60i**	Ammonia is determined colorimetrically using the Konelab60i autoanalyser. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm.	Methods for the Examination of Waters and Associated Materials Ammonia in Waters 1981 ISBN 0117516139. Aquakem Method. Ammonia in Waters Issue 2	0.8mg/l	UKAS
DETSC 2207	**Low Level Ammonia in Waters and Leachates by Konelab 60i**	Ammonia is determined colorimetrically using the Konelab60i autoanalyser. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm.	Methods for the Examination of Waters and Associated Materials Ammonia in Waters 1981 ISBN 0117516139. Aquakem Method. Ammonia in Waters Issue 2	0.015mg/l	UKAS

ID Manchester - Christine Campbell Brumfield SoilTest - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 615

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2208	**Sulphide in Waters and Leachates by Konelab 60i**	Sulphide is determined colorimetrically using the Konelab60i autoanalyser. Potassium Dichromate converts N-N-Diethyl-p-phenylenediamine to the free radical which reacts rapidly with sulphide to produce the coloured 'DPD Blue' or 'Ethylene Blue'. The absorbance can then be measured at wavelength 660nm.	The determination of sulphide in waters and associated materials (2007) - SCA - Draft (March 2007) Aquakem Method. Sulphide SP001 Issue 2 Standard Methods for the Examination of Water and Wastewater, 21st Edition 2005, Part 4500. ISBN0-87553-223-3	10µg/l	UKAS
DETSC 2210	**Ferrous Iron in Waters and Leachates by Konelab 60i**	Three molecules of phenanthroline chelate with each atom of ferrous iron to form an orange/red complex. The intensity of the coloured solution is stable between pH3 to pH9. Rapid colour development occurs between pH2.9 and pH3.5 in the presence of excess phenanthroline. The resulting colour absorbance is measured at 510nm	Aquakem Method Ferrous Iron FIR001 Issue 2	0.1mg/l	Not Accredited
DETSC 2211	**Silicate in Waters and Leachates by Konelab 60i**	Reactive forms of silicon in acid solution, below pH2, react with ammonium molybdate ions to form a yellow silicomolybdate. Ascorbic acid reduces the yellow silicomolybdate to produce a blue silicomolybdate complex. Oxalic acid is added to destroy any molybdophosphoric acid formed.	ASTM D7126 - 10 Standard Test Method for On-Line Colorimetric Measurement of Silica Aquakem Method Silica SIL Issue 2	0.1mg/l	Not Accredited
DETSC 2301	**Metals in Soil by ICP-OES** As, Ba, Be, Cd, Cr, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, V, Zn	Metals in soil are extracted using aqua regia and their concentrations are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Any metals not listed can be determined but are not accredited under UKAS or MCERTS for soils.	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005, AWWA, WEF	**mg/kg:** As, Be Cu, Ni =0.2, Ba=1.5, Cd=0.1, Cr=0.15, Co=0.7, Mn=20, Mo=0.4, Pb=0.3, Fe=1200, Se=0.5, V=0.8, Zn=1.0	UKAS (all listed) MCERTS (All soils listed except Fe)

ID Manchester Christine Campbell - Rothwood Scitech - 6/5/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 616

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2302	**Metals in Waters by ICP-OES** Al, As, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Zn	Concentrations of metals in water are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Any metals not listed can be determined but are not accredited under UKAS or MCERTS for waters	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005 APHA, AWWA, WEF	**µg/l:** Al=6.5, As= 7.1, Ca=100, Cd=0.3, Cr=0.75, Cu=0.75, Fe=70, K=20, Mg=5, Na=12, Ni=2.7, Pb=4, Se=11.3, Zn=3.8	**Dissolved:** UKAS (all listed) MCERTS(Waters)-Trade Effluent only (Al, Cd, Cr, Cu, Ni, Pb, Zn) **Total:** Not Accredited
DETSC 2303	**Total Hardness (By Calculation)**	The concentrations of calcium and magnesium are determined using the appropriate methodologies. The hardness is a measure of the sum of the calcium and magnesium concentration expressed as calcium carbonate.	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005 APHA, AWWA, WEF	n/a	UKAS
DETSC 2304	**Zinc Equivalent in Soil (By Calculation)**	The concentrations of copper, nickel and zinc concentrations are determined using the appropriate methodologies. The zinc equivalent is a measure of the combined toxicity of the three metals, relative to the toxicity of zinc.	n/a	n/a	Not Accredited
DETSC 2306	**Metals in Waters by ICP-MS** Ag, Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Sn, V, Zn	Concentrations of metals in water are determined by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Any metals not listed can be determined but are not accredited under UKAS.	Standard Methods for the Examination of Water and Wastewater Part 3125 B – 21st Edition 2005 APHA, AWWA, WEF	**µg/l:** Ag=0.13, Al=10.0, As=0.16, Ba=0.26, Ca=90, Cd=0.03, Co=0.16, Cr=0.25, Cu=0.40, Fe=5.50, Hg=0.01, K=80, Mg=20, Mn=0.22, Mo=1.1, Na=70, Ni=0.50, P=18.0, Pb=0.09, Sb=0.17, Se=0.25, Sn=0.40, V=0.60, Zn=1.3	**Dissolved:** UKAS (all listed) **Total:** Not Accredited

ID Manchester - Christine Campbell - Brunthwood SciTech - 9/30/2020 2:14:20 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 617

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2320	**Total Sulphur in Soil by ICP**	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia.	TRL 447 Sulphate Specification for Structural Backfills 2005 BRE SD1 Concrete in Aggressive Ground 2005	0.01%	UKAS
DETSC 2321	**Total Sulphate content of Soil by ICP-OES**	The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1 : 1990	0.01%	UKAS MCERTS(Soils)
DETSC 2322	**Total Potential Sulfate and Total Oxidisable Sulphur (By Calculation)**	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The wavelength used for identification and quantification of sulphate is 181.972nm. The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelength used for identification and quantification of sulphate is 181.972nm. The two results obtained from the above tests may then be combined to calculate the Total Potential Sulphate and Total Oxidisable Sulphur content	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1 : 1990	0.01%	Not Accredited

ID Manchester - Christine Campbell - Brunswick SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 618

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2324	**Mercury in Waters by Atomic Fluorescence Spectroscopy**	Waters and aqueous samples are preserved by fixing with concentrated nitric acid. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry.	Standard Methods for the Examination of Water and Wastewater Part 3112 B – 21st Edition 2005 APHA, AWWA, WEF PSA Method – Millennium Merlin Method for Total Mercury in Drinking, Surface, Ground, Industrial and Domestic Wastewaters and Saline Waters	0.05µg/l	UKAS
DETSC 2325	**Mercury in Soil Atomic Fluorescence Spectroscopy**	The mercury is extracted from soil in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments	0.05 mg/kg	UKAS MCERTS(Soils)
DETSC 2332	**Inorganic and Methyl Mercury Speciation**	Soils are air-dried and crushed before being subjected to a two-stage microwave extraction procedure for Inorganic (Hg(II)) and Methyl (MeHg) mercury. Waters and aqueous samples are filtered to remove particulates. An aliquot is separated via HPLC before treatment with bromate-bromide and tin (II) chloride to generate mercury and the mercury is determined by atomic fluorescence spectroscopy.	USEPA Method 3200 – Mercury Species Fractionation and Quantification by Microwave Assisted Extraction. PSA Application Note 053 – Mercury Speciation Using The Millenium Merlin Speciation System	**Soil:** 100µg/kg **Water:** 1µg/l	Not Accredited
DETSC 2333	**Elemental Mercury Speciation**	Soils, waters and aqueous samples are tested on an as-received bases. A known quantity of sample is extracted using argon and the released elemental mercury is trapped. The trapped mercury is released upon heating in a scarifier module and determined by atomic fluorescence spectroscopy.		**Soil:** 0.6µg/kg **Water:** 1µg/l	Not Accredited

ID Manchester Christine Campbell, Shirtwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 619

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2400	**Unified Barge Bioaccessible Metals in Soils**	The Unified BARGE Method (UBM) is a an in vitro method for simulating the human digestive system. Synthetic digestive fluids are used to simulate the fluids present in the body. Both inorganic solutions (Containing inorganic salts such as KCl, NaCletc), and organic solutions (Containing organic compounds such as Urea, Glucose etc) are mixed with enzymes to produce 4 Synthetic digestive fluids saliva (S), Gastric fluid (G), duodenal fluid (D) and bile (B). These solutions are then used to mimic the effect of a sample passing through a human gastro intestinal tract by shaking portions of the sample at 37^0C, human body temperature (17.4).	EPA 9200.2-86 April 2012- Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead in Soil BGS Chemical& Biological Hazards Programme Open Report OR/07/027 - Inter-laboratory Trial of a Unified Bioaccessibility Procedure	V = 1.0mg/kg Cr = 5.0mg/kg Co = 1.0mg/kg Ni = 5.0mg/kg As = 0.5mg/kg Se = 0.5mg/kg Cd = 0.5mg/kg Pb = 1.0mg/kg	Not Accredited
DETSC 3001	**Solvent Extractable Matter in Soil**	Soil samples are extracted with a water-immiscible solvent and filtered to remove the water. The solvent is evaporated and the amount of extractable matter in the sample is determined gravimetrically.	In-house method based on:- Problems Arising from the Redevelopment of Gas Works and Similar Sites - AERE Harwell Laboratory 1981. Environmental Agency The Determination of Material Extractable by Carbon Tetrachloride and of Certain Hydrocarbon Oil and Grease Components in sewage Sludge – 1978	40mg/kg	**Toluene & Cyclohexane:** UKAS **Other Solvents:** Not Accredited
DETSC 3002	**Oil & Grease/Solvent Extractable Matter in Waters**	A known volume of sample is acidified to pH<2 and extracted three times with an organic solvent, such as n-Hexane, in a separating funnel. The solvent is removed by evaporation and the amount of extractable matter in the sample is determined gravimetrically.	APHA 21st Edition, 2005 – Method 5520 B. Oil & Grease - Partition Gravimetric Method USEPA Method 1664, Revision A: n-Hexane Extractable Material (HEM: Oil & Grease) and Silica Treated N-Hexane Extractable Material (SGT-HEM; Non Polar Material) by Extraction and Gravimetry.	1mg/l for 500ml sample	UKAS

ID Manchester - Christine Campbell - Brantwood SciTech - 8/19/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 620

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3049	**Elemental Sulphur in Soils and Waters by HPLC**	Soils are extracted in dichloromethane (DCM) by sonication. The elemental sulphur concentration is determined by high performance liquid chromatography (HPLC) with UV detection using a C_{18} (e.g. 250mm x 4.6mm) column and a mobile phase composed of 95% methanol and 5% water. Waters and aqueous extracts of soils are extracted using DCM in a separating funnel, filtered, and the concentration determined using HPLC.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Elemental Sulphur.	**Soil:** 0.75mg/kg **Waters:** 90ug/l	**Soil:** UKAS MCERTS(Soils) **Water:** UKAS
DETSC 3072	**Aliphatic / Aromatic TPH by GC-FID**	Aliphatic and aromatic petroleum hydrocarbons (C_{10}-C_{35}) are extracted from soil and water using n-Hexane. The fractions are separated by solid phase extraction using silica columns, whereby the aliphatic fraction is eluted first with n-Hexane and the aromatic portion is eluted second with dichloromethane. The total, aliphatic, and aromatic concentrations are determined by gas chromatography flame ionisation detection (GC-FID) using a capillary column and hydrogen as the carrier gas. The chromatographic data is further characterized by subdivision into approximate boiling point/carbon number ranges with respect to n-alkane retention time markers.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Draft TNRCC Method 1006	**Soil mg/kg:** AL10-12 =1.5 AL12-16 =1.2 AL16-21 =1.5 AL21-35 =3.4 AR10-12 =0.9 AR12-16 =0.5 AR16-21 =0.6 AR21-35 =1.4 **Water:** 1ug/l	**Soil:** UKAS MCERTS(Soils) (C10-C35 only) **Water:** Not Accredited
DETSC 3301	**PAH in Soil by GC-FID**	Soils and associated materials are extracted in dichloromethane (DCM) using sonication. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m; 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.5 mg/kg each 1.6 mg/kg Total PAH	UKAS (16 PAH's only)
DETSC 3302	**Hexane / Acetone Extracted PAH in Soil by GC-FID**	Soils are extracted into hexane: acetone by shaking. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m; 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.1 mg/kg each 1.6 mg/kg Total PAH	Not Accredited

ID Manchester - Christine Corrigan - Ground Solutions - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 621

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3303	**Polyaromatic Hydrocarbons in Soils by GC-MS**	The PAHs in the soil sample are extracted into hexane: acetone by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision C, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	0.03 mg/kg each 0.10 mg/kg Total PAH	UKAS (All 16 PAH's) MCERTS (not Fluorene, Anthracene, Chrysene or Total)
DETSC 3304	**Polyaromatic Hydrocarbons in Waters by GC-MS**	The PAHs in the water sample are extracted into dichloromethane by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the Instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS) In-house method based on EPA Method 3510C- EPA Method 3510C, Revision 3, Separatory Funnel Liquid-Liquid Extraction	10 ng/l each	UKAS (16 PAH's only)
DETSC 3311	**Extractable Petroleum Hydrocarbons (EPH) in Soil, Ballast and Water**	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid and aqueous matrices. This method uses a dichloromethane (DCM) extraction followed by quantification using gas chromatography/flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10-C24), and "mineral oil range" (C24-C40).	USEPA Method 3550C – Ultrasonic Extraction USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	**Soil:** 10 mg/kg **Ballast:** 10mg/kg **Water:** 10µg/l	**Soil:** UKAS MCERTS(Soils) **Water:** UKAS

ID Manchester - Christine Greenhall - Bruntwood Scitech 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 622

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3312	**Hexane Extractable Petroleum Hydrocarbons (HPH)**	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid matrices. This method uses a hexane: acetone (9.4) extraction followed by quantification using gas chromatography/flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10- C24) and "mineral oil range" (C24-C40).	USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	**Soil:** 5 mg/kg	Not Accredited
DETSC 3321	**BTEX, MTBE & PRO in Soils by Headspace GC-FID**	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	0.01 mg/kg	UKAS MCERTS(Soils) Not accredited for PRO range (C5-10)
DETSC 3322	**BTEX, MTBE & PRO in Waters & Leachates by Headspace GC-FID**	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	1 µg/l	UKAS
DETSC 3401	**PCBs in Soils by GC-MS**	An as-received soil sample is extracted in Hexane:Acetone (1:2) using sonication methodology. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the instrument software.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	**µg/kg** PCB 28=1.25 PCB 52=1.12 PCB 101=1.32 PCB 118=1.43 PCB 153=2.08 PCB 138=1.35 PCB 180=1.42	UKAS MCERTS(Soils)

ID Manchester - Christine Campbell - Stantec UK - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 623

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3402	**Polychlorinated Biphenols in Waters by GC/MS**	The water sample is extracted in DCM on a reciprocal shaker. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the GC-MS software using an internal standard.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	**ng/l** PCB 28=208 PCB 52=161 PCB 101=211 PCB 118+123=513 PCB 153=163 PCB 138=107 PCB 180=132 PCB 105=133 PCB 114=253 PCB 126=399 PCB 156=253 PCB 157=119 PCB 167=248 PCB 169=181 PCB 189=271 PCB 77=202 PCB 81=186	UKAS
DETSC 3432	**Volatile Organic Compounds in Waters by Headspace GC-MS**	The method covers the range of volatile organic compounds with boiling points up to 220°C. Water samples are heated and agitated in a crimp cap vial. This drives the volatile components in to the headspace. An aliquot of the headspace is taken and injected in to a gas chromatograph with mass selective detection (GC-MS).The detector operates in full scan mode and is calibrated with standards containing known concentrations of the compounds of interest.	USEPA Method 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996	1 ug/l except: DCM (27), 2,2-Dichloropropane (2), Bromochloromethane (4), Bromodichloromethane (4), m+p-Xylene (2), 1,3-Dichlorobenzene (2)	UKAS except: Trichlorofluoromethane, Methylene Chloride, 1,1,1-Trichloroethane,

ID Manchester - Christine Campbell - Stantec SciTech - 6/10/2020 2:14:36 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 624

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3433	**Semi-Volatile Organic Compounds in Soils by GCMS**	The SVOCs in the soil sample are extracted into DCM: Acetone by shaking. The SVOCs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each SVOC is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semi volatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	Individual SVOCs 0.1 mg/kg	UKAS
DETSC 5001	**Ash Content of Coal**	The ash content of the sample is determined gravimetrically. A known weight of the sample is placed in a prepared ash crucible and placed in a furnace. The furnace is heated to 750ºC ±10ºC where the temperature is maintained. Following combustion the crucible and sample are removed, cooled and reweighed.	ASTM D3174-11 BS 1016-104.4 1998 ISO 1171: 2010	0.1%	UKAS
DETSC 5002	**Ash & LOI Content of Solid Biomass & Solid Recovered Fuels**	The ash and LOI content of the sample is determined gravimetrically. A known weight of the sample is placed in a prepared ash crucible and placed in a furnace. The furnace is heated to 550ºC ±10ºC where the temperature is maintained. Following combustion the crucible and sample are removed, cooled and reweighed.	BS EN 14775:2009 BS EN 15403:2011	0.1%	UKAS
DETSC 5003	**Volatile Matter Content of Solid Biomass, Solid Recovered Fuels and Coal**	A known weight of the sample produced for volatile matter determination is placed in a suitable crucible fitted with a lid. The crucible and sample is weighed and heated in a furnace with a limited air through put at a temperature of 900ºC ±10ºC for 7 minutes. The sample and crucible are re-weighed and the volatile matter content determined by difference.	BSEN15148:2009 – Solid Biofuels Determination of the Content of Volatile Matter BS EN 15402:2011 - Solid Recovered Fuels - Determination of the Content of Volatile Matter	0.1%	UKAS

ID Manchester - Christine Campbell - Brunswick SciTech - 6/30/2022 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 625

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5004	**Total Moisture / Dry Solids Content of Solid Biomass & Solid Recovered Fuels & Coal**	The sample produced for general analysis is placed into a suitable prepared and weighed tray and reweighed. The sample is dried at 105ºC to constant weight and the total moisture / dry solids content is calculated from the reduction in weight.	BSEN 14774 Parts 1 & 2 2009 DD CEN/TS 15414 Parts 1 & 2: 2010	0.1%	UKAS
DETSC 5005	**Analysis Moisture Content of Solid Biomass, Solid Recovered Fuels & Coal**	The sample produced for total moisture determination in accordance with DETSC 5009 or DETSC 5010 is placed in a suitable pre-weighed tray and reweighed. The sample is then dried at 105°C ±2°C to constant weight and then weighed again. The analysis moisture content is calculated from the reduction in weight.	BS EN 14774-3 2009 BS EN 15414-3 2011 BS 1016-104.1 -1999 ISO 11722 – 1999	n/a	UKAS
DETSC 5007	**Calorific Value of Solid Biomass, Solid Recovered Fuels & Coal**	Calorific value of a material is determined in an Isoperbol calorimeter by burning it in pure oxygen in a combustion bomb. A known amount of sample is placed in a combustion bomb which is then pressurised to 30bar with oxygen. A calorimeter bucket is filled with a known amount of deionised water which is placed in the calorimeter and the bomb placed in the bucket. The system is allowed to equilibrate and the bomb fired by electrical connection. The difference in temperature of the water in the calorimeter bucket caused by the ignition of the material in the bomb is measured and the calorific value calculated	BS EN 14918: Solid biofuels – Determination of calorific value BS EN 15400: Solid recovered fuels - Determination of calorific value	1MJ/kg	UKAS
DETSC 5008	**Calorific Value of Soil**	A known amount of sample material is burnt in a combustion bomb that is immersed in water in a calorimeter and the difference in the water temperature before and after ignition measured. The calorific value of the sample material is calculated making any necessary corrections for heat generation not associated with the combusting sample. A gelatine capsule will be required to assist combustion which is also corrected for in the final calculations.	BS 1016-105 1992 ISO 19208 ASTM 5865	1MJ/kg	UKAS

ID Manchester - Christine Campbell - Buchanan SciTech - 6/3/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 626

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5009	**Sample Preparation of Solid Biomass & Solid Recovered Fuels**	If analysis is required on the original material (i.e. Bulk Density) a sub-sample will be taken after initial mixing after which the sample is then reduced by cutting/chopping oversized pieces of material. The material is then mixed and subdivided by manual means during which process representative samples are taken for analysis i.e. total moisture. The remainder of the sample is dried and then reduced to <1mm and again mixed and subdivided to produce the sample for laboratory analysis.	BS EN 14780:2011 BS EN 15413:2011	n/a	Not Accredited
DETSC 5010	**Sample Preparation of Coal**	If required the sample received is first mixed and a sample taken for bulk density or bulk density is carried out on the whole initial sample. The remaining sample or the whole sample used for bulk density is then reduced to <10mm preferably by jaw crushing. The material is then mixed and subdivided by mechanical or manual means during which process representative samples are taken for any analysis required at this stage i.e. total moisture, The remainder of the sample is again mixed and subdivided to produce the sample for laboratory analysis which may require drying prior to crushing to <212 microns. If there is excessive water content a pre- drying stage of the whole sample may have to be carried out before sample blending and subdivision commences.	BS ISO 13909-4: 2001	n/a	Not Accredited
DETSC 5011	**Calculation of Fixed Carbon Content of Coal, SRF and Solid Biomass Fuels**	The total moisture, analysis moisture, ash and volatile matter content are determined by approved methods. The values obtained are deducted from 100 and this gives the fixed carbon value of the fuel.	DD CENT/S 15296:2006 BS 1016.100:1994 BS ISO 17246:2005	0.1%	Not Accredited

ID Manchester - Christine Campbell - Contractor SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 627

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5012	**Determination of Biomass Content of SRF**	Approximately 5g of the sample is dissolved in 150ml of 78% Sulphuric Acid for 16 hours ±2 hours after which 35ml of 30% Hydrogen Peroxide is added and the sample left for an additional 5 hours ±1 hour. At the end of this period 300ml of deionised water is added to the sample and the residue remaining filtered off using a glass fibre filter paper, washing the residue with an additional 300ml of deionised water. The filter paper and residue are placed in a pre-weighed crucible and dried at 1500C until completely dry. The filter paper is reweighed after drying and the non biomass residue determined. Corrections for carbonates content is made by determining the ash content of the original sample and the non biomass residue remaining. The result can also be expressed by percentage calorific value by performing a calorific valve on the solid captured on the filter paper.	BS EN 15440 Solid recovered fuels - Methods for the determination of biomass content	n/a	UKAS
DETSC 5013	**Determination Of Carbon, Hydrogen, Nitrogen & Oxygen In Solid Biomass, Solid Recovered Fuels & Coal**	A known mass of fuel is weighed into tin capsules which are dropped sequentially into the combustion reactor prior to the arrival of oxygen. The sample and tin capsule react with oxygen and combust at temperatures of 1700-1800 °C and the sample is broken down into its elemental components N2, CO2, and H2O. High performance copper wires absorb the excess oxygen not used for sample combustion. The gases flow through the gas chromatographic (GC) separation column which is kept at a constant temperature. As they pass through the GC column, the gases are separated and are detected sequentially by the thermal conductivity detector (TCD). The TCD generates a signal, which is proportional to the amount of element in the sample. The instrument software compares the elemental peak to a known standard material (after calibration) and generates a report for each element on a weight basis. The oxygen is calculated by deducting these quantities from 100 along with the moisture, ash, sulphur & chlorine contents determined by other methods.	BS EN 15104:2011 Solid biofuels - Determination of total content of carbon, hydrogen and nitrogen - Instrumental methods BS EN 15407:2011 Solid recovered fuels - Methods for the determination of carbon (C), hydrogen (H) and nitrogen(N) content BS EN 15296:2011 Solid biofuels - Conversion of analytical results from one basis to another	Carbon 0.10% Nitrogen 0.30% Hydrogen 0.30% Oxygen 3.55%	UKAS

ID Manchester - Christine Cameron - Brunswick SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 628

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5014	**Metals in Coal, SRF and Biomass by ICP**	Metals in coal, solid recovered fuel (SRF) and biomass samples are extracted by microwave using Hydrogen Peroxide (to oxidise and break down organic matter) and Aqua Regia (to dissolve the matrix and hold the metals in solution). Their concentrations are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS EN 15410 - Solid recovered fuels - Methods for the determination of the content of major elements (Al, Ca, Fe, K, Mg, Na, P, Si, Ti) BS EN 15411 - Solid recovered fuels - Methods for the determination of the content of trace elements (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Tl, V and Zn) BS EN 15290 - Solid biofuels - Determination of major elements - Al, Ca, Fe, Mg, P, K, Si, Na and Ti BS EN 15297 - Solid biofuels - Determination of minor elements - As, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, V and Zn	**0.1 mg/kg:** As, Be, Cd, Co, Mn, Ni, P, Pb, Sb, Se, Sn, Ti, V, Zn **0.2mg/kg:** Cr, Cu, Tl **0.5mg/kg:** Mo **1mg/kg:** Al, Fe, K, Mg **5mg/kg:** Ca **10mg/kg:** Ag, Ba, Rh, Sr, Te	UKAS: Al, As (SRF only), Ca, Cd, Co, Cr, Cu, K, Mg, Mn, Na (SRF only), Ni, P, Pb, Se, Sn, Tl, V, Zn All other metals not accredited
DETSC 5015	**Mercury in Coal, SRF and Biomass by Atomic Fluorescence Spectroscopy**	The mercury is extracted from coal, SRF and biomass in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment of the resulting solution with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is then quantitatively detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments.	0.055mg/kg	UKAS

ID Manchester - Christine Campbell - Brentwood SciTest - 25/06/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 629

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5016	**Total Sulphur Content Of Coal, SRF And Biomass**	Sulphur compounds in SRF and biomass are extracted using aqua regia / hydrogen peroxide and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The use of hydrogen peroxide enhances the oxidation properties of nitric acid especially in the digestion of organics. Sulphur compounds in coal are determined by ICP-OES from the aqueous washings of the combustion products after firing in a bomb calorimeter.	TRL Report TRL447 (Updated) - Sulphate specification for structural backfills 2005	0.001mg/kg	UKAS
DETSC 5017	**Sulphur, Chlorine, Fluorine & Bromine Content of Solid Biomass, Solid Recovered Fuels and Coal by IC**	A known weight of fuel is burnt in a pressurised bomb in pure oxygen. After firing of the bomb, it is stood for a minimum of five minutes to allow the combustion products to settle then the oxygen is slowly released over a period of at least three minutes. The bomb is then taken apart and the bomb electrodes rinsed with deionised water into the inside of the bomb. These washings are then decanted into a 50ml volumetric flask. The inside of the bomb is rinsed with deionised water and the washings added to those in the volumetric flask. The contents of the volumetric flask are made up to volume with deionised water and stored for the analysis of sulphur, chloride, fluoride and bromide by ion chromatography.	Operating Instruction Manual No. 442M 6200 Parr Oxygen Bomb Calorimeter Operating Instruction Manual No. 205M 1108 Oxygen Combustion Bomb Operating Instruction Manual No. 454M 6510 Water Handling System	0.01% Chlorine 0.01% Fluorine 0.01% Bromine 0.04% Sulphur (Coal only)	UKAS

ID Manchester - Christina Carnegie - Brentwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 630

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5018	**XRF Analysis of Coal, Biomass, SRF and Cement**	When X-rays are targeted at a material they will cause electrons to be ejected from the component atoms (Ionisation). The ejection of electrons will cause the electronic structure of the component atoms to become unstable resulting in electrons from the higher energy outer orbitals "falling" into the inner orbitals to compensate. This causes a release of energy in the form of a photon equal to the energy difference between the two orbitals involved. Thus the material emits radiation which has energy characteristics of the atoms present. In energy dispersive X-ray fluorescence the fluorescent X-rays emitted are directed to a detector from which the data is processed by a multichannel analyser, producing a digital spectrum which is processed to obtain analytical data. The instrument analytical parameters are set up for the matrix type. A sample cell is prepared by placing a piece of prolene film over the outer cell and then inserting the inner cell. This gives a complete cell with a clear prolene base. A portion of the sample is placed into the cell and then analysed.	Rigaku NEX CG EDXRF instruction manual	**Cement:** 0.01% BaO, Cr_2O_3, CuO, PbO, Rb_2O, SrO, ZnO 0.02% Cl, V_2O_5 0.05% TiO_2 0.1% Mn_2O_3, P_2O_5, SO_3 0.5% K_2O 1% Al_2O_3, CaO, CdO, Co_2O_3, Fe_2O_3, MgO, Na_2O, NiO, SiO_2, Y_2O_3 **Fuel:** 0.01% Co, Cr, Cu, I, Li, Mn, Ni, P, Pb, Sn, Ti, V, Zn 0.02% Al, Ba, S, Si 0.1% Mg 0.2% Ca 0.5% As, Cd, Hg, Mo, Na, Sb, Se, Th, Tl 1% Ag	UKAS Al, As, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Sb, Si, Sn, Tl, Ti, V, Zn Al2O3, BaO, CaO, Cl, Cr2O3, CuO, Fe2O3, K2O, MgO, Mn2O3, Na2O, P2O5, PbO, Rb2O, SiO2, SO3, SrO, TiO2, V2O5, ZnO All other testing not accredited
DETSC 5019	**Determination of Biodegradable Municipal Waste Content (Compositional Analysis)**	The method is based on handpicking the BMW fraction from the municipal waste sample, and then weighing the amount of BMW sorted and expressing this as a percentage on a wet weight basis of the weight of the whole municipal waste sample.	ENVIRONMENT AGENCY: Guidance on monitoring of MBT and other treatment processes for the landfill allowances schemes (LATS and LAS) for England and Wales	n/a	Not Accredited
DETSC 5020	**Determination of Bulk Density in Solid Biomass and Solid Recovered Fuels**	The test portion is filled into a standard container of a given size and shape and weighed afterwards. Bulk density is calculated from the net weight per standard volume and reported for the moisture content.	BS EN 15103:2009 Solid Biofuels- Determination of bulk density BS EN 15401:2010 Solid Recovered Fuels- Determination of bulk density	0.5kg/m^3	Not Accredited

ID Manchester, Christine Campbell, Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 631

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5021	**Auto Ignition Temperature**	A quantity of the sample is placed into a metal tray or crucible and placed into an oven or furnace. The temperature of the oven / furnace is increased in predefined increments and the temperature in which the sample ignites is noted.	None	25°C	Not Accredited

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

Appendix 9 – BS5837:2012 Tree Quality Survey

Tree Number	Common Species Name	Height (m)	Trunk Diameter (mm)	Stem Count	Crown Spread (m)				Height of Crown Clearance (m)	Age Class	Physiological Condition	Structural Condition	BS5837 Category	Comments/Preliminary Management Recommendations	RPA Radius (m)	Root Protection Area (m2)
					N	E	S	W								
T1	Sambucus nigra (Elder)	5m	130,120, 100	3	2.00	2.00	3.00	3.20	1.00	Semi Mature	Fair	Fair	C2	Low quality and value. Kerb close to stem base. Tree located within hard surface area. Decay present on stem. Cavity on stem. Dieback in crown.	2.4	19
G2.A	Fraxinus excelsior (Ash)	17m	470.00	1	8.50	4.00	4.50	8.50	3.00	Early Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure. Root exposure and induced impacts to tarmac footpath spanning RPA to north. surface root wounds occluded. No obvious A Dieback Symptoms- appears relatively healthy despite species.	5.6	100
G2.B	Fraxinus excelsior (Ash)	17m	580.00	1	9.00	6.50	5.00	5.00	3.00	Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure. Tarmac footpath through RPA to the north. No obvious Ash Dieback Symptoms - appears relatively healthy despite species.	7.0	152
G2.C	Fraxinus excelsior (Ash)	17m	530.00	1	3.50	3.00	8.50	9.00	3.00	Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure. No obvious Ash Dieback Symptoms - appears relatively healthy despite species. Co dominant stem at 2.7m, not an included union.	6.4	127
T3	Acer pseudoplatanus (Sycamore)	15m	750.00	1	9.00	8.00	10.00	9.00	2.50	Mature	Good	Good	B2	Moderate quality and value. Roadside tree: of value in the streetscene. Tree located within raised bed. Scattered deadwood. Co dominant stem at approx 2.5m with wide-mouth union. Minor scattered deadwood throughout canopy especially within internal branch structure.	9.0	255
T4	Acer platanoides (Norway Maple)	15m	620.00	1	7.00	5.00	9.50	8.00	2.50	Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure.	7.4	174
T5	Acer platanoides (Norway Maple)	16m	610.00	1	8.50	6.50	5.00	7.00	2.50	Mature	Fair	Good	B2	Declining in health and condition. Moderate quality and value. Located on bank. Exudation on stem. Scattered deadwood. Crown distorted due to group pressure. Crown touching car parking stairwell facade to the east. Rooted on mound with root exposure and potential girdling around buttress. Some canopy suppression in lower scaffold branches and decline likely induced from light availability.	7.3	168

Tree Number	Common Species Name	Height (m)	Trunk Diameter (mm)	Stem Count	Crown Spread (m)				Height of Crown Clearance (m)	Age Class	Physiological Condition	Structural Condition	BS5837 Category	Comments/Preliminary Management Recommendations	RPA Radius (m)	Root Protection Area (m2)
					N	E	S	W								
T6	Acer platanoides (Norway Maple)	14m	560.00	1	3.00	8.30	9.50	3.50	3.00	Mature	Fair	Fair	C2	Declining in health and condition. Low quality and value. Located on bank. Scattered deadwood. Sparse foliage. Dieback in crown. Crown distorted due to group pressure. Crown touching car park building to east. Lower canopy and internal structures significantly suppressed and in decline with reduced overall vigour and reduced foliage density likely due to light availability and or root issues (girdled buttress roots and root exposure above soil surface).	6.7	142
G7	Fraxinus excelsior (Ash)	4m	150.00	1	1.20	1.50	2.00	1.50	0.00	Semi Mature	Fair	Fair	C2	Low quality and value. Self set poor location.	1.8	10

T1 - C2
Elder

G7 - C2
Ash

G2.A - B2
Ash

G2.B - B2
Ash

G2.C - B2
Ash

T3 - B2
Sycamore

T4 - B2
Norway Maple

T5 - B2
Norway Maple

T6 - C2
Norway Maple

RAILWAY BRIDGE

NO ACCESS

TARMAC

GRASS

CONCRETE

PAVING

CHARLES STREET

PRINCESS STREET

0 10m

North

Survey Boundary

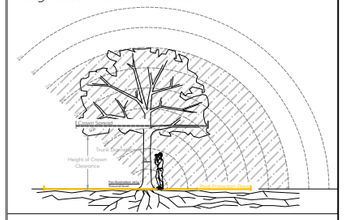
Category B - Trees of Moderate Quality and Value

Category C - Trees of Low Quality and Value

Root Protection Areas

Tree Shading Constraints

*Denotes trees and groups not identified on topographical survey. Locations approximated using measurements taken on site.



Rev	Description	Date
-	-	-

Tyler Grange

Head Office: 97 Icknield Street, Hockley, Birmingham, B18 6RU

E:info@tylergrange.co.uk

W: www.tylergrange.co.uk

Project title
MSCP, Manchester

Drawing title
Tree Constraints Plan

Scale 1:200 @ A3
Date 17.07.2024
Drawn BV
Checked WS

Drawing number
14667_P12

Revision
-

This document should not be relied on or used in circumstances other than those for which it was prepared and for which Tyler Grange was appointed.

Tyler Grange accepts no responsibility for this document to any other party other than the person by whom it was appointed.

Tyler Grange Group Limited
Copyright © Tyler Grange Group Limited 2024

Appendix 10 – TVIA Draft Viewpoints – Main works

SISTER - PLOT H: MAIN WORKS

Manchester, UK

Townscape & Visual Impact Assessment

Draft Viewpoints

15th September 2025

451-LYR-XX-ZZ-RPT-L-0001-09

Revision: 02

Layer.studio

Contents

01 Supporting Figures

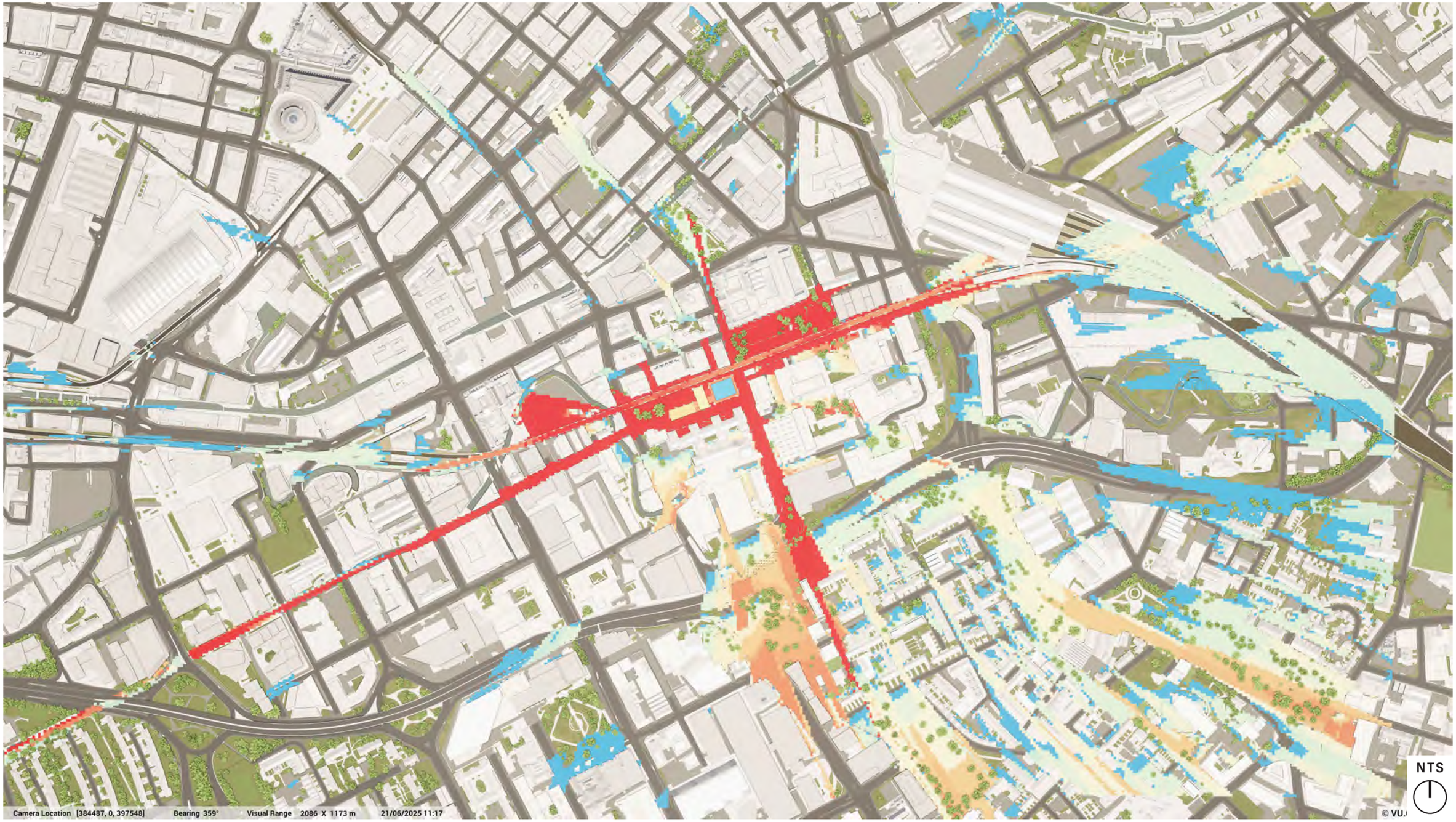
Figure 2.0: Zone of Theoretical Visibility (ZTV) 04
Figure 2.1: Viewpoint Location Plan 05

02 Draft Viewpoints

Viewpoint 1: Granby Row at Orient House 07
Viewpoint 2: Granby Row at Granby House 08
Viewpoint 3: Vimto Park (SRF View B) 09
Viewpoint 4: Altrincham Street 10
Viewpoint 5: Sackville Street 11
Viewpoint 6: Charles Street at Lass O' Gowrie pub 12
Viewpoint 7: Princess Street 13
Viewpoint 8: Sackville Gardens (SRF view 5) 14
Viewpoint 9: Chorlton Street (SRF view 2) 15
Viewpoint 10: London Road (SRF view 3) 16
Viewpoint 11: Fairfield Street (SRF view 4) 17
Viewpoint 12: Altrincham Street 18
Viewpoint 13: Mancunian Way 19
Viewpoint 14: Skerry Close 20
Viewpoint 15: Mancroft Walk 21
Viewpoint 16: Oxford Road 22
Viewpoint 17: Upper Brook Street 23
Viewpoint 18: Oxford Road Station 24
Discounted views (locations on page 05) 25

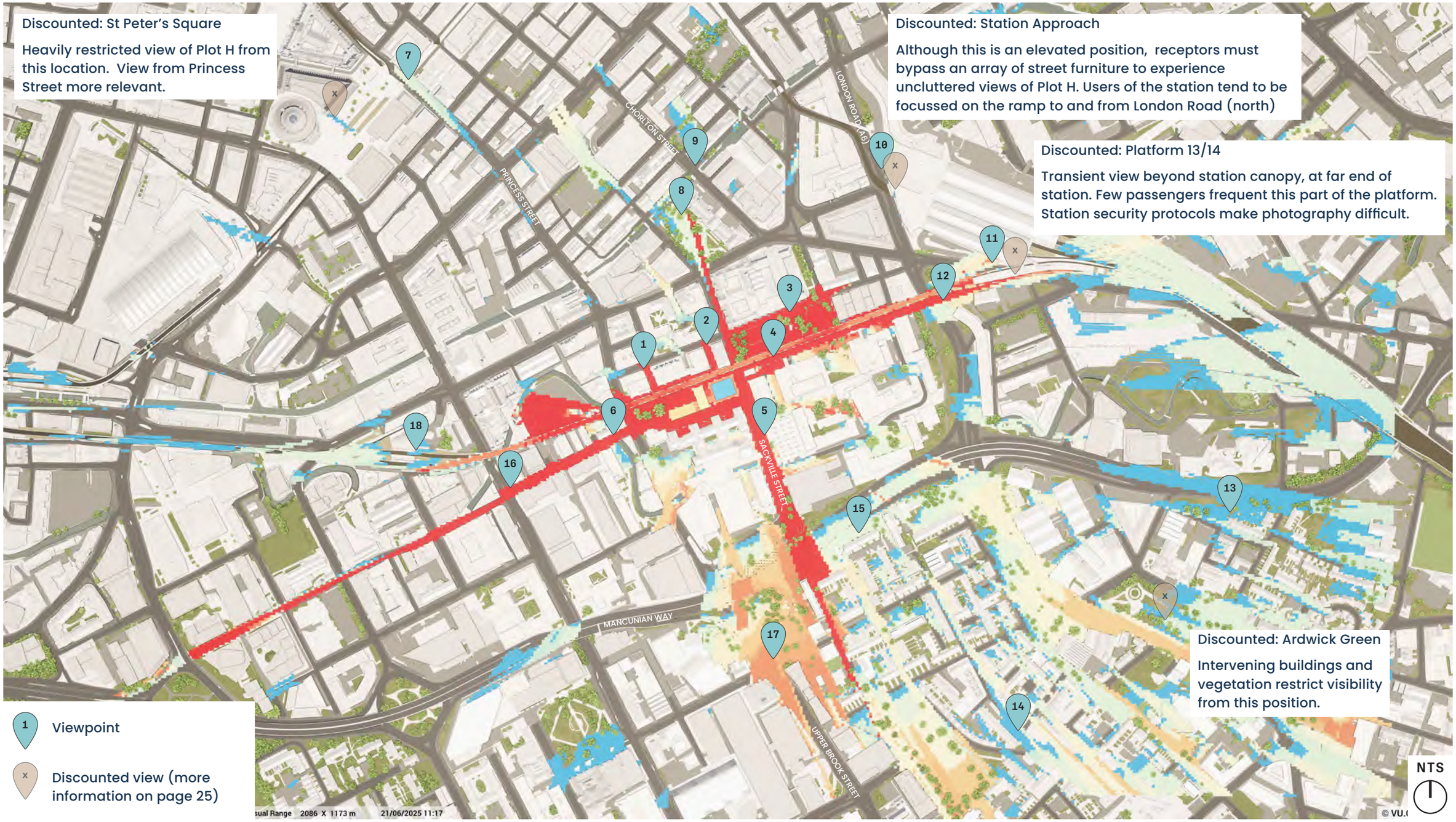
01 Supporting Figures

Figure 2.0: Zone of Theoretical Visibility (ZTV)



01 Supporting Figures

Figure 2.1: Viewpoint Location Plan



02 Draft Viewpoints

SISTER - PLOT H: MAIN WORKS

02 Draft Viewpoints

Viewpoint 1: Granby Row at Orient House



Render

Townscape view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 2: Granby Row at Granby House



Render

Townscape & Heritage view



Existing "Streetview"

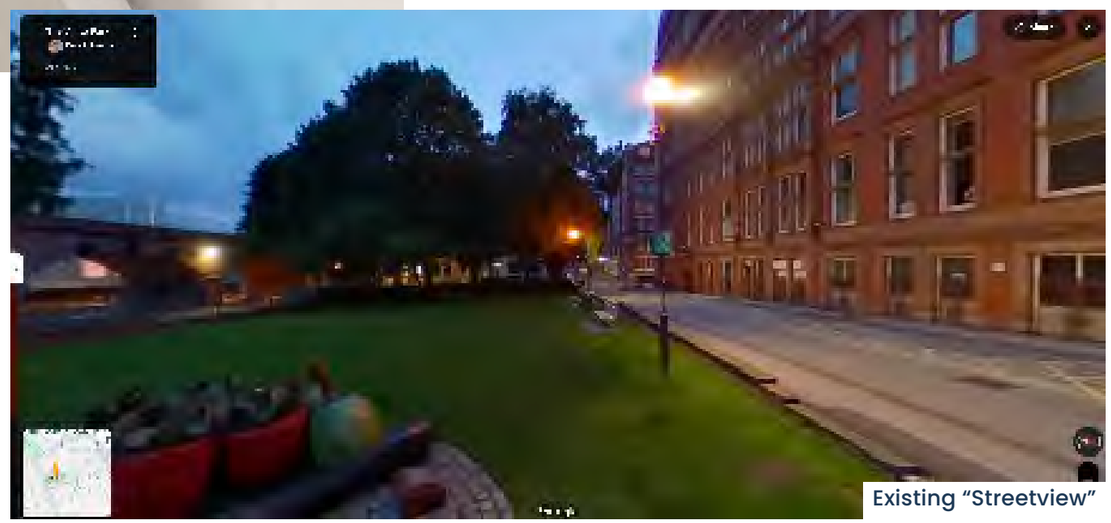
02 Draft Viewpoints

Viewpoint 3: Vimto Park (SRF View B)



Render

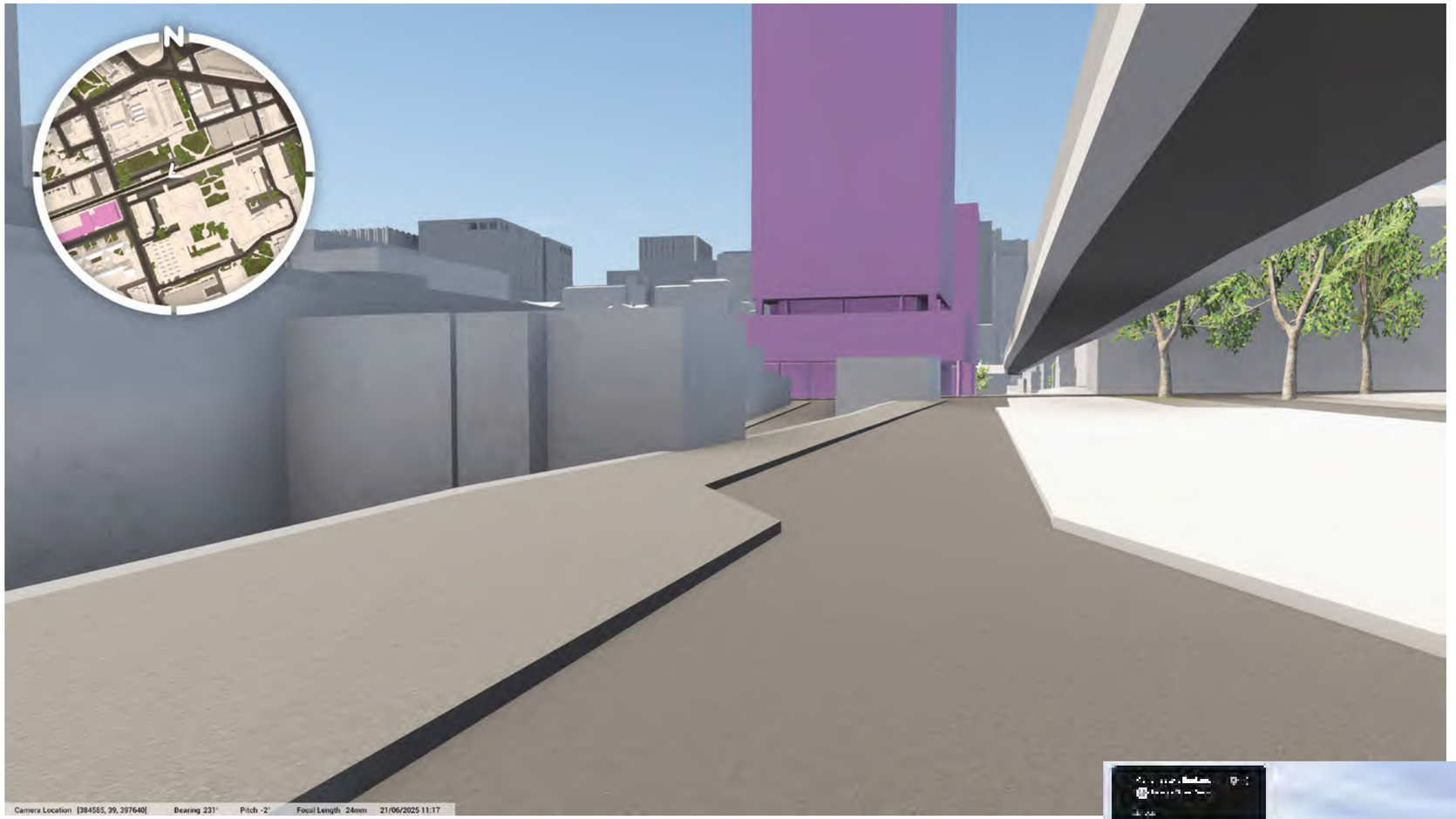
Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 4: Altrincham Street



Render

Townscape & Heritage view



Existing "Streetview"

02 Draft Viewpoints

Viewpoint 5: Sackville Street



Render

Townscape & Heriatge view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 6: Charles Street at Lass O' Gowrie pub



Render

Townscape & Heritage view

Night time view



Existing "Streetview"

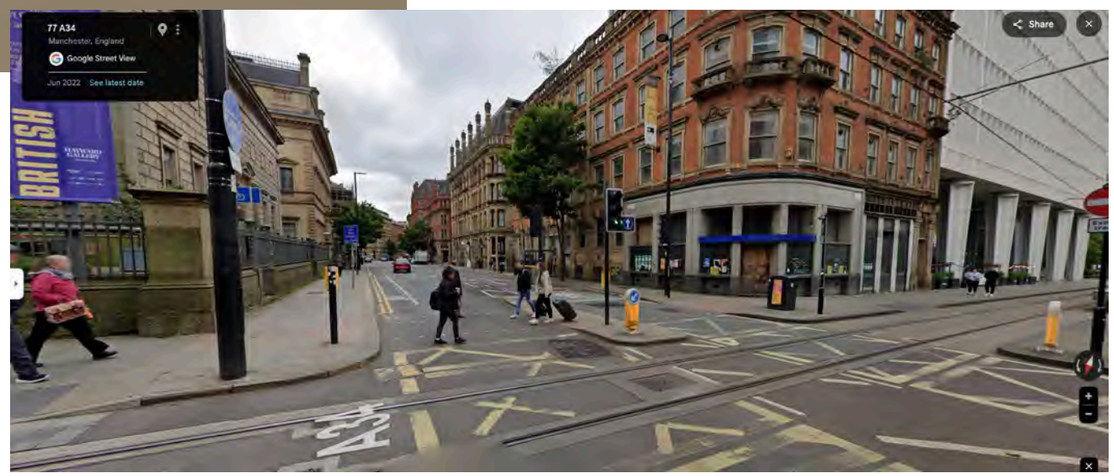
02 Draft Viewpoints

Viewpoint 7: Princess Street



Wireline

Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

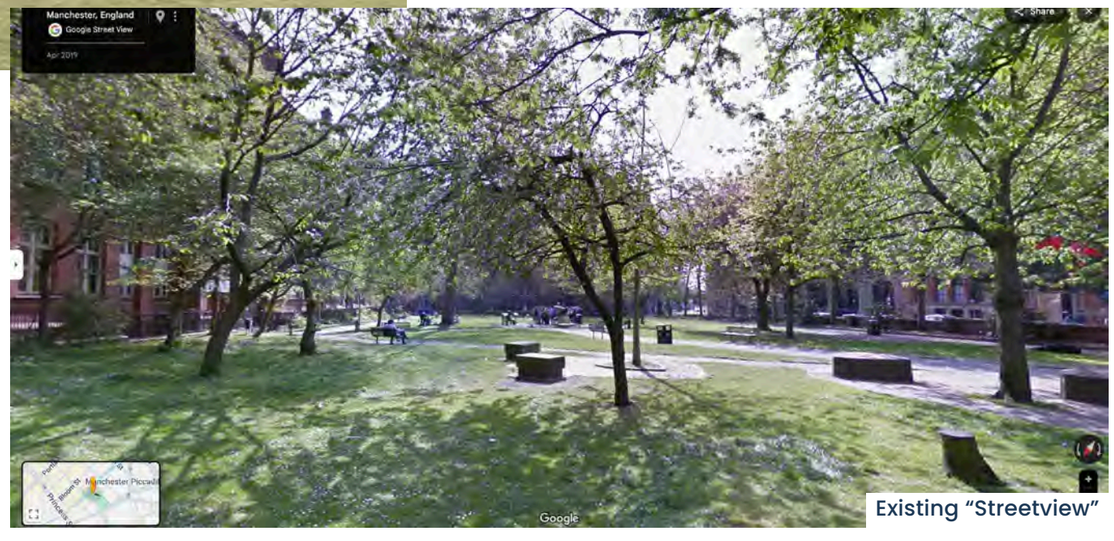
Viewpoint 8: Sackville Gardens (SRF view 5)



Render

Townscape & Heritage view

Night time view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 9: Chorlton Street (SRF view 2)



Wireline

Townscape & Heritage view



Existing “Streetview”

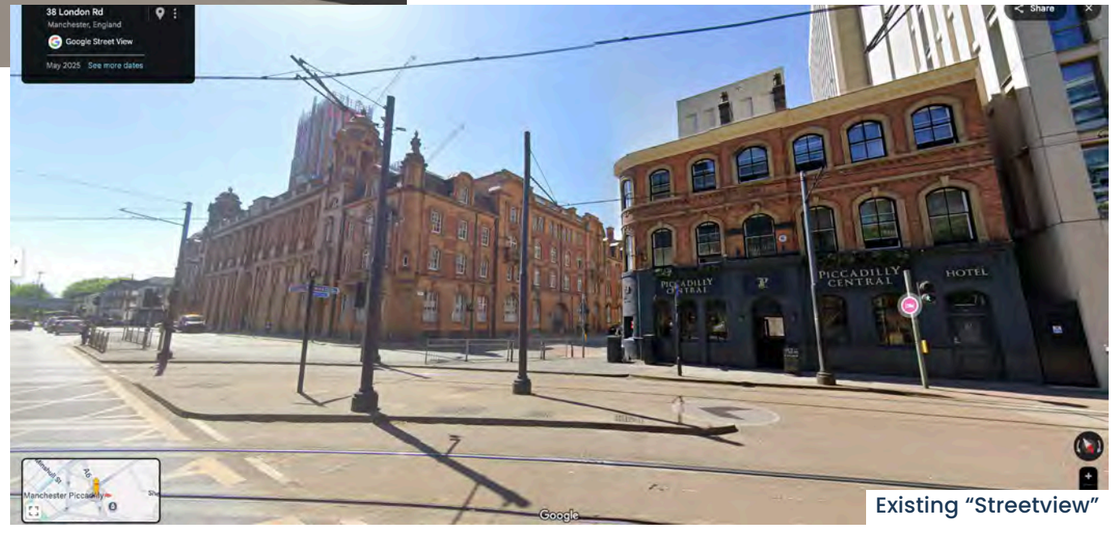
02 Draft Viewpoints

Viewpoint 10: London Road (SRF view 3)



Wireline

Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 11: Fairfield Street (SRF view 4)



Wireline

Townscape & Heritage view



Existing “Streetview”

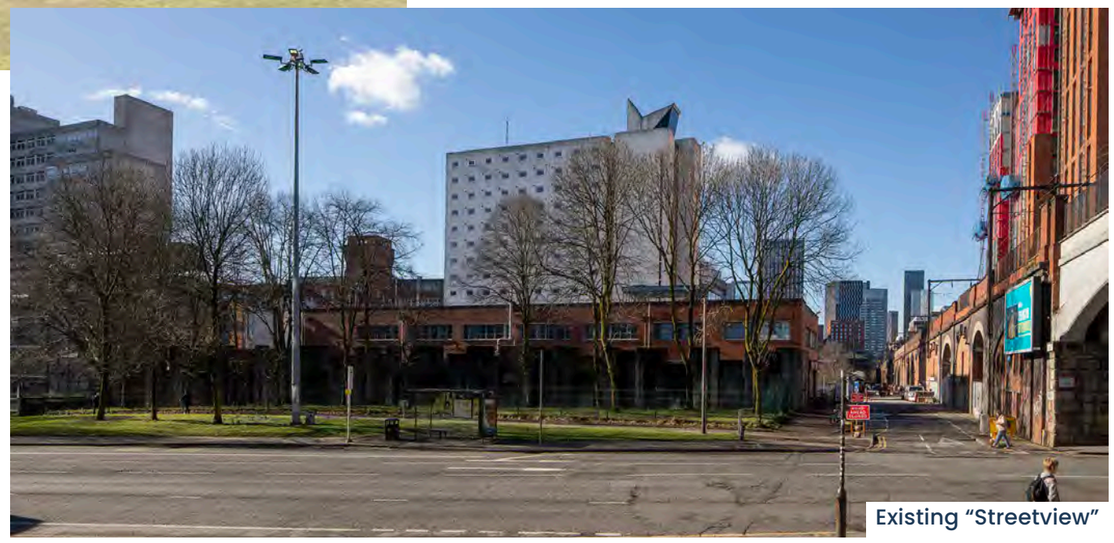
02 Draft Viewpoints

Viewpoint 12: Altrincham Street



Render

Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 13: Mancunian Way



Wireline

Townscape view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 14: Skerry Close



Wireline

Townscape view



Existing “Streetview”

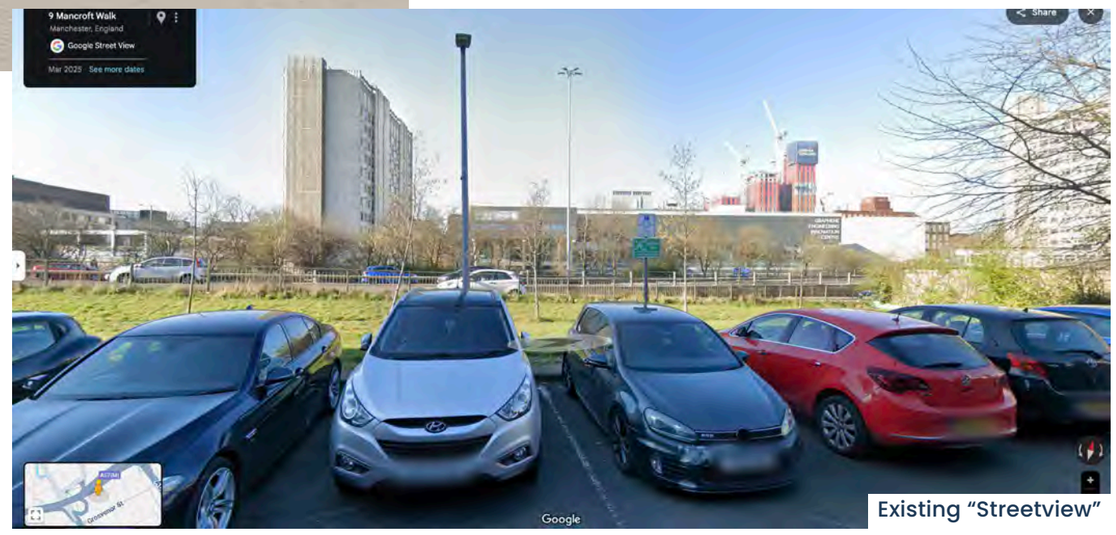
02 Draft Viewpoints

Viewpoint 15: Mancroft Walk



Render

Townscape view



Existing “Streetview”

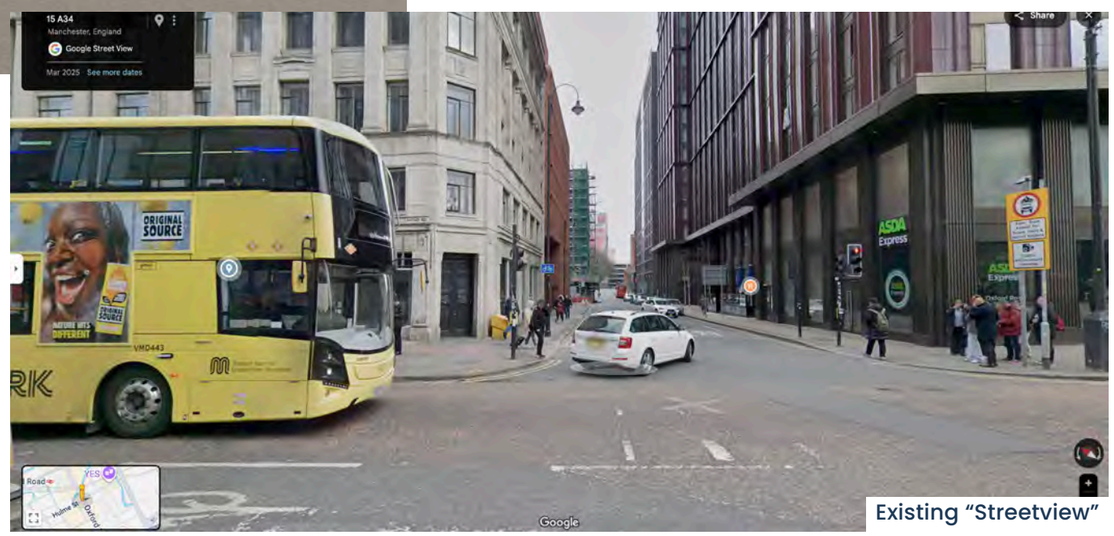
02 Draft Viewpoints

Viewpoint 16: Oxford Road



Render

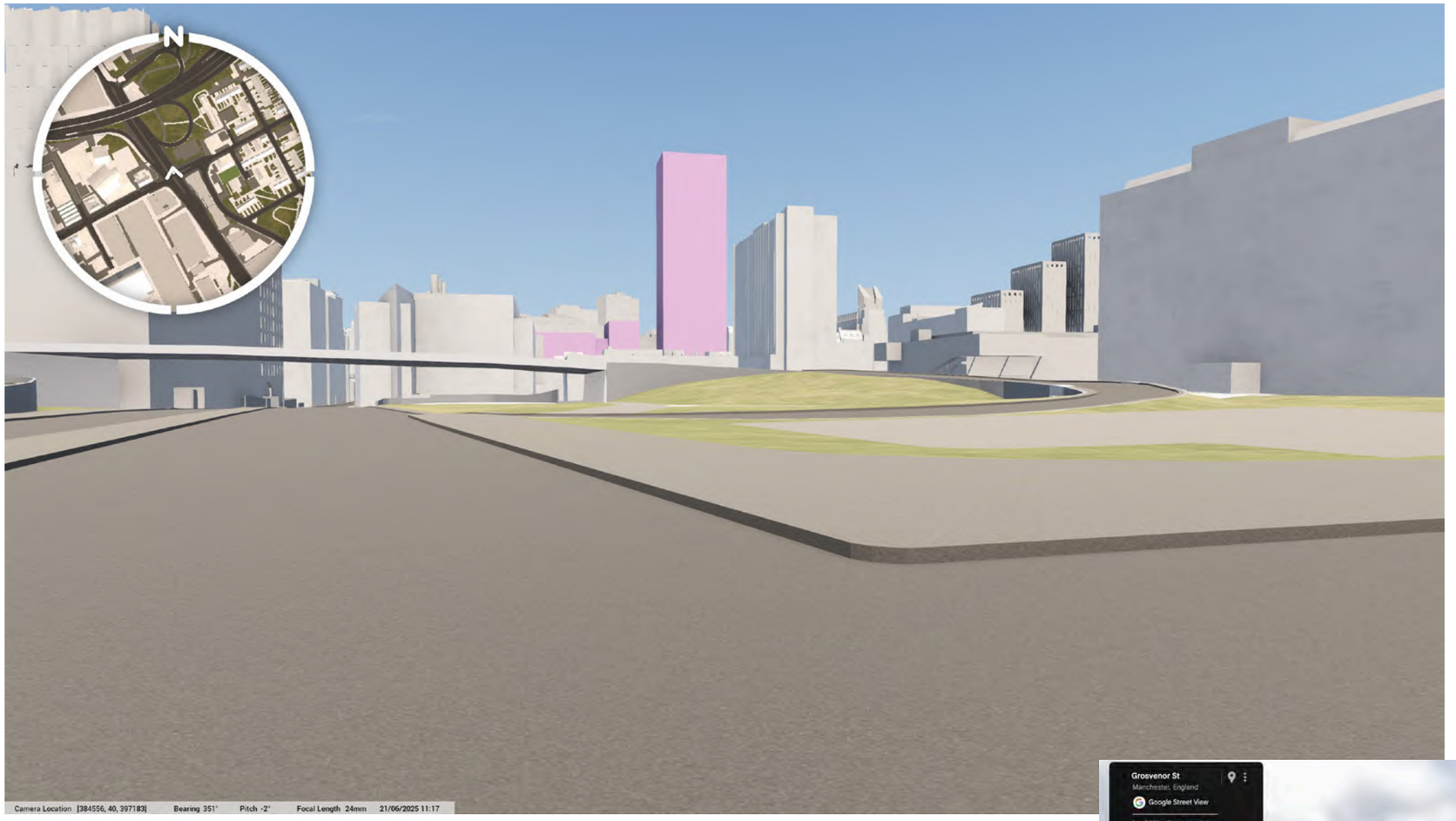
Townscape view



Existing “Streetview”

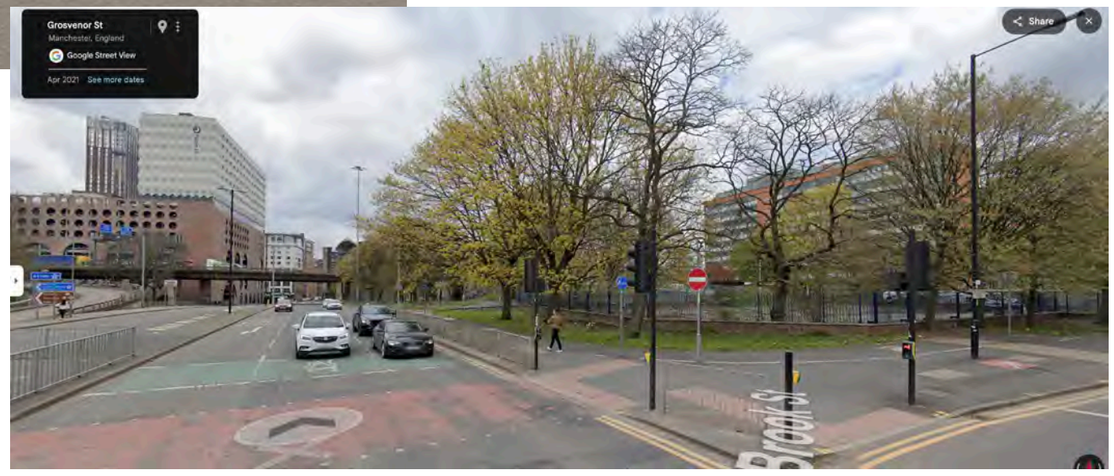
02 Draft Viewpoints

Viewpoint 17: Upper Brook Street



Wireline

Townscape view



Existing “Streetview”

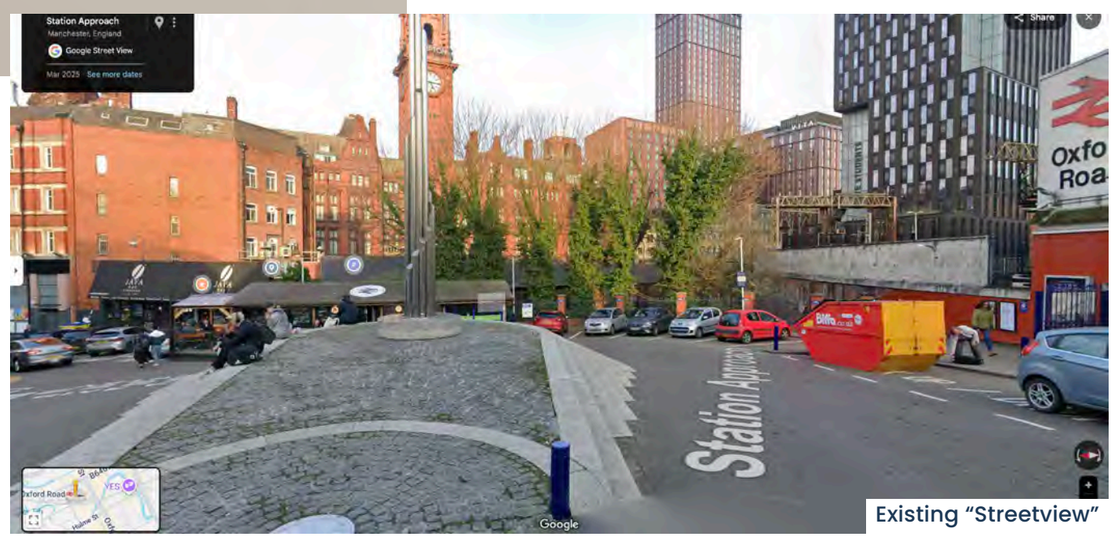
02 Draft Viewpoints

Viewpoint 18: Oxford Road Station



Wireline

Townscape & Heritage view



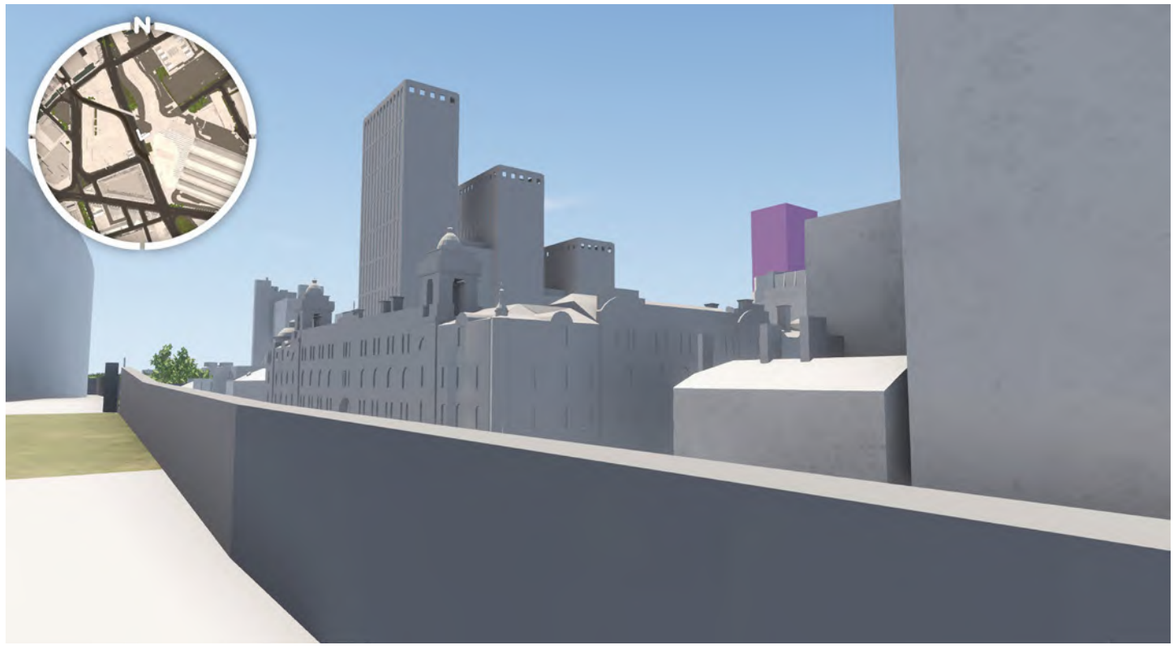
Existing "Streetview"

02 Draft Viewpoints

Discounted views (locations on page 05)



St Peter's Square



Station Approach



Ardwick Green



Station Platform 13/14

MANCHESTER

+44 (0)1625 523 157
manchester@layer.studio

8b Grove Street
Wilmslow
Cheshire
SK9 1DR, UK

NEWCASTLE

+44 (0)1625 523 157
newcastle@layer.studio

Studio 29, 39 High Bridge
Works, Newcastle-upon-
Tyne
NE1 1EW, UK

FOLLOW

Instagram, LinkedIn

VISIT

www.layer.studio

Layer.studio

Appendix 11 – Our Studio Methodology

DATE
02 · 07 · 2024

CLIENT
BRUNTWOOD

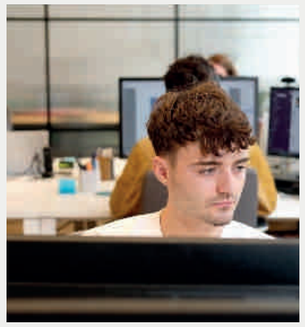
ID MANCHESTER, PLOT C AVRS X 22 VIEWPOINTS OUR STUDIO

OUR STUDIO
PROFILE

We understand our clients and the industry we work in and believe in the importance of building long term relationships and adding real value to our clients' team.

5plus architects
AlliedLondon
Balfour Beatty
bruntwood
CALLISONRTKL
CAPITAL&CENTRIC
CARTWRIGHT PICKARD
Deloitte.
Forge New Homes
GENERAL PROJECTS
greatplaces HOUSING GROUP
Hawkins\Brown
HBD
Jon Matthews Architects
LWC/ LISA WESTERMAN CONSULTANCY
mabanee
MORGAN SINDALL GROUP
MUSE
NORTHSTONE
NOCHINTZ
Peel L&P REALISING POSSIBILITY
PRP
PURCELL
Renaker
SALBOY
Select Property Group
SevenCapital
SHP
Shomoul
SHEPPARD ROBSON
stephenson STUDIO
VITA GROUP

Our Studio is a dedicated team of artists, designers, illustrators and producers. Together, we're proud to collaborate with architects and property developers around the world, bringing their ideas to life in 3D.







As a collective committed solely to visualising buildings and spaces, we're true industry specialists - we understand the technical nuances, project processes and journey touchpoints required to transform an architect's vision into something commercially viable.

Since switching on our PCs in 2009, we've become an essential part of each client's design process. We've helped to gain planning permission, earn funding, win tenders and market developments. Success that's meant as much to us as them.

Because, while we love creating stunning designs in the digital realm, we love seeing them in the real world even more.



Our Studio can produce a wide variety of 3D and interactive assets to target all areas of the market.

Image



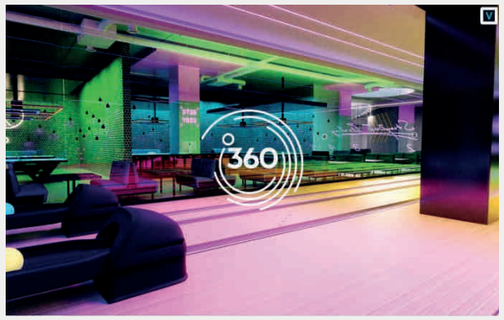
- Interior & Exterior Marketing CGI
- AVR & Planning CGI
- Axonometric 3D Plans
- Rendered 3D Sections
- Rendered Masterplans

Film & Animation



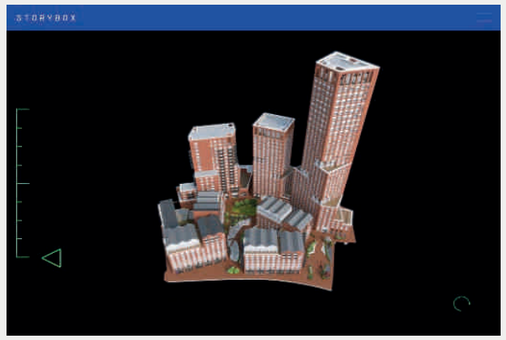
- Interior & Exterior Marketing Animations
- Corporate Launches
- Masterplan Animations
- Concepts
- Sun Path Study
- Social Media animation
- Animated stills / cinemagraphs
- Live location shoots and corporate films / interviews
- Storyboarding
- Greenscreen shoots
- Drone footage with tracking and compositing

VR



- Virtual Reality Tours for online and mobile
- Virtual Reality Tours for marketing suites
- 360 Degree Stereo Panoramas
- 360 Degree Panoramic Video
- Interactive VR
- Multi Platform Solutions
- UNREAL

Apps & Interactive



- Marketing Launch Apps
- Standalone VR Apps
- Multi Platform Solutions
- Web-progressive apps
- iOS apps

Your project

Your OS project will have a dedicated Account Manager and Production Director overseeing your project through all our key stages of production to ensure your project is delivered to a high standard, on time and on budget.

Your project will also include the following key people:

+ Creative Director for internal sign-off of drafts at each key stage
+ Lead 3D Artist
+ Supporting 3D Artist

Our Studio involves our clients at every stage of the process, only progressing to the next stage on sign-off of precedent stages. We think the process of image and animation creation should be an enjoyable one for both client and 3D Artist.

Our Studio's Processes are based on over 15 years working in the industry and are a tested method for the successful, efficient delivery of our projects.

Key stages of Production

01 Define
Scope of works and associated costs / schedule.

02 Pre-production
Organising design information, talking to architects and interior designers, cleaning drawings and preparing supplied 3D Models.

03 Concepts
Preparing moodboards for interiors, sourcing 3D assets, storyboard concepts, view composition, inspiration for lighting.

04 Production
Stills and animation - 3D modelling and texturing interior spaces, building modelling and landscape. Includes 3 key stages when drafts will be issued for client feedback:

+ White card view options for view selection prior to developing the 3D Model
+ First textured draft for feedback on lighting, furniture, textures.
+ Second textured draft with people placed in scene - final, minimal comments that do not require design or model changes.

05 Editing, Animating & Motion
For animation includes animatic creation, motion design and animation. Sourcing sound, music and/or v/o.

06 Rendering & Post Production
For stills, animation and VR

07 Delivery
Once the project is complete we ensure the client is happy with what has been delivered. Delivery is usually made via electronic file transfer in the usable file sizes for marketing and planning purposes specified at the start of the project.

Our Studio USPs

- Expertise
- Highly-skilled, Creative & Technical Team
- Collaboration
- Innovation
- Refined Processes
- Relationships
- Quality

01 Expertise

Each Director brings with them over 18 years experience in their key sector which is in turn shared on projects:

\+ Sam Crothers, Managing Director - Marketing & Branding

\+ Nick Harrison, Creative Director - Planning & Verified Views

02 Highly Skilled Artists

Our artists are experienced in key and complimentary skills across 3D modelling, exterior and interior cgi, interior design, animation and photography.

03 Team of 12

We are a relatively large team for a visualisation studio which means we can keep everything in-house having better control over quality and delivery. We can take on large projects and resource quick turnaround projects more easily than smaller studios / freelancers.

04 15 years in business

Our Studio is in its 15th year of business and takes pride in the relationships it has built with clients, architects, suppliers and collaborators. This makes for a smoother process from start to finish on a project.

05 Refined and proven processes

Our years working in Architectural Visualisation, we have honed in on our processes, understood how and what are more efficient and enjoyable ways of working balancing both technical and creative output. We have also built up an extensive 3D asset library over our 15 years of production. We are always open to improvement and welcome feedback from clients.

06 Collaboration & Innovation

These are two values that are important to us as a studio and enable us to always look at innovative solutions to our client's challenges. Whether it's using a VR Headset, a web progressive app or testing UNREAL technology, we always strive to find the right solution to add value and ROI.

OUR STUDIO
ACCURATE VISUAL REPRESENTATION (AVR) METHODOLOGY
2024

INTRODUCTION

This document outlines Our Studio's process for verified imagery. It describes the process from commission through to completion of wireline, massing and fully rendered views.

In drafting this methodology, guidance has been taken from relevant sections of the Landscape Institute Technical Guidance Note 06/19 - Visual Representation of Development Proposals. Where appropriate we have also taken guidance from the London Plan 2011 Implementation Framework (March 2012) London View Management Framework Supplementary planning Guidance: Appendix C: Accurate Visual Representations.

Prior to commencement, the series of views are chosen by the project team. This would usually be completed with the assistance of a townscape planning specialist - Our Studio would recommend that this is undertaken, especially if the views are intended to form part of an Environment Impact Assessment Report.

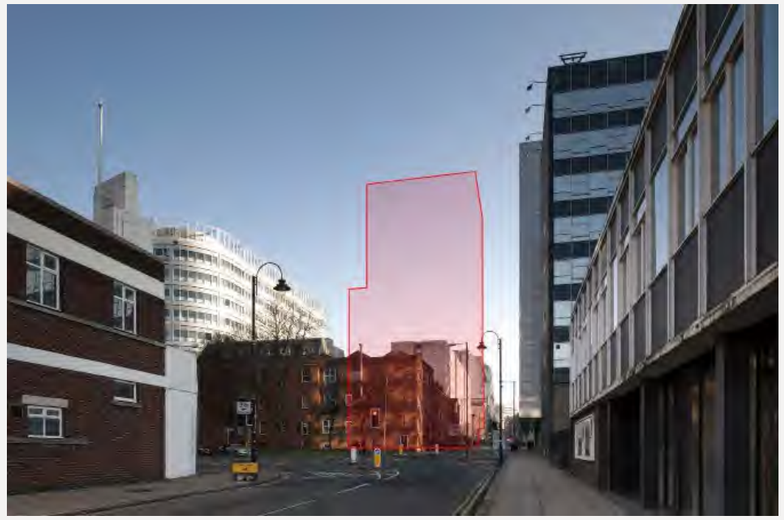
The disciplines employed are of the highest possible levels of accuracy and photo-realism which are achievable with today's standards of architectural photography and computer-generated models.

The process is divided into a number of stages, once the viewpoints have been chosen. These are summarised as follows:

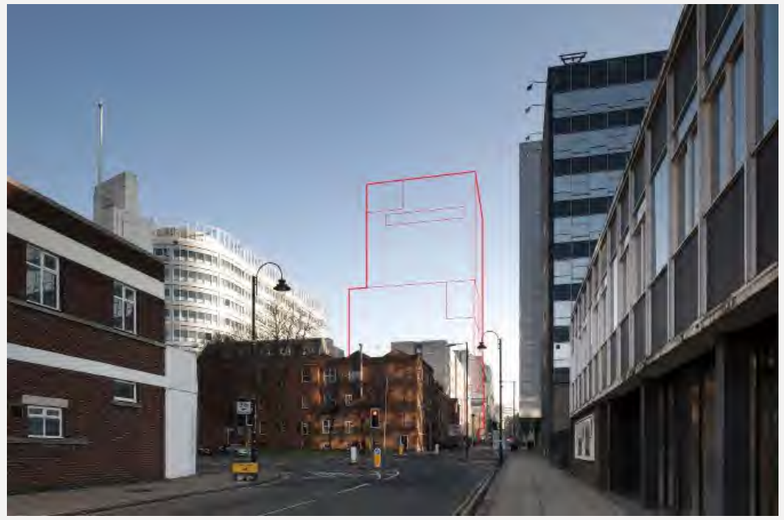
Stage 1 - Commissioning of photography
Stage 2 - Commissioning of Survey
Stage 3 - 3D Modelling of scheme
Stage 4 - Integration of photography and survey data to form the alignment
Stage 5 - Adding scheme and rendering
Stage 6 - Completion of final image



AVR LEVELS RELATING TO TYPE 4 VISUALISATION



LEVEL 0 - Location and size of proposal



LEVEL 1 - Location, size and degree of visibility of proposal



LEVEL 2 - As level 1 + description of architectural form



LEVEL 3 - As level 2 + use of materials

STAGE 1
PHOTOGRAPHY

After consultation with the Local Authorities, the chosen views are typically scoped out in the form of draft photographs and marked on an Ordanance Survey (OS) map. Our Studio will then brief the professional photographer on each viewpoint.

At each of the chosen viewpoints, a photograph of the actual view is taken recording its position on the ground (by photography as well as inserting a survey pin into the ground). This assists the survey team with identifying the camera position and measuring co-ordinates.

The Photography is taken using a full frame digital camera placed vertically above the chosen point at a standard height of 1.6m. This is typically achieved using a plumbline vertically beneath the centre of the lens.

Our photographer uses a lens with a known field-of-view (FOV) and sets the camera on a levelled tripod. High quality lenses are used to ensure minimum distortion. Within each study or series of images, the photographer will aim to use a consistent lens. This is typically a 24mm perspective control lens for a local view which equates to 73.7 degrees angle of view. However, for mid-distant views a 50mm lens may typically be used.

The Photographer notes the time and date of each shot (which is always captured in the EXIF metadata) - this enables any lighting conditions to be replicated later on in the process.

Our photographers use a range of full frame architectural cameras with the following high-resolution, digital lenses:
24mm, 28mm, 35mm, 50mm

Using perspective control shift may be required in Townscape views.
The digital chip dimensions are 36mm x 24mm.



Camera location map



Camera position



Final photo

STAGE 2
SURVEY

For each agreed photo viewpoint location an instructional document is released to the survey subcontractor. The surveyor is instructed (by means of a marked up photograph) to record a range of reference points that would enable a very high degree of accuracy.

These points should be centred on the location of the candidate scheme, and be varied throughout the depth of the view - ie near, mid-distant and far points. The points can then be measured by the survey team and will be recorded in terms of their Easting, Northing and height in relation to Ordanance Survey (OS datum)

The survey team also replicate the position of the camera in order to survey points on the horizon of the photograph. These can be used later in the process to remove any rotational errors in the photo.

Survey Equipment Required
• Global Positioning System (GPS)
• Total Station (with good reflectorless EDM range)

Field Survey Methodology
• Camera Locations - To establish the position of a viewpoint, the surveyor sets up a GPS on it and records enough points to ensure a high level of accuracy.
• Reference points - The surveyor sets up two temporary stations (TBMs) within view of each reference point and establishes their location using the GPS. Once these co-ordinates have been established, the surveyor sets up a Total Station on the TBMs and takes 3 reflectorless survey shots to the reference point in question.
Note: Where GPS positioning is not possible near to the required survey point - due to poor signal, for instance - the surveyor set up his TBMs at the nearest position possible and traversed traditionally to a position where he could survey the point.

Data Processing & Delivery
GPS data is processed through to acquire the surveyed points in the form of a delimited text file containing OSGB36 co-ordinates. Plus a 3D point cloud and camera position that can be imported into our 3D software.



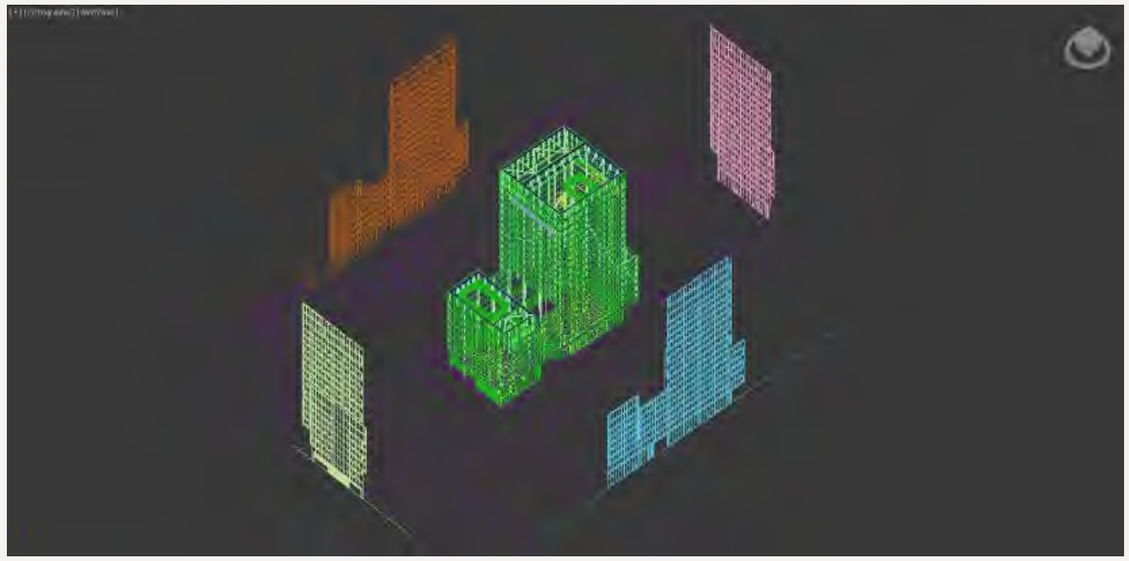
Survey points

STAGE 3
MODELLING OF THE SCHEME

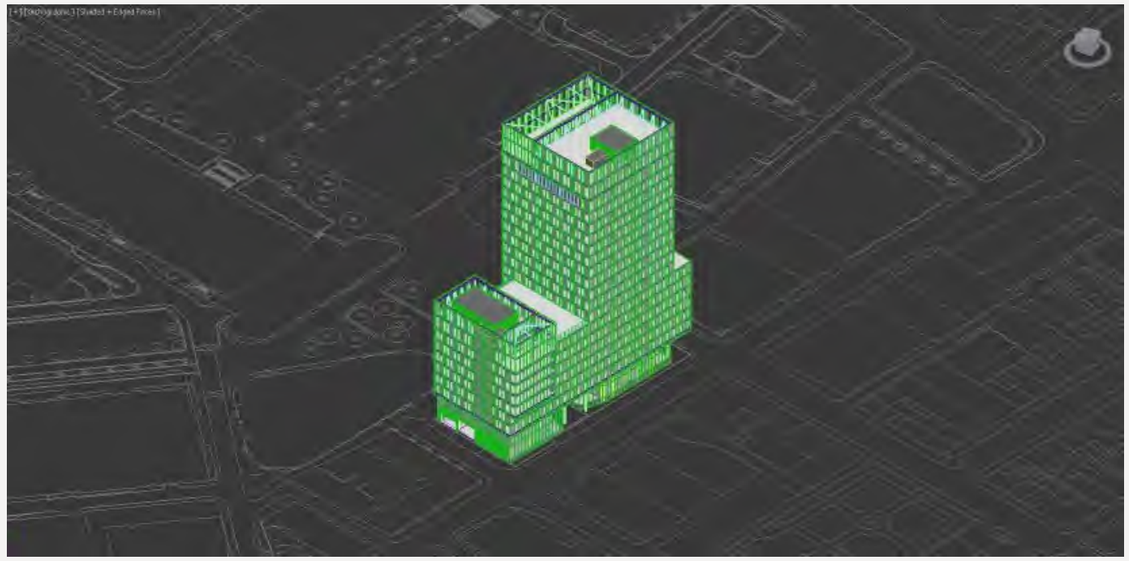
Within 3DSMax software, the scheme is either modelled from drawings supplied as dwgs by the architects or a detailed model will be supplied by the architect usually in the form of a Revit model. The model can be constructed in a number of ways dependent on the type of image being produced. The requirement is often for initial views, to study the form of the scheme and its impact on the surrounding environment - here, a block model is usually appropriate to allow all parties to assess the scheme.

From here a detailed model is often commissioned to progress to fully rendered certified imagery.

The model is setup in the 3D Virtual environment in relation to OS plan so that it can be integrated with the survey information.



DWG elevations and plans are imported to enable accurate modelling.



Orthographic view of detailed model

STAGE 4
INTEGRATION OF PHOTOGRAPHY, AND SURVEY DATA TO FORM THE ALIGNMENT

The first three stages are now brought together to create the alignment, within the 3D software.

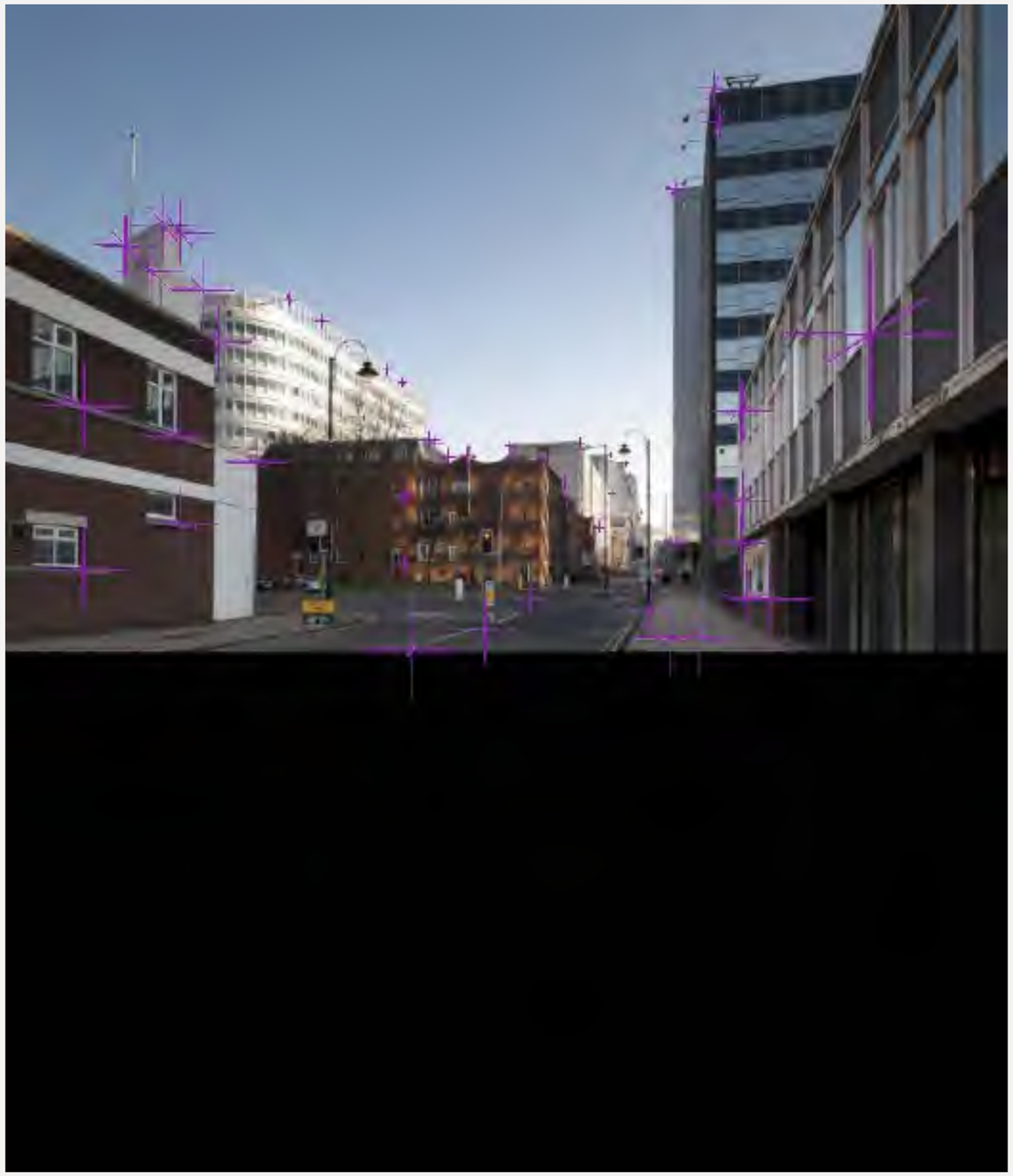
Firstly, the photography is brought into the 3D software, in the form of a background so that the surveyed information can be aligned to it ie camera-matching. A couple of stages are completed to accomplish this.

1. The photo is brought into ' Adobe Photoshop' editing software. Any rotational inaccuracies from the photo are removed. This is completed by using the surveyed horizon information and rotating the image accordingly.

2. Any 'shift' applied by the photographer using the perspective control lens needs to be addressed. Vertical shift is applied to allow the photographer to photograph tall buildings whilst keeping the camera level, and hence the verticals of the image vertical. It has the effect of 'shifting' the horizon off the centre of the image. To use the photography within the 3D software, the horizon has to be returned to the centre of the image - this is done by adding a blank area to the top or bottom.

Secondly, the survey data is brought into the 3D software. Returned to Our Studio as a database document, the Easting, Northing and height co-ordinates that can be imported so that they form points in 3-dimensional space. The virtual camera is also located, using the OS data reference returned to Our Studio.

Lastly, the camera is adjusted so that the surveyed points line up with the background photography. The field-of-view (FOV) is entered according to the lens the photographer used and the location of the camera's 'target' is adjusted in the X and Y plane (ie not vertically) so that the points align with the features surveyed.



3D software viewport showing background photography aligned with survey data points.

STAGE 5
ADDING SCHEME AND RENDERING

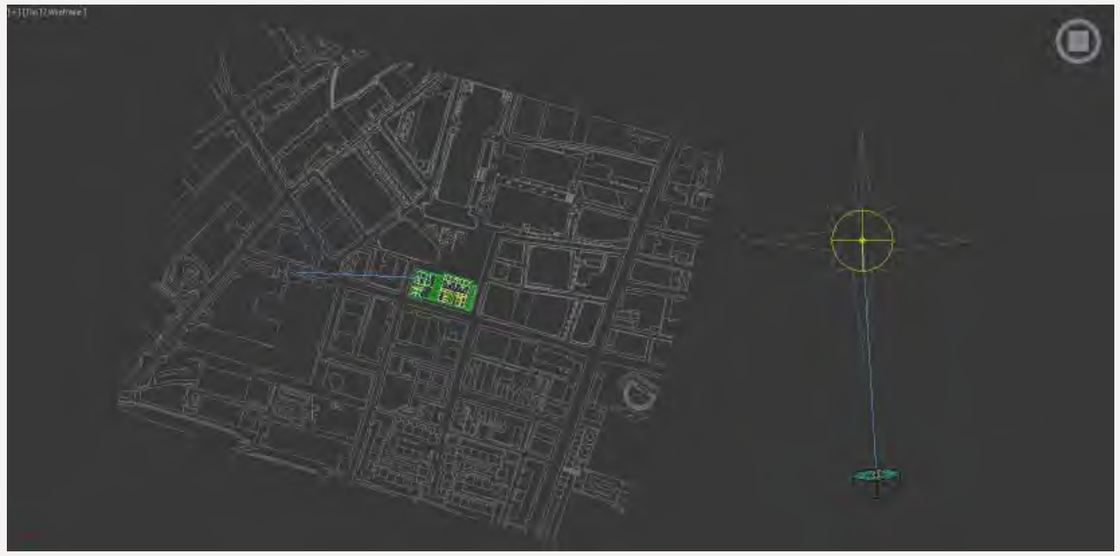
Upon completion of the camera alignment the 3D model (as described in stage 3) is brought into the 3D virtual environment in relation to OS datum.

Lighting is then setup in the 3D virtual environment to match the sunlight conditions at the time the source photograph was taken.

In order to assist a more qualitative assessment of the proposals, the output image needs to be a photo-realistic reflection of what the proposed scheme would look like once constructed. The process of transforming the wireframe 3D scheme model into one that can be used to create a photo-realistic image is called texturing.

Prior to rendering, Our Studio requires details from the architect regarding the proposed materials (e.g. type of glass, steel, aluminium etc.) to be utilised. This information is used to produce the appearance and qualities in the image that most closely relates to the real materials to be used.

The 3D model is then rendered in the 3D software at the same resolution as the photograph.



3d software showing top view of model aligned with OS plan including camera location and sun-light setup.



3d software showing view from camera with photo background and model in position.

CLIENT
TRILOGY PROPERTY

ARCHITECT
SIMPSON HAUGH & PARTNERS

GREAT NORTHERN



CLIENT
TRILOGY PROPERTY

ARCHITECT
SIMPSON HAUGH & PARTNERS

GREAT NORTHERN



OUR STUDIO

CLIENT
SELECT PROPERTY

ARCHITECT
SIMPSON HAUGH & PARTNERS

ONE PORT STREET.



OUR STUDIO

CLIENT
EASTERN GREEN LTD

ARCHITECT
FEILDEN CLEGG BRADLEY

67 PICCADILLY

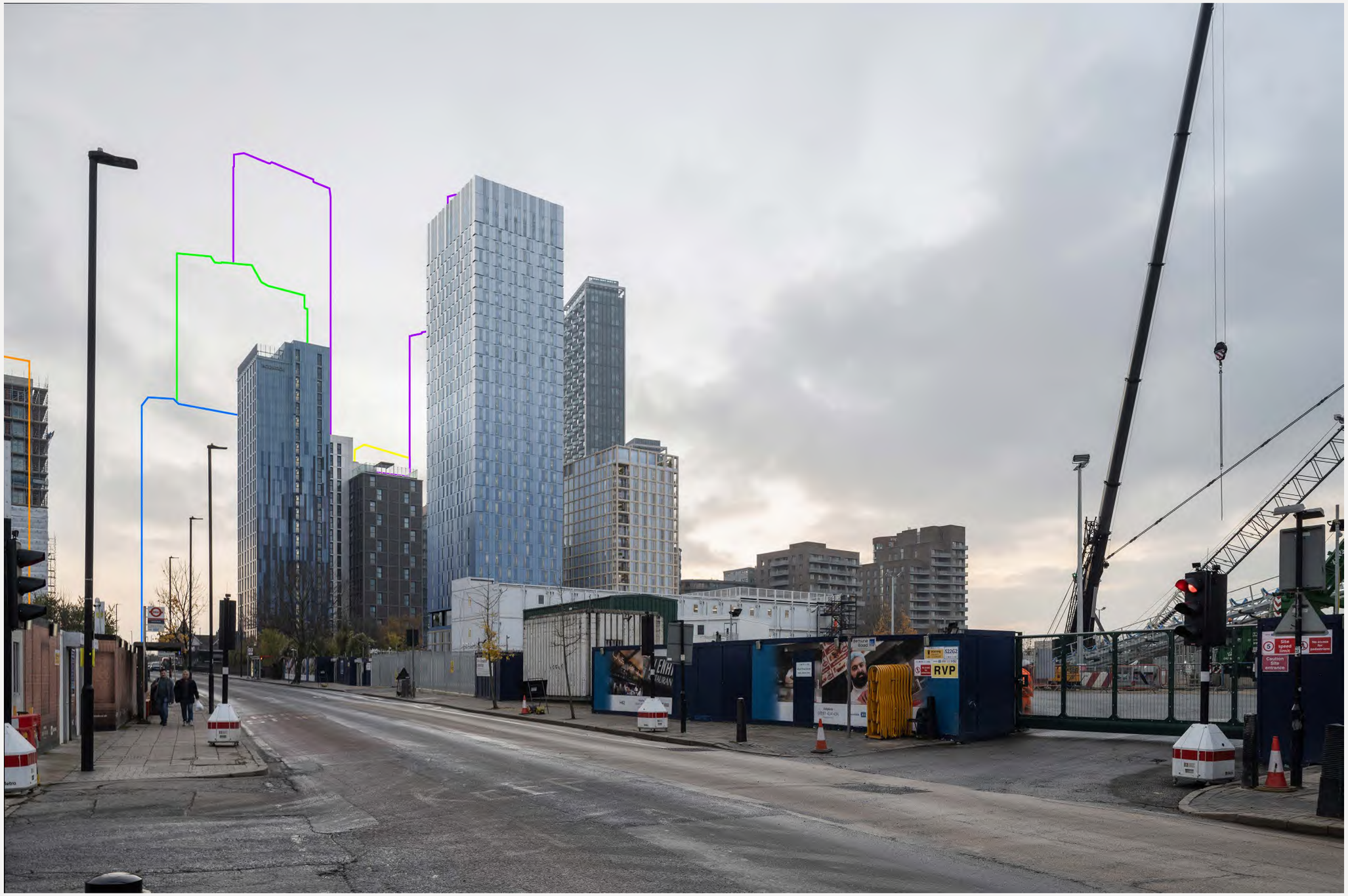


OUR STUDIO

CLIENT
DOWNING PROPERTY GROUP

ARCHITECT
SIMPSON HAUGH & PARTNERS

HOLIDAY INN, NORTH ACTON



CLIENT
DOMINVS GROUP AND WHITBREAD

ARCHITECT
JON MATTHEWS ARCHITECTS

MEDLOCK STREET



CLIENT
TOWER EIGHT

ARCHITECT
SIMPSON HAUGH & PARTNERS

CHARLES STREET



CLIENT
HENRY BOOT
DEVELOPMENTS (HBD)

ARCHITECT
CARTWRIGHT PICKARD

ISLAND



OUR STUDIO

OUR STUDIO

NORTHSPRING
SUITE 5D
70 SPRING GARDENS
MANCHESTER
M2 2BQ

Tel +44 (0)161 237 1900
Email hello@ourstudioltd.com

For more info
Sam Crothers
Founder & Managing Director
+44 (0)161 237 1900
+44 (0)777 1963039
sam.crothers@ourstudioltd.com

Appendix 12 – Built Heritage – EIA Scoping Figures

Project: ID Manchester – Plot H

Title: Built Heritage – EIA Scoping Figures

Date Issued: September 2025

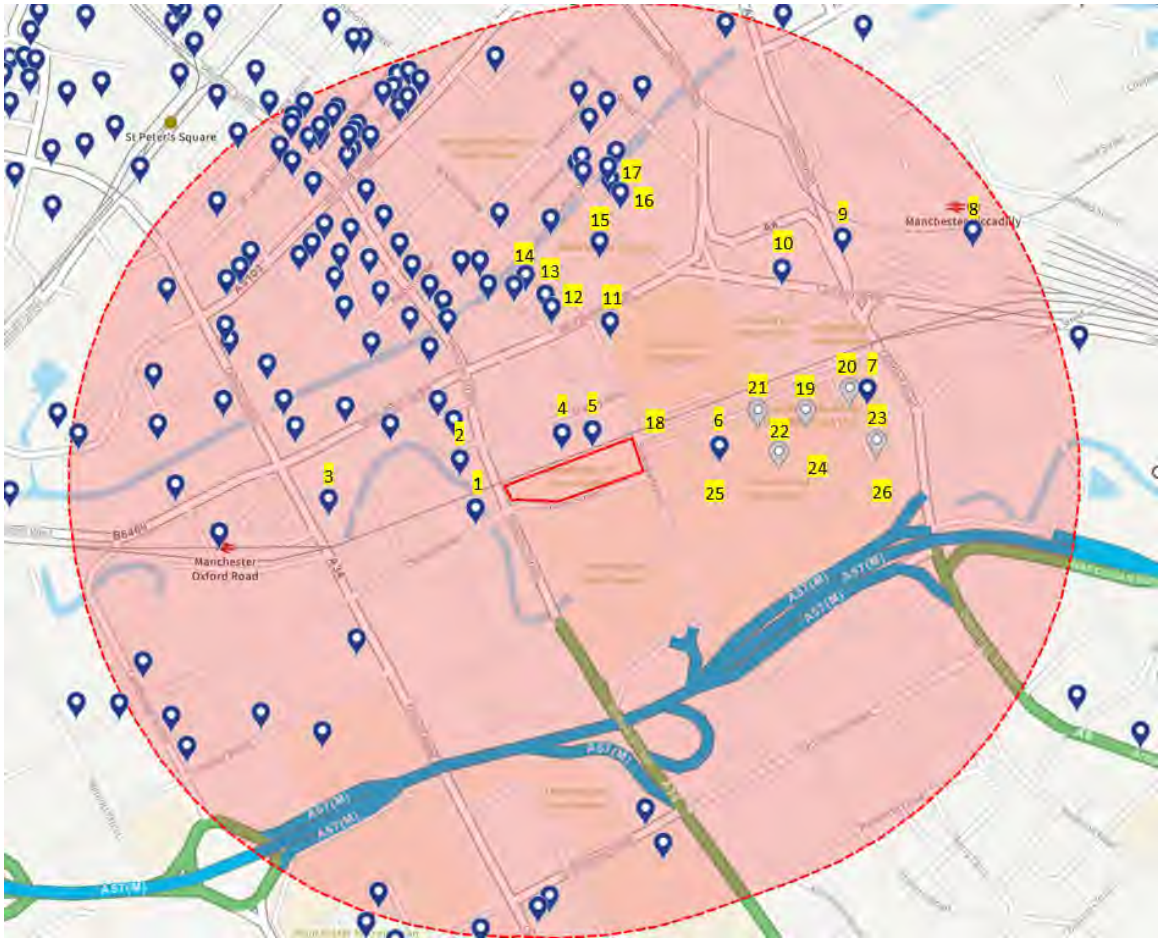


Figure 1: Location of listed buildings (blue markers) within 500m study area (red shading). Indicative Site boundary indicated in red. Identified receptors for inclusion within the scoping assessment numbered 1-18. Source: Historic England, National Heritage List for England.



Figure 2: Location of Whitworth Street Conservation Area (red line) in relation to the Site (Plot H boundary indicatively shown in area shaded green). Location of conservation areas in relation to the Site.

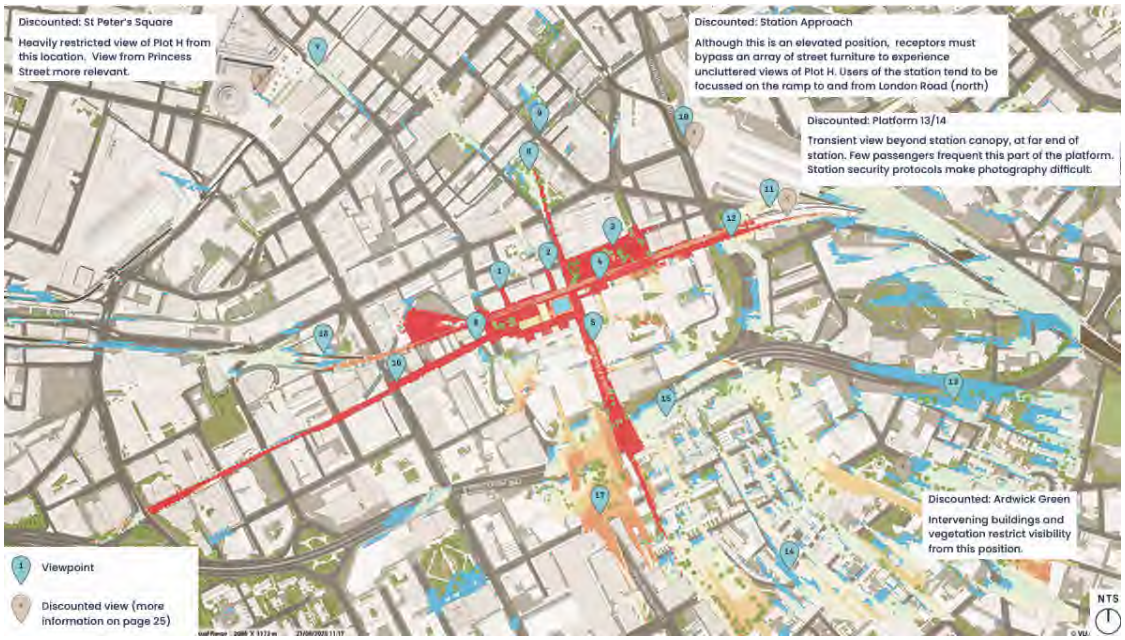


Figure 3: Zone of Theoretical Visibility (ZTV) of Tower 3 (148m) prepared by Layer Studio. The area shaded red is indicative of high visibility. The ZTV has informed initial viewpoint location discussion.

Draft viewpoint locations with potential effects on heritage as identified within the TVIA issued on 15 September 2025 are:

- 2 – Granby Row at Granby House
- 3 – Vimto Park (SRF view B)
- 4 – Altrincham Street
- 5 – Sackville Street
- 6 – Charles Street at Lass O' Gowrie pub
- 7 – Princess Street
- 8 – Sackville Gardens (SRF view 5)
- 9 – Chorlton Street (SRF view 2)
- 10 – London Road (SRF view 3)
- 11 – Fairfield Street (SRF view 4)
- 12 – Altrincham Street
- 18 – Oxford Street Station

Appendix 13 – Environmental Noise Survey Report

Ref: 2151.Rep.ENS

17 July 2025

blackbird acoustics
E: Alex.Wyatt@Blackbird-Acoustics.co.uk
M: 07958 439 142
W: www.blackbird-acoustics.co.uk/
A: Forest Hill, London SE23

Chris Lambourn
RG Group
Chris.Lambourn@rg-group.org.uk

Dear Chris

RGRE, PBSA, Plot H, Charles Street, Manchester M1 7AR
Environmental Noise Survey Report

Planning permission is being sought for the re-development of the current multi-storey car park on Charles Street in Manchester to build student accommodation (PBSA) on behalf of RGRE with ancillary communal amenity spaces, commercial uses, and landscaping. Blackbird Acoustics Limited (BAL) have been appointed by RGRE to supply acoustic input to the project at the planning application stage, through design and build stages, up to commissioning and handover. Blackbird Acoustics have undertaken baseline environmental noise surveying at the site to establish the prevailing noise levels. This report details the findings of the noise surveying, on which future assessments will be based; including detailed assessment of the glazing performance requirements, Part O and noise risks associated with overheating, mechanical services limits and criteria, etc.

Noise Surveying

Blackbird Acoustics attended site to undertake environmental noise surveying of the prevailing noise levels at site. Noise monitoring was conducted over a full weekend period (due to its central city location) between 15:15 hours on Friday 4th to 13:20 hours on Tuesday 8th July 2025.

The survey was undertaken in general accordance with BS 7445 and the ANC's Environmental Noise Measurement Guide. Weather conditions throughout the survey were conducive with obtaining representative noise measurements, being generally dry with light winds with periods of light rainfall occasionally. The measurements were made using Type 1 sound level meters, Norsonic 140s, which were calibrated both prior to and on completion of the surveying, with no significant calibration drifts observed. Calibration details available upon request.

Measurements were undertaken over 5-minute sample periods at the following positions, with microphones attached to booms at least 1.5m from the façade line, in the free-field.

Position 1 – North – Rail:	Rear of Site overlooking elevated railway tracks, 9.3m above ground level, circa 3rd floor, ~0.5m above tracks with direct line-of-sight [///august.museum.rank]
Position 2 – South-East – Sackville St:	Corner of site overlooking Sackville and Charles Streets, 5.6m above ground, circa 2nd floor [///chef.same.lease]
Position 3 – South-West – Charles St:	Corner of Site overlooking Charles St towards Princess St, opposite Echoes Day Nursery, 7.8m above ground, circa 2nd floor [///issue.prop.vibrates]

Figure 1 – Site Plan indicating Measurement Positions

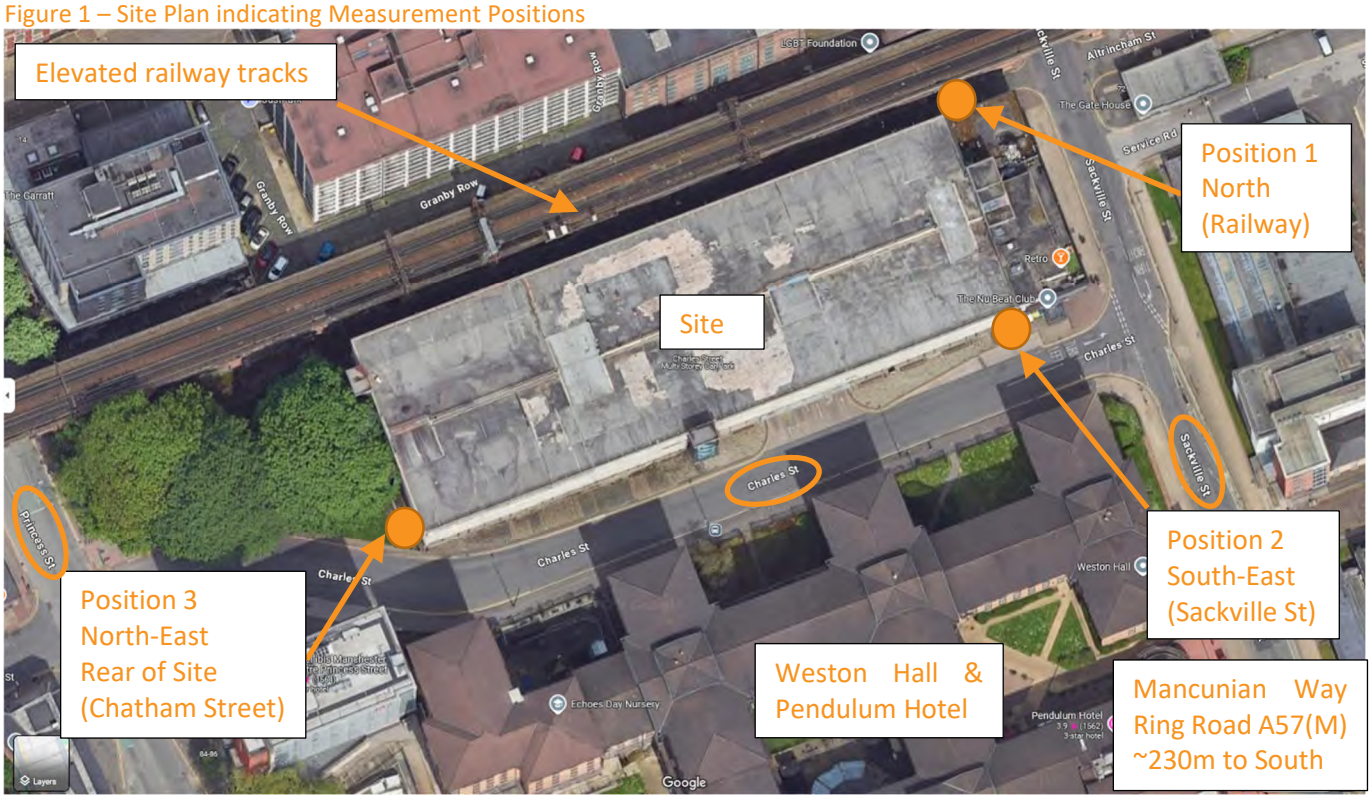


Image courtesy of Google Maps

The measured levels are summarised below;

Table 1 – Summary of Measured Noise Levels

Measurement Period	Pos 1 – North (Railway)			Pos 2 – South-East (Sackville St)			Pos 3 – South-West (Charles St)		
	Typical Lowest L_{A90} (dB)	Period-Averaged L_{Aeq} (dB)	Typical Night L_{Afmax} (dB)	Typical Lowest L_{A90} (dB)	Period-Averaged L_{Aeq} (dB)	Typical Night L_{Afmax} (dB)	Typical Lowest L_{A90} (dB)	Period-Averaged L_{Aeq} (dB)	Typical Night L_{Afmax} (dB)
Daytime (07:00 – 23:00 hours)	46	65	-	47	61	-	48	61	-
Night-time (23:00 – 07:00 hours)	41	62	82	43	58	75	43	58	78

The typical night-time $L_{Amax,f}$ values are calculated from the 90th percentile of the 5-minute samples.

It should be noted that noise levels at all Measurement Positions were dominated by local road traffic movements along the immediately adjacent Sackville (east) and Charles (south) Streets, and the other local roads, including Princess Street (west) and the Mancunian Way Ring Road A58(M), which is approximately 230m to the south of the site. Traffic is fairly consistent and prevalent in the vicinity, although quieter periods occur during the daytime with congestion during rush hour periods. Road traffic movements along the elevated A58(M) contribute to the prevailing background levels. Road sweeping machines were present around the site, on and off throughout the day. Vehicles of all types were present, i.e. cars, motorbikes, vans, buses, lorries, etc.

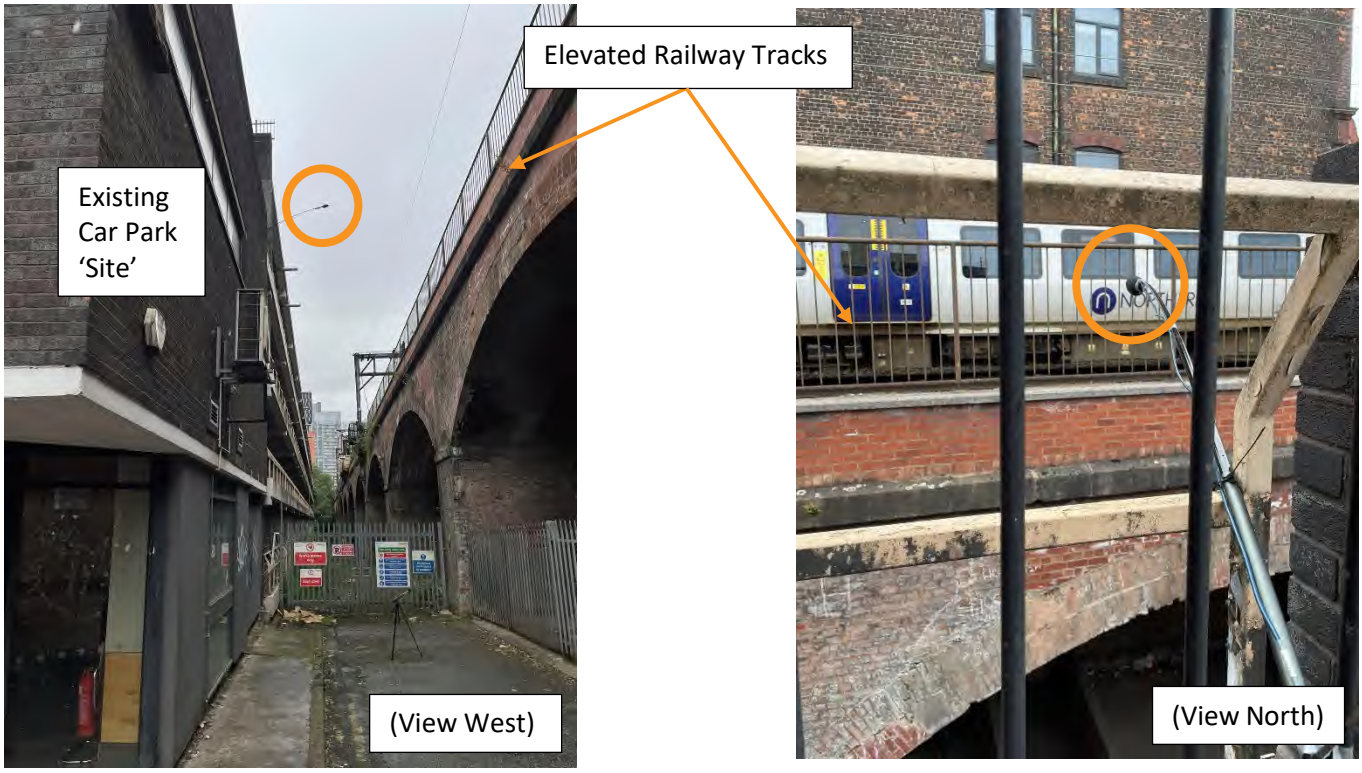
Rail traffic movements along the elevated railway tracks running the length of the northern boundary also heavily influenced the noise environs. Both passenger and freight trains use the tracks with movements generally quite slow, as the trains travel between stations, with Manchester Oxford Road station to the west of site and Manchester Piccadilly station to the east. Low frequency rumble ('boomy') noise was present on site due to re-radiated noise off the arches supporting the elevated tracks, particularly for faster moving trains.

The measured noise levels from the surveying are graphically represented in the attached Graphs;

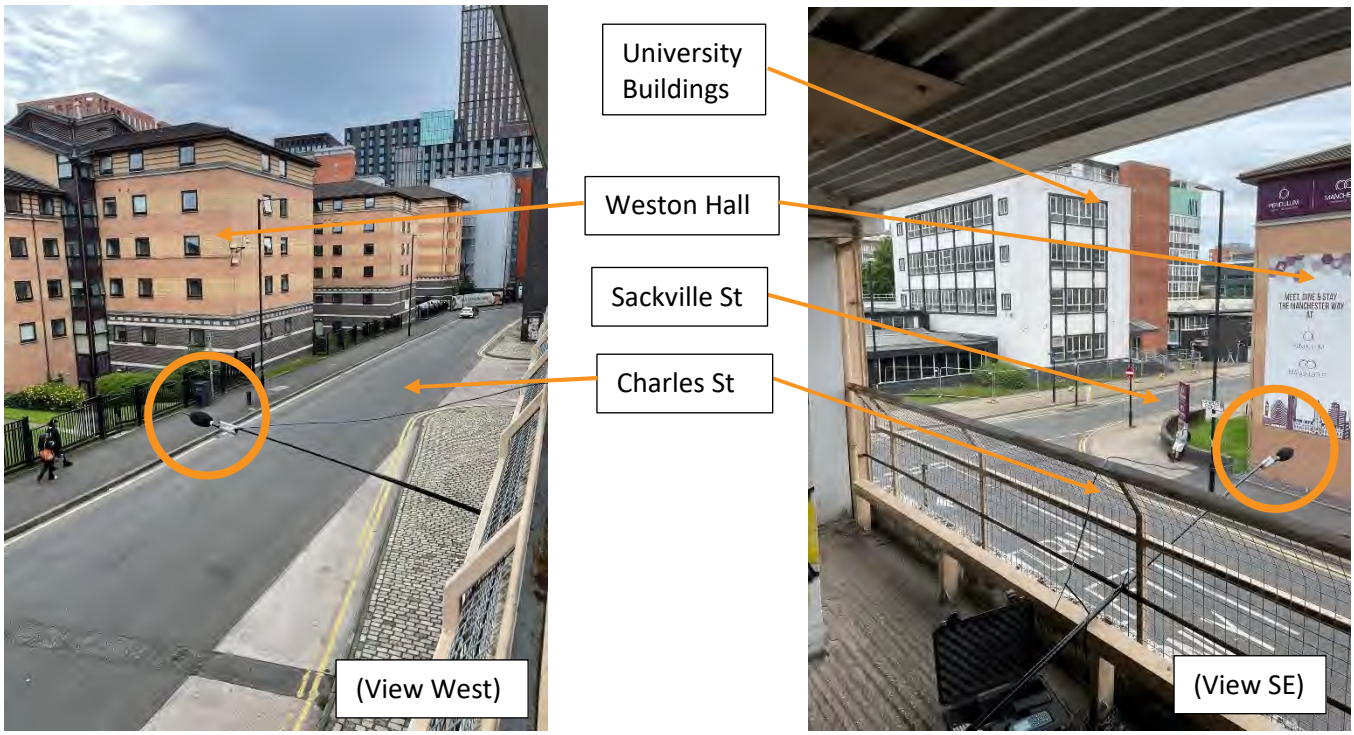
- Graphs 1 - 6 indicate the L_{eq} and L_{max} & L_{90} overall dBA value time-histories measured at each position.
- Graphs 7 - 9 indicate the spectral noise levels, which will be used in the assessment of the glazing specs.
- Graphs 10 - 12 indicate the L_{90} histograms used to derive the "typical lowest" values & thus plant noise criteria.
- Graphs 13 - 15 indicate the $L_{Amax,f,5mins}$ histograms for the night-time only, used to derive the "typical L_{max}" values.

Photos of the measurement positions are as follows;

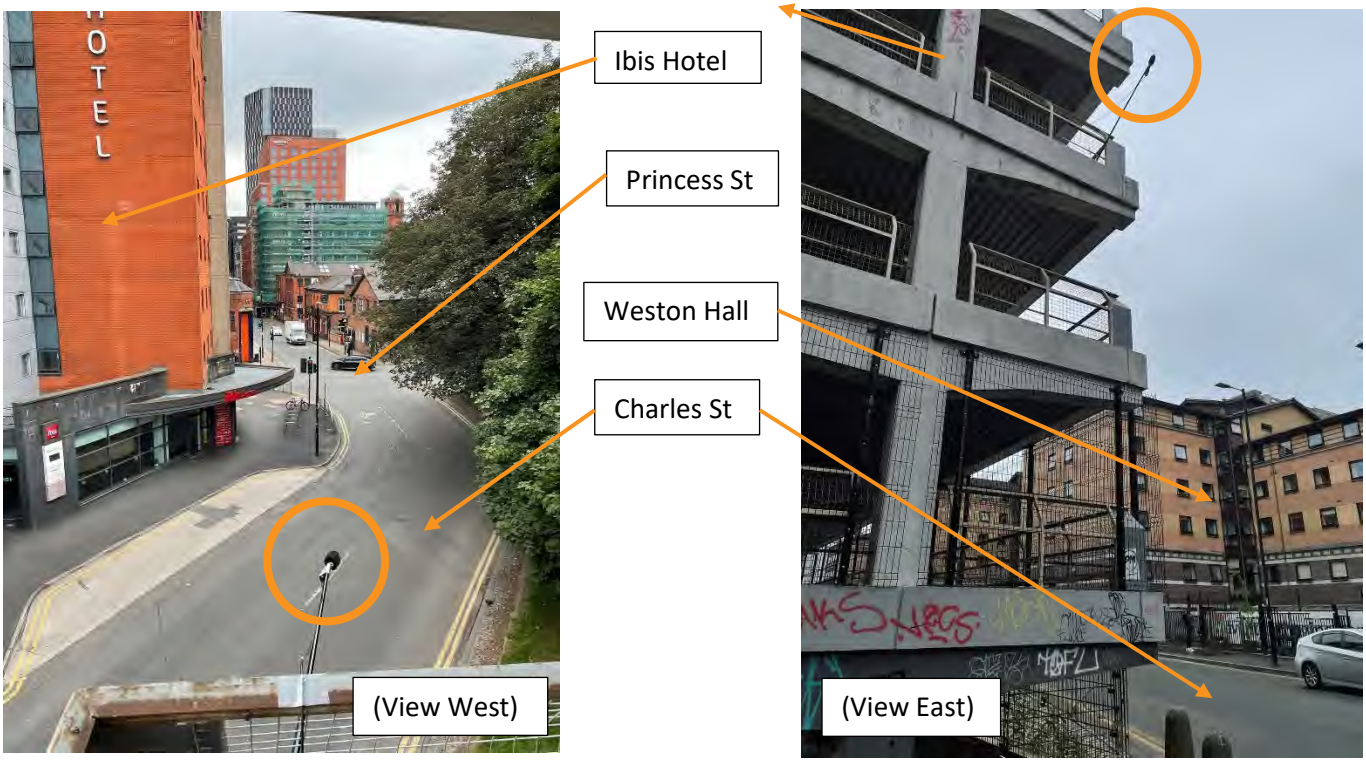
Position 1 – North – Railway Tracks



Position 2 – South-East – Sackville Street



Position 3 – South-West – Charles Street



"Typical-Lowest" Background Levels

When considering the existing background levels at a site, BS 4142:2014 "*Methods for Rating and Assessing Industrial and Commercial Sound*" recommends assessing to the "typical" measured $L_{A90,\ 15mins}$ background levels, BS 4142:2014 goes on to state:

> *In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.*

BS 4142:2014 suggests that statistical analysis is a suitable method to determine the "typical" background level. This can be carried out by calculating the level of the most-commonly occurring $L_{A90,\ 15mins}$ period during the proposed operating hours of equipment.

We generally consider that designing to the most-commonly occurring $L_{A90,\ 15mins}$ period is not sufficient during those slightly quieter periods. In our opinion, a more representative value would be the "typical-lowest" level, which can be determined statistically as the lowest rounded $L_{A90,\ 15mins}$ level which occurs for at least 10% of the assessment period.

The "typical-lowest" background noise levels ($L_{A90,\ 5mins}$) at the measurement positions are therefore summarised in the Table 1 above, based upon the L_{A90} histograms attached in Graphs 10 - 12. This data can be used to set plant noise emission criteria for use in the assessment of noise emissions from any proposed plant at the development.

Plant Noise Emissions Criteria

Local Authority Requirements

Manchester City Council's standard requirements in relation to fixed plant installations are outlined within Manchester City Council's Noise and Planning Guidance, which states that the noise assessment should be based on BS 4142:2014. It also states that:

> *"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) noise level at the nearest noise sensitive location."*

To this end, in setting plant noise emissions criteria to a level -5dB below the otherwise prevailing typical-lowest background noise level, the following criteria would therefore be formulated.

Table 2 – Proposed Plant Noise Emission Criteria at Existing Receptors

Time Period	Plant Noise Emission Criterion (dBA) at Nearest *Existing* Noise Sensitive Receptor (Relevant Location)		
	Pos 1 – North (Railway)	Pos 2 – South-East (Sackville St)	Pos 3 – South-West (Charles St)
Daytime (07:00 – 23:00 hours)	41	42	43
Night-time (23:00 – 07:00 hours)	36	38	37

In line with BS 4142:2014+A1:2019, should the proposed plant be identified as having intermittent or tonal characteristics, a further penalty should be subtracted from any of the above proposed noise emission limits.

Own Development Noise Sensitive Receptors

Where the nearest noise sensitive receptors to the plant locations or ventilation ductwork grilles/louvres are the bedroom windows of our own development, we have developed more relevant criteria based on guidance from applicable industry standards.

We propose maximum emission limits that would result in acceptable internal noise levels in the bedrooms and studios in the event of partially open windows. BS 8233 provides guidance on suitable internal noise levels (see below). A level of -5dBA below the internal noise criterion is targeted, in line with MCC's general intent.

Based on the sound reduction given by a partially open window as outlined in BS 8233:2014, internal noise levels are anticipated to be approximately 15dB lower than external noise levels. We therefore propose that cumulative noise emissions from mechanical services plant to the own development receptors should be below the levels detailed in Table 3 below.

Table 3 – Proposed Plant Noise Emission Criteria at Own Development Receptors

Time Period	Plant Noise Emission Criterion (dBA) at Nearest *Own Development* Noise Sensitive Receptor
Daytime (07:00 – 23:00 hours)	45
Night-time (23:00 – 07:00 hours)	40

Should the proposed plant be identified as having intermittent or tonal characteristics, a further applicable penalty should be subtracted from any of the above proposed noise emission limits.

Emergency Plant

As emergency plant will be operating only in emergencies and during periodic testing, it is common to accept a relaxed noise limit for such noise. It is common to target a level of 10dB above the existing background level for such a limit. This is in line with other City Councils' standard requirements. Given that testing will only occur during daytime hours, this therefore sets worst-case noise limits of 56 and 60 dB L_{Aeq} for emergency plant affecting Receptors, Existing & Own-Development respectively.

Summary of Assessment Criteria

Therefore, all future design advice will be based upon achievement of the plant noise limits stated in both Tables 2 & 3 above, as summarised below in Table 4.

Table 4 – Summary of Proposed Plant Noise Emission Criteria

Time Period	Plant Noise Emission Criterion (dBA) at Nearest Noise Sensitive Receptor (Relevant Location)				
	Existing Receptor			*Own Dev Receptor*	Emergency Plant at Receptors – *Exist/OwnDev*
	Pos 1 – North (Railway)	Pos 2 – SE (Sackville St)	Pos 3 – SW (Charles St)	All façades	
Daytime (07:00 – 23:00 hours)	41	42	43	45	56 / 60
Night-time (23:00 – 07:00 hours)	36	38	37	40	–

The findings in this report will be used as the basis for future assessments; including detailed assessment of the glazing performance requirements, Part O and noise risks associated with overheating, mechanical services limits and mitigation measures, and construction/demolition noise & vibration assessments, etc.

We trust the above is clear and of assistance, but should you have any queries, please do not hesitate to contact the undersigned.

Yours sincerely,
For Blackbird Acoustics Limited

[redacted]

Alex J Wyatt
Director

Att.

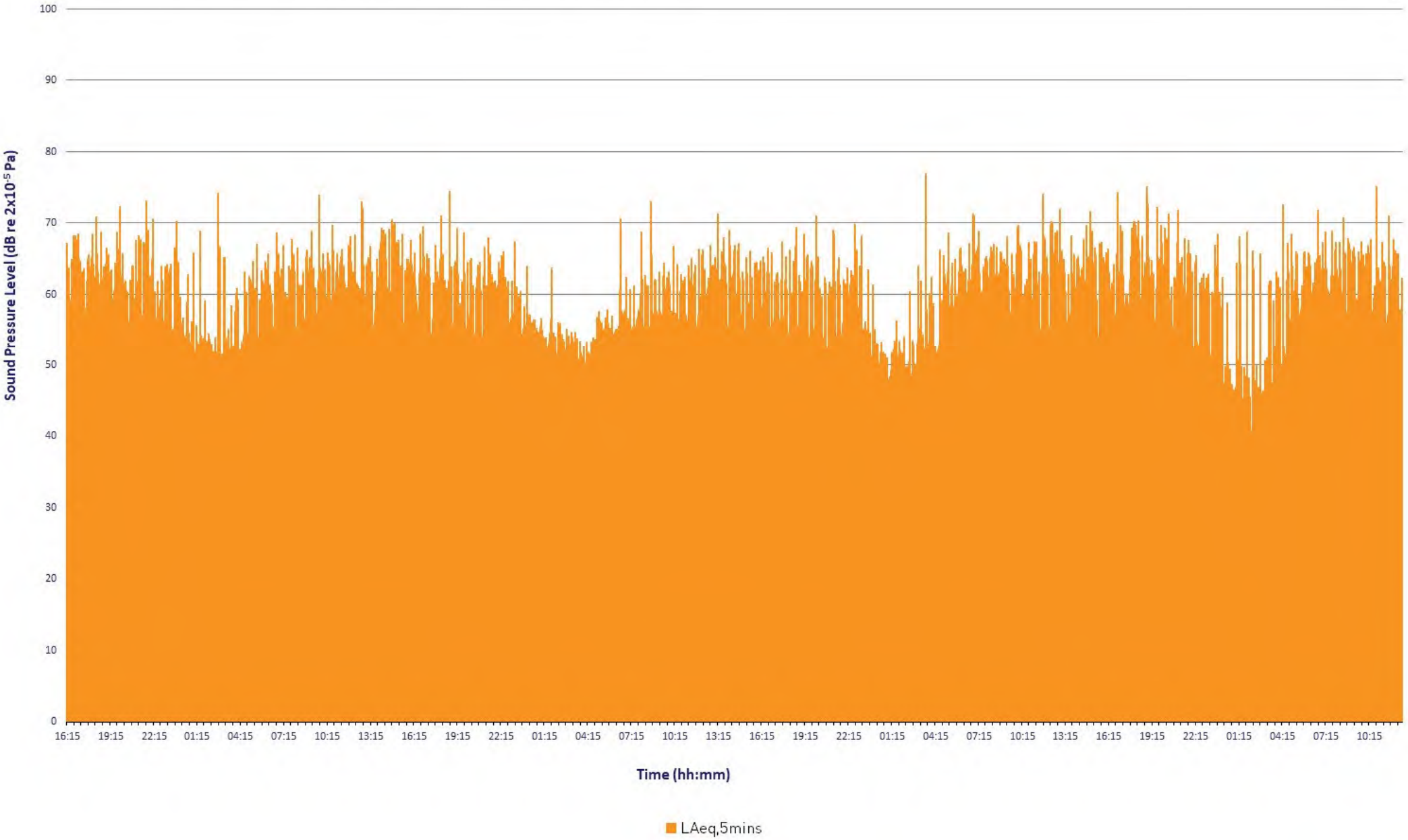
RGRE, PBSA, Plot H, Charles Street, Manchester

L_{Aeq} Time History (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 1



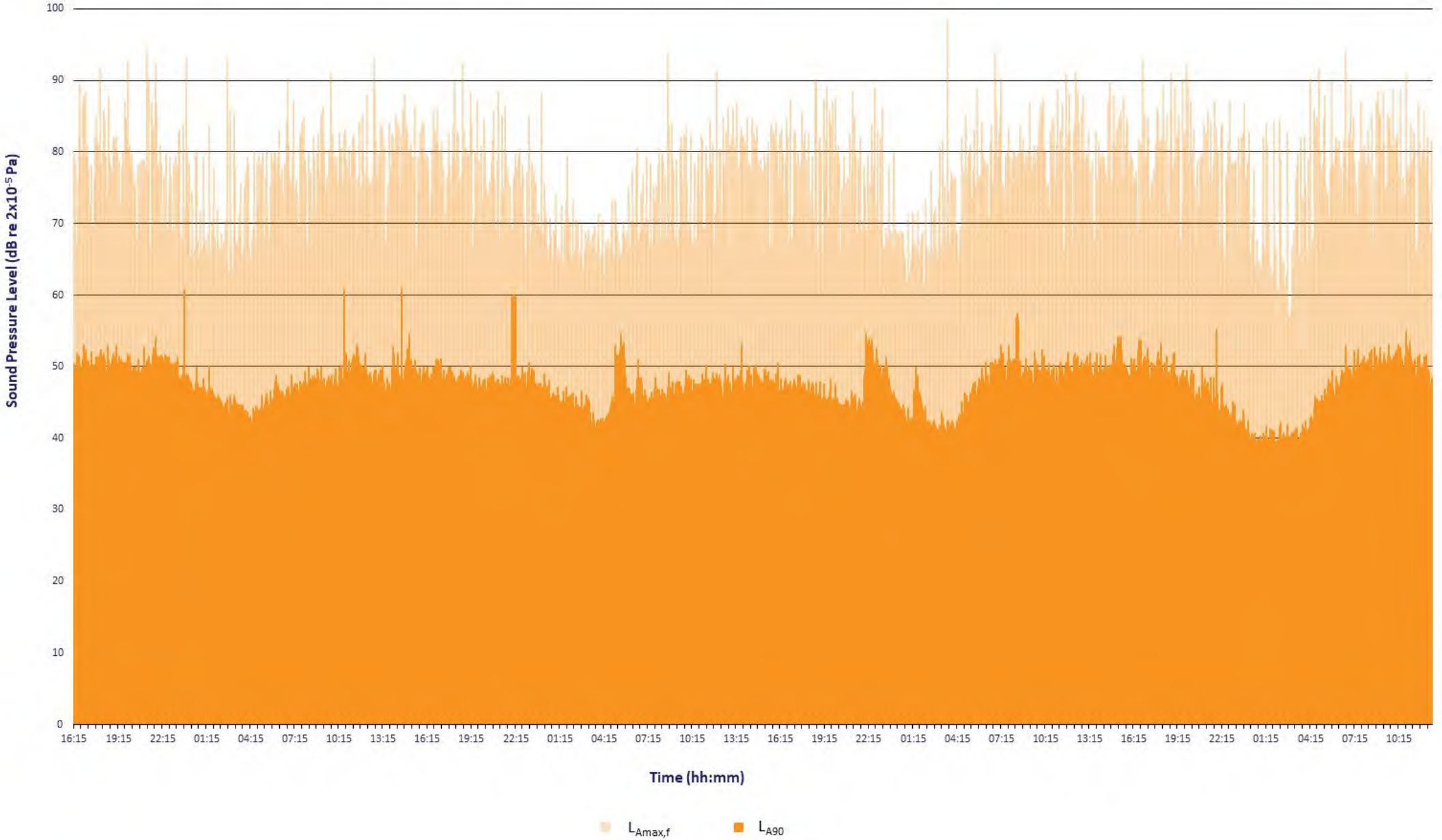
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 2



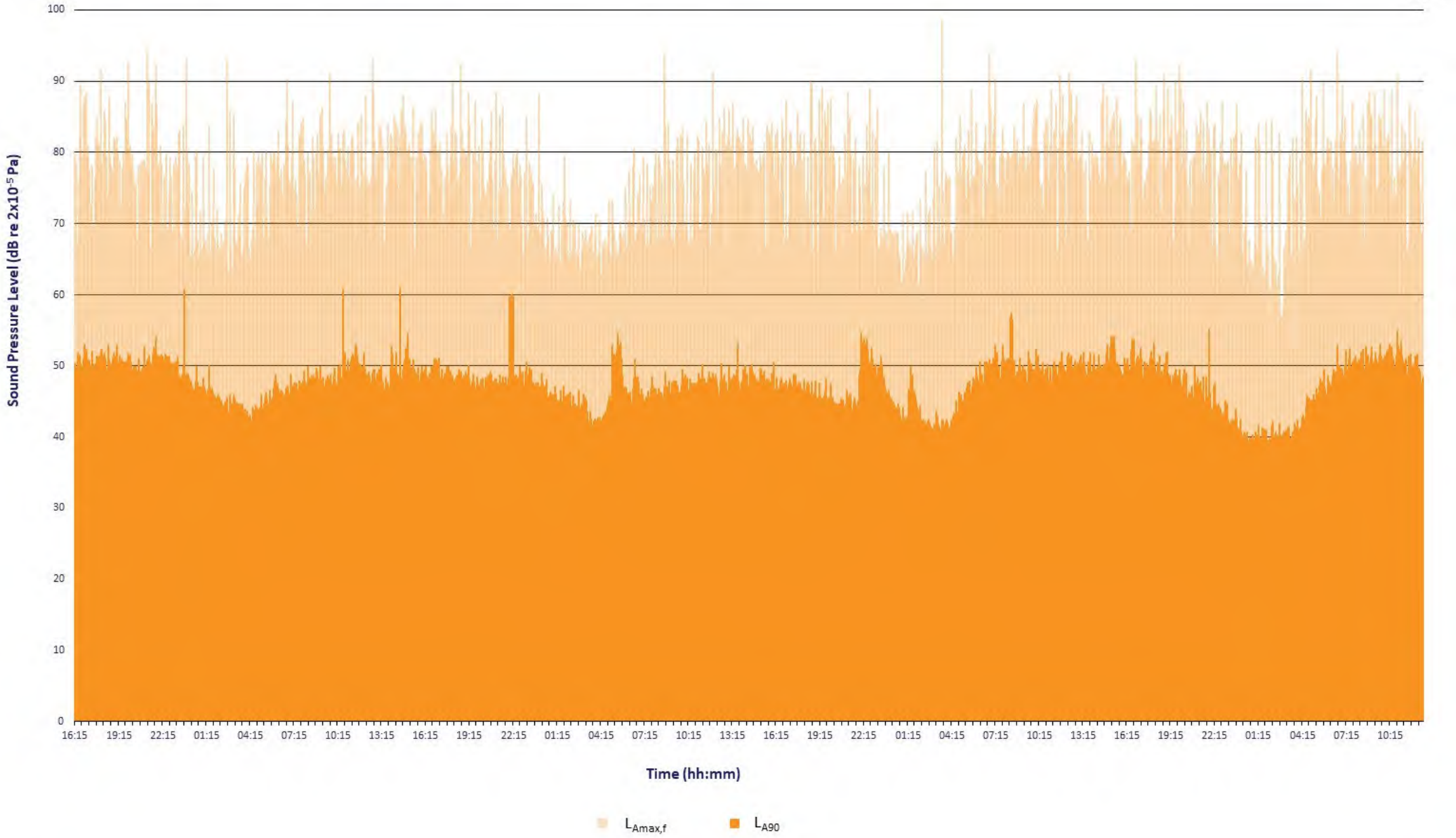
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 2



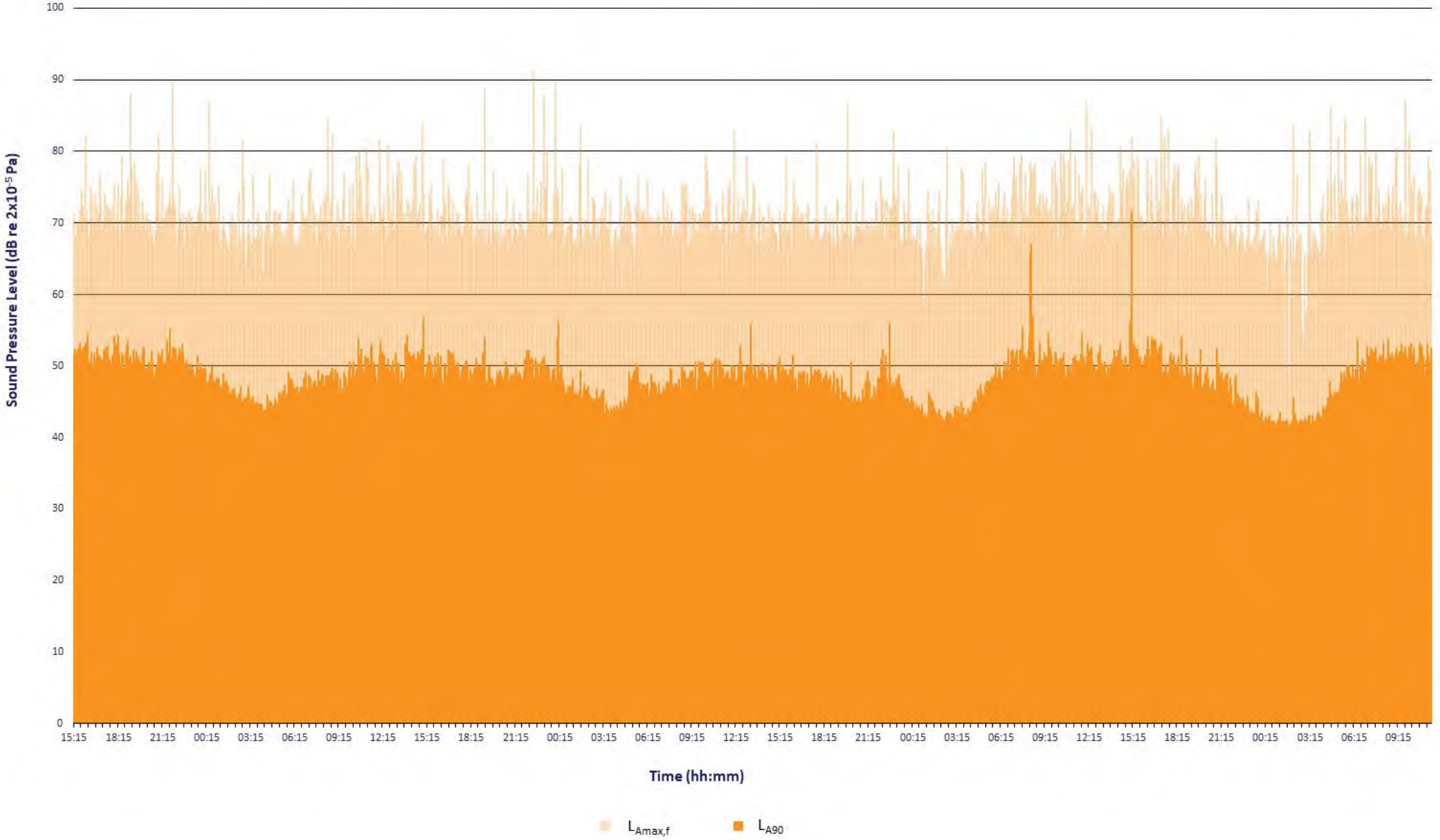
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 4



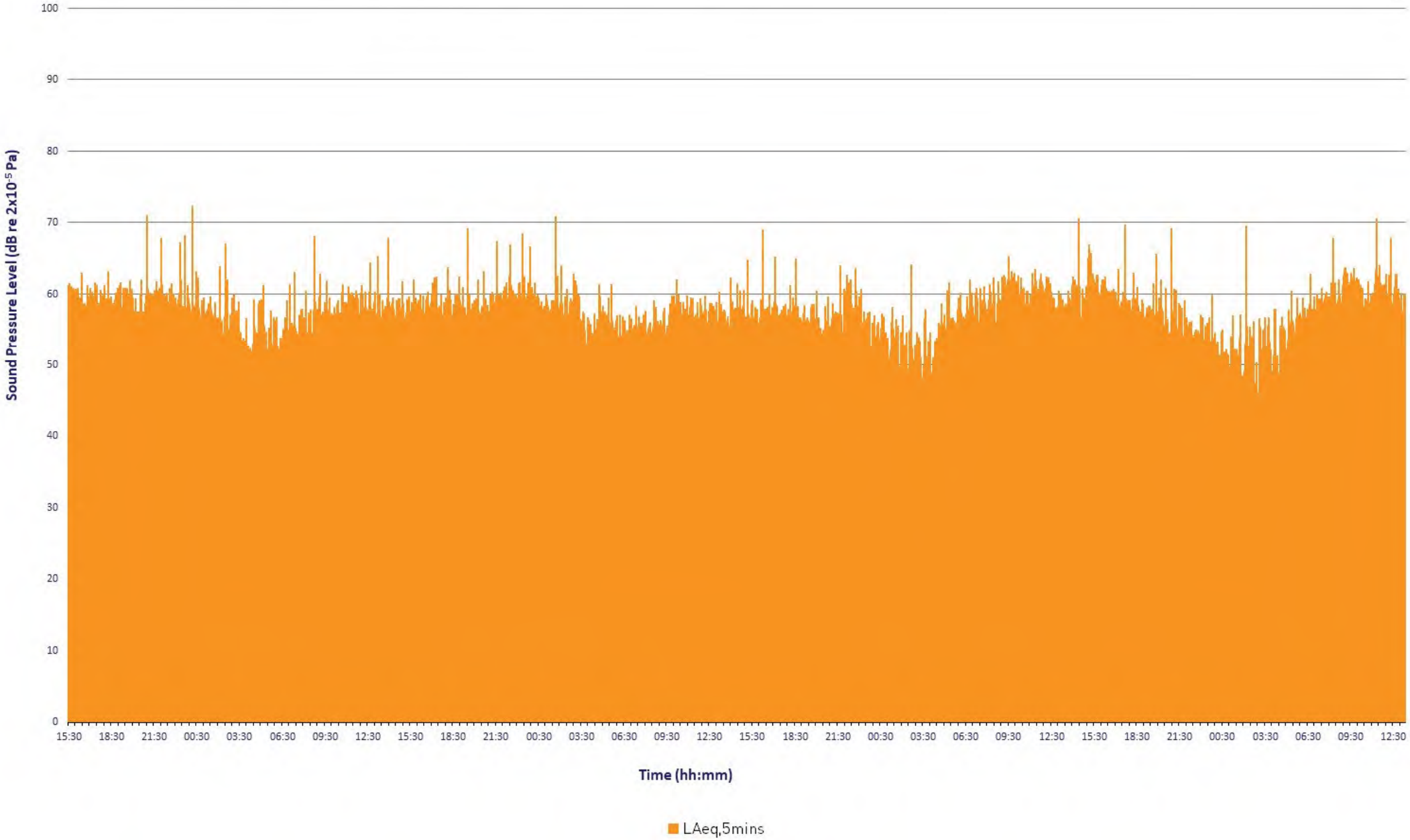
RGRE, PBSA, Plot H, Charles Street, Manchester

L_{Aeq} Time History (5-mins)

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 5



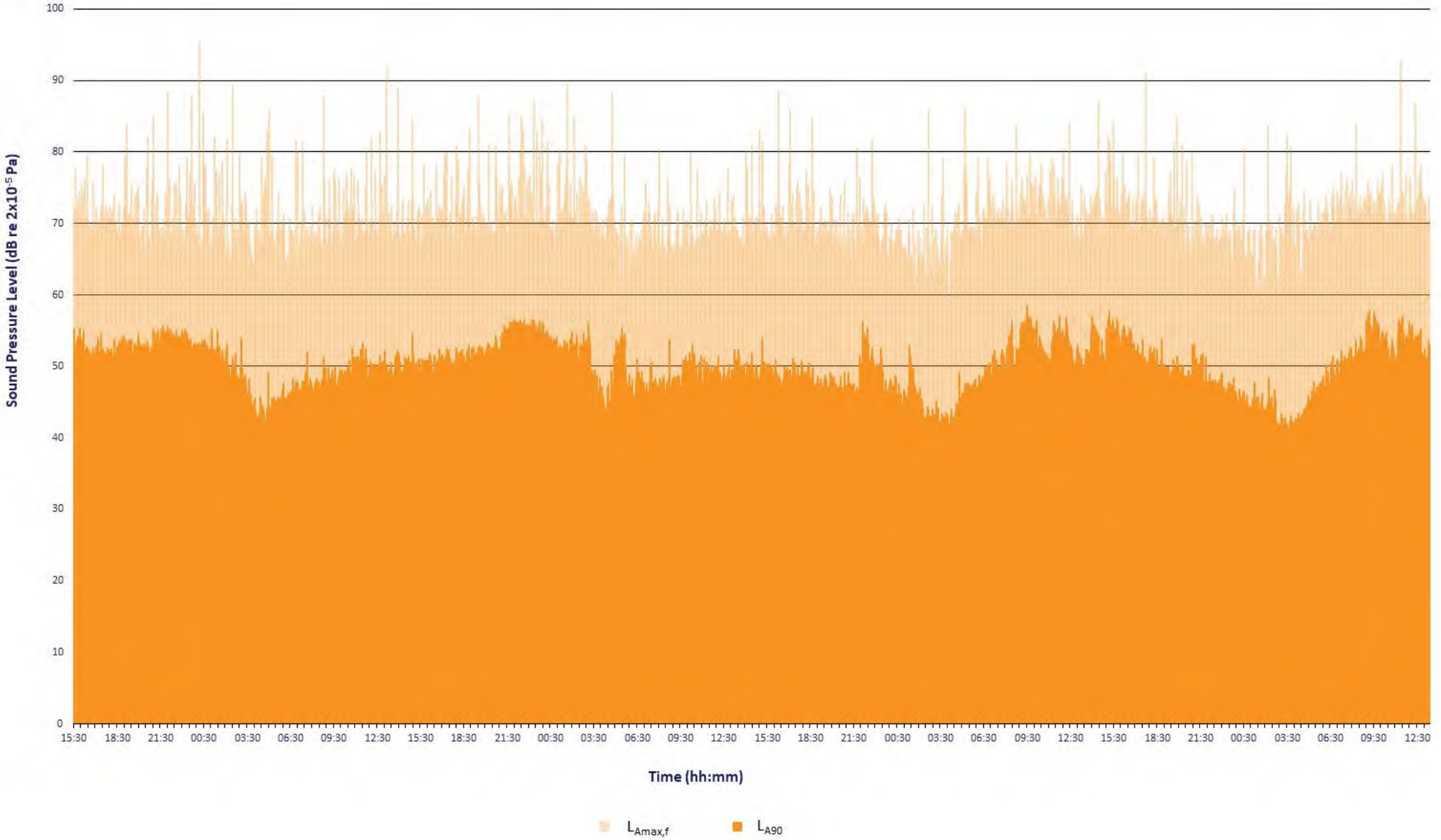
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 6



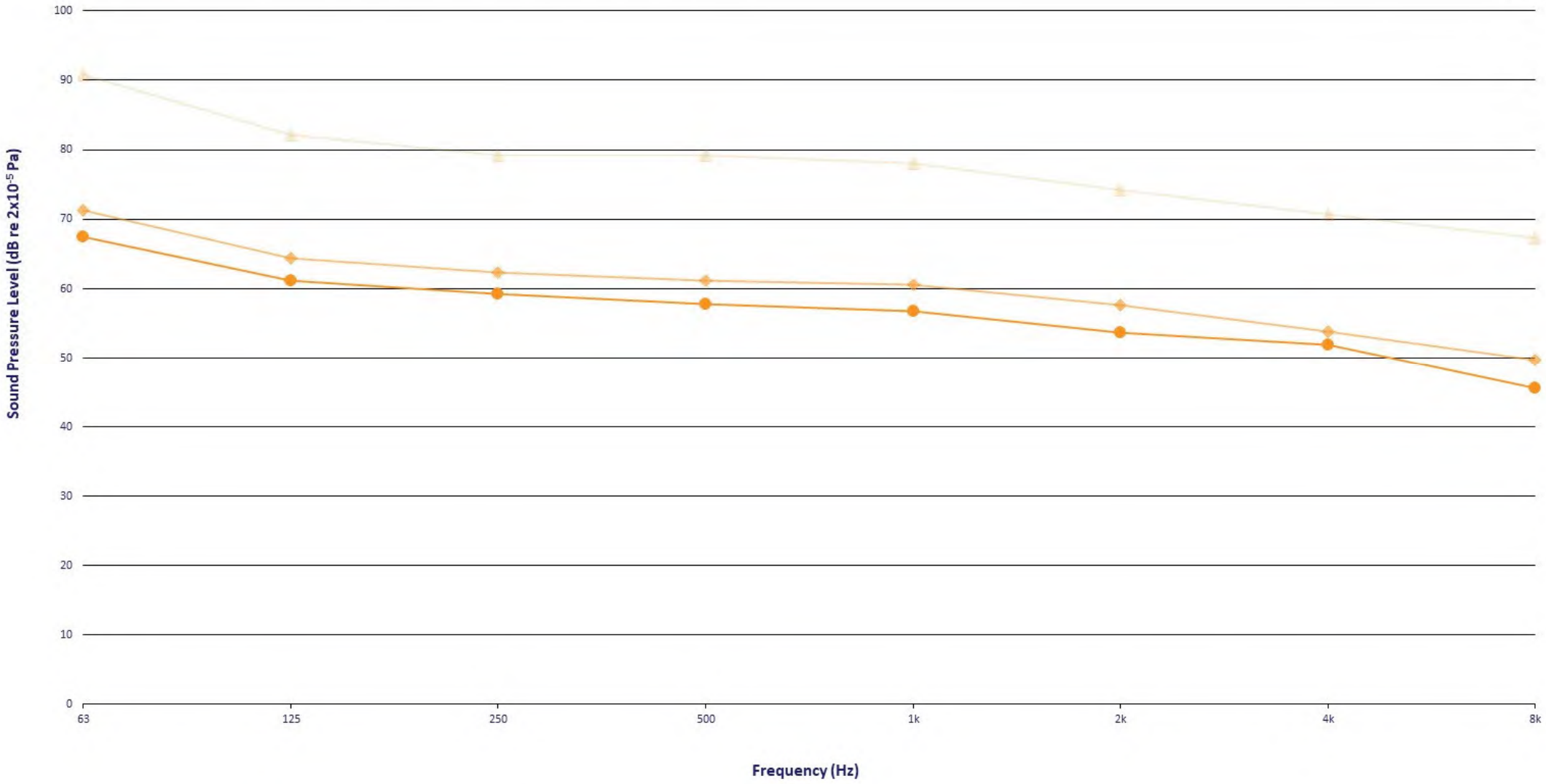
RGRE, PBSA, Plot H, Charles Street, Manchester

Spectral Noise Levels

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 7



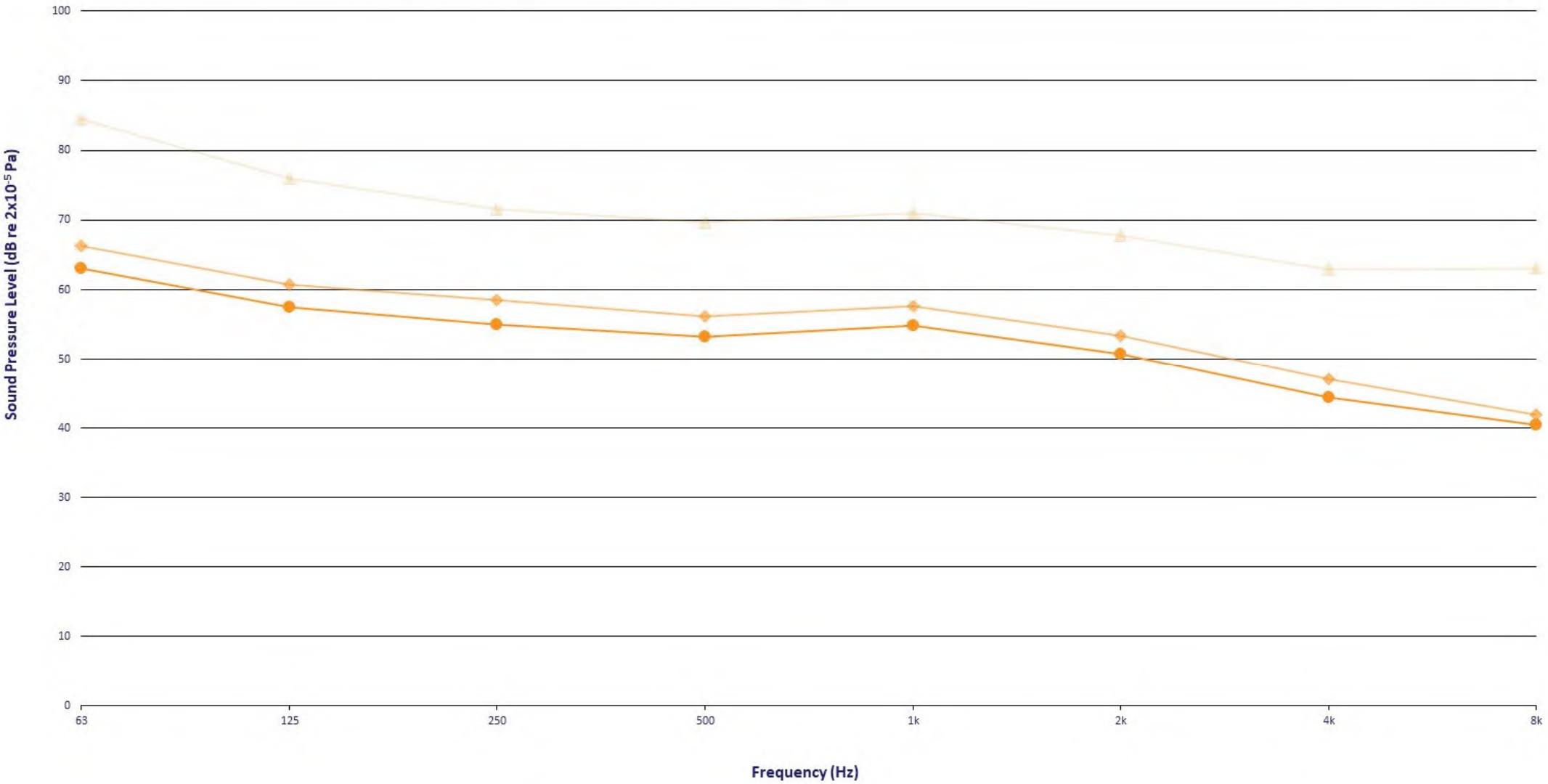
RGRE, PBSA, Plot H, Charles Street, Manchester

Spectral Noise Levels

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 8



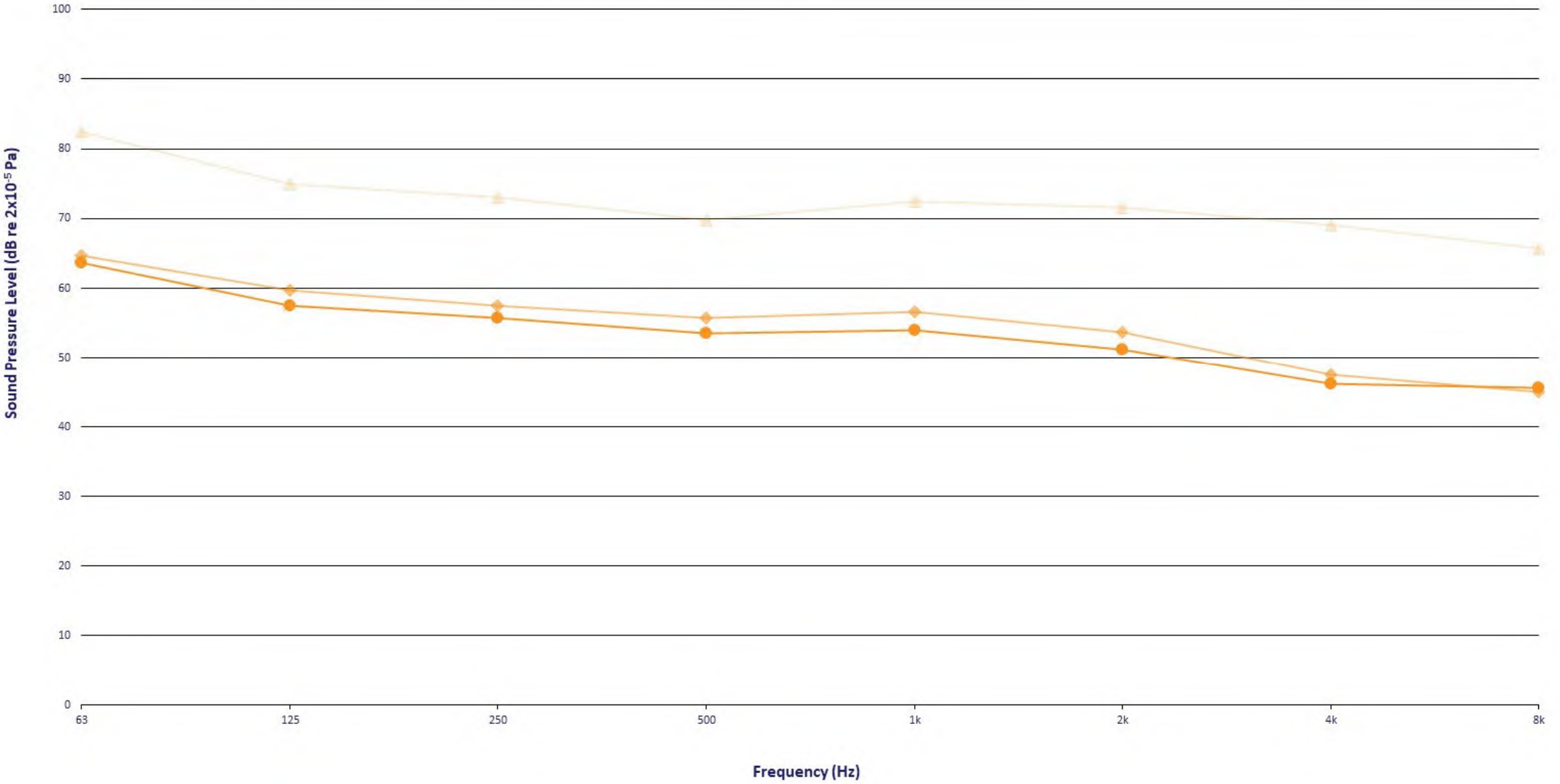
RGRE, PBSA, Plot H, Charles Street, Manchester

Spectral Noise Levels

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 9



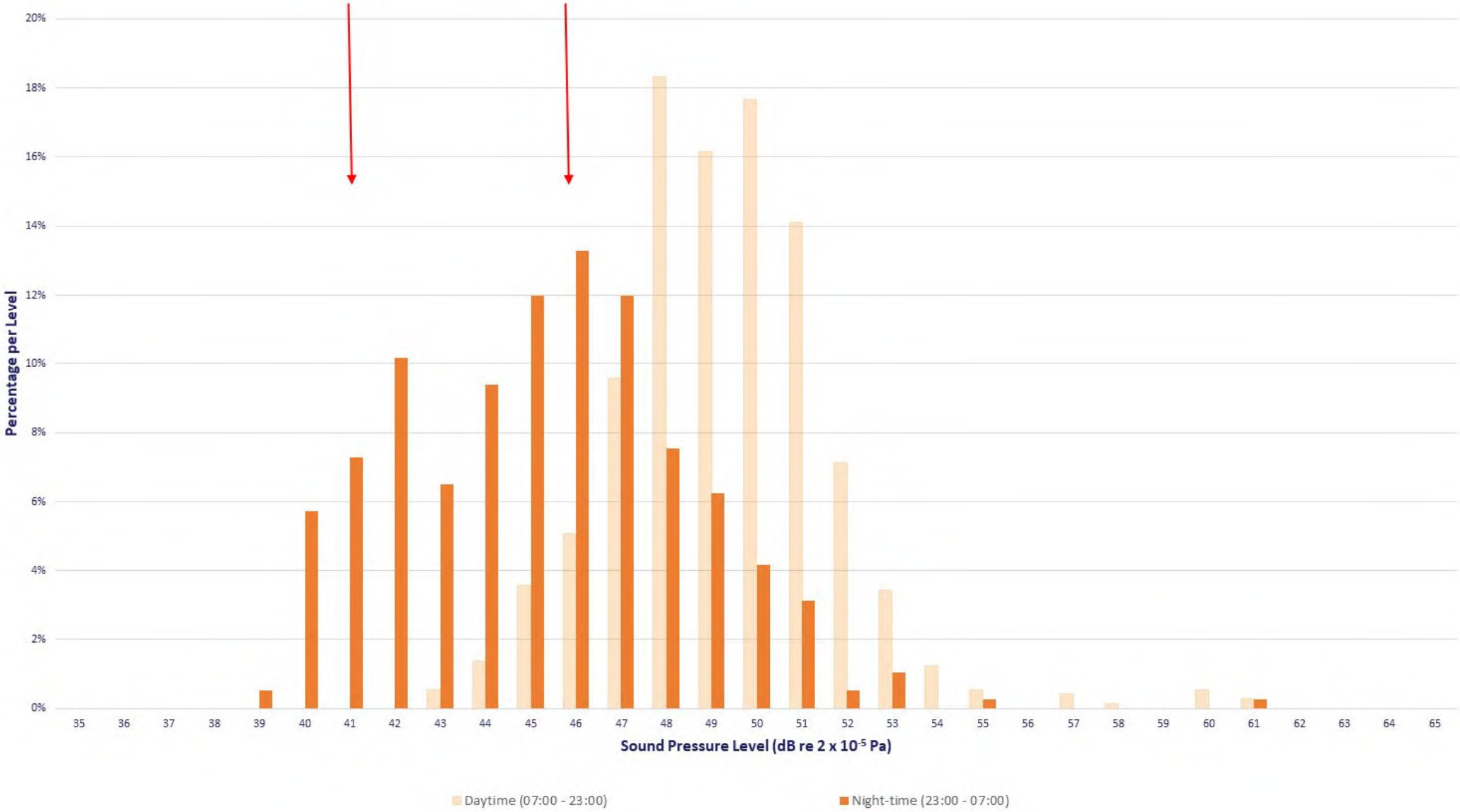
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{A90,5\ minutes}$ Histogram

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 10



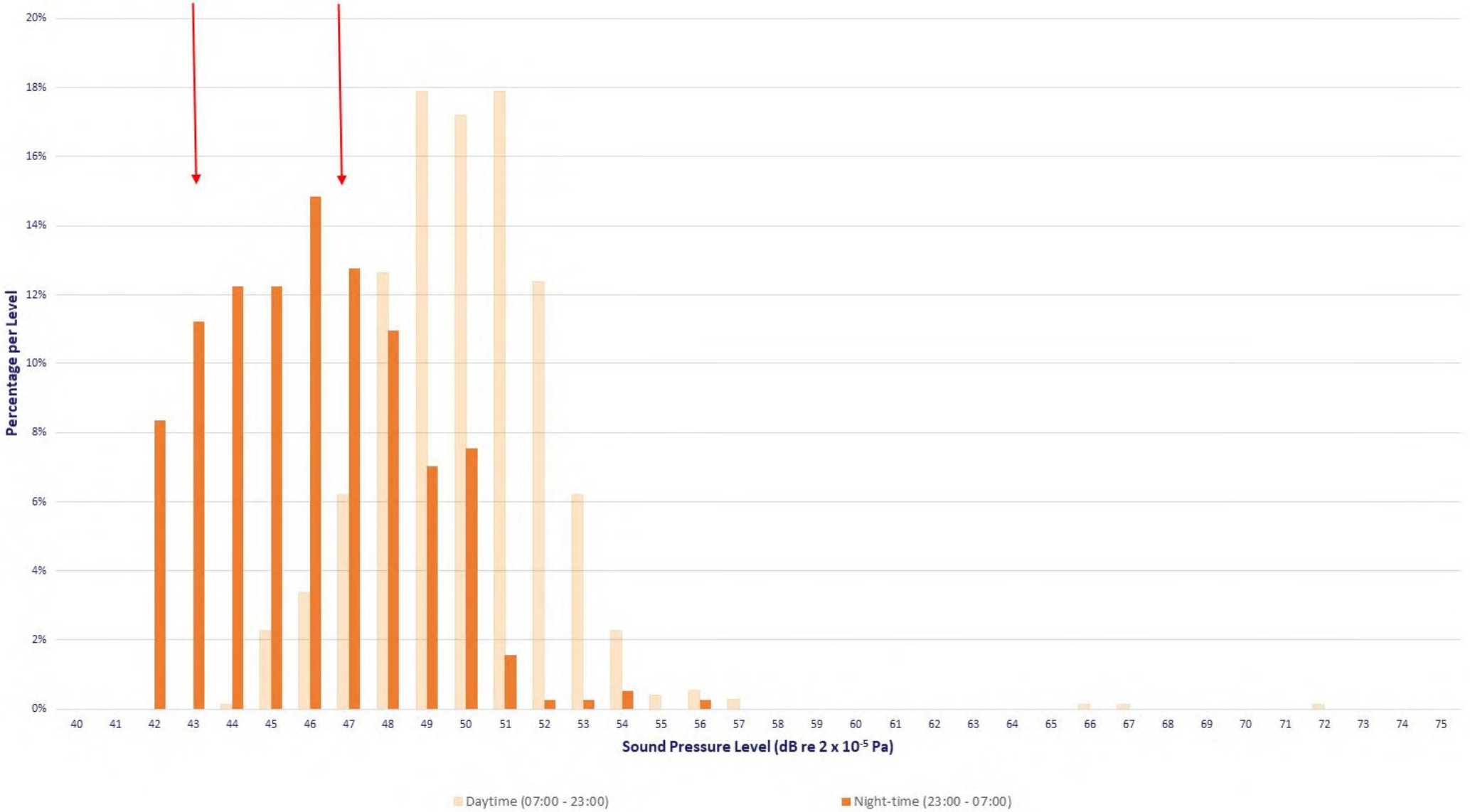
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{A90,5\ minutes}$ Histogram

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 11



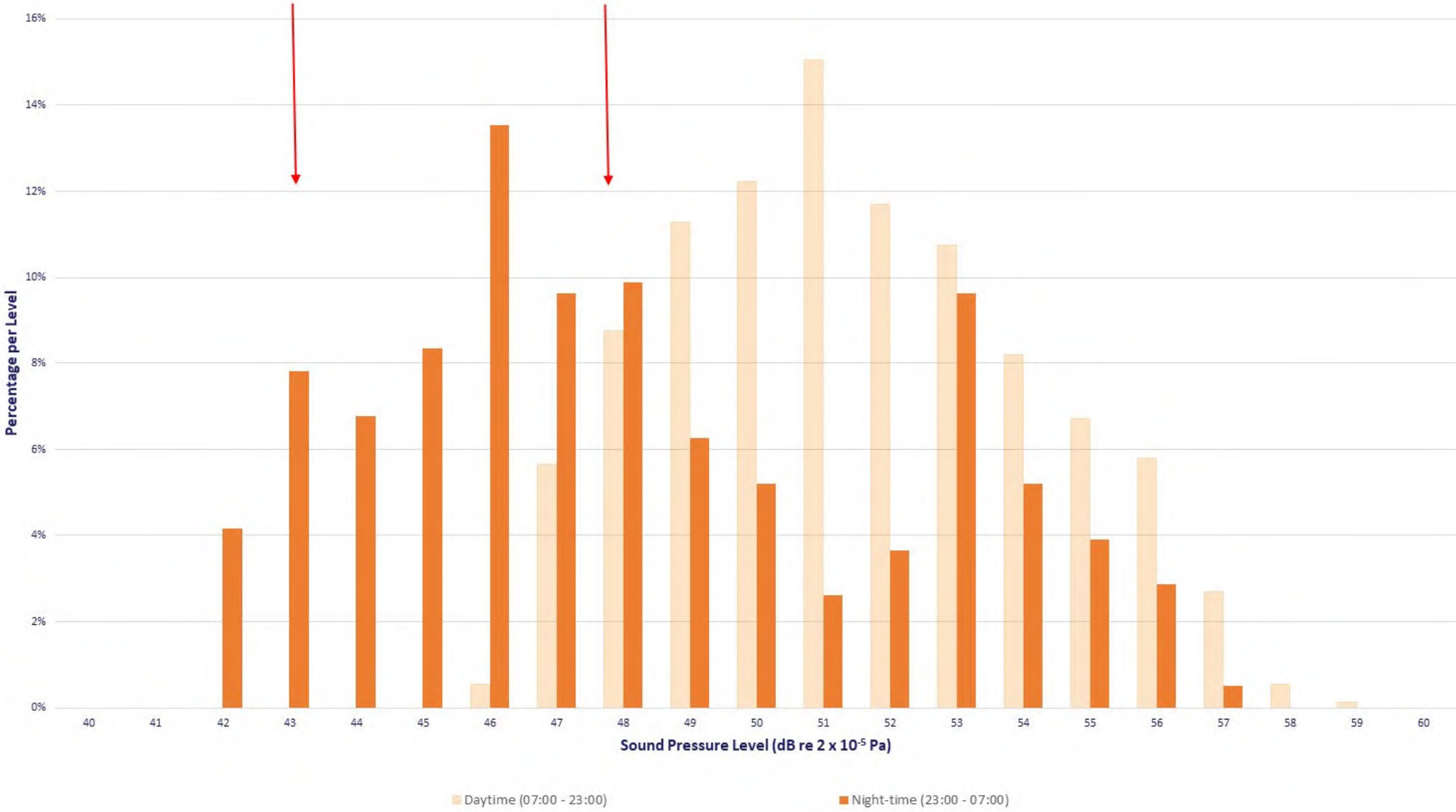
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{A90,5\ minutes}$ Histogram

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 12



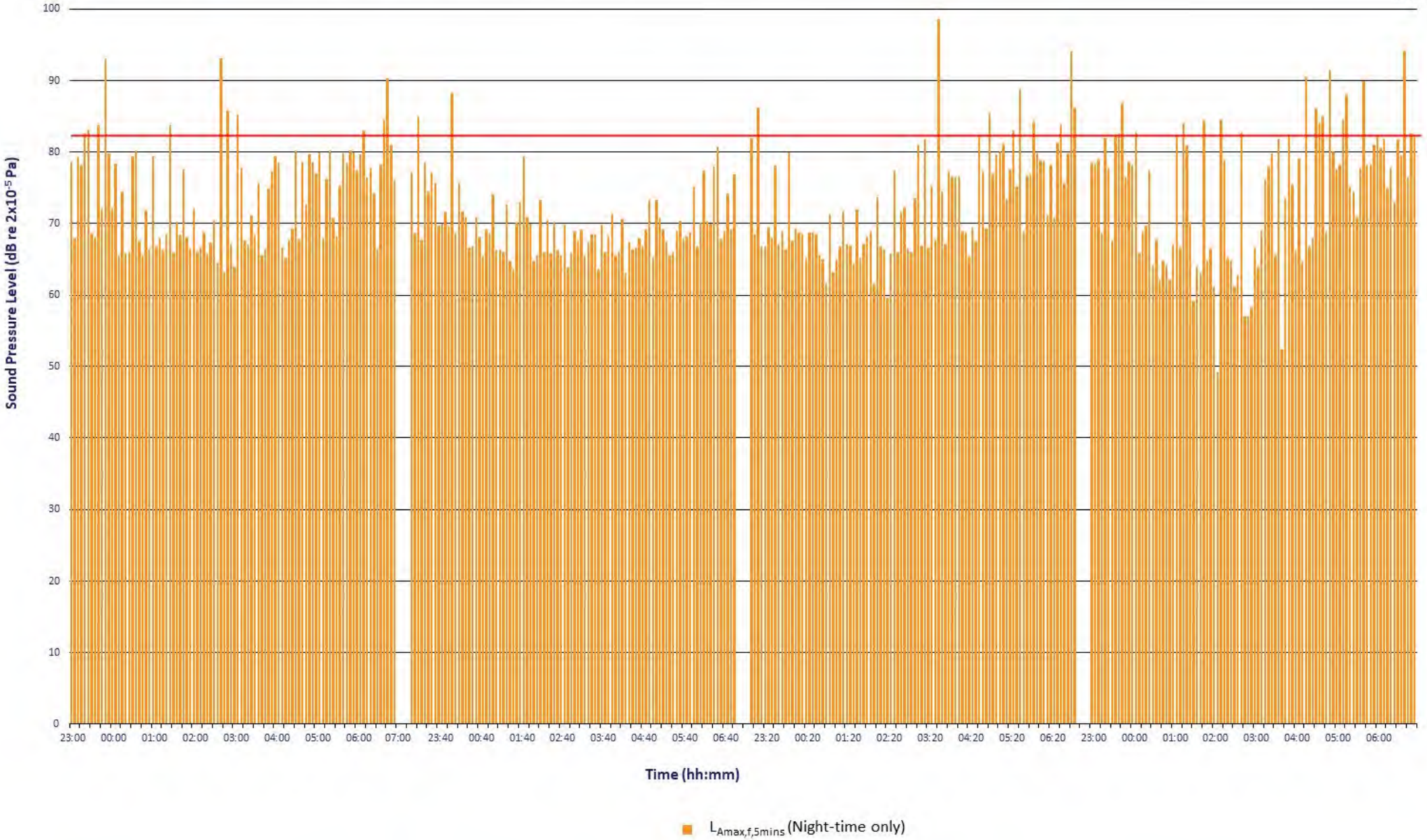
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ Time History - Night-Time Only (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 13



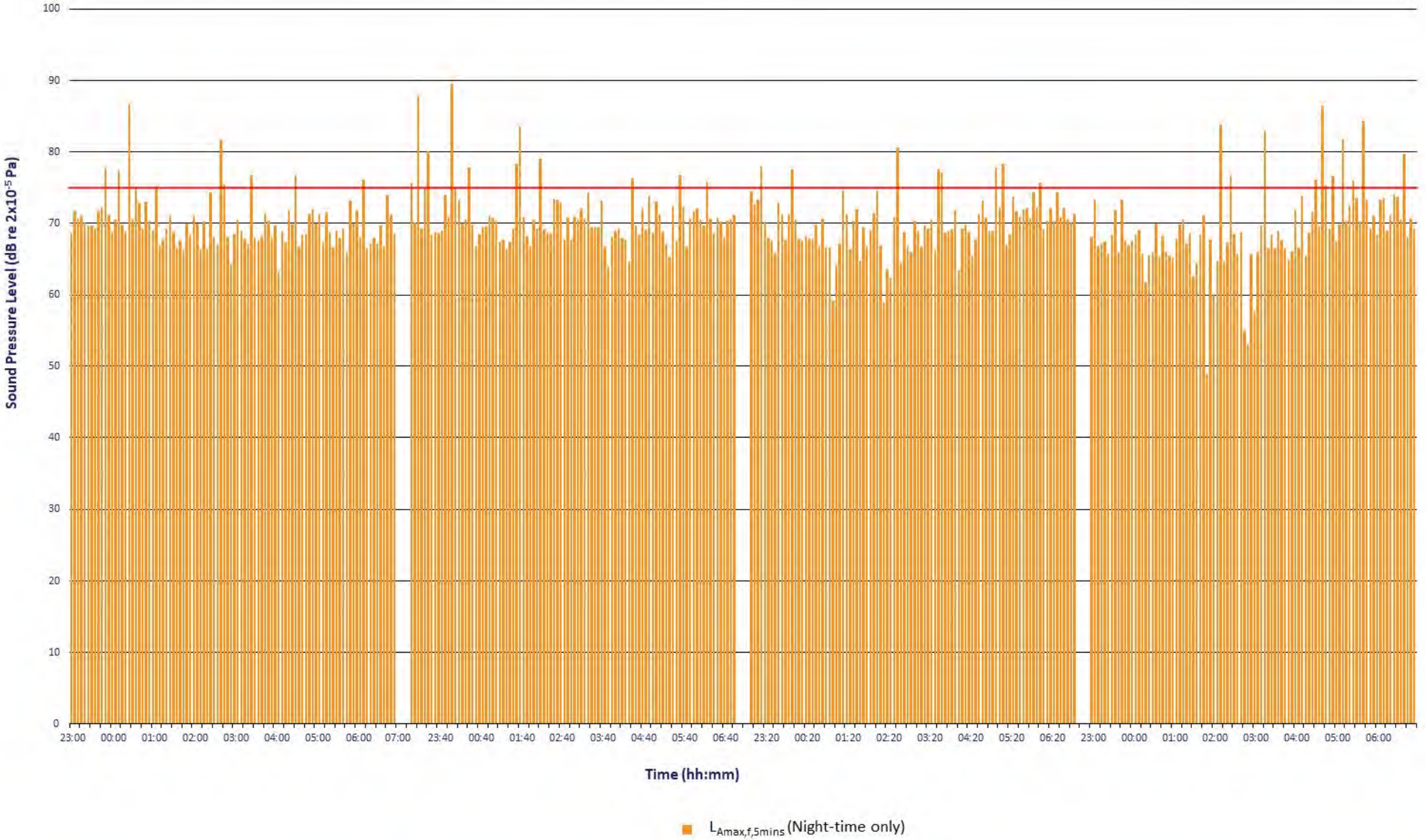
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ Time History - Night-Time Only (5-mins)

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 14



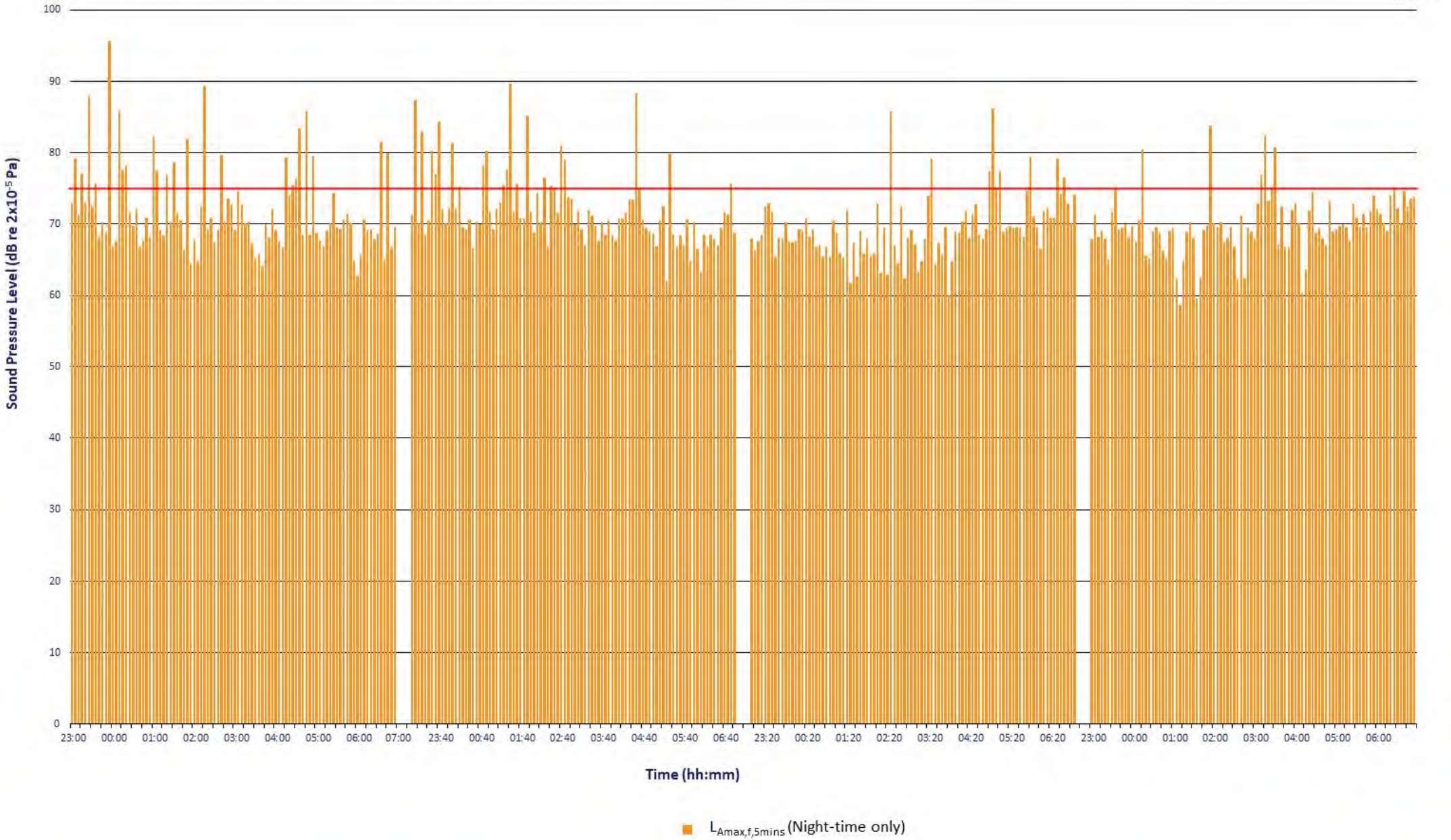
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ Time History - Night-Time Only (5-mins)

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 15



Appendix 14 – Wind Assessment Methodology Tables

(i) Methodologies for Determining Impact Magnitude

Magnitude of Impact	Criteria for assessing impact of Impact
Major	Wind conditions which are three categories windier/calmer than the target conditions (unless consistent with the baseline conditions)
Moderate	Wind conditions which are two categories windier/calmer than the target conditions (unless consistent with the baseline conditions)
Minor	Wind conditions which are one categories windier/calmer than the target conditions (unless consistent with the baseline conditions)

The sensitivity of a receptor is based on relative importance of the receptor using the scale in the table below:

Sensitivity	Examples of receptor
High	Any amenity spaces, public realm, footpaths or entrances to buildings
Moderate	Any general thoroughfares through or around the Proposed Development Site.
Low	Locations which are not accessible to pedestrians

Methodology for Determining Sensitivity

The significance of an environmental impact is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. The impact Significance Matrix is set out in the table below.

(ii) Standard Impact Signifiance Matrix

Magnitude	High	Sensitivity Moderate	Low
Major	Major Adverse/Beneficial	Major - Moderate Adverse -Beneficial	Moderate - Minor Adverse -Beneficial
Moderate	Major Adverse/Beneficial	Moderate Adverse – Beneficial	Minor Adverse/Beneficial
Minor	Minor Adverse/Beneficial	Minor Adverse/Beneficial	negligible
Negligible	Negligible	Negligible	Negligible

(iii) Lawson Comfort Criteria (LDDC variant)

Key	Comfort Category	Mean Wind Speed (5% exceedance)	Description
	Sitting	4 m/s	Acceptable for outdoor sitting use (e.g. cafes, benches, balconies)
	Standing	6 m/s	Acceptable for main building entrances, pick-up / drop-off points and bus stops
	Walking (leisure)	8 m/s	Acceptable for strolling
	Walking (business)	10 m/s	Acceptable for external pavements, walking purposefully without lingering
	Uncomfortable	>10 m/s	Not comfortable for regular pedestrian access

(iv) Lawson Safety Criteria

Key	Safety Category	Mean Wind Speed (0.025% exceedance)	Description
	No Safety Exceedance	<15 m/s	
	S15 (Distress)	>15 m/s	Unsafe for frail individuals, or cyclists
	S20 (Safety)	>20 m/s	Wind conditions considered unsafe for all users

Deloitte.

This report has been prepared for RG Real Estate Ltd and on the understanding that it will be made publicly available.

All copyright and other proprietary rights in the report remain the property of Deloitte LLP and any rights not expressly granted in these terms or in the Contract are reserved.

No party other than RG Real Estate Ltd is entitled to rely on the report for any purpose whatsoever and thus we accept no liability to any other party who is shown or gains access to this document.

The information contained within this report is provided to assist RG Real Estate Ltd with securing an EIA Screening and coping Opinion. The report makes use of a range of third-party data sources. Whilst every reasonable care has been taken in compiling this report, Deloitte LLP cannot guarantee its accuracy.

If this document contains details of an arrangement that could result in a tax or National Insurance saving, no such conditions of confidentiality apply to the details of that arrangement (for example, for the purpose of discussion with tax authorities).

The scope of our Services does not include any consideration of the likely impact of Coronavirus (COVID-19) on the project or transaction to which our Services relate (including but not limited to any impact on valuation, planning, construction, maintenance, or costs). We recommend that if you have not done so already, you should consider the increasingly broad effects of COVID-19 and its negative impact on the UK and global economy and major financial markets.

Deloitte LLP is a limited liability partnership registered in England and Wales with registered number OC303675 and its registered office at 1 New Street Square, London, EC4A 3HQ, United Kingdom.

Deloitte LLP is the United Kingdom affiliate of Deloitte NSE LLP, a member firm of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"). DTTL and each of its member firms are legally separate and independent entities. DTTL and Deloitte NSE LLP do not provide services to clients. Please see www.deloitte.com/about to learn more about our global network of member firms. Real Estate Services regulated by RICS.

© 2025 Deloitte LLP. All rights reserved.