

CONTRACT NO: D8044

FACTUAL REPORT ON SITE INVESTIGATION FOR LAND AT

IAMP PRELIMINARY INVESTIGATION

PREPARED FOR:

SUNDERLAND CITY COUNCIL









• FOUNDATION HOUSE • ST. JOHN'S ROAD • MEADOWFIELD • DURHAM • DH7 8TZ • TEL: 0191 378 3151 • FAX: 0191 378 3157















Contract No.	D8044
Job Name	IAMP PRELIMINARY INVESTIGATION

REPORT REVISIONS

Revision No.	Issue Date	Details
D8044/00	23.01.18	

VERIFICATION

Revision No.	Issue Date		Written By	Checked By	Verified By
D8044/00	23.01.18	Initials	DF	JH	AIL
		Signature	Vann Jam	allann.	Azatthaning



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1.0 INTRODUCTION

1.1 SCOPE OF WORKS

Dunelm Geotechnical and Environmental Ltd (Dunelm) were commissioned by Sunderland City Council (SCC), to carry out a site investigation of land at IAMP Sunderland.

The objectives of the investigation were as follows:

- To determine the typical nature, thickness and engineering parameters of the made ground and natural strata.
- To determine the nature and extent of potential contamination within the site.
- To recover samples of made ground and natural strata for chemical and geotechnical laboratory testing.
- To recover samples of groundwater from the standpipes for laboratory testing.
- To record gas concentrations and gas flows within the standpipes.

Fieldwork was undertaken generally as specified in the contract documents provided by AECOM. The fieldwork was carried out between 21st July and 29th November 2017.

Following the completion of the fieldwork selected soil and rock samples were submitted for a range of geotechnical and chemical testing.

This report presents the factual information obtained during the investigation; interpretation of these data was outside the remit of this report.

1.2 GENERAL

Guidance contained in the following Standards has been followed during the investigation work as appropriate: BS5930:2015, BS10175:2011+A1:2013; BS1377:2016; BS EN ISO 14688:2004 + A1:2013 and BS EN ISO 14689:2003.

The information contained in this report is limited to the site boundary, as indicated on the site plan shown in Appendix A, and the areas accessible during the ground investigation.

This report is for the exclusive use of SCC and their agents. No third party may rely upon, or reproduce, the contents of this report without the written approval of Dunelm.

This report is based on the data obtained from the exploratory holes and from the subsequent tests carried out. There is always a possibility of variation in the ground conditions between boreholes. Responsibility cannot be accepted for conditions not revealed by the investigation. Any diagram or opinion of the possible configuration of the findings is conjectural and given for guidance only, and confirmation of intermediate ground conditions should be considered if deemed necessary.

2.0 SITE LOCATION & FEATURES

The site is located 6.5km northwest of Sunderland city centre. The approximate centre of the site is at National Grid Reference 433578, 559388.

A site location plan is presented as Drawing No. D8044/01 in Appendix A to this report.

The site comprises a large, relatively flat irregular parcel of land presently covered by arable fields bound by the A19 to the east and the A1290 to the south.



3.0 FIELDWORK

3.1 INTRODUCTION

The fieldwork comprised the following:

Number	Exploratory Hole Label	Method
33	BH03, BH04, BH08-BH11, BH13- BH15, BH17, BH21-BH25, BH27, BH28, BH30-BH32, BH35-BH40, BH45-BH48, BH50-BH52.	Cable Percussive Boring with Rotary Core Drilling
7	BH05-BH07, BH12, BH16, BH16A, BH49	Cable Percussive Boring
1	BH16B	Rotary Open Hole Boring with Rotary Core Drilling
36	CPT01, CPT02, CPT04, CPT04A, CPT06-CPT10, CPT13-CPT16, CPT19, CPT20, CPT22-CPT24, CPT26-CPT28, CPT28A, CPT28B CPT29-CPT31, CPT31A, CPT31B, CPT31C, CPT32, CPT32B, CPT33-CPT36, CPTM01	Cone Penetration Testing
28	TP01-TP07, TP09, TP10, TP13, TP16, TP16A, TP17-TP19, TP21, TP22, TP24, TP25, TP30-TP38	Machine Excavated Trial Pit
7	TPS-01-TPS05, TPS-08, TPS-11	Machine Excavated Trial Pit with Soakaway Testing
6	RC01-RC06	Road Coring

In addition to the above, 6 dynamic cone penetration tests were carried out at each Road Core position, the results of these are presented in Appendix D. Six Insitu Plunger Type California Bearing Ratio tests were carried out, the results of these are presented in Appendix D.

Multiple attempts were required for BH16, CPT04, CPT28, CPT31 and TP16 due to obstructions being encountered. On completion all exploratory positions were backfilled immediately in accordance with instructions from AECOM, except where described below.

3.2 EXPLORATORY HOLE LOCATIONS

The locations of each of the above exploratory holes were recorded by survey following the completion of the works. The locations are shown on Drawing No. D8044/02 in Appendix A.

The ground elevations and co-ordinates of each of the exploratory holes determined from the survey are shown on the exploratory hole records.

3.3 STRATA DESCRIPTIONS

Descriptions of the strata encountered in each of the exploratory holes are presented on the exploratory hole record sheets in Appendix B to this report. Strata descriptions are based on an examination of the strata, together with consideration of the in-situ testing results and laboratory test data.



Strata descriptions have been completed in accordance with BS5930:2015, BS EN ISO 14688:2004 + A1:2013 and BS EN ISO 14689:2003 as appropriate.

3.4 SAMPLING

Samples were recovered during the investigation works in general accordance with the contract specification.

Samples of soil for chemical analysis were placed into suitable containers as specified by the chemical testing laboratory. Samples of soil and rock for geotechnical testing were recovered in accordance with the principles of BS1377-1:2016 and ISRM:2007.

Samples of made ground were scanned immediately after placement in the container using a Photo Ionisation Detector (PID) to check for the presence of volatile organic compounds. The results are shown on the Exploratory Hole Records in Appendix B.

3.5 IN-SITU TESTING

In-situ Standard Penetration Tests (SPTs) were carried out in the cable percussion boreholes at a frequency in general accordance with the contract specification.

SPT tests were carried out in accordance with BS EN ISO 22476-3 2005 + A1 2011 in order to determine the relative density of the granular soils and an indication of the undrained shear strength of cohesive soils. The results of these tests are shown as 'N' values on the exploratory hole records, with the blow counts for each increment shown in brackets.

Soakaway tests were carried out in general accordance with BRE365. The results of these tests are displayed in Appendix D.

Insitu Plunger Type California Bearing Ratio Tests were carried out at exploratory hole positions; TP17, TP18 & TP21. The tests were conducted in accordance with BS1377: 1990. The results of these tests are displayed in Appendix D.

Dynamic Cone Penetration Tests were carried out at each Road Core position. These tests were carried out in accordance with DMRB Vol.7 3.2 HD 29/08. The results are presented in Appendix D.

3.6 MONITORING WELLS

On completion of drilling, monitoring wells were installed in selected boreholes to enable subsequent gas and groundwater monitoring. The construction of the wells was as specified during the works by AECOM. Details of the installations are shown on the exploratory hole records in Appendix B and summarised in table D8044/B1.

Each well consisted of a lower slotted section of 50mm diameter HDPE standpipe surrounded by single size non-calcareous gravel, with an upper section of plain HDPE pipe surrounded by a bentonite cement seal.

Each of the wells was fitted with a suitable bung and gas tap to allow for gas and groundwater monitoring, and a protective steel cover to prevent damage to the installation.

Boreholes not fitted with a monitoring installation were backfilled in general accordance with the specification or subsequent instruction from AECOM.



4.0 LABORATORY TESTING

4.1 GEOTECHNICAL

Geotechnical laboratory testing, as scheduled by AECOM, was carried out on selected samples in accordance with techniques in BS 1377:2016. The testing was undertaken by a UKAS accredited laboratory and the results are presented in Appendix E.

4.2 CHEMICAL

Samples as scheduled by AECOM were tested for a range of contaminants by an MCERTS accredited laboratory. The results of these tests are presented in Appendix F.

5.0 GAS & GROUNDWATER MEASUREMENTS

5.1 INTRODUCTION

Following the completion of the investigation work on site, a Dunelm technician made a series of visits to the site in order to carry out measurements of gas and groundwater within the monitoring wells described above. The number and frequency of these visits were specified by AECOM.

The site has been monitored on two occasions on 20th December 2017 and 12th January 2018 at the time of issuing this report. The monitoring results are presented in Appendix G.

5.2 GAS MONITORING PROCEDURE

Each of the gas monitoring wells was monitored to record the concentration of methane, carbon dioxide, carbon monoxide, oxygen and hydrogen sulphide using an infra-red gas analyser. The borehole flow rate, atmospheric and differential pressure was also measured using a suitable instrument.

Gas monitoring was undertaken in accordance with current guidance.

5.3 GROUNDWATER MONITORING PROCEDURE

Measurements of groundwater level (in metres below ground level) were recorded in each borehole using a standard dipmeter.

5.4 GROUNDWATER SAMPLING PROCEDURE

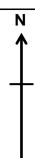
Samples of groundwater were recovered on 20th December 2017 using a water bailer and despatched to an appropriate laboratory for testing. The results of these tests are presented in Appendix F.

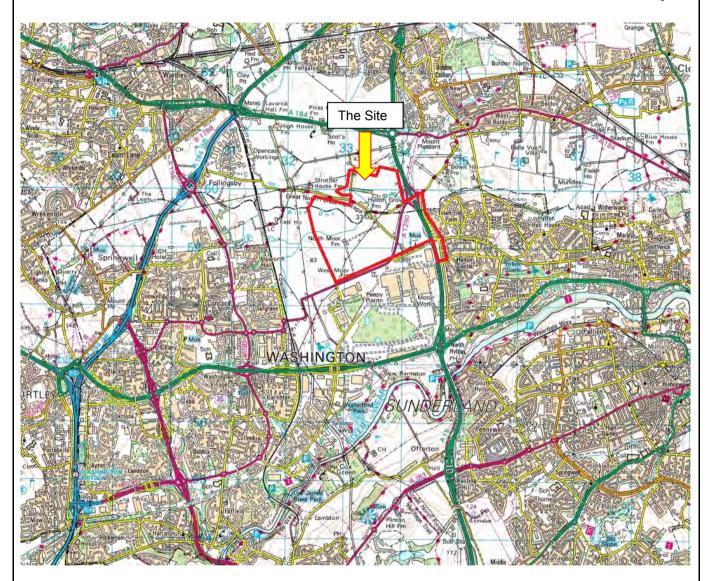
Measurements were taken on each water sample of redox potential, dissolved oxygen prior to despatch to the laboratory. The results obtained are included in a table in Appendix G.



APPENDIX A

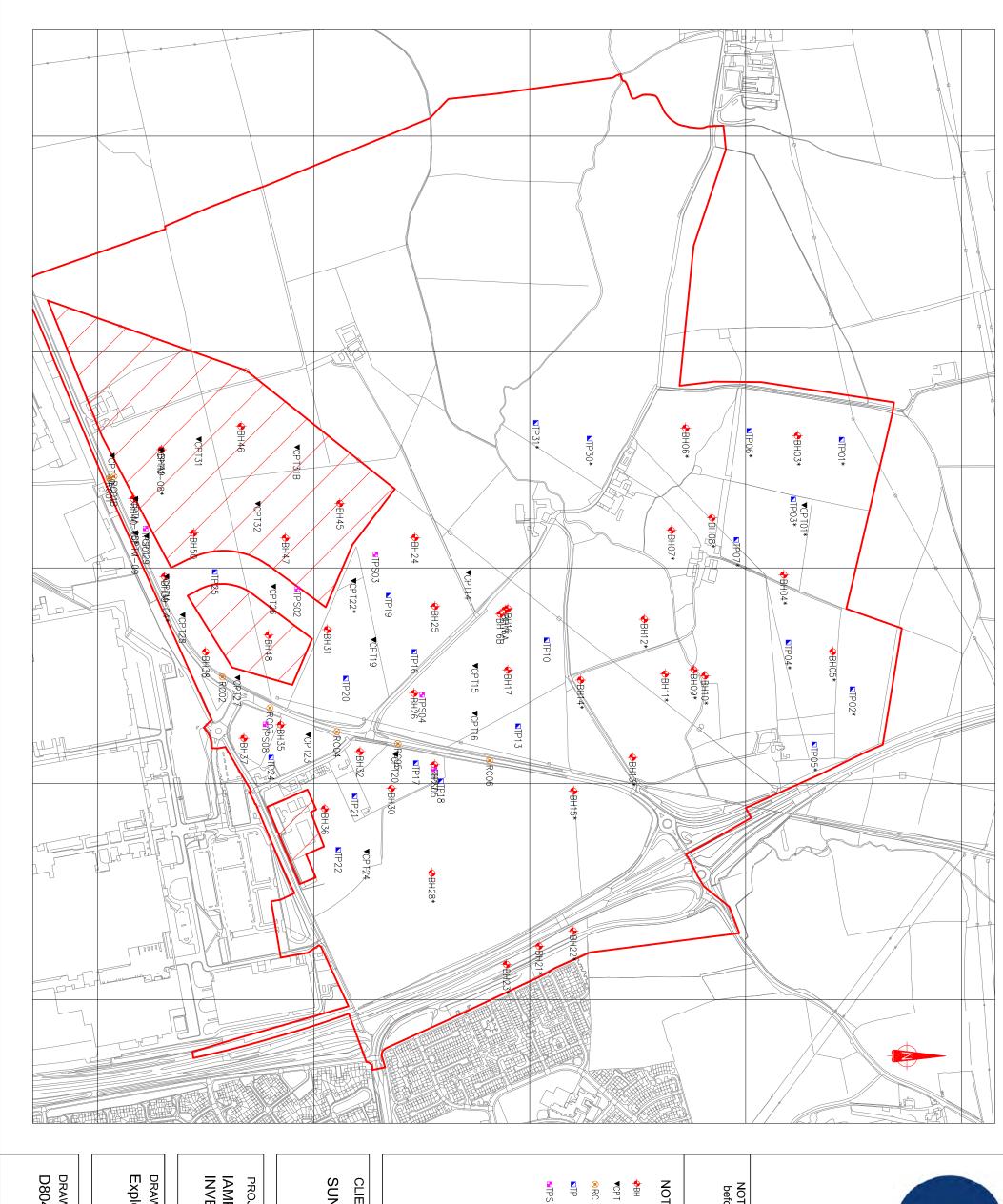
Drawings





Ordnance Survey © Crown copyright 2012 All rights reserved. Licence number 100048410.

DUNELM BEDTECHNICAL & ENVIRONMENTAL	Contract: IAMP Preliminar	Contract: Contract No: D8044									
	Client: Sunderland City Council										
TEL: 0191 378 3151 FAX: 0191 378 3157	Drawing Title: Site Location Pla	an									
Drawing No: D8044/01	Date: January 2018	Scale: NTS	Status: Final	Drawn by: DF							





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NOT TO SCALE: Contractor to check all dimensions on site before commencement of any works. No dimensions to be scaled from this drawing. © Copyright Reserved

NOTES

- Location of Cable Percussive Borehole
- Location of Cone Penetration Test
- Location of Road Core
- Location of Machine Excavated Trial Pit
- Location of Machine Excavated Soakaway Test

CLIENT

SUNDERLAND COUNTY COUNCIL

PROJECT TITLE:

INVESTIGATION IAMP - PRELIMINARY GROUND

DRAWING TITLE:

Exploratory Hole Location Plan

D8044/02 DRAWING NUMBER:



APPENDIX B

Exploratory Hole Records

INFORMATION GENERALLY RELATING TO ALL EXPLORATORY HOLE RECORDS

GENERAL

Borehole/Trial Pit No

The exploratory hole identity number used throughout the report.

Site

The ground investigation project name.

Client

Client's name responsible for funding the ground investigation project.

Ground Level and Location

The precise ground level in meters above Ordnance Datum at the exploratory hole location from which the reduced level for each stratigraphic boundary is calculated. The exploratory hole position is given as either national grid-coordinates or local grid as specified.

ABBREVIATIONS

Samples

- **B** Bulk disturbed sample generally representative of the soil type for cohesive and fine granular soils.
- **D** Small disturbed tub sample normally taken at intermediate depth between other sampling or testing operations. The sample is stored in an airtight container.
- BRE Sample taken for electrochemical testing
- **ES** Sample of potentially contaminated materials.
- **C** Core sample.
- **SB** Bulk disturbed sample subsampled from a liner sample
- **SD** Small disturbed tub sample subsampled from a liner sample.
- U 100mm diameter undisturbed thick walled sample (OS-TK/W)
- **UT** 100mm diameter undisturbed thin walled sample (OS-T/W)
- **UF** An attempted but failed 100mm undisturbed sample.
- W Water sample.

In-situ Testing

- **CBR** California Bearing Ratio mould sample or test.
- SPT Standard Penetration Test (SPT) using the split barrel sampler (shoe). The corresponding 'N' value is given in the test result column.

Rock Quality and Core Recovery

- TCR Total core recovery The length of the recovered core expressed as a percentage of the length of core run.
- SCR Solid Core Recovery The sum length of all core pieces (measured along the centre of the core), expressed as a percentage of the length core run.

RQD Rock Quality Designation- The sum length of all core pieces that are 100mm or longer (measured along the centre of the core), expressed as a percentage of the length of core run.

FI Fracture Index- The number of fractures per 1000mm length of solid core.

NI Non-intact- The material recovered in a non-intact state.

NR No recovery from the core run.

AZCL Assessed Zone of Core Loss.

COBBLE CONTENT

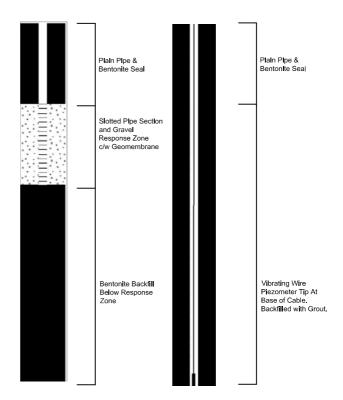
Low <10%, medium 10 – 20%, high >20%

Exploratory Hole Log Legend

BOREHOLE LEGEND:

TOPSOIL MADE GROUND SILT CLAY SAND **GRAVEL** عاد عاد عاد PEAT د ماد ماد ه ماد ماد ماد alta alta a MUDSTONE SILTSTONE SANDSTONE LIMESTONE CHALK COAL BENTONITE/ **GROUT**

MONITORING INSTALLATION LEGEND:



NB Where strata consists of material of more than one soil or rock type the legends are appropriately combined.



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Allied Exploration & Geotechnics Ltd.

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

Instrumented Rod Data

Wall Thickness tr (mm):

Assumed Modulus Ea (GPa):

Diameter d_r (mm):

Accelerometer No.1:

Accelerometer No.2:

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref: CD1

Test Date: 06/06/2017 Report Date: 06/06/2017

File Name: CD1.spt

Test Operator: BP

SPT Hammer Information

Hammer Mass m (kg): 63.5 Falling Height h (mm): 760 SPT String Length L (m): 14.0

Comments / Location

Mass and drop supplied by client



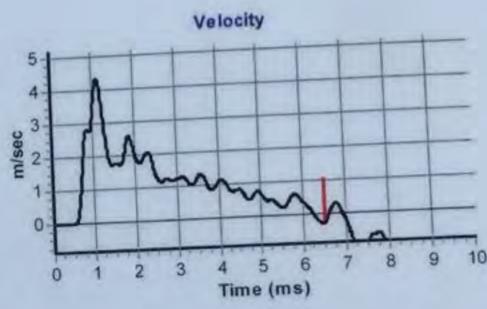
54

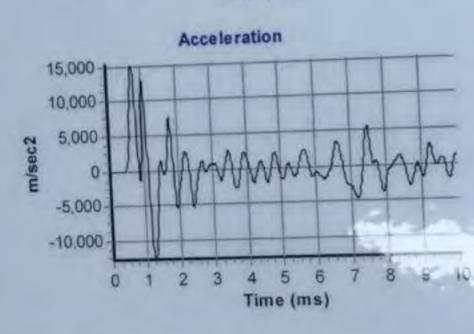
6.2

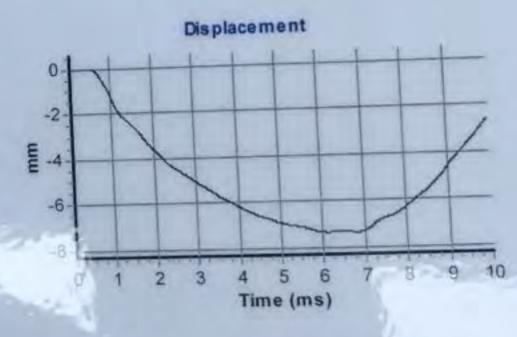
208

5990

5991







Calculations

Area of Rod A (mm2): 931

Theoretical Energy Etheor (J): 473

Measured Energy E_{meas} (J): 353

Energy Ratio E r (%):

75

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-5:2005

ARCHWAY ENGENEEING AINLEYS INDUSTRIAL ESTATE

ELLAND

WEST YORKSHIRE

HX59JP

SPT Hammer Ref: AR1817

Test Date: 26/05/2017

Report Date: 26/05/2017

File Name: AR1817.spt

Test Operator: SH

Instrumented Rod Data

Diameter d_r (mm): 54

Wall Thickness t_r (mm): 6.0

Assumed Modulus Ea (GPa): 208

Accelerometer No.1: 7080

Accelerometer No.2: 11609

SPT Hammer Information

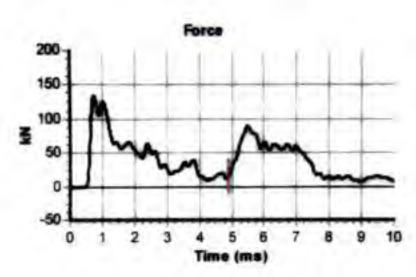
Hammer Mass m (kg): 63.5

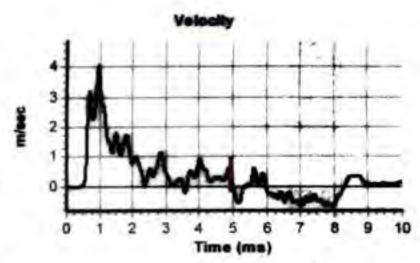
Falling Height h (mm): 760

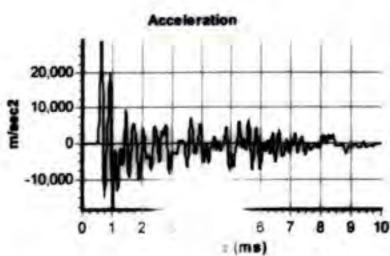
SPT String Length L (m): 10.0

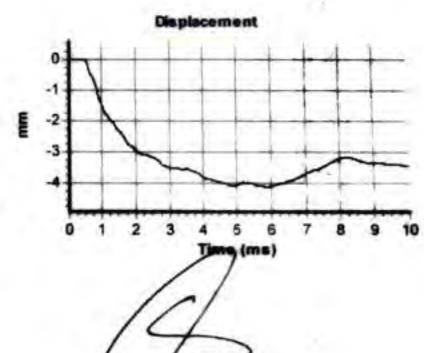
Comments / Location

CALIBRATION









Calculations

Area of Rod A (mm2): 905

Theoretical Energy Etheor (3): 473

- - - - F (3) 330

Measured Energy E_{meas} (J): 335

Energy Ratio E, (%):

71

Signed: S. HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

llied Exploration &

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

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:

DUN02

Test Date:

28/03/2017

Report Date:

30/03/2017

File Name:

DUN02.spt

Test Operator:

GW



Instrumented Rod Data

Diameter d_r (mm):

67

Wall Thickness t_r (mm):

8.4

Assumed Modulus Ea (GPa): 208

Accelerometer No.1:

6469

Accelerometer No.2:

11406

SPT Hammer Information

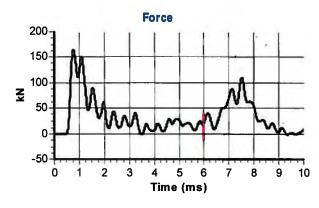
Hammer Mass m (kg):

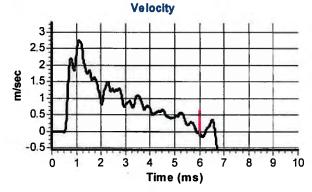
Falling Height h (mm):

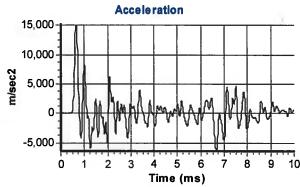
SPT String Length L (m): 13.7

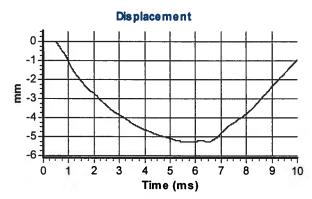
Comments / Location

Mass and Height supplied by Dunelm









Calculations

Area of Rod A (mm2):

1546

Theoretical Energy E_{theor} (J):

473

Measured Energy E_{meas}

318

Energy Ratio E_r (%):

67

Signed: Gareth Wear

Title:

Chief Laboratory Technician

The recommended calibration interval is 6 months

BH No.	Instrument	Instrume	Response Zone		Surface	Remarks
	Туре	nt Dia. (mm)	Top (m)	Base (m)	Protection	
BH03	BH03 SPIE 50 0.00 14.10		14.10	Flush Cover		
BH04	SPIE	50	0.00	12.80	Flush Cover	
BH09	SPIE	50	2.00	4.80	Flush Cover	
BH11	SPIE	50	0.00	11.20	Flush Cover	
BH13	SPIE	50	0.00	8.40	Flush Cover	
BH14	SPIE	50	16.00	17.70	Flush Cover	
BH15	SPIE	50	5.00	6.70	Flush Cover	
BH16B	SPIE	50	7.30	8.80	Flush Cover	
BH17	SPIE	50	16.00	17.00	Flush Cover	
BH21	SPIE	50	8.20	9.10	Flush Cover	
BH22	SPIE	50	3.50	4.50	Flush Cover	
BH24	SPIE	50	20.00	21.40	Flush Cover	
BH25	SPIE	50	11.00	11.70	Flush Cover	
BH27	SPIE	50	16.90	17.40	Flush Cover	
BH28	SP	50	1.50	3.30	Flush Cover	
BH30	SPIE	50	1.70	2.80	Raised Cover	
BH31	SPIE	50	11.00	12.50	Raised Cover	
BH32	SP	50	1.00	3.10	Flush Cover	
BH35	SP	50	1.00	2.00	Flush Cover	
BH36	SP	50	2.00	12.00	Flush Cover	
BH39	SPIE	50	9.00	10.80	Flush Cover	
BH40	SPIE	50	3.50	4.50	Flush Cover	
BH45	SPIE	50	9.60	11.90	Flush Cover	
BH46	SPIE	50	6.70	7.70	Flush Cover	
BH47	SPIE	50	15.00	19.00	Flush Cover	
BH48	SPIE	50	10.20	11.20	Flush Cover	
BH49	SPIE	50	2.00	3.20	Flush Cover	
BH50	SPIE	50	29.20	31.10	Flush Cover	
BH51	SPIE	50	0.00	3.00	Flush Cover	
BH52	SPIE	50	0.00	2.60	Flush Cover	

DUNELM	Contract: IAMP Preliminary	Investigation		Contract No: D8044				
BROTECHNICAL & ENVIRONMENTAL	Client: Sunderland City Council							
TEL: 0191 378 3151 FAX: 0191 378 3157	Table Title: Installation Summ	Table Title: Installation Summary						
Table No: D8044/B1	Date: January 2018			Inputted by: DF				



Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH03

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD)

Scale 1:50

Northing: 560120.08

Easting: 433194.12 Sheet 1 of 3

Logged By: FR/ Client: Sunderland City Council Driller: LS/AC

Metho	d: Cable Pe	ercussive Drillin	g with Rotary Core	Drilling	Checked By: JH	Dates:	Dates: 07/11/2017 - 15/11/20			
	SAMPLE	E DETAILS	g) /ater	CTD	ATA RECORD					
Туре	Depth From-To (m)	Insitu Testin	(Casing)		escription	Depth (m)	Level (m AOD)	Legend	We Bac	
B D ES PID B D ES PID BRE ES PID	0.00 - 0.30 0.20 0.20 0.20 0.50 - 1.00 0.50 0.50 1.00 1.00 1.00 1.20 - 1.65	PID: Oppmv PID: Oppmv	1	topsoil. Sand is fine to coasubrounded, fine to coarse fragments noted. MADE GROUND: Brown is slightly gravelly clay. Grav to coarse of sandstone an Organic Matter noted.	own sandy slightly gravelly claye arse. Gravel is subangular to e of sandstone and coal. Rare br mottled grey and orange sandy el is subangular to subrounded, d coal. Rare limestone noted.	ine (0.90)				
D B B BRE D SPT (S)	1.20 - 1.65 1.65 1.70 - 2.00 2.00 - 2.45 2.00 2.00 2.00 - 2.45	50 blows N=15 (2,2/3,3,4,5)	2 (1.80) Dry	Stiff dark grey slightly sand subangular to subrounded coal.	dy slightly gravelly CLAY. Gravel I, fine to coarse of sandstone and	IS ⊏				
BRE U	3.00 3.00 - 3.45 3.45	65 blows	3			(3.70)				
B BRE D SPT (S)	4.00 - 4.45 4.00 4.00 4.00 - 4.45	N=20 (3,3/4,5,5,6)	- 4 (3.80) Dry							
BRE D U	5.00 5.00 5.00 - 5.45 5.45	85 blows	5	gravelly CLAY. Gravel is s coarse of sandstone and o	brown slightly sandy slightly ubangular to subrounded, fine to coal.	5.00				
B BRE D SPT (S)	6.00 - 6.45 6.00 6.00 6.00 - 6.45	N=26 (2,3/5,5,7,9)	6 (5.80) Dry	noted. Medium dense brownish g	grey silty slightly gravelly SAND. avel is subangular, fine of coal. T	6.10		XX XX X X X X X X X X X X X X X X X X X X X		
B BRE D SPT (S)	7.00 - 7.45 7.00 7.00 7.00 7.00 - 7.45	N=12 (3,3/3,3,3,3)	7					X X X X X X X X X X X X X X X X X X X		
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=14 (2,3/3,3,4,4)	8 (7.80) 6.85							
B BRE D SPT (S)	9.00 - 9.45 9.00 9.00 9.00 - 9.45	N=15 (2,3/3,4,4,4)	9 (8.80) 7.66							
В	10.00 - 10.45 Ground Wat	er (m)	10 (9.80) 9.22 Chiselling / Hard Strat		nued on next sheet Hole Diameter General Remark	•		x. × .x.		
Depth Struck	Casing Depth	Water sealed		mo (hr) Diameter Dooth (m) Dia	ameter Depth (m) 1. Hand dug insp		0m.			
(m)	(m) Water Le	(m)		01:00 150 20.30	mm) 21.00 116 25.00 2. Water added b			m		

RESTOR TO STATE OF THE PRINT OF Contract No: D8044

BOREHOLE RECORD

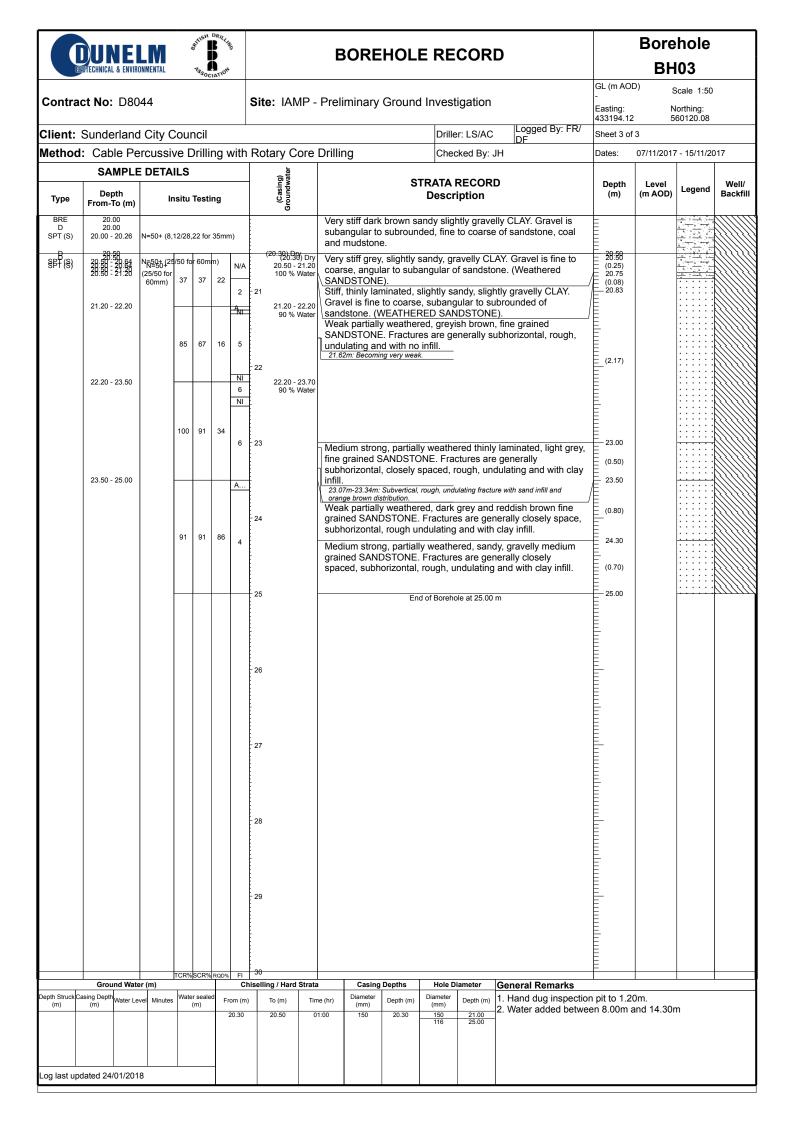
Borehole BH03

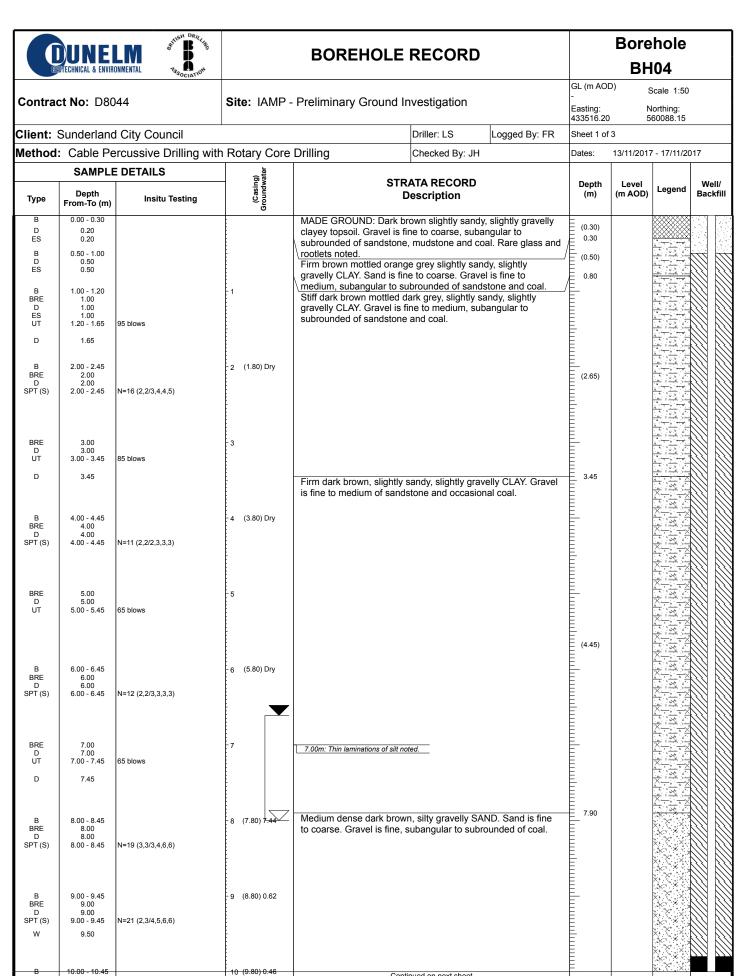
Site: IAMP - Preliminary Ground Investigation

GL (m AOD) Scale 1:50

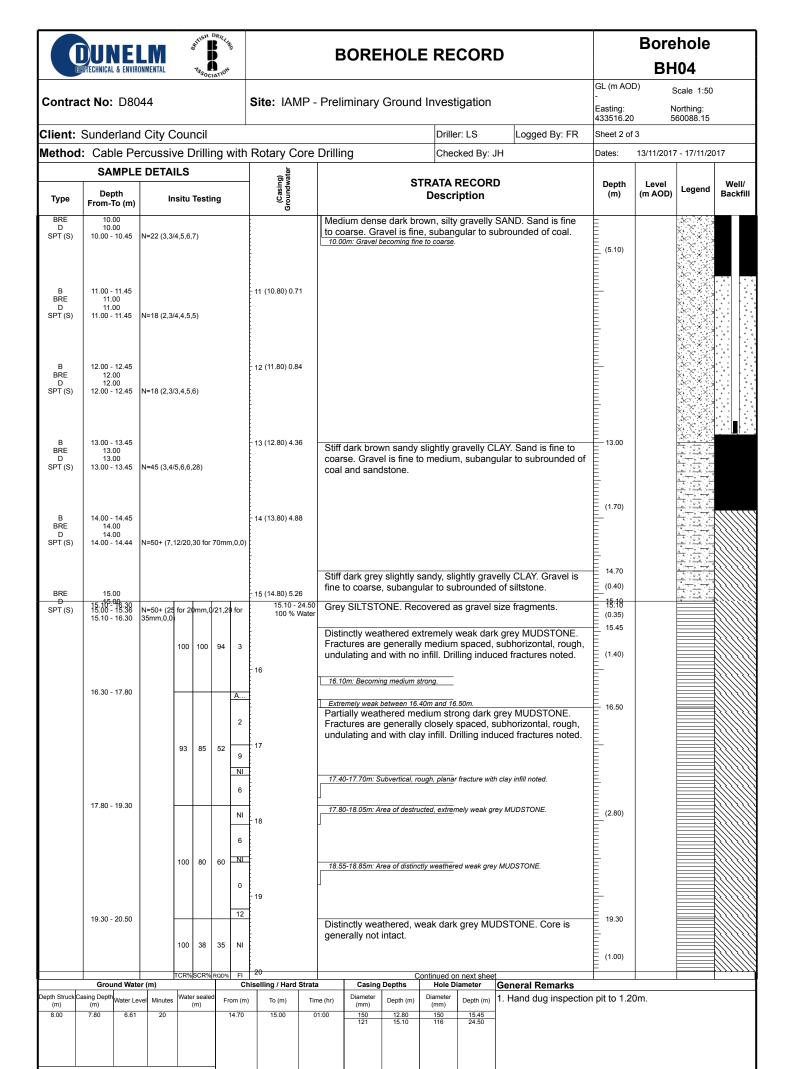
Northing: 560120.08 Easting: 433194.12

					1	II amount Dun ED/	433194.12	2 5	60120.08	
Client:	Sunderland	d City Council			Driller: LS/AC	Logged By: FR/ DF	Sheet 2 of	f 3		
Method: Cable Percussive Drilling with			Rotary Core	Drilling		Dates: 07/11/2017 - 15/11/2)17	
	SAMPLE	E DETAILS	g) ater	CTD	ATA DECODE					
Туре	Depth From-To (m)	Insitu Testing	(Casing) Groundwater		ATA RECORD Description	Depth (m)	(m AOD)	Legend	Well/ Backfill	
BRE D SPT (S)	10.00 10.00 10.00 - 10.45	N=15 (2,2/3,4,4,4)		Medium dense brownish of Sand is fine to coarse. Grabands of coal noted.	grey silty slightly g ravel is subangular	ravelly SAND. r, fine of coal. Thin	(8.20)		* * * * * * * * * * * * * * * * * * *	
B BRE D SPT (S)	11.00 - 11.45 11.00 11.00 11.00 - 11.45	N=17 (4,5/3,4,4,6)	11 (10.80) 9.54							
B BRE D SPT (S)	12.00 - 12.45 12.00 12.00 12.00 - 12.45	N=15 (4,5/3,4,4,4)	12(11.80) 10.11						* * * * * * * * * * * * * * * * * * *	
B BRE D SPT (S)	13.00 - 13.45 13.00 13.00 13.00 - 13.45	N=14 (3,3/4,4,3,3)	13 (12.80) 8.46							
B BRE D SPT (S)	14.00 - 14.45 14.00 14.00 14.00 - 14.45	N=14 (3,3/4,2,3,5)	14 (13.80) 9.04	Firm dark brown sandy sli subangular to subrounded coal.			<u> </u>			
B BRE D SPT (S) B	15.00 - 15.45 15.00 15.00 15.00 - 15.45 15.45	N=16 (3,3/4,3,4,5)	15 (14.80) 9.66	Very stiff dark brown sand subangular to subrounded	dy slightly gravelly d, fine to coarse of	CLAY. Gravel is f sandstone, coal	(1.10)			
BRE U	16.00 16.00 - 16.45	100 blows	- 16	and mudstone.						
D	16.45						E			
B BRE D SPT (S)	17.00 - 17.45 17.00 17.00 17.00 - 17.38	N=50+ (5,8/12,18,20)	- 17 (16.80) Dry							
B BRE D SPT (S)	18.00 - 18.45 18.00 18.00 18.00 - 18.31	N=50+ (6,11/20,22,8 for 10mm)	- 18 (17.80) Dry				(5.10)			
B BRE D SPT (S)	19.00 - 19.45 19.00 19.00 19.00 - 19.34	N=50+ (6,9/13,19,18 for 45mm)	- 19 (18.00) Dry				(5.10)			
В	20.00 - 20.45	or (m)	20 (19.80) Dry		inued on next sheet	amount Douglas				
Depth Struck Ci	Ground Water Le	well Minutes Water sealed From (m) 20.30		no (hr) Diameter Donth (m) Di	iameter Depth (m) 1.	eneral Remarks Hand dug inspectior Water added betwee			n	

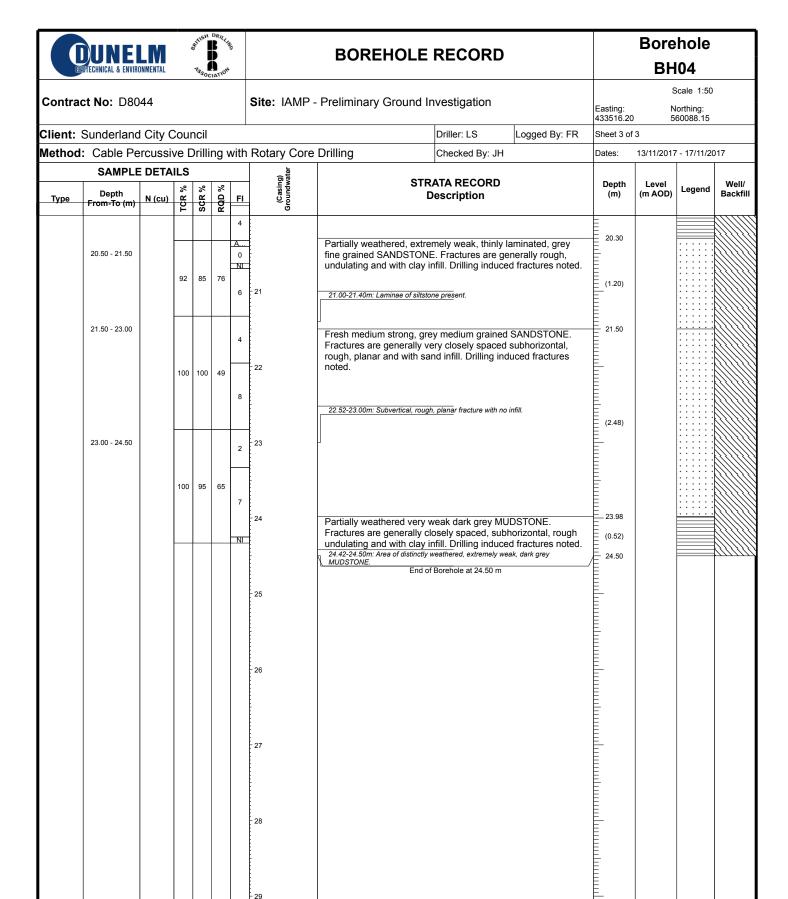




									U	<u>ontinuea or</u>	THEXT SHEE	l .			
	Ground Water (m)			Chis	Chiselling / Hard Strata			Casing Depths		ameter	General Remarks				
Depth Struck (m)	Casing Depth (m)	Water Leve	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection	pit to 1.20)m.	
8.00	7.80	6.61	20		14.70	15.00	01:00	150	12.80	150	15.45				
								121	15.10	116	24.50				
Log last u	pdated 24/	01/2018													



og last updated 24/01/2018



		nd Water (Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
8.00	7.80				14.70	15.00	01:00	150	12.80	150	15.45	
								121	15.10	116	24.50	
Log last u	Log last updated 24/01/2018											



Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH05

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) Easting: 433694.07

Scale 1:50 Northing: 560201.80

Client: Sunderland City Council

Driller: LS

Logged By: DF Sheet 1 of 2

· · · · · · · · · · · · · · · · · · ·				
Method: Cable Percussive Drilling	Checked E	Bv: JH	Dates:	15/11/2017

Metho	d: Cable Pe	ercussive Drillin	ng				Chec	ked By: c	JH	Dates:	15/11/2017	,	
		E DETAILS		2									
Туре	Depth From-To (m)	Insitu Testin	Gasing)			S	TRATA I Descri		D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
B D ES PID B D ES PID	0.00 - 0.30 0.20 0.20 0.20 0.50 - 1.00 0.50 0.50 0.50	PID: 0ppmv		Bro Gra mu Firn slig and	avel is fine dstone and thinly lare thinly lare thinly grave to coal.	to coarse d limestor minated, I lly CLAY.	e, subroui ne. Rootle orown mo Gravel is	nded to ro ets presentitled grey fine, sub	y, slightly sandy, angular of sandstone	(0.30) - 0.30 - (0.50) - 0.80			
B BRE D ES PID UT D	1.00 - 1.20 1.00 1.00 1.00 1.00 1.20 - 1.65 1.65	PID: 0ppmv 55 blows	- 1	slig		lly CLAY.	Gravel is		n, slightly sandy, edium, subangular of				
B BRE D SPT (S)	2.00 - 2.45 2.00 2.00 2.00 - 2.45	N=14 (2,2/3,3,4,4)	- 2										
BRE UT D	3.00 3.00 - 3.45 3.45	80 blows	-3										
B BRE D SPT (S)	4.00 - 4.45 4.00 4.00 4.00 - 4.45	N=15 (2,2/3,4,4,4)	- 4	gra		Y. Gravel	is fine to	coarse, s	y sandy, slightly ubangular to I coal.	4.00			
BRE UT D	5.00 5.00 - 5.45 5.45	65 blows	- 5 - 5 										
B BRE D SPT (S)	6.00 - 6.45 6.00 6.00 6.00 - 6.45	N=12 (2,2/3,3,3,3)	6										
BRE UT	7.00 7.00 - 7.45	60 blows	- 7 - 1							- - - -			
D B	7.45 8.00 - 8.45									_ - - -			
BRE D SPT (S)	8.00 8.00 8.00 - 8.45	N=18 (2,3/3,4,5,6)	- 8	8.0	0m: Becomin	g stiff.							
BRE D UT D	9.00 9.00 9.00 - 9.45 9.45	65 blows	- 9 - ! 	slig					sh brown of silt, brown silt on laminae	9.30			
В	10.00 - 10.45		10				Continued or			10.00			
Depth Struck (m) 13.00	Ground Water Casing Depth Water Le	Water sealed (m)	Chiselling / Ha From (m) To (m) 14.80 16.00	Time (hr)	Diameter (mm)	Depths Depth (m) 15.80	Diameter (mm)		General Remarks 1. Hand Dug inspection	n pit to 1.2	20m.		



Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH05

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD)

Scale 1:50 Northing: 560201.80

Client: Sunderland City Council

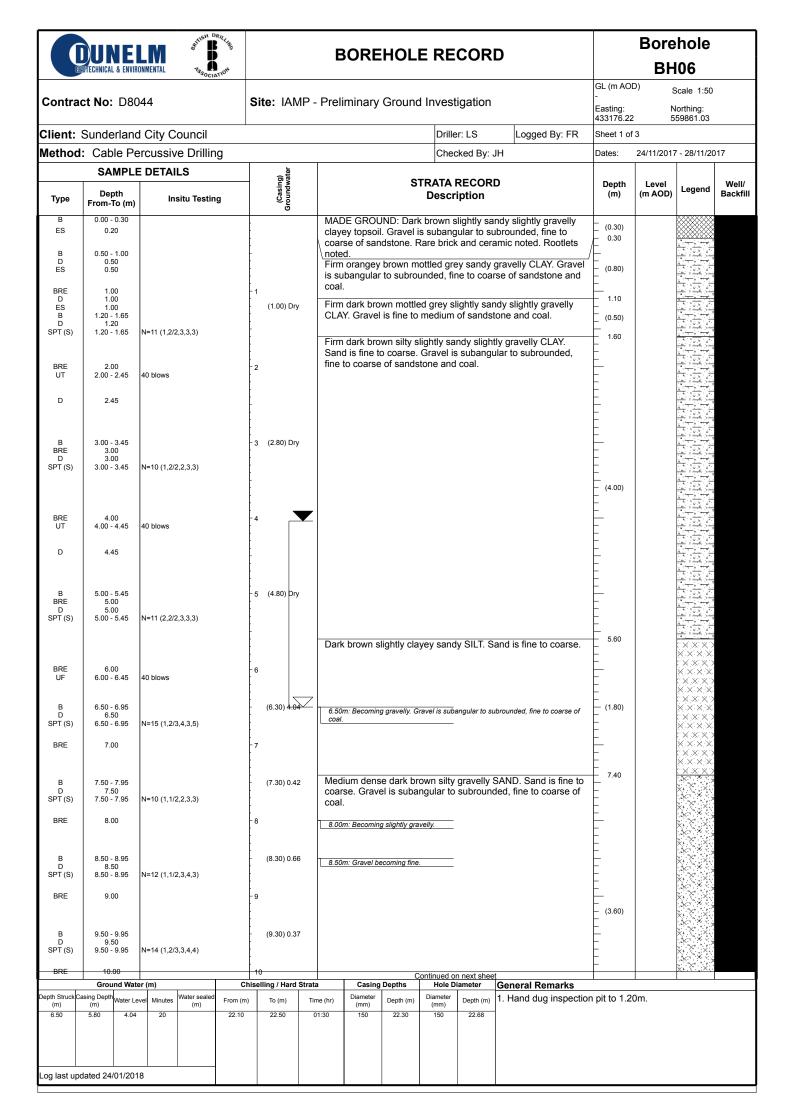
Driller: LS

Easting: 433694.07 Sheet 2 of 2

Logged By: DF

Method: Cable Percussive Drilling	Checked By: JH	Dates:	15/11/2017

		ercussive Drilling	1	Checked By: JH	Dates:	15/11/2017	7	
linoti ioc		E DETAILS		onesida by. sri				
Туре	Depth From-To (m)	Insitu Testing	(Casing)	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
BRE D SPT (S)	10.00 10.00 10.00 - 10.45	N=20 (3,3/4,5,5,6)		Stiff thinly brown, locally reddish brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone. Occasional thin bands of silt present.	-			
BRE UT	11.00 11.00 - 11.45	65 blows	- 11		(1.50) - - -			
D	11.45			Firm brown silty CLAY.	11.50		×	
B BRE D SPT (S)	12.00 - 12.45 12.00 12.00 12.00 - 12.45	N=13 (2,2/3,3,3,4)	12		(1.50)		× × × × × × × × × × × × × × × × × × ×	
B BRE D SPT (S)	13.00 - 13.45 13.00 13.00 13.00 - 13.45	N=11 (1,2/2,3,3,3)	13	Firm brown clayey, slightly sandy SILT. Sand is fine to coarse.	13.00		X———X X———X X X X X X X X X X X X X	
B BRE D	14.00 - 14.45 14.00 14.00		- 14	Stiff grey slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	13.80		× × × × × × × × × × × × × × × × × × ×	
SPT (S)	14.00 - 14.42 15.00 - 15.45	N=50+ (10,13/17,20,13 fo 45mm,0)	or ;					
BRE D SPT (S)	15.00 15.00 15.00 - 15.40	N=50+ (12,13/19,21,10 fc 25mm,0)						
B BRE D SPT (S)	16.00 - 16.45 16.00 16.00 16.00 - 16.38	N=50+ (10,15 for 20mm/27,28,0,0)	16	Very stiff grey slightly clayey, slightly sandy GRAVEL. Gravel is subangular, fine to coarse of sandstone. (Possible weathered rockhead).	(0.70)			
			- 17	End of Borehole at 16.50 m				
			- 18 - -					
			- 19 - 19		_ _ _ _ _			
			20					
	Ground Wat	er (m)	Chiselling / Hard Strat	Casing Depths Hole Diameter General Remarks	1			
Depth Struck ((m) 13.00	Casing Depth Water Le	well Minutes Water sealed (m) 8 14.00		te (hr)	n pit to 1.2	0m.		







BOREHOLE RECORD

Borehole **BH06**

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) Easting: 433176.22

Scale 1:50

Northing: 559861.03

Client: Sunderland City Council

Driller: LS

Logged By: FR Sheet 2 of 3

4.04

Log last updated 24/01/2018

22.10

22.50

01:30

Method	Method: Cable Percussive Drilling										Checked By: JH			Dates:	24/11/201	7 - 28/11/20)17	
	SAMPLE	E DETAI	LS		a)								_					
Туре	Depth From-To (m)	In	situ Testir	ng	(Casing) Groundwater				S		A REC		ט		Depth (m)	Level (m AOD)	Legend	Well/ Backfill
B D SPT (S) BRE	10.50 - 10.95 10.50 10.50 - 10.95	N=12 (1,2/2	2,3,3,4)		(10.30) 0.2	24	coars coal.	se. Grav	el is suba	ingular	to subr	round	SAND. Sand led, fine to o	coarse of	11.00		*	
B D SPT (S)	11.50 - 11.95 11.50 11.50 - 11.95	N=12 (1,2/3	3,3,3,3)		(11.30) 0.3	39	to co	um dens arse. Gr	se brown avel is su	siigntiy ibround	graveii ded, fine	e to c	y SAND. Sa coarse of co	and is fine al.			* * * * * * * * * * * * * * * * * * *	
BRE	12.00				- 12										-		× × × × × × × × × × × × × × × × × × ×	
B D SPT (S)	12.50 - 12.95 12.50 12.50 - 12.95	N=13 (2,3/3	3,3,4,3)		(12.30) 0.7	72									(3.00)		* * * * * * * * * * * * * * * * * * *	: :
BRE B	13.00 13.50 - 13.95				- 13	14									- - -		* * * * * * * * * * * * * * * * * * *	
D SPT (S) BRE	13.50 13.50 13.50 - 13.95	N=12 (3,3/3	3,3,3,3)		- 14	**	Modi	um don	oo dark b	courp o	liabth, a	rovoll	ly silty SAN	D. Sand	14.00		× × × × × × × × × × × × × × × × × × ×	
B D SPT (S)	14.50 - 14.95 14.50 14.50 - 14.95	N=14 (1,2/3	3,3,4,4)		(14.30) 7.8	38	is fine	e to coa	rse. Grav	el is su	ıbangula	ar to	subrounded	I, fine to			* * * * * * * * * * * * * * * * * * *	
BRE B D	15.50 - 15.95 15.50				- 15 - (15.30) 8.1	14									- - - - -		* * * * * * * * * * * * * * * * * * *	: :
SPT (S) BRE	15.50 - 15.95 16.00	N=15 (1,2/3	3,4,4,4)		- 16													
B D SPT (S) BRE	16.50 - 16.95 16.50 16.50 - 16.95	N=14 (1,1/3	3,3,4,4)		(16.30) 8.3 - (17	36									- - - - -		*	
D SPT (S)	17.50 17.50 - 17.95	N=15 (1,2/3	3,4,4,4)		- (17.30) 8.7	73									- - - - (7.00)		* * * * * * * * * * * * * * * * * * *	
BRE	18.00				- 18												× × × × × × × × × × × × × × × × × × ×	
B D SPT (S)	18.50 - 18.95 18.50 18.50 - 18.95	N=15 (2,3/3	3,4,4,4)		(18.30) 9.0	01									- - - -		* * * * * * * * * * * * * * * * * * *	
SPT (C)	19.50 - 19.95	N=31 (4,6/	7,8,8,8)		- 19	22	Below	v 19.50m: l	Dense		_							
BRE	20.00				20					Continue	d on next	sheet	1		+		x. × x.	
	Ground Water	1	I		niselling / Hard	Strata			Depths	Hol	le Diamete	er	General Re		•		•	
Depth Struck C (m)	Casing Depth (m) Water Le	evel Minutes	Water sealed (m)	From (m) To (m)		ne (hr)	Diameter (mm)	Depth (m)	Diame (mm) Depti	` ′	1. Hand du	g inspectio	n pit to 1.	20m.		

22.68

22.30



Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH06

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD)

Scale 1:50 Northing: 559861.03

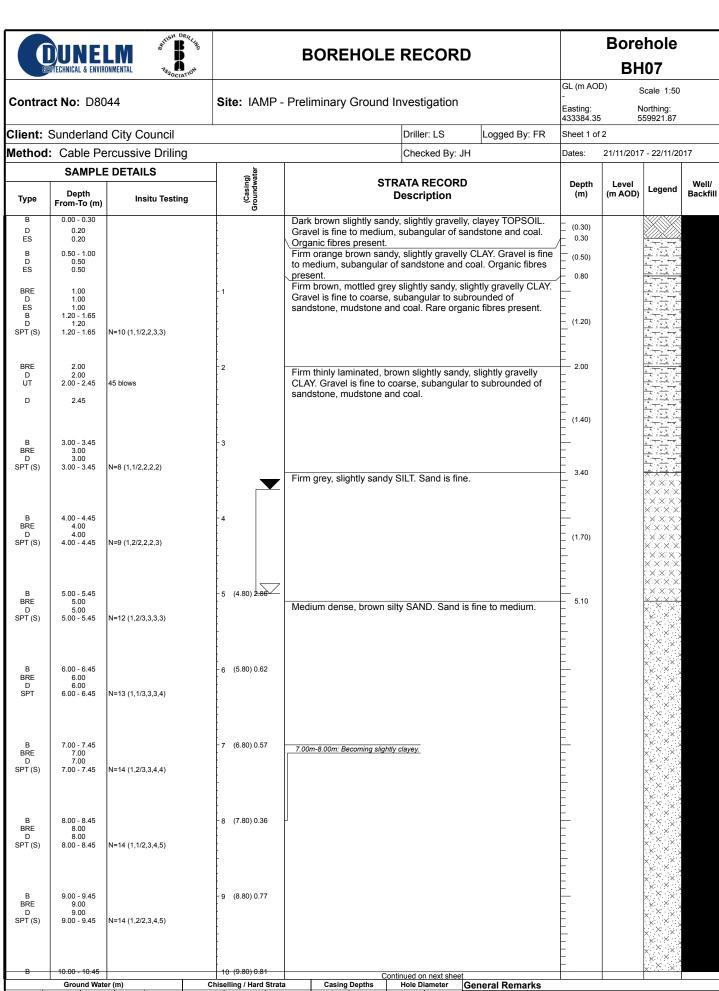
Client: Sunderland City Council

Driller: LS

Easting: 433176.22 Logged By: FR Sheet 3 of 3

Method: Cable Percussive Drilling	Checked By: JH	Dates:	24/11/2017 - 28/11/2017
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SAMPLE DETAILS				STRATA RECORD					Б				
Туре	Depth From-To (m)	Insitu Testing	(Casing)	Groundw		S	Descri		D	Depth (m)	Level (m AOD)	Legend	Well/ Backfi
B D	20.50 - 20.95 20.50 20.50 - 20.95		(20.30)		Medium dens is fine to coar coarse of sar 20.00m: Becomi	rse. Grave ndstone ai	el is subai nd coal.	tly grave ngular to	elly silty SAND. Sand subrounded, fine to	-		× × × × × × × × × × × × × × × × × × ×	
SPT (S)	20.50 - 20.95	N=32 (10,10/8,5,8,11)	į							E		^x	
BRE B	21.00 21.50 - 21.95		- 21		coal.	subroun	ded, fine	to coarse	D. Gravel is e of sandstone and CLAY. Sand is fine to	21.00			
D SPT (S)	21.50 21.50 21.50 - 21.84	N=50+ (9,11/17,18,15 for			coarse. Graves sandstone.	el is suba	ngular to	subround	ded, fine to coarse of	(0.70)			
BRE	22.00		- 22	-	Verv dense a	rev clave	v gravelly	SAND. 0	Gravel is subangular	22.10			
D	22.50 22.50 - 22.68		(22.30)		of sandstone					(0.58)			
SPT (S)	22.50 - 22.68	N=50+ (20,5 for 5mm/36, ² 25mm)	14 for			En	d of Boreho	le at 22.68	i m	22.68			
			- 23							-			
			-							-			
			- 24										
			-							-			
			- 25										
										-			
			ļ							E			
			- - 26							-			
										E			
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			27										
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			- 28							-			
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			- 29 -							<u></u>			
			ļ							Ė			
			Ī.							E			
	Ground Wat	er (m)	30 Chiselling / H	ard Strata	Casino	Depths	Hole Di	ameter	General Remarks				
th Struck Ca	asing Depth	Water sealed	From (m) To (m)		(hr) Diameter	Depth (m)	Diameter	Depth (m)	Hand dug inspect	ion pit to 1.2	0m.		
(m) 6.50	(m) Water Le	()	22.10 22.50		(111111)	22.30	(mm) 150	22.68	-				



_							Continued on next sines				l .					
	Ground Water (m)					Chis	selling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks			
Dep	th Struck (m)	Casing Depth (m)	Water Leve	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection	pit to 1.20)m.	
	5.00	4.80	3.62	20	17.50	18.30	18.50	01:00	150	18.30	150	19.00				
	, loct w	adatad 24	(01/2019													
-00	og last updated 24/01/2018															





17.50

Log last updated 24/01/2018

18.30

BOREHOLE RECORD

Borehole BH07

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

Driller: LS

GL (m AOD) Scale 1:50

Easting: 433384.35

Sheet 2 of 2

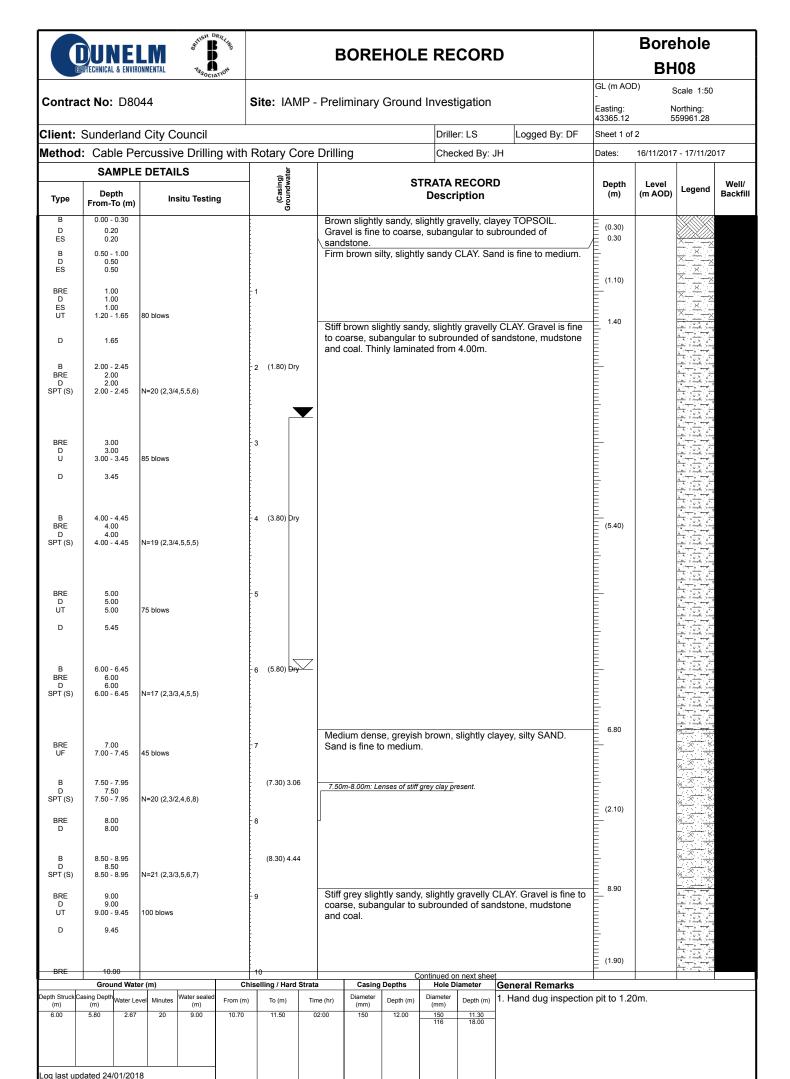
Northing: 559921.87

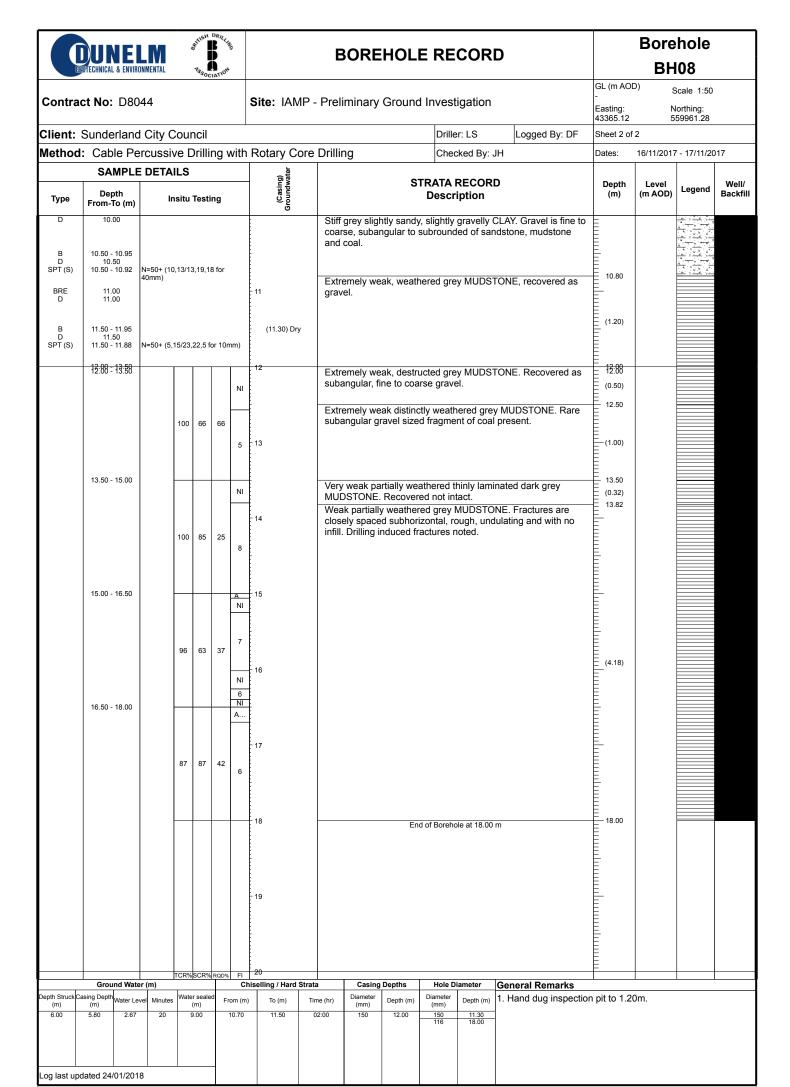
Client: Sunderland City Council

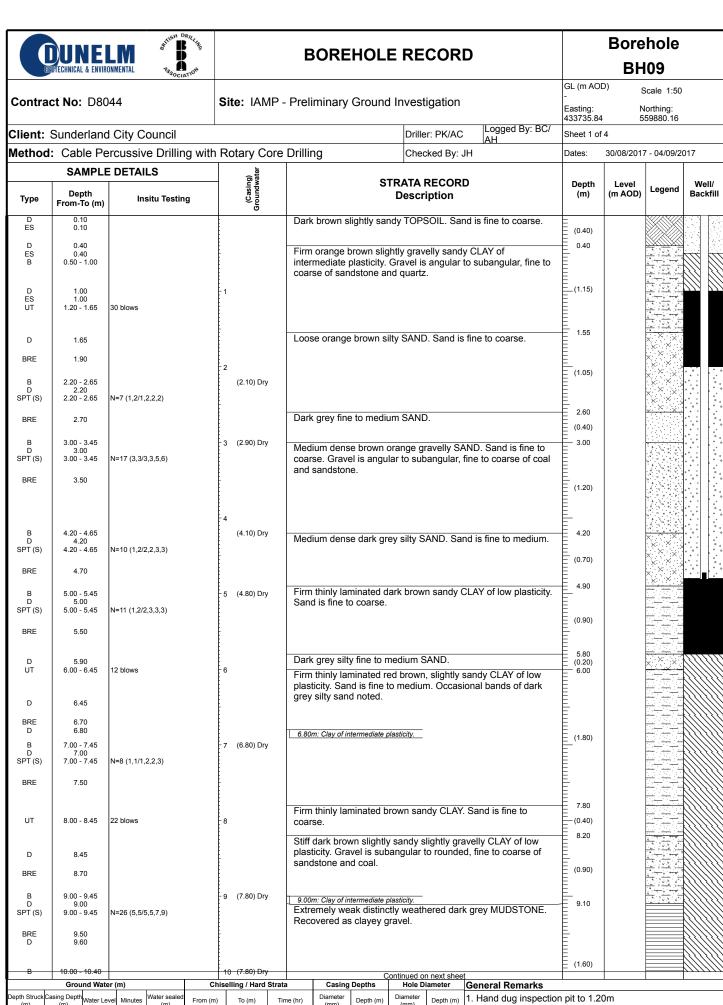
Method: Cable Percussive Driling

Logged By: FR

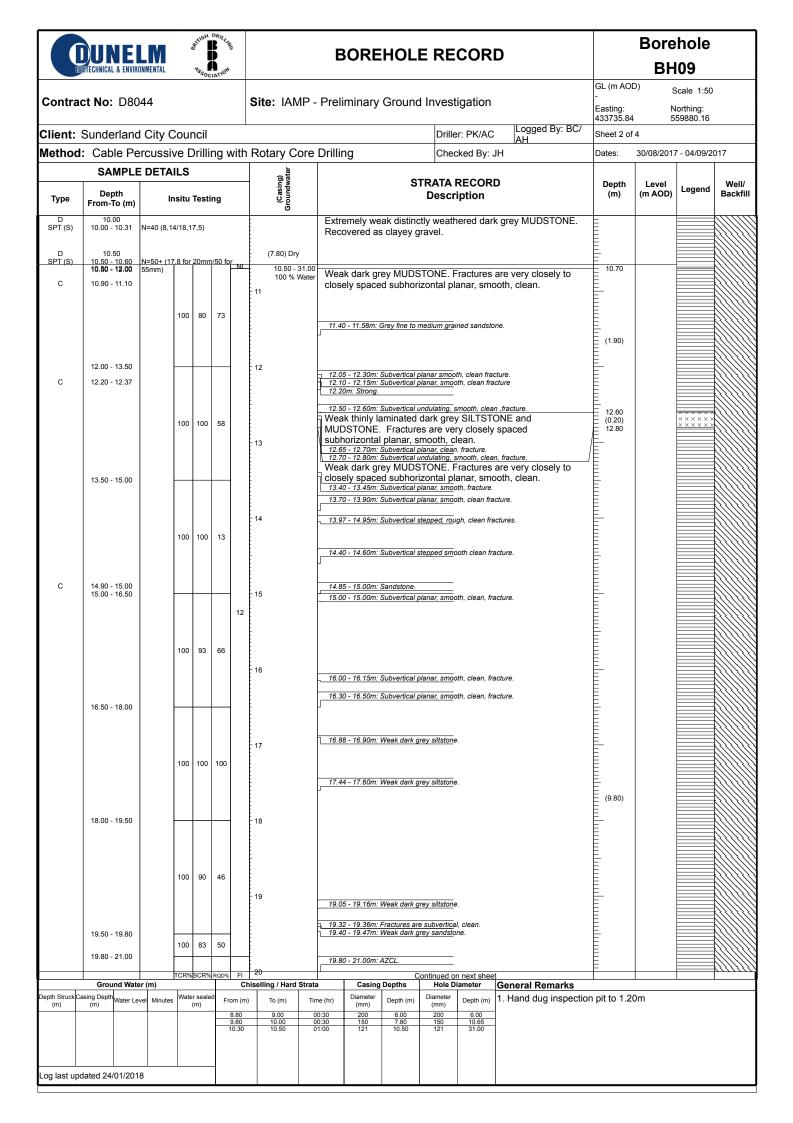
Ctilou		ercussive Driling		Checked By: JH						Z 1/ 1 1/ZU 1 /	7 - 22/11/20	, , ,
	SAMPLE	DETAILS	g) rater			TDATA	DECOD	.	1			
Туре	Depth From-To (m)	Insitu Testing	(Casing) Groundwater		5		RECORI ription	U	Depth (m)	(m AOD)	Legend	Well Backf
BRE D	10.00 10.00			Medium den	se, brown	silty SAI	ND. Sand	is fine to medium.	-		××××	
PT (S)		N=14 (2,3/3,3,4,4)							F		××,	
			-						- (10.60) -		× × ×	
			<u> </u>						L		x × x	
			ŀ						L		××××	
В	11.00 - 11.45		- 11 (11.00) Dry								××,	
D PT (S)	11.00 11.00 - 11.45	N=14 (2,3/3,3,4,4)							F		×××	
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							Ė		× × ×	
											××××	
									-		\times \times $^{^{\circ}}$	
									F		× × ×	
B BRE	12.00 - 12.45 12.00		12 (11.80) 2.86								×××××	
D	12.00	N=40 (2.2/2.2.4)	:						L		××××	
SPT (S)	12.00 - 12.45	N=10 (2,3/3,3,4)	•						-		× ×	
									F		\times \times \times	
									F		××××	
В	13.00 - 13.45		- - 13 (12.80) 0.42						L		`x	
BRE	13.00		10 (12.00) 0.72						E		× ×	
D PT (S)	13.00 13.00 - 13.45	N=14 (1,2/3,3,4,4)							F		\times \times \times	
			-						F		$\times \times \times \times \times$	
									F		.×.×.,	
			<u> </u>						L		× ×	
В	14.00 - 14.45		- 14 (13.80) 2.60						_		\times \times \times	
BRE D	14.00 14.00								F		××××	
PT (S)	14.00 - 14.45	N=14 (2,2/3,3,4,4)									x × x	
			<u> </u>								× ^ ×	
			ŀ						L		$_{x}$ x $_{x}$	
_	45.00 45.45		(44.00) 5						F		××××	
B BRE	15.00 - 15.45 15.00		- 15 (14.80) Dry						F		`x	
D SPT (S)	15.00 15.00 - 15.45	N=15 (2,3/3,4,4,4)							Ė		× ×	
(0)	10.00	(2,6/6, 1, 1, 1)	-						L		\times \times \times	
			ŀ						15.70		××××	
				Stiff grey, sli	ghtly sand	y, slightly	gravelly	CLAY. Gravel is fine	- 13.70			
BRE	16.00		- 16	to coarse, su	ıbangular	to subro	unded of s	andstone, mudstone				
D UF	16.00 16.00 - 16.45	40 blows		and coal.					Ė			
B D	16.50 - 16.95		- (16.30) Dry									
PT (S)	16.50 16.50 - 16.95	N=48 (6,8/10,10,13,15)							F			
									(2.30)			
BRE D	17.00 17.00		17						F			
			1						þ			
В	17.50 - 17.95		- (17.30) Dry						L			
PT (S)		N=45 (10,12/12,13,15,5)	(17.30) DIY						-			
									F			
BRE	18.00		- 18	Extrace	ook alleri	o4b 11	nored II-I	t and dark	18.00			
D	18.00		1	MUDSTONE	eak distino	cily weat	avey grav	t and dark grey	ļ.			
			ŀ	WICEGIONE	(1100046	43 0	ayoy giav	O.,.	E			
В	18.50 - 18.95		- (18.30) Dry						(1.00)			
D PT (S)	18.50 18.50 - 18.56	N=50+ (25 for 30mm/50 fo	r -						F			
		25mm) `							F			
			- 19		En	d of Boreh	ole at 19.00	m	19.00			
			ŀ						E			
			ŀ						-			
			Ī						F			
									F			
			20									
	Ground Wate		Chiselling / Hard Stra	ta Casin	g Depths	Hole [Diameter	General Remarks				L
	asing Depth (m) Water Le		From (m) To (m) Ti	ma (hr) Diameter	T .	Diameter	1	Hand dug inspection		20		

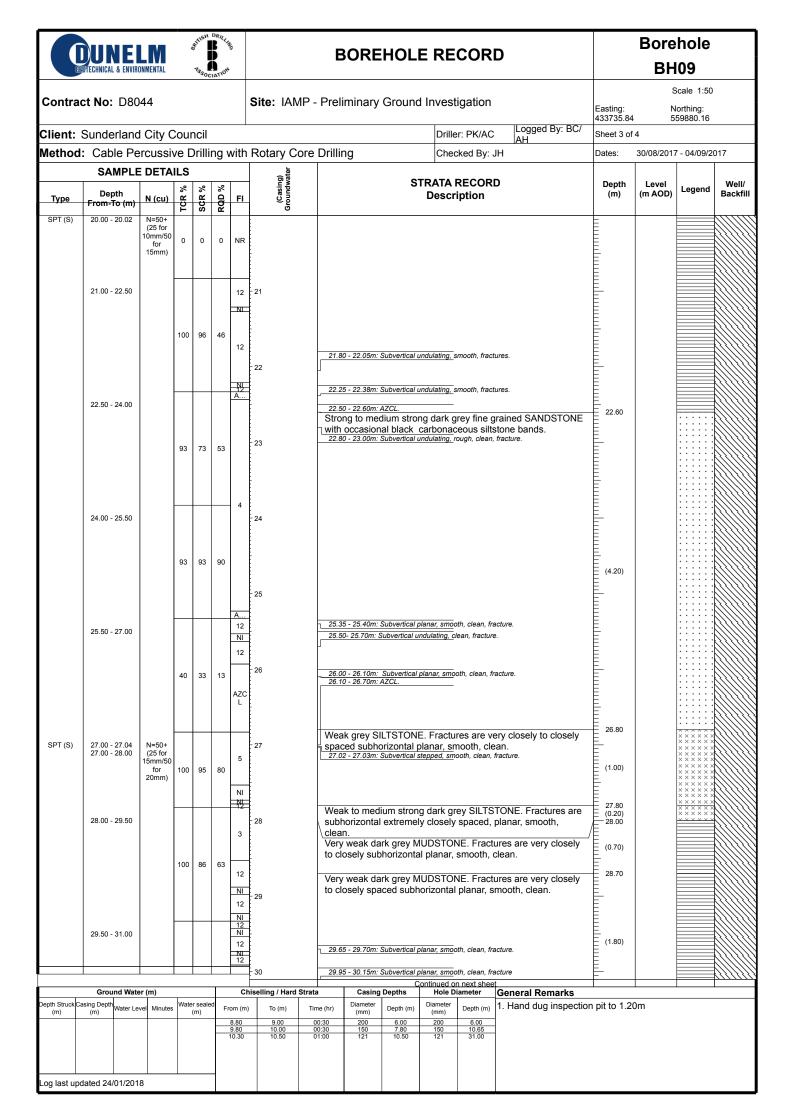


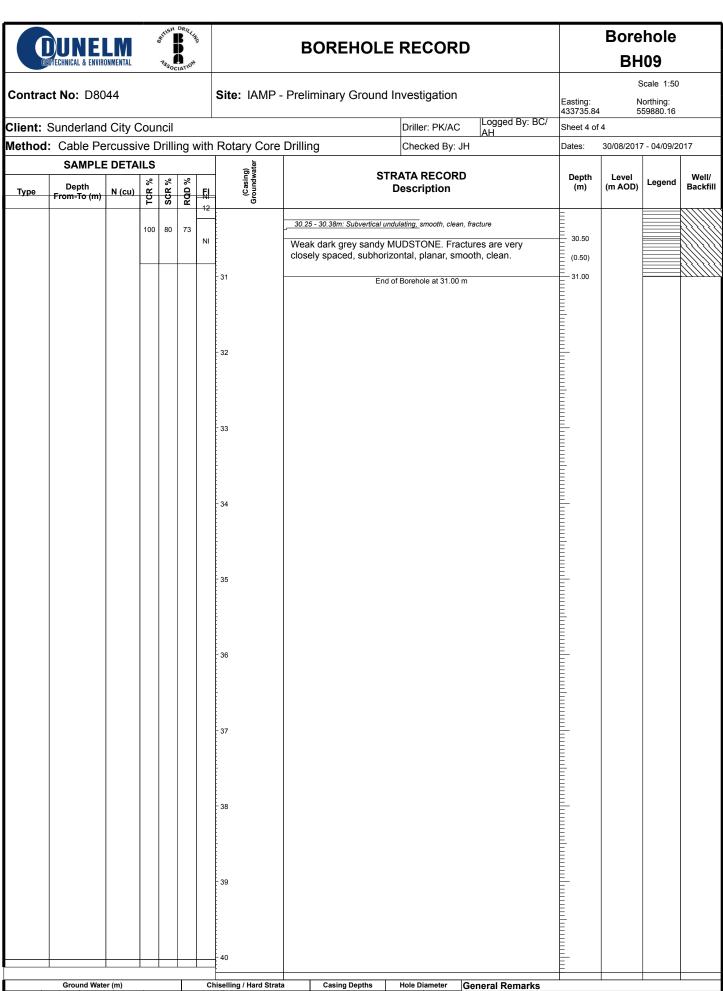




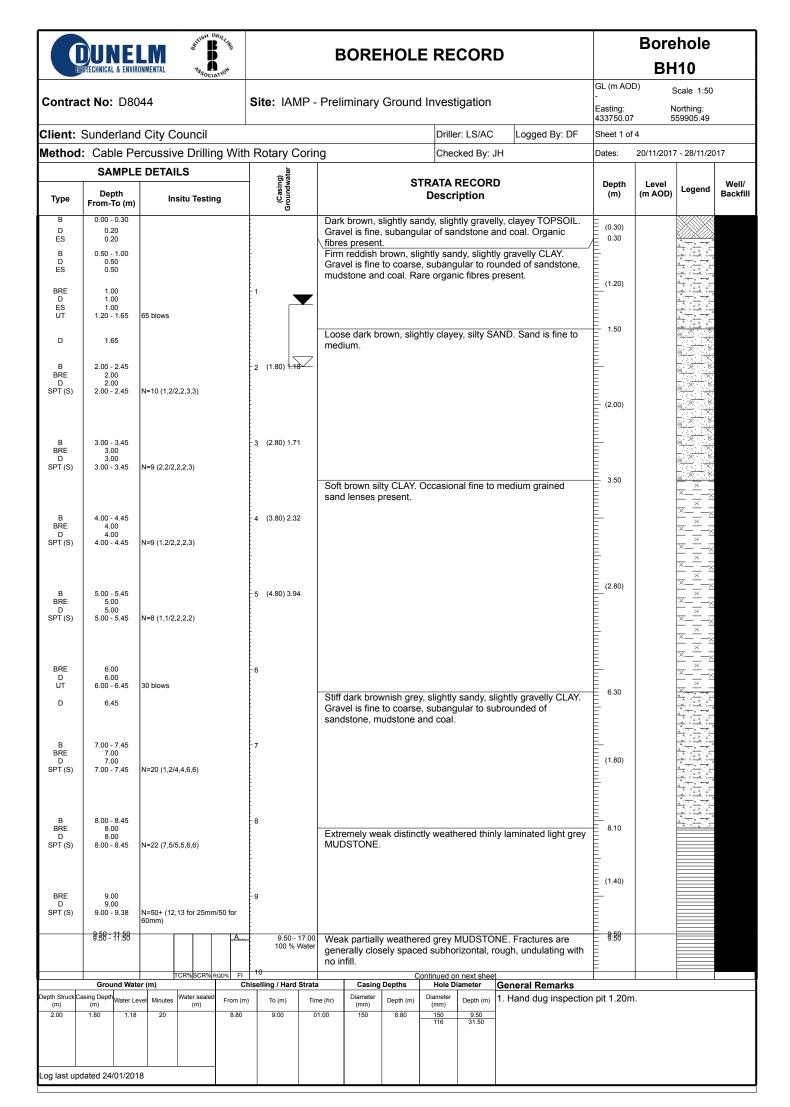
	Ground Water (m)					Chiselling / Hard Strata			Casing Depths		iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m
					8.80	9.00	00:30	200	6.00	200	6.00	
					9.80	10.00	00:30	150	7.80	150	10.65	
					10.30	10.50	01:00	121	10.50	121	31.00	
Log last updated 24/01/2018												

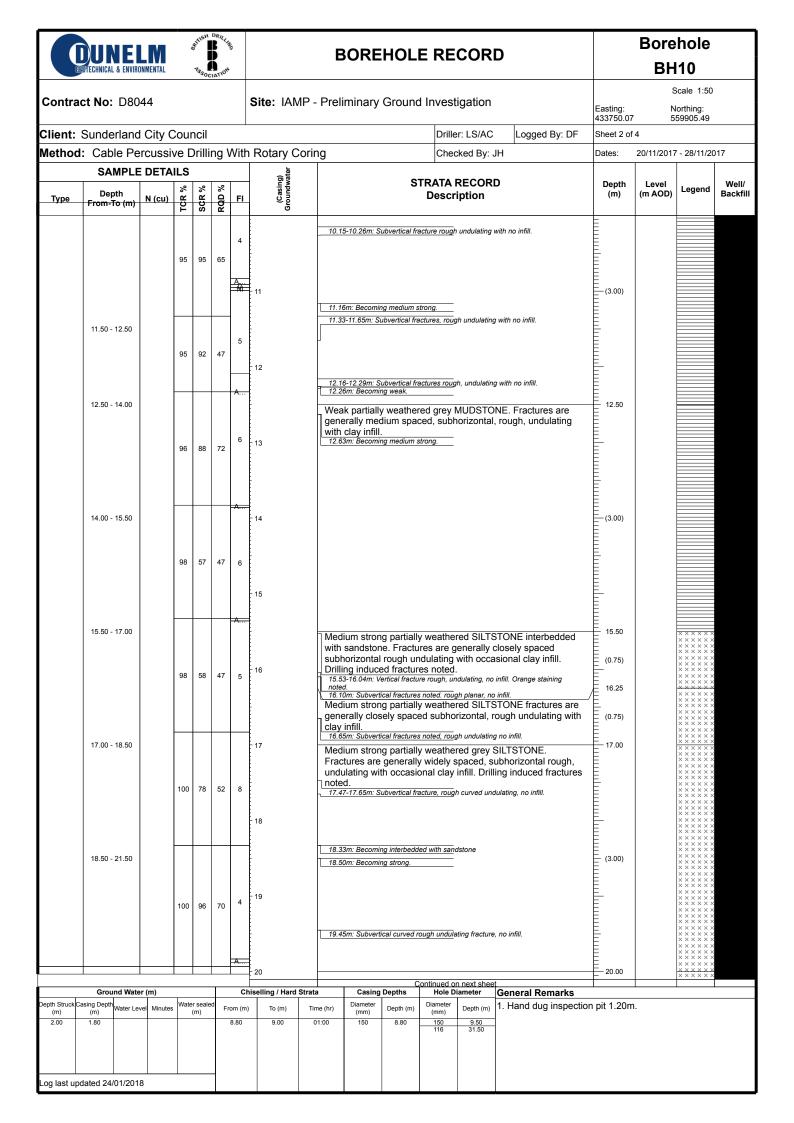


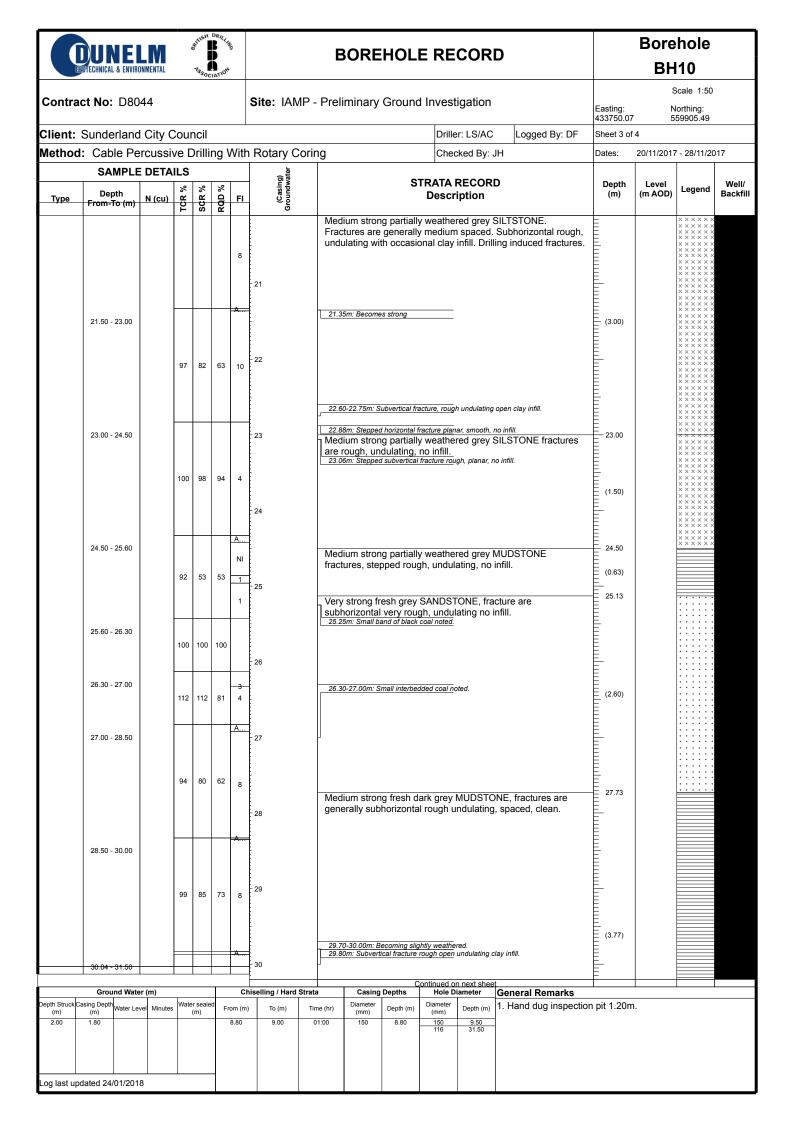


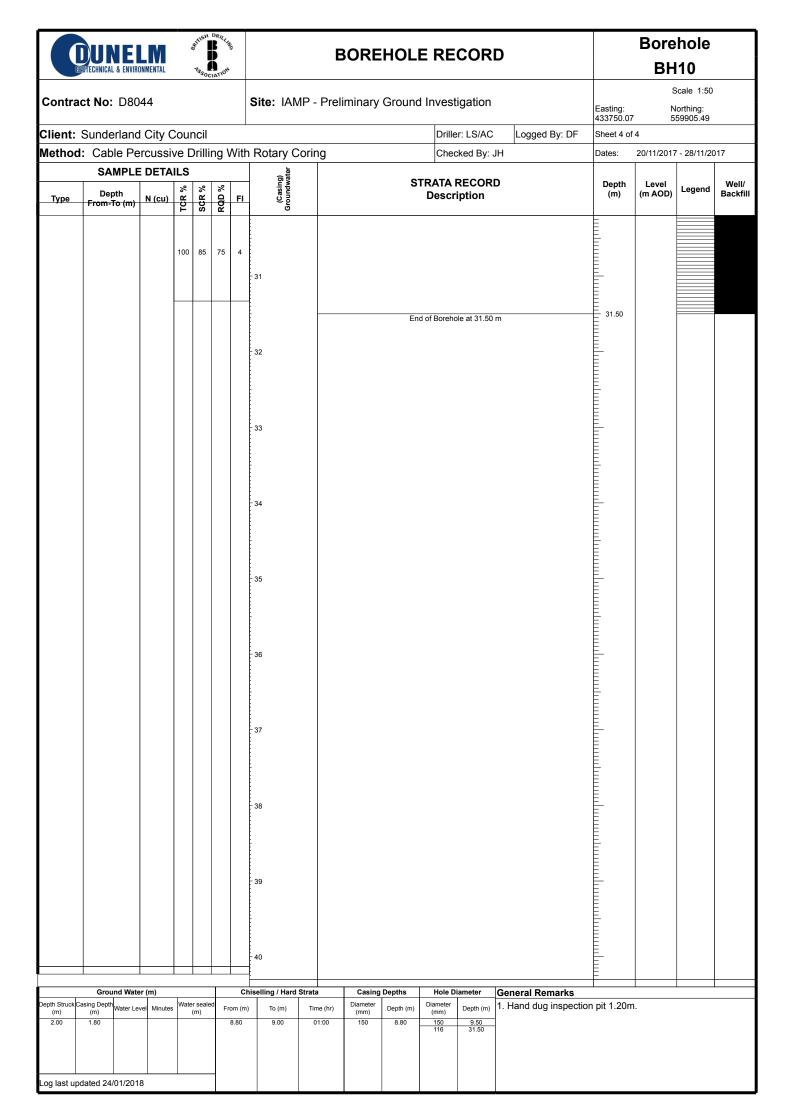


		nd Water (Chise	elling / Hard	Strata	Casing	Depths	Hole D	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m
					8.80	9.00	00:30	200	6.00	200	6.00	
					9.80	10.00	00:30	150	7.80	150	10.65	
					10.30	10.50	01:00	121	10.50	121	31.00	
Log last u	pdated 24/	/01/2018										
	p											













Borehole BH11

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)

Scale 1:50

Client: Sunderland City Council

Driller: PK/AC

Easting: Northing: 433745.67 559813.44

Method: Cable Percussive Drilling with Rotary Core Drilling

11.80 12.70

4.90 10.90

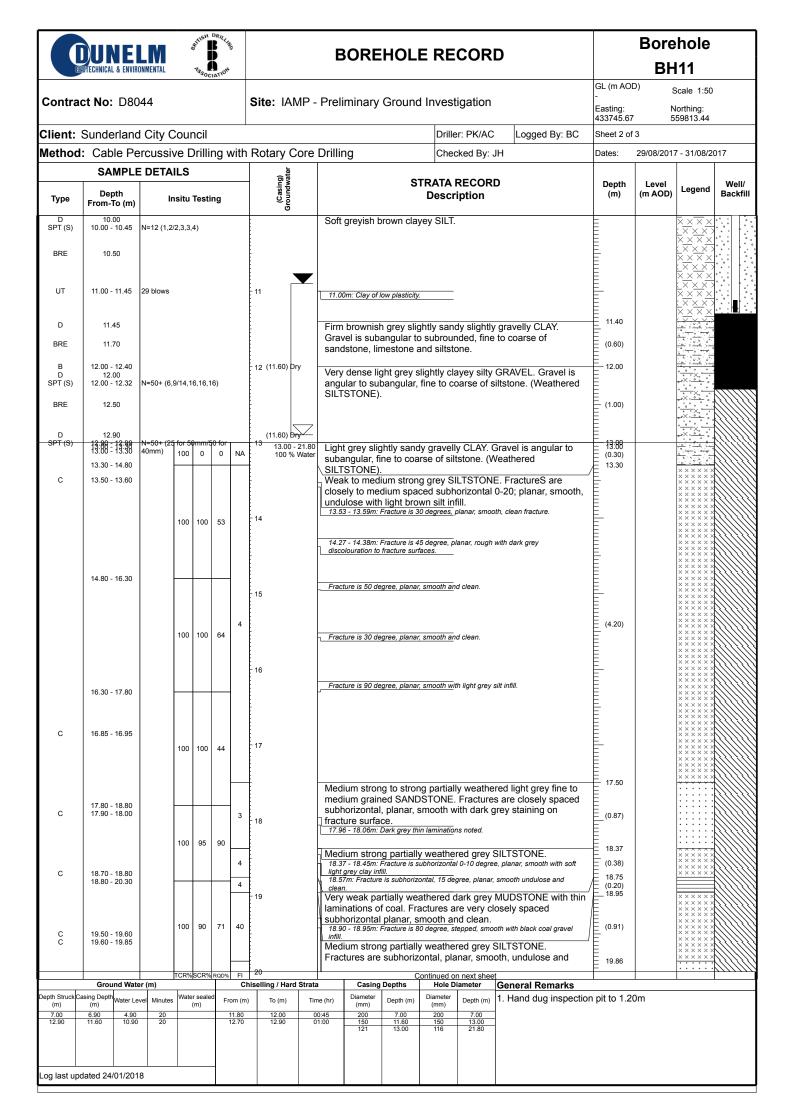
Log last updated 24/01/2018

Checked By: JH

Logged By: BC Sheet 1 of 3

Dates: 29/08/2017 - 31/08/2017

netiioa		E DETAILS		Checked By: JH	Dates:	29/08/2017	- 31/08/2	517	
		DETAILS	sing) dwate	STRATA RECORD	Depth	Level	Legend	We	
Туре	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	Description	(m)	(m AOD)	Legenu	Back	cfil
D ES	0.10 0.10			Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone,	(0.30)				
D ES	0.40 0.40		-	mudstone, siltstone, limestone and coal. Stiff light brown mottled light grey slightly sandy slightly	作				
В	0.50 - 1.00		[gravelly CLAY of intermediate plasticity. Gravel is subangular	Ē				
				to subrounded, fine to coarse of sandstone, mudstone and coal.	E				
ES	1.00		1	- Court					
UT	1.20 - 1.65	39 blows			(2.00)				
			-		E I				
D	1.65				Ė I				
В	2.00 - 2.45		2 (1.80) Dry						
D PT (S)	2.00 2.00 - 2.45	N=23 (3,4/4,5,6,8)			Ē				
(-)				Stiff dark brown slightly sandy, slightly gravelly CLAY of	2.30				
				intermediate plasticity. Gravel is subangular to rounded, fine to coarse of sandstone, siltstone and mudstone.	E				
				to obtaine or surrestorie, silicitorie and mudstorie.	E I				
U	3.00 - 3.45	42 blows	3		(1.50)				
					E				
D	3.45		-		E				
					E				
D	3.80			Firm greyish dark brown slightly gravelly silty CLAY. Gravel is	3.80		×		
B D	4.00 - 4.45 4.00		- 4 (3.90) Dry	subangular to subrounded, fine to coarse of sandstone, siltstone and limestone.	F		× × -		
PT (S)	4.00 - 4.45	N=8 (1,2/2,2,2,2)		Sitstone and innestone.			<u> </u>		
			ŀ		F		^X		
							××		
UT	5.00 - 5.45	14 blows	5		E I		×		
				5.00m: Clay of high plasticity.	F		×		
D	5.45				E		×		
					(3.70)		×		
BRE	5.70				E (****)		×		
В	6.00 - 6.45		6 (5.90) Dry		E		× × ×		
D PT (S)	6.00 6.00 - 6.45	N=8 (1,1/2,2,2,2)			E		× 3e		
BRE	6.50				Ė I		<u> </u>		
					E		^X		
					E		<u></u>		
UT	7.00 - 7.45	12 blows	7	7.00m: Clay of low plasticity,	E		× × ×		ì
							×		
D	7.45		ŀ	Soft greyish brown clayey SILT.	7.50		X X X X X		
BRE	7.70		1	Series de la composition della	E		$\times \times \times \times$		
В	8.00 - 8.45		8 (7.80) Dry	T. 0.00m 5 im			X X X X		
D PT (S)	8.00 8.00 - 8.45	N=9 (2,2/2,2,2,3)	[,	8.00m: Firm	E		X X X X X		
		(-,,-,-,-)	[E		X X X X X		
BRE	8.50		ŀ		E		X X X X		
					E		$(\times \times \times \times)$		
B UF	9.00 - 9.65	O blove	9				$\times \times \times \times \times$		
UF	9.00 - 9.65	9 blows	[(3.90)		$\times \times $		
			1		(3.90)		××××		
BRE	9.70				<u> </u>		$\times \times \times \times$		
					E		X X X X		
В	10.00 - 10.45		10	Continued on next sheet			XXXX	• •	
n Struck Ca	Ground Water Le		Chiselling / Hard Strat	Bi-mates Bi-mates 4 11 1 1 1 11	on nit to 1 20	m			_
(m)	(m) Water Le	evel Minutes (m) From (i	m) To (m) Tii	Diameter (mm) Depth (m) Diameter (mm) Depth (m) Depth (m	אוז pit נס 1.20	111			







Borehole BH11

Scale 1:50 Site: IAMP - Preliminary Ground Investigation Contract No: D8044

Easting: 433745.67 Sheet 3 of 3 Northing: 559813.44

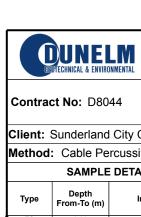
Client: Sunderland City Council

Driller: PK/AC

Logged By: BC

	Cariacrianic							2 209904 2): 20				
Method	: Cable Pe	rcussi	ve [Orilli	ing ι	with	Rotary Core	Drilling Checked By: JH	Dates:	29/08/2017	7 - 31/08/2	017
	SAMPLE								†			
	JAIVIT LE	JEIA					(Casing) Groundwater	STRATA RECORD	Depth	Level		Well/
Туре	Depth	N (cu)	<u>%</u>	۲ %	% 	FI	Casii	Description	(m)	Level (m AOD)	Legend	Backfill
туре	From-To (m)	iv (cu)	TCR %	SCR %	RQD %	CI	- E					
				Ė	Ė		ļ	clean.	<u></u>			111111
С	20.30 - 20.70						[19.29 - 19.42m: Fracture is 75 degree, stepped, smooth with light grey clay infill.	<u> </u>			
	20.30 - 21.80							Medium strong partially weathered light grey fine to medium grained SANDSTONE.	E			
							į.	grained SANDSTONE.				
						1	ļ		(1.94)		: : : : :	
			100	100	100		[(1.94)		: : : : : :	
							21		E			
							ļ		E		::::::	
							[E		: : : : : :	
С	21.60 - 21.70						į.	21.50 - 21.52m: Fracture is subhorizontal, 5 degree, planar, smooth with light	E		: : : : :	
]	brown silt infill. 21.55 - 21.65m: Dark grey thin laminations noted	21.80		::::::	
							[21.55 - 21.65m: Dark grey thin laminations noted. 21.70 - 21.80m: Fracture is 70 degree, planar, smooth with light brown silt infill. End of Borehole at 21.80 m	21.80			
							22	End of Borehole at 21.80 m	F			
							ļ		Ē			
							[E			
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										<u> </u>		
	Ground Water	er (m)			T	CI	niselling / Hard Strat	a Casing Depths Hole Diameter General Remarks				

	Grou	nd Water ((m)		Chis	elling / Hard	Strata	Casing	Depths	Hole D	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m
7.00	6.90				11.80	12.00	00:45	200	7.00	200	7.00	
12.90	11.60				12.70	12.90	01:00	150	11.60	150	13.00	
								121	13.00	116	21.80	
Log last u	pdated 24/	/01/2018										





BOREHOLE RECORD

Borehole BH12

GL (m AOD)

Scale 1:50

Contra	ct No: D80)44		8	Site: IA	MP -	Preli	iminary	Ground	d Invest	igation			- Easting: 433619.12	N 5	lorthing: 59765.21	
Client:	Sunderland	d City Co	ouncil							Drille	er: SR		Logged By: DF	Sheet 1 of		33703.21	
Method	l: Cable Pe	ercussiv	e Drillin	ıg						Chec	ked By: .	JH	-	Dates:	15/11/2017	7 - 16/11/20)17
	SAMPLE	E DETAII	LS) ater												
Туре	Depth From-To (m)	Ins	situ Testin	g	(Casing) Groundwater				S	TRATA I Descr		D		Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES ES B	0.00 0.50 0.60				1		sligh	itly grave		Gravel is	fine to co	oars	htly sandy, se, subangular to al.	(2.00)			
ES B UT	1.00 1.20 - 1.70 1.20 - 1.65	63 blows			'									(2.00)			
D B D ES SPT (S)	1.85 2.00 - 2.50 2.00 - 2.45 2.00 2.00 - 2.45	N=21 (4,5/5	i,5,5,6)		2		CLA	Y. Grave		coarse, s	subangula		slightly gravelly subrounded of	2.00			
B D ES UT	2.75 3.00 - 3.50 3.00 3.00 3.00 - 3.45	54 blows			3	•	CLA	Y. Grave Istone an	l is fine to d coal.	coarse, s	subangula	ar o	lightly gravelly f sandstone, bands present.	3.00			
B D ES SPT (S)	3.75 4.00 - 4.50 4.00 - 4.45 4.00 4.00 - 4.45	N=23 (4,5/5	i,5,6,7)		4	\searrow	Loos	se brown	slightly c	layey, gra	evelly SAI	ND.	Gravel is fine to	(1.50)			
B D ES SPT (S)	4.75 5.00 - 5.50 5.00 - 5.45 5.00 5.00 - 5.45	N=3 (1,0/0,	1,1,1)		5 (5.00) 3.	.00		rse, suba sent in gr		coal and	mudstone	е. К	are pyrite crystals				
B D SPT (S)	5.75 6.00 - 6.50 6.00 - 6.45 6.00 - 6.45	N=1 (1,1/0,0	0,0,1)		6 (6.00) 4.	.50	6.00	m: Becomir	ng slightly gra	avelly.				(2.50)			
D B D ES SPT (S)	6.75 7.00 - 7.50 7.00 - 7.45 7.00 7.00 - 7.45	N=11 (3,3/3	,3,2,3)		7 (7.00) 5.	.40	Soft med		h grey silt	y, slightly	sandy Cl	LAY.	. Sand is fine to	7.00			
D B D UT SPT (S)	7.75 8.00 - 8.50 8.00 - 8.45 8.00 - 8.45 8.00 - 8.45	43 blows N=13 (2,3/3	5,3,3,4)		8 (8.00) 6.	.00											
D B D SPT (S)	8.75 9.00 - 9.50 9.00 - 9.45 9.00 - 9.45	N=11 (2,3/3	,2,3,3)		9 (9.00) 7.	.40											
D	9.75 10.00 - 10.50				10 (10.00) 7	7.00				Continued or	n nevt shoo	ot .					
	Ground Wat			Chis	selling / Har		a		g Depths	Hole D	n next snee iameter		neral Remarks	1	1	ı	<u> </u>
Depth Struck ((m) 4.50	Casing Depth (m) Water Le 4.50 3.50	evel ivilliules	Water sealed (m)	From (m) 17.00	To (m)		ne (hr) 01:00	Diameter (mm) 200 150	Depth (m) 10.00 17.00	Diameter (mm) 200 150	Depth (m) 10.00 17.70	1. H	Hand dug inspection	on pit 1.20m	۱.		



Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH12

GL (m AOD) Site: IAMP - Preliminary Ground Investigation Easting: 433619.12

Scale 1:50 Northing: 559765.21

Client: Sunderland City Council

Method: Cable Percussive Drilling

Driller: SR

Checked By: JH

Logged By: DF Sheet 2 of 2 Dates:

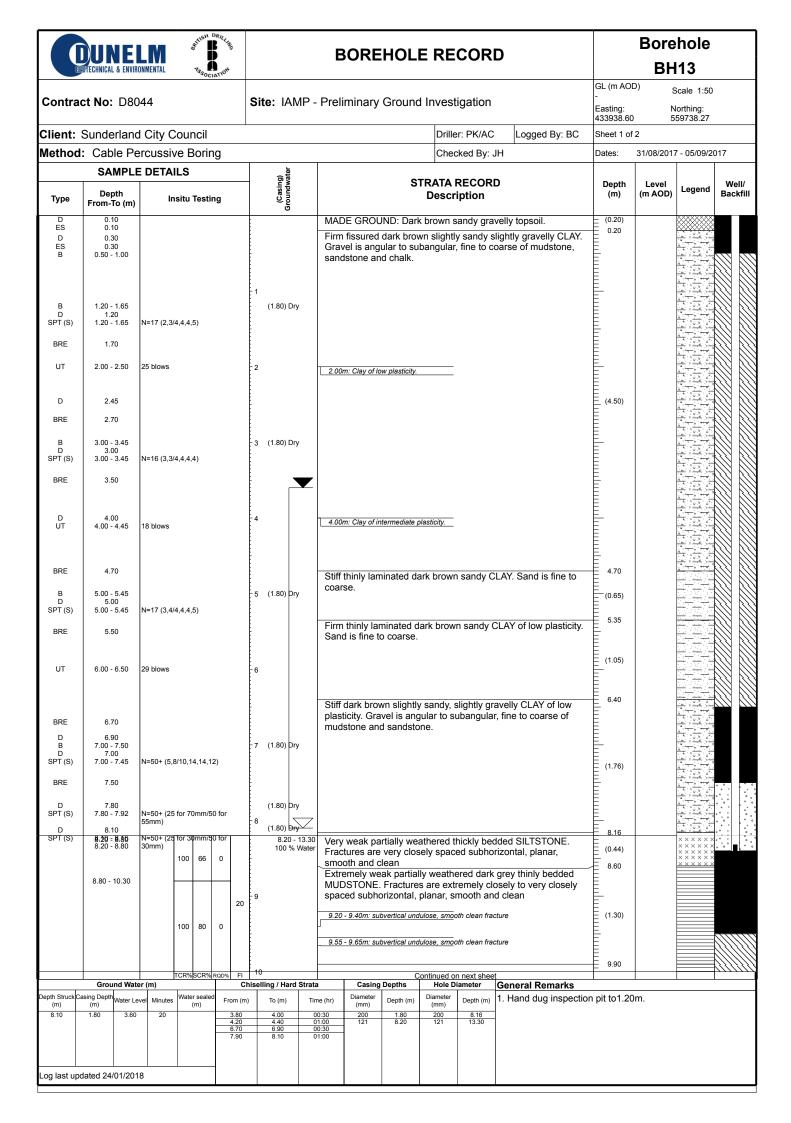
15/11/2017 - 16/11/2017

wetnoa		ercussive Drilling	1						Cne	скеа ву:	ЛП		Dates:	15/11/2017	7 - 16/11/20) <i>(</i>
	SAMPLE	DETAILS		ng) water				S	TRAT∆	RECOR	.D		Depth	Level		Well/
Туре	Depth From-To (m)	Insitu Testing	,	(Casing) Groundwater				3		ription			(m)	(m AOD)	Legend	Backfill
SPT (S)	10.00 - 10.45	N=3 (1,0/0,1,1,1)				Soft I medi		grey silt	y, slightly	sandy C	LAY. Sand	is fine to				
D B D SPT (S)	10.75 11.00 - 11.50 11.00 - 11.45 11.00 - 11.45	N=9 (2,3/2,2,2,3)		- 11 (11.00) 7.7	70								(8.00)			
D B D SPT (S)	11.75 12.00 - 12.50 12.00 - 12.45 12.00 - 12.45	N=13 (3,3/3,4,3,3)		- 12 (12.00) 8.0	00								<u></u>			
D B D SPT (S)	12.75 13.00 - 13.50 13.00 - 13.45	N=13 (3,3/3,4,3,3)		- 13 (13.00) 9.8	50											
D B D SPT (S)	13.75 14.00 - 14.50 14.00 - 14.45 14.00 - 14.45	N=9 (2,3/2,2,2,3)		- - 14(14.00) 11.	00											
D B D SPT (S)	14.75 15.00 - 15.50 15.00 - 15.45 15.00 - 15.45	N=27 (5,7/7,6,7,7)		- 15(15.00) 12.	00	Stiff of to coo	arse, sub	htly sand pangular	y, slightly to subrou	/ gravelly unded of	CLAY. Gravsandstone,	vel is fine mudstone	15.00			
D B D SPT (S)	15.75 16.00 - 16.50 16.00 - 16.45 16.00 - 16.45	N=42 (8,9/11,10,10,11)		- 16(16.00) 13.	00								(1.75)			
D SPT (S) D SPT (S)	16.75 17.00 17.00 - 17.32 17.30 17.30 - 17.70	N=50+ (20,5 for 5mm/40, 10mm) N=50+ (14,11 for 45mm/2	10 for	- 17(17.00) 10. (17.00) 10.				ark grey Note weath			overed as g	ravelly	16.75			
		55mm)		- 18				En	d of Boreh	ole at 17.70) m		17.70			
				- 19												
				20									<u> </u>			
Denth Struck	Ground Wate			iselling / Hard				Depths	Hole D	Diameter	General R		n nit 4 00			
(m) 4 50	asing Depth (m) Water Le	()	From (m)	To (m)		me (hr)	Diameter (mm)	Depth (m)	(mm)	Depth (m)	i. Hand di	ug inspectio	n pit 1.20 n	1.		

200

10.00 17.00

10.00 17.70







Borehole BH13

Scale 1:50

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

Easting: 433938.60 Northing: 559738.27

Client: Sunderland City Council

Client: Sunderland City Council		Driller: PK/AC	Logged By: BC	Sneet 2 of			
Method: Cable Percussive Boring		Checked By: Jh	1	Dates:	31/08/2017	7 - 05/09/20)17
SAMPLE DETAILS	ıg) vater	STRATA DECORD					

Description No. Sec. S	vietilou	: Cable Pe			OUIII	ıy		<u> </u>	Cnecked By: JH	Dates:	31/08/2017	1 - 05/09/20	J1/
10		SAMPLE	DETA			\o	1	ing) dwate	STRATA RECORD	Depth		Lamand	Well/
10	Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Cas	Description	(m)	(m AOD)	Legena	Backfill
C 11:20 - 11:30 100 100 30 4 11 100 100 30 4 11 11:20 - 11:30 100 100 30 4 11 11:20 - 11:30		10.30 - 10.80		100	60	0			MUDSTONE. Fractures are extremely closely to very closely	E `` '			
C 13.20 - 13.30 13				100	100	30	4	- 11	Very stiff distinctly weathered dark grey very clayey, sandy GRAVEL of mudstone. (Highly weathered MUDSTONE) Very weak to weak fresh brown clayey fine to medium grained	(0.20) 10.80			
C 13.20 - 13.30 13	С	11.20 - 11.30							subhorizontal, planar and clean. 10.95 - 11.05 0 to 80 degree undulose rough fracture 11.05 - 11.45m: 40 to 60 degree undulose, rough fracture with orange brown				
14		11.80 - 13.30					12	12		(2.50)			
14				93	80	53	3						
16 16 18 18 19 10 10 10 10 10 10 10 10 10	С	13.20 - 13.30						13		13.30			
118									End of Bollehole at 15.50 III				
118								14					
118								45					
118								- 15					
118								16					
								17		E			
								18					
								19					
								20		E			
teroung water (m) Chicoling / Hard Strate Caping Heather Cabin Diameter Caping Diameter		Ground Wate	or (m)			_	C1	niselling / Hard Stra	ta Casing Depths Hole Diameter General Remarks				

		nd Water (Chise	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to1.20m.
8.10	1.80				3.80	4.00	00:30	200	1.80	200	8.16	
					4.20	4.40	01:00	121	8.20	121	13.30	
					6.70	6.90	00:30					
					7.90	8.10	01:00					
Log last u	pdated 24/	01/2018										





BOREHOLE RECORD

Borehole BH14

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

Scale 1:50

Easting: 433759.87

GL (m AOD)

Sheet 1 of 3

Northing: 559617.72

Client: Sunderland City Council Driller: PK/AC Logged By: BC

	Surideriario									Dillic	1.110/40	LO	gged by. b	,,,	Officer 1 of	<u> </u>		
Method	I: Cable Pe	ercussive	Drillin	g with F	Rotary C	ore D	Drilling	g		Chec	ked By: J	JH			Dates:	29/08/2017	7	
	SAMPLE	DETAILS	•		<u>p</u>													
Туре	Depth From-To (m)		u Testin	g	(Casing) Groundwater				S	TRATA Descr	RECORI iption	D			Depth (m)	Level (m AOD)	Legend	Well/ Backfill
B D BRE D ES	0.20 - 0.40 0.20 0.50 0.50 0.50						Grave mudst Firm b CLAY	el is suba tone and prown m of inter	angular to d coal. nottled lig mediate p	n rounded ht grey sl plasticity.	d, fine to d ightly san Gravel is	dy sligh angula	r TOPSOIL of sandston otly gravelly r to one, siltstor	ne, /	0.45)			
B D ES UT	1.00 - 1.20 1.00 1.00 1.20 - 1.65	45 blows			1		and co			u. 00 0. 0.					(1.35)			
D D	1.65 1.70						Stiff d	ark brov	vn slightly	y sandy, s	slightly gra	avelly C	LAY. Grave	el is	1.80			
B D SPT (S)	2.00 - 2.45 2.00 2.00 - 2.45	N=16 (3,3/3,4,4	4,5)		2 (1.80) Dry				orounded d siltstone		oarse of	coal, sa	ndstone,					
BRE	2.50																	
UT	3.00 - 3.45	50 blows		ļ.;	3	T	3.00m.	: Clay of in	termediate j	plasticity.								
D BRE	3.45 3.50																	
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=17 (2,3/3,4,5	5,5)	ļ.,	4 (3.80) Dry	′									(4.60)			
D	4.50																	
UT	5.00 - 5.45	45 blows		ļ. 	5													
D BRE	5.45 5.50														(4.60)			
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=13 (3,3/4,3,	3,3)	ļ.	(5.80) Dry	′												
BRE	6.50								orown slię o coarse.		dy silty CL	_AY of h	nigh plastici		6.40			
UT	7.00 - 7.45	50 blows			7													
D D	7.45 7.50																	
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=12 (2,2/3,3,3	3,3)	1	3 (7.80) Dry	<i>'</i>												
BRE	8.50																	
UT	9.00 - 9.45	40 blows			9													
D BRE	9.45 9.50																	
<u>В</u>	10.00 - 10.45 Ground Wate				10 (9.80) Dry elling / Hard			Casing	(Depths		n next sheet		al Remarks					
Depth Struck	asing Depth Water Le	vel Minutes Wa	iter sealed	From (m)	To (m)	Time	(hr)	Diameter	Depth (m)	Diameter	Depth (m)	1. Hand	d dug inspe	ection				
(m) 10.50	(m) 778151 25 9.80 9.96	8	(m)		13.50			(mm) 150		(mm) 150	18.50		ındwater ei					
	2.00		Ī	13.30 18.30	18.50	01:0 01:0	00	121	18.40 18.50	116	28.20							

Contract No: D8044 Client: Sunderland City Council

Log last updated 24/01/2018



BOREHOLE RECORD

Driller: PK/AC

Borehole BH14

Site: IAMP - Preliminary Ground Investigation

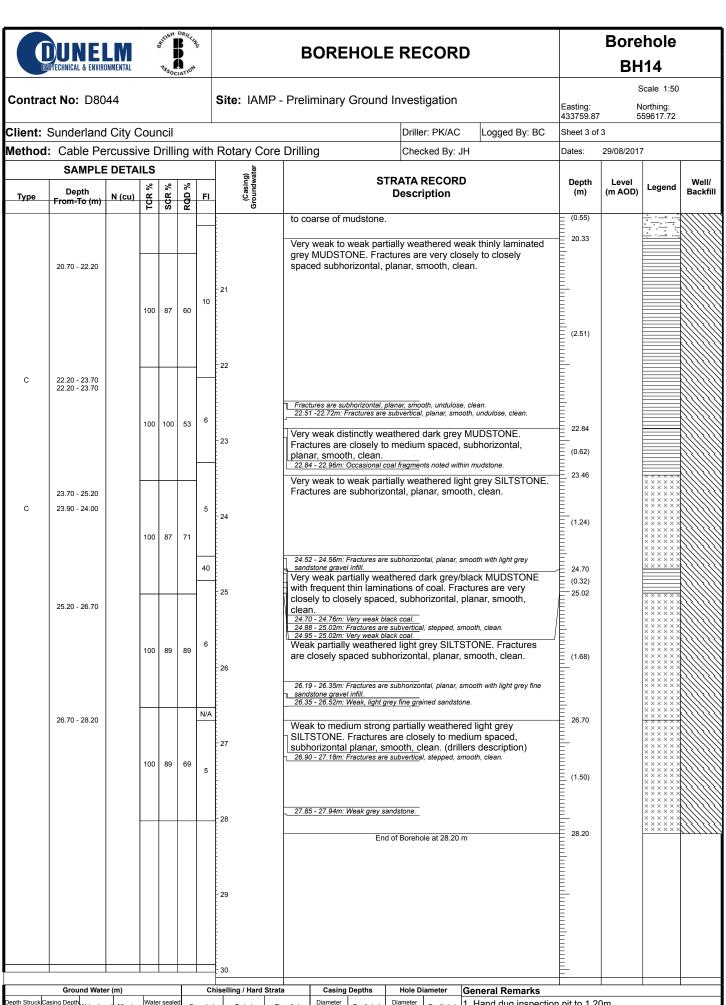
GL (m AOD)

Scale 1:50

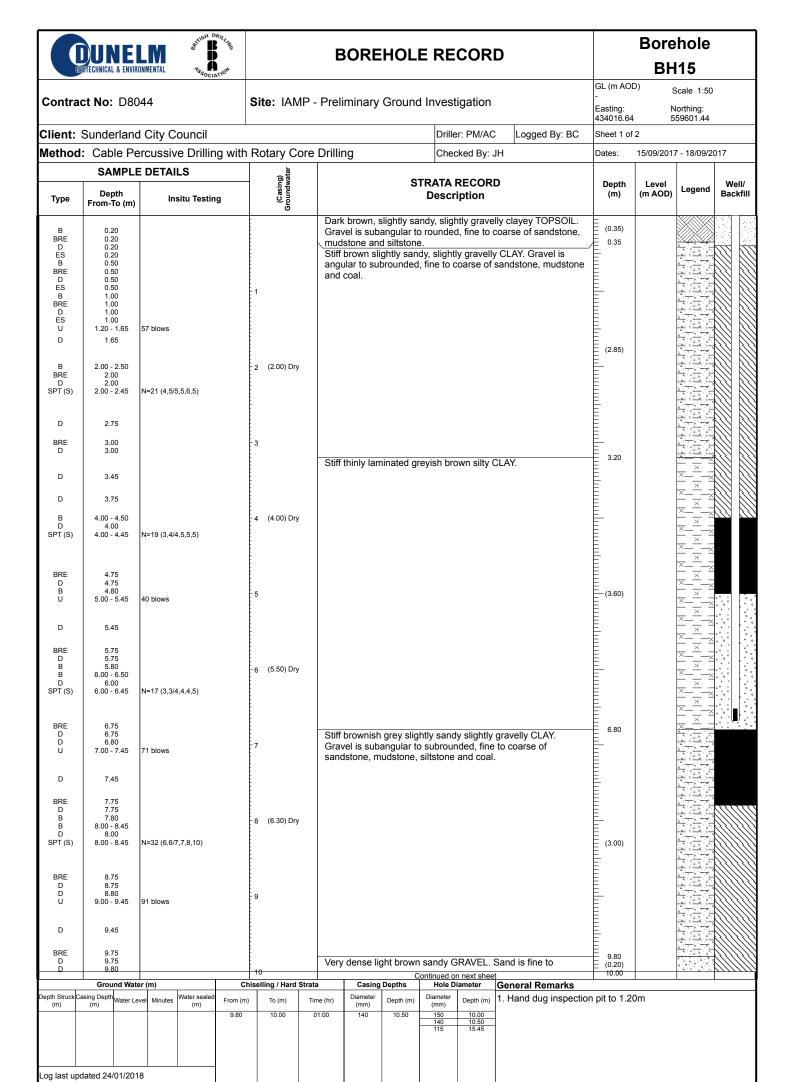
Northing: 559617.72

Easting: 433759.87 Logged By: BC Sheet 2 of 3

Method	l: Cab	le Pe	rcussiv	ve Γ)rilli	ng w	/ith F	Rotary C	ore	Drillir	 ng		Cher	cked By: .	JH			Dates:	29/08/2017	7		
			DETAI				\Box															\neg
Туре	Dep From-T	To (m)	In	situ	Testir	ng		(Casing) Groundwater					Descri	ription				Depth (m)	Level (m AOD)	Legend	Wel Back	
D SPT (S)	10.00 -	00 - 10.45	N=12 (2,3/3	3,3,3,	,3)		\Box					brown slig to coarse.	ightly sand	dy silty Cl	LAY	of high p	lasticity.					
В	10.5	50						7										E				
									ļ									E				
UT	11.00 -	- 11.45	45 blows					11	ļ									E				
			1						ļ									E				
D	11.4																	E				
D	11.5	50							ļ									Ē				
В	12.00 -							12(11.80) 10.3	.32									E				
D SPT (S)	12.00 -		N=14 (2,3/3	3,3,4,4	,4)													(11.50)				
BRE	12.5								ļ									E				
D	12.5	50							ļ									E				
UT	13.00 -	- 13.45	40 blows				-	13	ļ									E				
																		Ė				
D	13.4	.45					-		ļ									Ė				
																		Ė				
B D	14.00 -						-	14(13.80) 10.9	.98									E				
SPT (S)	14.00 -		N=16 (2,3/4	4,4,4,4	4)				1									Ē				
BRE D	14.5 14.5						ŧ		1													
5	17.0	50							ļ									Ė				
UT	15.00 -	15.45	60 blows				-	15	ļ													
									ļ									Ē				
D BRE	15.4 15.5	.50					ŀ		ļ									E				
D	15.5	50							ļ									E				
B D	16.00 - 16.0	.00	l				+	16(15.80) 12.8	84									E				
SPT (S)	16.00 -		N=16 (2,2/4	4,4,4,4	4)				ļ									E				
BRE D	16.5 16.5	50 .50					ŧ		ļ									Ė				
									ļ									_				
UT	17.00 -	17.45	70 blows				F 1	17	ļ									17.90				
l _																		E				
B D SPT (S)	17.50 - 17.5 17.50 -	.50	N=15 (3,3/3	1344	4)			(17.30) 13.5	52									Ė				
			10 (0,0	J,, . , .	*,			10	ļ	Stiff	brownisł	dark gre	ey slightly	sandy sl	liahtl	lv gravelly	CLAY	17.90				
BRE D	18.0 18.0						[18	ļ	with	occasion	nal cobble	es. Gravel e, mudsto	l is suban	ngula	ar to roun	ded, fine	(0.60)			÷	
	18	50						(19.40) 14	96	of sa	andstone.	÷.	,					18.50				
§B∓(§)	18:50 18:50 18:50	50.58	N=50+ (25 20mm) (25 for	for 55	5mm/5	0 for		(18,40) 14,6 (18,40) 18,50 - 1 100 % \	14.86 28.20	Stiff I	brown sli ounded, f	ghtly san	ndy gravel arse of sar	ily CLAY.	. Gra , muc	avel is sub dstone an	angular d	18:58				
	10.50	19.20	55mm/50 for	100	0	0		19	Water	siltste	tone.		ine sandstone					E				III.
С	18.70 -		20mm)	\vdash		\vdash	N/A	10	ļ									(1.28)				
С	19.20 - 19.20 -	20.70	.]	ı														Ē				
			.]	100	81	60			ļ									(1.28)				
<u> </u>	 			TCB%	SCR%	200%	FI 2	20		Stiff	grey grav		AY. Gravel Continued or			subangu	lar, fine	[100			////	
		und Water						selling / Hard	Strata	3		g Depths	Hole Di	on next snee Diameter	Ge	eneral Re						
Depth Struck C (m) 10.50	Casing Depth (m) 9.80	Water Leve	vel Minutes 8		er sealed (m)	FIOI	om (m)	To (m)		me (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. I 2. (Hand dug Groundwa	inspection ater entry	on pit to 1.2 at 10.50m	0m overnight.			
10.50	9.80	9.96	8			18	3.30 8.30	13.50 18.50	0,	01:00 01:00	150 121	18.40 18.50	150 116	18.50 28.20	1							



		nd Water (Chise	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	Hand dug inspection pit to 1.20m Groundwater entry at 10.50m overnight.
10.50	9.80				13.30	13.50	01:00	150	18.40	150	18.50	2. Grandwater entry at 10.00m overnight.
					18.30	18.50	01:00	121	18.50	116	28.20	
Log last u	pdated 24/	01/2018										







Borehole BH15

Scale 1:50 Contract No: D8044

Site: IAMP - Preliminary Ground Investigation

Easting: 434016.64 Northing: 559601.44

Client: Sunderland City Council Driller: PM/AC Logged By: BC Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: JH Dates: 15/09/2017 - 18/09/2017

Method	: Cable Pe	ercussi	ve [Orilli	ng ι	with	Rotary Core	Drilling Checked By: JH	Dates:	15/09/2017	7 - 18/09/20	017
	SAMPLE	DETA	ILS				ater					
Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D SPT (S)	10.00 10.00 - 10.11 10.00 - 10.95	N=0 (25,0 for 35mm/)	100		34	NA	9.60 - 10.95 85 % Water	coarse. Gravel is angular to subangular, fine to coarse of sandstone. (Weathered SANDSTONE). Stiff dark brown slight sandy, slightly gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded, fine	(0.62)			
С	10.75 - 10.95							to coarse of sandstone, mudstone, and siltstone. Cobbles are of sandstone. 10.00 - 10.12m: Sandstone cobble.	E 10.02			
С	10.95 - 12.45 11.15 - 11.57		100	100	100		10.95 - 12.45 11 100 % Water	Weak fresh reddish brown fine grained SANDSTONE. Fractures are closely to medium spaced subhorizontal, planar, smooth, clean with discolouration of fracture surface.				
						4	12	11.64 - 11.83m: Fractures are subvertical, planar, smooth, clean.	(3.22)			
С	12.45 - 12.62 12.45 - 13.95		100	100	100		12.45 - 15.45 90 % Water	12.42m: Medium strong.				
			100	100	100							
С	13.95 - 14.09 13.95 - 15.45		100	100	33	7	- 14	Very weak partially weathered reddish grey SILTSTONE. Fractures are very closely to closely spaced, subhorizontal planar, smooth, clean. 13.98 - 14.06m: Very weak reddish brown mudstone. 14.44 - 14.61m: Fractures are subvertical, planar, smooth, clean.	13.84		****** ****** ****** ****** ****** ******	
							15		(1.61)		× × × × × × × × × × × × × × × × × × ×	
							-	End of Borehole at 15.45 m	15.45		****	
							16					
							- 17					
							18					
							- 19 -					
			<u> </u>				20		Ē			
							- 20		E			
	Ground Water	er (m)	_			Cl	iselling / Hard Strat	Casing Depths Hole Diameter General Remarks				

		nd Water (Chise	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m
				9.80	10.00	01:00	140	10.50	150	10.00		
										140	10.50	
										115	15.45	
Log last u	pdated 24/	01/2018		'								





BOREHOLE RECORD

Borehole BH16

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation GL (m AOD) 37.83 Easting: 433594.41

Scale 1:50

Northing: 559449.20

Client: Sunderland City Council

Driller: SK

Logged By: ST Sheet 1 of 2

Method: Cable Percussive Drilling	Checked By: JH	Dates: 31/07/2017 - 01/08/2017
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	Surideriand									Dille	1. SK		Logged b	y. 31	Sheet 1 01			
Method	: Cable Pe	ercussive	Drillin	g						Chec	ked By: .	JH			Dates:	31/07/2017	7 - 01/08/2	017
	SAMPLE	DETAIL	.s		iter)					•								
Туре	Depth From-To (m)		itu Testin	g	(Casing) Groundwater				S	TRATA I Descr	RECORI iption	D			Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES B D ES	0.10 0.10 0.50 - 1.00 0.50 0.50			- - - - - -		:	to sub Stiff, b Grave	orounde orown sa el is ang	d, fine to andy grav	medium of relly CLA brounded	of coal an	nd san media	te plastici		0.30)	37.53		
UT	1.20 - 1.65	100 blows			1													
D	1.70														(3.00)			
B D SPT (S)	2.00 - 2.50 2.00 2.00 - 2.45	N=19 (3,4/4,	5,4,6)	-	2 (2.00) Dry										 - - - - - -			
D UT	3.00 3.00 - 3.45	80 blows		-	3		Firm t	thinly lar	minated b	prown silty	/ CLAY w	ith silt	y partings	s. Light	3.30	34.53	×	
D B D	3.50 4.00 - 4.50 4.00		-	4 (3.00) Dry		brown	n and gr	ey silt du	stings/pai	tings on I	lamina	ae surface	es.	- - - - - -		X X X X X X X X X X X X X X X X X X X		
SPT (S)	4.00 - 4.45	N=14 (2,3/3,3	-	•										- - - - -		X——X X——X X——X		
D UT	5.00 5.00 - 5.45	60 blows			5		5.00m.	: Clay of Id	w plasticity.						(3.70)		× × ×	
D	5.50														_ - - -		×x ×x	
B D SPT (S)	6.00 - 6.50 6.00 6.00 - 6.45	N=15 (3,4/4,3	3,4,4)	-	6										- - - - - -		× – × × × × – ×	
D UT	7.00 7.00 - 7.45	60 blows			701/08/2017 08 (7.00) Dam 31/07/2017 13 (7.00) Dam	700	Browr	n clayey	fine to m	nedium S/	AND.				7.00	30.83	×— —×	
D	7.50				(7.00) Dain		Browr	n sandy	SILT. Sa	nd is fine	to mediui	m.			7.50	30.33	· · · · · · · · · · · · · · · ·	
B D SPT (S)	8.00 - 8.50 8.00 8.00 - 8.45	N=13 (2,2/3,3	3,4,3)	-	8		Mediu	um dens	e brown	clayey fin	e to medi	ium S	AND.		8.00	29.83	× × × × × × × × × × × × × × × × × × ×	
В	9.00 - 9.50				9										(1.00)	28.83		
D UF	9.00 9.00 - 9.45	70 blows		-			Firm t brown	thinly lar n and gr	minated bey silt du	orown silty sting/part	/ CLAY wings on la	ith silt aminae	y partings e surfaces	s. Light	5.500 - - - - -	20.00	× × × × × × × × × × × × × × × × × × ×	
В	10.00 - 10.50				10												×	
	Ground Wate			Chis	selling / Hard	Strata	T	Casing	Depths		n next shee iameter		ral Rema	arks	1		I	
Depth Struck C	asing Depth (m) Water Le	evel Minutes V	Vater sealed (m)	From (m)	To (m)	Time ((hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	-			pit to 1.2	0m.		
13.10	4.50 4.9 13.00 12.1	20 20	6.00	15.00	15.30	01:0	00	200	4.50 15.30	200	11.50 15.30							





BOREHOLE RECORD

Borehole BH16

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 37.83 Easting: 433594.41

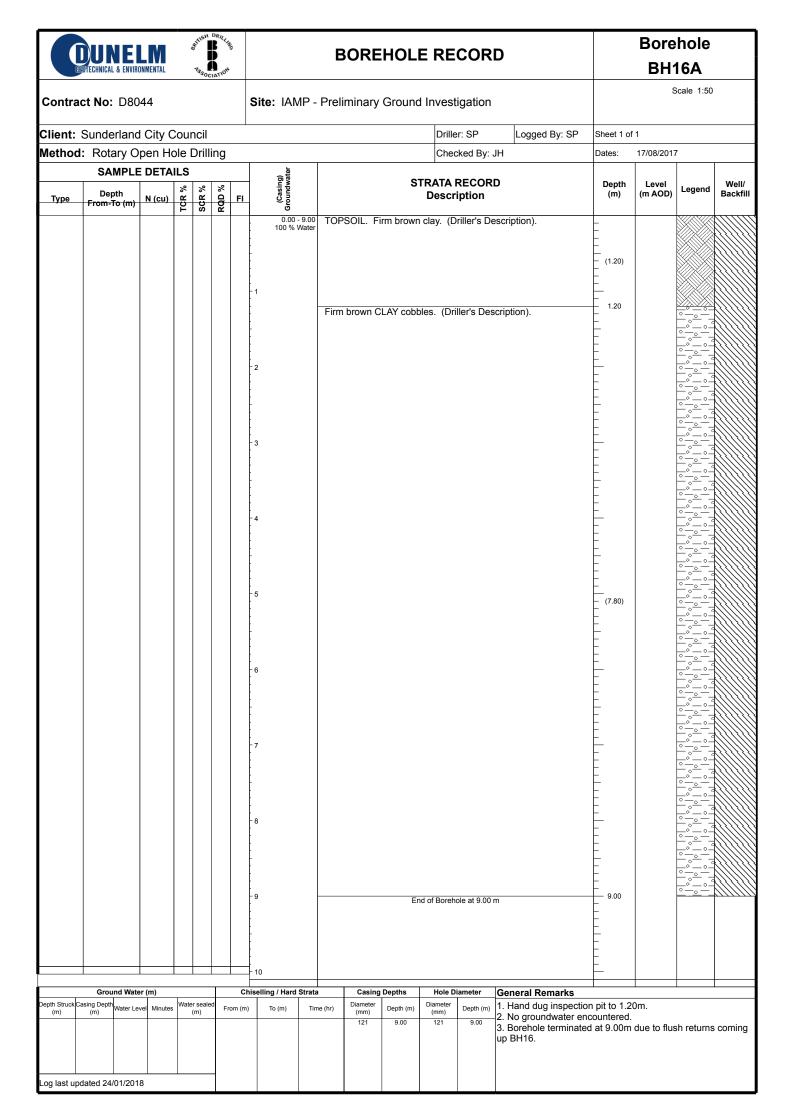
Scale 1:50 Northing: 559449.20

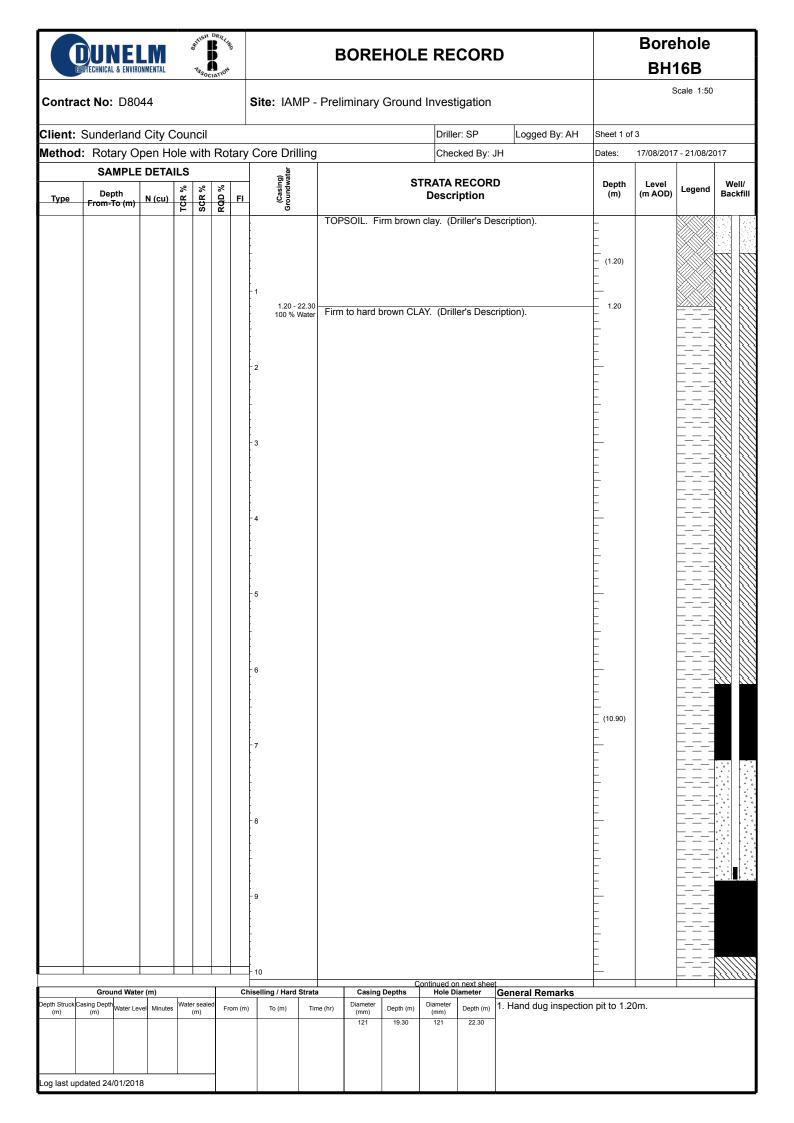
Client: Sunderland City Council

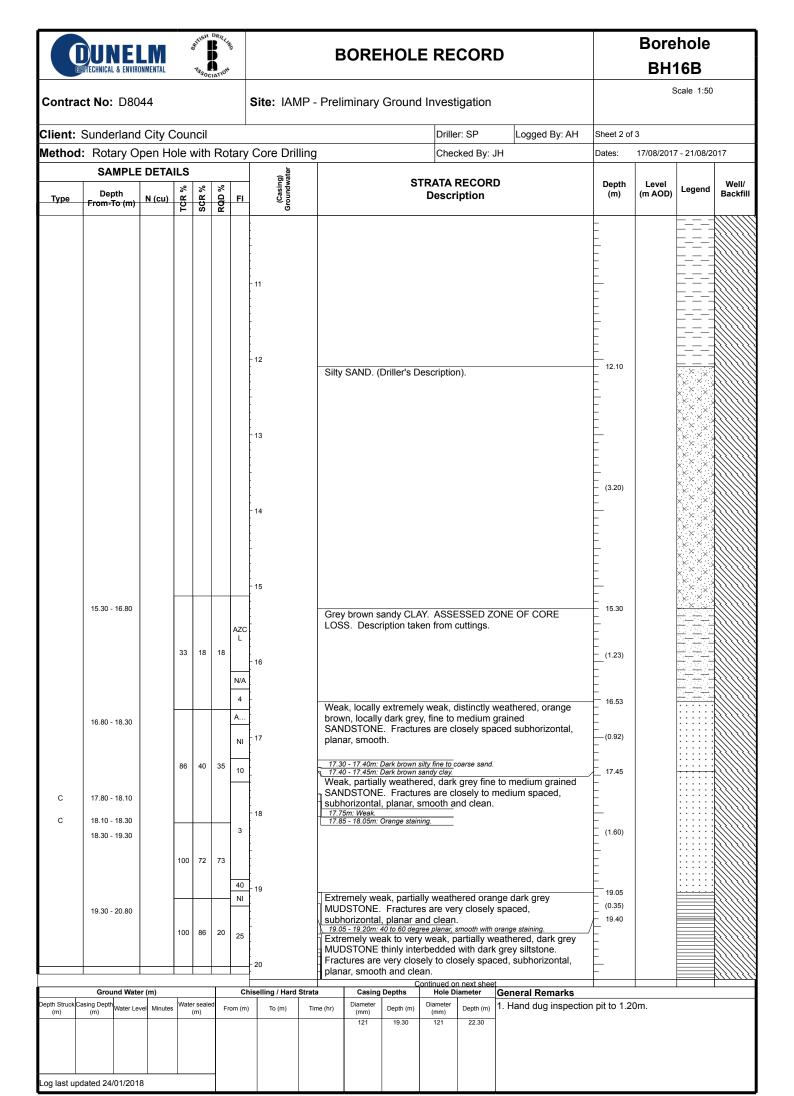
Driller: SK

Logged By: ST Sheet 2 of 2

Client:	Sunderla	and	City Co	ouncil							Drille	r: SK	Lo	ogged By: ST	Sheet 2 of	2		
Metho	d: Cable	Per	cussiv	e Drillir	ng						Chec	ked By: J	JH		Dates:	31/07/2017	7 - 01/08/2	017
Туре	SAMI Depth From-To	1	DETAII Ins	LS situ Testin	ıg	(Casing) Groundwater				s	TRATA I Descr	RECORI	D		Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D SPT (S)	10.00 10.00 - 10	1.45 N	N=23 (3,3/4	,6,6,7)				Firm	thinly lar	minated b ey silt du	orown silty sting/part	/ CLAY wi ings on la	rith silty aminae	partings. Light surfaces.	-		X—————————————————————————————————————	
D UT	11.00 11.00 - 11.	.45 8	30 blows			· 11	_	11.00)m: Soft cla	y of intermed	diate plastic <mark>i</mark> t	'y.			- - - - - -		× – × × × × – × × × – ×	
D	11.50														(5.50)		X——X	
B D SPT (S)	12.00 - 12 12.00 12.00 - 12	2.50 2.45 N	N=24 (4,4/5	6,6,6,7)		12									- - - - - - -		× – – × × – × × – × × – × × – ×	
D UF	13.00 13.00 - 13	5.45 5	60 blows			13									<u>-</u>		×	
D	13.50														_ - - -		×——×	
B D SPT (S)	14.00 - 14 14.00 14.00 - 14		N=22 (3,5/4	,5,7,6)		14 (14.00) 3.9	0			low plasticity					14.50	23.33	XX	
SPT (S)	15.00 - 15	i.33 N	N=50+ (10,	11/14,26,10	for 30mm)	· 15 (15.00) 1.8	0	Very fine t	stiff grey to coarse	gravelly of muds	CLAY. Gi tone. (Po	ravel is ar ssible wea	ngular t athered	to subangular, d rockhead).	(0.80)	20.00		
SPT (C)	15.30 - 15	i.39 N	N=50+ (25 f 80mm)	for 60mm/50) for	01/08/2017 1 (15.30) 3.6 (15.30) 3.6	60			En	d of Boreho	ole at 15.30	m		15.30	22.53		
						- 16									- - - - - - - - -			
						17									- - - - - - -			
						18									- - - - - - -			
						19									- - - - - - -			
															E			
	Ground	Water	(m)		Chi	selling / Hard	Strata	I	Casing	Depths	Hole D	iameter	Gener	al Remarks				
Depth Struck (m)	Casing Depth (m)	iter Leve	Minutes	Water sealed (m)	From (m)	To (m)		e (hr)	Diameter (mm)	Depth (m)	Diameter (mm)			d dug inspection	n pit to 1.2	0m.		
13.10		4.9 12.1	20 20	6.00	15.00	15.30	01	:00	200	4.50 15.30	200	11.50 15.30	-					









Client: Sunderland City Council

og last updated 24/01/2018

22.30



BOREHOLE RECORD

Borehole BH16B

Scale 1:50

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

> Driller: SP Logged By: AH Sheet 3 of 3

Method: Rotary Open Hole with Rotary Core Drilling Checked By: JH Dates: 17/08/2017 - 21/08/2017

Method	I: Rotary O	pen Ho	ole v	with	Ro	tary	Core Drilling			Checl	ked By: .	JH	Dates:	17/08/2017	7 - 21/08/20	017
	SAMPLE	DETA	ILS) iter									
Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater		s ⁻	TRATA F Descri		D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
						9 25		19.60 - 19.65m: 19.80 - 19.85m: 4	10 to 60 dea	ree nlanar si	mooth clea	n fracture	_			
								19.90 - 20.00m: 4 20.10 - 20.25m: 4 20.40 - 20.50m: 5	45 degree, p	lanar, smooti	h fracture.		F			
						. 5		20.40 - 20.50m: S	subvertical p	iariar, smooti ilanar, smoot	h clean frac	cture.	F			
	20.80 - 22.30					20		20.42 - 20.60m: 1 20.60 - 20.95m: 3	Very closely Subvertical,	<u>spaced, 45</u> to planar, clean	o 60 degree fracture.	e, planar, smooth fractures.	(2.90)			
							- 21									
			86	73	66								E			
						10							E			
						<u> </u>										
							- 22									
						T-							22.30			
						[En	d of Borehol	e at 22.30	m	F 22.30			
						F							F			
													F			
							- 23						Ē.			
													F			
													F			
													-			
							- 24									
													_			
							- 25									
													-			
													E			
							- 26									
							20									
						l							E			
													E			
						F							F			
						F	0.7						F			
							- 27						-			
													F			
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							- 28						F			
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													Ė			
							- 30						F			
						딕							<u> </u>			
	Ground Water	er (m)			1	Chi	iselling / Hard Strata	a Casing	Depths	Hole Dia	ameter	General Remarks	I		1	
epth Struck C	Casing Depth	vel Minutes	Wate	er seale	d Fr	om (m)		Diameter	Depth (m)	Diameter		Hand dug inspection	pit to 1.2	0m.		
(m)	(m) Water Le			(m)		- '		(mm) 121	19.30	(mm) 121	22.30	-				





BOREHOLE RECORD

Borehole BH17

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation GL (m AOD) 36.46

Scale 1:50

Northing: 559451.89

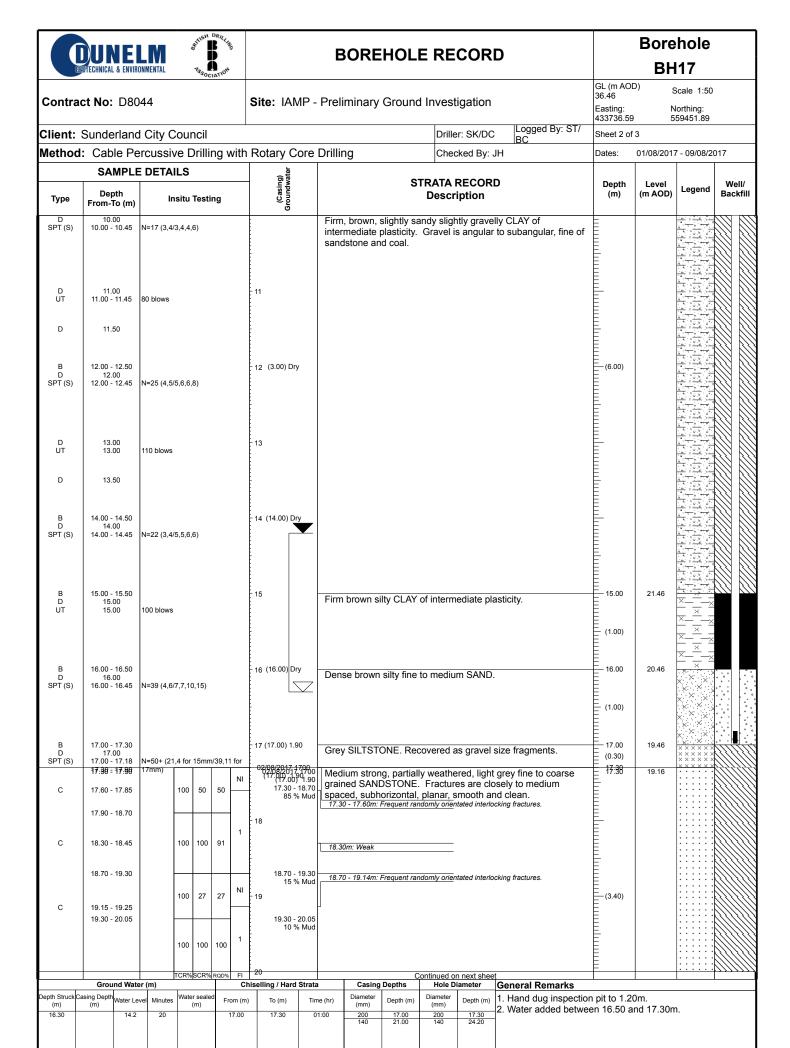
Easting: 433736.59

Client: Sunderland City Council

Driller: SK/DC

Logged By: ST/ Sheet 1 of 3

	Sundenand								Dime	1. SN/DC	' BC	Sneet 1 01			
Method	l: Cable Pe	ercussive	e Drillin	g with F	Rotary Co	ore Dr	rilling		Ched	cked By: .	JH	Dates:	01/08/2017	7 - 09/08/2	017
	SAMPLE	DETAIL	s		a										
Туре	Depth From-To (m)		itu Testin	g	(Casing) Groundwater			S	TRATA Descr	RECOR iption	D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES B D ES	0.10 0.10 0.50 - 1.00 0.50 0.50			-		to S ir	o subrounde Stiff dark bro	ed, fine to wn slightl plasticity.	medium y sandy, s Gravel is	of coal ar slightly gr s subangu	Gravel is subangular d sandstone. avelly CLAY of ular to subrounded,	0.30	36.16		
UT	1.20 - 1.65	100 blows			1										
D	1.70														
B D SPT (S)	2.00 - 2.50 2.00 2.00 - 2.45	N=16 (2,4/4	,3,4,5)	-2	202/08/2017 0/ (2.00) Dry (2.00) Dry	800						(4.30)			
D UT D	3.00 3.00 - 3.45 3.50	70 blows		- 3	3										
B D SPT (S)	4.00 - 4.50 4.00	N=12 (2,3/3,	,3,3,3)	- 4	4 (3.00) Dry		3.50m: Become	es firm.				(4.30)			
D UT D	5.00 5.00 - 5.45 5.50	70 blows			5	p	Firm thinly la plasticity, wit partings on l	h silty par	tings. Lig	y CLAY o	f intermediate and grey silt dusting/	4.60	31.86	× × × × × × × × × × × × × × × × × × ×	
B D SPT (S)	6.00 - 6.50 6.00 6.00 - 6.45	N=14 (3,4/3,	,3,4,4)		3 (3.00) Dry	,						E (4.40)		X	
D UT		80 blows		-7	7		7.00m: Clay of	high plasticity	<i>i</i> .					X———X X————X X————X	
B D SPT (S)	7.50 8.00 - 8.50 8.00 8.00 - 8.45	N=16 (3,3/4,	,5,4,3)	- E	3 (3.00) Dry	,								× × × × × × × × × × × × × × × × × × ×	
D UT	9.00 9.00 - 9.45	75 blows		- (9	ir	Firm, brown, ntermediate andstone a	plasticity.			illy CLAY of to subangular, fine of	9.00	27.46	× × × × × × × × × × × × × × × × × × ×	
D	9.50														
B	10.00 - 10.50				10 (3.00) Dry		1 6		Continued o	n next shee				TRACT CA	/// ///
Denth Struck	Ground Water Le		Water sealed		elling / Hard		Diameter	g Depths	Hole D Diameter	iameter	General Remarks	n nit t= 1 0	0		
Jepth Struckic (m) 16.30	asing Depth Water Le		(m)	From (m) 17.00	To (m) 17.30	Time (h	(mm)	Depth (m) 17.00 21.00	200 140	Depth (m) 17.30 24.20	Hand dug inspection Water added between			٦.	







Borehole **BH17**

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) 36.46

Scale 1:50

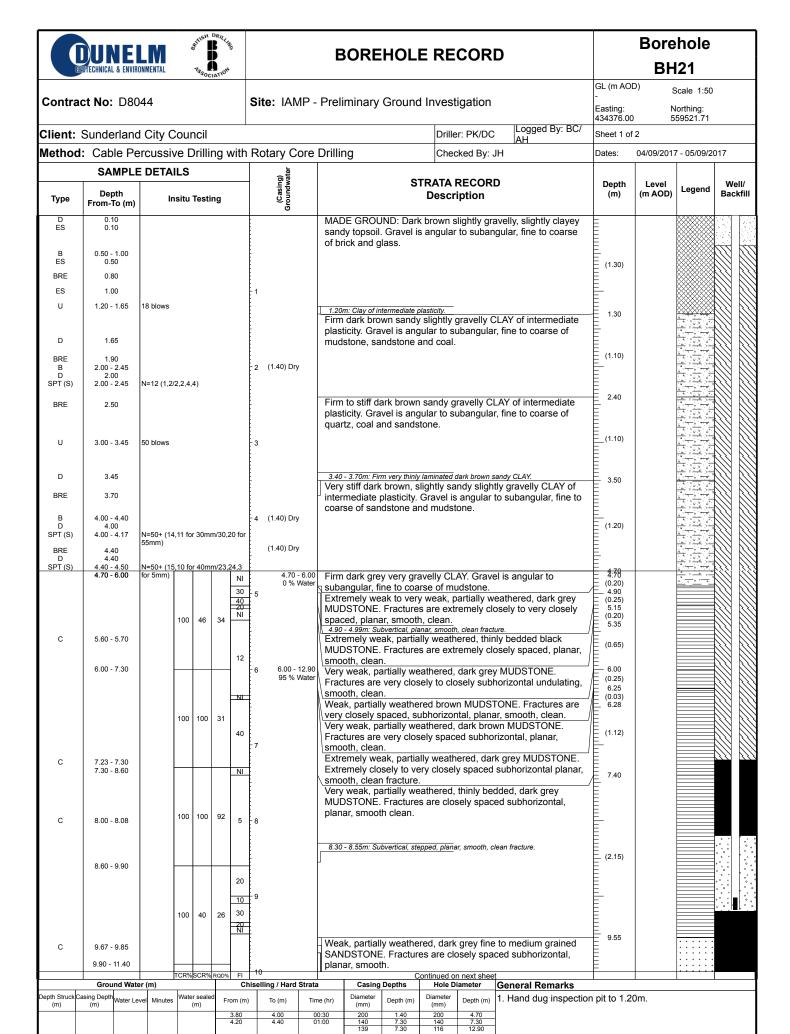
Driller: SK/DC

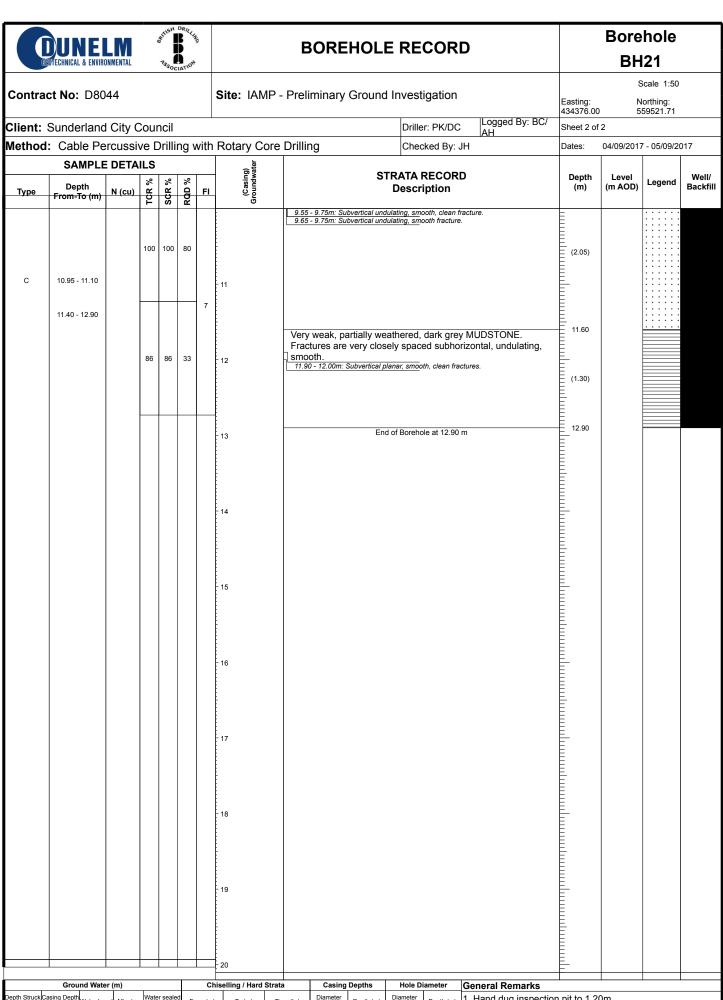
Easting: 433736.59 Logged By: ST/ Sheet 3 of 3 Northing: 559451.89

Client: Sunderland City Council Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: JH Dates: 01/08/2017 - 09/08/2017

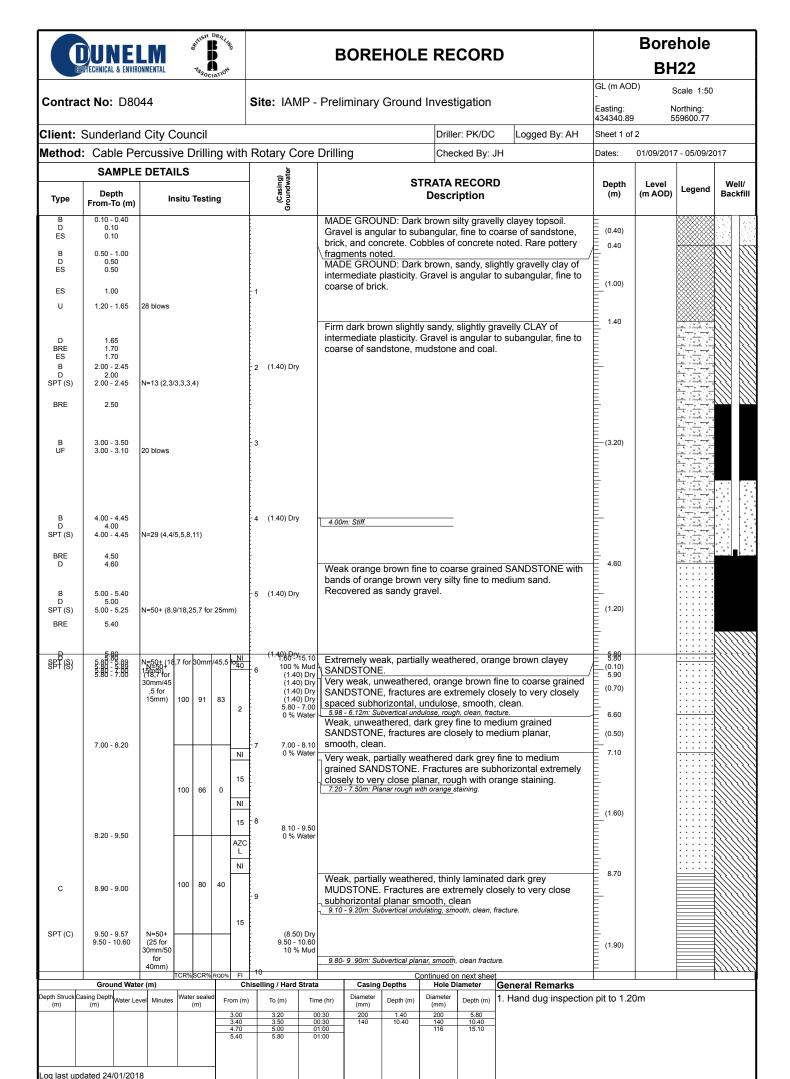
Method	: Cable Pe	rcussi	ve E	Orilli	ng v	with	Rotary	Core	Drilling	Checked By:	JH	Dates:	01/08/2017	7 - 09/08/2	017
	SAMPLE	DETA	ILS) ater								
Туре	Depth From-To (m)	N (cu)	%	SCR %	RQD %	FI	(Casing) Groundwater		ST	RATA RECOR Description	D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
	20.05 - 21.00			, , , , , , , , , , , , , , , , , , ,			20.05	- 21.00 % Mud				E			
С	20.40 - 20.50		100	100	100			70 IVIGG				20.70			
	20:10 20:00					NI AZC L			00.00.00.70		adding for the second	<u></u>			
						L			20.63 - 20.70m: Frequent rand AZCL.	omly onemated intend	ocking tractures.	20.70	15.76		
	21.00 - 22.00						-21 21.00 100	- 24.20 % Mud	weak, partially weather	ed, light grey fine	e grained	21.00	15.46		
			70	63	63				SANDSTONE. 21.26m: Fracture is 10 degree,	planar, smooth, undu	llose and clean.	Ē			
												Ē			
			-			-						Ē			
	22.00 - 23.50					1	22					Ē			
									22.29m: Fracture is 14 degree,	planar, smooth, undu	llose and clean.	(2.46)			
С	22.50 - 22.65		100	100	100							Ē			
												E			
							23								
						A ¹						(2.46)	13.00		
	23.50 - 24.70								Very weak to weak, unw Coal fragments noted w	reathered, dark g ithin mudstone.	grey MUDSTONE.	(0.04)	12.96 12.91		
			96	96	96	1			∐AZCL.		rrev MUDSTONE	(0.05)			
							- 24		Very weak to weak, unw 23.55 - 23.87m: Coal fragment			(0.65)	12.26		
									End	of Borehole at 24.20) m				
							25								
							25					E			
												E			
							26								
							20								
												Ē			
												Ē			
							- 27								
												E			
												E			
												E			
							28								
												Ē			
							-					Ë			
												Ė			
							29					E			
												E			
							<u> </u>					E			
							30								
	Ground Water	er (m)				Ch	niselling / Ha	rd Strata	a Casing Depths	Hole Diameter	General Remarks				
					1										

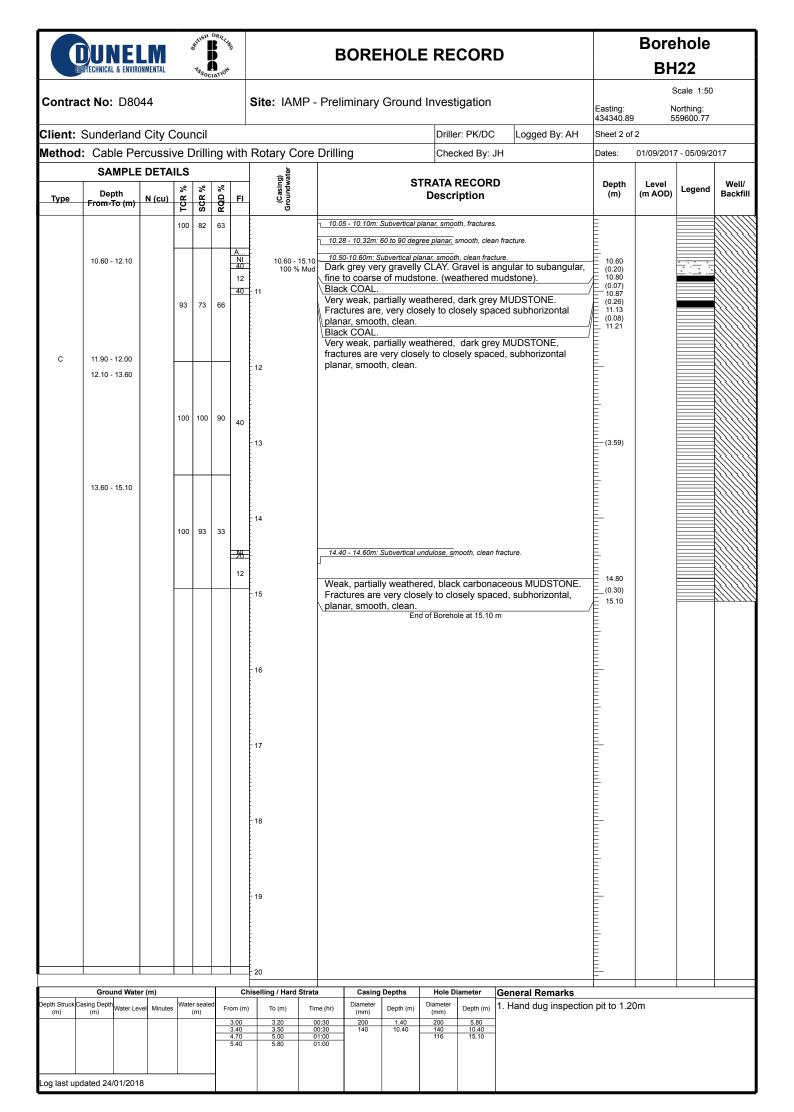
		nd Water (,		Chise	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	Hand dug inspection pit to 1.20m. Water added between 16.50 and 17.30m.
16.30					17.00	17.30	01:00	200	17.00	200	17.30	2. Water added between 16.66 and 17.66m.
								140	21.00	140	24.20	
Log last u	pdated 24/	01/2018										





		nd Water (Chise	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
					3.80	4.00	00:30	200	1.40	200	4.70	
					4.20	4.40	01:00	140	7.30	140	7.30	
								139	7.30	116	12.90	
			-									
Log last u	last updated 24/01/2018											





Contract No: D8044 Client: Sunderland City Council



6.40 4.00

Log last updated 24/01/2018

4.30

BOREHOLE RECORD

Borehole BH23

Site: IAMP - Preliminary Ground Investigation

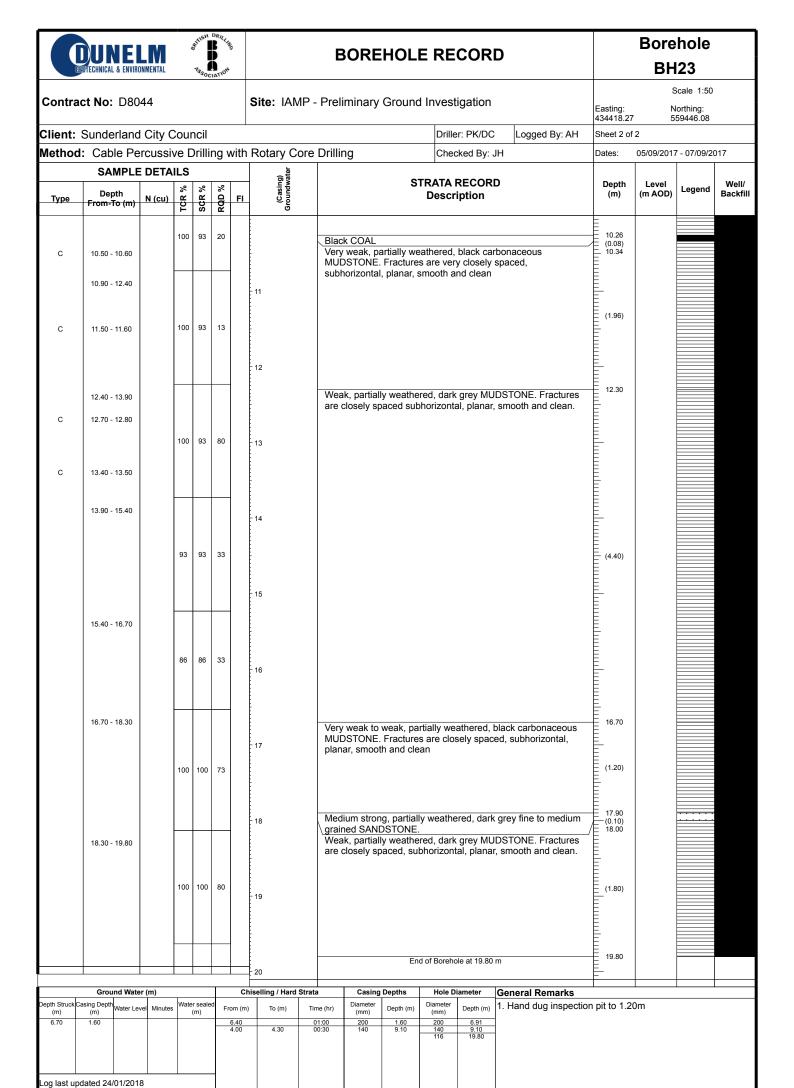
GL (m AOD)

Scale 1:50

Easting: 434418.27 Sheet 1 of 2 Northing: 559446.08

Driller: PK/DC Logged By: AH Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: JH Dates: 05/09/2017 - 07/09/2017

Method	l: Cable Pe	ercussi	ve L)rilli	ng	with	Ro	tary C	ore	Drillir	ng		Ch	ieck	ed By: 、	JH			Dates:	05/09/201	7 - 07/09/20	J17
	SAMPLE	E DETA	ILS					g) rater					TD 4 T			_						
Туре	Depth From-To (m)	lr	nsitu	Testi	ing			(Casing) Groundwater				8			ECOR otion	ט			Depth (m)	(m AOD)	Legend	Well/ Backfill
D ES	0.10 0.10									high		y. Gravel	is angu	lar t	o subar		elly CLAY of to coarso					
B D ES	0.50 - 1.00 0.50 0.50																		(1.40)			
D ES U	1.00 1.00 1.20 - 1.65	40 blows					-1												<u> </u>			
D	1.65										DE GROU . Sand is			own	mottled	d grey slig	htly sandy	′	1.40			
D ES B	1.90 1.90 2.00 - 2.50						2	(1.60) Dry	,	\ sligh	DE GROU otly grave se of sar	lly clay. (Gravel is	s an	ottled g gular to	rey slight subangu	ly sandy lar, fine to		1.80 (0.10) 1.90			
D SPT (S) D	2.00 2.00 - 2.45 2.50	N=5 (1,0/1	1,1,1,2	2)						MAE grey	DE GROU slightly s	JND: Ver sandy CL	y thinly .AY. Sar	lam nd is	fine to	coarse.	n mottled		2.60			
D D	2.70 3.00						3			Grav	vel is ang dolomite	jular to si	ubangul	ar, f	ine to c	oarse of	gravelly classandstone		(0.30)			
U D	3.00 - 3.65 3.40	40 blows								inter	DE GROU mediate se of sar	plasticity	. Grave	l is a	ndy gra angular	velly clay to subanç	of gular, fine	to	(0.90)			
D	3.70															/ sandy, s			3.80			
B D SPT (S)	4.00 - 4.50 4.00 4.00 - 4.33	N=44 (22,	,3 for 1	15mm/	24,9,	6,5)	- 4	(1.60) Dry	/							Gravel is sandston	angular to e.					
D	4.50																		(1.50)			
D U	5.00 5.00 - 5.50	40 blows					5				m: Clay of lo			_					5.30			
D	5.60							_	•		emely we overed a					ey MUDS gravel	TONE.		- 0.00 			
B D SPT (S)	6.00 - 6.40 6.00 6.00 - 6.39	N=50+ (11 for 65mm)		or 65m	m/14	,18,18	6	(1.60) Dry	,										(1.61)			
D SPT (S)	6.70 6.70 - 6.94	N=50+ (14	4,11 fc	or 45m	m/30	,20)		(1.60) Drj														
С	6: 7 8 = 7 : <u>98</u> 7.30 - 7.40		100	91	0		7	6.90 50 %	- 7.90 Water	MUE		. Fracture	ės are v	ery	closely	to closely	, dark grey spaced,	·	6.91 _ _ _ _ _ _			
	7.90 - 9.40						- 8	7.90 95 %	- 9.40 Water										(3.36)			
С	8.10 - 8.20							30 70	vvatci													
С	8.90 - 9.00		100	93	80														(3.36)			
	9.40 - 10.90						9	9.40 -	19.80													
С	9.58 - 9.68							100 %											<u></u>			
			TCR%	SCR%	ROD	% FI	10						Continue	d on i	next shee	ot .						
	Ground Wat				<u> </u>		iselli	ing / Hard	Strata	a	Casing	Depths			meter		Remarks					
Depth Struck C	asing Depth (m) Water Le	vel Minutes	Wate	er seale	ed F	rom (m)	T	To (m)	Tin	ne (hr)	Diameter	Depth (m)	Diamete		Depth (m)		dug inspe		pit to 1.2	0m		
(m) 6.70	(m) Water Le			(m)	+-	6.40	_	(111)		11:00	(mm) 200	1.60	(mm) 200		6.91		. Jopo.					







BOREHOLE RECORD

Borehole BH24

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) Scale 1:50

35.48 Easting: Northing: 433429.81 559234.30

Client: Sunderland City Council Driller: PK/DC Logged By: BC Sheet 1 of 3

vietho	d: Cable Pe			ng with I		ore L	rilling)		Che	cked By: E	3L		Dates:	01/08/201	7 - 16/08/2	017	
	SAMPLE	DETAI	LS		ւց) vater				e	TRATA	RECORI	n		Davit	Laurel		147	.117
Туре	Depth From-To (m)	In	situ Testir	ng	(Casing) Groundwater				3		ription	J		Depth (m)	Level (m AOD)	Legend	Bac	
D ES	0.10 0.10						Gravel	l is suba	angular t	o rounde		y clayey To coarse of s	OPSOIL. andstone,	(0.30)	35.18			
D ES	0.40 0.40			ŀ					d mudsto ightly sar		tly gravelly	y CLAY. G	ravel is	É				
B BRE	0.50 - 1.00 0.50						subang	gular to	rounded	d, fine to	coarse of	sandstone	, mudstone	(0.90)				
					1		and iiii	riestorie	5.					E`				
UT	1.20 - 1.65	18 blows				L	0						01.01.6	1.20	34.28			
												avelly silty ular to sub		E				
ES D	1.50 1.65										estone an		,	Ē				
BRE	1.90																	
B D	2.00 - 2.45 2.00			ŀ	2 (1.80) Dry	у								F				
SPT (S)	2.00 - 2.45	N=15 (2,3/4	4,4,3,4)											Ē				
BRE	2.50													E				
														E				
UT	3.00 - 3.45	22 blows			3									E				
01	0.00 0.40	ZZ BIOWS			J									E				
D	3.45													E				
														(4.80)				
BRE	3.70													E				
B D	4.00 - 4.45 4.00				4 (3.90) Dry	y T	4.00m:	Soft.						F				
SPT (S)	4.00 - 4.45	N=7 (1,1/2,	1,2,2)											E				
BRE	4.50			-										E				
														Ė				
UT	5.00 - 5.45	28 blows			5	h	Occasio	onal thinly	laminated i	bands noted	d from 4.90m.			E				
01	3.00 - 3.43	20 blows			5									E				
D	5.45													Ē				
				İ										E				
BRE D	5.70 5.80													E				
B D	6.00 - 6.45 6.00			-	6 (5.90) Dry	y	Soft da	ark brov	vn, silty,	sandy Cl	_AY of low	plasticity.	Sand is	6.00	29.48	×— —		
SPT (S)	6.00 - 6.45	N=12 (1,2/2	2,3,3,4)				fine to	coarse						(0.30) 6.30	29.18	X		
BRE	6.50			-					wn, siity, o coarse.		sandy CLA	Y of high p	plasticity.	E		×_×_,		
				ŀ										E		<u> </u>		
UT	7.00 - 7.45	12 blows			7									E		$\sqrt{\times}$		
01	7.00 7.40	12 blows			,									E		×		
D	7.45													(2.10)		$\frac{1}{2}$ \times		
														(2.10)		×—		
BRE	7.70													E		×— ×		
B D	8.00 - 8.45 8.00				8 (8.00) Dry	y T	8.00m:	Soft.						F		X——>		
SPT (S)	8.00 - 8.45	N=8 (2,2/2,	2,2,2)											E		X——>		
BRE	8.50			-								CLAY of hi	gh	8.40	27.08	X—		
							plastici	ity. San	d is fine	to coarse	Э.			E		\times — \longrightarrow		
UT	9.00 - 9.45	12 blows			0									E		X—		
O I	5.00 - 9.45	IZ DIOWS			9									E		X——>		
Г	9.45											E		\times				
D				ŀ												\times		
BRE	9.70			01/08/2017 1 (8.90) Dr	y I								E		× × ′			
В	10.00 - 10.45				02/08/2017 (10 (8.90) 2.6	30					n next sheet			=		F = 7		1/
enth Struck	Casing Depth Water Le		Water sealed		selling / Hard			Casing Diameter		Hole I		General F		n nit to 1 0	0m			
(m)	(m) Water Le	evel Minutes	(m)	FIOIII (III)	To (m)	Time	: (111)	(mm)	Depth (m)	(mm)	Depth (m) 5.90		ug inspection undwater obs		UIII.			
				13.80 15.60	14.10 15.90	00:4	00	200 150 140	5.90 13.50 16.50	200 150 121	16.80 21.50	_						
	1	1	1	1	1	1					150	i						



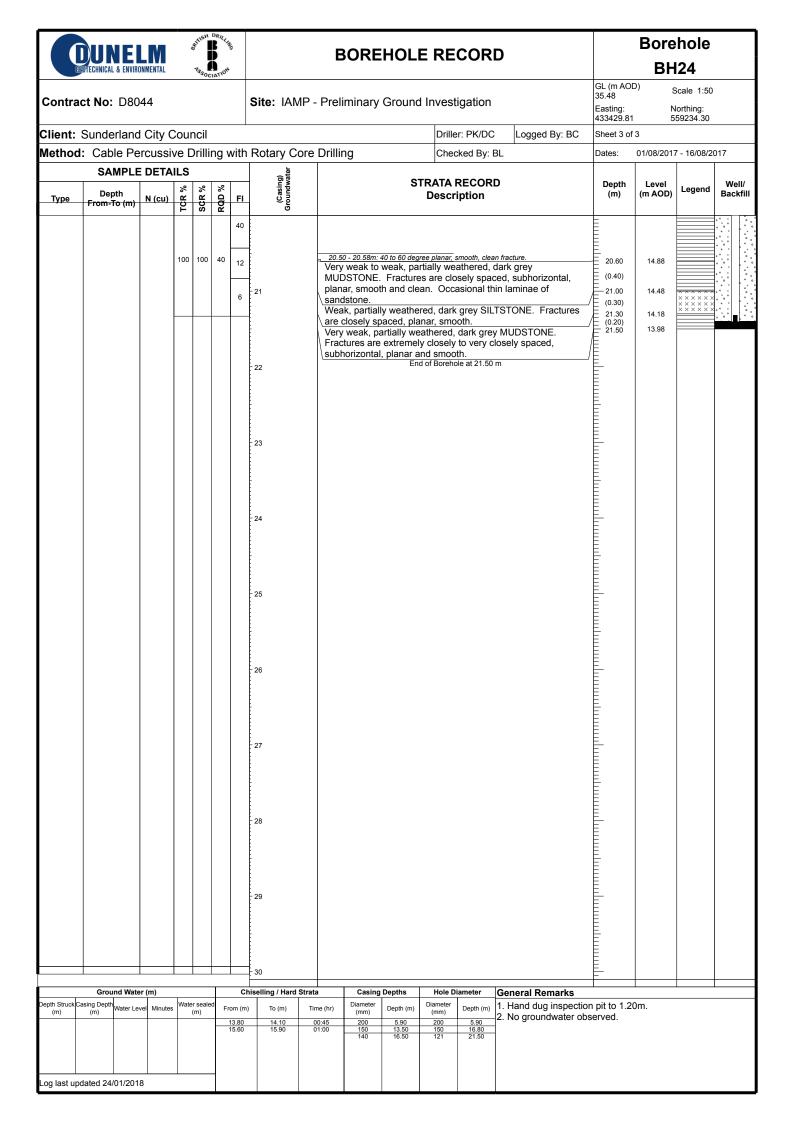


BOREHOLE RECORD

Borehole BH24

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation GL (m AOD) 35.48 Scale 1:50 Easting: 433429.81 Northing: 559234.30

Client: Sunderland City Council										Driller: PK/DC Logged By: BC						433429.81 559234.30 Sheet 2 of 3						
Method: Cable Percussive Drilling with Rotary Core															Dates:	7 - 16/08/2	- 16/08/2017					
SAMPLE DETAILS										-												
Туре	Depth From-To (m)	Insitu Testinç			Insitu Testing		(Casing) Groundwater		STRATA RECORD Description						Depth (m)	Level (m AOD)	Legend	We Bacl				
D SPT (S)	10.00 10.00 - 10.45	N=8 (2,2/2,2,2,2)					(9.90) 9.70					silty, slight to coarse		CLA	Y of high	1			X			
BRE	10.50								•	•							E (4.30)		X——>			
D	10.70																(4.30)		× ×			
В	11.00 - 11.65	3 blows				- 11											E					
UF	11.00 - 11.65	3 DIOWS															E		\times			
																	(4.30)		X—			
BRE	11.70																		×-×>			
B D	12.00 - 12.45 12.00			E			12(11.80) 11.70										F		X			
SPT (S)		N=5 (1,2/	1,1,1,2	2)													E		×			
BRE D	12.50 12.70																12.70	22.78				
В	13.00 - 13.45						- 13 (12.90) Dry		plasti	city. Gra	avel is su	ghtly sand ibangular	to rounde				E					
D SPT (S)	13.00	N=33 (3,5/7,8,9,9)			9,9)		13 (12.00) Diy		sandstone, mudstone and coal.								E					
BRE	13.50						-										Ē					
																	(1.80)					
В	14.10 - 14.55						- 14															
D SPT (S)	14.10																					
BRE	14.60						_	H	Dens	e light g	rey claye	y GRAVE	L. Grave	el is	subangu	lar to	14.50	20.98				
									angul	ar, fine	to coarse	of siltsto	ne. (Wea	ather	red SILT	STONE).	Ē					
B D SPT (S)	15.00 - 15.45 15.00 15.00 - 15.45	N=36 (8,15/10,9,8,9)					15															
BRE	15.50																(1.75)					
DIVE	13.30																E					
D SPT (S)	15.90) 15.90 - 16.20 N=50+ (13,12 for 50mm.			nm/20	(13.50) Dry n/20,19,11 + 16																	
	16.00 - 17.00 16.00 - 17.00	0 - 17.00 for 25mm)				1	02/08/2017 1790 (13.59) % Water		Extremely weak, partially weathered, dark grey MUDSTONE						STONE	= 16:25	19.23					
			100	0.5	0	40	02/08/2017	700	oo Fractures are extremen			y closely spaced, subhorizontal, plana				E						
			100	85		40	(13.50)	٦	16.68 - 16.71m: Extremely weak black carbonaceous mudstone.				(0.95)									
	17.00 - 18.50					A	- 17										E	40.00				
						6						remely we actures a				d, dark	17.20	18.28				
		87 87 13						subhorizontal, planar, smooth and clean. 17.28 - 17.42m: Subvertical, planar, smooth clean fracture.						Ē								
						- 18	F			Orange iror Subvertical,	nstone. planar, smc	oth, clean fr	racture	9.		(0.95)						
							-										E					
	18.50 - 20.00					40		-	18.40	- 18.45m:	Very weak,	black carbo	naceous mud	dstone	е.		E					
																	E					
С	18.95 - 19.05					10	- 19										(3.40)					
	40		100	100	53	40						E										
С	19.45 - 19.60					20									Ē							
0000 0450						40 5											E					
20:00 - 21:50 TCR%SCR%R0D% FI 20								trata		Casing	Depths	Continued o	n next shee		neral Re	marks						
Depth Struck ((m)	evel Minute		er seale (m)	ed F	rom (m)	To (m)	Time		Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)			j inspection	on pit to 1.2	0m.					
						13.80 15.60	13.80 14.10 0 15.60 15.90 0		45 00	200 150 140	5.90 13.50 16.50	200 150 121	50 5.90		.o groun							
										-												







Borehole BH25

 Contract No: D8044
 Site: IAMP - Preliminary Ground Investigation
 GL (m AOD) 36.57 Scale 1:50
 Scale 1:50

 Easting: 433589.11
 Northing: 433589.11
 559280.69

Client: Sunderland City Council Driller: PK/DC Logged By: BC Sheet 1 of 3

Method	: Cable Pe	rcussive D	Orilling with	Rotary C	otary Core Drilling Checked By: BL Dates: 31/07/2017 - 15/08/20							017			
	SAMPLE	DETAILS		ter		STRATA RECORD									
Туре	Depth From-To (m)		Testing	(Casing) Groundwater			D	Depth (m)	Level (m AOD)	Legend	nd Well/ Backfil				
D ES D ES	0.10 0.10 0.40 0.40				\ \!	Gravel is suba mudstone and Firm brown sl	angular to d coal. ightly sar	o rounde	d, fine to d	y clayey TOPSOIL. coarse of sandstone, y CLAY. Gravel is	(0.30) 0.30 (0.60)	36.27			
В	0.50 - 1.00			- 1		subangular to subrounded, fine to coarse of sandstone, limestone and coal. Stiff dark brown slightly sandy slightly gravelly CLAY of high plasticity. Gravel is angular, fine to coarse of sandstone,			avelly CLAY of high	0.90	35.67				
UT ES	1.20 - 1.65	18 blows				mudstone and coal.	e or sandstone,								
BRE B D	1.65 1.90 2.00 - 2.45 2.00			- 2 (1.80) Dry	,						(2.50)				
SPT (S) BRE	2.00 - 2.45	N=19 (3,4/4,4,5,	(6)												
UT	3.00 - 3.45	18 blows		3		3.00m: Clay of in	termediate j	plasticity.							
D BRE	3.45 3.70					Firm thinly lar high plasticity coarse of san	. Gravel	is suban	gular to su	tly gravelly CLAY of ubrounded, fine to	3.40	33.17			
B D SPT (S)		N=11 (2,2/2,3,3,	3)	- 4 (3.90) Dry	′										
BRE UT	4.50 5.00 - 5.45	22 blows		- 5											
D	5.45			5		5.00m: Clay of in	termediate į	olasticity.							
BRE B D	5.70 6.00 - 6.45 6.00			- 6 (5.90) Dry	,										
SPT (S) BRE		N=10 (1,1/2,2,3,	.3)								3.40				
U	7.00 - 7.45	10 blows		7		7.00m: Clay of high plasticity.			<u> </u>						
D BRE	7.45 7.70														
B D SPT (S)		N=11 (2,2/2,3,3,	3)	8 (7.80) Dry	'										
BRE U	8.50 9.00 - 9.45	18 blows		9							(7.60)				
D	9.45														
BRE	9.70										Ē				
В	10.00 - 10.45	L		10 (9.90) Dry					n next shee				. X · *	////	7777
Denth Struck	Ground Wate		r cooled	iselling / Hard		Casing Diameter		Hole Diameter		General Remarks	n nit t- 1 0	`			-
(m)	asing Depth (m) Water Le	vel Minutes water	r sealed (m) From (m)	To (m)	Time ((hr) Diameter (mm)	Depth (m)	(mm)	Depth (m)	Hand dug inspectio	n pit to 1.20	Jrn.			

| Casing Depth | Casing Depth | Water Level | Minutes | Water sealed (m) | Casing Depth | Casing Depth | Water Level (m) | Casing Depth | Water Level (m) | Casing Depth | Casing Depth | Water Level (m) | Casing Depth | Casing Depth (m) | Cas





BOREHOLE RECORD

Borehole BH25

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 36.57 Easting: 433589.11

Scale 1:50 Northing: 559280.69

Client: Sunderland City Council

Driller: PK/DC

Logged By: BC Sheet 2 of 3

	Suriueriani											DI	IIIei. FN/DC		LOG	geu by	/. BC	311	leel 2 01	J		
Method	l: Cable Pe	ercussi	ve I	Drilli	ng	with	Rotary	Core	Drillin	ng		Ch	ecked By: I	BL				Da	ites:	31/07/201	7 - 15/08/2	.017
	SAMPLE	E DETA	ILS]	<u> </u>														
Туре	Depth From-To (m)			Testi	ing		(Casing)				S		A RECOR	RD					Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D SPT (S)	10.00 10.00 - 10.45	N=8 (2,2/2	2,2,2,2	2)					high		. Gravel	is suba	sandy slight angular to s									
BRE	10.50								Coai	36 OI 36I	iusione e	ina iine	storie.									
B UF	11.00 - 11.65 11.00 - 11.45	2 blows					11		Soft		wn slight	ly sand	y silty CLAY	Y. Sa	and is	s fine to)	E	11.00	25.57	×	
BRE	11.70																	Ē	11.80	24.77	×——×	
D B UF	11.90 12.00 - 12.65 12.00 - 12.45	58 blows					12		grav coar Stiff, is su	elly silty se of sar dark bro bangular	CLAY. Godstone and stone a	ravel is and mud tly sand	rown slightly subangular dstone. y slightly gr fine to coar	r to	round	ded, fin	e to ravel	F	(0.30) 12.10	24.47	X - X	
BRE	12.70								mud	stone an	d coal.							E				
B D SPT (S)	13.00 - 13.45 13.00 13.00 - 13.45	N=33 (5,5	5/6,8,9),10)			13 (12.90)	Dry														
BRE	13.50						01/08/201 (12.90) 31/07/201 (12.90)	Dry 7 1700														
U	14.00 - 14.45	49 blows					14		14.0	0m: Clay of	low plasticit	ty.	_ _					E	(4.10)			
D	14.45																	E				
BRE B D	14.70 15.00 - 15.45 15.00						15 (13.50)	Dry														
SPT (S)	15.00 - 15.45 15.50	N=41 (5,6	6/8,9,1	2,12)																		
U	16.00 - 16.45	63 blows					16												16.20	20.37		
D BRE	16.45 16.70								is an		subangu		of intermedi to coarse o				Gravel	E	(0.90)	20.57		
BRE	10.70						- - 17															
\$\$7 (§)	17:18 17:33 17:18 17:33 17:18 18:58	N=50+ (2: 50mm) (25,-1 for 30mm/26	5,-1 fc	or 30mi	m/26,	24 for NA	95 (1	0-22.90 % Water 3.50) Dry 017 1700	suba	angular, f	ine to co	arse of	elly CLAY. (mudstone. veathered,			_		Ē	17:18 (0.23) 17.33	19.47 19.24		
		,24 for 50mm)	97	60	9	9	(13	.50) Dry	Frac		very clo	sely to	closely spac					E	(0.86)			
						NI	- 18 -		siltst	one gravel i	nfill.		zontal, planar,					F	18.20 (0.13)	18.37 18.24		
	18.50 - 19.90					6			Freq 18.2	uent ran 0 - 18.33m:	domly or Thin lamina	ientated	d, dark grey interlockin an 5mm thick) o	ng fr	acture	es. _{d.}		Æ	18.33 (0.17) 18.50	18.07		
С	19.10 - 19.30		100	100	7.0		- 19		Frac	ctures are ar, smoo	very clo	sely to ean.	veathered, good closely spaced thinly lam	aced	l, subl	horizon	ital,		(0.36) 18.86	17.71		
			100	100	78				MUE	OSTONE oth, undu	. Fractur ulose and	es are d l clean.	closely space	ced	subh	orizont	al,	Æ	(0.65) 19.51	17.06		
	10.00 20.10					10	ļ		MUE	DSTONE	. Fractur	es are	closely to m	nedi				/F	(0.39)	16.67		
С	19.90 - 20.10 19.90 - 21.40		TCR9	%SCR%	6 RQD	NI 6 FI	20		Subr	ionzonia			and clean.					1	19.90	16.67		
	Ground Wat						niselling / Ha	rd Strat	a		Depths	Hole	Diameter		enera	l Rema	ırks	•		•	•	
Depth Struck C (m)	asing Depth (m) Water Le	evel Minutes	s Wat	er seale (m)	ed F	rom (m)	To (m)	Tir	me (hr)	Diameter (mm)	Depth (m)	Diamete (mm)	Depth (m)	1.	Hand	l dug in	spectio	n pit	t to 1.20	Om.		
		_			-1-	16.90	17 10	-	11:00	200	10.00	200	10.00	7								





Borehole BH25

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) 36.57 Easting: 433589.11

Scale 1:50 Northing: 559280.69

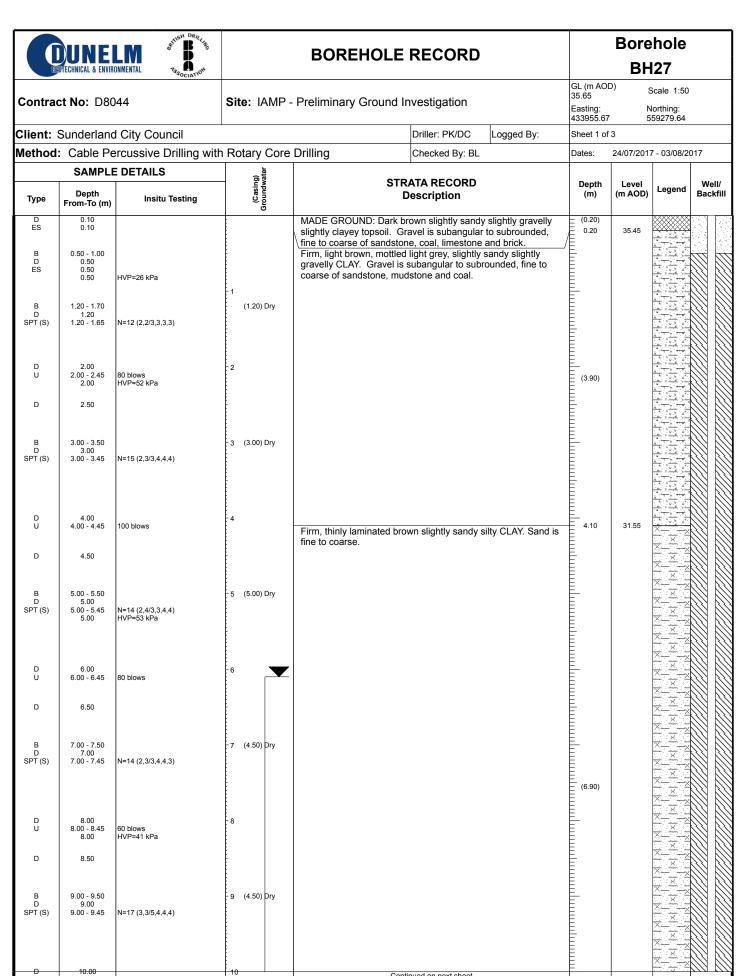
Client: Sunderland City Council

Driller: PK/DC

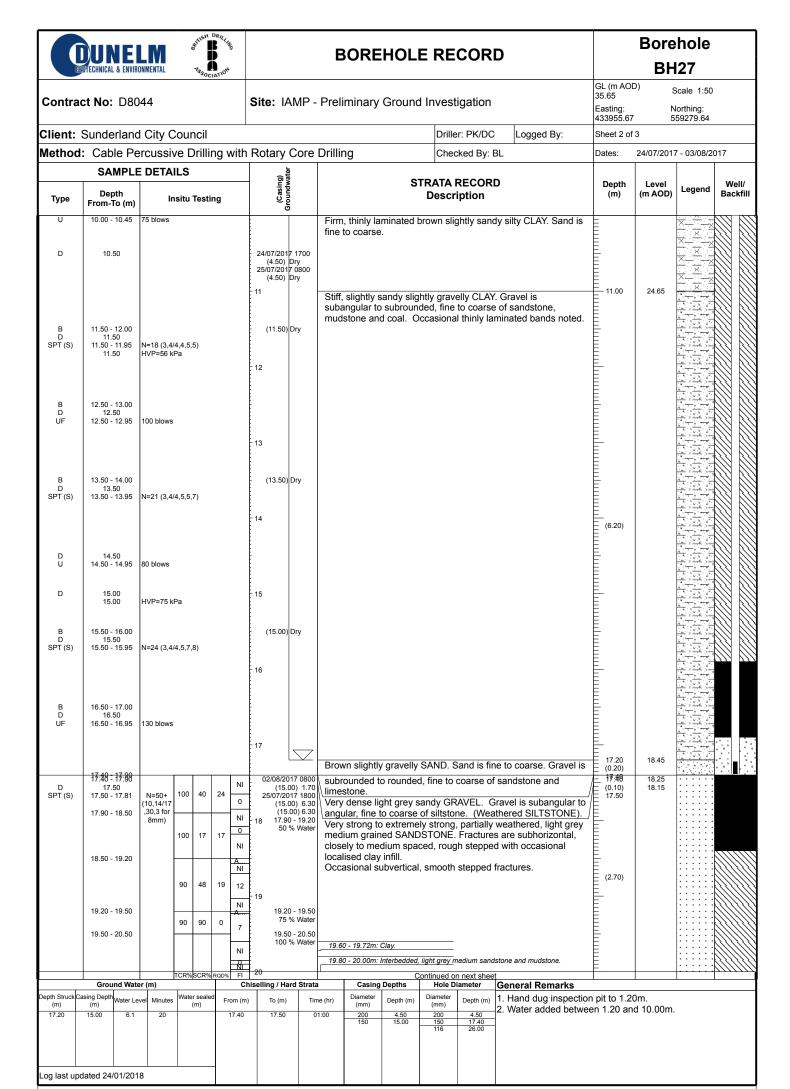
Logged By: BC Sheet 3 of 3

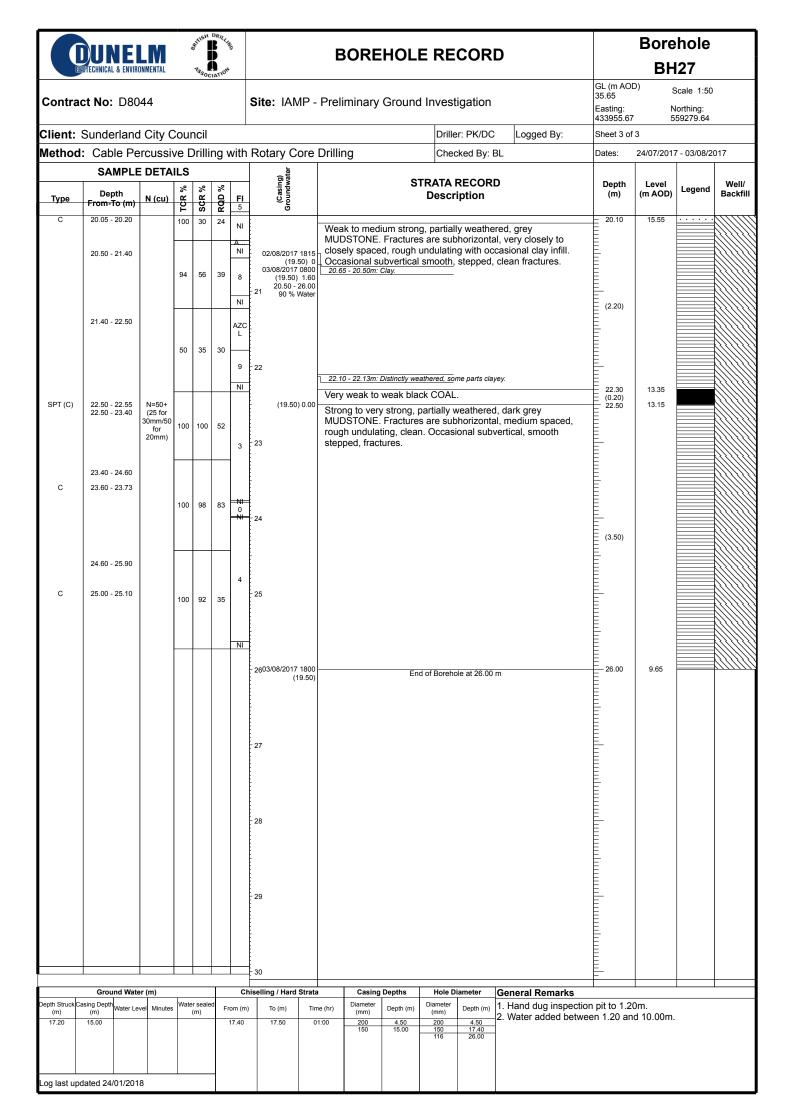
Method	: Cable Pe	rcussi	ve D	Drilli	ng v	with	Rotary Core	Drilling	Checked By: E	BL	Dates:	31/07/2017	7 - 15/08/2	017
	SAMPLE	DETA	ILS				ater			_				
Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater		ATA RECORI escription	D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
			100	96	96	2	-21	Very weak, partially weath black MUDSTONE. Fract spaced, subhorizontal, pla 19.57 - 19.62m: 10 degree fractus 19.63 - 19.82m: Thin laminae (lest Very weak to weak, partial MUDSTONE. Fractures a subhorizontal, planar, smo	ures are very canar, smooth are, planar, smooth, use than 5mm thick) of ally weathered, I are closely to mooth and clean.	closely to closely and clean. undulose and clean. of coal noted. light grey ledium spaced,	20.65	15.92	××××× ××××× ×××××× ××××××	
С	21.40 - 21.55					4		19.98 - 20.04m: 30 degree fracture 20.43 - 20.47m: 8 degree fracture siltstone grained infill. Weak to medium strong, p		andulose. Indulose with light grey	21.27	15.30	*****	
С	21.40 - 22.90		100	100	91	3	- 22	light grey SILTSTONE. 20.71 - 20.76m: 18 degree fractu Weak to medium strong, p coarse grained SANDSTC medium spaced, subhoriz light brown sand infill. 21.41 - 21.54m: Fracture is subve infill.	re, stepped, smooth partially weathe DNE. Fractures ontal, planar, su ertical, planar, smooth	and clean. Pred, grey fine to sare closely to mooth, undulose with the with light brown sand	(0.35) = 21.62 = (1.28) = (1.28)	14.95	**************************************	
							- 23	Very weak to weak, partia SILTSTONE. Fractures a subhorizontal, planar, smc 22.74 - 22.79m: 12 degree fractu End of	re closely to me both and clean.	edium spaced, vith grey clay infill.	/ <u></u>	13.67	× × × × × × × × × × × × × × × × × × ×	
							- 24							
							25							
							- 26							
							- 27				F			
							- 28							
							- 29							
							- 30				E			
	Ground Wate	er (m)			1	Ch	niselling / Hard Strata	a Casing Depths	Hole Diameter	General Remarks				

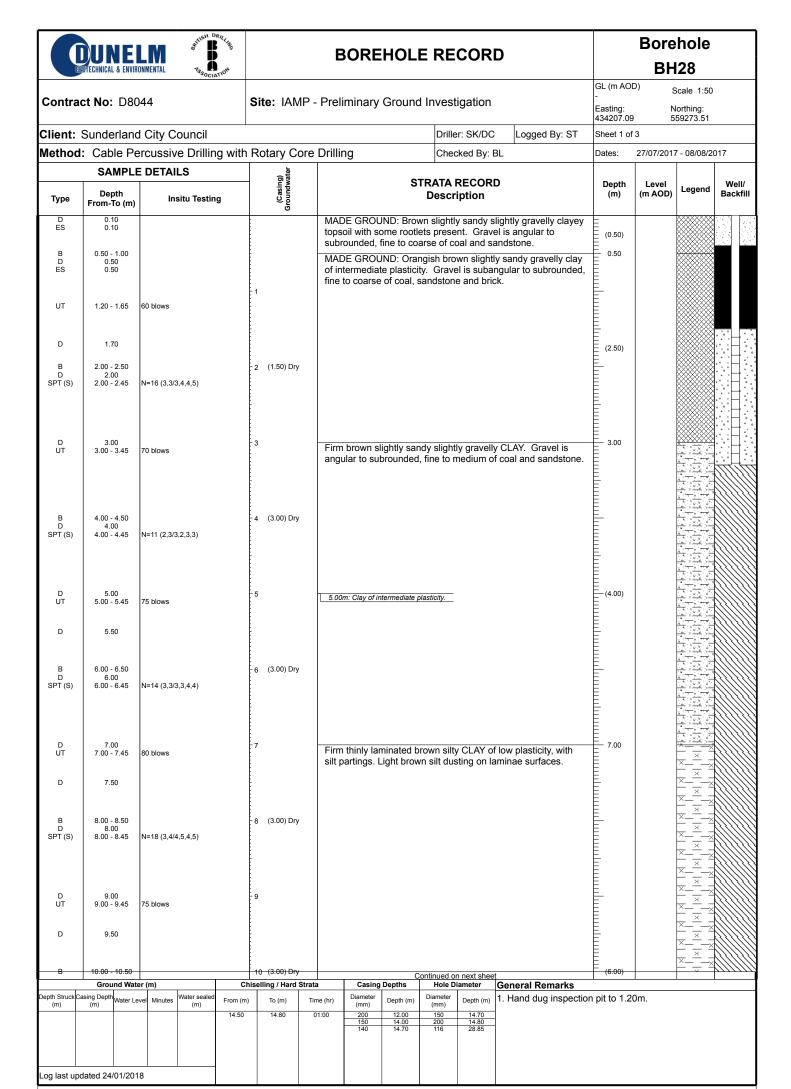
		nd Water (Chis	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
					16.80	17.10	01:00	200	10.90	200	10.90	
								150	12.90	150	17.10	
								140	17.00	116	22.90	
Log last u	pdated 24/	/01/2018										

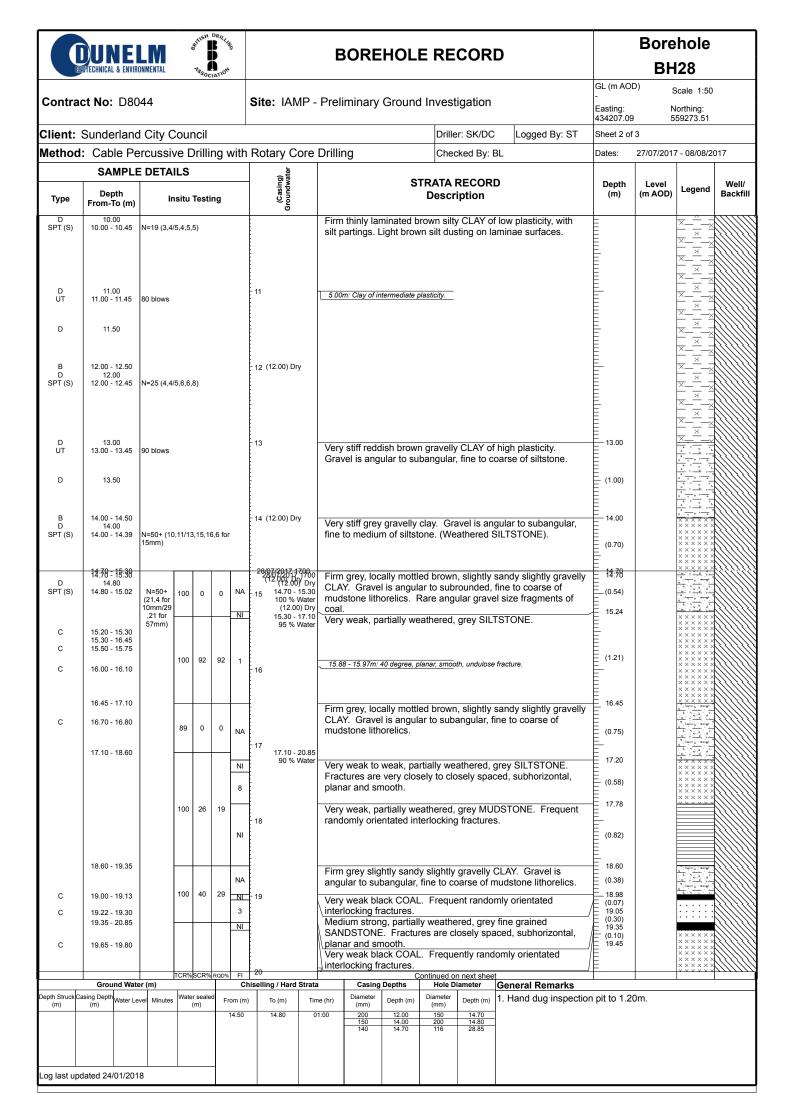


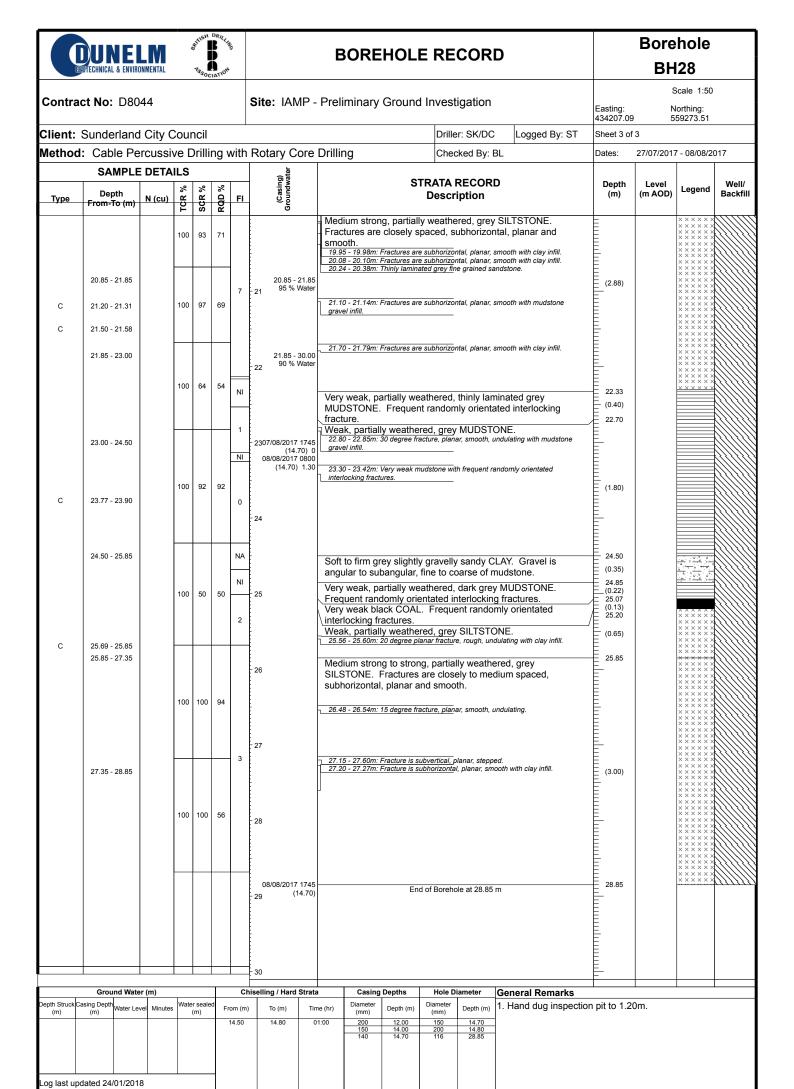
										C	ontinuea or	i next snee	et l l l
I			ınd Water			Chi	iselling / Hard	Strata	Casing	Depths	Hole Di	ameter	General Remarks
ľ	Depth Struck (m)	Casing Depth (m)	Water Leve	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 1.20 and 10.00m.
-	17.20	15.00	6.1	20		17.40	17.50	01:00	200	4.50	200	4.50	2. Water added between 1.25 and 16.56m.
- 1									150	15.00	150	17.40	
- 1											116	26.00	
l	Log last up	odated 24/	/01/2018										















BOREHOLE RECORD

Borehole BH30

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) 35.62

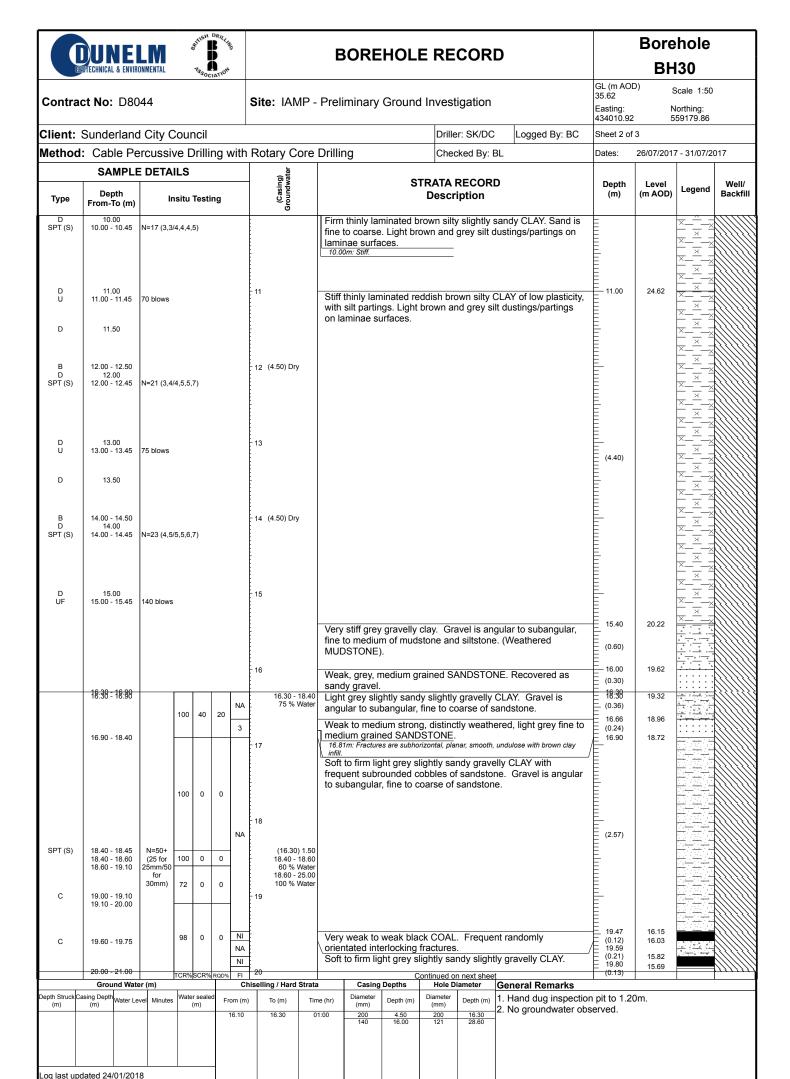
Scale 1:50 Northing: 559179.86

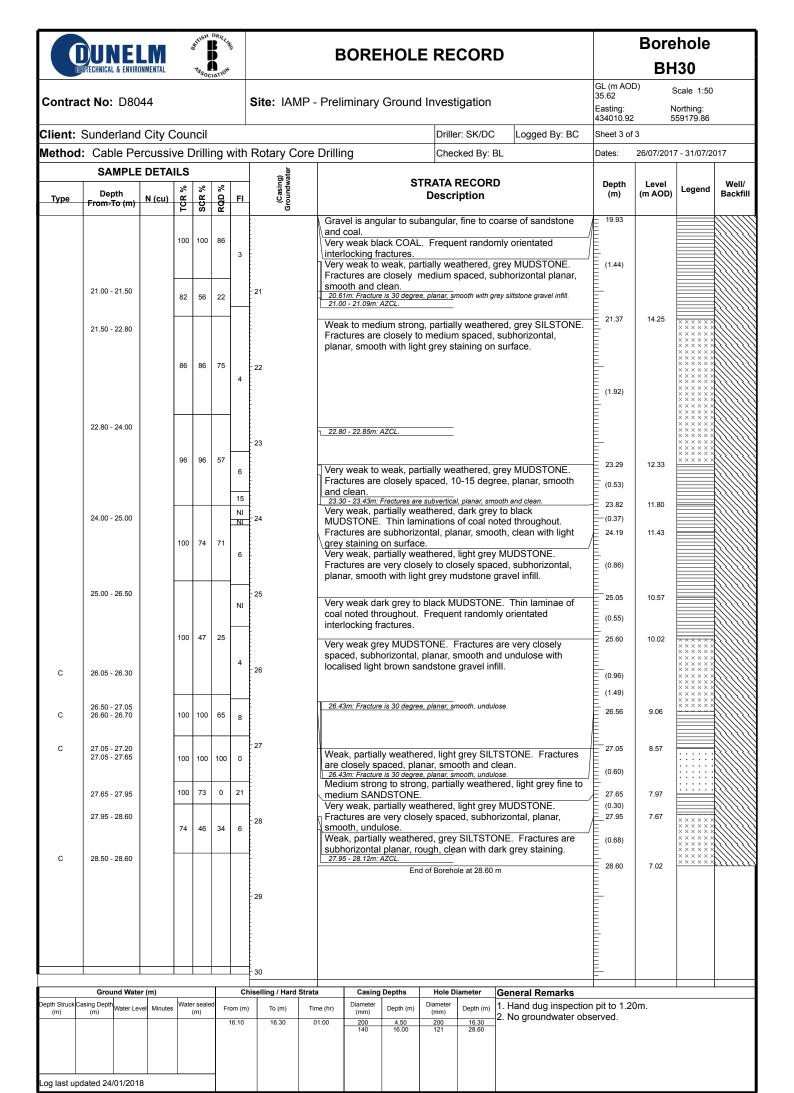
Client: Sunderland City Council

Driller: SK/DC

Easting: 434010.92 Logged By: BC Sheet 1 of 3

Depth From 15 kpq Profession Profess	Metho	d: Cable Pe	ercussiv	e Drillir	ng with I	Rotary C	ore Drill	ing		Che	cked By: E	BL		Dates:	26/07/201	7 - 31/07/2	017
### 100 1.20 1.00		SAMPLI	E DETAI	LS		g) ater				TD 4=1	DE005						
Copyright Copy	Туре		In	situ Testir	ng	(Casing Groundw				Descr	iption					Legend	Well/ Backfill
Coal, sandstone and brick. Coal, sandstone and brick. Coal, sandstone	ES D	0.10					top COS MA	soil. Graval and sand	vel is angi dstone. R JND: Firn	ular to su tootlets n n orangis	brounded oted. h brown s	, fine to co	dy gravelly	—	35.27		
### 12.00 2.45 N=14 (2.324.3.3) ### 2.00 2.45 N=14 (2.324.3.3.3) ### 2.00 2.45 N=14 (2.324.3.3.3.3) ### 2.00 2.45 N=14 (2.324.3.3.3.3.3) ### 2.00 2.45 N=14 (2.324.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.	U	1.20 - 1.65	120 blows			1						,		(1.35)			
Firm thrown slightly sarrely Signate State						2 (2 00) Dn	, ano	gular to su	brounded	d, fine to r	nedium o	f coal and	sandstone.	(0.30)			
D 3.00 - 3.45 110 blows	D	2.00	N=14 (2,3/2	2,4,3,5)		2 (2.00) 3.1	inte	ermediate	plasticity.	Gravel i	s angular				00.02		
### A	U	3.00 - 3.45	110 blows			3	3.0	00m: Stiff						(2.70)			
Firm thinky laminated brown slightly sandy gravelly CLAY 4.70 30.92 1.70 1.7	B D	4.00 - 4.50 4.00	N=14 (3,3/3	3,4,4,3)		4 (3.00) Dry	4.0	00m: Firm									
D 7.00 7.05 75 blows 7 5 blows 7 7 5 blows 7 7 5 blows 9 7 7.00m: Clay of intermediate plasticity. B 8.00 - 8.50 8.00 8.00 - 8.45 N=15 (3.4/3.4,3.5) 8 (4.50) Dry Firm thinly laminated brown silty slightly sandy CLAY. Sand is fine to coarse. Light brown and grey silt dustings/partings on laminae surfaces. D 9.00 9.00 9.00 9.00 9.45 75 blows 9 9.00m: Soft clay of intermediate plasticity. D 9.50 (3.00) 9.00 (3.	U	5.00 - 5.45	80 blows			5	Gra	avel is sub	angular t					4.70	30.92		
D 7.00 7.05 75 blows 7 5 blows 7 7 5 blows 7 7 5 blows 9 7 7.00m: Clay of intermediate plasticity. B 8.00 - 8.50 8.00 8.00 - 8.45 N=15 (3.4/3.4,3.5) 8 (4.50) Dry Firm thinly laminated brown silty slightly sandy CLAY. Sand is fine to coarse. Light brown and grey silt dustings/partings on laminae surfaces. D 9.00 9.00 9.00 9.00 9.45 75 blows 9 9.00m: Soft clay of intermediate plasticity. D 9.50 (3.00) 9.00 (3.	B D	6.00 - 6.50 6.00	N=14 (3,4/3	3,4,4,3)		6 (4.50) Dry	,							(3.30)			
SPT (S) 8.00 - 8.45 N=15 (3,4/3,4,3,5) N=15	U	7.00 - 7.45	75 blows			7	7.0	00m: Clay of ii	ntermediate	plsaticity.				-			
B 10.00 - 10.50	D	8.00	N=15 (3,4/3	3,4,3,5)		8 (4.50) Dry	fine	e to coarse	e. Light br					8.00	27.62	××	
B 10.00 - 10.50	U	9.00 - 9.45	75 blows			9	9.0	00m: Soft clay	of intermed	iate plasticit	ı.			(3.00)		××	
Ground Water (m) Chiselling / Hard Strata Casing Depths Hole Diameter General Remarks General Remarks Depth (m) Diameter (mm) Diamete	B	10.00 - 10.50												(3.00)		××	
(iii) (iiii) 2 No groundwater cheened						selling / Hard	Strata			Hole D		General I					
16.10 16.30 01:00 200 4.50 200 16.30 16.30 16.30 16.00 121 28.60	epth Struck (m)	(m) Water Le	evel Minutes		FIOIII (III)			(mm)		(mm)					Um.		
					16.10	16.30	01:00	200 140	4.50 16.00	200 121	16.30 28.60	g.o					







Client: Sunderland City Council



BOREHOLE RECORD

Borehole BH31

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) 35.18

Scale 1:50

Northing: 559031.39

Easting: 433642.91 Logged By: ST/ BC Driller: PK/DC Sheet 1 of 3

13.80 18.50

Log last updated 24/01/2018

Method	: Cable Pe	rcussive Drillin	g with Rotary Core	Drilling Checked By: BL	Dates:	26/07/201	7 - 11/08/2)17
	SAMPLE	DETAILS	vater	STRATA RECORD				
Туре	Depth From-To (m)	Insitu Testin	(Casing)	Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES BRE D	0.10 0.10 0.20 0.20			MADE GROUND: Brown slightly sandy slightly gravelly clayey topsoil with some rootlets present. Gravel is angular to subrounded, fine to coarse of coal and sandstone.	(0.50)			
ES B D ES D ES B BRE	0.20 0.40 - 0.90 0.40 0.40 0.70 0.70 0.80 - 1.20 0.80		-1	MADE GROUND: Orangish brown slightly sandy gravelly clay of high plasticity. Gravel is subangular to subrounded, fine to coarse of coal, sandstone and brick.	0.50	34.68		
D B UT BRE D	1.50 1.50	6 blows		Firm reddish brown slightly sandy gravelly CLAY. Gravel is	1.70	33.48		
D B BRE D ES SPT (S)	1.65 2.00 - 2.45 2.00 2.00 2.00 2.00 - 2.45	N=9 (2,2/2,2,2,3)	2 (1.80) Dry	angular to subrounded, fine to medium of coal and sandstone. Firm brown slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subrounded, fine to medium of coal and sandstone.	2.00	33.18		
BRE D	2.50 2.50 2.50 3.00 - 3.50	14-5 (2,2/2,2,2,3)	(1.80) Dry 27/07/2017 0800 (1.80) Dry		(2.00)			
UT D BRE	3.00 - 3.45 3.45 3.50	9 blows		3.00m: Stiff	(2.00)			
D BRE B D	3.50 3.70 4.00 - 4.45 4.00		-4 (3.10) Dry	Soft, thinly laminated brown silty CLAY. Light brown and grey	4.00	31.18	×	
SPT (S) B BRE	4.00 - 4.45 4.40 - 4.90 4.50	N=5 (1,1/1,2,1,1)		silt dustings/partings on laminae surfaces.			X—————————————————————————————————————	
BRE D UT	5.00 5.00 5.00 - 5.45	15 blows	- 5	5.00m: Clay of intermediate plasticity.			X—————————————————————————————————————	
D BRE	5.45 5.70						XX	
B D SPT (S) BRE	6.00 - 6.45 6.00 6.00 - 6.45	N=8 (1,2/1,2,2,3)	6 (3.10) Dry				XX	
UT	7.00 - 7.45	15 blows	- 7		-		× × × × × × × × × × × × × × × × × × ×	
D	7.45						× - ×	
BRE B D SPT (S)	7.70 8.00 - 8.45 8.00 8.00 - 8.45	N=7 (1,1/2,1,2,2)	8 (3.10) Dry		(8.60)		X——X X——X	
BRE D	8.50 8.70				(8.60)		X—————————————————————————————————————	
UT	9.00 - 9.45	10 blows	9	9.00m: Clay of high plasticity.			X—————————————————————————————————————	
D BRE	9.45 9.70						X—————————————————————————————————————	
В	10.00 - 10.45	1	10 (9.90) Dry	Continued on next sheet	f			
Depth Struck Co	Ground Water asing Depth (m) Water Le	10/	Chiselling / Hard Strata From (m) To (m) Tin	a Casing Depths Hole Diameter General Remarks ne (hr) Diameter (mm) Diameter (mm) Depth (m) 1. Hand dug inspectio	n pit to 1.2	Om.		





13.80 18.50

Log last updated 24/01/2018

BOREHOLE RECORD

Borehole BH31

GL (m AOD) 35.18 Contract No: D8044 Site: IAMP - Preliminary Ground Investigation Easting: 433642.91 Northing: 559031.39

Scale 1:50

Logged By: ST/ Client: Sunderland City Council Driller: PK/DC

Sheet 2 of 3

	I: Cable Pe				na	with	Rotary C	ore	Drilli	na		Chec	ked By: I	<u>BC</u> BL	Dates:	26/07/201	7 - 11/08/20	017
	SAMPL				9				T									
Туре	Depth From-To (m)			ı Testi	ing		(Casing) Groundwater				S	TRATA I Descri		D	Depth (m)	Level (m AOD)	Legend	Well/ Backfil
D SPT (S)	10.00 10.00 - 10.45	N=6 (1,1/	1,1,2,	2)								orown silty n laminae		ight brown and grey			××	
BRE UT	10.50 11.00 - 11.45	8 blows					- 11		11.0	0m: Clay of	high plasticit	ły.					X	
D	11.45																× ×	
BRE	11.70														E		××	
B D SPT (S)	12.00 - 12.45 12.00 12.00 - 12.45	N=7 (1,1/	2,1,2,	2)			12 (10.90) D	ry							<u>=</u>		×x ×x	
BRE D	12.50 12.70								Firm dust	thinly lai	minated rings on la	eddish br iminae su	own silty rfaces.	CLAY. Light grey silty	12.60	22.58	× ×	
UT	13.00 - 13.45	40 blows					- 13										× × ×	
D BRE	13.45 13.70																××	
B D SPT (S)	14.00 - 14.45 14.00 14.00 - 14.45	N=32 (9,7	7/7,8,8	3,9)			14 (10.90) D	ry	14.0	Om: Stiff.							×——×	
BRE	14.50																× × × ×	
UT	15.00 - 15.45	70 blows					15		15.0	0m: Clay of	low plasticity	/.			(5.20)		× × ×	
D BRE	15.45 15.70																× × ×	
							- 16										× – ×	
B D SPT (S)	16.30 - 16.75 16.30 16.30 - 16.75	N=41 (5,7	7/8,11,	,11,11)			(16.10) Di	ry									×——×	
BRE UT	16.80 17.00 - 17.45	80 blows					- 17										× × ×	
D BRE	17.45 17.70																× × ×	
D B D SPT (S)	17.70 17.90 18.00 - 18.45 18.00 18.00 - 18.40	N=50+ (7	,9/11, ⁻	15,15,9	9 for	30mm)	- 18 (17.90) D	ry	angi					velly, CLAY. Gravel is mudstone and	17.80	17.38	^X	
BRE D SPT (S)	18.50 18.70 18.70 - 18.88	N=50+ (2	5 for 7	70mm/3	30,20	0 for	(18.10) D								(1.20)			
	19:88 - 28:38	35mm)				NA	19 (18,10) D	20.30 Water 1700	Grav	to stiff revel is ang	ular to su	ey slightly ibrounded	sandy sl I, fine to o	ightly gravelly CLAY. coarse of sandstone,	19:88	16.18		
С	19.50 - 19.75		100		55		20	_	Stro	ng, partia ned SANI	Illy weath DSTONE orizontal,	. Fracture , planar a	es are clo nd smoot	fine to medium sely to medium h with light brown silt	19.50	15.68	<u> </u>	
	Ground Wat	er (m)	TCR9	%SCR%	6 RQD		²⁰ hiselling / Hard	Strate	a	Casino	Depths	Continued or Hole Di	n next shee	General Remarks				
Depth Struck C	Casing Depth Water L			er seale	ed	From (m			me (hr)	Diameter	Depth (m)	Diameter	Depth (m)	Hand dug inspection	on pit to 1.2	:0m.		
(m)	(m) Water Le			(m)	- -	13.80			0:30	(mm) 200	15.00	(mm) 200	15.00					





Method: Cable Percussive Drilling with Rotary Core Drilling

BOREHOLE RECORD

Borehole BH31

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.18

Dates:

Scale 1:50 Northing: 559031.39

Client: Sunderland City Council

Driller: PK/DC
Checked By: BL

Easting: 433642.91 ged By: ST/ Sheet 3 of 3

PK/DC Logged By: ST/

26/07/2017 - 11/08/2017

C 20.06 - 21.00 100 100 100 100 2 2 2 2 2 2 2 2 2	wethou	: Cable Pe	cussi	ve L	ווווזכ	ng v	MILII	Rolary Core	Drilling Checked By: BL	Dates:	26/07/201	7 - 11/08/20	J17
C 28.90, 24.00	SAMPLE	DETA	ILS				ater						
20.00 21.89 C 20.06 - 21.00 100 100 100 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Туре		N (cu)	TCR %	SCR %	RQD %	FI	(Casing Groundwa				Legend	Well/ Backfill
C 21.81 - 21.29 100 100 100 100 100 100 100 100 100 10	С			100	100	93	_	95 % Water					
C 23.30 - 23.45 100 100 100 100 100 100 100 100 100 10	С	21.75 - 21.85 21.80 - 23.20		100	100	100	2	95 % Water	1tu	E			
Very weak to weak, partially weathered, dark grey 2.28	С	23.20 - 24.70 23.30 - 23.45		100	100	100		23.20 - 24.70	coarse grained SANDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth, undulose and clean.	(0.81)			
27	С	24.40 - 24.55					, b	11/08/2017 1700 (18.70) 2.60	Very weak to weak, partially weathered, dark grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth and clean. 24.00 - 24.06m: 30 degree, planar, smooth, undulose. 24.14 - 24.17m: Subhorizontal, planar, smooth with light grey clay infill. Medium strong to strong, partially weathered, light grey fine to coarse grained SANDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth, undulose and clean.	(0.29) 24.17 (0.53) 24.70	11.01		
28								26					
30 -								27					
30 -								28					
teroung wister (m) Chicalling / Hard Strate Cacing Denths Hald Diameter Cacanal Demants		Ground Motor	or (m)			_	C1	hiselling / Hard Strat	a Casing Depths Hole Diameter General Remarks				

		ına vvater (,		Cnise	eiling / Hard	Strata	Casing	Deptns	Hole D	ameter	General Remarks
Depth Struct (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
					13.80	14.00	00:30	200	15.00	200	15.00	
1				l [18.50	18.70	01:00	150	18.10	150	19.00	
1								140	18.70	116	24.70	
Log last u	pdated 24	/01/2018										





Borehole BH32

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 36.15 Easting: 433925.45

Scale 1:50 Northing: 559106.83

Client: Sunderland City Council

13.5

Log last updated 24/01/2018

Driller: PK/DC

Logged By: BC Sheet 1 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling	Checked By: B
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Dates: 26/07/2017 - 04/08/2017

wetnoa	: Cable Pe	rcussiv	e Drillir	ig with	Rotary	Core	זווווזט	ng		Che	скеа ву:	BL	Dates:	26/07/201	7 - 04/08/20	J17
	SAMPLE	DETAII	LS		(Bu	water			S	TRATA	RECOR	D	Depth	Level		Well/
Туре	Depth From-To (m)	Ins	situ Testir	ng	(Casing)	Ground					ription	_	(m)	(m AOD)	Legend	Backfill
D ES B D ES	0.10 0.10 0.30 - 0.60 0.30 0.30 0.70 - 1.20						sand coar MAD to su	dy topsoil se of san DE GROU ubrounde	. Gravel i: idstone, li JND: Darl	s subang mestone k grey gr	ular to su and brick avelly sar	ayey, slightly gravelly abrounded, fine to c. nd. Gravel is angular andstone, limestone	(0.20) 0.20 (0.40) 0.60	35.95 35.55		
D ES U	0.70 0.70 1.20 - 1.65	5 blows			-1		high	light brow plasticity	. Gravel i	s subang	slightly gr gular to su and coal	avelly CLAY of very abrounded, fine to l.	0.60			
D BRE ES B D SPT (S)	1.65 1.90 1.90 2.00 2.00 2.00 - 2.45	N=4 (1,1/1,	1,1,1)		-2 (1.80) Dry							(2.70)			
BRE U	2.50 3.00 - 3.45	14 blows			-3											
D BRE B	3.45 3.70 4.00 - 4.45				-4 (2.90) Dry	inter	mediate	plasticity.	Gravel is		avelly CLAY of ular to subrounded, nd coal.	3.30	32.85		
D SPT (S) BRE	4.00 4.00 - 4.45 4.50	N=7 (1,1/1,2	2,2,2)										(2.80)			
U D BRE	5.00 - 5.45 5.45 5.70	10 blows			5		5.001	m: Firm								
D SPT (S) BRE	6.00 6.00 - 6.45 6.60	N=8 (1,1/2,2	2,2,2)		6 (2.90) Dry	suba	angular to	rounded	, fine to	coarse of	avelly CLAY. Gravel is sandstone and ands noted.	6.10	30.05		
U	7.00 - 7.45	12 blows			7		7.00	m: Clay of in	ntermediate į	plasticity.						
B D SPT (S) BRE	8.00 - 8.45 8.00 8.00 - 8.45	N=8 (1,2/2,2	2,2,2)		8 (2.90) Dry										
U	9.00 - 9.45 9.45	10 blows			- 9											
BRE B	9.70 10.00 - 10.45				10 (2.90) Dry				Continued	n next shee	et	(7.70)			
	Ground Wate			Ch	iselling / F	lard Strat	a	Casing	Depths		iameter	General Remarks	-1		1	
Depth Struck Ca	asing Depth (m) Water Le	vel Minutes	Water sealed	From (m)	To (m	,	me (hr)	Diameter	Depth (m)	Diameter	Depth (m)	1. Hand dug inspection	n pit to 1 2	:0m		
(m) 13.80	(m) Water Le		(m) 14.00	16.80	17.00		01:00	(mm) 200	2.90	(mm) 200	2.90		F 10 1.12			





BOREHOLE RECORD

Borehole BH32

Contract No: D8044

Site: IAMP - Preliminary Ground Investigation

| 36.15 | Easting: | 433925.45 |

GL (m AOD) 36.15

Scale 1:50 Northing: 559106.83

Client: Sunderland City Council

Driller: PK/DC

Logged By: BC Sheet 2 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: BL Dates: 26/07/2017 - 04/08/2017

	SAMPLE	DETA	ILS				g) .ater			0.	TDATA F	ECOP	D				
Туре	Depth From-To (m)	lı	nsitu	Test	ing		(Casing) Groundwater			5	TRATA F Descri		U	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D SPT (S) BRE	10.00 10.00 - 10.45 10.50	N=6 (1,2/	1,2,1,2	2)					Soft dark brow subangular to limestone. Oc	rounded	, fine to c	oarse of	avelly CLAY. Gravel is sandstone and ands noted.				
U	11.00 - 11.45	10 blows					- 11		11.00m: Clay of h	igh plasticity	у.						
D	11.45													Ē			
BRE	11.70													E			
B D SPT (S)	12.00 - 12.45 12.00 12.00 - 12.45	N=12 (1,2	2/2,3,3	,4)			- 12 (2.90) Dry										
BRE	12.50																
U	13.00 - 13.45	10 blows					- 13										
D	13.45													E			
BRE B D	13.70 14.00 - 14.45 14.00						- 14 (2.90) Dry	Z	coarse of sand	dstone ar	nd limesto	one.	ular to rounded, fine to	13.80 (0.10) 13.90	22.35 22.25		
SPT (S) BRE	14.00 - 14.45 14.50	N=16 (3,3	3/3,4,4	,5)						vel is ang	jular to su		d, fine to coarse of				
U	15.00 - 15.45	50 blows					- 15							(2.45)			
D	15.45																
BRE B D	15.70 16.00 16.00						- 16 (15.90) Dry										
SPT (S)	16.00 - 16.45 16.50	N=48 (5,5	5/7,9,1	0,22)					Very dense gr				l is angular to /eathered rock).	16.35	19.80		
D	16.70								Suburigular, iii	10 000	130 01 311	310110 (**	editioned rook).	(0.95)			
D SPT (S)	17.00 17.00 - 17.19	N=50+ (18 8mm)	8,7 for	30mr	n/45,	5 for	17 (16.90) Dry										
С	1 7:38 - 17:98 17.60 - 17.70		100	83	60	1 1	17.30 - 19 90 % Wa	9.30 ater	closely spaced	Fractured, rough	es are sub undulatin	horizont g, clean.	al, very closely to Occasional	17:38 	18.85		
	17.90 - 19.30					NI 9	- 18		subvertical clo		ieaium sp	oaced, sr	nooth stepped with	Ē			
С	18.40 - 18.50		100	94	44									(2.02)			
						8	- 19										
	19.30 - 20.80					10	19.30 - 20 100 % Wa		MUDSTONE.	Fracture d, rough	es are sub	horizont	eathered, dark grey al, very closely to partly open with	19.32 (0.50)	16.83		
			TCR%	SCR9	% RQD		20			С	ontinued or			(0.15) 19.97	16.18		
anth Struck	Ground Water Le	1	Mate	er seale	ed		iselling / Hard St		Diameter	Depths	Hole Di Diameter	ameter	General Remarks	4 O	0		
(m) 13.80	(m) Water Le	vel Minutes 20	*	(m) 14.00	F	16.80	To (m)		1:00 Diameter (mm) 1:00 200 150 140	2.90 16.90 19.20	(mm) 200 150 116	2.90 17.00 26.40	1. Hand dug inspection	ι μιι το 1.2	UIII		





Borehole BH32

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 36.15 Easting: 433925.45

Scale 1:50 Northing: 559106.83

Client: Sunderland City Council

Driller: PK/DC

Logged By: BC Sheet 3 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 26/07/2017 - 04/08/2017

	SAMPLE	DETA	ILS				ater					
Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfil
	, ,		-	S	~	11		Occasional subhorizontal, very closely to closely spaced,	E			
			99	99	72			rough undulating with localised clay infill. Highly weathered from 19.60m.	(0.51)			
С	20.50 - 20.70					6		\Very weak to weak black COAL. Extremely weak to very weak, partially weathered, dark grey	20.48	15.67	×××××× ××××××	
	20.80 - 22.20					7 NI	20.80 - 23.40 80 % Water	MUDSTONE. Fractures are subhorizontal, very closely to closely spaced, rough undulating with localised clay infill.	20.80	15.35	××××××	
							- 21	Occasional subhorizontal, very closely to closely spaced,				
			100	86	64	6		rough undulating with localised clay infill. Weak to medium strong, partially weathered, light grey	(0.88)			
						NI		SILTSTONE. Fractures are subhorizontal, closely to medium spaced, rough undulating with localised clay infill.	E			
						50		Medium strong to strong, partially weathered, grey	21.68 (0.26)	14.47		
С	22.00 - 22.20					5 NI	22	\MUDSTONE. Very weak to weak black COAL.	21.94	14.21		
С	22.20 - 22.50 22.20 - 23.40					INI		Medium strong to strong, partially weathered, grey	E			
	22.20 20.40							MUDSTONE. Fractures are subhorizontal, very closely to closely spaced, rough undulating, clean.	Ē			
			100	89	89				Ē			
С	23.00 - 23.10						- 23		(1.76)			
C	23.05					- V I			E			
	23.40 - 24.90					12	23.40 - 26.40					
							90 % Water		23.70	12.45		
						5		Strong to very strong, partially weathered, grey fine grained SANDSTONE. Fractures are subhorizontal, closely to medium	25.70	12.43		
			100	93	85	ľ	- 24	spaced, rough, undulating.				
						NI			(1.05)			
						6			E			
								Medium strong to strong, partially weathered, grey	24.75	11.40		
	24.90 - 26.40						25	MUDSTONE. Fractures are subhorizontal, very closely to				
						6		closely spaced, rough undulating, clean. Occasional subvertical closely to medium spaced, smooth stepped with	E			
			100	94	75	0		local clay infill.	(1.65)			
С	25.70 - 25.80								E (1.03)			
							26					
						NI 0			Ē			
								End of Borehole at 26.40 m	26.40	9.75		
									E			
									E			
							- 27		Ē			
									E			
									E			
									E			
							- 28					
									E			
									E			
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							29		Ē			
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									Ē			
						-	- 30		Ē			
					1		E 311					1

		nd Water (Chis	elling / Hard	Strata	Casing	Depths	Hole Di	ameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m
13.80	13.50			14.00	16.80	17.00	01:00	200	2.90	200	2.90	
								150	16.90	150	17.00	
								140	19.20	116	26.40	
Log last u	pdated 24/	/01/2018										



18.80

Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH35

 Contract No: D8044
 Site: IAMP - Preliminary Ground Investigation
 GL (m AOD) 34.46 Scale 1:50
 Scale 1:50

 Easting: 433863.41
 Northing: 433863.41
 558923.32

Client: Sunderland City Council Driller: PK/DC Logged By: ST Sheet 1 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: BL Dates: 19/07/2017 - 21/07/2017

	SAMPLE	DETAILS		ig) vater			6.	TD A T A .	וברטפי	n	.	l		147
Туре	Depth From-To (m)	Insitu Testi	ng	(Casing) Groundwater			5	TRATA I Descri		ט	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES	0.10 0.20				to		ome rootl	ets prese	nt. Grave	gravelly, clayey el is angular to andstone.	(0.50)			
B BRE D ES B	0.60 - 1.00 0.60 0.60 0.60 1.00 - 10.45			1	s s	slightly grave	lly clay of	intermed	iate plast	lly grey slightly sandy, ticity. Gravel is m of coal and	0.50	33.96		
U	1.20 - 1.65	15 blows									(1.15)			
D BRE ES	1.65 1.90 1.90		<u> </u>	2 (1.80) Dry	l p	Stiff brown sli plasticity. Gra	vel is and	dy gravel gular to su	ly CLAY oubrounde	of intermediate d, fine to coarse of	1.65	32.81		
B D SPT (S) BRE	2.00 - 2.45 2.00 2.00 - 2.45 2.50	N=16 (2,3/3,4,4,5)									(1.80)			
U	3.00 - 3.45	17 blows		3							<u></u>			
D BRE	3.45 3.70				ir		plasticity.	Gravel is	subangu	ghtly gravelly CLAY of lar to subrounded,	3.45	31.01		
B D SPT (S)	4.00 4.00 4.00 - 4.45	N=10 (2,1/2,2,3,3)		4 (3.10) Dry										
BRE	4.50										(2.55)			
U D	5.00 - 5.45 5.45	12 blows		5										
BRE B	5.70 6.00 - 6.45			6 (3.10) Dry							6.00	28.46		
D SPT (S) BRE	6.00 6.00 - 6.45 6.50	N=5 (1,2/1,1,2,1)		((0.10) Diy	0	Soft laminate occasional gr and sandston	avel band	silty slight ls. Grave	ly gravelly I is subar	y CLAY with ngular, fine of coal	5.50	20.40	× - ×	
U	7.00 - 7.45	13 blows		7		7.00m: Clay of h	izh ulantinit						× - ×	
D	7.45					7.00m. Clay of m	igri piasticity.						× - ×	
BRE B	7.70 8.00 - 8.45			8 (7.80) Dry									× - ×	
D SPT (S) BRE	8.00 8.00 - 8.45 8.50	N=6 (1,1/2,1,1,2)											× - × × - × × - ×	
U	9.00 - 9.45	12 blows		9							E (6.70)		× × × · × · × · × · × · × · × · × ·	
D BRE	9.45 9.70										(6.70)		× - × - × - × - × - × - × - × - × - × -	
D	10.00			10 (9.90) Dry							E		X X	
	Ground Wate		Chi	selling / Hard	Strata	Casing	Depths	ontinued or Hole Di		t General Remarks	1		1	
pth Struck C	asing Depth Water Le	evel Minutes Water seale	ed From (m)	To (m)	Time (h	hr) Diameter	Depth (m)	Diameter		1. Hand dug inspection	n pit to 1.2	0m.		
(m) 18.80	(m) Water Ed	(m)	16.30	16.70	01:00	(111111)	18.80	(mm) 200	3.10		•			





BOREHOLE RECORD

Borehole BH35

GL (m AOD) 34.46 Easting: 433863.41 Scale 1:50 Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

Northing: 558923.32

01:	0	I Oite : O il			Della a DICIDO	I I D . OT	433863.41		58923.32	
		d City Council			Driller: PK/DC	Logged By: ST	Sheet 2 of			
Method		ercussive Drilling with		Drilling	Checked By: BL		Dates:	19/07/2017	7 - 21/07/2	017
Туре	Depth	Insitu Testing	(Casing) Groundwater		ATA RECORD escription		Depth (m)	Level (m AOD)	Legend	Well/ Backfill
SPT (S)	From-To (m)	N=6 (1,2/1,2,2,1)	5	Coft laminated brown silts	aliabth, aroually C	N AV with				
BRE	10.50	N=0 (1,21,2,2,1)		Soft laminated brown silty occasional gravel bands. (and sandstone.					X - X	
U	11.00 - 11.45	12 blows	- 11	11.00m: Clay of intermediate plas	ticity.		<u> </u>		^X	
D BRE	11.45 11.70								X - X	
B D SPT (S)	12.00 - 12.45 12.00	N=7 (1,2/2,1,2,2)	12 (11.90) Dry				= - - - - - - - - - - - - - - - - - - -		× - × · × · × · × · × · × · × · × · × ·	
BRE D U	12.70 12.80 13.00 - 13.45	60 blows	13	Stiff brown slightly sandy g subrounded, fine to coarse 13.00m: Clay of low plasticity.			12.70	21.76	,	
D BRE	13.45 13.70									
B D SPT (S)	14.00 - 14.45 14.00 14.00 - 14.45	N=33 (5,5/7,7,8,11)	- 14 (13.90) Dry							
BRE	14.50									
U	15.00 - 15.45	70 blows	15				(5.00)			
D BRE	15.45 15.70									
B D SPT (S)	16.00 - 16.36 16.00 16.00 - 16.36	N=50+ (7,12/13,14,23 for 60mm)	- 16 (15.90) Dry				<u>-</u>			
BRE B D	16.50 16.70 - 17.04 16.70		(16.60) Dry							
SPT (S) BRE	16.70 - 17.04 17.20	N=50+ (9,11/16,19,15 for 35mm)	17							
D B D	17.80 18.00 - 18.34 18.00		- 18 (17.80) Dry	Reddish brown weathered	SILTSTONE. Re	covered as gravel.	17.70	16.76	× × × × × × × × × × × × × × × × × × ×	
SPT (S)		N=50+ (9,12/14,18,18 for 40mm)					(1.26)		X X X X X X X X X X X X X X X X X X X	
	18:98 18:98 - 18:98	N _{\(\bar{1}\)50\(\bar{1}\)425 for 35mm/50 for 30\(\bar{2}\)70 7 92 73 50}	- 19 (18.50) Dry 18.50) Dry 18.90 - 23.90	Medium strong, partially w			18.96	15.50	*****	
c c	19.00 - 19.20 19.40 - 20.90	30mm/50 for 30mm) 92 73 50 11	100 % Water	medium grained SANDST spaced, undulose, rough v			(1.62)			
	18.40 - 20.80	TCR%SCR%RQD% FI	20	0	auad an naut ah aa'		(1.62)			
	Ground Wate	er (m) Ch	l niselling / Hard Strata	a Casing Depths	nued on next sheet Hole Diameter Ge	eneral Remarks	1	1	l	1
Depth StruckC (m) 18.80	asing Depth (m) Water Le	well Minutes Water sealed (m) From (m) 16.30 17.00 18.80	16.70 C	(mm) Depth (iii) (01:00 150 18.80 00:45 140 18.90	meter mm) Depth (m) 1. 200 3.10 150 18.90 116 23.90	Hand dug inspection	pit to 1.2	Om.		





Borehole BH35

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) 34.46

Scale 1:50 Northing: 558923.32

Client: Sunderland City Council

Driller: PK/DC

Easting: 433863.41 Logged By: ST Sheet 3 of 3

	oundenand								Dillici. I TODO	Logged by. O1	Officer of of			
lethod:	: Cable Pe	rcussi	ve E	Orilli	ng ι	with	Rotary Core	Drilling	Checked By: BL		Dates:	19/07/2017	7 - 21/07/2	017
	SAMPLE													
Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	STR D	ATA RECORD Description		Depth (m)	Level (m AOD)	Legend	Well Back
											E			
			100	100	55						Ē			
						7		Medium strong, partially w	veathered, yellowis	sh brown medium	20.52	13.94		
	20.90 - 22.40							to coarse grained SANDS	STONE		E			
						12	21				F			
											E			
			100	93	72						E			
						5					Ē			
							22				E			
С	22.40 22.60										(3.38)			
	22.40 - 22.60 22.40 - 23.90										Ē			
						12					E			
			100	100	62		23				F			
С	23.30 - 23.75													
						6					Ē			
											23.90	10.56		
							- 24	End of	Borehole at 23.90 m		E_20.50	10.50		
											Ē			
											Ē			
											Ē			
							25							
											Ē			
											Ē			
							26				E			
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							- 29				E			
											Ē			
											Ē			
											Ē			
	l .	L					- 30				F			

	Grou	nd Water (m)		Chis	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
18.80	18.80				16.30	16.70	01:00	150	18.80	200	3.10	
					17.00	17.30	00:45	140	18.90	150	18.90	
					18.80	18.90	01:00			116	23.90	
Log last u	pdated 24/	/01/2018										





BOREHOLE RECORD

Borehole BH36

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.96 Easting: 434057.88

Scale 1:50

Driller: RL/DC

Logged By: ST/ Sheet 1 of 3 Northing: 559025.36

Client: S	underland	I City C	ouncil						Drille	er: RL/DC	BC	Sheet 1 o	f 3		
lethod:	Cable Pe	rcussiv	e Drillir	g with F	Rotary Co	ore Drilli	ng		Chec	ked By: Bl	-	Dates:	21/07/2017	7 - 24/07/20	J17
Туре	SAMPLE Depth		LS situ Testin	ıq	(Casing) Groundwater			ST	TRATA I Descri	RECORD iption		Depth (m)	Level (m AOD)	Legend	Well/ Backfil
ES	0.20				- 6	tops	oil. Grave	el is angula	ar to sub	rounded, fi	ghtly gravelly claye ne to coarse of	y = (0.50)			
ES	0.50					MAE	DE GROU	JND: Oran	ngeish br	own locally	grey gravelly clay.	0.50	35.46		
U	1.20 - 1.65	32 blows		1		Sand Firm Grav	dstone ar	nd brick. lightly grav	velly CLA	AY of intern	nediate plasticity. o coarse of coal and	1.00	34.96		
В	2.00			 - -2	2							(2.00)			
D SPT (S)	2.20 2.20 - 2.65	N=11 (2,2/2	2,3,3,3)												
B U	3.00 3.20 - 3.65	45 blows		-5	3	occa	asional gr of coal a	lightly san ravel band nd sandsto	s. Grave one.	tly gravelly Il is subang	CLAY, with ular to subrounded	3.00	32.96		
D	3.70					3.20	m. Olay Orn	nemediate p	idolloity.						
D SPT (S)	4.20 - 4.65 4.20 - 4.65	N=15 (3,3/4	1,3,4,4)	- 2	ı										
B U	5.00 5.20 - 5.65	45 blows		- 5	5	5.20	n: Clay of h	igh plasticity.							
D	5.65			- 6	6										
D SPT (S)	6.50 - 6.95 6.50 - 6.95	N=13 (4,3/3	3,4,3,3)												
В	7.00 - 7.50			7	,										
U	8.00 - 8.45	55 blows		- 8	3	8.00	m: Clay of lo	ow plasticity.							
D	8.50			- 6)							(11.25)			
D SPT (S)	9.50 9.50 - 9.95	N=14 (4,4/4	4,3,4,3)												
В	10.00 - 10.50				10		T .			n next sheet		F			<u> </u>
epth Struck Casin	Ground Water ng Depth (m) Water Lev		Water sealed		elling / Hard S		Casing Diameter	Depths	Hole Di Diameter		Seneral Remarks . Hand dug inspect	ion nit to 1 ?	20m		
(m)	(m) Water Le	vei iviinutes	(m)	From (m) 17.00	To (m) 17.20	Time (hr) 01:30	(mm) 200	7.50	(mm)	7.50	. Hand day mapect	10.11 pit tO 1.2	.0111.		
							140 150	16.80 17.20	150 140	17.20 22.00					





BOREHOLE RECORD

Borehole BH36

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation GL (m AOD) 35.96

Scale 1:50

Northing: 559025.36

Client: Sunderland City Council

Easting: 434057.88

Logged By: ST/ Driller: RL/DC Sheet 2 of 3

	: Cable P				na v	with I	Rotary C	ore	Drillir	าต				cked By:	<u>BC</u> BL	Dates:		7 - 24/07/2	.017
		E DETA						70.0		·9			0	J. 10 a 2 y . 1					
Туре	Depth From-To (m)	T .		Testi	ing		(Casing) Groundwater					ST	RATA Descr	RECOR iption	D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
									occa	brown s sional gr of coal a	avel ba	and	s. Grave	tly gravel Il is subai	ly CLAY, with ngular to subrounded,				
U	11.00 - 11.45	42 blows					· 11		11.00	Om: Clay of	high plas	ticity	<u>. </u>						
D	11.50																		
							· 12												
SPT (S)	12.50 - 12.95	N=27 (5,6	6/6,7,7	',7)					12.50	0m: Stiff									
D B	12.95 13.00 - 13.50						- 13									14.25			
UF	14.00 - 14.45	65 blows					· 14		Grev	, weathe	red ML	IDS	TONE I	Recovere	d as a gravelly clay.	14.25	21.71		
B D	14.50 - 16.00 14.50														coarse of mudstone.	E			
							· 15												
D SPT (S)	15.50 15.50 - 15.95 16.00	N=45 (7,9	/9,12,	,12,12)			40									(2.55)			
D	16.30 - 18.00						16												
D SPT (S)	16.30 - 18.00 17.00 17.00 - 17.18	N=50+ (10,15/50 for	98	79	48	A	24/07/2017 (24/07/2017 (16.80) 17 (16.80 - 100 %	22.00	spac	STONE. ced, smo	Fractuoth ste	ires ppe	are sub d with o	horizonta ccasional	ered, light grey II, closely to medium I clay infill. Occasional ulating fractures.	18:88	19.16	××××× ××××× ××××× ××××× ×××××	
D SPT (S)	17.20 17.20 - 17.25	27mm) N=50+ (25 for 35mm/50	90	79	40	NI 50		-	Very Wea	weak to	weak l	blac	ck COAL g, partial	 ly weathe	ered, grey	17.62 (0.12) 17.74	18.34 18.22	×××××× ×××××××	
	18.00 - 19.30	for 15mm)				A 6 NI	· 18		spac	ed, smo	oth ste	ppe	d, clean		ered, light grey	(0.59)	17.63	× × × × × × × × × × × × × × × × × × ×	
			94	88	82	5			SILT		Fractu	ires	are sub		II, closely to medium	(1.09)		××××× ××××× ××××× ×××××	
	19.30 - 20.80						· 19		Mad	ium otro	na to ot	ros	a portic	lly worth	ered, dark grey	(1.09)	16.54	××××× ×××××× ××××××	
			TOPS	/ 6000	DOD!	15	20		MUE	STONE	. Fractued, roug	ures gh, i matte	s are sub undulation ar noted.	ng, clean	al, very closely to	(0.66)			
	Ground Wa	ter (m)	II CR9	%SCR%	rQD%		selling / Hard	l Strata	1	Casing	Depths			n next shee iameter	General Remarks				<u> </u>
epth Struck ((m)	Casing Depth (m) Water I	r Level Minutes Water sealed (m) From (m) To (m) Time (hr) Diameter (mm) De 17.00 17.20 01:30 200 140								(mm) 200 140	7.50 16.80)	Diameter (mm) 200 150	Depth (m) 7.50 17.20	1. Hand dug inspectio	n pit to 1.	20m.		
										150	17.20		140	22.00					





Borehole BH36

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.96

Scale 1:50

Northing: 559025.36

Easting: 434057.88

Logged By: ST/ Sheet 3 of 3

Client: Sunderland City Council

Driller: RL/DC

Type From-To (m) N (cu) 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	017 - 24/07/2017	21/07/2017	Dates:	3L	Checked By: I	Drilling	Rotary Core	vith	ng v	Orilli	ve D	rcussi	: Cable Pe	Method:				
100 97 97 77				_	OTD 171 DECCE		g) ater											
100 97 97 77				D			(Casing Groundw	FI	RQD %	SCR %	TCR %	N (cu)	Depth From-To (m)	Туре				
Strong to very strong, partially weathered, light grey SILTSTONE. Fractures are subhorizontal, closely for medium spaced, rough stepped, partly open to open, clean. Occasional subvertical, smooth stepped, fractures 2224407/2017 1700 End of Borehoe at 22:00 m 23 24 25 26 27 27 28 29 20 21 05 14 30 21 05 14 30 22 15 2 - 21 62 21 05 14 30 22 15 30 22 15 30 End of Borehoe at 22:00 m 22 20 13 80 23 25 24 25 26 27 27	××××× ××××× ××××× ×××××× ××××××	15.88		ered, light grey I, closely to medium	es are subhorizonta	SILTSTONE. Frac		7										
222407720171700 End of Borehole at 122.00 m 223 23 24 25 27 27 28		14.90		I, closely to medium en, clean.	es are subhorizonta ed, partly open to op	SILTSTONE. Frac spaced, rough ste	21	4	79	97	100			С				
24	*****	13.96	22.00				- 2224/07/2017 1700 (16.80)											
25							- 23											
26							24											
27							25											
28							26											
							27											
29							- 28											
							29											
30							30											

		nd Water (Chise	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
					17.00	17.20	01:30	200	7.50	200	7.50	
								140	16.80	150	17.20	
								150	17.20	140	22.00	
-		l										
Log last u	pdated 24/	/01/2018										





Borehole BH37

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

Log last updated 24/01/2018

GL (m AOD) 33.86 Easting: 433894.58

Scale 1:50 Northing: 558838.05

Client: Sunderland City Council

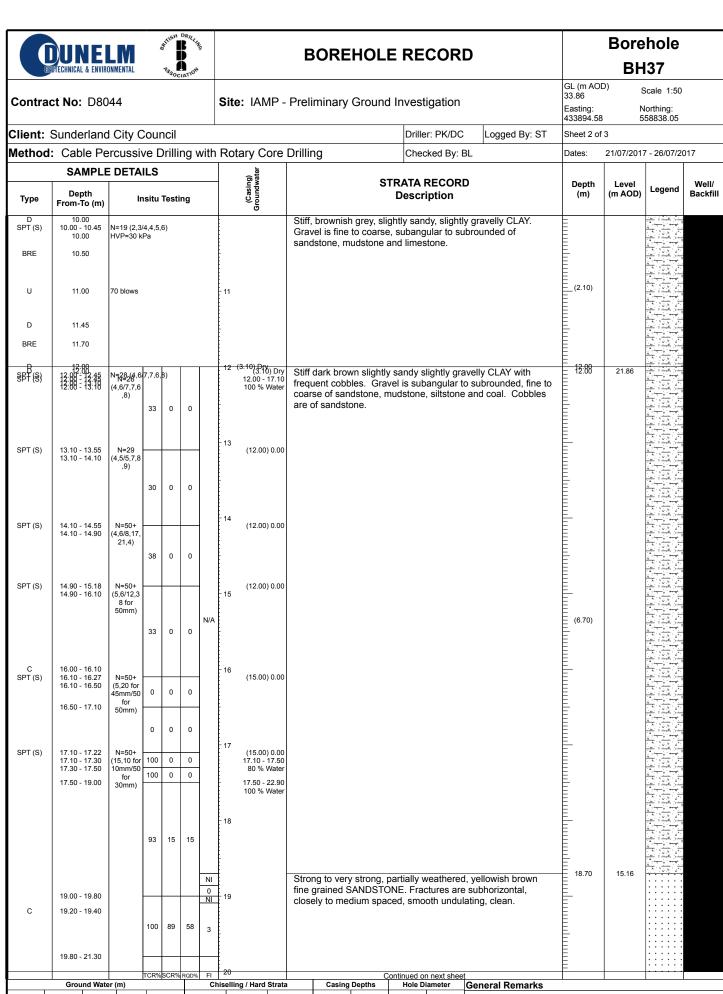
Driller: PK/DC

Logged By: ST Sheet 1 of 3

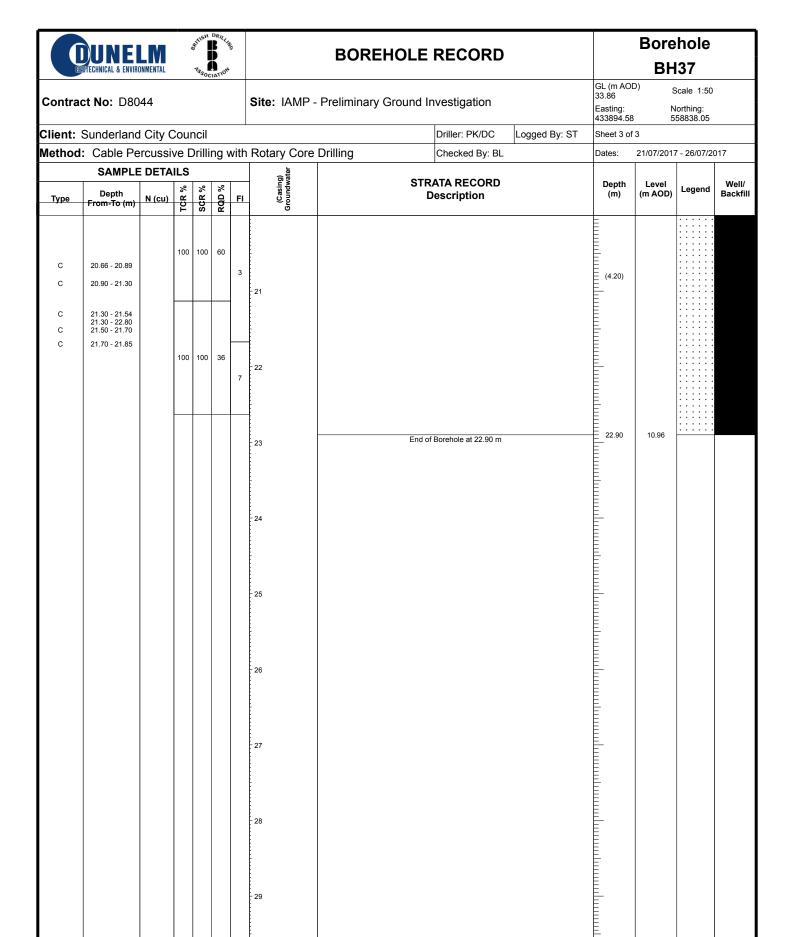
Method:	Cable Percussive	Drilling with	Rotar	v Core Drilling
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Checked By: BL Dates: 21/07/2017 - 26/07/2017

Metho	d: Cable Pe	ercussiv	e Drillir	ng with F	Rotary C	ore Dr	rilling		Chec	ked By:	BL	Dates:	21/07/2017	7 - 26/07/20	017
	SAMPLI	E DETAII	LS		g) /ater				TDATA	DECOR					
Туре	Depth From-To (m)	Ins	situ Testin	ng	(Casing) Groundwater			S	TRATA Descr		ט	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES B D ES	0.10 0.10 0.50 - 1.00 0.50 0.50					s S C	clayey TOPS subrounded coal. Firm, light b	SOIL. Grave of sandstone of san	vel is fine one, mude ntly sandy	to coarse stone, lim	andy, slightly gravelly e, subangular to lestone, brick and gravelly CLAY of	(0.40)	33.46		
	0.50	HVP=51 kP	'a		1	ii S	ntermediate subrounded	plasticity. of sandsto	Gravel is one, mud	s fine to o stone and	oarse, subangular to d coal.				
U	1.20 - 1.65	15 blows										(2.40)			
D BRE	1.65 1.90											(2.40)			
B D SPT (S)	2.00 - 2.45 2.00 2.00 - 2.45	N=14 (3,4/3	3,3,4,4)		2 (1.80) Dry	′									
BRE	2.50											2.80	31.06		
D U	2.90 2.90 3.00 - 3.45	HVP=21 kP 16 blows	⁴a		3	8	Soft, greyish Occasional	brown, si hinly lami	Ity CLAY nated silt	of intermo	ediate plasticity. oted.	E	31.00	×x	
D	3.45											E		×	
BRE	3.70													×	
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=6 (1,2/1,2	2,1,2)		4 (3.10) Dry	′								× × ×	
BRE	4.50													<u>×</u> <u>×</u> <u>×</u> <u>×</u> <u>×</u>	
U	5.00 - 5.45	14 blows			5							_		××	
D	5.45													× ×	
BRE	5.70											Ē		××	
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=6 (1,1/2,	1,1,2)	1	6 (3.10) Dry	′						(7.10)		×x	
BRE	6.50													××	
U	7.00 - 7.45	12 blows			7		7.00m: Firm							××	
D	7.45											E		××	
BRE	7.70											Ē		××	
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=7 (1,1/2,	1,2,2)		8 (3.10) Dry		8.00m: Sof							×——×	
BRE	8.50													×——× ×——×	
U	9.00 - 9.45	10 blows			9									×——×	
D	9.45											E		× × ×	
BRE D	9.70 9.90											9.90	23.96	^x	
. В В	10.00 - 10.45	<u></u>			10 (3.10) Dry				Continued o			- 9.90	23.90		
Depth Struck	Ground Water Le		Water sealed		selling / Hard		Diameter	g Depths	Hole D Diameter	iameter	General Remarks 1. Hand dug inspection	n nit to 1.2	0m		
(m)	(m) Water Le	evel Minutes	(m)	11.70	To (m)	01:00 01:00	") (mm)	12.00	(mm) 200	Depth (m)	No groundwater end CP section terminate	ountered.		hle/ hould	lor
				12.00	12.20	01:00	140	15.00	140	22.90	obstruction.	≂u αι 1∠.U!	OIII OII COD	DIE/ DOUIG	101



		ınd Water (Chis	elling / Hard	Strata	Casing	Depths	Hole D	iameter	General Remarks
Depth Struct (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	Hand dug inspection pit to 1.20m. No groundwater encountered.
					11.70	12.00	01:00	200	12.00	200	12.00	
					12.00	12.20	01:00	140	15.00	140	22.90	3. CP section terminated at 12.00m on cobble/ boulder
1												obstruction.
1												
1												
1												
1	1	1										
Log last ı	updated 24	/01/2018										



	Grou	nd Water ((m)		Chis	elling / Hard	Strata	Casing	Depths	Hole D	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	Hand dug inspection pit to 1.20m. No groundwater encountered.
					11.70	12.00	01:00	200	12.00	200	12.00	
					12.00	12.20	01:00	140	15.00	140		CP section terminated at 12.00m on cobble/ boulder obstruction.
Log last u	pdated 24/	/01/2018										





BOREHOLE RECORD

Borehole BH38

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.74 Easting: 433694.57

Scale 1:50 Northing: 558749.55

Client: Sunderland City Council

Driller: PK/DC

Sheet 1 of 3

Logged By: BC

	SAMPLE	DETAI	ILS		g) ater				_	TD 4 T 4	DE005					
Туре	Depth From-To (m)	In	ısitu Testir	ng	(Casing) Groundwater				S	TRATA I Descri		D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES	0.10 0.10											andy slightly gravelly	(0.30)			
D ES	0.30 0.40								i. Gravei , mudstor			ounded, fine to coarse	0.30	35.44		
В	0.40 0.40 0.50 - 1.00	HVP=70 kf	Pa				Stiff,	, brown n	nottled lig	ht grey, sl	lightly sa	ndy slightly gravelly	É			
BRE	0.50						roun	ay of inter ided, fine	mediate posts	olasticity. e of sands	Gravei i stone, mi	s subangular to udstone and coal.	E			
					-1			,			,		E			
U	1.20 - 1.65	22 blows											E			
													E			
D	1.65												(2.50)			
BRE	1.90												E			
B D	2.00 - 2.45 2.00				2 (1.60) Dr	у	2.00	m: Firm					F			
SPT (S)	2.00 - 2.45	N=13 (2,3/	3,3,3,4)										E			
BRE	2.50												E			
													Ē			
D	2.90						Soft,	, thinly la	minated,	greyish b	rown, silt	ty, slightly gravelly	2.80	32.94	× >e :-	
UT	3.00 - 3.45	29 blows			- 3				el is subar nd mudsto		subround	led, fine to coarse of	(0.80)		> ×	
													E (0.80)			
D	3.45												3.60	32.14	××	
BRE	3.70						Soft	greyish I	orown slig	htly sand	y slightly	clayey SILT.	(0.30)	02.11	$\times \times \times \times \times$	
D B	3.90 4.00 - 4.45				4 (1.60) Dr	v						dy, slightly gravelly	3.90	31.84	<u> </u>	
D SPT (S)	4.00 4.00 - 4.45	N=7 (1,1/2	2.1.2)			•						led, fine to coarse of	E			
			,_,,_,				Sanc	ustone, n	nudstone	and coal.			E			
BRE	4.50												E			
													E			
UT	5.00 - 5.45	12 blows			5		5.00	m: Firm					E			
													E			
D	5.45												E			
BRE	5.70												E			
													E			
B D	6.00 - 6.45 6.00				6 (1.60) Dr	у							E			
SPT (S)	6.00 - 6.45	N=10 (1,2/	2,2,3,3)										(4.80)			
BRE	6.50												E			
													E			
UT	7.00 - 7.45	12 blows			7								E			
I -													E			
D	7.45												E			
													E			
BRE	7.70												E			
					8								E			
B D	8.20 - 8.65 8.20				(1.60) Dr	у							E			
SPT (S)	8.20 - 8.65	N=16 (2,2/	3,3,4,6)										E			
BRE	8.70						Crite	brown!	h ara:: -!"	abth:	المحالمة	v gravally CLAV	8.70	27.04		
												y gravelly CLAY. coarse of sandstone,	E			
U	9.00 - 9.45	42 blows			9		mud	stone, lir	nestone,				E			
							9.00	m: Clay of lo	ow plasticity.				E			
D	9.45				-								E			
BRE	9.70												E			
В	10.00 - 10.45				10 (9.10) Dr	v				N			E			
	Ground Wate			Ch	iselling / Hard		a a	Casing	Depths	Ontinued or Hole Di	n next shee iameter	General Remarks				<u> </u>
Depth Struck (m)	Casing Depth (m) Water Le	vel Minutes	Water sealed (m)	From (m)	To (m)	Tin	ne (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspectio	n pit to 1.2	0m.		
()	···/	-	()	11.90	12.10	-	00:30	200	1.60	200	1.60	+				



Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH38

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation Easting: 433694.57

GL (m AOD) 35.74

Scale 1:50 Northing: 558749.55

Client: Sunderland City Council

Driller: PK/DC

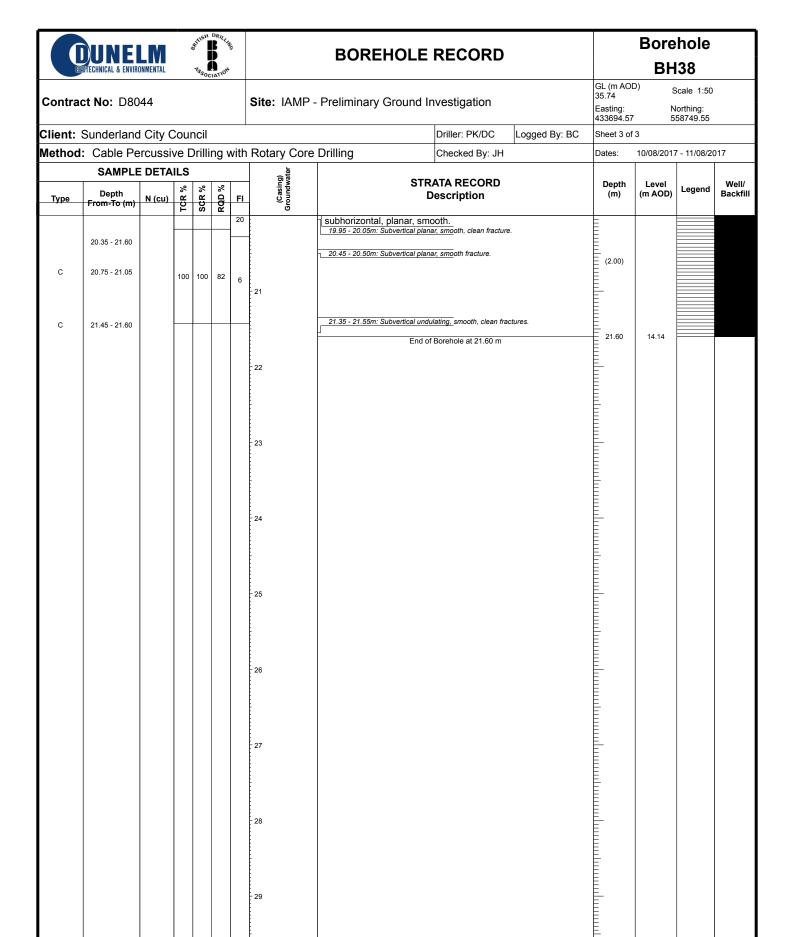
Logged By: BC Sheet 2 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: JH

Dates: 10/08/2017 - 11/08/2017

INIETHO	i: Cable Pe	cussi	ve L	ווווווכ	ııg '	witij	_		ore	ווווווט	iig		Cne	скеа ву:	. JH		Dates:	10/08/201	7 - 11/08/20	U 1 /
	SAMPLE	E DETA	ILS				_	ater				_								
Туре	Depth From-To (m)	lr	nsitu	Testi	ing		(Casing	Groundwater				S	TRATA Descr	RECOR ription	RD		Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D SPT (S)	10.00 10.00 - 10.45	N=34 (4,5	6,8,9	,11)												gravelly CLAY. arse of sandstone,	Ē			
											ver is sub Istone, lin					arse or sandstone,	E			
BRE	10.50						-										Ē			
																	E			
U	11.00 - 11.45	59 blows					11										E			
																	E			
D	11.45																E			
BRE	11.70						10/08/20										(6.00)			
							(9.10 11/08/20 12 (9.10	117 0	เลดด								E			
B D	12.00 - 12.45 12.00						(11.9)	0) Dr	y y								E			
SPT (S)	12.00 - 12.41	N=49 (19,	,6 for 3	35mm/9	9,10,1	15,15)											E			
BRE	12.50																E			
																	E			
U	13.00 - 13.45	52 blows					13										E			
																	E			
D	13.45																E			
BRE	13.70						-										E			
							[E			
B D	14.00 - 14.45 14.00						14 (12.1	0) Dr	У								F			
SPT (S)	14.00 - 14.30	N=50+ (5,	,7/10,4	10 for 7	70mm)											E			
BRE	14.50						E										E			
D	14.65 - 16.15 14.80									Verv	dense li	ght grey.	slightly c	layey, slic	ightl	ly sandy, GRAVEL.	14.70	21.04		
В	15.00 - 15.50						15 (12.1	0) Dr	у	Grav	vel is ang	ular to su	ıbangular			rse of mudstone	E			
D SPT (S)	15.00 15.00 - 15.32	N=50+ (8,	,11/14.	,26,10	for 25	5mm)			-	(vve	athered N	พบบราบ	IN⊏).				E			
1						•	-										(1.15)			
D	15.70						(12.1	U) D~	· ·								E			
SPT (S)	15.70 - 15.90	N=50+ (9, 15mm)	,16 for	35mm	1/42,8	for	F								_		15.85	46.00		
D	14.65 - 16.15 14.80		100		0	20	11/08/20 16 (12.1)	8 % [Water	LINALIE	emely we DSTONE					red brown baced	16.15	19.89 19.59		
B D SPT (S)	15.00 - 15.50 15.00 15.00 - 15.32	N=50+				A	11/08/	12.10	1700 I) Dry	subh	norizonta 0 - 16.15m:	l, planar,	smooth,	clean.			(0.30)			
371(3)	10.00 - 10.32	(8,11/14, 26,10 for				40	<u> </u>			Stiff	dark red	dish brow	n gravell	y CLAY. (Gra	avel is is angular to	16.45	19.29		
D	15.70	25,10 for 25mm)	100	70	0		<u> </u>			Suba	angular, f emely we	ine to coa	arse of sa	indstone.	e. ark i	red brown	/ 			
SPT (S)	15.70 - 15.90 16.15 - 17.45	N=50+ (9,16 for					17			MUE	DSTONE.	. Fracture	es are ext	remely cl	clos	ely to very closely	E			
	1.5.10	35mm/42 ,8 for					<u> </u>			spac	ced subh	orizontal,	planar, s	mooth, c	clea	ın.	E			
	17.45 - 18.95	15mm)				1	<u> </u>			17.3	0 - 17.45m:	Subvertical	planar, smo	oth, clean fra	ractu	ıre.	(2.50)			
						40	-										(2.50)			
						"											E (2.00)			
							- 18										Ē			
С	18.35 - 18.55		100	100	0												E			
							E										E			
С	18.65 - 18.95						<u> </u>			18.7	'4 - 18.77m:	Dark grev sa	andstone.				E			
	18.95 - 20.35					Α	18. - 19	.95 - 3	21.60 Water	Oritt				liahtly ara	ave	elly CLAY. Gravel is	18.95	16.79		
							10	i∪ % \	vvater		ular to su						(0.35)			
			86	43	13	NI										LAY. Gravel is	19.30	16.44		
			"	~		"					ular to su weak, p					own MUDSTONE.	19.60	16.14		
																sely spaced	E			
	Ground Water	or (m)	TCR%	SCR%	RQD%		120 niselling / h	Hord	Ctunt		Casir		Continued of	n next shee		lonoral Damaria	F			
Depth Struck	Casing Depth Water Le			er seale	ed F	rom (m)				ne (hr)	Diameter	Depths Depth (m)	Diameter	Depth (m)		eneral Remarks . Hand dug inspectio	n pit to 1.2	0m.		
(m)	(m) Water Le		-	(m)		11.90				0:30	(mm) 200	1.60	(mm) 200	1.60	Ή.		p			



			nd Water (,		Chise	elling / Hard	Strata	Casing	Depths	Hole Di	ameter	General Remarks
D	epth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
Г						11.90	12.10	00:30	200	1.60	200	1.60	
•						14.20	14.40	00:30	150	12.10	150	15.90	
•						15.50	15.70	01:00	140	16.00	116	21.60	
ı													
ı													
L													
L	og last u	pdated 24/	01/2018										





9.90 11.00

Log last updated 24/01/2018

BOREHOLE RECORD

Borehole BH39

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation GL (m AOD) 37.84

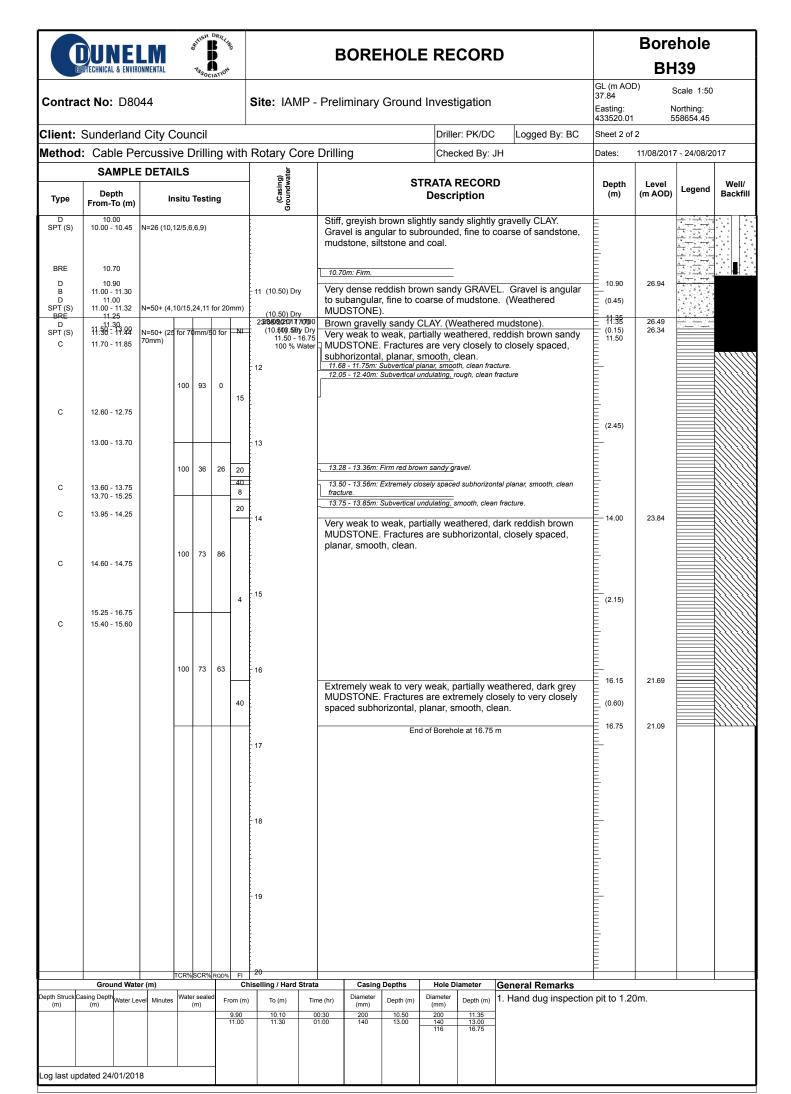
Scale 1:50

Client: Sunderland City Council

Driller: PK/DC

Easting: 433520.01 Logged By: BC Sheet 1 of 2 Northing: 558654.45

		a Oity Oddilon						_		
Method	: Cable Pe	ercussive Drilling	g with Rotary Core	Drilling	Checked By: J	JH	Dates:	11/08/2017	7 - 24/08/20)17
	SAMPLE	E DETAILS	iter							
Туре	Depth From-To (m)	Insitu Testing	(Casing)		ATA RECORI Description	0	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES	0.20 0.20 0.20 0.20	HVP=24 kPa		Dark brown slightly sandy Gravel is subangular to ro mudstone and coal.	ounded, fine to c	coarse of sandstone,	(0.30)	37.54		
B D ES	0.50 - 1.20 0.50 0.50 0.70	HVP=67 kPa		Firm light brown slightly s high plasticity. Gravel is s coarse of sandstone, muc	subangular to su	ubrounded, fine to	(0.90)			
BRE D D UT	1.00 1.00 1.20 1.20 - 1.65	22 blows	- 1 : :	Firm brown mottled dark of CLAY of high plasticity.	Gravel is subang	ular to subrounded,	1.20	36.64		
D BRE	1.65			fine to coarse of sandstor	ie and mudston	e.				
B D SPT (S)	2.00 - 2.45 2.00 2.00 - 2.45	N=10 (1,2/2,2,3,3)	- 2				(1.80)			
BRE	2.50		11/08/2017 1700 (1.60) Dry 23/08/2017 0800							
UT D	3.00 - 3.30	23 blows	3 (1.60) Dry	Firm greyish brown silty, s plasticity.	slightly sandy Cl	LAY of intermediate	3.00	34.84	X———X	
B BRE D	3.40 - 3.90 3.50 3.90						3.90	33.94	^x xx	
B D SPT (S)	4.00 - 4.50 4.00 4.00 4.00 - 4.45	N=16 (3,3/4,4,3,5)	4 (3.90) Dry	Stiff, greyish brown slight Gravel is angular to subro mudstone, siltstone and o	ounded, fine to c	gravelly CLAY. coarse of sandstone,		33.94		
BRE	4.50									
UT	5.00 - 5.45	87 blows	5	5.00m: Clay of low plasticity.						
D BRE	5.50 5.70									
B D SPT (S)	6.00 - 6.50 6.00 6.00 - 6.45	N=19 (4,3/4,4,5,6)	6 (5.90) Dry							
BRE	6.70	00 hlavor	_							
UT	7.00 - 7.45	80 blows	,				(7.00)			
D BRE	7.50 7.70									
B D SPT (S)	8.00 - 8.50 8.00 8.00 - 8.45	N=23 (3,4/4,5,7,7)	- 8 (7.90) Dry							
BRE	8.70									
UT D	9.00 - 9.30 9.35	100 blows	9	9.00m: Clay of intermediate plas	ticity.					
BRE	9.70									
В	10.00 - 10.50	-	10 (9.90) Dry	Cont	inued on next sheet	•	F			
	Ground Wate	er (m)	Chiselling / Hard Strata			General Remarks	•	•		
Depth Struck C (m)	asing Depth (m) Water Le	evel Minutes Water sealed (m)	From (m) To (m) Tin		iameter (mm) Depth (m)	1. Hand dug inspection	pit to 1.2	0m.		



Contract No: D8044 Client: Sunderland City Council

Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH40

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 38.97

Scale 1:50 Northing: 558582.52

Easting: 433340.02 Driller: RH/DC Logged By: BC Sheet 1 of 2

Method	I: Cable Pe	ercuss	ive I	Drilli	ng v	with	Rot	ary Core	Drilling	Checked By:	JH	Dates:	25/08/201	7 - 04/09/2	017
	SAMPLI	E DETA	AILS					ater			_				
Туре	Depth From-To (m)		nsitu	Testi	ng			(Casing) Groundwater		ATA RECOR Description	D	Depth (m)	Level (m AOD)	Legend	Well/ Backfi
D ES B D	0.20 0.20 0.20 0.50 - 1.20 0.50	HVP=25	kPa						Dark brown slightly sand Gravel is subangular to re mudstone, siltstone and Firm dark brown mottled	ounded, fine to coal. light grey slight	coarse of sandstone,	(0.30)	38.67		
ES BRE D B	0.50 0.50 0.70 1.00 1.00 1.20 - 1.70	HVP=67	kPa				1	Dry	gravelly CLAY of intermeto rounded, fine to coarse siltstone.						
D SPT (S)	1.20 1.20 - 1.65	N=16 (1,	3/4,4,4	i,4)					i.zom. sun			(2.00)			
BRE U	1.90 2.20 - 2.65	57 blows					2		Very soft greyish brown s	ilty sandy CLA	Y. Sand is fine to	2.30	36.67	×	
B D BRE	2.50 - 3.00 2.70 2.90						- 3		coarse.			(0.90)		X— —x X— —x X— —x	
B D SPT (S)	3.20 - 3.70 3.20 3.20 - 3.65	N=17 (2,	2/3,4,5	i,5)				(3.00) Dry	Stiff brown slightly gravel plasticity. Gravel is subar sandstone, mudstone and	gular to round		3.20	35.77	× × × × × × × × × × × × × × × × × × ×	
BRE UF	3.90 4.20 - 4.70	54 blows					-4					(1.40)		× - ×	
B D SPT (S) BRE	4.70 - 5.20 4.70 4.70 - 5.15 4.90	N=12 (2,	3/3,3,3	3,3)			-5	(3.00) Dry	Firm greyish dark brown of low plasticity. Gravel is coarse of sandstone, much	subangular to	subrounded, fine to	4.60	34.37		
BRE U	5.40 5.70 - 5.90	100 blow	s									5.80	33.17		
D D SPT (S)	5.95 6.20	N=50+ (2	(5 for 5	5φmm/5	0 for	AZC	6	(3.00) Dry 6.30 - 11.85	Very dense brownish gre Gravel is angular to suba (Weathered SILTSTONE	ngular, fine to		(0.60)	32.57		
С	8:38 - 9:38 8:38 - 6:58	50mm)				L		95 % Water	Firm dark brown sandy g subangular, fine to coarse	e of mudstone.		(0.15)	32.42	• • • • •	
			95	76	28	30	7		Very weak, partially weat MUDSTONE. Fractures a subhorizontal, planar, sm 7.00m: Subvertical, stepped, sm	are closely to ve ooth, clean.	ery closely spaced				
	7.35 - 8.85					A 30			7.80 - 7.86m: Subvertical undula	<u>ting, sm</u> ooth, clean	fracture.				
			90	73	16		8		8.35 - 8.42m: Subvertical planar	smooth, clean frac	ture.	(3.40)			
	8.85 - 10.35		100	100	26	12	-9		8.82m: Subvertical, planar, smoo 9.00- 9.85m: Subvertical undular		racture.				
			TODA	6SCR%		FI	10			linuad en en tra		9.95	29.02		
	Ground Wat			∞p∪K%	RUD%		iselli	ng / Hard Strat		tinued on next she Hole Diameter	General Remarks	1	1	1	1
epth Struck ((m)	Casing Depth (m) Water Le	evel Minute	Wate	er seale (m)	-	om (m) 6.00			me (hr) Diameter (mm) Depth (m) Depth (m) Diameter (mm) Diameter (mm) Diameter (mm) Depth (m) Diameter (mm)	planeter (mm) Depth (m) 116 6.30 200 6.30 116 11.85	1. Hand dug inspection	n pit to 1.2	Om.		



epth Struck Casing Depth (m) (m)

og last updated 24/01/2018

Water seale (m)

From (m)

To (m)

Minutes



BOREHOLE RECORD

Borehole BH40

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation GL (m AOD) 38.97

Scale 1:50 Northing: 558582.52

Client: Sunderland City Council

Driller: RH/DC

Easting: 433340.02 Logged By: BC Sheet 2 of 2

1. Hand dug inspection pit to 1.20m.

Method:	Cable Percussive Drilling with Rota	ry Core Drilling
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etiiou.				<i>-</i> 11111	ııy \	vvilil	Rotary Core	i Dulling	Checked By: J	"11	Dates:	25/08/2017	- 04/09/2	017
	SAMPLE	DETA		T			'ng) water	STR	ATA RECORI)	Depth	Level		Well/
уре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater		escription		(m)	Level (m AOD)	Legend	Backfi
			<u> </u>	0,	<u> </u>			Weak, partially weathered	, dark grey SIL	TSTONE. Fractures	E		××××× ××××××	11111
	10.35 - 11.85							are very closely to closely smooth, clean.	spaced subhor	izontal, planar,	E		XXXXXX	
	10.00						-	Smooth, clean.			E		*****	
						4					E		× × × × × × × × × × × × × × × × × × ×	
			100	100	94		- 11	10.95 - 11.00m: Subvertical undu	lating, smooth fractu	re.	(1.90)		× × × × × × × × × × × × × × × × × × ×	
											Ē		××××××	
											E		× × × × × ×	
							[11.50 - 11.65m: At 50-90 degree,	undulating, rough fra	actures,	E		× × × × × ×	
								End of	Borehole at 11.85 i	m	11.85	27.12	××××××	[[]]
							12	Liid oi	borenole at 11.05					
											E			
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	Ground Water	er (m)	Wate		_	CI	hiselling / Hard Stra			General Remarks 1. Hand dug inspection				

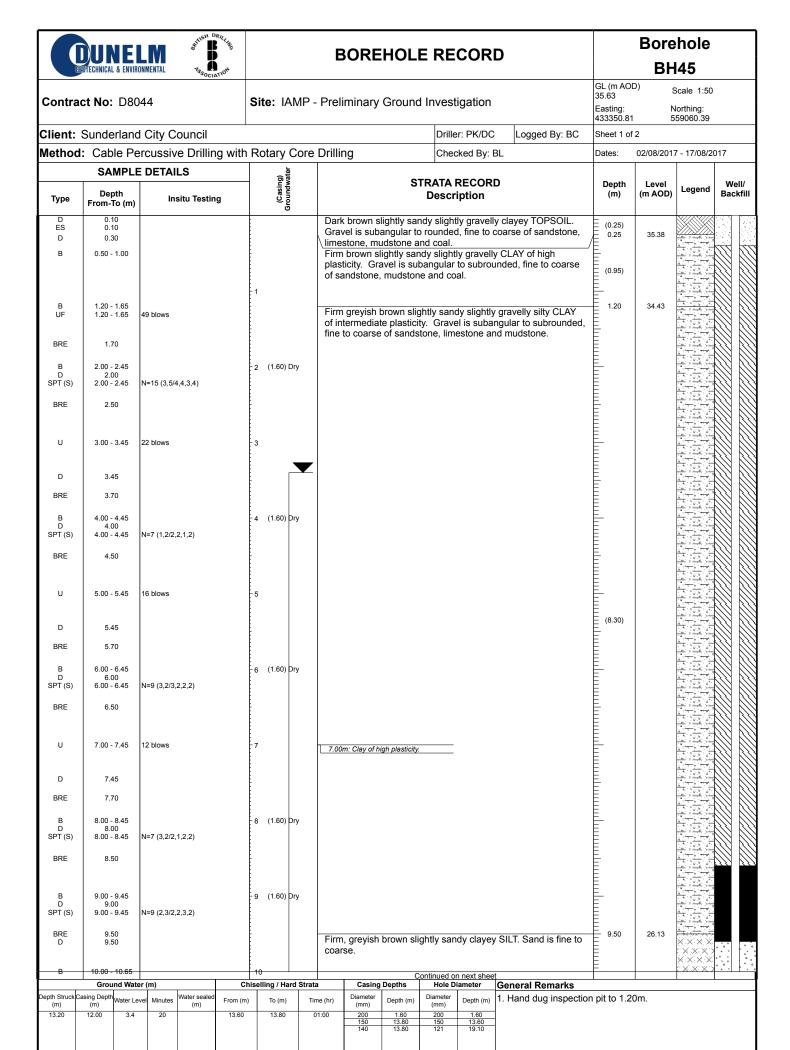
Diameter (mm)

Time (hr)

Diameter (mm)

Depth (m)

Depth (m)



Contract No: D8044 Client: Sunderland City Council

Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH45

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.63

Scale 1:50 Northing: 559060.39

Easting: 433350.81 Driller: PK/DC Logged By: BC Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 02/08/2017 - 17/08/2017

Method	I: Cable Pe	ercussi	ve [Drilli	ng v	vith	Rotary (Core	Drillir	ng		Chec	ked By: E	BL			Dates:	02/08/2017	7 - 17/08/2	017
	SAMPLE	DETA	ILS)) ater													
Туре	Depth From-To (m)	lr	nsitu	Testi	ng		(Casing) Groundwate				S	TRATA I Descr		D			Depth (m)	Level (m AOD)	Legend	Well/ Backfill
UF	10.00 - 10.64	4 blows							Firm		brown sli	ightly san	dy clayey	y SILT. §	Sand is f	ine to	(1.20)		× × × × × × × × × × × × × × × ×	
BRE D U	10.70 10.70 11.00 - 11.45	7 blows					- 11		plast	ticity. Gra	avel is su	ghtly grav bangular and coal.	to rounde				10.70	24.93		
D BRE D B D	11.45 11.70 11.90 12.00 - 12.45 12.00						- 12 (11.90)[Ory	12.00	0m: Stiff.							(2.00)		X x X x X x X x	
SPT (S) BRE D	12.00 - 12.45 12.50 12.80	N=30 (4,5	/6,7,8	,9)								htly sand bangular					12.70	22.93	X x	
B D SPT (S) BRE	13.20 - 13.65 13.20 13.20 - 13.65 13.60	N=39 (4,4	/6,8,1	0,15)			13 (12.10)4	ory	sand	Istone, m	udstone	and coal.					(0.90)	22.03		
D D	13.70 13.80	N-50 - /8	47/40	#0 for	-10		03/08/2017	1700	suba	angular, f		n sandy G arse of sa				ar to	(0.45)			
SPT (S) C	13:80 = 14:90 14:00 = 14:90	N=50+ (8,	100	80	80	1) NI	(13,89) (14 (13,80) 3	7-177.70 Water	Medi medi	ium grair norizontal	ed SANE	ly weathe DSTONE. smooth, u	Fracture	es are c	losely sp		14.05	21.58		
С	14.70 - 14.90 14.90 - 15.90		91	91	49	NI 0 A	- 15		14.62 brow	2 - 14.72m:	gravel infill	subhorizonta 	l, planar, rou	ugh, undul	ating with n	eddish				
С	15.80 - 15.90 15.90 - 16.30		90	90	90	A	- 16			6 - 15.77m: 0 - 15.94m:		80 degrees, p	olanar and si	mooth.			(3.80)			
С	16.90 - 17.20		100	100	91	1	- 17		16.46 16.46	6m: Fracture 6 - 16.56m:	e is 10 degre Fractures ar	ees, planar, s e 30 degree	smooth with g s, planar, rou	grey clay ugh with g	infill. Irey clay inf	äll.				
C	17.70 - 19.10 18.00 18.20 - 18.40					NA 6	17.70 75 %	- 19.10 6 Water	Grav Medi	el is ang ium stror	ular to sung to stron	n slightly s ibangular ng, partial NDSTON	, fine to colly weathe	oarse o	of sandsto ht brown	one. fine	17.70 (0.23) 17.93 (0.27) 18.20	17.93 17.70 17.43		
			100	80	62	4			\spac Medi SAN \subh	ced, subh ium stror IDSTONE norizontal	orizontal, ig, partial E. Fractu I, planar,	, planar, s ly weathe res are cl smooth a	mooth ar ered, light osely to r nd clean.	nd clear grey fir medium	n. ne graine i spaced	ed,	(0.50)	16.93		
							19		to co spac 18.82 18.92 slight	oarse gra ced, subh 2m: Fracture 2 - 18.99m:	ined SAN orizontal, es are 20 de Fractures ar clay infill. Gi	ng, partial IDSTONE , planar, s gree, planar, e subhorizor ravel is angu	E. Fractui mooth ar smooth with ntal, planar, s lar to subang	res are nd clear h black cla smooth wi gular, fine	closely 1. ay infill. ith reddish	brown	19.10	16.53		
	Ground Wate	er (m)	TCR%	SCR%	RQD%		iselling / Har	d Strata	a	Casino	Depths	Hole D	iameter	Gener	al Rema	rks		1		
epth Struck C (m) 13.20		T i		er seale (m)	-	om (m)		Tin	ne (hr)	Diameter (mm) 200 150	Depth (m) 1.60 13.80	Diameter (mm) 200 150	Depth (m) 1.60 13.60				n pit to 1.2	0m.		



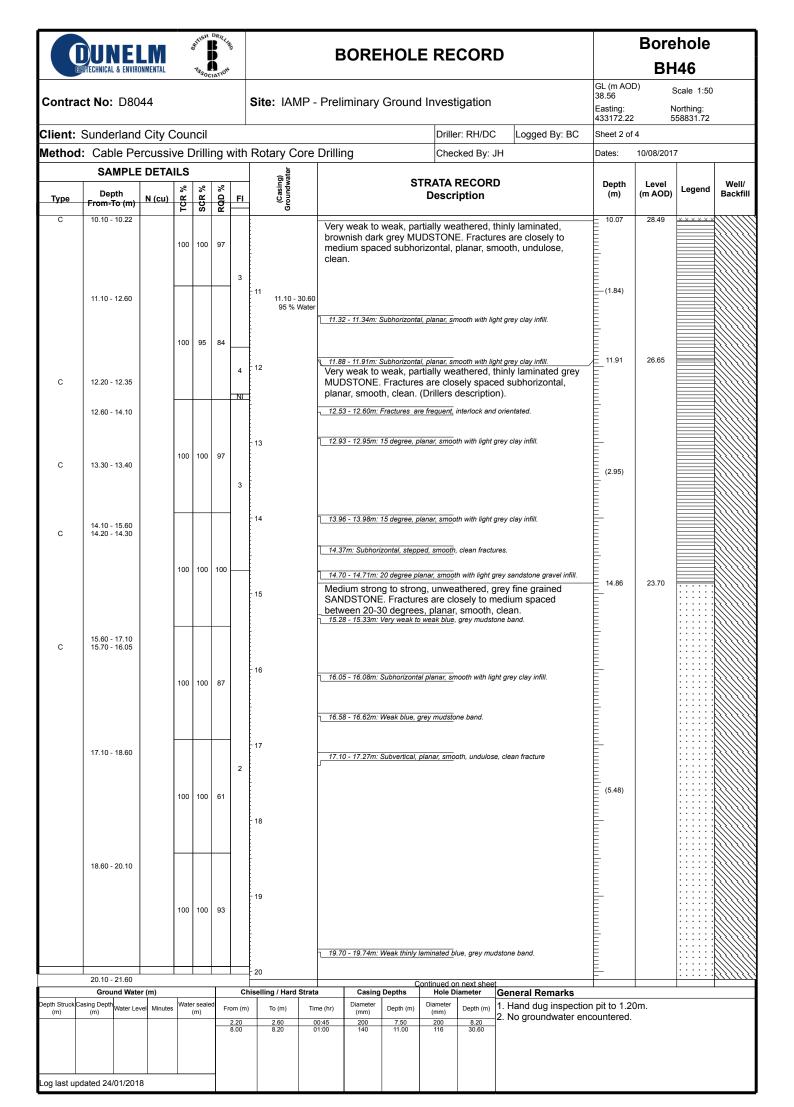


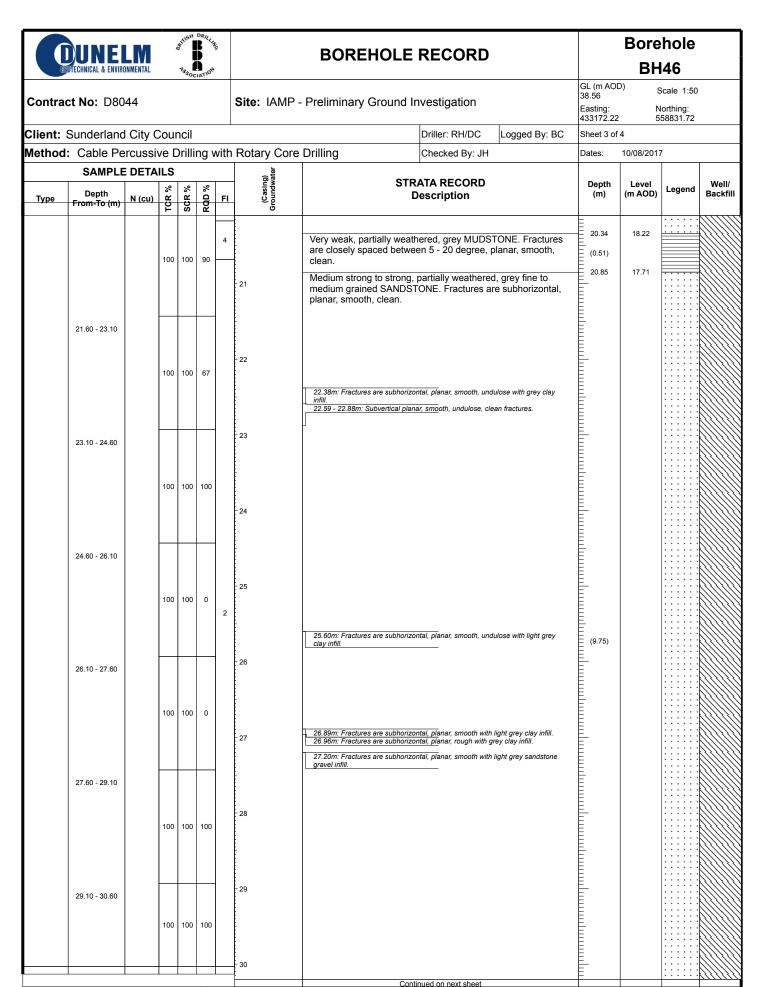
Borehole BH46

GL (m AOD) 38.56

Scale 1:50 Northing:

Contrac	ct No: D80)44		Site: IAMP -	Preliminary Ground Ir	vestigation		38.56 Easting: 433172.22	N	lorthing:	
Client:	Sunderland	l City Council	l			Driller: RH/DC	Logged By: BC	Sheet 1 of		58831.72	
				Rotary Core	Drilling	Checked By: JH		Dates:	10/08/2017	7	
	SAMPLE	DETAILS		ater							
Туре	Depth From-To (m)	Insitu Tes	ting	(Casing) Groundwater		ATA RECORD escription		Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES ES B D	0.20 0.40 0.50 0.60 - 1.20 0.60	HVP=57 kPa			Dark brown slightly sandy TOPSOIL. Gravel is suba sandstone, mudstone, silt Firm brownish grey slightl Gravel is subangular to su sandstone, mudstone, silt	ingular to rounded, f stone and coal. y sandy slightly grav ibrounded, fine to co	rine to coarse of velly CLAY.	(0.10) (0.10) (0.40) (0.50)	38.46 38.06		
BRE D UT	1.00 1.00 1.20 - 1.65	54 blows		1	noted. Stiff orangish brown, mottl gravelly CLAY of intermed to subrounded, fine to coacoal.	led grey, slightly sar liate plasticity. Grav	ndy slightly rel is subangular	(1.70)			
BRE D B D SPT (S)	2.00 2.00 2.20 - 2.70 2.20 2.20 - 2.29	N=50+ (25 for 40mm 50mm)	n/50 for	2 (2.00) Dry	Stiff greyish brown slightly occasional cobbles. Grav coarse of sandstone, mud are of sandstone.	el is subangular to r	ounded, fine to	2.20	36.36		
B BRE D B UT	3.00 3.00 3.00 3.20 - 3.70 3.20 - 3.65	94 blows		3	3.20m: Clay of low plasticity.	<u> </u>					
U D	3.80 - 4.25 4.25	150 blows		4							
BRE D B D SPT (S)	4.80 4.80 5.00 - 5.50 5.00 5.00 - 5.45	N=31 (5,7/7,7,8,9)		5 (4.50) Dry				(5.70)			
BRE D U	5.80 5.80 6.00 - 6.45	135 blows		6	6.00m: Clay of intermediate plast.	icity.		= = = = = = = = = = = = = = = = = = =			
D	6.45				6.45 - 6.80m: Firm.			E			
BRE D B D SPT (S)	6.80 6.80 7.00 - 7.50 7.00 7.00 - 7.44	N=50+ (7,9/9,12,15,1	14 for 60mm)	7 (6.00) Dry							
BRE D D D SPT (S)	7.80 7.80 7.90 8.00 8.20 = 8.80	N=50+ (12,13 tor 10r	m (n/50 f [srNl	- 8 (7.50) Dry (6.60) 2.00 8.20 - 11.10	Very dense reddish brown to subangular, fine to coar			7.90 (0.30)	30.66	×××××	
SPT (C)	8.10 - 8.17 8.20 - 9.60	20mm) N=0 (25 fqr 40mm,0	for 30mm/)	75 % Water		e closely spaced su	bhorizontal brown discolouration	(1.87)		X X X X X X X X X X X X X X X X X X X	
С	9.50 - 9.60 9.60 - 11.10 Ground Wate	TCR%SCR		10		nued on next sheet Hole Diameter Gen	eral Remarks			× × × × × × × × × × × × × × × × × × ×	
(III)	dated 24/01/201	vel Minutes Water sea (m)) To (m) Tir	me (hr) Diameter (mm) Depth (m)	ameter Depth (m) 1. H	eral Remarks and dug inspectior o groundwater enc		0m.		





		nd Water (Chis	elling / Hard	Strata	Casing	Depths	Hole Di		General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Deptn (m)	Hand dug inspection pit to 1.20m. No groundwater encountered.
					2.20	2.60	00:45	200	7.50	200	8.20	1. The ground rater entountered.
					8.00	8.20	01:00	140	11.00	116	30.60	
Log last u	pdated 24/	01/2018										

Contract No: D8044 Client: Sunderland City Council Method: Cable Percussive Drilling with Rotary Core Drilling

BOREHOLE RECORD

Borehole BH46

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 38.56

Scale 1:50

Easting: 433172.22

Northing: 558831.72

Driller: RH/DC Logged By: BC Sheet 4 of 4

Checked By: JH Dates: 10/08/2017

oti iou.					ııy v	V 1 C 1 1	Rotary Core Drill	A	Checked By:	VI I	Dates:	10/08/2017		1
	SAMPLE	DETA					ng) water	8	TRATA RECOR	n	Donth	Lovel		Well/
Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	3	Description	J	Depth (m)	Level (m AOD)	Legend	Backfi
	,		F	S	œ		:				=			/////
											30.60			
								En	d of Borehole at 30.60	m	30.60	7.96		/////
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	Ground Water						iselling / Hard Strata	Casing Depths	Hole Diameter	General Remarks			·	

		und Water			Chis	elling / Hard	Strata	Casing	Depths	Hole D	iameter	General Remarks
Depth Stru (m)	ck Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	Hand dug inspection pit to 1.20m. No groundwater encountered.
					2.20	2.60	00:45	200	7.50	200	8.20	2. No groundwater encountered.
					8.00	8.20	01:00	140	11.00	116	30.60	
Log last	updated 24	/01/2018										





BOREHOLE RECORD

Borehole BH47

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

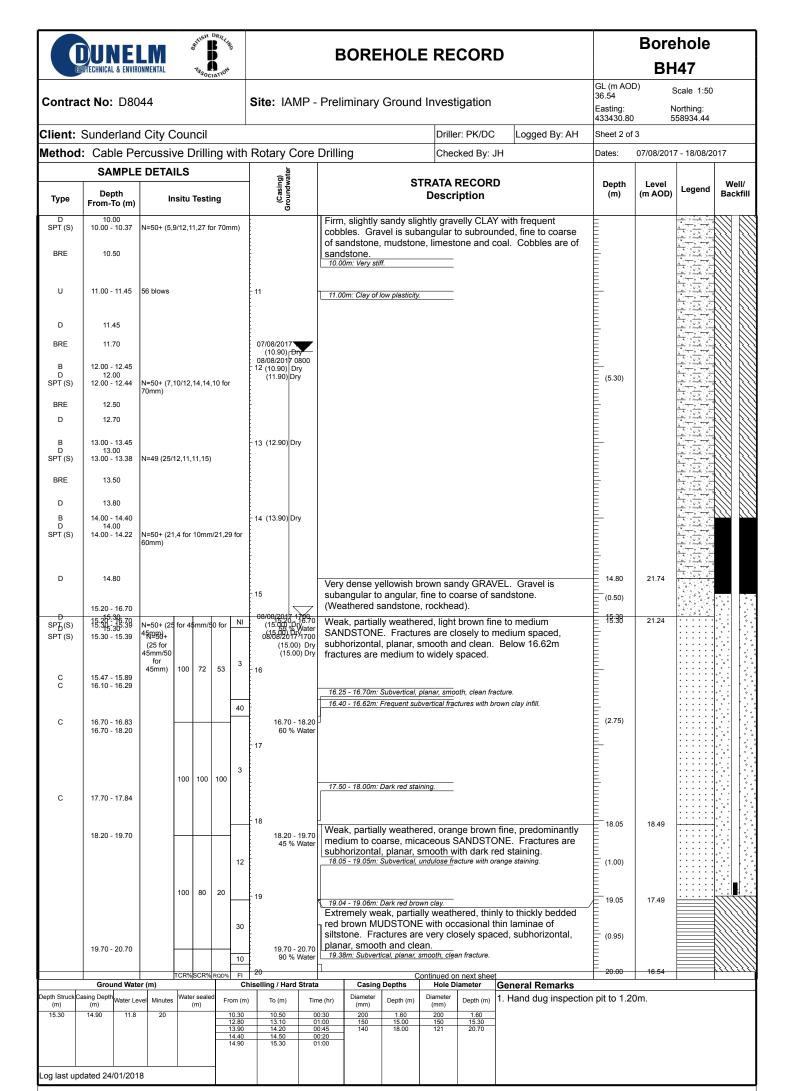
GL (m AOD) 36.54 Easting: 433430.80

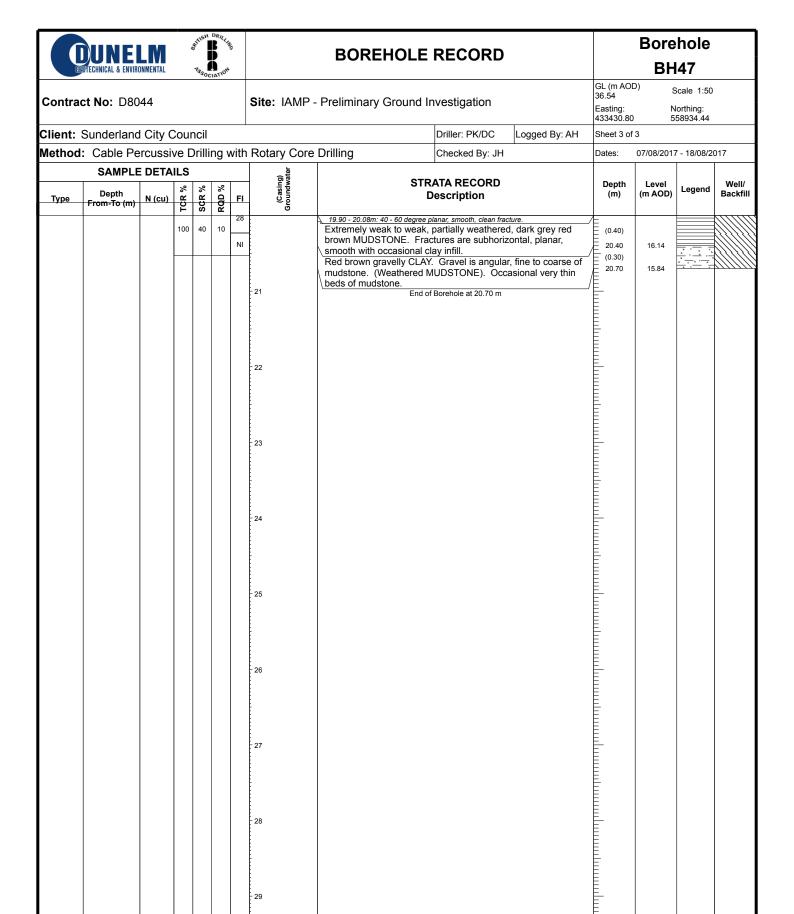
Scale 1:50 Northing: 558934.44

Client: Sunderland City Council Driller: PK/DC Logged By: AH Sheet 1 of 3

-39----

Depth Point Poin	1416(110(ercussive Drillir			Drilling		Cite	ked By: .	л i	Dates:	07/08/201	1 - 10/00/2	517	
D	Туре	Depth		ng S	Sroundwater		S			D			Legend	We Bac	
Column	D ES	0.10	HVP=25 kPa		0	topsoil. Grav	el is suba	ngular to	rounded		(0.60)				~
SPT (S) 2.00	ES B BRE	0.70 0.70 0.80 - 1.20 0.80		- 1		CLAY of inter subrounded, and coal.	mediate p	lasticity.	Gravel is	s subangular to	0.60	35.94			
### Committee Part	D	1.65									Ē				
D 3.46 22 blave 5 3	D	2.00	N=14 (2,2/3,3,4,4)	2 (1.6	0) Dry						(2.50)				
Firm. dark brown mottled grey, silly slightly sandy slightly sandy slightly gravely CLAY of intermediate placetistic. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and sillstone.	BRE	2.50													
## Seption			22 blows	3		gravelly CLA	Y of intern	nediate p	lasticity.	Gravel is subangular	3.10	33.44	× × ×		
D	BRE	3.70					ine to coa	rse of sa	ndstone, i	mudstone and	(1.20)				
D	D SPT (S) D	4.00 4.00 - 4.45 4.30	N=12 (1,2/2,3,4,3)	-4 (1.6)	u) Dry	gravelly CLA	Y. Gravel	is suban	gular to s	ubrounded, fine to	4.30	32.24	X-:-X		
D 5.45 SPT S S S S S S S S S	UT	5.00 - 5.45	12 blows	5				nudstone 	and silts	tone.			XX		
D													Xx Xx		
UT 7.00 - 7.45 22 blows 7 D 7.45 BRE 7.70 B 8.00 - 8.45 8.00 SPT (S) 8.00 - 8.45 N=20 (5.5/6.5.5.4) BRE 8.50 UT 9.00 - 9.45 18 blows 9 D 9.45 BRE 9.70 D 9.45 BRE 9.70 Continued on next sheet 100 Depth Shuck Casing Depth Mater Level Minutes Water sealed (m) From (m) To (m) Time (hr) Depth (m) Collameter General Remarks Casing Depth (m) Collameter General Remarks Casing Depth (m)	D	6.00	N=13 (2,3/3,3,3,4)	6 (1.2	0) Dry						(3.70)		XX X		
BRE 7.70 BRE 7.70 BRE 8.00 -8.45 BRE 8.50 UT 9.00 -9.45 18 blows D 9.45 BRE 9.70 Firm, slightly sandy slightly gravelly CLAY with frequent cobbles. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, limestone and coal. Cobbles are of sandstone, mudstone, limestone and coal. Cobbles are of sandstone, mudstone, limestone and coal. Cobbles are of Continued on next steet Ground Water (m) Chiselling / Hard Strata Casing Depth (m) Time (hr) Depth Struck Casing Depth (m) Depth (m) Chiselling / Hard Strata Casing Depth (m) Chiselling / Hard Strata Casing Depth (m) Depth Struck Casing Depth (m) Limeter Depth (m) Depth (m) Depth (m) Depth (m) Depth (m) Limeter Depth (m) Depth (m) Depth (m) Depth (m) Limeter Depth (m) Depth (m) Depth (m) Limeter Depth (m) Depth (m) Depth (m) Depth (m) Depth (m) Limeter Depth (m) Depth (m) Depth (m) Depth (m) Limeter Depth (m) Dep			22 blows	- 7									$\times -\cdot \times \times$		
B 8.00 - 8.45 8.00 SPT (S) 8.00 - 8.45 N=20 (5.5/6.5.5.4) BRE 8.50 UT 9.00 - 9.45 18 blows 9 9 Firm, slightly sandy slightly gravelly CLAY with frequent cobbles. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, limestone and coal. Cobbles are of sandstone, mudstone, limestone and coal. Cobbles are of sandstone, mudstone, limestone and coal. Cobbles are of Septh Struck Casing Depth Water (m) Water sealed (m) Water sealed (m) Water sealed (m) From (m) To (m) Time (hr) Diameter (mm) Depth (m) Depth (m) Diameter (mm) Depth (m) Depth (m															
BRE 8.50 UT 9.00 - 9.45 18 blows 9 Firm, slightly sandy slightly gravelly CLAY with frequent cobbles. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, limestone and coal. Cobbles are of sandstone, mudstone, limestone and coal. Cobbles are of Centinued on next sheet Ground Water (m) Continued on next sheet Ground Water (m) Chiselling / Hard Strata Casing Depth Struck Casing Depth (m) Continued on next sheet Hole Diameter General Remarks Depth Struck Casing Depth (m) Diameter (m)	B D	8.00 - 8.45 8.00	N=20 (5,5/6,5,5,4)	- 8 (1.6	0) Dry	Stiff greyish b	orown silty	slightly:	sandy CL	AY of low plasticity.		28.54	XX XX		
UT 9.00 - 9.45 18 blows 9 D 9.45 BRE 9.70 BRE 9.70 BRE Ground Water (m) Chiselling / Hard Strata Casing Depth Struck Casing Depth (m) Chiselling / Hard Strata Casing Depth (m) Chiselling / Hard Str											(1.50)		×——× ×——×		
Firm, slightly sandy slightly gravelly CLAY with frequent cobbles. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, limestone and coal. Cobbles are of 10 (9:90) Dry Continued on next sheet	UT		18 blows	9									×— —×		
Ground Water (m) Chiselling / Hard Strata Casing Depths Hole Diameter (m) Depth Struck Casing Depth Water Level (m) Casing Depth Water Level (m) Casing Depth (m) Diameter (mm) Dia		9.70			N D:	cobbles. Gra	avel is sub	angular t	o subroui	nded, fine to coarse	9.50	27.04	×		
Depth Struck Casing Depth Water Level (m) Water Level (m) Water Level (m) Water Sealed (m) To (m) To (m) Time (hr) Diameter (mm) Depth (m) Depth (В		or (m)			0					1		. s. s. gs.	***	
(11) (11) (11) (1111) (11111) (11111)	Depth Struck					Diameter					nit to 1 2	0m			
13.90 14.20 00.45 140 18.00 121 20.70 14.40 14.50 00.20 14.90 15.30 01.00	(111)	(111)	(111)	10.30 10.5 12.80 13.1 13.90 14.2	0 00	0:30 200 1:00 150	1.60 15.00 18.00		1.60 15.30 20.70	T. Hand dug Inspection	ι μιι ιΟ 1.2	OIII.			





		nd Water (Chise	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
15.30	14.90				10.30	10.50	00:30	200	1.60	200	1.60	
					12.80	13.10	01:00	150	15.00	150	15.30	
					13.90	14.20	00:45	140	18.00	121	20.70	
					14.40	14.50	00:20					
					14.90	15.30	01:00					
Log last u	pdated 24/	01/2018										





BOREHOLE RECORD

Borehole BH48

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD) 35.44

Scale 1:50 Northing: 558895.29

Client: Sunderland City Council

Driller: PK/DC

Easting: 433655.60 Logged By: BC Sheet 1 of 3

/lethod	: Cable Pe	ercussive Drillin	ng with Rotary Core	Drilling Checked By: JH	Dates:	08/08/2017	7 - 18/08/20	017
		DETAILS						
Туре	Depth From-To (m)	Insitu Testin	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES	0.10 0.10 0.40	HVP=26 kPa		Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, limestone, mudstone, siltstone and coal.	(0.50)	24.04		
D ES B BRE	0.50 0.50 0.60 - 1.20 0.60 0.70	HVP=68 kPa	-1	Firm, brown mottled light brown, slightly sandy slightly gravelly CLAY of high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.80)	34.94		
U	1.20 - 1.65	29 blows			1.30	34.14		
D	1.65			Firm brown, mottled light grey, slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.		04.14		
BRE B D SPT (S)	1.90 2.00 - 2.45 2.00 2.00 - 2.45	N=17 (2,3/3,4,5,5)	- 2 (1.60) Dry	2.00m: Stiff				
BRE	2.50				(2.15)			
U	3.00 - 3.45	15 blows	- 3					
D BRE	3.45 3.70			Firm, thinly laminated, greyish brown, slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of sandstone, mudstone and coal.	3.45	31.99		
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=9 (1,2/2,2,2,3)	4 (1.60) Dry					
BRE	4.50							
UT	5.00 - 5.45	9 blows	5	5.00m: Clay of intermediate plasticity.				
D BRE	5.45 5.70				<u>E</u>			
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=10 (2,2/2,2,3,3)	6 (1.60) Dry					
BRE	6.50		08/08/2017 1700 (1.60) Dry 09/08/2017 0800 (1.60) 2.10					
UT	7.00 - 7.45	12 blows	7		(7.35)			
D BRE	7.45 7.70							
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=9 (2,2/2,2,2,3)	8 (1.60) pry	8.00m: Clay of high plasticity.	(7.35)			
BRE	8.50							
UT	9.00 - 9.45	10 blows	9					
D BRE	9.45 9.70				E E			
В	10.00 - 10.45		10 (9.90) Dry	Continued on next sheet	<u> </u>			
	Ground Wate	er (m)	Chiselling / Hard Strat	Continued of hext sneet Casing Depths Hole Diameter General Remarks	1	i	1	
oth Struck	asing Depth (m) Water Le			Diameter Diameter 4 11 - 1 - 1 - 1 - 1 - 1 - 1	nit to 1 2	Ωm		
(m)	(m) Water Le	vel Minutes (m)	From (m) To (m) Ti	ne (hr) Dameter (mm) Depth (m) Dameter (mm) Depth (m) 1. Hand dug inspection	ι ριι ιυ 1.2	O111.		
9.00	40.40 5.0	,	14.00 15.10	0:20 200 1.60 200 10.00				





BOREHOLE RECORD

Borehole BH48

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.44 Easting: 433655.60

Scale 1:50 Northing: 558895.29

Client: Sunderland City Council Driller: PK/DC Logged By: BC Sheet 2 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: JH Dates: 08/08/2017 - 18/08/2017

	SAMPLI	E DETA	ILS										_				
Туре	Depth From-To (m)	Ir	nsitu To	estir	ng	(Casing)				S	TRATA I Descr		D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D SPT (S) BRE	10.00 10.00 - 10.45 10.50	N=10 (1,2	/2,2,3,3))				grav	elly CLA	Y. Grave		inded to	ghtly sandy slightly rounded, fine to l.				
D B UF	10.90 11.00 - 11.65 11.00 - 11.65	4 blows				- 11			, thinly la	minated :	slightly sa	ndy silty (CLAY of intermediate	10.80	24.64	× × × × × × × × × × × × × × × × × × ×	
BRE D B D	11.70 11.80 12.00 - 12.45 12.00	N. 20 (2 A	44.5.0.TV			12 (11.90)	Dry	suba					y CLAY. Gravel is sandstone, mudstone	11.80	23.64	X——X X———	
SPT (S) BRE	12.00 - 12.45 12.50	N=22 (3,4	/4,5,6,7))				und	oou.								
U	13.00 - 13.45	60 blows				- 13		13.0	00m: Clay of	low plasticit	у			(6.20)			
D BRE	13.45 13.70																
B D SPT (S)	14.00 - 14.45 14.00 14.00 - 14.45	N=29 (4,5	/7,8,8,6))		14 (12.40)	Dry										
BRE	14.50													(6.20)			
B D SPT (S)	15.20 - 15.65 15.20 15.20 - 15.64	N=50+ (6, 70mm)	8/13,14,	,11,12	2 for	(12.40)	Dry										
BRE U	15.70 16.00 - 16.45	72 blows				16											
D BRE	16.45 16.70																
B D SPT (S)	17.00 - 17.45 17.00 17.00 - 17.20	N=50+ (9,	16 for 5	5mm/	(50)	17 (12.40)	Dry							E			
BRE B	17.50 18.00 - 18.30					18 (12.40)								18.00	17.44		
D SPT (S) D SPT (S)	18.00 18.00 - 18.14 18.30 18.30 = 28.50	N=50+ (15 55mm)	5,10 for	15mn	n/50 for	(12.40)	4.70	suba (We	angular to athered S	angular SANDST	, fine to co ONE).	arse of s	EL. Gravel is candstone.	(0.50)	16.94		
	18.50 - 20.00		100	81	10	18.5	017/1700 40) 4.70 0 - 20.00 % Water	coar clos clay	rse graine ely space infill.	ed SAND ed, subho	STONE. rizontal, p	Fractures lanar, sm	ered, brown fine to s are very closely to nooth with localised smooth, undulose with light	(0.79)			
С	19.40 - 19.60		100	91	0 12			Very graii inter	00 - 19.01m: weak to ned SAN rlocking fi	weak, pa DSTONE ractures.	artially we Frequei	athered, I nt randon	brown fine to coarse nly orientated	19.29 (0.15) 19.44 (0.33) 19.77 (0.16)	16.15 16.00 15.67		
	20.00 - 21.30		TCR%S	CR%		-F		ivied	num Stror		ng, partial Continued or		ered, light brown fine	19.93	15.51		7111111
	Ground Wat	er (m)			C	hiselling / Ha	ard Strat	a	1	Depths	Hole D	ameter	General Remarks				
Depth Struck C (m) 18.00	casing Depth Water Le (m) Water Le 12.40 5.3		Water s		From (n 14.90 17.10	15.10	(me (hr) 00:20 00:20	Diameter (mm) 200 150	Depth (m) 1.60 11.50	Diameter (mm) 200 150	Depth (m) 10.00 18.50	Hand dug inspectio	n pit to 1.2	0m.		



epth Struck Casing Depth (m) (m)

12.40

og last updated 24/01/2018

Water seale (m)

From (m)

To (m)

Minutes



BOREHOLE RECORD

Borehole BH48

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation GL (m AOD) 35.44

Scale 1:50 Northing: 558895.29

Client: Sunderland City Council

Driller: PK/DC

Easting: 433655.60 Logged By: BC Sheet 3 of 3

1. Hand dug inspection pit to 1.20m.

	oundenand								Dillicit 1 10 DO Logged By. E	0.10	.0.00.			
Method:	: Cable Pe	ercussi	ve [Drilli	ing v	with	Rotary C	Core	Drilling Checked By: JH	Date	es:	08/08/2017	7 - 18/08/2	017
									<u> </u>					
	SAMPLE	DEIA	ILS				g)		STRATA RECORD					
	Depth		%	%	%		(Casing) Groundwater				epth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	From-To (m)	N (cu)	TGR.	SCR	RQD	FI	S of o		Description	'	(,	(III AOD)		Dackiiii
	` '		_	ေ	~	2		- 21.30	to mediate ensired CANDCTONE					
						-	50 %	Water	to medium grained SANDSTONE. Weak to medium strong, partially weathered, brown fine to	—∕E ((0.49)			
						NI			coarse grained SANDSTONE. Fractures are very closely t	. E				
			100	85	44				closely spaced, subhorizontal, planar, smooth with localise		0.42	15.02 14.92		
						5			clay infill.	E 20	0.10) :0.52	14.52		
									19.82 - 19.93m: Fractures are subvertical, planar, smooth, undulose and clea	IE "	0.61)			
С	20.95 - 21.10					NA	21		Medium strong to strong, partially weathered, reddish brow	ı /⊫ ˈ	0.01,			
						INA	1		fine to medium grained SANDSTONE. Fractures are medi spaced, subhorizontal, planar, smooth and clean.	m ⊫ 2′	1.13	14.31		
	21.30 - 22.50						21.30	- 22.50	Weak to medium strong, partially weathered, reddish brown	— 	0.10) !1.23	14.21	*****	
С	21.50 - 21.60						60 %	Water	fine to medium grained SANDSTONE. Frequent randomly	E ^	11.23		XXXXXX	
C	21.50 - 21.00								orientated interlocking fractures.	IE			××××××	
			100	83	56	4			Medium strong to strong, partially weathered, brown fine to	<u> </u>			××××××	
									coarse grained SANDSTONE	(0			××××××	
							- 22		20.76 - 20.88m: Fracture is 35 degrees, planar, smooth and clean.				××××××	
									21.01m: Fracture is subhorizontal, planar, smooth with light grey clay infill. 21.06 - 21.11m: Fracture is 25 degrees, planar, smooth and clean with light g	(2			××××××	
						Α	1	0-	discolouration on surface of fracture.	E (2	2.27)		×××××× ××××××	
	22.50 - 23.50						22.50	- 23.50 Water	Firm brown slightly sandy CLAY. Weak to medium strong, partially weathered, greyish brown	F			××××××	
						1	33 /		SILTSTONE. Fractures are closely to medium spaced,	F			××××××	
			90	90	62	4	[subhorizontal, planar, smooth and clean.	E			××××××	
							- 23		21.76 -21.79m: Fracture is subhorizontal, planar, smooth with reddish brown	ay 🔚			××××××	
						1	1		infill. 22.50 - 22.60m: AZCL.	E			×××××× ××××××	
				-	_	_			23.16 - 23.17m: Fracture is subhorizontal, planar, smooth with brown clay infi	E			×××××× ××××××	
							-		End of Borehole at 23.50 m	23	3.50	11.94	××××××	777777
										E				
										E				
							- 24			E				
										E				
										E				
										E				
										E				
										E				
							25			E				
										F				
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			1	-		1	30			E				
				•	1		_ 30			F				
	Ground Wate	er (m)				CI	hiselling / Hare	d Strata	Casing Depths Hole Diameter General Remark				1	
Depth Struck Ca		i'	Wate	er seale	ed			1	Diameter Diameter 1 Hand dug inch		to 1 20	lm		

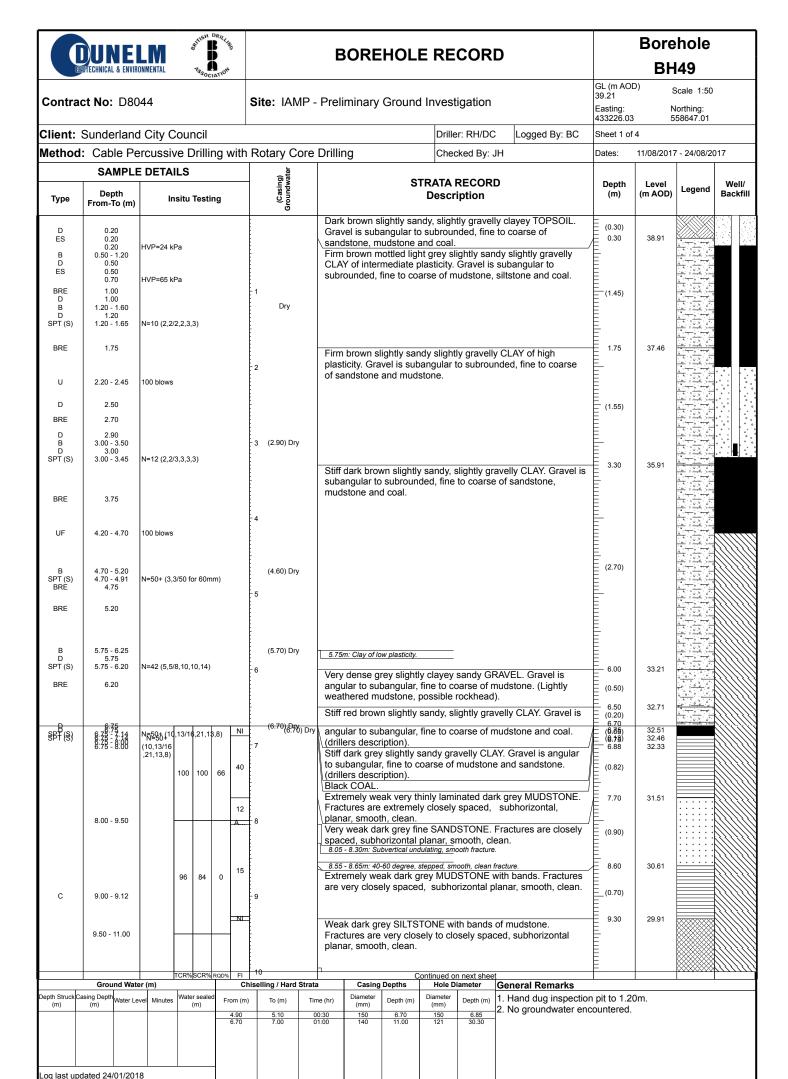
Diameter (mm)

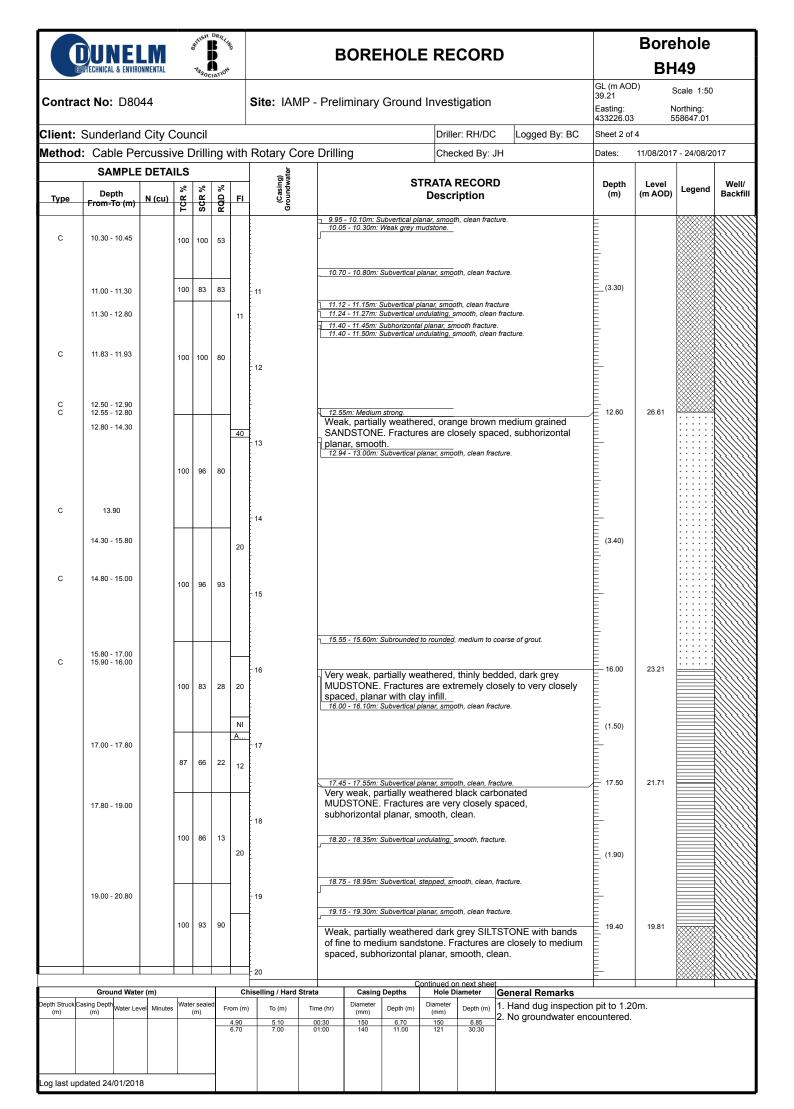
Time (hr)

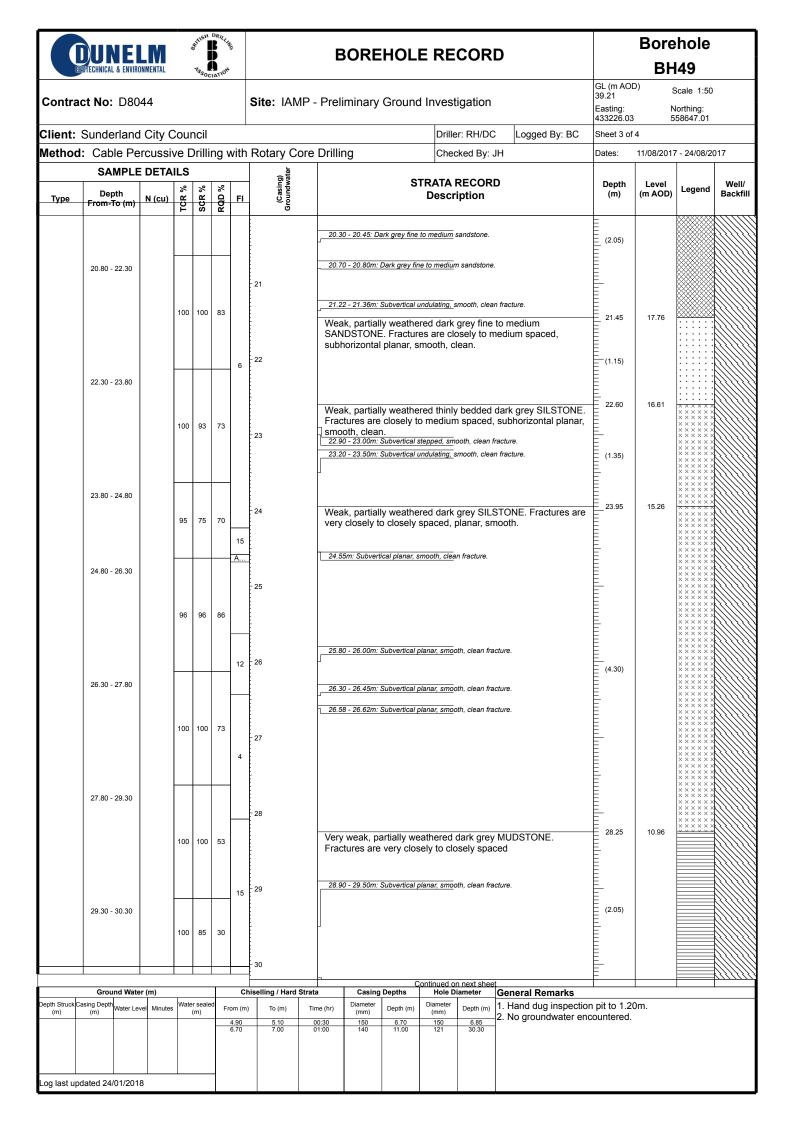
Diameter (mm)

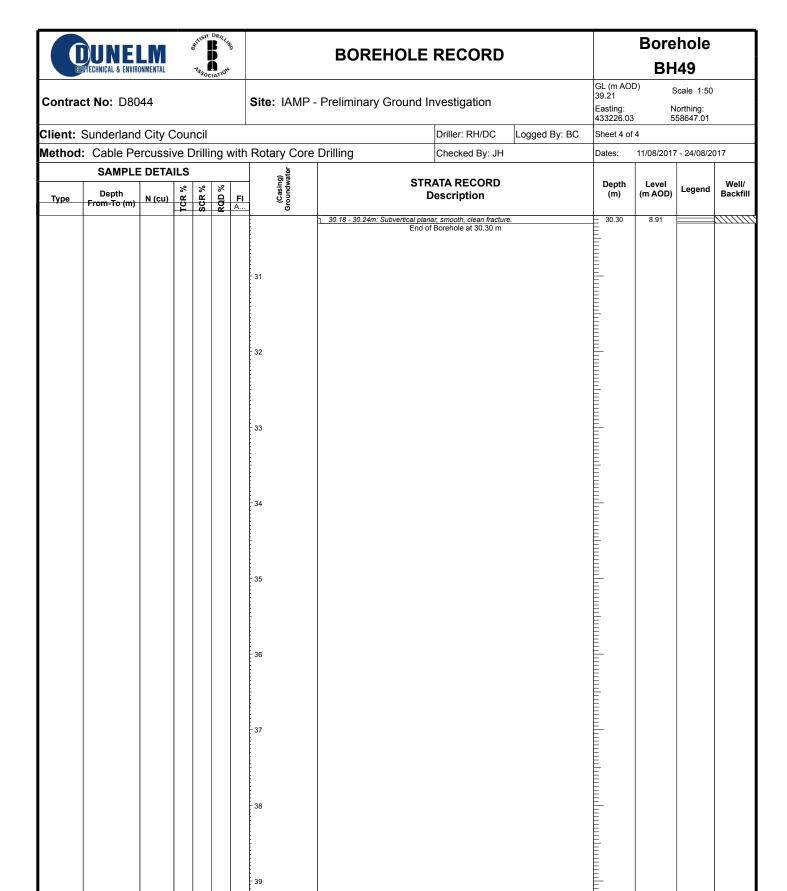
Depth (m)

Depth (m)









		nd Water (Chis	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	Hand dug inspection pit to 1.20m. No groundwater encountered.
					4.90	5.10	00:30	150	6.70	150	6.85	2. No groundwater encountered.
					6.70	7.00	01:00	140	11.00	121	30.30	
Log last u	ast updated 24/01/2018											





BOREHOLE RECORD

Borehole BH50

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 38.09

Scale 1:50

Client: Sunderland City Council

Driller: CT/DC

Easting: 433419.38

Logged By: BC Sheet 1 of 4

Northing: 558721.55

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: JH

Dates: 24/08/2017 - 25/08/2017

/lethod	: Cable Pe	ercussiv	e Drillin	ng with	Rotary	Core	: Drilli	ng		Che	cked By: .	JH		Dates:	24/08/201	7 - 25/08/2	017
	SAMPLE	DETAI	LS		_	Ter.											
Туре	Depth From-To (m)	In	situ Testin	ng	(Casing)	Groundwa			S		RECOR ription	D		Depth (m)	Level (m AOD)	Legend	Well/ Backfi
B D ES D B ES BRE	0.00 - 0.30 0.10 0.20 0.35 0.40 - 0.90 0.50 0.75 1.00				- 1 Dr		is su mud Firm CLA sand	ubangula Istone, si n brown r NY. Grave dstone, n	r to round iltstone ar nottled lig el is subar nudstone	ded, fine and coal. The grey so and coal and coal ed dark o	lightly sar rounded, f	yey TOPSOIL. Gr of sandstone, ndy slightly gravel fine to coarse of	lly	(0.35)	37.74		
D SPT (S) BRE	1.20 1.20 - 1.65 1.75	N=11 (2,2/2	2,3,3,3)		2		to su	velly CLA ubrounde Istone ar	ed, fine to	mediate (olasticity. (of sandsto	Gravel is subangune, siltstone,	ular	= = = = = = = = = = (2.00)			
U D BRE	2.20 - 2.65 2.70 2.75	76 blows					2.20	n: Stiff.						(2.33)			
B D SPT (S)	3.20 3.20 3.20 - 3.65	N=17 (4,4/4	4,4,4,5)		(3.10)	Dry	San	d is fine	brown silt to mediur	n.	sandy CL	.AY of low plastici	ity.	3.10	34.99	X - x	
BRE U	3.75 4.20 - 4.65	57 blows			-4		4.20	0m: Firm silt	of low plasti	city.						X	
D BRE B	4.70 4.90 5.20 - 5.70				- 5	Drv								(3.30)		X	
D PT (S) BRE	5.20 5.20 - 5.65 5.90	N=11 (1,3/3	3,2,2,4)			,										X - X - X - X - X - X - X - X - X - X -	
U D	6.20 - 6.50 6.60	100 blows			6							gravelly CLAY.		6.40	31.69	X—————————————————————————————————————	
BRE B D PT (S)	6.90 7.20 - 7.70 7.20 7.20 - 7.46	N=50+ (5,7	7/26,24 for 40	Omm)	7 (4.50)	Dry	sand	dstone, n	nudstone	and coal							
BRE U	7.90 8.20 - 8.70	100 blows			- 8		7.90	n: Very sot	ft band noted	1.							
B D PT (S) BRE	8.70 - 9.20 8.70 8.70 - 9.14 8.90	N=50+ (6,7	7/8,11,16,15 1	for 70mm)	(4.50)	Dry								(4.20)			
B D PT (S) BRE	9.70 - 10.20 9.70 9.70 - 10.15 9.90	N=42 (6,9/9	9,10,10,13)		(4.50)						on next shee						
	Ground Water				niselling / H	ard Stra	ta	 	g Depths	Hole I	Diameter	General Remar					
n Struck Ci (m)	asing Depth (m) Water Le	evel Minutes	Water sealed (m)	From (m)	To (m)	Т	ime (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug insp	pection	pit to 1.2	Um.		
-+		+	 	9.00	9.10		00:20	200	4.50	200	10.60	1					

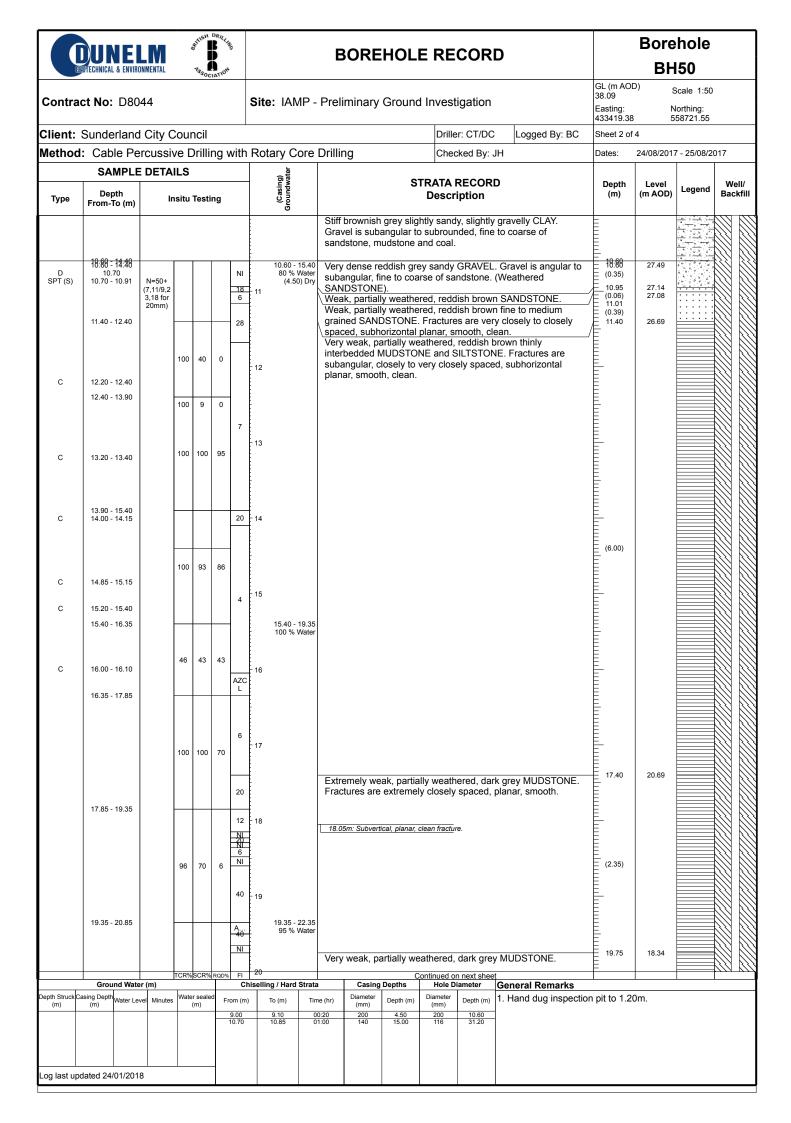
00:20 01:00

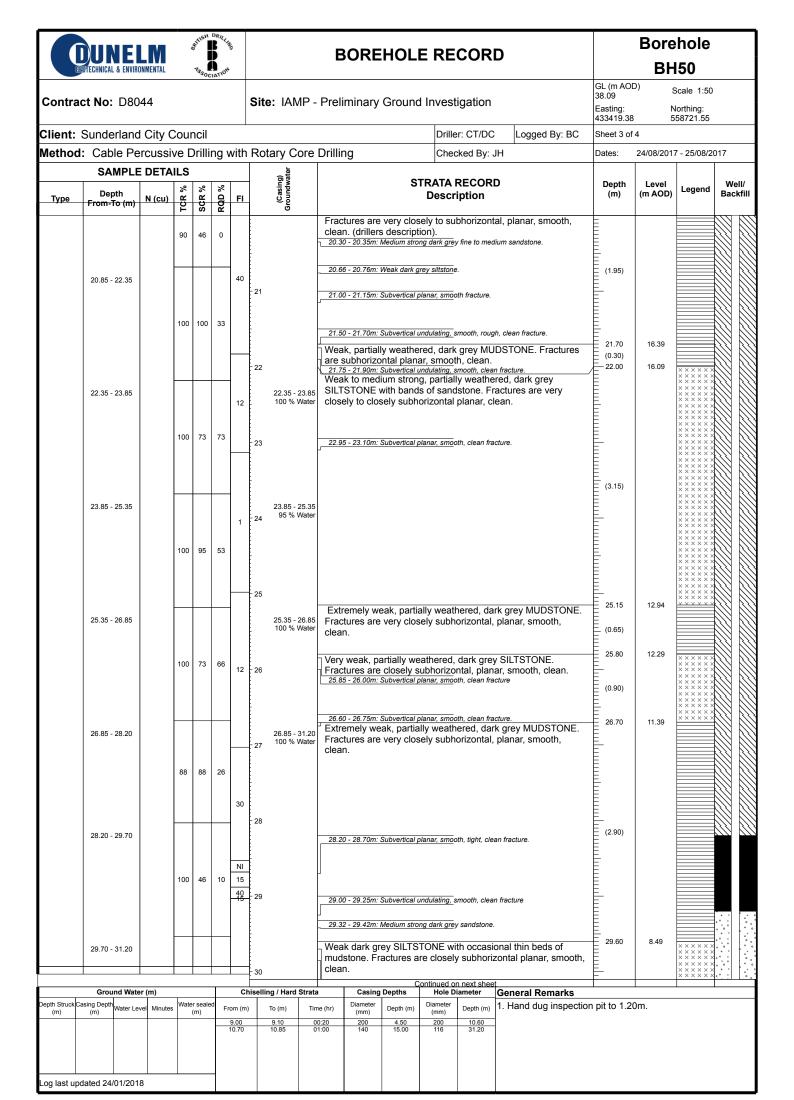
9.00 10.70

Log last updated 24/01/2018

200

4.50 15.00









BOREHOLE RECORD

Borehole BH50

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 38.09

Scale 1:50

Client: Sunderland City Council

Driller: CT/DC

Easting: 433419.38

Logged By: BC Sheet 4 of 4

Northing: 558721.55

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: JH Dates:

24/08/2017 - 25/08/2017

vietnod	: Cable Pe	rcussi	ve L	Jrilli	ng v	vitn	Rotary Core	Drilling	Checked By: J	JH	Dates:	24/08/2017	7 - 25/08/20)17
	SAMPLE	DETA	ILS				iter							
Туре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	STR [ATA RECORI Description	D	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
			100		50		-31	29.70 - 29.85m: Subvertical und	<u>ulating,</u> smooth, clear		(1.60)		******* ******* ******* ******* ******	
							- 32	End o	f Borehole at 31.20	m	31.20	6.89		<u>**.;</u> <u> </u>
							-33							
							- 34				31.20			
							-35							
							- 36							
							- 37							
							- 38							
							- 39							
							40				<u></u>			
	Ground Wate	er (m)				Ch	iselling / Hard Strata	Casing Depths	Hole Diameter	General Remarks		I.		

	Grou	nd Water ((m)		Chis	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
					9.00	9.10	00:20	200	4.50	200	10.60	
					10.70	10.85	01:00	140	15.00	116	31.20	
Log last u	pdated 24/	/01/2018		•								





BOREHOLE RECORD

Borehole BH51

Site: IAMP - Preliminary Ground Investigation Contract No: D8044

GL (m AOD)

Easting:

Scale 1:50 Northing:

Client: Sunderland City Council

Driller: PM/DC

Logged By: BC Sheet 1 of 2

	SAMPLE	DET	AILS				_	ater							
Туре	Depth From-To (m)		Insitu	Testi	ing		(Casing	Groundwater	S1	RATA RECORE Description)	Depth (m)	Level (m AOD)	Legend	Well/ Backfil
D BRE DES BRE DES BRE DES BRE DES BRE DES U	0.10 0.20 0.20 0.20 0.50 0.50 0.50 1.00 1.00 1.00 1.00 1.20 - 1.65	69 blows					1		Dark brown sandy sligh Gravel is subangular to mudstone and siltstone Stiff brown mottled grey Gravel is subangular to mudstone and siltstone	rounded, fine to construction of the construct	oarse of sandstone,	(0.25) (
D BRE	1.65 2.00						2								
SPT (S) BRE	2.00 - 2.45	N=28 (3	,5/5,7,7	,9)					Firm to stiff reddish bro is angular to subrounde mudstone and siltstone	d, fine to coarse o		2.35			
D B D SPT (S)	2.75 3.00 - 3.50 3.00 3.00 - 3.24	N=50+ (7,18/20	,30 for	10mr	n)	3 (1.20	Dry	Very dense light grey s	andy GRAVEL Gr	avel is angular to	3.20			
D SPT (S)	3.50 3.50 - 3.72	N=50+ (5,20/50)			(1.70	D) Dry	subangular of siltstone.			(0.95)			
	4:15 - 4: 75						4	0.45 4.75				=_ = 4:15			55555
С	4.42 - 4.57		98	98	72		7	3.15 - 4.75 '0 % Water (1.70) Dry	Weak partially weather Fractures are closely to planar, smooth with ligh	medium spaced,		4.15			
С	4.75 - 5.65 5.00 - 5.30		100	100	79			.75 - 13.20 10 % Water	5.23 - 5.34m: Fractures are si	ibvertical, planar, smoot.	h, clean.	<u>-</u> 			
С	5.65 - 7.15 5.81 - 6.00					-			5.65 - 5.70m: AZCL.						
С	6.73 - 6.97		97	97	97	4	- 6		6.52 - 6.56m: Weak thinly lam	inated grey siltstone.		(4.20)			
	7.15 - 8.65					-	7		7.30 - 7.33m: Weak grey silts:	one.		<u>-</u>			
	0.00 0.07		100	100	77		- 8		7.58 - 7.70m: Fractures are st		oth, clean.				
С	8.20 - 8.37 8.65 - 10.15					7			Weak to medium strong SILTSTONE. Fractures planar, smooth, clean.	are closely space	d, subhorizontal,	8.35		****** ****** ****** ****** ******	
			100	100	88		9		Medium strong, partiall' SANDSTONE. Fracture planar, smooth, undulo: 9.59 - 9.65m: Weak grey siltsi	y weathered, light es are medium spa se, clean.	grey fine grained	9.11		*****	
			TCR%	SCR%	ROD«	FI	10		C	ontinued on next sheet		Ē,			
	Ground Water	TCR% SCR% RQD% FI 10									General Remarks	1	1	1	





BOREHOLE RECORD

Borehole BH51

Sheet 2 of 2

Scale 1:50

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

Client: Sunderland City Council Driller: PM/DC Logged By: BC

Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: JH Dates: 12/09/2017 - 14/09/2017

Type Fro	Depth rom-To (m)	N (cu)	ICR % NOT	scr %	RQD %		(Casing) Groundwater	STE	RATA RECORD	Depth	Level		Well/
		N (cu)	CR %	%	% C		dw	STR	PATA RECORD	Depth	Level		Well/
10	0.15 - 11.70			SC	ᅙ	FI	(Cas Groun	1	Description	(m)	(m AOD)	Legend	Well/ Backfill
			100		100		- 11			13.15			
11	1.70 - 13.15					1	-12	11.52 - 11.56m: Weak grey sillist	one.	(4.04)			
			100	100	100								
							13	End o	f Borehole at 13.15 m	13.15			
							-14						
							15						
							-16						
							-17			<u> </u>			
							-18						
							-19						
	Ground Wate						- 20 iselling / Hard Strata	Casing Depths	Hole Diameter General Remark:	-			

		ınd Water (Chis	elling / Hard	Strata	Casing	Depths	Hole Di	iameter	General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m.
					3.20	3.50	01:00	200	3.00	200	3.15	
1								140	4.50	116	7.15	
1												
1												
1												
1												
Log last u	pdated 24	/01/2018										

Contract No: D8044 Client: Sunderland City Council

Log last updated 24/01/2018



BOREHOLE RECORD

Borehole BH52

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) Scale 1:50

Northing:

Easting:

Driller: PM/DC Logged By: BC Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: JH

Dates: 11/09/2017 - 12/09/2017

Dark brown slightly sandy, slightly gravely cape; TORSOLL (Crave) is subsurgular to runded, fire to coarse of anadistone, mudebne and slitstone. C.22 (CALAY Crave) is subsurgular to trunded, fire to coarse of sandstone, mudebne and slitstone. C.23 (CALAY Crave) is subsurgular to subsurgul		SAM	PLE	DETA	ILS				ˈg) <i>r</i> ater				C	TDATA '	DECOR	n						
Converties assubatingular to rounded, fine to coarse of sandstone, Coarse Sandstone, mudstone and sillatione. Coarse Sandstone, mudstone, and sillatione. Coarse Sandstone, and sillatione. Coarse Sandstone, and sillatione. Coarse Sandstone, and sillatione. Coarse Sandstone, mudstone, and sillatione. Coarse Sandstone, a	Туре			In	nsitu	Testi	ng		(Casing) Groundwater					Descr	iption				Depth (m)	Level (m AOD)	Legend	Well/ Backfil
1.00	BRE ES BRE D	0.20 0.20 0.50 0.50									Grav mud Stiff CLA	vel is sub stone an brown m Y. Gravel	angular to d siltstone ottled ligh is suban	o rounded e. It grey slig gular to s	d, fine to ghtly san ubround	coarse	of sands	elly	0.25			
## Annual Processing P	BRE D ES U	1.00 1.00 1.00 1.20 - 1.		91 blows					1		Firm	to stiff g	rey mottle	ed brown	slightly s							* * *
Columb C	D SPT (S)	1.60 1.60 - 2.		N=38 (4,6/	/8,10, ⁻	10,10)				,				brounded	i, fine to	coarse	or muas	tone	(1.25)			
Siff, grey motified brown slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular of mudstone and siltstone. Go. 34	B BRE D	2.60 - 3. 2.60 2.60		N=25 (3,4/	/5,6,6,	8)				,	suba	angular o	f mudstor					to				
3.00 - 4.70	B D	3.60 - 4. 3.60							(1.70) Dry	,									3.60			
4.70 - 6.20 100 91 84 4 7.0 - 7.70 90 % Water 100 91 84 100 91 91 91 91 91 91 9	D SPT (S) D	3.60 - 4. 4.00 4.00 - 4 3.60 - 4. 4.00	70 16	N=50+ (10	,15/5() for 1	9mm)		3.60 70 %	- 4.70 Water	(Wea	athered S	weak, pa	NE).	athered,	grey SII	LTSTON	IE.	–		× × × × × × × × × × × × × × × × × × ×	
5.56 Soft to firm grey slightly sandy gravelly CLAY. Gravel is angular to subangular of mudstone and siltstone. Very weak distinctly weathered light grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, undulose and clean. Very weak partially weathered grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, clean with dark grey discolouration on fracture surface. Firmt to stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics. 7.70 - 8.80 Weak to medium strong, partially weathered, grey SILTSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth, clean. 8.80 - 9.80 NI 9 NI	(-)		1	(10,15/50 for				NI	4.70 90 %	- 7.70	3.94			ndomly orien	ntate interloc	cking fracti	ures.		(1.62)		× × × × × × × × × × × × × × × × × × ×	
and clean. Soft to firm grey slightly sandy gravelly CLAY. Gravel is angular to subangular of mudstone and silistone. Very weak distinctly weathered light grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean subhorizontal, planar, smooth, clean subhorizontal, planar, smooth, clean. 7.70 - 8.80 8.80 - 9.80 90 30 24 NA C 9.67 - 9.80 90 30 24					100	91	84	6			Very	weak, pa	artially we	eathered,	grey MU	IDSTON	IE. Frac		5.56		× × × × × × × × × × × × × × × × × × ×	
Very weak distinctly weathered light grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean with dark grey discolouration on fracture surface. Firm to stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics. 7.70 - 8.80 Weak to medium strong, partially weathered, grey SILTSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth, clean. 8.80 - 9.80 NI 97 82 75 NI 90 30 24 NA NI 90 30 24 NA NA NA NI 90 30 24 NA NA NA NA NA NA NA NA Original planar, smooth, clean. 8.20 Note the fractures are subhorizontal, planar, smooth with light grey siltstone gravel. Very weak to weak, partially weathered, grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean. 8.80 - 9.80 NI 90 30 24 NA NA NA NA NA NA NA NA NA N		6.20 - 7.	70					Ц	6		and	to firm gr	rey slightl	y sandy g	ravelly C	CLAY. G	ravel is		6.20			
angular to subangular, fine to coarse of mudstone lithorelics. 7.70 - 8.80 Weak to medium strong, partially weathered, grey SILTSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth, clean. 8.80 - 9.80 NI 90 30 24 NA NI 90 30 24 NA NI 90 30 24 NA Requested to subangular, fine to coarse of mudstone lithorelics. 8.80 - 8.90 m: AZC. 8.80 - 8.90 m: AZ					100	37	37	4	7		Very Frac plans surfa	weak distures are ar, smoot	stinctly we very clos th, clean	eathered sely to clo with dark	light grey sely spa grey disc	/ MUDS ced, sul colourat	STONE. bhorizor ion on fr	acture	(0.55)			
Reak to medium strong, partially weathered, grey SILTSTONE. Fractures are closely to medium stpaced, subhorizontal, planar, smooth, clean. 8.20 8.80 - 9.80 8.80 - 9.80 8.80 - 9.80 8.80 - 9.80 90 30 24 NA NI 9 90 30 24 NA NA 8.80 - 9.20 m: NI. frequent randomly spaced interlocking fractures. Firm to stiff greyish brown slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics. Weak to medium strong, partially weathered, grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, clean. 8.20 8.20 8.20 1.00 % Water Firm to stiff greyish brown slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics. Weak, partially weathered, light grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, undulose, clean with grey discolouration on fracture surface. Ground Water (m) Chiselling / Hard Strata Casing Depth Hole Diameter General Remarks Continued on next sheet Hole Diameter General Remarks From (m) Depth (m) 1. Hand dug inspection pit to 1.20m.		7.70 - 8.	80					NA	7.70	- 8.80	angu	ular to su	bangular,	fine to co	parse of r	mudstor	ne lithore					
Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean. 8.80 - 9.80 90 30 24 NA 90 30 24 NA Firm to stiff greyish brown slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics. Weak, partially weathered, light grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, undulose, clean with grey discolouration on fracture surface. Ground Water (m) Ground Water (m) Chiselling / Hard Strata Casing Depth (m) Water Level (m) Time (hr) Diameter (mm) Diameter		7.70 0.			97	82	75	6	75 %		SILT subh	STONE. norizontal - 8.14m: Fra el.	Fractures I, planar, s actures are s	s are clos smooth, c subhorizonta	ely to me clean. I, planar, sn	edium sp	paced,		(0.50)		× × × × × × × × × × × × × × × × × × ×	
C 9.67 - 9.80 9.80 - 11.30 90 30 24 NA FI 10 Strick Casing Depth (m) Water Level (m) Water (m) Water Level (m) Water (m) Water (m) Water (m) Water (m) To (m) Time (hr) Diameter (mm) Depth (m) Depth		8.80 - 9.	80					\square	100 %	16.20 Water	Frac plan	tures are ar, smoot - 8.90m: AZ	very clos th, clean.	sely to clo	sely spa	ced, sul	bhorizor		(1.00)			
9.80 - 11.30 are closely spaced, subhorizontal, planar, smooth, undulose, clean with grey discolouration on fracture surface. Solution Continued on next sheet Contin	С	9,67 - 9	80		90	30	24	NA			is an Wea	ngular to s ik, partial	subangula ly weathe	ar, fine to red, light	coarse c	of mudst	tone lithe	orelics. tures	(0.30) 9.50			
Ground Water (m) Chiselling / Hard Strata Casing Depths Hole Diameter (m) Water Level Minutes Mater Level Minutes Mater Sealed (m) To (m) To (m) Time (hr) Diameter (mm) Diameter (mm) Diameter (mm) Diameter (mm) Depth (m) Diameter (mm) Depth (m) D					TCD0/	SCD0/	DOD.		10				ey discolo	uration o	n fracture	e surfac		lose,	F ' '		::::::	
				r (m)		%۲۱۰۰۲	AUD*		selling / Hard	Strata	a	Casing					al Rema	arks				<u> </u>
4.60 4.90 01:00 200 1.70 200 4.00	oth Struck C (m)	asing Depth (m)	ater Leve	el Minutes	Wate		d F					(mm)		(mm)	, , ,	1. Han	d dug in	spection	n pit to 1.2	0m.		



Client: Sunderland City Council



Water sealer (m)

From (m)

To (m)

Minutes

epth Struck Casing Depth (m) (m)

og last updated 24/01/2018.

BOREHOLE RECORD

Borehole BH52

Scale 1:50

Contract No: D8044 Site: IAMP - Preliminary Ground Investigation

Driller: PM/DC Logged By: BC Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling Checked By: JH Dates: 11/09/2017 - 12/09/2017

- 1	SAMPLE	DEIA			.0		ing) Iwater	STRATA RECORD	Depth	Level		Wel
уре	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	Description	(m)	(m AOD)	Legend	Back
			100	100		5		Weak to medium strong, partially weathered, light grey fine grained SANDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth with grey siltstone gravel infill. 9.97 - 10.09m: Weak grey mudstone.	(0.93)			
С	11.00 - 11.10					3	- 11	Very weak, partially weathered, grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean.	(0.57)			
	11.30 - 12.80							T11.17 - 11.22m: Weak grey siltstone. Weak to medium strong, partially weathered, thinly laminated grey SILTSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, clean	11.30		××××× ×××××× ×××××× ××××××	
			100	100	100	3	12	11.77m: Fracture are subhorizontal, planar, smooth, clean with dark grey discolouration on fracture surface.			× × × × × × × × × × × × × × × × × × ×	
	12.80 - 14.30							12.80 - 12.88m: AZCL.	(2.17)		X X X X X X X X X X X X X X X X X X X	
			95	95	53		13	13.15 - 13.27m: Fractures are subvertical, planar, smooth, clean.	13.47		× × × × × × × × × × × × × × × × × × ×	
						6	- 14	Very weak to weak, partially weathered, grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean.				
	14.30 - 15.10		100	35	15	NI		14.50 - 15.10m: NI, frequent randomly orientated interlocking fracture.	(1.63)			
	15.10 - 16.20						- 15	Weak to medium strong, partially weathered, grey SILTSTONE. Fractures are closely to medium spaced,	15.10		××××× ×××××	
			91	86	64	4		subhorizontal, planar, smooth, clean. 15.10 - 15.20m: AZCL. 15.37 - 15.42m: Fractures are subhorizontal, planar, smooth with grey siltstone gravel infill.	(1.10)		X X X X X X X X X X X X X X X X X X X	
							16	End of Borehole at 16.20 m	16.20		× × × × × × × × × × × × × × × × × × ×	
							- 17					
							- 18					
							- 19					
							- 20					

Diameter (mm)

Time (hr)

Diameter (mm)

Depth (m) 4.00 16.20

Depth (m)

1. Hand dug inspection pit to 1.20m.

Contract No.: 188044 Site: IANIP - Preliminary Ground Investigation Carry Society 20 Site: IANIP - Preliminary Ground Investigation Carry Society 20 Society							DIAL DI			TP I	No.	
Contract No.: D8044 Site: IAMP - Preliminary Cround Investigation Contract No.: D804		GEOTECHNICA	L & ENVIRONMENT	AL		TI	RIAL PIT RE	ECORD				
Client: Sunderland City Council Method: Hand Executed inspection Pit SAMPLE DETAILS Total Property Institute 160 9 330 1677 6949 First Property Institute Dark brown slightly sandy, slightly gravelity clayer TOPSOIL. Sand is first be coarse. Cravel is first to coarse, subangular to subcounded of sandstone and coal. Organic fiores noted. First Province motified, grey slightly sandy, slightly gravelity CLAY. Sand is fast and coal. Organic fiores noted. Self dark grey motified bown, slightly sandy, slightly gravelity CLAY. Sand is fast and coal. Organic fiores noted. Self dark grey motified bown, slightly sandy, slightly gravelity CLAY. Sand is fast to coarse, subangular to subcounded of sandstone and coal. Organic fiores noted. Self dark grey motified bown, slightly sandy, slightly gravelity CLAY. Sand is fast to coarse, subangular to subcounded of sandstone and coal. Organic fiores noted. 120 70 70m. Cobbles of sandstone noted. 120 70 70m. Cobbles of sandstone noted. 120 120 120 120 120 120 120 12	Contra	ct No.: D804	4		Site: IAMP -	Preliminar	y Ground Invest	igation	Easting: 433354.32	No	orthing:	
SAMPLE DETAILS Battus Depth Service Property Service	Client:	Sunderland C	ity Council		l			Logged By: FR	Sheet 1 of	1		
Type: Promise Promise	Method:	Hand Exca	vated Insp	ection Pit				Checked By: JH	Dates:	17/11/2017		
Dark brown slightly sandy, slightly gravely (clayer, TOPSQIL, Sand is fine to coarse. Cravel is fine to coarse, subangular to subrounded of sandstone. Roots noted. Firm brown mottled, grey slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Cravel is fine to coarse. Subangular to subrounded of sandstone and coal. Organic fibres noted. Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone and coal. Organic fibres noted. Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone and coal. Organic fibres noted. Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone and coal. Organic fibres noted. Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone and coal. Organic fibres noted. Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone and coal. Organic fibres noted. Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone. Stiff dark grey mottled brown, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone. Stiff dark grey mottled brown, slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone. Stiff dark grey mottled brown. slightly gravelly CLAY. Sand is fine to coarse, subangular to subrounded of sandstone. Stiff dark grey mottled brown. slightly gravelly CLAY. Stiff dark grey mottled brown. slight	SA	AMPLE DETA	ILS	vater			STDATA DEC	OPD	Donath			
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Firm brown motified, grey slightly sample, slightly sample (CAY Sand a single to coarse, subangular to subrounded of sandstone and coal Crigatic fibre to coarse, subangular to subrounded of sandstone and coal. Stiff dark grey motified brown, slightly sample, slightly gravelly CLAY Clay Crigate is fine to coarse, subangular to subrounded of sandstone and coal. 2 70m: Cobbles of sandstone noted. Find of Irial PE at 120 m 120 Remarks Ground Water (m) Excavation Details Orientation					fine to coarse	e. Gravel is	fine to coarse, s	elly clayey TOPSOIL. Sand is subangular to subrounded of	(0.30)			
Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal. 1. 70m: Cobbles of sandstone noted. End of Trial Pit st 1.20 m 1.20 Remarks Remarks Part of Trial Pit st 1.20 m Similar pit st 1.20 m Similar pit st 1.20 m Casal	HVP	0.30	HVP: 69kPa	- - - -	fine to coarse	e. Gravel is	fine to coarse, s	subangular to subrounded of				
Remarks Caravel is fine to coarse, subangular to subrounded of sandstone and coal. 0.55) 0.70m. Cobbles of sandstone noted. 0.55) 1.00 1	HVP	0.65	HVP: 97kPa	- - -					0.65			
Remarks Cround Water (m) Excavation Details Orientation				- - -	Gravel is fine coal.	to coarse,	subangular to s		-			
Remarks 1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. Stability: Stable Weather: Fine Find of Trial Pt at 1 20 m Stability: Stable Weather: Fine The dor Trial Pt at 1 20 m Stability: Stable Weather: Fine The dor Trial Pt at 1 20 m Stability: Stable Weather: Fine The dor Trial Pt at 1 20 m Stability: Stable Weather: Fine				_ _ 1 _	0.70m: Cobb	oles of san	dstone noted.		(0.55)			
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Remarks 1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. Ground Water (m) Excavation Details Orientation Orientati				- - -					_			
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Remarks Ground Water (m) Excavation Details Orientation 1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. Depth Strike Remarks Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Depth Strike C B Weather: Fine Depth Strike C B				_					E			
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Weather: Fine D C B			n nit to 1 2)m		 				Orient	ation	
Weather: Fine D C	2. No gro	oundwater end	countered.	Z.111.		ъери зи же	nemarks		-	Δ		
									D		В	٥
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	DUI	L & ENVIRONMENT	AL		Т	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D8044	1		Site: IAMP -	Prelimina	ry Ground Invest	igation	GL (m AOI 37.20 Easting: 433510.61	. 3	cale 1:25 orthing: 59351.79	
Client:	Sunderland C	ity Counci					Logged By: BC	Sheet 1 of			
	: Hand Excav						Checked By: BL	Dates:	27/07/2017		
	AMPLE DETA								Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			2	subangular to	subround	led, fine to coars	Illy, clayey TOPSOIL. Gravel is e of sandstone and mudstone. Travelly CLAY. Gravel is e of sandstone, mudstone and	1.20	36.90		
			5					- - - - - - - - - - - - - - - - - - -			
Remarks	 3			1	Grou	und Water (m)	Excavation Details		Orient	ation	1
	oundwater enc	ountered.			Depth Strike	I	Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection Pit	D	A C	В	0

									TP	No.	
	DU GEOTECHNICA	NELN L & ENVIRONMENT	TAL		Ti	RIAL PIT RE	ECORD		CP		
Contra	ct No.: D804	4		Site: IAMP -	Preliminar	y Ground Investi	igation	GL (m AOD 36.80 Easting: 433726.28	N	Scale 1:25 orthing: 59368.00	
Client:	Sunderland C	ity Counci	1			I	Logged By: BC	Sheet 1 of	1		
Method:	Hand Exca	vated Insp	ection Pit				Checked By: BL	Dates:	31/07/2017	,	
SA	AMPLE DETA	ILS	ater			070474 050	000		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
HVP	0.25	HVP: 86kPa		subangular to coal. Stiff dark brown	subround wn slightly subround	ed, fine to coars	ly clayey TOPSOIL. Gravel is e of sandstone, mudstone and ravelly CLAY. Gravel is e of sandstone, mudstone,	1.20	35.60		
			5					_			
L							T		L		
Remarks					 	nd Water (m)	Excavation Details		Orien	tation	
1. No gro	oundwater end	countered.			Depth Strike	Remarks	Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection Pit	D	A C	В	o

	DU BEOTECHNICA	VELIV	AL		т	RIAL PIT RE	CORD		TP I		
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AO 35.67 Easting: 433836.80	D) s	cale 1:25 orthing: 59367.01	
Client:	Sunderland C	ity Council		ı			Logged By: BC	Sheet 1 of			
Method:							Checked By: BL	Dates:	31/07/2017		
	AMPLE DETA								Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
HVP	1.00	HVP: 53kPa		subangular to limestone and Light brown s subangular to	o subround d coal. lightly gra o rounded,	ded, fine to coarse velly clayey fine t fine to coarse of	ly, clayey TOPSOIL. Gravel is e of sandstone, mudstone, o coarse SAND. Gravel is sandstone and limestone. gravelly CLAY. Gravel is e of sandstone and limestone. 1.20 m	(0.25) 0.25 (0.75) 1.00 (0.20) 1.20	34.67 34.47		
								- - - - - - - -			
			_					_			
Remarks	3			1	Grou	und Water (m)	Excavation Details		Orient	ation	
	oundwater end	countered.			Depth Strike		Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection Pit	D	A C	В	o

	DU GEOTECHNICA	NELN	TAL		Т	RIAL PIT RE	CORD		TP CP		
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investi		GL (m AO 35.96 Easting: 433666.30		scale 1:25 orthing: 59132.48	
Client:	Sunderland C	ity Counci	l				Logged By: BC	Sheet 1 o	f 1		
Method	: Hand Exca	vated Insp	ection Pit	_		(Checked By: BL	Dates:	31/07/2017	,	
S	AMPLE DETA	ILS	/ater			STRATA REC	OPP		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Descriptio	n	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
HVP	0.30	HVP: 67kPa	2	subangular to mudstone and Firm to stiff br	rounded, d coal. own sligh	fine to coarse of	ly, clayey TOPSOIL. Gravel is sandstone, limestone, gravelly CLAY. Gravel is e of sandstone, mudstone and	0.30	35.66		
			- - - - - - 5					- - - -			
								+	+	+	
Remark	s				Grou	und Water (m)	Excavation Details		Orien	tation	
1. No gr	oundwater end	countered.			Depth Strike	1	Dimensions: 0.30m x 0.30m Stability: Stable	D	Α	В	0
							Weather: Fine Remarks: Hand Excavated Inspection F		С		

	DUI DEOTECHNICA	VELIV . & ENVIRONMENT	AL		Т	RIAL PIT RE	CORD		TP I		
Contra	ct No.: D8044	4		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AO 36.12 Easting: 433931.63	D) s	cale 1:25 orthing: 59183.14	
Client:	Sunderland C	ity Council				L	ogged By: BC	Sheet 1 of			
Method:							Checked By: BL	Dates:	27/07/2017		
	AMPLE DETA						<u> </u>		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
				sandstone, br MADE GROU angular to sul coal. Firm light brow	rick, muds JND: Dark prounded, wn slightly	grey slightly clay fine to coarse of	ey gravelly sand. Gravel is shale, brick, sandstone and ravelly CLAY. Gravel is e of sandstone and coal.	0.15 (0.35) 0.50 (0.70)	35.97 35.62 34.92		
			2								
Remarks	3				Grou	und Water (m)	Excavation Details		Orient	ation	
1. No gro	oundwater end	ountered.			Depth Strike	Remarks	Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection F	D	A C	В	٥

		NELN			TI	RIAL PIT RI			TP	lo.	
	GEOTECHNICA	L & ENVIRONMENT	AL		11	NAL FII KI			CPT	22	
Contra	ct No.: D804	4		Site: IAMP -	Preliminar	y Ground Invest	igation	Easting: 433529.93		cale 1:25 orthing: 9085.82	
Client:	Sunderland C	itv Counci	<u> </u>				Logged By: BC	433529.93 Sheet 1 of		9085.82	
	: Hand Exca						Checked By: BL		31/07/2017		
	AMPLE DETA						-		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
HVP	0.30	HVP: 85kPa		subangular to coal. Stiff brown sli	subround	ed, fine to coars	lly clayey TOPSOIL. Gravel is se of sandstone, mudstone and y CLAY. Gravel is subangular, mudstone and coal.	(0.30) - (0.30) - (0.90) - (0.90) - (1.20)	(ppm)		
			 - - - -					- - - - - -			
			- - -					F			
			5 								
Remarks	 S				Grou	nd Water (m)	Excavation Details		Orienta	l ation	
	oundwater end	countered.			Depth Strike	Remarks	Dimensions: 0.30m x 0.30m		Jilonik	~	
910	3.13.0.010				-,	.c.marks	Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection P	D	A C	В	o

	OUNELW BEOTECHNICAL & ENVIRONMENTAL				Т	RIAL PIT RE	CORD	TP No. CPT23							
Contra	ct No.: D8044	1		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AOD) 34.63 Scale 1:25 Easting: Northing: 433886.25 558980.82							
Client:	Sunderland C	ity Counci	1			L	ogged By: BC	Sheet 1 of 1							
Method					Dates: 27/07/2017										
	AMPLE DETA						Checked By: BL		Level						
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill				
				subangular to and limestone Firm dark bro	rounded, e. wn slightly	fine to coarse of y sandy, slightly g	ly clayey TOPSOIL. Gravel is sandstone, mudstone, coal ravelly CLAY. Gravel is e of sandstone, mudstone and	1.20	34.38						
								E							
			_					F							
\vdash			5 					F							
					1		1								
Remarks				Grou	und Water (m)	Excavation Details		Orient	ation						
1. No gr	oundwater end			Depth Strike	Remarks	Dimensions: 0.30m x 0.30m									
							Stability: Stable		Α						
							Weather: Fine	D	С	В	٥				
							Remarks: Hand Excavated Inspection Pit	┧ └─	U						
I					1	I	L. C. Harro L. Fland L. Acavated Hispecticii Fil	1							

Contract No.: D8044 Site: IAMP - Preliminary Ground Investigation Client: Sunderland City Council Method: Hand Excarvated inspection Pit SAMPLE DETAILS JOSS Stream Form Stream		DU	VELI L & ENVIRONMEN	ITAL			TP No. CPT24									
Method: Hand Excavated Inspection Pit Description	Contra	ct No.: D804	4		Site: IAMP -	35.44	35.44 Scale 1.25 Easting: Northing: 434156.61 559116.26									
SAMPLE DETAILS Type Depth Invalid, Person-to (ny) 1-testing. Depth Invalid, Person-to (ny) 1-testing.	Client:	Sunderland C	ity Counc	il					Sheet 1 o	Sheet 1 of 1						
Depth Technic Premitre (ev) Premitre (Method	: Hand Exca	vated Insp	pection Pit		Dates:	Dates: 27/07/2017									
Dark brown sightly sandy, slightly gravelly, clayer TOPSOIL. Gravel is subangular to nunded, fine to carse of sandstone, mudstone and coal. Firm brown mottled light grey, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal. End of Teal Pe at 120 m 128 34.24	S	AMPLE DETA	ILS	vater			STDATA DEC	OPD	Dth-	Level						
subangular to rounded, fine to coarse of sandstone, mudstone and coal. Firm brown mottled light grey, slightly sandy, slightly gravelly, CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal. 1	Туре	Depth From-To (m)		Ground			(m)	PID	Legend	Backfill						
				3	subangular to coal. Firm brown m Gravel is sub	o rounded, nottled ligh angular to	fine to coarse of at grey, slightly sa subrounded, fine	sandstone, mudstone and andy, slightly gravelly CLAY. e to coarse of sandstone,	(0.25) - 0.25							
Remarks Ground Water (m) Excavation Details Orientation				}												
Nemarko Ground water (III) Excavation Details Offentation	Demorte	e				Cro	ind Water (m)	Execution Details		Orion	tation					
1. No groundwater encountered. Depth Strike Remarks Dimensions: 0.30m x 0.30m			nuntered				1			Onen	ıaııUII					
1. No groundwater encountered. Depth Strike Remarks Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Depth Strike Remarks Dimensions: 0.30m x 0.30m Stability: Stable C D A D A C	i. No gr	oundwater end	ountered.			Deptn Strike	Kemarks	Stability: Stable			В	۰				

	DUL	AL		Т	RIAL PIT RE	CORD		TP I							
Contra	ct No.: D8044	1		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AOD) Scale 1:25 Easting: Northing: 433542.89 558900.40							
Client:	Sunderland C	ity Counci		ı		ı	Logged By: BC	Sheet 1 of 1							
Method					Dates: 27/07/2017										
	AMPLE DETA					I.	Checked By: BL		Level						
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill				
				subangular to coal. Soft to firm br subrounded, to Stiff dark brown	o subround rown sand fine to coa	ded, fine to coarse y slightly gravelly arse of sandstone sandy, slightly gr	lly, clayey TOPSOIL. Gravel is e of sandstone, mudstone and CLAY. Gravel is subangular to mudstone and coal. Tavelly CLAY. Gravel is sandstone, limestone and 1.20 m	(0.25) - (0.25) - (0.45) - (0.50) - (0.	35.60 35.15						
								E							
			5 5					-							
	I														
Remarks	3		-	Grou	und Water (m)	Excavation Details		Orient	ation						
1. No gr	oundwater enc	ountered.			Depth Strike	Remarks	Dimensions: 0.30m x 0.30m Stability: Stable	D	Α	В	0				
							Weather: Fine Remarks: Hand Excavated Inspection Pit		С						

	OUNELM BEOTECHNICAL & ENVIRONMENTAL				Т	RIAL PIT RE	CORD	TP No. CPT27						
Contra	ct No.: D8044	4		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AOD) 34.88 Scale 1:25 Easting: Northing: 433754.12 558817.36						
Client:	Sunderland C	ity Council				L	ogged By: BC	Sheet 1 of 1						
Method					Dates: 27/07/2017									
	AMPLE DETA	-				1	Checked By: BL		Level					
Туре	Depth	Insitu Testing	Groundwater			STRATA RECO Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill			
			Dark brown s subangular to mudstone and	subround	dy, slightly gravel led, fine to coarse	ly, clayey TOPSOIL. Gravel is e of sandstone, limestone,	_ _ _ (0.30)							
			- - - - - -	Firm brown sl to subrounder coal.	ightly sand, fine to o	dy, slightly gravell coarse of sandstor	y CLAY. Gravel is subangular ne, limestone, mudstone and	0.30	34.58					
			- - - - -					(0.90)						
			1 1 			End of Trial Pit at 1		1.20	33.68					
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								E						
Remarks	2				Grou	und Water (m)	Excavation Details		Orient	ation				
	oundwater enc			Depth Strike		Dimensions: 0.30m x 0.30m								
							Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection Pit	D	A C	В	0			

	QUI BEOTECHNICA	VELN L& ENVIRONMEN	TAL	TRIAL PIT RECORD		TP CP						
Contra	ct No.: D804	4		Site: IAMP - Preliminary Ground Investigation	37.38	GL (m AOD) 37.38 Scale 1:25 Easting: Northing: 433608.92 558690.36						
Client:	Sunderland C	ity Counc	il	Logged By: BC	Sheet 1 of	1						
Method	: Hand Exca	vated Insp	ection Pit	Checked By: BL	Dates:	Dates: 27/07/2017						
S	AMPLE DETA	ILS	/ater	STRATA RECORD		Level						
Туре	Depth From-To (m)	Insitu Testing	Groundwater	Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill				
			- - -	MADE GROUND: Dark brown slightly sandy, slightly gravelly, clayey topsoil. Gravel is subangular to subrounded, fine to coarse of brick, sandstone, mudstone and coal.	(0.25)							
				Firm becoming stiff with depth brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.25	37.13						
			- - - - -		 (0.95) 							
			1 1 	End of Trial Pit at 1.20 m	1.20	36.18						
			2									
			4									
Remarks	3			Ground Water (m) Excavation Details		Orient	ation					
	oundwater end	ountered.		Depth Strike Remarks Dimensions: 0.30m x 0.30m Stability: Stable		A						
				Weather: Fine Remarks: Hand Excavated Inspection F	D D	C	В	٥				

	OUNELM BEOTECHNICAL & ENVIRONMENTAL				TRIAL PIT RECORD											
Contra	ct No.: D8044	4		Site: IAMP -	Preliminar	ry Ground Investi	gation	GL (m AOI 38.54 Easting: 433426.43	GL (m AOD) Scale 1:25 38.54 Scale 1:25 Easting: Northing: 433426.43 558606.45							
Client:	Sunderland C	ity Counci					Logged By: BC	Sheet 1 of 1								
	: Hand Excav						Checked By: BL	Dates: 27/07/2017								
	AMPLE DETA															
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descriptio		Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill					
				topsoil. Grave	el is suban	brown slightly sa gular to subroun- imestone and bri	andy, slightly gravelly clayey ded, fine to coarse of ck.	- - - (0.30)								
				gravelly CLA	Gravel is	wn mottled light of subangular to some and co	grey slightly sandy, slightly ubrounded, fine to coarse of al.	0.30	38.24							
								(0.90)								
			1 1 			1.20	37.34									
						End of Trial Pit at										
Remarks	6		5		Grou	und Water (m)	Excavation Details	-	Orient	ation						
	oundwater enc	ountered,			Depth Strike		Dimensions: 0.30m x 0.30m Stability: Stable Weather: Overcast Remarks: Hand Excavated Inspection P	D	A C	В	0					

	OUNELW BEOTECHNICAL & ENVIRONMENTAL				Т	RIAL PIT RE	CORD	TP No. CPT30							
Contra	ct No.: D8044	1		Site: IAMP -	Prelimina	ry Ground Investi	gation	39.52	GL (m AOD) 39.52 Scale 1:25 Easting: Northing: 433239.82 558526.88						
Client:	Sunderland C	ity Council				L	ogged By: BC	Sheet 1 of 1							
Method					Dates: 27/07/2017										
	AMPLE DETA						Checked By: BL		Level						
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill				
			- - -	Dark brown s subangular to	lightly san rounded,	dy, slightly gravel fine to coarse of	ly clayey TOPSOIL. Gravel is sandstone and mudstone.	_ _ (0.25)							
			-	Firm light brownsubangular to mudstone and	rounded,	sandy, slightly gr fine to coarse of	ravelly CLAY. Gravel is sandstone, limestone,	0.25	39.27						
			- - - -					(0.95)							
			- - - - 1 -					- - - -							
			- - - -			End of Trial Pit at 1	.20 m	1.20	38.32						
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Remarks				Grou	und Water (m)	Excavation Details		Orient	ation						
1. No gr	oundwater end	ountered.			Depth Strike	Remarks	Dimensions: 0.30m x 0.30m Stability: Stable		Α	В	o				
							Weather: Overcast Remarks: Hand Excavated Inspection Pit	D	С	В					

	OUNELM BEOTECHNICAL & ENVIRONMENTAL				Т	RIAL PIT RE	CORD	TP No. CPT31						
Contra	ct No.: D8044	4		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AOD) 39.07 Scale 1:25 Easting: Northing: 433201.82 558727.90						
Client:	Sunderland C	ity Council				L	_ogged By: BC	Sheet 1 of 1						
Method:					Dates: 28/07/2017									
	AMPLE DETA					I	Checked By: BL		Level					
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill			
				subangular to coal. Stiff dark brow	vn slightly rounded,	led, fine to coarse sandy, slightly gr	ly, clayey TOPSOIL. Gravel is a of sandstone, mudstone and avelly CLAY. Gravel is sandstone, mudstone,	1.20	37.87					
			5 _					F						
							T _			L				
Remarks					ınd Water (m)	Excavation Details	1	Orient	ation					
1. No gro	oundwater end	countered.			Depth Strike	Remarks	Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection Pit	D	A C	В	o			

DUNELW DESTECHNICAL & ENVIRONMENTAL			TAL		Т	RIAL PIT RI	ECORD		TP I		
	act No.: D804			Site: IAMP -	Prelimina	ry Ground Invest	-	GL (m AOI 37.13 Easting: 433351.04	. 3	scale 1:25 orthing: 58864.47	
	Sunderland C						Logged By: BC	Sheet 1 of			
	I: Hand Exca						Checked By: BL	Dates:	28/07/2017		Т
S	AMPLE DETA		Jwater			STRATA REC	CORD	Depth	Level (m AOD)	l and	D = - 1-4:11
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description		(m)	PID (ppm)	Legend	Backfill
				subangular to limestone and	o rounded, d coal.	, fine to coarse o	elly, clayey TOPSOIL. Gravel if sandstone, mudstone,	(0.30)	36.83		
			- - - - -	Stiff brown sli to subrounde	ghtly sand d, fine to c	ly, slightly grave coarse of sandst	lly CLAY. Gravel is subangula one, limestone and coal.	r 5.30	00.00		
			1 - - - -			End of Trial Pit at	t 1.20 m	1.20	35.93		
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			_ _ _ 5 _					<u>-</u>			
Remarks					Grou	und Water (m)	Excavation Details		Orient	ration	
	roundwater end	countered.			Depth Strike		Dimensions: 0.30m x 0.30r Stability: Stable		A		
							Weather: Fine Remarks: Hand Excavated Inspection	D Pit	С	В	0

Contract No.: D8044					Т	RIAL PIT RE	CORD		TP CP1		
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investi	gation		S	Scale 1:25	
Client:	Sunderland C	ity Counc	il			L	ogged By: BC	Sheet 1 o	f1		
Method	: Hand Exca	vated Insp	ection Pit			C	Checked By: BL	Dates:	28/07/2017	,	
S	AMPLE DETA	ILS	ater			CTDATA DEC	ODD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			_	Dark brown s subangular to coal.	lightly san	ndy, slightly gravel ded, fine to coarse	ly clayey TOPSOIL. Gravel is e of sandstone, limestone and	- - - (0.30)			
			- - - - -	Stiff dark brown subangular to mudstone and	rounded,	sandy, slightly gr , fine to coarse of	avelly CLAY. Gravel is sandstone, limestone,	0.30			
								(0.90)			
			- - 1 -								
						End of Trial Pit at 1	.20 m	1.20			
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			5 -					<u>F</u>			
Remark					Gro	und Water (m)	Excavation Details	+	Orient	 tation	<u> </u>
Remarks 1. No groundwater encountered.				Depth Strike		Dimensions: 0.30m x 0.30m		Olicili			
							Stability: Stable Weather: Fine	D	A C	В	0
							Remarks: Hand Excavated Inspection Pit	┦ └─			

		VELN		TRIAL PIT RECORD		TP No	
	GEOTECHNICA	L & ENVIRONMENT	AL			CPTM4	1
Contra	ct No.: D8044	4		Site: IAMP - Preliminary Ground Investigation	Easting: 433519.91	Scale Northin 558653	g:
Client:	Sunderland C	ity Council		Logged By: BC	Sheet 1 of 1		.02
Method:	: Hand Excav	vated Insp	ection Pit	Checked By: BL	Dates:	27/07/2017	
S	AMPLE DETA	ILS	ater	OTDATA RECORD		Level	
Туре	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	(m AOD) PID (ppm)	end Backfill
			_ _ _ _	MADE GROUND: Dark brown slightly sandy, slightly gravelly clayey topsoil. Gravel is subangular to subrounded, fine to coarse of sandstone, brick, limestone and coal.	(0.30)		
			- - -	Firm light grey mottled light brown, silty, slightly sandy CLAY.	0.30		
			_ _ _ _		(0.60)	<u>×</u> _	
			_ _ _		(5.55)	X	X
	- - - - 1		_ _ _	Firm reddish brown slightly sandy, slightly gravelly CLAY. Gravel is	0.90		·· ···· /\/\\\\
			_ 1 _ -	subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.30)	8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
				End of Trial Pit at 1.20 m	1.20	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
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				Construction 5 " 5 "	 	Order of 11	
Remarks	oundwater end	ountered		Ground Water (m) Excavation Details Depth Strike Remarks Dimensions: 0.30m x 0.30m	-	Orientation	ı
I				Stability: Stable		A	¬
				Weather: Rain	D	C E	3 °
				Remarks: Hand Excavated Inspection Pit			

	DUI	NELN	<u> </u>		T	RIAL PIT RE	ECORD		TPI		
Contra	ct No.: D8044	L & ENVIRONMEN	TAL	Site: IAMP -	Preliminar	y Ground Invest	igation	Easting:	No	cale 1:25	
Client:	Sunderland C	ity Counc	il				Logged By: BC	433340.01 Sheet 1 of		8581.15	
	: Hand Excav						Checked By: BL		27/07/2017		
	AMPLE DETA								Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
				subangular to coal. Firm to stiff do	ark brown	ed, fine to coars	elly clayey TOPSOIL. Gravel is the of sandstone, mudstone and lightly gravelly CLAY. Gravel is the of sandstone, limestone, and lightly gravelly CLAY. Gravel is the of sandstone, limestone, and lightly gravelly CLAY. Gravel is the of sandstone, limestone, and lightly gravelly CLAY. Gravel is the of sandstone, limestone, and lightly gravelly gravelly clayer.	- (0.30) - (0.90) - (
L			_ _ _ 5					_			
			- "					F			
Remarks			<u> </u>	Grou	nd Water (m)	Excavation Details		Orient	ation		
Remarks 1. No groundwater encountered.				Depth Strike	Remarks	Dimensions: 0.30m x 0.30m Stability: Stable Weather: Drizzle Remarks: Hand Excavated Inspection Pi	D	A C	В	0	

	DU	TAL		Т	RIAL PIT RE	CORD		TP CPT			
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investiç	gation		S	cale 1:25	
Client:	Sunderland C	ity Counc	1			L	ogged By: BC	Sheet 1 of	1		
Method	: Hand Exca	vated Insp	ection Pit			C	Checked By: BL	Dates:	27/07/2017		
S	AMPLE DETA	ILS	vater			STRATA RECO	ngn	Depth	Level (m AOD)		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description	n	(m)	PID (ppm)	Legend	Backfill
			_ _ _ _ _	MADE GROU topsoil. Grave sandstone, m	el is angula	ar to subrounded,	ndy, slightly gravelly clayey fine to coarse of brick,	- (0.30)			
			- - - - -	Firm to stiff be CLAY. Gravel sandstone, m	is subang	gular to subrounde	ntly sandy, slightly gravelly ed, fine to coarse of	0.30			
								(0.90)			
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			<u>-</u> -			End of Trial Pit at 1	.20 m	1.20			VA.\VA.\
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D	-									-4:	
Remark	s oundwater end	countered			Grou Depth Strike	und Water (m) Remarks	Excavation Details Dimensions: 0.30m x 0.30m		Orient	ation	
140 gi	Janawaler GIR				Schui suike	Nemarks	Stability: Stable	$+$ \vdash	Α		
							Weather: Overcast		C	В	٥
							Remarks: Hand Excavated Inspection F	it L			

	DU	TAL		Т	RIAL PIT RE	CORD		TP CPT			
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investi	gation		S	Scale 1:25	
Client:	Sunderland C	ity Counci	il	I		l	_ogged By: BC	Sheet 1 of	1		
Method	: Hand Exca	vated Insp	ection Pit			C	Checked By: BL	Dates:	27/07/2017	,	
S	AMPLE DETA	ILS	ater			0TD 1T1 DE0			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO Descriptio	n	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			_ _ _ _	Dark brown s subangular to coal.	lightly san	idy, slightly gravel ded, fine to coarse	ly clayey topsoil. Gravel is e of sandstone, mudstone and	(0.30)			
				Firm brown m Gravel is sub- limestone, mu	angular to	rounded, fine to	ndy, slightly gravelly CLAY. coarse of sandstone,	0.30			
			- - - -					(0.90)			
			_ _ _ _ 1					<u>-</u>			
			- - - -			End of Trial Pit at 1	.20 m	1.20			
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Remark	S		L	<u> </u>	Grou	und Water (m)	Excavation Details		Orient	tation	l .
	oundwater end	countered.			Depth Strike	1	Dimensions: 0.30m x 0.30m				
							Stability: Stable	$ _{D}$	Α	В	0
							Weather: Drizzle	↓ Ľ	С		
							Remarks: Hand Excavated Inspection Pit				

		VELN	<u> </u>	TRIAL PIT RECORD		TP I		
Contra	oct No.: D804	L & ENVIRUNMEN	IAL	Site: IAMP - Preliminary Ground Investigation	Easting: 433226.47	S	cale 1:25 orthing: 58640.18	
Client:	Sunderland C	ity Counci	il	Logged By: BC	Sheet 1 of			
	: Hand Exca			Checked By: BL	Dates:	28/07/2017		
S	AMPLE DETA	ILS	ater	OTDATA DECORD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			- - - - -	Dark brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal. Firm brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone and coal.	0.25			
			- - - - -		(0.55)			
			1 1 1	Firm to stiff dark brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.40)			
				End of Trial Pit at 1.20 m	1.20		***********	
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			- - - - -					
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Remark	S			Ground Water (m) Excavation Details	+	Orient	ation	I
	oundwater end	countered.		Depth Strike Remarks Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection Pit	D	A C	В	٥

	DUI.	VELT.	A		TI	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D804	4	IIAL	Site: IAMP -	Preliminar	y Ground Invest	igation	Easting: 433418.99	S	cale 1:25 orthing: 58718.55	
Client:	Sunderland C	ity Counc	il				Logged By: BC	Sheet 1 of	1		
Method:	: Hand Exca	vated Insp	pection Pit				Checked By: BL	Dates:	28/07/2017		
S	AMPLE DETA	ILS	ater			0TD 4T4 DE0			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
				subrounded t mudstone an Firm to stiff b	o subangu d coal. rown slight	lar, fine to coars	elly clayey TOPSOIL. Gravel is e of sandstone, limestone, gravelly CLAY. Gravel is sandstone, mudstone and	- (0.25) - (0.95) - (0.95) - (1.20) - (
			E					-			
			5					F			
					1						
Remarks					 	nd Water (m)	Excavation Details		Orient	ation	
No groundwater encountered.				Depth Strike	Remarks	Dimensions: 0.30m x 0.30m Stability: Stable Weather: Fine Remarks: Hand Excavated Inspection Pi	D	A C	В	0	

	OUR REDTFCHNICAL	VELN	AL	TRIAL PIT RECORD		TP N		
Contra	ct No.: D8044	4		Site: IAMP - Preliminary Ground Investigation	Easting: 433197.39	Sc	cale 1:25 rthing: 0216.69	
Client:	Sunderland C	ity Counci	l	Logged By: FR	Sheet 1 of	1		
Method	: Machine Ex	cavated T	rial Pit	Checked By: JH	Dates:	10/11/2017		
S	AMPLE DETAI	LS	/ater	STRATA RECORD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.20 0.20 0.40		-	MADE GROUND: Dark brown sandy slightly gravelly, clayey topsoil. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of sandstone and coal. Occasional brick, class and ceramic fragments, rare plastic, rootlets and organic matter noted. Stiff light brown slightly sandy, slightly gravelly CLAY. Sand is fine to	(0.40)			
BRE D ES	0.50 0.50 0.50		 = - -	coarse. Gravel is fine to coarse of sandstone and coal. Organic matter noted.	(0.30)			
B BRE D	0.80 - 1.50 0.80 0.80			Stiff dark grey, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of sandstone and coal.	-			
			- - - - - - - -		- - - - - - - - - - - - - - - - - - -			
BRE D	1.70 1.70			1.70m: Brown fine to coarse sand. Sand lens at 1.70m.				
В	2.00 - 2.50		2 	2.00m: Becoming thinly laminated				
BRE D	2.50 2.50				(3.80)			
B BRE D	3.40 - 3.80 3.50 3.50							
В	4.40 - 4.50		4 	4.40m: Thin laminae of sandy silt noted. End of Trial Pit at 4.50 m	4.50			
					- - - -			
Remark				Ground Water (m) Excavation Details		Orienta	ation	
	oundwater enc	ountered.		Depth Strike Remarks Dimensions: 3.60m x 0.70m Stability: Stable Weather: Sunny/ Cold Remarks: Machine Excavated Trial Pit	D	A C	В	o

		& ENVIRONMENT	AI	TRIAL PIT RECORD		TP I		
Contract No.	D8044	a ENVIRONMENT	HL .	Site: IAMP - Preliminary Ground Investigation	Easting: 433775.43	So	cale 1:25 orthing: 0241.80	
Client: Sund	derland Cit	ty Council		Logged By: FR	Sheet 1 of	1		
Method: Ma	achine Exc	cavated T	rial Pit	Checked By: JH	Dates:	14/11/2017		
SAMPL	E DETAII	LS	/ater	CTDATA DECORD		Level		
	Depth m-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
B B BRE D BRE D BRE D BRE D BRE D B A.0	0.20 0.20 0.20 0.20 0.20 0.40 0.50 0.50 0.80 0.90 00 - 1.50 00 - 2.50 2.00 2.00 2.00 00 - 4.50 4.00 4.00		1	MADE GROUND: Dark brown slightly sandy, slightly gravelly, clayey topsoil. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of sandstone and coal. Firm light brown mottled grey and orange, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal. Stiff dark grey, mottled dark brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and occasional coal. 1.20m: Becoming sandy Below 3.00m thinly laminated.	0.30 - 0.30 - 0.30 - 0.75 - 0.75			
D	4.50		- - - - -	End of Trial Pit at 4.50 m	4.50 - - - - -			
			- - - - 5		- - - -			
			_					
Remarks				Ground Water (m) Excavation Details		Orienta	ation	
1. No groundw	water enco	ountered.		Depth Strike Remarks Dimensions: 3.30m x 6.00m Stability: Stable Weather: Cloudy Remarks: Machine Excavated Trial Pit	D	A C	В	o

	DUI	NELIV	AL		т	RIAL PIT RE	CORD		TP I		
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investi	gation	Easting: 433335.84	N	cale 1:25 orthing: 60104.99	
Client:	Sunderland C	ity Council					Logged By: FR	Sheet 1 of	1		
Method	Machine Ex	xcavated T	rial Pit			(Checked By: JH	Dates:	13/11/2017		
S	AMPLE DETA	ILS	/ater			STRATA REC	ODD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.20 0.20		- - - -	topsoil. Grave	el is fine to	coarse, subangu	andy, slightly gravelly, clayey ular to subrounded of coal, ments noted. Rootlets noted.	(0.35)			
B D ES HVP BRE	0.40 - 0.70 0.40 0.40 0.40 0.50	HVP: 97kPa	- - - - - -	Firm brown m is fine to med Rootlets note	ium, suba	y slightly sandy, s ngular to subrour	slightly gravelly CLAY. Gravel nded of sandstone and coal.	0.35			
B D HVP	0.80 - 1.20 0.80 0.80	HVP: 139kPa	- - - - - - 1	Gravel is fine	to coarse	, subangular to si	ndy, slightly gravelly CLAY. ubrounded of sandstone and to subrounded sandstone at	0.75			
BRE	1.20		- - - - - - - - -								
B D	1.80 - 2.50 1.80		- - - - - - 2	1.80m: Pock	et of sand	noted, becoming	g sandy.				
BRE	2.30		- - - -								
В	2.60 - 3.20										
BRE D	3.20 3.20		- - - - - - - - -	3.50m: Beco	ming thinl	y laminated with	silt.				
B D	3.80 - 4.10 4.00		= - - - - - - 4					-			
BRE	4.10		- - - - -			End of Trial Pit at 4	4.10 m	4.10			
			- - - - - - - - - -					- - - - - - - - - - -			
			— 5 -					F			
Remarks	,				Cro	und Water (m)	Excavation Details		Orient	ation	
	oundwater end	countered			Depth Strike		Dimensions: 3.10m x 6.00m		Onent	auUH	
911					, , , od ike	. Contains	Stability: Very Stable Weather: Overcast Remarks: Machine Excavated Trial Pit	D	A C	В	350°

	O DEDTECHNICA	VELN L& ENVIRONMENT	TAL	TRIAL PIT RECORD		TP N		
Contra	ct No.: D804	4		Site: IAMP - Preliminary Ground Investigation	Easting: 433667.30	No	ale 1:25 rthing: 0093.08	
Client:	Sunderland C	ity Counci	I	Logged By: FR	Sheet 1 of	1		
Method	: Machine Ex	cavated T	rial Pit	Checked By: JH	Dates:	14/11/2017		
S	AMPLE DETA	ILS	ater			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.20 0.20			MADE GROUND: Dark brown slightly sandy, slightly gravelly, clayey topsoil. Gravel is fine to coarse, subangular to subrounded of sandstone, coal, mudstone and brick. Occasional glass and ceramic fragments noted. Rootlets noted.	(0.35)			
D ES BRE	0.40 0.40 0.50		- - - - -	Firm light brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal. Organic fibres present.	0.35			
B D	0.70 - 1.30 0.70			Stiff grey mottled brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and coal.	0.65			
BRE D B	1.40 1.40 1.50 - 2.00		1 1 		- - - - - - - - - - - - - - - - - - -			
			2	Below 2.00m: Thinly laminated.	- - - - - - - - - - - - - - - - - - -			
B BRE D	2.50 - 3.00 2.50 2.50				(3.85)			
BRE D	3.00 3.00		- 3 		- - - - - - - - - - - - - - - - - - -			
В	3.80 - 4.20		- - - -	3.80m: Thin bands of silt noted.	- - - -			
B BRE D	4.00 - 4.50 4.00 4.00		4					
D	4.50		- - - - -	End of Trial Pit at 4.50 m	4.50			
					- - - - - -			
					+			
Remark	S		ı	Ground Water (m) Excavation Details	1	Orienta	ation	
1. No gr	oundwater enc	countered.		Depth Strike Remarks Dimensions: 3.50m x 6.00m Stability: Stable Weather: Cloudy	D	A	В	360°
				Remarks: Machine Excavated Trial Pit		С		

	DUI BEOTECHNICA	VELN L& ENVIRONMENT	AL		Т	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D8044	4		Site: IAMP -	Prelimina	ry Ground Invest	igation	Easting: 433903.42	N	cale 1:25 orthing: 60153.12	
	Sunderland C						Logged By: FR	Sheet 1 of	1		
	: Machine Ex		rial Pit	T			Checked By: JH	Dates:	14/11/2017		
S	AMPLE DETA	ILS	water			STRATA REC	CORD	Depth	Level (m AOD)		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description		(m)	PID (ppm)	Legend	Backfill
BRE D ES BRE D ES B	0.20 0.20 0.20 0.20 0.40 0.40 0.40 0.50 - 0.90			Firm brown m to coarse sub noted.	e. Gravel is cal and oc nottled ora cangular to	s fine to coarse, s casional mudsto nge sandy slight subrounded of	lly, clayey TOPSOIL. Sand is subangular to subrounded of ne. Rootlets noted. ly gravelly CLAY. Gravel is fine sandstone and coal. Rootlets	- (0.40) - 0.40 - 0.40			
			_	0.70m: Beco	ming very	sandy.		-			
D BRE	0.90 1.00		- - - - 1 - - -		of interme	diate plasiticity.	htly gravelly, CLAY.	0.90			
В	1.50 - 2.00			1.25m. Beec	rimig Siigri	ay canay.		-			
BRE D	2.00 2.00		2 2 	2.00m: Beco	ming stiff.			- - - - - - -			
B BRE	2.50 - 3.00			2 22 22 2	ancia au Alaire I			- - - - - - - - - - - - - - - - - - -			
В	3.50 - 4.00			3.00m: Beco	ming tnini	<u>y laminated</u> with	siit bands.	- - - - - - - - - - - - - - - - - - -			
BRE D	4.00 4.00		- - - - - - - - -					-			
D	4.50		- - - - - - - - -			End of Trial Pit at	4.50 m	4.50			
			- - - -					-			
			5 					-			
Remarks	S		1	1	Grou	ınd Water (m)	Excavation Details	1	Orient	ation	
1. No gr	oundwater enc	countered			Depth Strike	Remarks	Dimensions: 5.70m x 6.00m Stability: Stable Weather: Cloudy Remarks: Machine Excavated Trial Pit	D	A C	В	o

	DU	NELN	1	TRIAL PIT RECORD		TP I		
Contra	ct No.: D8044	L & ENVIRONMENT	AL	Site: IAMP - Preliminary Ground Investigation	Easting: 433176.92	So	cale 1:25 orthing: 0002.87	
Client:	Sunderland C	ity Counci	I	Logged By: FR	Sheet 1 of	1		
Method:	: Machine Ex	cavated T	rial Pit	Checked By: JH	Dates:	10/11/2017		
S	AMPLE DETA	ILS	ater			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.20 0.20			MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is fine to coarse, subangular to subrounded of sandstone. Occasional brick and glass fragments noted. Rare coal noted. Rootlets noted.	(0.35)			
BRE D ES B	0.40 0.40 0.40 0.50 - 0.80		_ _ _ _	Firm light brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and rare coal.	0.35			
B BRE D	1.00 - 1.50 1.00 1.00			Stiff dark grey, slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone. 1.00m: Land drain	0.80			
В	1.50 - 2.00				-			
D	1.60			1.50m: Becoming sandy at 1.50m	- - - - - - - - -			
D	2.30		_ _ _ _ _		(2.70)			
B BRE	2.50 - 3.00 2.60				- - - - - - - -			
D	3.00		3		- - - - - - -			
B BRE	3.50 - 3.70 3.70			Grey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium, subangular to subrounded of coal.	3.50			
			4	End of Trial Pit at 3.80 m	3.80			
					- - - - - - - - - -			
			5 5		-			
Remarks				Ground Water (m) Excavation Details		Orienta	ation	
i. No gro	oundwater end	ountered.		Depth Strike Remarks Dimensions: 3.50m x 0.70m Stability: Stable Weather: Sunny/ Cold Remarks: Machine Excavated Trial Pit	D	A C	В	o

	DU BEOTECHNICA	NELIV	AL		Т	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D804	4		Site: IAMP -	Preliminaı	ry Ground Invest	igation	Easting: 433429.40	No	cale 1:25 orthing: 59973.13	
Client:	Sunderland C	ity Council					Logged By: FR	Sheet 1 of	1		
Method	: Machine Ex	cavated T	rial Pit				Checked By: JH	Dates:	13/11/2017		
S	AMPLE DETA	ILS	vater			STRATA REC	OPD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES B	0.20 0.20 0.40 - 0.60		- - - - - -	topsoil. Grave sandstone, co noted. Rootle	el is fine to pal and bri ets noted.	coarse, subang ck. Occasional g	andy, slightly gravelly, clayey ular to subrounded of lass and ceramic fragments and, slightly gravelly CLAY.	- (0.40) - 0.40			
D ES HVP B	0.50 0.50 0.50 0.60 - 1.10	HVP: 129kPa	- - - - - - - -	coal. Low cob sandstone.	ble conte		ubrounded of sandstone and subangular to subrounded of dy.	- - - - - - - - - - -			
D BRE	1.10		— 1 	1.00m: Clay	of low pla	sticity.		- (1.50) - (1.50) 			
B D BRE	1.90 - 2.30 2.00 2.10		- - - - - - 2 - - - - -		to coarse		andy, slightly gravelly CLAY. ubrounded of sandstone, coal	1.90			
B D HVP BRE	2.90 - 3.30 2.90 2.90 3.20	HVP: 102kPa	- - - - - - - - - - - - - - - - - - -	2.50m: Beco	ming stiff.			- - - - - - - - - - - - - - - - - - -			
D HVP B BRE	3.60 3.60 3.70 - 4.00 3.70	HVP: 99kPa	- - - - - - - - - - - - - - - - - - -					-			
BRE D B	4.10 4.10 4.40 - 4.60		- - - - -			lty slightly grave ubrounded of co	lly CLAY. Gravel is fine to al.	4.10		× × ×	
D BRE	4.40 4.50		- - - - - - - - - - - - 5			End of Trial Pit at	4.60 m	4.60		× · · · · · · · · · · · · · · · · · · ·	
Remarks	2				Grav	ınd Water (m)	Excavation Details	-	Orient	ation	
	s oundwater enc	countered.			Depth Strike		Dimensions: 3.70m x 6.50m Stability: Very Stable Weather: Overcast Remarks: Machine Excavated Trial Pit	D	A C	B	30°

	DUI	NELN		TRIAL PIT RECORD		TP N		
Contra	ct No.: D804	L & ENVIRONMENT	AL	Site: IAMP - Preliminary Ground Investigation	Easting: 433782.05		ale 1:25 thing:	
Client:	Sunderland C	ity Council		Logged By: AH	Sheet 1 of		110.20	
	Machine Ex			Checked By: JH	Dates:	08/09/2017		
S	AMPLE DETA	ILS	ater	OTDATA DECODO		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.10 0.10		- - - -	MADE GROUND: Dark brown, slightly sandy, slightly gravelly, clayey topsoil. Gravel is angular to subangular, fine to coarse of brick. Occasional pottery fragments present.	_ _ _ (0.30)			
В	0.50		- - - - -	Firm, dark brown, slightly sandy, slightly gravelly CLAY with low cobble content. Gravel is angular to subangular, fine to coarse of mudstone and coal. Cobbles are subangular to subrounded of mudstone.	0.30	\$		
BRE D ES HVP	0.50 0.50 0.50 0.50	HVP: 67kPa	- - - -		0.80			
B BRE D	1.00 1.00 1.00		- - - - 1 -	Firm, dark brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.	- - - -	- - - - -		
ES	1.00		- - - -		 (0.90)	- - - - - - -		
			- - - -		- - - - - 1.70			
В	2.00		- - - - - - -	Very stiff, dark brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone, sandstone and coal.				
BRE D	2.00 2.00							
			- - - - - - - - -					
B BRE D	3.00 3.00 3.00		- - - - - - - - - - - - -					
B BRE D	4.00 4.00 4.00		- - - - - - - - - 4	Stiff, thinly laminated, dark brown, sandy CLAY. Sand is fine to medium.	3.80	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		
			= = = = = =		(0.70)			
				End of Trial Pit at 4.50 m	4.50 - - - -		_ ` ` 3	
			- - - - - 5		- - - - -			
Remarks	<u> </u>			Ground Water (m) Excavation Details		Orienta	tion	
	oundwater end	ountered		Depth Strike Remarks Dimensions: 0.60m x 4.00m		Onenia	uUII	
git	Landin office			Stability: Stable Weather: Dry	D	A C	В	360°
				Remarks: Machine Excavated Trial Pit				

	DU GEOTECHNICA	NELN L & ENVIRONMENT	AL		т	RIAL PIT RE	CORD		TP I		
Contrac	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AOI 37.01 Easting: 433662.00	, s	cale 1:25 orthing: 59544.50	
Client:	Sunderland C	ity Council				L	Logged By: AB	Sheet 1 of	1		
Method:	Machine Ex	cavated T	rial Pit			C	Checked By: JH	Dates:	22/08/2017		
SA	MPLE DETA	ILS	ter						Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES D ES HVP B	0.20 0.20 0.40 0.40 0.40 0.50 - 0.70	HVP: 53kPa		topsoil. Grav and brick. Firm light gre of intermedia	el is angul y and brow te plasticit	lar to subrounded	Indy slightly gravelly clayey I, fine to coarse of sandstone by sandy slightly gravelly CLAY Ilar to subrounded, fine to d limestone.	0.25	36.76		
BRE D	1.00 1.00				plasticity.	Gravel is subangu	andy slightly gravelly CLAY of ular to subrounded, fine to	1.10	35.91		
В	1.50		- - - - - - - - - -					- - - - - - - - - -			
BRE D	2.10 2.10		2 _ _ _ _ _ _								
B HVP	2.50 2.50	HVP: 120kPa	- - - - - - -					- - - - - - -			
BRE D HVP	3.00 3.00 3.00	HVP: 55kPa	- - 3 - - - - -	Below 3.00n subrounded			oles are subangular to	- - - - - - -			
В	3.50		- - - - - - -	Firm brown s is subangular mudstone.	lightly clay r to subrou	rey slightly sandy Inded, fine to coal	slightly gravelly SILT. Gravel rse of sandstone and	3.50	33.51	****** ***** *****	
BRE D	4.00 4.00		- - - - - - - - -	3.90m: 1 No	. Subround	ded boulder of sa	ndstone.	(1.00)			
B HVP	4.50 4.50	HVP: 31kPa	- - - - - - - - - -			End of Trial Pit at 4	4.50 m	4.50	32.51	****** *****	
			_ 5 _								
								£			
Remarks	j	-			Grou	und Water (m)	Excavation Details		Orient	ation	
1. No gro	oundwater end	countered.			Depth Strike	Remarks	Dimensions: 0.60m x 3.90m Stability: Good Weather: Overcast Remarks: Machine Excavated Trial Pit	D	A C	В	83°

	DU	NELW AL & ENVIRONMENT	AL		T	RIAL PIT RI	ECORD		TP I		
Contrac	ct No.: D804	4		Site: IAMP -	Preliminar	ry Ground Inves	tigation	GL (m AOE 35.47 Easting: 433861.00	, SI	Scale 1:25 Northing: 159478.70	,
Client:	Sunderland C	ity Council					Logged By: AB	Sheet 1 of			
Method:	: Machine Ex	xcavated T	rial Pit				Checked By: JH	Dates:	23/08/2017	/	
SA	AMPLE DETA	ILS	vater			STRATA REC		46	Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description	ion	Depth (m)	(m AOD) PID (ppm)	Legend	l Backfill
D ES BRE D ES HVP B	0.20 0.20 0.40 0.40 0.40 0.40 0.50 - 0.70	HVP: 90kPa		Gravel is ang occasional moccasional mocca	gular to sub nudstone. ottled brown plasticity. C ndstone, m	brounded, fine to	sandy slightly gravelly clay. co coarse of sandstone and slightly gravelly CLAY of gular to subrounded, fine to sal.	0.30	35.16		
BRE D	1.00 1.00	-	1	1.00m: Clay	of low plas	sticity.		- - - - - - - - - - - - - - - - - - -			
В	1.50		: - - - - - - -	1.50m: Occa	asional sub	brounded cobble	s of sandstone.	- (2.30) 			
BRE D	2.00 2.00		2 2					E F			
HVP	2.20	HVP:	- -					F			
В	2.50	108kPa	- - - - -								
BRE D	3.00 3.00	-		Firm locally signarticity. Grasandstone. R	Rare sandst	stone cobbles no	gravelly CLAY of intermediate bunded, fine to coarse of oted.	2.60	32.86	X	
	3.00			J.00111	ming			Ē		×_ ×_	
HVP	3.30	HVP: 41kPa	: - - - -					- - - - -		×_ ×	
В	3.50	-								X	
BRE D HVP	4.20 4.20 4.30	HVP: 31kPa	- - - -					- - - - - -		X	
В	4.60					End of Trial Pit at	t 4.70 m	4.70	30.76	<u>x</u> <u>x</u> <u>x</u>	
- marks					Grou	I Mater (m)			Orion	1 dian	
Remarks 1. No gro	s oundwater end	countered.			Grou Depth Strike	e Remarks	Excavation Details Dimensions: 0.60m x 3.80m Stability: Good Weather: Overcast Remarks: Machine Excavated Trial Pit	_ D	Orient A C	B	136°

DUNE BEOTECHNICAL & EV	ELW IVIRONMENTAL		Т	RIAL PIT RI	ECORD		TP N TP1		
Contract No.: D8044		Site: IAMP -	· Preliminar	ry Ground Invest	tigation	GL (m AOD 35.98 Easting: 433688.72	30	cale 1:25 orthing: 9238.29	
Client: Sunderland City (- Council		,		Logged By: AH	Sheet 1 of 1			
Method: Machine Excav	ated Trial Pit				Checked By: JH	Dates:	08/09/2017		
SAMPLE DETAILS	vater			OTRATA DEC	2000	T	Level		
	nsitu esting			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
		topsoil. Grave and coal.	vel is angula	ar to subangular	y, slightly gravelly, clayey r, fine to coarse of mudstone lightly gravelly CLAY. Gravel is mudstone sandstone and	0.30	35.68		
	- - - - - - 1			End of Trial Pit at	11.00 m	1.00	34.98		
	2			End of Trial Pit at	1.00 m	1.00	34.98		
Remarks 1. No groundwater encoun 2. Trial Pit terminated at 1. encountered.	antered.	d drain being	Grou Depth Strike	und Water (m)	Excavation Details Dimensions: 0.60m x 3.00m Stability: Stable Weather: Dry		Orienta	ation	360°

		NELN		TRIAL PIT RECORD		TP N		
Contra	ct No.: D804	L & ENVIRUNMENT	AL	Site: IAMP - Preliminary Ground Investigation			OA ale 1:25	
Client:	Sunderland C	ity Council	<u> </u>	Logged By: AH	Sheet 1 of	1		
Method		-		Checked By: JH	Dates:	08/09/2017		
S	AMPLE DETA	ILS	ater			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.10 0.10			MADE GROUND: Dark brown, slightly sandy, slightly gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of mudstone, brick and coal.	_ _ _ (0.30)			
			_	Firm, dark brown, sandy CLAY. Sand is fine to coarse.	0.30 (0.10)			
В	0.50		_	Stiff, dark brown, slightly sandy, slightly gravelly CLAY. Gravel is	0.40			
BRE D	0.50 0.50 0.50			angular to subangular, fine to coarse of mudstone and sandstone.	E			
ES HVP	0.50 0.50	HVP: 93kPa	_		F			
			_		E			
_			=		-			
B BRE D	1.00 1.00 1.00		— 1 - -		E			
ES HVP	1.00 1.00 1.00	HVP: 90kPa	_		-			
	1.00	11V1 . 30KI U	_		- (1.70) -			
			_ _ _		E			
			_		-			
			_		E			
					E			
			_		F			
B BRE	2.00 2.00		_ 2 		E			
D	2.00		_	Very stiff, brown, slightly sandy, slightly gravelly CLAY. Gravel is	2.10			
			_	angular to subangular, fine to coarse of mudstone, sandstone and	F			
			_	coal.	E			
			_		F			
			_ _ _		E			
			_		F			
			_		F			
В	3.00		_ _ 3		(1.80)			
BRE D	3.00 3.00		_		(1.50)			
			_		F			
			_ _ _		E			
			_		F			
			_		F			
			_ _ _		E			
			= -		F			
			_	Very stiff, dark brown, slightly sandy, slightly gravelly CLAY. Gravel is	3.90			
B BRE	4.00 4.00		4 4	angular to subangular, fine to coarse of mudstone and coal.	F			
D	4.00		- -		F			
			- - -		(0.70)			
			_		F			
			<u>-</u>		E			
			- -	End of Trial Pit at 4.60 m	4.60			
			-		F			
			- - -		E			
			_ _ 5		<u> </u>			
			<u> </u>		+			
Remarks	 S			Ground Water (m) Excavation Details		Orienta	ition	I
	oundwater end	countered.		Depth Strike Remarks Dimensions: 0.60m x 4.00m				
				Stability: Stable	\dashv	Α		
				Weather: Dry	-		В	360°
				Remarks: Machine Excavated Trial Pit	\dashv \sqsubseteq	С		
				Remarks: Machine Excavated Trial Pit				

	DU GEOTECHNICA	NELN IL & ENVIRONMENT	TAL		T	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D804	4		Site: IAMP -	Preliminar	ry Ground Invest	igation	GL (m AOI 35.68 Easting: 433946.39	, s	cale 1:25 orthing: 59241.92	
Client:	Sunderland C	ity Counci	I				Logged By: BC	Sheet 1 of			
	: Machine Ex						Checked By: JH	Dates:	24/08/2017		
	AMPLE DETA					l		+	Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.20 0.20		- - - - -	topsoil. Grav mudstone, co	el is angul al and brid	ar to subrounded ck.	andy slightly gravelly clayey d, fine to coarse of sandstone,	- - - (0.30) - - 0.30	35.38		
BRE D ES	0.50 0.50 0.50		_ _ _ _ _ _	Stiff brown sli Gravel is sub- mudstone and	angular to	ly slightly gravell rounded, fine to	y CLAY of high plasticity. coarse of sandstone,	0.50	35.30		
HVP B	0.50 0.80 - 1.00	HVP: 93kPa	- - - - - -					(0.90)			
			1 	Firm dark bro	wn slightly	sandy slightly g	ravelly CLAY of high plasticity.	1.20	34.48		
BRE D HVP	1.50 1.50 1.50	HVP: 61kPa	- - - - - -	mudstone and	d coal. asional sub	pangular to subro	ounded cobbles and boulders	- - - - - -			
В	1.80 - 2.00			1.70m: Beco							
BRE D	2.50 2.50			2.50m: Beco	oming stiff.			- - - - - - - -			
HVP B	2.50 2.80 - 3.00	HVP: 83kPa						- (3.40) (-			
B BRE D HVP	3.50 - 4.00 3.50 3.50 3.50 3.50	HVP: 90kPa									
HVP	4.20	HVP: 93kPa	- - - - - -								
BRE D	4.50 4.50					End of Trial Pit at	4.60 m	4.60	31.08		
								-			
Remarks					Grou	ınd Water (m)	Excavation Details		Orient	ation	
	s oundwater end	countered.			Depth Strike		Dimensions: 0.60m x 2.80m Stability: Stable Weather: Fine Remarks: Machine Excavated Trial Pit	D	A C	В	354°

	O U GEOTECHNICA	NELN AL & ENVIRONMENT	TAL		т	RIAL PIT RE	ECORD		TP I		
Contra	ict No.: D8044	4		Site: IAMP -	- Preliminaı	ry Ground Investi	igation	GL (m AOE 35.57 Easting: 433988.44	, s	cale 1:25 orthing: 59229.79	
Client:	Sunderland C	ity Counci	il	_			Logged By: AB	Sheet 1 of	1		
	: Machine Ex						Checked By: JH	Dates:	24/08/2017	,	
	AMPLE DETA							+	Level	T	
Туре	Depth	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.10 0.10			Gravel is and	gular to sub	brounded, fine to	ravelly sandy clayey topsoil. coarse of brick coal and	- - (0.20)			
			-	Stiff orange a	casional gl	ass and tile.	sandy slightly gravelly CLAY.	0.20	35.37		
BRE D	0.30 0.30		Ę	Gravel is sub	bangular to	subrounded, fine	e to coarse of sandstone,	E			
ES HVP	0.30 0.30 0.50 - 0.70	HVP: 87kPa		occasional m				E			
В	0.50 - 0.70		_					F			
		'	_					F			
			_					F			
			-					F			
BRE D	1.00 1.00	'	1					E			
HVP	1.00	HVP: 97kPa						E			
		'						F			
			F					F			
В	4.50	'	_					F			
В	1.50	'	Ę					E			
			E					(2.90)			
								F			
i								F			
BRE	2.00		_ 2					L			
D	2.00		-					F			
i			-					F			
i			Ę					E			
i								E			
В	2.50	'	_					F			
HVP	2.60	HVP: 87kPa						F			
i			_					þ			
ı		'	-					F			
i			-					F			
l			3 					3.10	32.47		
BRE	3.20		E	Stiff, locally fi	irm, dark g	rey silty slightly o	gravelly CLAY of intermediate	Ŧ 3.10	34.71	X	
D	3.20	'		plasticity. Gra	avel is suba	angular to subrou	unded, fine to coarse of	E		×	
ı		'	F	ourrante	Id madde.	10.		þ		×	
i			_					F		× 3e .	
В	3.60	'	_					F		×	
i			_					F		×	
HVP	3.80	HVP: 70kPa	E					(1.40)		× × :	
i		'	E					E		×	
BRE D	4.00 4.00		<u> </u>					F		×—,—	
i			- -					F		×	
l			-					F		×	
В	4.40		F					F		×	
В	4.40	'						4.50	31.07	× × ·	
						End of Trial Pit at	4.50 m		01.0.		
		'						þ			
		'	_					þ			
i			-					F			
	<u> </u>	<u> </u>	5					E			
								+	+	+	-
Remarks	s				Grou	und Water (m)	Excavation Details	1	Orient	ation	-
	oundwater end	countered.	-		Depth Strike	· · ·	Dimensions: 0.60m x 3.70m	+			
, ,							Stability: Good	1 —	Α		
ı								-		В	149°
l							Weather: Overcast	-	С		
1						1	Remarks: Machine Excavated Trial Pit				

	QUI GEOTECHNICA	NELIV	TAL		т	RIAL PIT RE	CORD		TP I		
Contra	ct No.: D804	.4		Site: IAMP	- Preliminar	ry Ground Investi	igation	GL (m AOE 35.65 Easting: 433558.57	, s	cale 1:25 orthing: 59178.56	
Client:	Sunderland C	Lity Counci	il				Logged By: AB	Sheet 1 of			
	: Machine Ex						Checked By: JH	Dates:	23/08/2017	,	
	AMPLE DETA						<u> </u>	+	Level	Τ	
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
DES BREDES PER BRD B	0.20 0.20 0.40 0.40 0.40 0.40 0.50 - 0.70 0.80 1.00 1.50	HVP: 56kPa	_	topsoil. Gravand mudstor Firm light ora gravelly CLA	vel is angul ne. angish brow VY. Gravel i occasional r	lar to subrounded wn mottled light gi is subangular to s mudstone and co	andy slightly gravelly clayey d, fine to coarse of sandstone grey, slightly sandy slightly subrounded, fine to coarse of oal.	0.30)	35.35		
BRE D	2.00 2.00		2			ediate plasticity. ndstone and rare	mudstone subrounded	-			
BRE D HVP	3.00 3.00 3.00	HVP: 69kPa	3	subrounded, coal.	, fine to coa		Y. Gravel is subangular to e, occasional mudstone and silty SAND.	2.90	32.75 32.45	× × ×	
В	3.50			Firm grey sli	ghtly sandy grey slight	y SILT. Sand is fin		3.50	32.15		
BRE D B	4.00 4.00 4.20		- 4			End of Trial Pit at 4	4.30 m	4.30	31.35		
 		+	5					F			
										\vdash	<u> </u>
Remarks	3				Grou	und Water (m)	Excavation Details	T	Orient	ation	
1. Seepa	age at 3.80m.				Depth Strike 3.80	e Remarks	Dimensions: 0.60m x 4.00m Stability: Poor from 3.20m. Weather: Overcast Remarks: Machine Excavated Trial Pit	D	A C	В	73°

	QUI GEOTECHNIC/	NELN AL & ENVIRONMENT	T NTAL		T	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D8044	4		Site: IAMP -	· Preliminar	ry Ground Investi	igation	GL (m AOI 35.83 Easting: 434023.31	, SI	Scale 1:25 Northing: 559100.27	
Client:	Sunderland C	ity Counc	il l				Logged By: AB	Sheet 1 of			
Method:	: Machine Ex	xcavated 7	Γrial Pit				Checked By: JH	Dates:	21/08/2017	/	
S	AMPLE DETAI	ILS	vater			STRATA REC			Level	Γ '	
Type	Depth From-To (m)	Insitu Testing	Groundwater			Descriptio	on	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
ES BESHVP BREDHVP B BRED B BRED B BRED	0.30 0.50 - 0.70 0.50 0.50 1.00 1.00 1.00 1.00 2.00 2.00 2.00 2.00 3.00 3.00 3.50 - 3.70	HVP: 65kPa	- - - - - - - - - - - - - - - - - - -	topsoil. Grave and mudston Firm greyish intermediate coarse of san 1.00m: Becco	vel is angulane. brown slight plasticity. (ndstone, occoming stiff.	ar to subrounded httly sandy slightly Gravel is subang ccasional coal an		0.40	35.43		
D B	4.00 4.50 - 4.70		- - - - - - - - - - - -	4 50m: Occ.	scional len	ses of silty clay.					
			- - - - - - - - - - 5	7.0011.	ISIONAL TOTAL	End of Trial Pit at	4.70 m	4.70	31.13		
Remarks	s				Grou	und Water (m)	Excavation Details	+	Orient	± tation	
	oundwater enc	ountered.			Depth Strike	T	Dimensions: 0.60m x 3.40m Stability: OK Weather: Sunny Remarks: Machine Excavated Trial Pit	_ D	A C	В	81°

	BEOTECHNICA	NELN AL & ENVIRONMENT	M NTAL		T	RIAL PIT	RECORD		TP TP		
Contrac	ct No.: D804	4		Site: IAMP -	Preliminar	ry Ground Inv	vestigation	GL (m AO 35.92 Easting: 434147.44	, 3	Scale 1:25 lorthing: 59062.56	
Client:	Sunderland C	ity Counc	il				Logged By: AB	Sheet 1 of			
Method:							Checked By: JH	Dates:	21/08/2017	7	
S/	AMPLE DETA		Τ .						Level	T	
Туре	Depth From-To (m)	Insitu	Groundwater			STRATA F Descri		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
DES BESP D B D B	0.20 0.20 0.50 - 0.70 0.50 0.50 1.20 1.50 - 1.70 2.00 2.50 - 2.70	HVP: 69kPa		topsoil. Grav sandstone ar Firm grey broplasticity with	wel is subarnd brick. Ra own slightly n low cobble fine to coa o subround m stiff.	ngular to sublare clay pipe y sandy slight le content. G arse of sandst ded of sandst	cly gravelly slightly sandy clayey prounded, fine to coarse of and metal fragments noted. Ity gravelly CLAY of intermediate stravel is subangular to stone and coal. Cobbles are tone.	(3.80)	35.52		
В	4.30 - 4.50			Fillii daik gio	ty snity OLA			- (0.30) - 4.50	31.42	<u> </u>	
			E			End of Trial P	² it at 4.50 m		J1.72		
								F			
			E					E			
	ĺ							E			
	 	+	5					F			
			<u> </u>						+	+	
Remarks	3				Grou	und Water (m)	Excavation Details		Orient	tation	
1. No gro	oundwater end	ountered.			Depth Strike	Remarks	Dimensions: 0.60m x 3.70m Stability: OK Weather: Sunny Remarks: Machine Excavated Trial Pit	D	A C	В	50°

	DUL	VELN L & ENVIRONMEN	AL		т	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Investi	gation	GL (m AOE 34.36 Easting: 433933.59	, s	cale 1:25 orthing: 58906.53	
Client:	Sunderland C	ity Counci	l				Logged By: AB	Sheet 1 of			
Method							Checked By: JH	Dates:	22/08/2017		
	AMPLE DETA										
Туре	Depth From-To (m)	Insitu Testing	Groundwateı			STRATA REC Descriptio		Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
D	0.10			topsoil. Grav			ravelly slightly sandy clayey d, fine to coarse of brick and	- - (0.20)			
ES	0.30		_	sandstone. Firm dark bro	wn sliahtly	/ sandv slightly g	ravelly CLAY. Gravel is	0.20	34.16		
20	0.00		_	angular to su	brounded,	fine to coarse of	sandstone and mudstone.	0.40	33.96		
В	0.50 - 0.70		_	Stiff orangish	and greyi	sh brown slightly subrounded, fine	sandy slightly gravelly CLAY. e to coarse of sandstone.	F			
D ES	0.50 0.50		-	0.50 - 0.60m	: Lens of s	sandy clay of inte	rmediate plasticity.	F			
HVP	0.50	HVP: 74kPa		0.60m Mottle	ed dark bro	own.		E			
			_					_			
			_					F			
BRE D	1.00 1.00		<u> </u>					_			
			_					F			
								E			
			_					L			
В	1.50 - 1.70		_					L			
HVP	1.50	HVP: 92kPa	_					F			
								(2.60)			
			_								
			_					_			
BRE D	2.00 2.00		— 2 –					_			
			=					F			
								E			
			_					-			
В	2.50 - 2.70		_					F			
			- -					F			
								E			
								E			
			_					F			
BRE D	3.00 3.00		— 3 –	Firm grey mo	ttled brow	n silty, slightly sa	ndy slightly gravelly CLAY of	3.00	31.36	×	
			_				gular to subrounded, fine to	F		X	
				coarse of sar	idstone an	a muastone.		E		×	
			_					E		X	
В	3.50 - 3.70		_					_		× × × × × × × × × × × × × × × × × × ×	
HVP	3.50	HVP: 48kPa	_					F		$\frac{\times}{\times}$	
			_ _					F		X	
								(1.60)		200	
			_					_			
BRE D	4.00 4.00		<u> </u>	Below 4.00n	n soft.					×	
			-			_		F		×	
								E		1×	
В	4.40 - 4.60							E		X	
			_							X—————————————————————————————————————	
HVP	4.60	HVP: 22kPa	- -			End of Trial Pit at	4 60 m	4.60	29.76	×	
						Life of Thair it at	4.00 III	E			
			_								
			_					F			
			— 5 –					F			
					ı		T				
Remarks					Grou	ınd Water (m)	Excavation Details		Orient	ation	
1. No gr	oundwater end	ountered.			Depth Strike	Remarks	Dimensions: 0.60m x 4.20m				
							Stability: Good		Α		
							Weather: Overcast	D	С	В	57°
							Remarks: Machine Excavated Trial Pit				

	DU	VELIV	AL		Т	RIAL PIT RE	ECORD		TP TP		
Contrac	ct No.: D804	4		Site: IAMP -	Preliminaı	ry Ground Invest	igation	GL (m AO 37.51 Easting: 433503.76	, s	cale 1:25 orthing: 58776.40	
Client:	Sunderland C	ity Council		l			Logged By: AB	Sheet 1 of	1		
Method:	Machine Ex	cavated T	rial Pit				Checked By: JH	Dates:	23/08/2017		
SA	MPLE DETA	ILS	ater						Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.20 0.20		- - - -	MADE GROU topsoil. Grav Rare clay tiles	el is angul	lar to subrounded	andy slightly gravelly clayey d, fine to coarse of sandstone.				
BRE D ES	0.40 0.40 0.40		- - - -	CLAY of inter	mediate p	lasticity. Gravel is	htly sandy slightly gravelly s subangular to subrounded, coal and mudstone.	0.30	37.21		
HVP B	0.40 0.60	HVP: 62kPa		0.60m: Beco	ming dark	grey and brown	mottled.	<u>-</u>			
			- - - - - 1	0.80m: Beco cobbles and	ming stiff boulders	with occasional s of sandstone.	subangular to subrounded				
BRE D	1.10 1.10		- ' - - - - -					- - - - -			
В	1.50		 					- - - (2.60)			
BRE D	2.00 2.00										
B HVP	2.50 2.50	HVP: 83kPa	- - - - - - - -					- - - - - -			
D	3.00		- - - - - 3 - -		angular to		Y of intermediate plasticity. e to coarse of sandstone,	2.90	34.61	× × × × × × × × × × × × × × × × × × ×	
B HVP	3.50 3.60	HVP: 53kPa	- - - - - - - - - -	3.50m: Beco	oming firm.	<u> </u>				×	
BRE D	4.10 4.10		- - - - - - - - -					- - - - - -		×	
B HVP	4.50 4.60	HVP: 34kPa	- - - - - - -			End of Trial Pit at	4.60 m	4.60	32.91	×	
			- - - - - - 5					- - - - - - -			
Dome						and Mater (an)	Everyation Details		Out - 1	otic -	
Remarks	oundwater end	ountored				und Water (m)	Excavation Details		Orient	ation	
i. No git	odilawatel eff	ouincieu.			Depth Strike	Remarks	Dimensions: 0.60m x 3.80m Stability: Good Weather: Rain Remarks: Machine Excavated Trial Pit	D	A C	В	65°

	DUI GEOTECHNICA	VELN L& ENVIRONMENT	T		Т	RIAL PIT RE	ECORD		TP I		
Contra	ct No.: D8044	4		Site: IAMP -	Prelimina	ry Ground Investi	igation	Easting: 433194.96	No	cale 1:25 orthing: 59632.82	
Client:	Sunderland C	ity Counci	I				Logged By: FR	Sheet 1 of	1		
Method	Machine Ex	cavated T	rial Pit				Checked By: JH	Dates:	15/11/2017		
S	AMPLE DETA	ILS	vater			STRATA REC	OPD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
BRE D ES B BRE D ES	0.20 0.20 0.20 0.40 - 0.70 0.40 0.40 0.40			topsoil. Grave sandstone an	el is fine to d mudstor vn mottled	coarse, subangune. Rare ceramic	andy, slightly gravelly, clayey ular to subrounded of fragments noted. e, sandy, slightly gravelly CLAY. ubrounded of sandstone and	- (0.40) 0.40 (0.30)			
B D	0.70 - 1.10 0.70			Stiff dark brow Gravel is fine coal.	vn mottled to coarse	l grey, slightly sa , subangular to s	ndy, slightly gravelly CLAY. ubrounded of sandstone and	0.70			
B BRE D	1.50 - 2.00 1.50 1.50			1.50m: Beco	_	dy. Sandstone co	bble noted.	- (2.80)			
B BRE D	2.50 - 3.00 2.50 2.50										
BRE D B	3.30 3.30 3.50 - 4.00					n of silt noted. r SILT. Sand is fin	ne to coarse.	3.50			
BRE D	4.00 4.00		- - - - 4 - - - -					- (1.30)			
D	4.50					End of Trial Pit at	4.80 m	4.80		X X X X X X X X	
		I					T				
Remarks					Grou	ınd Water (m)	Excavation Details		Orient	ation	_
1. No gr	oundwater end	ountered.			Depth Strike	Remarks	Dimensions: 3.70m x 6.00m Stability: Stable Weather: Cloudy Remarks: Machine Excavated Trial Pit	D	A C	В	0

	DUI	NELN			Т	RIAL PIT RI	ECORD		TP I		
Contra	ct No.: D804	L & ENVIRONMENT	AL	Site: IAMP -	Preliminar	ry Ground Invest	igation	Easting: 433158.62	No	cale 1:25 orthing: 59508.73	
Client:	Sunderland C	itv Council					Logged By: FR	Sheet 1 of		9506.73	
Method:		-					Checked By: JH	Dates:	15/11/2017		
SA	MPLE DETA	ILS	ater			070474 056			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description	on	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
BRE D ES B	0.20 0.20 0.20 0.20		- - - - - -	topsoil. Grave sandstone, co	el is fine to pal, brick. I	coarse, subang Rare ceramic fra	sandy, slightly gravelly clayey ular to subrounded of gments noted. e, slightly gravelly, sandy CLA	(0.40)			
D ES HVP	0.40 0.40 0.40	HVP: 114kPa	- - - - -	Sand is fine to subrounded o	o coarse. (Gravel is fine to	coarse, subangular to	- (0.60)			
D HVP	0.80 0.80	HVP: 97kPa						<u>-</u>			
В	1.00 - 1.50		— 1 - - - - -	Stiff dark brow subangular to mudstone.	vn mottled subround	l grey, slightly sa led of sandstone	ndy, slightly gravelly CLAY. e, coal and occasional	1.00			
BRE D	1.50 1.50		- - - - - - -								
В	2.00 - 2.50		- - - - - 2 - -					- - - - -			
BRE D	2.50 2.50		- - - - - - -								
В	3.00 - 3.50		- - - - 3 - - -					- - - - - - - -			
BRE D	3.50 3.50		- - - - - - -								
D	4.00 - 5.00		4 4	3.90m: Thin	lamination	ns of sandy silt n	oted. Becoming firm.				
В	4.40 - 4.90		- - - - -	Grey clayey s	lightly san	ndy SILT. Sand is	s fine to coarse.	4.50			
				4.50m: Thin	bands of c	clay noted.		- (0.50) 			
			— 5 - -			End of Trial Pit at	5.00 m	5.00			
Remarks	3			I	Grou	ınd Water (m)	Excavation Details		Orient	ation	1
					Depth Strike 4.70	Remarks Seepage	Dimensions: 3.30m x 0.60m Stability: Stable		A		
							Weather: Cloudy Remarks: Machine Excavated Trial Pit	_ D	С	В	0

	QUI GEOTECHNIC!	NELIV	TAL		T	RIAL PIT R	ECORD		TP I		
Contra	act No.: D804	4		Site: IAMP	- Preliminar	ry Ground Inves	tigation		S	cale 1:25	
Client:	Sunderland C	Lity Counci					Logged By: AB	Sheet 1 of	1		
Method:							Checked By: JH	Dates:	22/08/2017	,	
Si	AMPLE DETA	ILS	ater				-		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REG Descripti		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES	0.10 0.20			MADE GROU Gravel is and occasional b	gular to sub	prounded, fine to	ightly gravelly clayey topsoil. coarse of concrete, pottery,				
D ES B	0.40 0.40 0.50 - 0.70		- -▼ - - - -	clay with high	h cobble co ick, concret	ontent. Gravel is	slightly sandy slightly gravelly angular to subangular, fine to e. Cobbles are angular of brick	0.30			
				Firm brown s	slightly sand	dy slightly grave angular to subro mudstone and c	elly CLAY of intermediate unded, fine to coarse of oal.	0.70			
	1.50 - 1.70		- - - - - - - -					-			
B ES HVP	1.50 - 1.70 1.50 1.50	HVP: 53kPa	_ - - - - -	1.80m: Becc	oming stiff.			-			
BRE D	2.00 2.00		2 					- - - - - -			
В	2.50 - 2.70		- - - - - - -					(3.80)			
BRE D HVP	3.00 3.00 3.00	HVP: 85kPa	- - - 3 - - - -	2.90m: Becc	oming silty.			-			
B HVP	3.50 - 3.70 3.50	HVP: 48kPa		3.50m: Becc	oming firm.			- - - - - - - - -			
BRE D	4.00 4.00		4					- - - - - -			
В	4.30 - 4.50		E					E			
HVP	4.50	HVP: 34kPa	_ _ _ _			End of Trial Pit a	4.50 m	4.50			
								-			
									<u> </u>		
Remarks						und Water (m)	Excavation Details		Orient	ation	
1. Seepa	age at 0.30m.				Depth Strike 0.30	Remarks	Dimensions: 0.60m x 3.90m Stability: Ok in natural, poor ir made ground Weather: Overcast Remarks: Machine Excavated Trial Pit	D	A C	В	17°

	O U GEOTECHNICA	NELN AL & ENVIRONMEN	TAL		Т	RIAL PIT RE	ECORD		TP N		
Contra	act No.: D8044	.4		Site: IAMP	- Prelimina	ry Ground Invest	tigation		So	cale 1:25	
Client:	Sunderland C	City Counc	il				Logged By: AB	Sheet 1 of	f 1		
Method	I: Machine Ex	xcavated T	rial Pit				Checked By: JH	Dates:	22/08/2017		
S/	AMPLE DETAI	ILS	vater			OTDATA DEC		46	Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D B ES BRE ES HVP	0.10 0.20 - 0.40 0.30 0.50 - 0.70 0.50 0.50 0.50	HVP: 79kPa		Gravel is an brick and my MADE GRO angular to su Occasional Stiff light grecobble contestandstone, cubrounded 0.40 - 0.600 0.50m: Clay	ngular to sub nudstone. DUND: Dark subrounded, pottery fragi ey and brow tent. Gravel occasional r d of sandstor om: Firm.	brounded, fine to a grey slightly clar , fine to coarse or gments noted. vm slightly sandy I is subangular to mudstone, coal a une and limestone	y slightly gravelly sandy topsoil. o coarse of coal, occasional lyey gravelly sand. Gravel is if mudstone, slate and clinker. slightly gravelly CLAY with low o subrounded, fine to coarse of and limestone. Cobbles are e.	(0.20) - (0.20) - (0.20) - (0.40)			
В	1.50 - 1.70				coming dark			-			
BRE D	2.00 2.00		2 2 								
B BRE D HVP	2.50 - 2.70 3.00 3.00 3.00 3.00	HVP: 50kPa	3	3.00m: Bec	coming firm.			(4.30)			
BRE	3.50			3.50m: Bec	coming sligh	htly sandy silty cl	'ay.				
BRE D	4.00 4.00		- - 4 - - - -								
B HVP	4.50 - 4.70 4.50	HVP: 33kPa				End of Trial Pit at	4.70 m	4.70			
ark					Grou	114/stor/m)	Fusciation Potails	Ŧ-	Orient	e e e	
Remarks	s roundwater enc	ountered.			Depth Strike	und Water (m) Remarks	Excavation Details Dimensions: 0.60m x 4.10m Stability: Good Weather: Overcast/humid Remarks: Machine Excavated Trial Pit	D	Orienta A C	B	66°

	DUI	NELP	Л		т	RIAL PIT RE	ECORD		TP I		
Contra	GEOTECHNICAL	L & ENVIRONMENT	<u>ral</u>	Sito: IAMP	Prolimina		tication	+	TP:	34 Scale 1:25	;
	ict No.: D8044			SITE: IAIVIP -	Premminai	ry Ground Invest	-				
	Sunderland Ci	-					Logged By: AB	Sheet 1 o	of 1		
	: Machine Ex		īrial Pit				Checked By: JH	Dates:	21/08/2017		
S/	AMPLE DETAI	ILS	vater			STRATA REC	CORN	Danth	Level (m AOD)	.	
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			-	MADE GROU	JND: Dark	brown slightly g	gravelly clayey sandy topsoil. o coarse of concrete, coal and	- - (0.20)	+		
В	0.20 - 0.40		F	brick.	_			0.20			
BRE	0.30		F	MADE GROU	JND: Firm	dark brown san	dy slightly gravelly clay with low	1			
D ES	0.30 0.30		F	cobble conter	nt. Gravel	is angular to sur	brounded, fine to coarse of sh. Cobbles are angular to	(0.30)			
В	0.50 - 0.70		F	subrounded o	of concrete	Э.	_	0.50			
HVP ES	0.50 0.60	HVP: 100kPa	F	Stiff brown sli	lightly sand	dy slightly gravell	lly CLAY of intermediate	作			
'	1		F	plasticity with	h low cobble	le content. Grave	el is angular to subrounded,	F			
'	1		F	fine to coarse subrounded of			nudstone. Cobbles are	F.			
'	1		F	Subioniaca	Ji Sanusio.	ie.		F			
BRE	1.00		1					F		12.00	***************************************
D	1.00		F					F			
<u> </u>	1		F					F			
'	1		F					F			
	1		F	1.40m: Beco	ina dark			F			
В	1.50 - 1.70		F	1.40m. booo	miriy uai k	grey.		F			\$(X)(X)
'	1		F					þ			,\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
ļ '	1							þ			
	1		F					þ			
ļ '	1		E					F			
BRE	2.00		_ 2								
D	2.00		- 4					E.			
! '	1		F					F			
! '	1		F					F			
i '	1		F					F			
_	350 370		F					F (4.00)			
В	2.50 - 2.70		F					(4.00)		12 : 12 : 13 : 14 : 15 : 15 : 15 : 15 : 15 : 15 : 15	!
1 '	1		F					F			
4	1		-	<i>,</i>				þ			
4 '	1		_	2.80m: Sano	d pocke <u>t.</u>			L			*//////
1 '	1		E		7 10-1-			E			
BRE D	3.00 3.00		3					<u>-</u>			
	3.00		F					F			
4 '	1		F					F			*//////
1 '	1		F					F			
4 '	1		þ					þ			
В	3.50 - 3.70							L			
4	1							F			K/XXX
1 '	1		E					E			
4	1		E					E			
4 '	1		Ē					E			
BRE	4.00		F.					F_			
D BRE	4.00		4	4.00m: Beco	ming silty.			F			XXXXX
4 '	1		F					F			
l _ '	1		F					þ			
В	4.30 - 4.50		F					þ			
4 '	1		F					<u> </u>			ł XXX
4	1		F			End of Trial Pit at	4.50 m	4.50			WALL.
4 '	1		E					þ			
4 '	1		E					F			
1	[E					F			1
1	[F.					E			1
	-		5					F _.			1
 				+				+	+	+	-
Remarks	s				Grou	und Water (m)	Excavation Details	+	Orient	tation	
	age at 2.80m.				Depth Strike		Dimensions: 0.60m x 7.00m	+			
1	· • ·				2.80			1 —	Δ		
1						1	Stability: OK	- П	Α	В	20°
4					1	1	Weather: Sunny	=	С	-	
1					,	1	Remarks: Machine Excavated Trial Pit	7 —			

	DUR	VELN	TAL		Т	RIAL PIT RE	CORD		TP I		
Contra	ct No.: D8044	4	···	Site: IAMP -	Prelimina	ry Ground Investi	gation			cale 1:25	
Client:	Sunderland Ci	ity Counci	l			I	Logged By: BC	Sheet 1 of	1		
Method:	: Machine Ex	cavated T	rial Pit				Checked By: BL	Dates:	21/09/2017		
S	AMPLE DETAI	ILS	ater			070474 050			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
D ES BRE D ES B HVP BRE D	0.20 0.20 0.40 0.40 0.40 0.50 - 0.70 0.80 1.00 1.00 1.50 - 1.70 2.00 2.00 2.00 3.00 3.00	HVP: 101kPa		subangular to mudstone. Stiff brownish subangular to siltstone.	grey slights subround	fine to coarse of	lly clayey TOPSOIL. Gravel is sandstone, siltstone and gravelly CLAY. Gravel is e of sandstone, mudstone and avel is angular to subangular of NE).	- (0.30) - 0.30 - 1			
BRE D B	4.00 4.00 4.30 - 4.40		- - - 4 - - -					- - - - - - - - - - - -			
						End of Trial Pit at 4	4.50 m	4.50 - 4.50 			
Remarks					0	und Water (m)	Everyation Details		0===1	l otion	
	age at 4.50m.				Depth Strike 4.50	Ind Water (m) Remarks	Excavation Details Dimensions: 2.30m x 0.80m Stability: Stable Weather: Overcast Remarks: Machine Excavated Trial Pit	D	Orient A C	B	86°

	DU	NELN L & ENVIRONMENT	AL	TRIAL PIT RECORD		TP N		
Contra	ct No.: D804	4		Site: IAMP - Preliminary Ground Investigation		Sc	cale 1:25	
Client:	Sunderland C	ity Council		Logged By: BC	Sheet 1 of	1		
Method	: Machine Ex	cavated T	rial Pit	Checked By: BL	Dates:	21/09/2017		
S	AMPLE DETA	ILS	vater	STRATA RECORD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	Description	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
BRE	0.20		- - - -	Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone, coal, mudstone and siltstone.	(0.30)			
D ES	0.20 0.20		- - - -	Stiff brown sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone.	0.30			
BRE D ES HVP B	0.50 0.50 0.50 0.60 0.70 - 0.80	HVP: 91kPa	- - - - -		- (0.60) 			
BRE D	1.00 1.00		- - - - - 1	Stiff light brown mottled light grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone,	0.90			
			- - - - -	mudstone and siltstone.				
D	1.50		- - - - - -		- (1.00) - - - - -			
BRE D	2.00 2.00		- - - - - - 2	Stiff becoming firm with depth slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone,	1.90			
HVP	2.00	HVP: 126kPa		mudstone, siltstone and coal.	- - - - -			
D	2.50		- - - - -		- - - -			
HVP	2.80	HVP: 62kPa	- - - -		- (1.70) - - -			
BRE D	3.00 3.00		— 3 - - - -					
В	3.40 - 3.50				-			
				End of Trial Pit at 3.60 m	3.60			
			- - - - - - 4					
			- - - - -		-			
			- - - - -		- - - - -			
			- - - - -		- - - - -			
			5 		-			
Remarks	3			Ground Water (m) Excavation Details		Orienta	ation	
	nd water struck nated at 3.60m							
د. الااااااا	iiaicu ai 3.00M	i due to gr	Junuwaler.	Stability: Stable		Α	В	92°
				Weather: Overcast	ן ט	С		32
				Remarks: Machine Excavated Trial Pit				

	DU BEOTECHNICA	NELN L & ENVIRONMEN	TAL	TRIAL PIT REC	ORD		TP I		
Contra	ct No.: D804	4		Site: IAMP - Preliminary Ground Investigat	tion		So	cale 1:25	
Client:	Sunderland C	ity Counci	I	Log	gged By: BC	Sheet 1 of	1		
Method:	: Machine Ex	cavated T	rial Pit	Che	ecked By: BL	Dates:	22/09/2017		
S	AMPLE DETA	ILS	vater	STRATA RECOR	חי	Depth	Level (m AOD)		
Туре	Depth From-To (m)	Insitu Testing	Groundwater	Description		(m)	PID (ppm)	Legend	Backfill
BRE D ES BRE D B B B BRE D B B B B B B B B B B B B B B B B B B	0.20 0.20 0.20 0.50 0.50 0.50 0.60 0.70 - 0.80 1.00 1.00	HVP: 96kPa	2	Dark brown slightly sandy, slightly gravelly of subangular to rounded, fine to coarse of sal coal. Stiff brown mottled light grey slightly sandy, Gravel is subangular to subrounded, fine to mudstone and siltstone. Stiff grey slightly sandy, slightly gravelly CL subrounded, fine to coarse of sandstone, modern to coarse of sandstone. Grey slightly clayey sandy GRAVEL. Grave fine to coarse of sandstone. (Possible weat End of Trial Pit at 2.40	AY. Gravel is angular to nudstone, siltstone and coal.	(0.40)			
			5			-			
Remarks				Ground Water (m)	Excavation Details		Orienta	ation	
	s minated at 2.4	0m due to	groundwa	er. Depth Strike Remarks Di	imensions: 3.00m x 0.80m tability: Stable //eather: Fine emarks: Machine Excavated Trial Pit	D	A C	В	99°

	DU	NELN L& ENVIRONMENT	TAL		Т	RIAL PIT RE	CORD		TP I		
Contra	ct No.: D804	4		Site: IAMP	- Prelimina	ry Ground Investi	gation		S	cale 1:25	i
Client:	Sunderland C	ity Counci	1				Logged By: BC	Sheet 1 of	1		
Method	: Machine Ex	cavated T	rial Pit				Checked By: BL	Dates:	21/09/2017		
S	AMPLE DETA	ILS	ater			070474.050	ODD		Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descriptio		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			_	Dark brown s	slightly san	dy, slightly grave	lly clayey TOPSOIL. Gravel is sandstone, mudstone and	F			
BRE D	0.20 0.20		Ė	coal.	o rounded,	inic to coarse or	sandstone, madstone and	(0.30)			
ES	0.20		_	Stiff brown m	nottled light	grey slightly san	dy, slightly gravelly CLAY.	0.30			
BRE	0.50		-	Gravel is sub	bangular to	rounded sandsto	one, mudstone and siltstone.	F			
D ES	0.50 0.50 0.50		E					E			
В	0.70 - 0.80		_					F			
			E					E			
HVP	0.90	HVP: 105kPa	_					-			
BRE D	1.00 1.00		<u></u> 1 − 1					<u> </u>			
								(1.60)			
			_					F			
			-					F			
В	1.50 - 1.70							E			
			_					-			
HVP	1.70	HVP: 84kPa	E					E			
			_	0.1111			" 01 11/0	1.90			
BRE	2.00		_ 2	Stiff brownish	h grey sligh o rounded	ntly sandy, slightly fine to coarse of	y gravelly CLAY. Gravel is sandstone, mudstone,				
D	2.00		Ē	siltstone and			canacione, madetene,	E			
			_					_			
			_					F			
В	2.50 - 2.70							E			
	2.00 2.70		_					F			
			_					F			
								E			
			-					(2.00)			
BRE D	3.00 3.00		3					F			
			E					E			
			-					-			
			<u> </u>					F			
В	3.50 - 3.70							E			
								F			
			E					E			
							(E) 0	3.90			
В	4.00 - 4.05		<u> </u>	Grey slightly	sandy, slig	Intly clayey GRA\ se siltstone (Pos	/EL. Gravel is angular to ssible weathered rockhead).	(0.20)			
BRE D	4.00 4.00		E	- Japangulai,	5 15 6641	End of Trial Pit at		4.10			
			F					F			
			Ė					F			
			E					E			
			F					F			
			Ė					E			
			E					E			
			Ė					F			
			5								
Remark	S				Gro	und Water (m)	Excavation Details		Orient	ation	
	ndwater struck	at 3 80m	rose to 3.0	0m.	Depth Strike		Dimensions: 3.10m x 0.90m		Onlone		
	nated at 4.10m				3.90	Tierra No	Stability: Overcast	\dashv	Α		
								_ D		В	96°
							Weather: Overcast	\dashv \sqcup	С		
							Remarks: Machine Excavated Trial Pit				

GEOTECHNICAL & ENVIRONMENTAL			TRIAL PIT RECORD TPS-01										
Contra	ct No.: D804	4		Site: IAMP -	GL (m AOD) 38.57 Scale 1:25 Easting: Northing: 433408.79 558610.29								
Client:	Sunderland C	ity Counci				L	_ogged By : AB	Sheet 1 of 1					
Method: Machine Excavated Trial Pit			rial Pit			(Checked By: JH	Dates: 25/08/2017					
S	SAMPLE DETAILS		ater						Level				
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO Descriptio	n	Depth (m)	(m AOD) PID (ppm)	Legend	Backfill		
			- - - - -	topsoil. Grave	el is angula	brown slightly sa ar to subrounded, re clay tile fragme	ndy slightly gravelly clayey fine to coarse of sandstone, ents noted.	 (0.30) 					
HVP	0.50	HVP: 58kPa	- - - - - -	Firm dark ora CLAY. Gravel sandstone, m	is subang	gular to subrounde	ghtly sandy, slightly gravelly ed, fine to coarse of	0.30	38.27				
								- - - - -					
HVP	1.20	HVP: 84kPa	1 	1.10m: Beco	ming stiff	dark greyish brow	ın.	(1.70)					
			- - - - - - - -					- - - - - - - -					
						End of Trial Pit at 2	100 m	2.00	36.57				
			<u>-</u> -			Eliu di mai Pil al 2	2.00 111	E					
								-					
			_					-					
			<u> </u>					F					
								E					
			_					E					
								F					
			— 3 – –					E					
								E					
			<u>-</u> -					F					
			_					E					
			_					E					
			_					E					
			_					E					
			_ 4										
								E					
			_					F					
								E					
			_					F					
			_					E					
			_					-					
								E					
			 5					E					
	<u> </u>												
Remarks					Grou	und Water (m)	Excavation Details		Orient	tation			
1. No gro	oundwater end away test carri	countered.	00m		Depth Strike	Remarks	Dimensions: 0.65m x 2.00m						
L. OUANA	array icoi calli	ou out at Z					Stability: Good	_ D	Α	В	59°		
							Weather: Sunny	_ '	С	_ B	55		
							Remarks: Machine Excavated Trial Pit						

DUNELM			TRIAL PIT RECORD TP No. TPS-02								
Contra	nct No.: D804	L & ENVIRONMENT	TAL	Site: IAMP -	Prelimina Prelimina	ry Ground Inves	atigation	GL (m AOD) 35.68) Se	Scale 1:25	i
								Easting: 433549.01	5.5	orthing: 58961.59	
Client:	Sunderland C	ity Counci	il				Logged By: AB	Sheet 1 of 1			
Method	: Machine Ex	xcavated 7	Γrial Pit				Checked By: JH	Dates: 2	25/08/2017		
S	AMPLE DETA	ILS	ater			CTDATA DE			Level		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descripti		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			- - - -	MADE GROU Gravel is ang	JND: Dark ular to sul	brown slightly gorounded, fine to	gravelly sandy clayey topsoil. o coarse of mudstone and coal.	_ _ _ (0.30)			
111/0	0.52	10 E7kDe	- - - -	Gravel is sub	angular to	yish brown slight subrounded, fir	tly sandy, slightly gravelly CLAY ne to coarse of sandstone,	0.30	35.38		
HVP	0.50	HVP: 57kPa	- - - -	mudstone and	d coal.			- - - -			
LIVE	4.00	HVP: 80kPa						- - - -			
HVP	1.00	HVP: OUKFa	1 - -	0.70m: Becc	0.70m: Becoming stiff dark greyish brown.						
			_ _ _	0.1 om. 2000	Illing Can	uain giogiai. 2. 2	·wii.	(1.80)			
			_ _ _ _					_ _ _ _			
			_ 2								
			-		-	End of Trial Pit at	t 2.10 m	2.10	33.58	. :	(///2////2
			E					E			
								-			
			F					<u> </u>			
			E					_			
			3					E			
			-					-			
			Ė.					_			
			E					E			
			E					-			
			F					F			
			4					E			
								Ė E			
			E					E			
			-					-			
			-					F			
			E					E			
		-	5 5					-			
					T C==	114/-4/ma)			2-i(
Remarks	s oundwater end	countered			Grou Depth Strike	und Water (m) Remarks	Excavation Details Dimensions: 0.65m x 2.00m		Orient	ation	
2. Soaka	away test carrie	ed out at 2	2.10m.		рериг за ко	Remains	Stability: Stable	\dashv \vdash	Α		
					'		Weather: Overcast	— D		В	158°
					'		Remarks: Machine Excavated Trial Pit	\dashv \sqsubseteq	С		
						1	rtemants: Machine Excavated main it				

DUNELM REFERENCIAL & ENVIRONMENTAL			TRIAL PIT RECORD TPS-03								
Contra	act No.: D804	4	<u></u>	Site: IAMP -	Preliminar	GL (m AOD) Scale 1:25 35.58 Scale 1:25 Easting: Northing: 433468.90 559142.80					
Client:	Sunderland C	ity Counci	il			L	_ogged By: AB	Sheet 1 of		-	
	: Machine Ex					-	Checked By: JH	Dates:	25/08/2017	,	
S	AMPLE DETA	ILS	ater			L			Level	\Box	
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA RECO Description		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill
			- - - - - - -	topsoil. Grave occasional me	el is angula udstone, ra n brown sli o subround	ar to subrounded, are coal, glass, cl	indy slightly gravelly clayey fine to coarse of sandstone, lay tile and pot. ady CLAY. Gravel is e of sandstone, occasional	(0.30)	35.28		
HVP	0.50	HVP: 46kPa	- - - - - - -	mudstone and	d coal. oming sligh	ntly sandy gravelly					
HVP	1.00	HVP: 63kPa	- - - - - - - - - -					(1.70)			
HVP	1.50	HVP: 88kPa	- - - - - - - - - -	Below 1.50m	1: Stiff.						
			_ 2			End of Trial Pit at 2	2.00 m	2.00	33.58	<u> </u>	(//25///25
			3								
Remarks					Grou	und Water (m)	Excavation Details		Orient	ation	
1. No gr	oundwater end away test carri	countered. ed out at 2	2.00m.		Depth Strike		Dimensions: 0.65m x 2.10m Stability: Stable Weather: Sunny Remarks: Machine Excavated Trial Pit	_ D	A C	В	81°

DUNELM			1	TRIAL PIT RECORD TPS-04								
	GEOTECHNICA	L & ENVIRONMENT	TAL					GL (m AOD)	5- 04 Scale 1:25		
Contra	nct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Inves	tigation	35.73 Easting: 433794.09	, 3	orthing:		
Client	Cundorland C	Counc					I amond Day AD	433794.09 Sheet 1 of		59250.90		
	Sunderland C : Machine Ex						Logged By: AB Checked By: JH		25/08/2017			
	AMPLE DETA		т.				Checked by. Jii	Dates.	Level	\top		
	Depth	Insitu	Groundwater			STRATA REC		Depth (m)	(m AOD) PID	Legend	Backfill	
Type	From-To (m)	Testing	Grou			Descripti		(,	(ppm)			
			E	MADE GROU	JND: Dark	brown slightly s	sandy slightly gravelly clayey d, fine to coarse of sandstone,	(0.25)				
			E	occasional m	iudstone, r	rare coal and bri	ck fragments.	0.25	35.48			
U//D	0.40	LIVE: 51kPa	ļ.	Firm orangish subangular to	า brown รม ว subround	ghtly sandy sligided, fine to coar	htly gravelly CLAY. Gravel is se of sandstone, mudstone and	-	, .			
HVP	0.40	HVP: 51kPa	E	coal.	, 642. 5	100, 111.0 12 22.	Jo of carracterity, management					
			F					F				
			E	0.70m: Becc	oming dark	k greyish brown.		E				
			F					F				
			E,	0.90m: Occa	isional sub	oangular to subr	rounded sandstone cobbles.					
			<u> </u>					(1.75)				
			E									
			F					F				
			E	1.40m: Stiff.				E				
			F					F				
			E					Ė				
			F					F				
			_ 2			17.104.		2.00	33.73			
			- 1		_	End of Trial Pit at	t 2.00 m		00			
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l			E					E				
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										<u> </u>		
Remarks					Grou	und Water (m)	Excavation Details		Orient	ation		
1. No gr	oundwater end	countered.	0.00m		Depth Strike	Remarks	Dimensions: 0.65m x 2.00m	<u> </u>				
2. 30ana	away test carrie	∂û Oul al ∠	2.00111.		'		Stability: Stable]	Α	_ D	4060	
					'		Weather: Overcast		С	В	126°	
							Remarks: Machine Excavated Trial Pit	7 -				

OUNELM GEOFECHNICAL & ENVIRONMENTAL			TAL		Т	RIAL PIT R	ECORD		TP No. TPS-05					
Contra	ct No.: D804	4		Site: IAMP -	Site: IAMP - Preliminary Ground Investigation GL (m AOD) 35.66 Scale 1:25 Easting: 433966.48 Northing: 433966.48 559279.24									
Client:	Sunderland C	ity Counc	i				Logged By: AB	Sheet 1 of		33273.24				
Method							Checked By: JH	Dates:	24/08/2017	,				
S	SAMPLE DETAILS					,		Level						
Туре	Depth From-To (m)	Insitu Testing	Groundwater			STRATA REC Descripti		Depth (m)	(m AOD) PID (ppm)	Legend	Backfill			
нур	0.50	HVP: 48kPa	3	Gravel is ang sandstone. C MADE GROU angular to su and coal. Firm dark ora CLAY. Grave sandstone, m	jular to sub Occasional JND: Dark brounded, angish and I is subanç nudstone a	prounded, fine to tiles noted. brown clayey si fine to coarse of greyish brown signals to subround and coal.	ightly gravelly sandy topsoil. coarse of brick, concrete and ightly gravelly sand. Gravel is f brick, concrete, sandstone slightly sandy, slightly gravelly ded, fine to coarse of slightly gravelly CLAY. Gravel arse of sandstone, mudstone 2.00 m	0.20	35.46 35.26 33.76 33.66					
D	_						F., 0 5 . 0							
Remarks		ounto			+	und Water (m)	Excavation Details		Orient	ation				
	oundwater end away test carri				Depth Strike	Remarks	Dimensions: 0.65m x 2.00m Stability: Good Weather: Overcast Remarks: Machine Excavated Trial Pit	D	A C	В	175°			

GEOTECHNICAL & ENVIRONMENTAL			TRIAL PIT RECORD TP No. TPS-08										
Contra	act No.: D804	4		Site: IAMP -	Prelimina	ry Ground Inves	tigation	34.36	GL (m AOD) Scale 1:25				
	Sunderland C						Logged By: AB Checked By: JH	Sheet 1 of	1				
	I: Machine Ex					Dates:	25/08/2017	· -	1				
SA	AMPLE DETA		Jwater			STRATA REG	CORD	Depth	Level (m AOD)		_ i-en		
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Descripti		(m)	(m AOD) PID (ppm)	Legend	Backfill		
HVP	0.50	HVP: 63kPa	- - - - - - - - - -	Gravel is sub- occasional mi	pangular to nudstone. h brown sli o subround d coal.	o subrounded, fir	gravelly sandy clayey topsoil. ne to coarse of sandstone and httly gravelly CLAY. Gravel is se of sandstone, occasional	- (0.35) - (32.36				
D and						1111-1 (ma)	E constitut Dataila						
Remarks		torod				und Water (m)	Excavation Details		Orient	ation			
1. No gro 2. Soak <i>a</i>	oundwater enc away test carri	ed out at 2	2.00m.		Depth Strike	e Remarks	Dimensions: 0.65m x 2.00m Stability: Stable Weather: Overcast Remarks: Machine Excavated Trial Pit	D	A C	В	134°		

DUNELM Bedtechnical & environmental						TP No. TPS-11								
Contra	ct No.: D804	4		Site: IAMP -	Prelimina	ry Ground Invest	rigation	Easting: 433887.50		cale 1:25 orthing: 59726.61				
Client:	Sunderland C						Logged By: BC	Sheet 1 of	Sheet 1 of 1					
Method: Machine Excavated Trial Pit				T			Checked By: BL	Dates:	22/09/2017					
S	AMPLE DETA	ILS	water			STRATA REC	CORD	Depth	Level (m AOD)					
Туре	Depth From-To (m)	Insitu Testing	Groundwater			Description	on	(m)	PID (ppm)	Legend	Backfill			
	-			Dark brown s subangular to	lightly san subround	dy slightly grave led, fine to coars	Illy clayey TOPSOIL. Gravel is se of sandstone and mudstone	- (0.30)						
				Firm to stiff by	own mottl	ed light grev slig	htly sandy slightly gravelly	0.30						
			_	CLAY. Gravel mudstone and	is subang	jular to rounded,	fine to coarse of sandstone,	- - -						
			-					F						
								(0.90)						
			<u>-</u>					F						
			1					F						
			_					1.20						
			E	Stiff dark brow	vn slightly	sandy, slightly g	ravelly CLAY. Gravel is se of sandstone, mudstone and	-						
			F	coal.	Subrouric	ieu, iiile to coars	se of saliusione, muusione am	1						
			_					F						
			=					- (0.80) -						
			<u> </u>					E						
			Ė					E						
			_ 2			End of Trial Pit at	2.00 m	2.00		<u> </u>	\\/X\\/X\			
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Dom					0	and Mater (=c)	Everyties D-4-9-		0-1	otion				
Remarks	s oundwater end	nuntered				Ind Water (m)	Excavation Details		Orient	auon				
2. Soaka	oundwater end away test carri	ed out at 2	2.00m.		Depth Strike	Remarks	Dimensions: 3.30m x 0.80m		^					
							Stability: Stable Weather: Fine	— р	A	В	176°			
								-	С					
							Remarks: Machine Excavated Trial Pit							



APPENDIX C

Photographs



BH03 20.50-22.20m



BH03 22.20-23.50m



Project IAMP Preliminary Investigation
Project No. D8044

Project No. D80
Carried out for Sun



BH03 23.50-25.00m



BH04 15.10-16.30m



BH04 16.30-17.80m



Project IAMP Preliminary Investigation
Project No. D8044

Project No. D8044

Carried out for Sunderland City Council

Plate



BH04 17.80-19.30m



BH04 19.30-20.50m



Project No. IAMP Preliminary Investigation
Project No. D8044

Carried out for Sunderland City Council

Plate



BH04 20.50-21.50m



BH04 21.50-23.00m



Project IAMP Preliminary Investigation
Project No. D8044

Project No. D8044
Carried out for Sunderland City Council

Plate



BH04 23.00-24.50m



BH08 12.00-13.50m



BH08 13.50-15.00m



Project IAMP Preliminary Investigation
Project No. D8044
Carried out for Sunderland City Council

Plate



BH08 15.00-16.50m



BH08 16.50-18.00m



Project No. IAMP Preliminary Investigation
Project No. D8044

Carried out for Sunderland City Council

Plate



BH09 10.50-12.00m



BH09 12.00-13.50m



Project IAMP Preliminary Investigation
Project No. D8044

Carried out for Sunderland City Council

Plate



BH09 13.50-15.00m



BH09 15.00-16.50m



Project IAMP Preliminary Investigation
Project No. D8044

Carried out for Sunderland City Council



BH09 16.50-18.00m



BH09 18.00-19.50m



Project IAMP Preliminary Investigation
Project No. D8044

Carried out for Sund



BH09 19.00-19.80m



BH09 21.00-22.50m



Project IAMP Preliminary Investigation
Project No. D8044

Project No. D8044
Carried out for Sunderland City Council

Plate



BH09 22.50-24.00m



BH09 24.00-25.50m

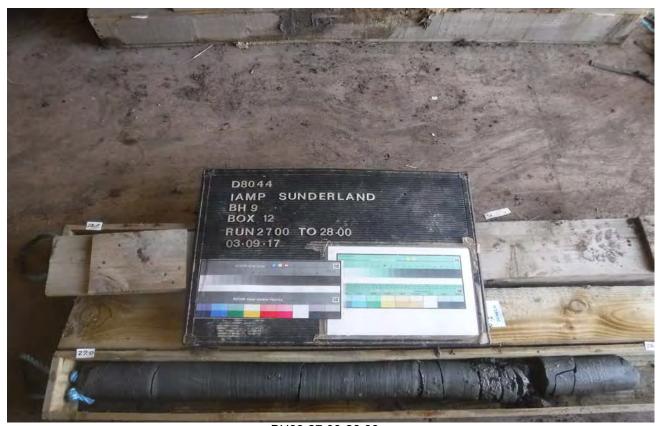


Project IAMP Preliminary Investigation
Project No. D8044

Carried out for Sun



BH09 25.50-27.00m



BH09 27.00-28.00m



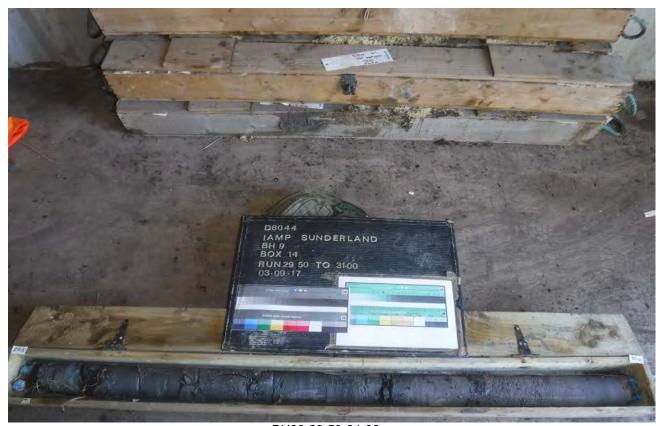
Project IAMP Preliminary Investigation

Project No. D8044

Carried out for Sunderland City Council



BH09 28.00-29.50m



BH09 29.50-31.00m



Project IAMP Preliminary Investigation
Project No. D8044

Project No. D80 Carried out for Sur



BH10 9.50-11.00m



BH10 11.00-12.50m



Project IAMP Preliminary Investigation
Project No. D8044
Carried out for Sunderland City Council

Plate



BH10 12.50-14.00m



BH10 14.00-15.50m



Project IAMP Preliminary Investigation
Project No. D8044

ject No. Dou

Carried out for Sunderland City Council



BH10 17.00-18.50m



BH10 18.50-20.00m



Project IAMP Preliminary Investigation D8044 Project No. Sunderland City Council

Carried out for

Plate



BH10 20.00-21.50m



BH10 21.50-23.00m



Project No. IAMP Preliminary Investigation
Project No. D8044

Project No. D80

Carried out for Sun



BH10 23.00-24.50m



BH11 13.00-13.30m



BH11 13.30-14.80m



Project IAMP Preliminary Investigation Project No. Sunderland City Council

Carried out for

Plate



BH11 14.80-16.30m



BH11 16.30-17.80m



Project IAMP Preliminary Investigation
Project No. D8044

Carried out for Sun



BH11 17.80-18.80m





IAMP Preliminary Investigation Project Project No.

Sunderland City Council Carried out for

Plate



BH11 20.30-21.80m

Plate