

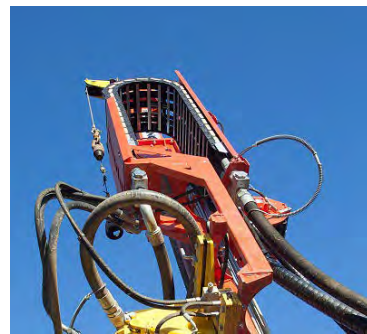


CONTRACT NO: D8044

**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			

CONTENTS

1.0 INTRODUCTION	1
1.1 SCOPE OF WORKS	1
1.2 GENERAL	1
2.0 SITE LOCATION & FEATURES	1
3.0 FIELDWORK	2
3.1 INTRODUCTION	2
3.2 EXPLORATORY HOLE LOCATIONS	2
3.3 STRATA DESCRIPTIONS	2
3.4 SAMPLING	3
3.5 IN-SITU TESTING	3
3.6 MONITORING WELLS	3
4.0 LABORATORY TESTING	4
4.1 GEOTECHNICAL	4
4.2 CHEMICAL	4
5.0 GAS & GROUNDWATER MEASUREMENTS	4
5.1 INTRODUCTION	4
5.2 GAS MONITORING PROCEDURE	4
5.3 GROUNDWATER MONITORING PROCEDURE	4
5.4 GROUNDWATER SAMPLING PROCEDURE	4

LIST OF APPENDICES

APPENDIX A	DRAWINGS <ul style="list-style-type: none">• Site Location Plan• Exploratory Hole Location Plan
APPENDIX B	EXPLORATORY HOLE RECORDS
APPENDIX C	PHOTOGRAPHS <ul style="list-style-type: none">• Core Photographs• Trial Pit Photographs
APPENDIX D	INSITU TESTING <ul style="list-style-type: none">• CPT Results• Road Cores• Soakaways• DCP Testing Results• CBR Testing Results
APPENDIX E	GEOTECHNICAL LABORATORY RESULTS
APPENDIX F	CHEMICAL LABORATORY RESULTS
APPENDIX G	GAS AND GROUNDWATER MONITORING RESULTS

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

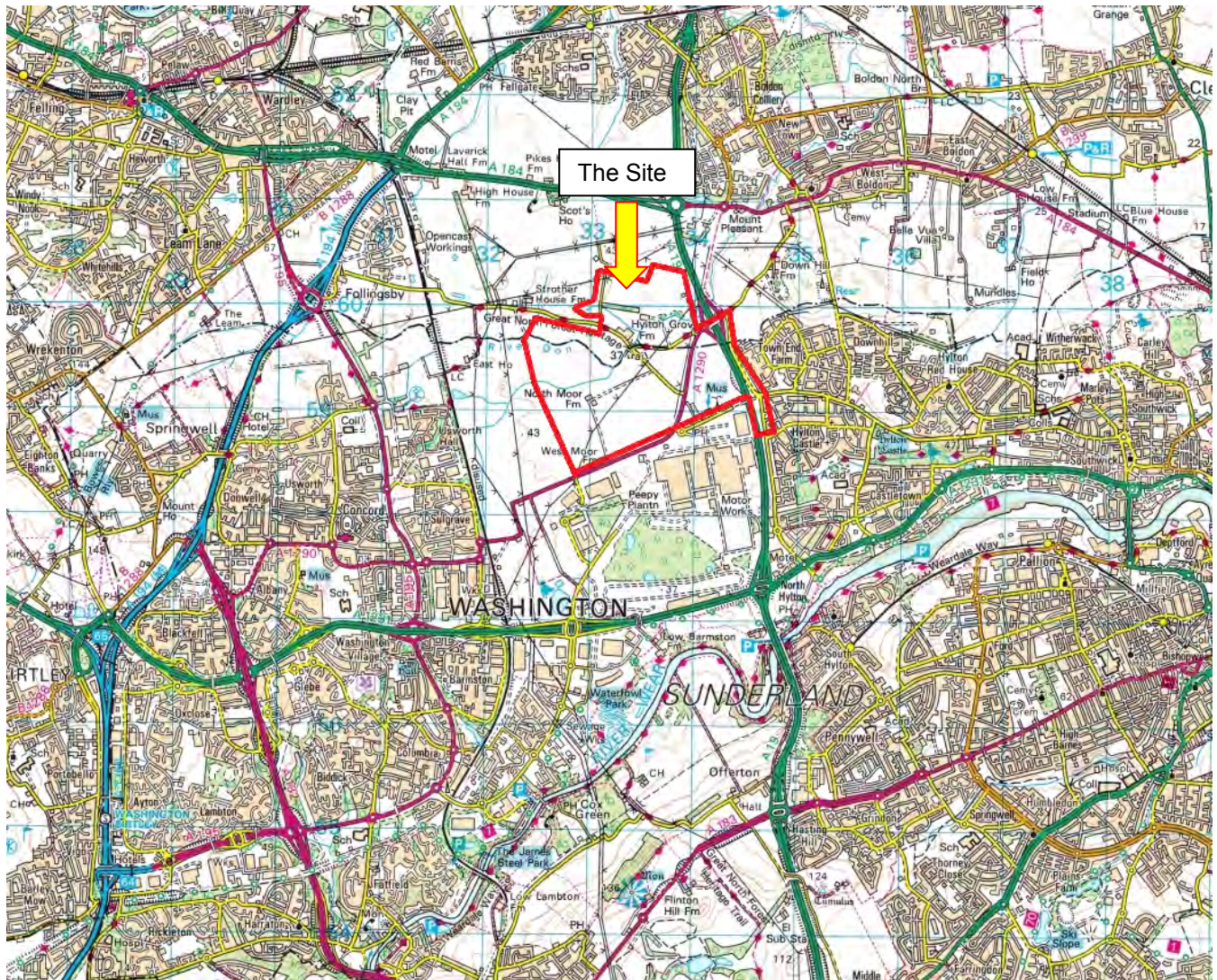
Samples of groundwater were recovered on 20th December 2017 using a water bailer and despatched to an appropriate laboratory for testing. The results of these tests are presented in Appendix F.

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

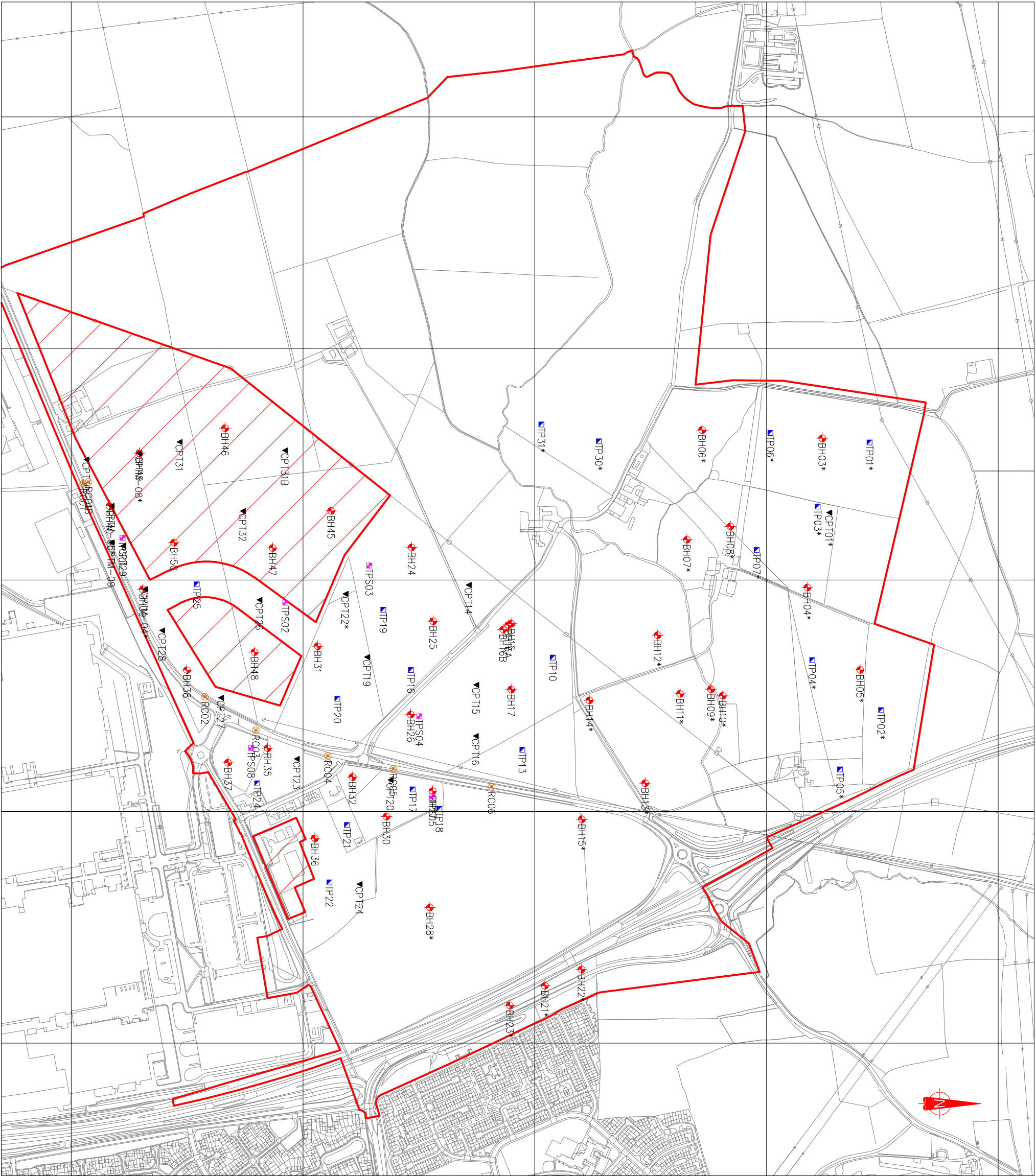
Drawings





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

	Contract: IAMP Preliminary Investigation			Contract No: D8044
	Client: Sunderland City Council			
TEL: 0191 378 3151 FAX: 0191 378 3157	Drawing Title: Site Location Plan			
Drawing No: D8044/01	Date: January 2018	Scale: NTS	Status: Final	Drawn by: DF



Dunelm Geotechnical & Environmental Ltd
Foundation House, St John's Road, Meadowfield
Durham, DH78TZ
Tel: 0191 378 3151
Fax: 0191 378 3157
e-mail: admin@dunelm.co.uk
web: www.dunelm.co.uk

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:
- BH Location of Cable Percussive Borehole
 - CPT Location of Cone Penetration Test
 - RC Location of Road Core
 - TIP Location of Machine Excavated Trial Pit
 - TPS Location of Machine Excavated Soakaway Test

CLIENT:
SUNDERLAND COUNTY COUNCIL

PROJECT TITLE:
IAMP - PRELIMINARY GROUND INVESTIGATION

DRAWING TITLE:
Exploratory Hole Location Plan

DRAWING NUMBER:
D8044/02

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

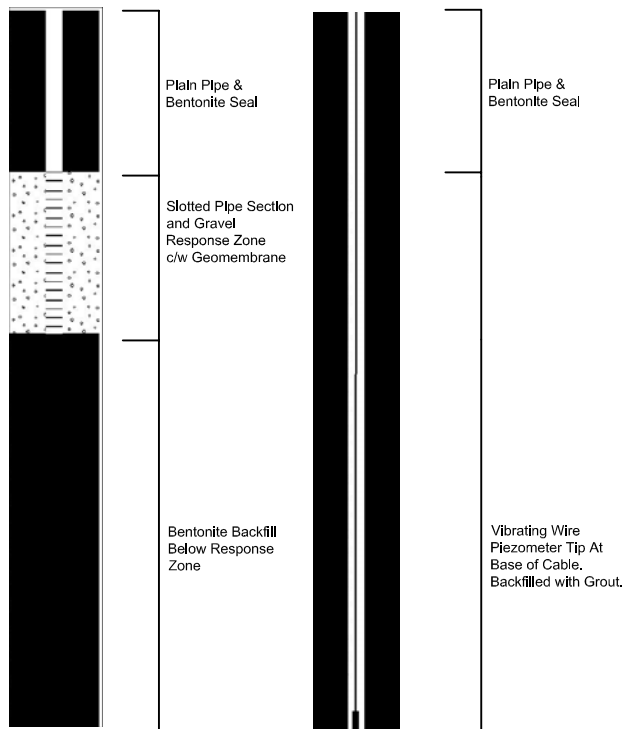
Low <10%, medium 10 – 20%, high >20%

Exploratory Hole Log Legend

BOREHOLE LEGEND:

TOPSOIL	
MADE GROUND	
SILT	
CLAY	
SAND	
GRAVEL	
PEAT	
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.



Dunelm Geotechnical & Environmental Ltd
Foundation House, St John's Road, Meadowfield
Durham, DH78TZ
Tel: 0191 378 3151
Fax: 0191 378 3157
e-mail: admin@dunelm.co.uk
web: www.dunelm.co.uk

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: CD1
Test Date: 06/06/2017
Report Date: 06/06/2017
File Name: CD1.spt
Test Operator: BP

Instrumented Rod Data

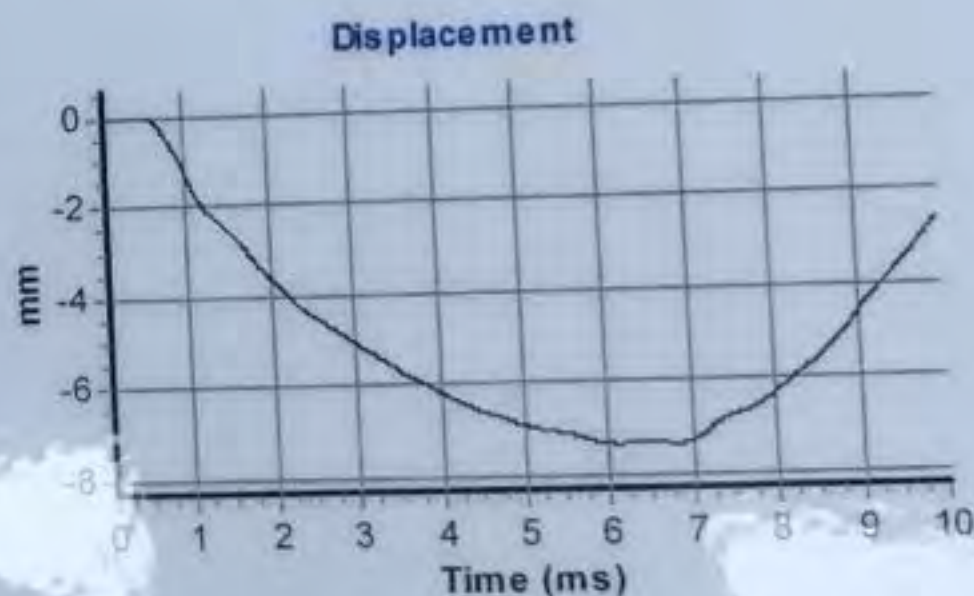
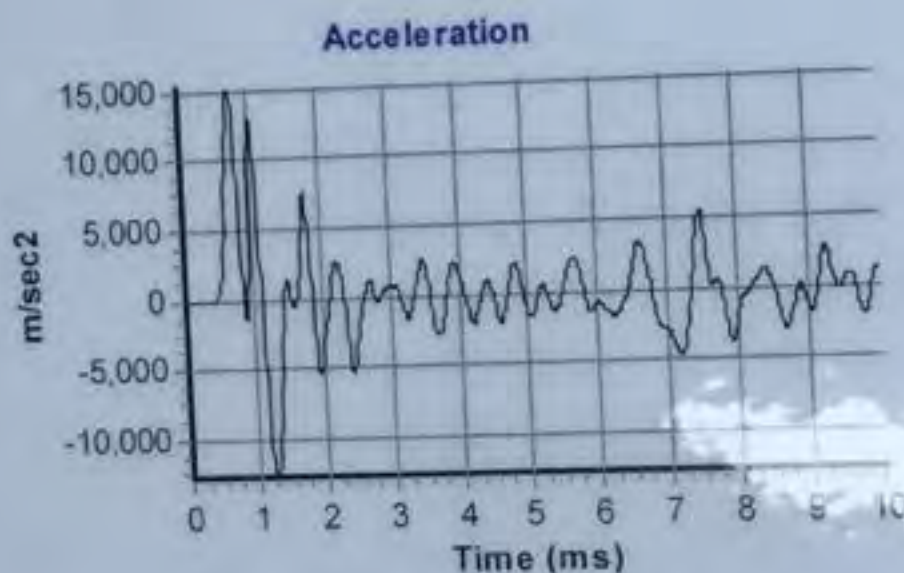
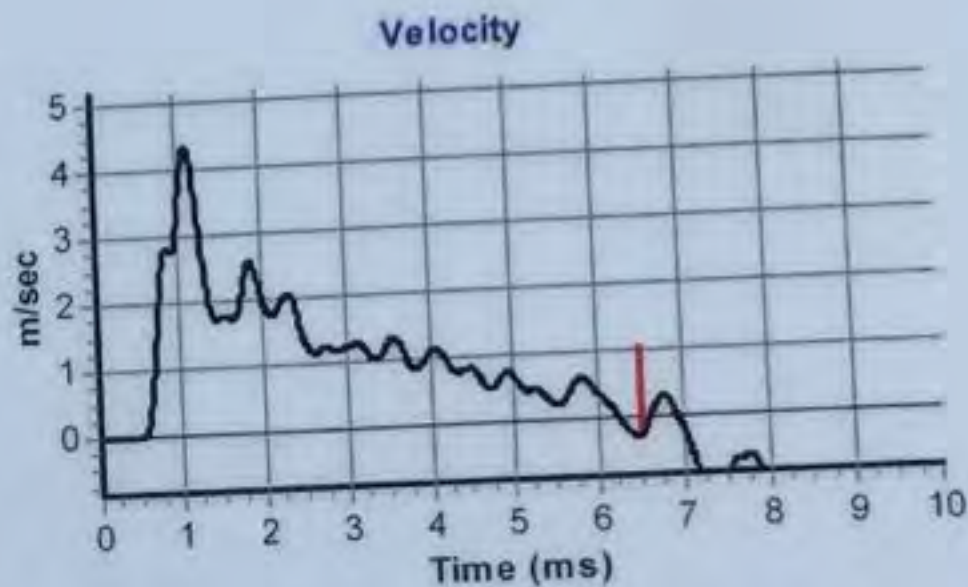
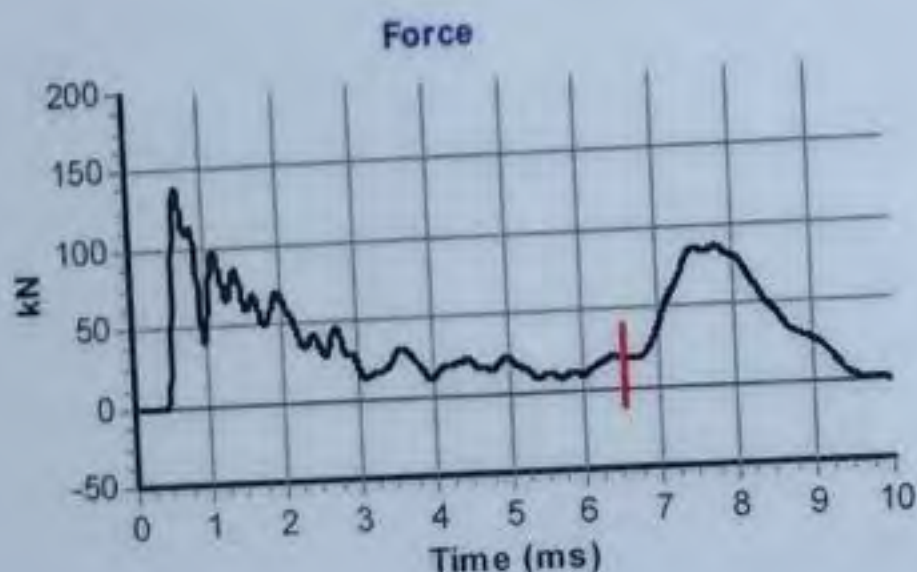
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.2
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 5990
Accelerometer No.2: 5991

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



Calculations

Area of Rod A (mm^2): 931
Theoretical Energy E_{theor} (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 ENGINEERING
AINLEY'S 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

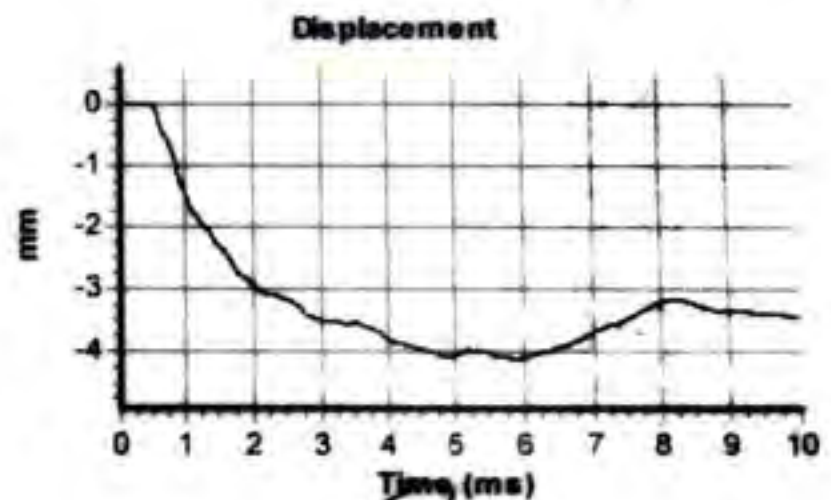
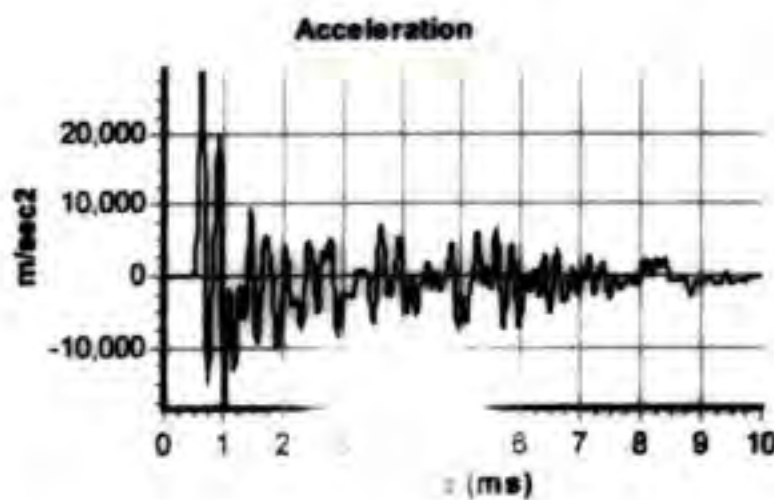
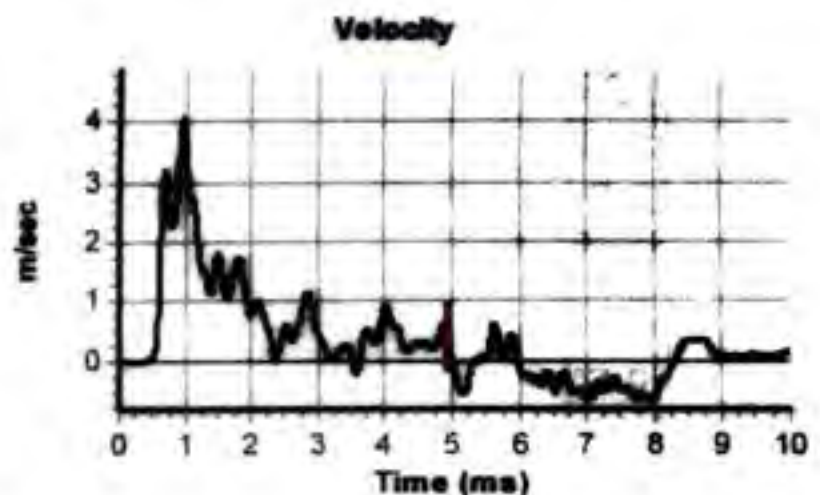
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 7080
Accelerometer No.2: 11609

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 E_{theor} (J): 473
Measured Energy E_{meas} (J): 335

Energy Ratio E_r (%): 71

Signed: S. HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

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

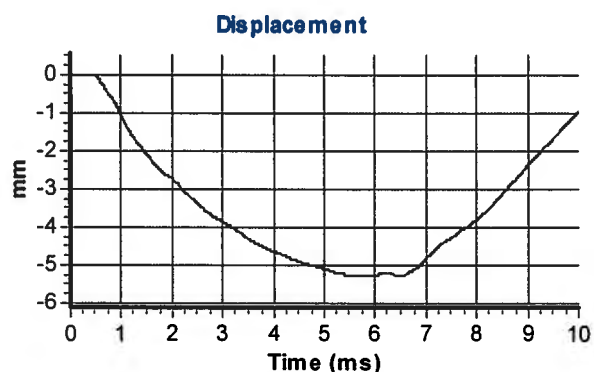
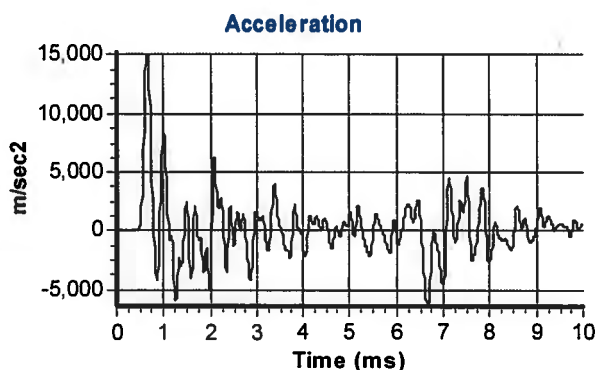
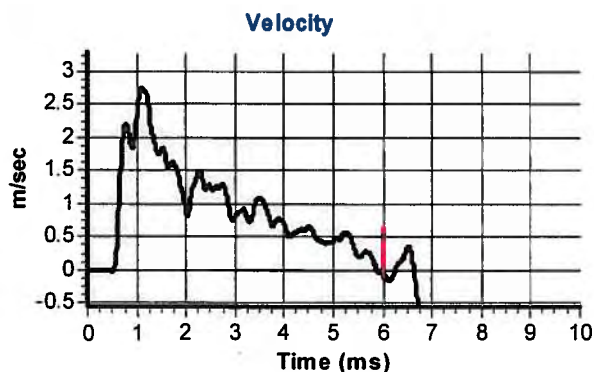
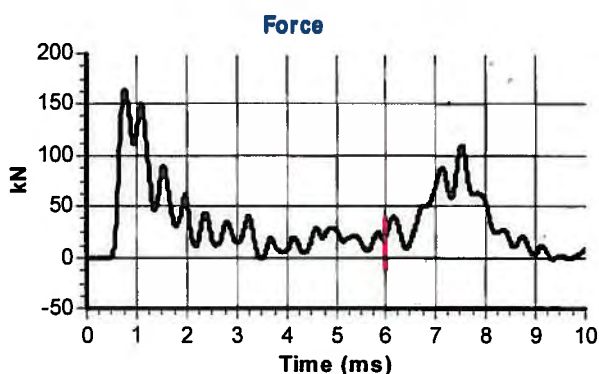
Diameter d_r (mm): 67
Wall Thickness t_r (mm): 8.4
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 6469
Accelerometer No.2: 11406

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
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} (J): 318

Energy Ratio E_r (%)

67

Signed: Gareth Wear
Title: Chief Laboratory Technician

The recommended calibration interval is 6 months

BH No.	Instrument Type	Instrument Dia. (mm)	Response Zone		Surface Protection	Remarks
			Top (m)	Base (m)		
BH03	SPIE	50	0.00	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	



Contract:
IAMP Preliminary Investigation

Contract No:
D8044

Client:
Sunderland City Council



TEL: 0191 378 3151
FAX: 0191 378 3157



Table Title:
Installation Summary



Table No:
D8044/B1



Date:
January 2018



Inputted by:
DF

 		BOREHOLE RECORD				Borehole BH03						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50					
						Easting: 433194.12	Northing: 560120.08					
Client: Sunderland City Council				Driller: LS/AC	Logged By: FR/DF	Sheet 1 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 07/11/2017 - 15/11/2017						
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
B D ES PID B D ES PID BRE ES PID U	0.00 - 0.30 0.20 0.20 0.20 0.50 - 1.00 0.50 0.50 0.50 1.00 1.00 1.00 1.20 - 1.65	PID: 0ppmv PID: 0ppmv PID: 0ppmv 50 blows	1	MADE GROUND: Dark brown sandy slightly gravelly clayey topsoil. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of sandstone and coal. Rare brick fragments noted. MADE GROUND: Brown mottled grey and orange sandy slightly gravelly clay. Gravel is subangular to subrounded, fine to coarse of sandstone and coal. Rare limestone noted. Organic Matter noted.	(0.40) 0.40							
D B	1.65 1.70 - 2.00			Stiff dark grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.	1.30							
B BRE D SPT (S)	2.00 - 2.45 2.00 2.00 2.00 - 2.45	N=15 (2,2/3,3,4,5)	2 (1.80) Dry									
BRE U	3.00 3.00 - 3.45	65 blows	3		(3.70)							
D	3.45											
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	85 blows	5	Firm thinly laminated dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.	5.00 (0.60)							
D	5.45			Firm dark brown silty sandy CLAY. Thin beds of sand and silt noted.	5.60 (0.50)							
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	Medium dense brownish grey silty slightly gravelly SAND. Sand is fine to coarse. Gravel is subangular, fine of coal. Thin bands of coal noted.	6.10							
B BRE D SPT (S)	7.00 - 7.45 7.00 7.00 7.00 - 7.45	N=12 (3,3/3,3,3,3)	7									
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									
B	10.00 - 10.45		10 (9.80) 9.22									
Continued on next sheet												
Ground Water (m)					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)	
					20.30	20.50	01:00	150	20.30	150	21.00	
										116	25.00	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH03				
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50			
						Easting: 433194.12	Northing: 560120.08			
Client: Sunderland City Council				Driller: LS/AC	Logged By: FR/DF	Sheet 2 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 07/11/2017 - 15/11/2017				
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing								
BRE D SPT (S)	10.00 10.00 10.00 - 10.45	N=15 (2,2/3,4,4,4)		Medium dense brownish grey silty slightly gravelly SAND. Sand is fine to coarse. Gravel is subangular, fine of coal. Thin bands of coal noted.	(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							
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	Firm dark brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.	14.30 (1.10)					
BRE U D	16.00 16.00 - 16.45 16.45	100 blows	16	Very stiff dark brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, coal and mudstone.	15.40					
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							
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							
B	20.00 - 20.45		20 (19.80) Dry							
Ground Water (m)				Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m. 2. Water added between 8.00m and 14.30m
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	
					20.30	20.50	01:00	150	20.30	
Log last updated 24/01/2018										

 		BOREHOLE RECORD				Borehole BH03						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50					
						Easting: 433194.12	Northing: 560120.08					
Client: Sunderland City Council				Driller: LS/AC	Logged By: FR/DF	Sheet 3 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 07/11/2017 - 15/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
BRE D	20.00 20.00					Very stiff dark brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, coal and mudstone.						
SPT (S)	20.00 - 20.26	N=50+ (8,12/28,22 for 35mm)										
B SPT (S)	20.26 - 20.50 20.50 - 20.64 20.64 - 20.88 20.88 - 21.20	N=50+ (25/50 for 60mm) N=50+ (25/50 for 60mm)			(20.30) Dry 20.50 - 21.20 100 % Water	Very stiff grey, slightly sandy, gravelly CLAY. Gravel is fine to coarse, angular to subangular of sandstone. (Weathered SANDSTONE).	20.50 (0.25) 20.75 (0.08) 20.83					
	21.20 - 22.20	37	37	22	21	Stiff, thinly laminated, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone. (WEATHERED SANDSTONE).						
					21.20 - 22.20 90 % Water	Weak partially weathered, greyish brown, fine grained SANDSTONE. Fractures are generally subhorizontal, rough, undulating and with no infill.						
		85	67	16	5	21.62m: Becoming very weak.						
	22.20 - 23.50				22		(2.17)					
					6							
					NI							
		100	91	34	6		23.00 (0.50)					
	23.50 - 25.00				23	Medium strong, partially weathered thinly laminated, light grey, fine grained SANDSTONE. Fractures are generally subhorizontal, closely spaced, rough, undulating and with clay infill.	23.50					
					A...	23.07m-23.34m: Subvertical, rough, undulating fracture with sand infill and orange brown distribution.						
		91	91	86	4	Weak partially weathered, dark grey and reddish brown fine grained SANDSTONE. Fractures are generally closely space, subhorizontal, rough undulating and with clay infill.	(0.80)					
						Medium strong, partially weathered, sandy, gravelly medium grained SANDSTONE. Fractures are generally closely spaced, subhorizontal, rough, undulating and with clay infill.	24.30 (0.70)					
					25	End of Borehole at 25.00 m	25.00					
					26							
					27							
					28							
					29							
					30							
Ground Water (m)					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)
					20.30	20.50	01:00	150	20.30	150		21.00
										116	25.00	
Log last updated 24/01/2018												

				BOREHOLE RECORD				Borehole BH04				
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 433516.20		Northing: 560088.15				
Client: Sunderland City Council				Driller: LS		Logged By: FR		Sheet 1 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 13/11/2017 - 17/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
B D ES	0.00 - 0.30 0.20 0.20				MADE GROUND: Dark brown slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal. Rare glass and rootlets noted. Firm brown mottled orange grey slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, subangular to subrounded of sandstone and coal. Stiff dark brown mottled dark grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular to subrounded of sandstone and coal.	(0.30)						
B D ES	0.50 - 1.00 0.50 0.50					(0.50)						
B BRE D ES UT	1.00 - 1.20 1.00 1.00 1.00 1.20 - 1.65	95 blows		1		0.80						
D	1.65											
B BRE D SPT (S)	2.00 - 2.45 2.00 2.00 2.00 - 2.45	N=16 (2,2/3,4,4,5)		2 (1.80) Dry			(2.65)					
BRE D UT	3.00 3.00 3.00 - 3.45	85 blows		3								
D	3.45					3.45						
B BRE D SPT (S)	4.00 - 4.45 4.00 4.00 4.00 - 4.45	N=11 (2,2/3,3,3,3)		4 (3.80) Dry								
BRE D UT	5.00 5.00 5.00 - 5.45	65 blows		5			(4.45)					
D	5.45											
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 (5.80) Dry								
BRE D UT	7.00 7.00 7.00 - 7.45	65 blows		7	7.00m: Thin laminations of silt noted.							
D	7.45											
B BRE D SPT (S)	8.00 - 8.45 8.00 8.00 8.00 - 8.45	N=19 (3,3/4,4,6,6)		8 (7.80) 7.44	Medium dense dark brown, silty gravelly SAND. Sand is fine to coarse. Gravel is fine, subangular to subrounded of coal.	7.90						
B BRE D SPT (S) W	9.00 - 9.45 9.00 9.00 9.00 - 9.45 9.50	N=21 (2,3/4,5,6,6)		9 (8.80) 0.62								
B	10.00 - 10.45			10 (9.80) 0.46								
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
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)	
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 updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH04						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) - Easting: 433516.20 Northing: 560088.15 Scale 1:50						
Client: Sunderland City Council				Driller: LS	Logged By: FR	Sheet 2 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 13/11/2017 - 17/11/2017						
SAMPLE DETAILS					Casing Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
BRE D SPT (S)	10.00 10.00 10.00 - 10.45	N=22 (3,3/4,5,6,7)			11 (10.80) 0.71	Medium dense dark brown, silty gravelly SAND. Sand is fine to coarse. Gravel is fine, subangular to subrounded of coal. <i>10.00m: Gravel becoming fine to coarse.</i>	(5.10)					
B BRE D SPT (S)	11.00 - 11.45 11.00 11.00 11.00 - 11.45	N=18 (2,3/4,4,5,5)										
B BRE D SPT (S)	12.00 - 12.45 12.00 12.00 12.00 - 12.45	N=18 (2,3/3,4,5,6)				12 (11.80) 0.84						
B BRE D SPT (S)	13.00 - 13.45 13.00 13.00 13.00 - 13.45	N=45 (3,4/5,6,6,28)				13 (12.80) 4.36	Stiff dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, subangular to subrounded of coal and sandstone.	13.00				
B BRE D SPT (S)	14.00 - 14.45 14.00 14.00 14.00 - 14.44	N=50+ (7,12/20,30 for 70mm,0,0)			14 (13.80) 4.88		(1.70)					
BRE D SPT (S)	15.00 15.00 15.00 - 15.30 15.10 - 16.30	N=50+ (25 for 20mm,0/21,29 for 35mm,0,0)			15 (14.80) 5.26	Stiff dark grey slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of siltstone.	14.70 (0.40)					
SPT (S)	16.30 - 17.80	100 100 94 3			16	Grey SILTSTONE. Recovered as gravel size fragments.	15.10 (0.35)					
	16.30 - 17.80	A...			17	Distinctly weathered extremely weak dark grey MUDSTONE. Fractures are generally medium spaced, subhorizontal, rough, undulating and with no infill. Drilling induced fractures noted.	15.45 (1.40)					
		2				<i>16.10m: Becoming medium strong.</i>						
		93 85 52				<i>Extremely weak between 16.40m and 16.50m.</i>	16.50					
		9				Partially weathered medium strong dark grey MUDSTONE. Fractures are generally closely spaced, subhorizontal, rough, undulating and with clay infill. Drilling induced fractures noted.						
	17.80 - 19.30	NI			18	<i>17.40-17.70m: Subvertical, rough, planar fracture with clay infill noted.</i>						
		6				<i>17.80-18.05m: Area of destructured, extremely weak grey MUDSTONE.</i>	(2.80)					
		100 80 60				<i>18.55-18.85m: Area of distinctly weathered weak grey MUDSTONE.</i>						
		NI										
	19.30 - 20.50	0			19							
12												
SPT (S)	19.30 - 20.50	100 38 35 NI			20	Distinctly weathered, weak dark grey MUDSTONE. Core is generally not intact.	19.30 (1.00)					
TCR% SCR% ROD% FI					Continued on next sheet							
Ground Water (m)					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)	
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 updated 24/01/2018												



Borehole BH04






























Scale 1:50



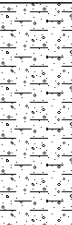
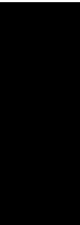
Northing:
560088.15



Sheet 3 of 3



Dates:	13/11/2017 - 17/11/2017
--------	-------------------------

Ground Water (m)					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)	
8.00	7.80				14.70	15.00	01:00	150	12.80	150	15.45	
								121	15.10	116	24.50	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH05						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 433694.07		Northing: 560201.80				
Client: Sunderland City Council				Driller: LS		Logged By: DF		Sheet 1 of 2				
Method: Cable Percussive Drilling				Checked By: JH		Dates: 15/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
B D ES PID B D ES PID B BRE D ES PID UT D	0.00 - 0.30 0.20 0.20 0.20 0.50 - 1.00 0.50 0.50 0.50 1.00 - 1.20 1.00 1.00 1.00 1.00 1.20 - 1.65 1.65	PID: 0ppmv PID: 0ppmv PID: 0ppmv 55 blows		1	Brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is fine to coarse, subrounded to rounded of sandstone, mudstone and limestone. Rootlets present. Firm thinly laminated, brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine, subangular of sandstone and coal. Firm thinly laminated, grey mottled brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular of sandstone, mudstone and coal.	(0.30) 0.30 (0.50) 0.80		   	                      			
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			(3.20)					
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 (2,2/3,4,4,2)		4		Firm thinly laminated, dark brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	4.00					
BRE UT D	5.00 5.00 - 5.45 5.45	65 blows		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			(5.30)					
BRE UT D	7.00 7.00 - 7.45 7.45	60 blows		7								
B BRE D SPT (S)	8.00 - 8.45 8.00 8.00 8.00 - 8.45	N=18 (2,3/4,5,6)		8	8.00m: Becoming stiff.							
BRE D UT D	9.00 9.00 9.00 - 9.45 9.45	65 blows		9	Firm thinly laminated, brown locally reddish brown of silt, slightly sandy CLAY. Occasional reddish brown silt on laminae surfaces.	9.30 (0.70)						
B	10.00 - 10.45			10			10.00					
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand Dug inspection pit to 1.20m.
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)	
13.00	12.80	9.24	8	14.00	14.80	16.00	01:30	150	15.80	150	16.50	
Log last updated 24/01/2018												

				BOREHOLE RECORD				Borehole BH05				
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50		
								Easting: 433694.07		Northing: 560201.80		
Client: Sunderland City Council						Driller: LS		Logged By: DF		Sheet 2 of 2		
Method: Cable Percussive Drilling						Checked By: JH		Dates: 15/11/2017				
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
BRE D SPT (S)	10.00 10.00 10.00 - 10.45	N=20 (3,3/4,5,5,6)			11	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.	(1.50)					
BRE UT D	11.00 11.00 - 11.45 11.45	65 blows				Firm brown silty CLAY.	11.50					
B BRE D SPT (S)	12.00 - 12.45 12.00 12.00 - 12.45	N=13 (2,2/3,3,3,4)				12	Firm brown clayey, slightly sandy SILT. Sand is fine to coarse.	(1.50)				
B BRE D SPT (S)	13.00 - 13.45 13.00 13.00 - 13.45	N=11 (1,2/2,3,3,3)			13			Stiff grey slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	13.00			
B BRE D SPT (S)	14.00 - 14.45 14.00 14.00 - 14.42	N=50+ (10,13/17,20,13 for 45mm,0)							14	Very stiff grey slightly clayey, slightly sandy GRAVEL. Gravel is subangular, fine to coarse of sandstone. (Possible weathered rockhead).	13.80	
B BRE D SPT (S)	15.00 - 15.45 15.00 15.00 - 15.40	N=50+ (12,13/19,21,10 for 25mm,0)				15	End of Borehole at 16.50 m				(2.00)	
B BRE D SPT (S)	16.00 - 16.45 16.00 16.00 - 16.38	N=50+ (10,15 for 20mm/27,28,0,0)			16						15.80	
									17		(0.70)	
						18						
					19							
									20			
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand Dug inspection pit to 1.20m.
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)	
13.00	12.80	9.24	8	14.00	14.80	16.00	01:30	150	15.80	150	16.50	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH06						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 433176.22		Northing: 559861.03				
Client: Sunderland City Council				Driller: LS		Logged By: FR		Sheet 1 of 3				
Method: Cable Percussive Drilling				Checked By: JH		Dates: 24/11/2017 - 28/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
B ES	0.00 - 0.30 0.20				1 (1.00) Dry	MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is subangular to subrounded, fine to coarse of sandstone. Rare brick and ceramic noted. Rootlets noted. Firm orangey brown mottled grey sandy gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.	(0.30) 0.30					
B D ES	0.50 - 1.00 0.50 0.50					Firm dark brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium of sandstone and coal.	(0.80) 1.10 (0.50)					
BRE D ES B D SPT (S)	1.00 1.00 1.00 1.20 - 1.65 1.20 1.20 - 1.65	N=11 (1,2/2,3,3,3)				Firm dark brown silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.	1.60					
BRE UT	2.00 2.00 - 2.45	40 blows										
D	2.45											
B BRE D SPT (S)	3.00 - 3.45 3.00 3.00 3.00 - 3.45	N=10 (1,2/2,2,3,3)				3 (2.80) Dry						
BRE UT	4.00 4.00 - 4.45	40 blows				4						
D	4.45											
B BRE D SPT (S)	5.00 - 5.45 5.00 5.00 5.00 - 5.45	N=11 (2,2/2,3,3,3)				5 (4.80) Dry						
BRE UF	6.00 6.00 - 6.45	40 blows				6						
B D SPT (S)	6.50 - 6.95 6.50 6.50 - 6.95	N=15 (1,2/3,4,3,5)			(6.30) 4.64	Dark brown slightly clayey sandy SILT. Sand is fine to coarse. 6.50m: Becoming gravelly. Gravel is subangular to subrounded, fine to coarse of coal.	5.60 (1.80)					
BRE	7.00				7							
B D SPT (S)	7.50 - 7.95 7.50 7.50 - 7.95	N=10 (1,1/2,2,3,3)			(7.30) 0.42	Medium dense dark brown silty gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of coal.	7.40					
BRE	8.00				8	8.00m: Becoming slightly gravelly.						
B D SPT (S)	8.50 - 8.95 8.50 8.50 - 8.95	N=12 (1,1/2,3,4,3)			(8.30) 0.66	8.50m: Gravel becoming fine.						
BRE	9.00				9							
B D SPT (S)	9.50 - 9.95 9.50 9.50 - 9.95	N=14 (1,2/3,3,4,4)			(9.30) 0.37		(3.60)					
BRE	10.00				10							
Continued on next sheet												
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
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)	
6.50	5.80	4.04	20		22.10	22.50	01:30	150	22.30	150	22.68	
Log last updated 24/01/2018												

				BOREHOLE RECORD						Borehole BH06			
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation						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			
Method: Cable Percussive Drilling						Checked By: JH		Dates: 24/11/2017 - 28/11/2017					
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description				Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing											
B D SPT (S)	10.50 - 10.95	N=12 (1,2/2,3,3,4)	(10.30) 0.24	Medium dense dark brown silty gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of coal.				11.00					
	10.50 - 10.95												
BRE	11.00		11	Medium dense brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is subrounded, fine to coarse of coal.				(3.00)					
B D SPT (S)	11.50 - 11.95	N=12 (1,2/3,3,3,3)	(11.30) 0.39										
11.50 - 11.95					12								
BRE	12.00		13	Medium dense dark brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.				14.00					
B D SPT (S)	12.50 - 12.95	N=13 (2,3/3,3,4,3)	(12.30) 0.72										
12.50 - 12.95					14								
BRE	13.00		15					(7.00)					
B D SPT (S)	13.50 - 13.95	N=12 (3,3/3,3,3,3)	(13.30) 0.44										
13.50 - 13.95					16								
BRE	14.00		17										
B D SPT (S)	14.50 - 14.95	N=14 (1,2/3,3,4,4)	(14.30) 7.88										
14.50 - 14.95					18								
BRE	15.00		19										
B D SPT (S)	15.50 - 15.95	N=15 (1,2/3,4,4,4)	(15.30) 8.14										
15.50 - 15.95					20								
BRE	16.00												
B D SPT (S)	16.50 - 16.95	N=14 (1,1/3,3,4,4)	(16.30) 8.36										
16.50 - 16.95													
BRE	17.00												
D SPT (S)	17.50 - 17.95	N=15 (1,2/3,4,4,4)	(17.30) 8.73										
17.50 - 17.95													
BRE	18.00												
B D SPT (S)	18.50 - 18.95	N=15 (2,3/3,4,4,4)	(18.30) 9.01										
18.50 - 18.95													
SPT (C)	19.50 - 19.95	N=31 (4,6/7,8,8,8)	(19.30) 9.22										
						Below 19.50m: Dense							
BRE	20.00		20										
Continued on next sheet													
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)		
6.50	5.80	4.04	20		22.10	22.50	01:30	150	22.30	150	22.68		
Log last updated 24/01/2018													



Borehole BH06

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
-	
Easting:	Northing:
433176.22	559861.03

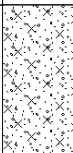






Driller: LS

Logged By: FR



Sheet 3 of 3




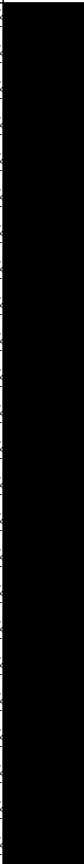
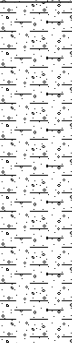
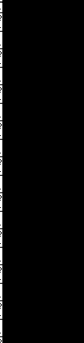
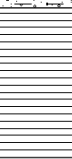



Checked By: JH



Dates:	24/11/2017 - 28/11/2017
--------	-------------------------

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
B D SPT (S)	20.50 - 20.95	N=32 (10,10/8,5,8,11)	(20.30) 9.48	Medium dense dark brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.				
	20.50			<u>20.00m: Becoming very gravelly.</u>				
BRE	21.00		21	Dark brown slightly clayey gravelly SAND. Gravel is subangular to subrounded, fine to coarse of sandstone and coal.	21.00			
B D SPT (S)	21.50 - 21.95	N=50+ (9,11/17,18,15 for 40mm)	(21.30) 6.36	Stiff dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of sandstone.	21.40			
	21.50 - 21.84				(0.70)			
BRE	22.00		22	Very dense grey clayey gravelly SAND. Gravel is subangular of sandstone. (Possible weathered rockhead).	22.10			
D SPT (S)	22.50	N=50+ (20,5 for 5mm/36,14 for 25mm)	(22.30) 6.88		(0.58)			
	22.50 - 22.68				22.68			
			23	End of Borehole at 22.68 m				
			24					
			25					
			26					
			27					
			28					
			29					
			30					

Ground Water (m)					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)	
6.50	5.80	4.04	20		22.10	22.50	01:30	150	22.30	150	22.68	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH07					
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50				
						Easting: 433384.35	Northing: 559921.87				
Client: Sunderland City Council				Driller: LS	Logged By: FR	Sheet 1 of 2					
Method: Cable Percussive Drilling				Checked By: JH		Dates: 21/11/2017 - 22/11/2017					
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
Type	Depth From-To (m)	Insitu Testing									
B D ES	0.00 - 0.30 0.20 0.20		1	Dark brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is fine to medium, subangular of sandstone and coal. Organic fibres present.	(0.30) 0.30						
B D ES	0.50 - 1.00 0.50 0.50			Firm orange brown sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular of sandstone and coal. Organic fibres present.	(0.50) 0.80						
BRE D ES B D SPT (S)	1.00 1.00 1.00 1.20 - 1.65 1.20 1.20 - 1.65	N=10 (1,1/2,2,3,3)		Firm brown, mottled grey slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal. Rare organic fibres present.	(1.20)						
BRE D UT D	2.00 2.00 2.00 - 2.45 2.45	45 blows		Firm thinly laminated, brown slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	2.00 (1.40)						
B BRE D SPT (S)	3.00 - 3.45 3.00 3.00 3.00 - 3.45	N=8 (1,1/2,2,2,2)		Firm grey, slightly sandy SILT. Sand is fine.	3.40						
B BRE D SPT (S)	4.00 - 4.45 4.00 4.00 4.00 - 4.45	N=9 (1,2/2,2,2,3)			(1.70)						
B BRE D SPT (S)	5.00 - 5.45 5.00 5.00 5.00 - 5.45	N=12 (1,2/3,3,3,3)			5.10						
B BRE D SPT	6.00 - 6.45 6.00 6.00 6.00 - 6.45	N=13 (1,1/3,3,3,4)									
B BRE D SPT (S)	7.00 - 7.45 7.00 7.00 7.00 - 7.45	N=14 (1,2/3,3,4,4)									
B BRE D SPT (S)	8.00 - 8.45 8.00 8.00 8.00 - 8.45	N=14 (1,1/2,3,4,5)									
B BRE D SPT (S)	9.00 - 9.45 9.00 9.00 9.00 - 9.45	N=14 (1,2/2,3,4,5)									
B	10.00 - 10.45		10 (9.80) 0.81	Continued on next sheet							
Ground Water (m)				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)
5.00	4.80	3.62	20	17.50	18.30	18.50	01:00	150	18.30	150	19.00
Log last updated 24/01/2018											

				BOREHOLE RECORD				Borehole BH07				
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 433384.35		Northing: 559921.87				
Client: Sunderland City Council				Driller: LS		Logged By: FR		Sheet 2 of 2				
Method: Cable Percussive Drilling				Checked By: JH		Dates: 21/11/2017 - 22/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
BRE D SPT (S)	10.00 10.00 10.00 - 10.45	N=14 (2,3/3,3,4,4)			Medium dense, brown silty SAND. Sand is fine to medium.	(10.60)						
B D SPT (S)	11.00 - 11.45 11.00 11.00 - 11.45	N=14 (2,3/3,3,4,4)		11 (11.00) Dry								
B BRE D SPT (S)	12.00 - 12.45 12.00 12.00 - 12.45	N=10 (2,3/3,3,4)		12 (11.80) 2.86								
B BRE D SPT (S)	13.00 - 13.45 13.00 13.00 - 13.45	N=14 (1,2/3,3,4,4)		13 (12.80) 0.42								
B BRE D SPT (S)	14.00 - 14.45 14.00 14.00 - 14.45	N=14 (2,2/3,3,4,4)		14 (13.80) 2.60								
B BRE D SPT (S)	15.00 - 15.45 15.00 15.00 - 15.45	N=15 (2,3/3,4,4,4)		15 (14.80) Dry								
BRE D UF	16.00 16.00 16.00 - 16.45	40 blows		16	Stiff grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	15.70						
B D SPT (S)	16.50 - 16.95 16.50 16.50 - 16.95	N=48 (6,8/10,10,13,15)		(16.30) Dry								
BRE D	17.00 17.00			17								
B SPT (S)	17.50 - 17.95 17.50 - 17.90	N=45 (10,12/12,13,15,5)		(17.30) Dry	Extremely weak distinctly weathered light and dark grey MUDSTONE. (Recovered as clayey gravel).	18.00						
BRE D	18.00 18.00			18								
B D SPT (S)	18.50 - 18.95 18.50 18.50 - 18.56	N=50+ (25 for 30mm/50 for 25mm)		(18.30) Dry								
				19	End of Borehole at 19.00 m	19.00						
				20								
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
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)	
5.00	4.80	3.62	20	17.50	18.30	18.50	01:00	150	18.30	150	19.00	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH08						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50					
						Easting: 43365.12	Northing: 559961.28					
Client: Sunderland City Council				Driller: LS	Logged By: DF	Sheet 1 of 2						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 16/11/2017 - 17/11/2017						
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
B D ES	0.00 - 0.30 0.20 0.20			Brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is fine to coarse, subangular to subrounded of sandstone.	(0.30) 0.30							
B D ES	0.50 - 1.00 0.50 0.50			Firm brown silty, slightly sandy CLAY. Sand is fine to medium.								
BRE D ES UT	1.00 1.00 1.00 1.20 - 1.65	80 blows	1		(1.10)							
D	1.65			Stiff brown slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal. Thinly laminated from 4.00m.	1.40							
B BRE D SPT (S)	2.00 - 2.45 2.00 2.00 2.00 - 2.45	N=20 (2,3/4,5,5,6)	2 (1.80) Dry									
BRE D U	3.00 3.00 3.00 - 3.45	85 blows	3									
D	3.45											
B BRE D SPT (S)	4.00 - 4.45 4.00 4.00 4.00 - 4.45	N=19 (2,3/4,5,5,5)	4 (3.80) Dry		(5.40)							
BRE D UT	5.00 5.00 5.00	75 blows	5									
D	5.45											
B BRE D SPT (S)	6.00 - 6.45 6.00 6.00 6.00 - 6.45	N=17 (2,3/4,5,5)	6 (5.80) Dry									
BRE UF	7.00 7.00 - 7.45	45 blows	7	Medium dense, greyish brown, slightly clayey, silty SAND. Sand is fine to medium.	6.80							
B D SPT (S)	7.50 - 7.95 7.50 7.50 - 7.95	N=20 (2,3/2,4,6,8)	(7.30) 3.06	7.50m-8.00m: Lenses of stiff grey clay present.	(2.10)							
BRE D	8.00 8.00		8									
B D SPT (S)	8.50 - 8.95 8.50 8.50 - 8.95	N=21 (2,3/3,5,6,7)	(8.30) 4.44									
BRE D UT	9.00 9.00 9.00 - 9.45	100 blows	9	Stiff grey slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	8.90							
D	9.45											
BRE	10.00		10		(1.90)							
Continued on next sheet												
Ground Water (m)					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)	
6.00	5.80	2.67	20	9.00	10.70	11.50	02:00	150	12.00	150	11.30	
										116	18.00	
Log last updated 24/01/2018												



Borehole BH08

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
-	
Easting:	Northing:
43365.12	559961.28

Driller: LS

Logged By: DF

Sheet 2 of 2

Checked By: JH

Dates:	16/11/2017 - 17/11/2017
--------	-------------------------

(Casing)
Groundwater

Depth
(m)Level
(m AOD)

Legend

Well/
Backfill[illegible]

End of Borehole at 18.00 m

Ground Water (m)

a

Casing Depths

Diameter	Depth (mm)
----------	------------

(mm)	Exptl (°C)
150	13.00

130	12.00
-----	-------



[illegible][illegible][illegible]

|

General Remarks	
------------------------	--

1. Hand dug inspection pit to 1.20m.

Log last updated 24/01/2018

 		BOREHOLE RECORD				Borehole BH09						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50					
						Easting: 433735.84	Northing: 559880.16					
Client: Sunderland City Council				Driller: PK/AC	Logged By: BC/AH	Sheet 1 of 4						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 30/08/2017 - 04/09/2017						
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10			Dark brown slightly sandy TOPSOIL. Sand is fine to coarse.	(0.40)							
D ES B	0.40 0.40 0.50 - 1.00			Firm orange brown slightly gravelly sandy CLAY of intermediate plasticity. Gravel is angular to subangular, fine to coarse of sandstone and quartz.	0.40							
D ES UT	1.00 1.00 1.20 - 1.65	30 blows	1		(1.15)							
D BRE	1.65 1.90			Loose orange brown silty SAND. Sand is fine to coarse.	1.55							
B D SPT (S)	2.20 - 2.65 2.20 2.20 - 2.65	N=7 (1,2/1,2,2,2)	2 (2.10) Dry		(1.05)							
BRE	2.70			Dark grey fine to medium SAND.	2.60							
B D SPT (S)	3.00 - 3.45 3.00 3.00 - 3.45	N=17 (3,3/3,3,5,6)	3 (2.90) Dry	Medium dense brown orange gravelly SAND. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of coal and sandstone.	3.00							
BRE	3.50				(1.20)							
B D SPT (S)	4.20 - 4.65 4.20 4.20 - 4.65	N=10 (1,2/2,2,3,3)	4 (4.10) Dry	Medium dense dark grey silty SAND. Sand is fine to medium.	4.20							
BRE	4.70				(0.70)							
B D SPT (S)	5.00 - 5.45 5.00 5.00 - 5.45	N=11 (1,2/2,3,3,3)	5 (4.80) Dry	Firm thinly laminated dark brown sandy CLAY of low plasticity. Sand is fine to coarse.	4.90							
BRE	5.50				(0.90)							
D UT	5.90 6.00 - 6.45	12 blows	6	Dark grey silty fine to medium SAND.	5.80 (0.20)							
D	6.45			Firm thinly laminated red brown, slightly sandy CLAY of low plasticity. Sand is fine to medium. Occasional bands of dark grey silty sand noted.	6.00							
B D SPT (S)	7.00 - 7.45 7.00 7.00 - 7.45	N=8 (1,1/1,2,2,3)	7 (6.80) Dry	6.80m: Clay of intermediate plasticity.	(1.80)							
BRE	7.50											
UT	8.00 - 8.45	22 blows	8	Firm thinly laminated brown sandy CLAY. Sand is fine to coarse.	7.80 (0.40)							
D BRE	8.45 8.70			Stiff dark brown slightly sandy slightly gravelly CLAY of low plasticity. Gravel is subangular to rounded, fine to coarse of sandstone and coal.	8.20 (0.90)							
B D SPT (S)	9.00 - 9.45 9.00 9.00 - 9.45	N=26 (5,5/5,5,7,9)	9 (7.80) Dry	9.00m: Clay of intermediate plasticity.	9.10							
BRE D	9.50 9.60			Extremely weak distinctly weathered dark grey MUDSTONE. Recovered as clayey gravel.								
B	10.00 - 10.40		10 (7.80) Dry		(1.60)							
Continued on next sheet												
Ground Water (m)					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)
					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												



Borehole BH09

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
-	
Easting:	Northing:
433735.84	559880.16

Driller: PK/AC	Logged By: BC/AH
----------------	------------------

Sheet 2 of 4

Checked By: JH

Dates: 30/08/2017 - 04/09/2017

(Casing)
Groundwater

Depth
(m)Level
(m AOD)

Legend

Well/
Backfill[illegible]

Continued on next sheet

Ground Water (m)					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)	
					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												



Borehole BH09

Northings:
559880 16

Sheet 3 of 4

Dates:	30/08/2017 - 04/09/2017
--------	-------------------------

Ground Water (m)					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)	
					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												



Borehole BH09

Site: IAMP - Preliminary Ground Investigation

Easting:
433735.84

Northing:
559880.16

Driller: PK/AC

Logged By: BC/
AH



Sheet 4 of 4



Checked By: JH



Dates: 30/08/2017 - 04/09/2017

[illegible]

Ground Water (m)					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
					8.80	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												

 		BOREHOLE RECORD				Borehole BH10						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50					
						Easting: 433750.07	Northing: 559905.49					
Client: Sunderland City Council				Driller: LS/AC	Logged By: DF	Sheet 1 of 4						
Method: Cable Percussive Drilling With Rotary Coring				Checked By: JH		Dates: 20/11/2017 - 28/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
B D ES	0.00 - 0.30 0.20 0.20					Dark brown, slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is fine, subangular of sandstone and coal. Organic fibres present.	(0.30) 0.30					
B D ES	0.50 - 1.00 0.50 0.50					Firm reddish brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to rounded of sandstone, mudstone and coal. Rare organic fibres present.	(1.20)					
BRE D ES UT	1.00 1.00 1.00 1.20 - 1.65	65 blows			1							
D	1.65					Loose dark brown, slightly clayey, silty SAND. Sand is fine to medium.	1.50					
B BRE D SPT (S)	2.00 - 2.45 2.00 2.00 2.00 - 2.45	N=10 (1,2/2,2,3,3)			2 (1.80) 1.18							
B BRE D SPT (S)	3.00 - 3.45 3.00 3.00 3.00 - 3.45	N=9 (2,2/2,2,2,3)			3 (2.80) 1.71							
B BRE D SPT (S)	4.00 - 4.45 4.00 4.00 4.00 - 4.45	N=9 (1,2/2,2,2,3)			4 (3.80) 2.32							
B BRE D SPT (S)	5.00 - 5.45 5.00 5.00 5.00 - 5.45	N=8 (1,1/2,2,2,2)			5 (4.80) 3.94							
BRE D UT	6.00 6.00 6.00 - 6.45	30 blows			6							
D	6.45					Stiff dark brownish grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	6.30					
B BRE D SPT (S)	7.00 - 7.45 7.00 7.00 7.00 - 7.45	N=20 (1,2/4,4,6,6)			7							
B BRE D SPT (S)	8.00 - 8.45 8.00 8.00 8.00 - 8.45	N=22 (7,5/5,5,6,6)			8							
BRE D SPT (S)	9.00 9.00 9.00 - 9.38	N=50+ (12,13 for 25mm/50 for 60mm)			9							
	9.50 - 11.50					Weak partially weathered grey MUDSTONE. Fractures are generally closely spaced subhorizontal, rough, undulating with no infill.	9.50					
					10							
TCR% SCR% ROD% FI 9.50 - 17.00 100 % Water					Continued on next sheet							
Ground Water (m)					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)	
2.00	1.80	1.18	20		8.80	9.00	01:00	150	8.80	150	9.50	
										116	31.50	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH10						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				Scale 1:50 Easting: 433750.07 Northing: 559905.49						
Client: Sunderland City Council				Driller: LS/AC		Logged By: DF						
Method: Cable Percussive Drilling With Rotary Coring				Checked By: JH		Dates: 20/11/2017 - 28/11/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %	FI						
						4		10.15-10.26m: Subvertical fracture rough undulating with no infill.				
	11.50 - 12.50		95	95	65	5		11.16m: Becoming medium strong. 11.33-11.65m: Subvertical fractures, rough undulating with no infill.	(3.00)			
	12.50 - 14.00					6		12.16-12.29m: Subvertical fractures rough, undulating with no infill. 12.26m: Becoming weak.	12.50			
	14.00 - 15.50					6		Weak partially weathered grey MUDSTONE. Fractures are generally medium spaced, subhorizontal, rough, undulating with clay infill. 12.63m: Becoming medium strong.	(3.00)			
	15.50 - 17.00					5		Medium strong partially weathered SILTSTONE interbedded with sandstone. Fractures are generally closely spaced subhorizontal rough undulating with occasional clay infill. Drilling induced fractures noted. 15.53-16.04m: Vertical fracture rough, undulating, no infill. Orange staining noted. 16.10m: Subvertical fractures noted, rough planar, no infill.	15.50 (0.75) 16.25		XXXXXX	
	17.00 - 18.50					8		Medium strong partially weathered grey SILTSTONE. Fractures are generally widely spaced, subhorizontal rough, undulating with occasional clay infill. Drilling induced fractures noted. 16.65m: Subvertical fractures noted, rough undulating no infill.	(0.75) 17.00		XXXXXX	
	18.50 - 21.50					4		18.33m: Becoming interbedded with sandstone 18.50m: Becoming strong.	(3.00)		XXXXXX	
								19.45m: Subvertical curved rough undulating fracture, no infill.			XXXXXX	
									20.00		XXXXXX	
Ground Water (m)					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)	
2.00	1.80				8.80	9.00	01:00	150	8.80	150	9.50	
										116	31.50	

 		BOREHOLE RECORD				Borehole BH10						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				Scale 1:50 Easting: 433750.07 Northing: 559905.49						
Client: Sunderland City Council				Driller: LS/AC		Logged By: DF		Sheet 3 of 4				
Method: Cable Percussive Drilling With Rotary Coring				Checked By: JH		Dates: 20/11/2017 - 28/11/2017						
SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %							FI
	21.50 - 23.00					8	Medium strong partially weathered grey SILTSTONE. Fractures are generally medium spaced. Subhorizontal rough, undulating with occasional clay infill. Drilling induced fractures.			xxxxxx		
						21				xxxxxx		
							21.35m: Becomes strong	(3.00)		xxxxxx		
			97	82	63	10				xxxxxx		
	23.00 - 24.50					22	22.60-22.75m: Subvertical fracture, rough undulating open clay infill.			xxxxxx		
						23	22.88m: Stepped horizontal fracture planar, smooth, no infill.	23.00		xxxxxx		
			100	98	94	4	Medium strong partially weathered grey SILTSTONE fractures are rough, undulating, no infill.			xxxxxx		
							23.06m: Stepped subvertical fracture rough, planar, no infill.	(1.50)		xxxxxx		
	24.50 - 25.60					24				xxxxxx		
								24.50		xxxxxx		
			92	53	53	1	Medium strong partially weathered grey MUDSTONE fractures, stepped rough, undulating, no infill.	(0.63)		xxxxxx		
						25				xxxxxx		
	25.60 - 26.30						Very strong fresh grey SANDSTONE, fracture are subhorizontal very rough, undulating no infill.	25.13		xxxxxx		
			100	100	100		25.25m: Small band of black coal noted.			xxxxxx		
	26.30 - 27.00					26				xxxxxx		
			112	112	81	4	26.30-27.00m: Small interbedded coal noted.	(2.60)		xxxxxx		
	27.00 - 28.50					27				xxxxxx		
			94	80	62	8				xxxxxx		
						28	Medium strong fresh dark grey MUDSTONE, fractures are generally subhorizontal rough undulating, spaced, clean.	27.73		xxxxxx		
	28.50 - 30.00					29				xxxxxx		
			99	85	73	8				xxxxxx		
						30	29.70-30.00m: Becoming slightly weathered.	(3.77)		xxxxxx		
							29.80m: Subvertical fracture rough open undulating clay infill.			xxxxxx		
	30.04 - 31.50									xxxxxx		
Continued on next sheet												
Ground Water (m)					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)	
2.00	1.80				8.80	9.00	01:00	150	8.80	150	9.50	
										116	31.50	
Log last updated 24/01/2018												



Borehole BH10



Scale 1:50

Northing:
559905.49

Sheet 4 of 4

Dates:	20/11/2017 - 28/11/2017
--------	-------------------------





















Ground Water (m)					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)	
2.00	1.80				8.80	9.00	01:00	150	8.80	150	9.50	
										116	31.50	
Log last updated 24/01/2018												



 		BOREHOLE RECORD				Borehole BH11		
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50	
						Easting: 433745.67	Northing: 559813.44	
Client: Sunderland City Council				Driller: PK/AC	Logged By: BC	Sheet 1 of 3		
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 29/08/2017 - 31/08/2017		
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.10 0.10			Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, siltstone, limestone and coal.	(0.30)			
D ES B	0.40 0.40 0.50 - 1.00			Stiff light brown mottled light grey slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.30			
ES UT	1.00 1.20 - 1.65	39 blows	1		(2.00)			
D	1.65							
B D SPT (S)	2.00 - 2.45 2.00 2.00 - 2.45	N=23 (3,4/4,5,6,8)	2 (1.80) Dry					
				Stiff dark brown slightly sandy, slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to rounded, fine to coarse of sandstone, siltstone and mudstone.	2.30			
U	3.00 - 3.45	42 blows	3		(1.50)			
D	3.45							
D	3.80							
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=8 (1,2/2,2,2,2)	4 (3.90) Dry	Firm greyish dark brown slightly gravelly silty CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, siltstone and limestone.	3.80			
UT	5.00 - 5.45	14 blows	5	5.00m: Clay of high plasticity.				
D	5.45							
BRE	5.70				(3.70)			
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=8 (1,1/2,2,2,2)	6 (5.90) Dry					
BRE	6.50							
UT	7.00 - 7.45	12 blows	7	7.00m: Clay of low plasticity.				
D	7.45							
BRE	7.70			Soft greyish brown clayey SILT.	7.50			
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=9 (2,2/2,2,2,3)	8 (7.80) Dry	8.00m: Firm				
BRE	8.50							
B UF	9.00 - 9.65 9.00 - 9.65	9 blows	9		(3.90)			
BRE	9.70							
B	10.00 - 10.45		10					



Continued on next sheet



Ground Water (m)					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)		
7.00	6.90	4.90	20		11.80	12.00	00:45	200	7.00	200	7.00		1. Hand dug inspection pit to 1.20m
12.90	11.60	10.90	20		12.70	12.90	01:00	150	11.60	150	13.00		
								121	13.00	116	21.80		

Log last updated 24/01/2018

 		BOREHOLE RECORD				Borehole BH11						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 433745.67		Northing: 559813.44				
Client: Sunderland City Council				Driller: PK/AC		Logged By: BC		Sheet 2 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 29/08/2017 - 31/08/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=12 (1,2,3,3,4)			11	Soft greyish brown clayey SILT.						
BRE	10.50											
UT	11.00 - 11.45	29 blows			12 (11.60) Dry	11.00m: Clay of low plasticity.						
D BRE	11.45 11.70					Firm brownish grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone and siltstone.	11.40 (0.60)					
B D SPT (S)	12.00 - 12.40 12.00 12.00 - 12.32	N=50+ (6,9/14,16,16)			13 (11.60) Dry	Very dense light grey slightly clayey silty GRAVEL. Gravel is angular to subangular, fine to coarse of siltstone. (Weathered SILTSTONE).						
BRE	12.50											
D SPT (S)	12.90 13.00 - 13.30 13.00 - 13.30	N=50+ (25 for 50mm/50 for 40mm)			14	Light grey slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of siltstone. (Weathered SILTSTONE).	13.00 (0.30)					
C	13.50 - 13.60	100	0	0		NA	Weak to medium strong grey SILTSTONE. Fractures are closely to medium spaced subhorizontal 0-20; planar, smooth, undulose with light brown silt infill.	13.30				
		100	100	53		13.53 - 13.59m: Fracture is 30 degrees, planar, smooth, clean fracture.						
	14.80 - 16.30					14.27 - 14.38m: Fracture is 45 degree, planar, rough with dark grey discolouration to fracture surfaces.						
		100	100	64	4	Fracture is 50 degree, planar, smooth and clean.						
	16.30 - 17.80					Fracture is 30 degree, planar, smooth and clean.	(4.20)					
		100	100	44		Fracture is 90 degree, planar, smooth with light grey silt infill.						
C	16.85 - 16.95											
		100	95	90	3	Medium strong to strong partially weathered light grey fine to medium grained SANDSTONE. Fractures are closely spaced subhorizontal, planar, smooth with dark grey staining on fracture surface.	17.50 (0.87)					
C	17.80 - 18.80 17.90 - 18.00					17.96 - 18.06m: Dark grey thin laminations noted.						
		100	90	71	4	Medium strong partially weathered grey SILTSTONE.	18.37 (0.38)					
C	18.70 - 18.80 18.80 - 20.30					18.37 - 18.45m: Fracture is subhorizontal 0-10 degree, planar, smooth with soft light grey clay infill.	18.75 (0.20)					
		100	90	71	4	18.57m: Fracture is subhorizontal, 15 degree, planar, smooth undulose and clean.	18.95					
C	19.50 - 19.60 19.60 - 19.85					Very weak partially weathered dark grey MUDSTONE with thin laminations of coal. Fractures are very closely spaced subhorizontal planar, smooth and clean.	(0.91)					
		100	90	71	40	18.90 - 18.95m: Fracture is 80 degree, stepped, smooth with black coal gravel infill.						
C						Medium strong partially weathered grey SILTSTONE. Fractures are subhorizontal, planar, smooth, undulose and	19.86					
					20	Continued on next sheet						
Ground Water (m)					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)	
7.00	6.90	4.90	20		11.80	12.00	00:45	200	7.00	200	7.00	
12.90	11.60	10.90	20		12.70	12.90	01:00	150	11.60	150	13.00	
								121	13.00	116	21.80	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH12						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 433619.12		Northing: 559765.21				
Client: Sunderland City Council				Driller: SR		Logged By: DF		Sheet 1 of 2				
Method: Cable Percussive Drilling				Checked By: JH		Dates: 15/11/2017 - 16/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
ES	0.00				Stiff thinly laminated brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.							
ES B	0.50 0.60											
D ES B UT	1.00 1.00 1.20 - 1.70 1.20 - 1.65	63 blows		1		(2.00)						
D B ES SPT (S)	1.85 2.00 - 2.50 2.00 - 2.45 2.00	N=21 (4,5/5,5,6)		2	Stiff dark brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	2.00						
D	2.75					(1.00)						
B D ES UT	3.00 - 3.50 3.00 3.00 3.00 - 3.45	54 blows		3	Stiff thinly laminated, brown slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular of sandstone, mudstone and coal.	3.00						
D	3.75				3.00-4.00m: Frequent orange brown, fine to medium sand bands present.	(1.50)						
B D ES SPT (S)	4.00 - 4.50 4.00 - 4.45 4.00 4.00 - 4.45	N=23 (4,5/5,5,6,7)		4								
D	4.75				Loose brown slightly clayey, gravelly SAND. Gravel is fine to coarse, subangular of coal and mudstone. Rare pyrite crystals present in gravel.	4.50						
B D ES SPT (S)	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								
D	5.75					(2.50)						
B D SPT (S)	6.00 - 6.50 6.00 - 6.45 6.00 - 6.45	N=1 (1,1/0,0,0,1)		6 (6.00) 4.50	6.00m: Becoming slightly gravelly.							
D	6.75											
B D ES SPT (S)	7.00 - 7.50 7.00 - 7.45 7.00 7.00 - 7.45	N=11 (3,3/3,2,3)		7 (7.00) 5.40	Soft brownish grey silty, slightly sandy CLAY. Sand is fine to medium.	7.00						
D	7.75											
B D UT SPT (S)	8.00 - 8.50 8.00 - 8.45 8.00 - 8.45 8.00 - 8.45	43 blows N=13 (2,3/3,3,4)		8 (8.00) 6.00								
D	8.75											
B D SPT (S)	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											
B	10.00 - 10.50			10 (10.00) 7.00								
					Continued on next sheet							
Ground Water (m)					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)	
4.50	4.50	3.50	20		17.00	17.30	01:00	200	10.00	200	10.00	
								150	17.00	150	17.70	
Log last updated 24/01/2018												

				BOREHOLE RECORD				Borehole BH12				
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 433619.12		Northing: 559765.21				
Client: Sunderland City Council				Driller: SR		Logged By: DF		Sheet 2 of 2				
Method: Cable Percussive Drilling				Checked By: JH		Dates: 15/11/2017 - 16/11/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
SPT (S)	10.00 - 10.45	N=3 (1,0/0,1,1,1)			Soft brownish grey silty, slightly sandy CLAY. Sand is fine to medium.							
D	10.75											
B D SPT (S)	11.00 - 11.50 11.00 - 11.45 11.00 - 11.45	N=9 (2,3/2,2,2,3)		11 (11.00) 7.70		(8.00)						
D	11.75											
B D SPT (S)	12.00 - 12.50 12.00 - 12.45 12.00 - 12.45	N=13 (3,3/3,4,3,3)		12 (12.00) 8.00								
D	12.75											
B D SPT (S)	13.00 - 13.50 13.00 - 13.45 13.00 - 13.45	N=14 (3,3/4,3,4,3)		13 (13.00) 9.50								
D	13.75											
B D SPT (S)	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	14.75											
B D SPT (S)	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 grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	15.00						
D	15.75											
B D SPT (S)	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	16.75											
D SPT (S)	17.00 17.00 - 17.32	N=50+ (20,5 for 5mm/40,10 for 10mm)		17(17.00) 10.00	Weathered dark grey MUDSTONE. Recovered as gravelly CLAY. (Possible weathered rockhead).	16.75						
D SPT (S)	17.30 17.30 - 17.70	N=50+ (14,11 for 45mm/26,24 for 55mm)		(17.00) 10.00		(0.95)						
					End of Borehole at 17.70 m	17.70						
					18							
					19							
					20							
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit 1.20m.	
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)
4.50	4.50	3.50	20		17.00	17.30	01:00	200	10.00	200		10.00
								150	17.00	150		17.70
Log last updated 24/01/2018												

				BOREHOLE RECORD				Borehole BH13				
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50		
								Easting: 433938.60		Northing: 559738.27		
Client: Sunderland City Council				Driller: PK/AC		Logged By: BC		Sheet 1 of 2				
Method: Cable Percussive Boring				Checked By: JH				Dates: 31/08/2017 - 05/09/2017				
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES D ES B	0.10 0.10 0.30 0.30 0.50 - 1.00				1 (1.80) Dry	MADE GROUND: Dark brown sandy gravelly topsoil. Firm fissured dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone, sandstone and chalk.	(0.20) 0.20					
B D SPT (S)	1.20 - 1.65 1.20 1.20 - 1.65	N=17 (2,3/4,4,4,5)				2 2.00m: Clay of low plasticity.						
BRE	1.70											
UT	2.00 - 2.50	25 blows			3 (1.80) Dry							
D BRE	2.45 2.70					4 4.00m: Clay of intermediate plasticity.		(4.50)				
B D SPT (S)	3.00 - 3.45 3.00 3.00 - 3.45	N=16 (3,3/4,4,4,4)										
BRE	3.50				5 (1.80) Dry							
D UT	4.00 4.00 - 4.45	18 blows				6 Stiff thinlly laminated dark brown sandy CLAY. Sand is fine to coarse.						
BRE	4.70							4.70				
B D SPT (S)	5.00 - 5.45 5.00 5.00 - 5.45	N=17 (3,4/4,4,4,5)			7 (1.80) Dry			(0.65)				
BRE	5.50					8 Firm thinlly laminated dark brown sandy CLAY of low plasticity. Sand is fine to coarse.		5.35				
UT	6.00 - 6.50	29 blows						(1.05)				
BRE	6.70				9 (1.80) Dry			6.40				
D B D SPT (S)	6.90 7.00 - 7.50 7.00 7.00 - 7.45	N=50+ (5,8/10,14,14,12)				10 (1.80) Dry		(1.76)				
BRE	7.50											
D SPT (S)	7.80 7.80 - 7.92	N=50+ (25 for 70mm/50 for 55mm)			11 (1.80) Dry			8.16				
D	8.10					12 Very weak partially weathered thickly bedded SILTSTONE. Fractures are very closely spaced subhorizontal, planar, smooth and clean Extremely weak partially weathered dark grey thinlly bedded MUDSTONE. Fractures are extremely closely to very closely spaced subhorizontal, planar, smooth and clean		(0.44)				
SPT (S)	8.20 - 8.80 8.20 - 8.80	N=50+ (25 for 30mm/40 for 30mm)						8.60				
	8.80 - 10.30				13 9.20 - 9.40m: subvertical undulose, smooth clean fracture 9.55 - 9.65m: subvertical undulose, smooth clean fracture			(1.30)				
							9.90					
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	
8.10	1.80	3.60	20		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 updated 24/01/2018												



Borehole BH13



Scale 1:50




Northing:
559738.27



Sheet 2 of 2

Dates:	31/08/2017 - 05/09/2017
--------	-------------------------

Ground Water (m)					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)	
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 updated 24/01/2018												



 		BOREHOLE RECORD				Borehole BH14						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50					
						Easting: 433759.87	Northing: 559617.72					
Client: Sunderland City Council				Driller: PK/AC	Logged By: BC	Sheet 1 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 29/08/2017						
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
B D	0.20 - 0.40 0.20			Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	(0.45)							
BRE D ES	0.50 0.50 0.50			Firm brown mottled light grey slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone, siltstone and coal.	0.45							
B D ES UT	1.00 - 1.20 1.00 1.00 1.20 - 1.65	45 blows	1		(1.35)							
D D	1.65 1.70				1.80							
B D SPT (S)	2.00 - 2.45 2.00 2.00 - 2.45	N=16 (3,3/3,4,4,5)	2 (1.80) Dry	Stiff dark brown slightly sandy, slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of coal, sandstone, mudstone and siltstone.								
BRE	2.50											
UT	3.00 - 3.45	50 blows	3	3.00m: Clay of intermediate 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)	4 (3.80) Dry		(4.60)							
D	4.50											
UT	5.00 - 5.45	45 blows	5									
D BRE	5.45 5.50											
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=13 (3,3/4,3,3,3)	6 (5.80) Dry									
BRE	6.50			Firm greyish brown slightly sandy silty CLAY of high plasticity. Sand is fine to coarse.	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)	8 (7.80) Dry									
BRE	8.50											
UT	9.00 - 9.45	40 blows	9									
D BRE	9.45 9.50											
B	10.00 - 10.45		10 (9.80) Dry									
				Continued on next sheet								
Ground Water (m)					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)	
10.50	9.80	9.96	8		13.30	13.50	01:00	150	18.40	150	18.50	
					18.30	18.50	01:00	121	18.50	116	28.20	
Log last updated 24/01/2018												



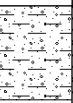



				BOREHOLE RECORD				Borehole BH14				
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50		
								Easting: 433759.87		Northing: 559617.72		
Client: Sunderland City Council				Driller: PK/AC		Logged By: BC		Sheet 2 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH				Dates: 29/08/2017				
SAMPLE DETAILS				(Casing) Groundwater	STRATA RECORD Description		Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=12 (2,3/3,3,3,3)			Firm greyish brown slightly sandy silty CLAY of high plasticity. Sand is fine to coarse.							
B	10.50											
UT	11.00 - 11.45	45 blows		11								
D D	11.45 11.50											
B D SPT (S)	12.00 - 12.45 12.00 12.00 - 12.45	N=14 (2,3/3,3,4,4)		12(11.80) 10.32			(11.50)					
BRE D	12.50 12.50											
UT	13.00 - 13.45	40 blows		13								
D	13.45											
B D SPT (S)	14.00 - 14.45 14.00 14.00 - 14.45	N=16 (2,3/4,4,4,4)		14(13.80) 10.98								
BRE D	14.50 14.50											
UT	15.00 - 15.45	60 blows		15								
D BRE D	15.45 15.50 15.50											
B D SPT (S)	16.00 - 16.45 16.00 16.00 - 16.45	N=16 (2,2/4,4,4,4)		16(15.80) 12.84								
BRE D	16.50 16.50											
UT	17.00 - 17.45	70 blows		17								
B D SPT (S)	17.50 - 17.95 17.50 17.50 - 17.95	N=15 (3,3/3,4,4,4)		(17.30) 13.52								
BRE D	18.00 18.00			18	Stiff brownish dark grey slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone. Cobbles are of sandstone.		17.90 (0.60)					
B SPT (S)	18.50 18.50 - 18.58 18.50 - 18.20	N=50 ± 25 for 55mm/50 for 20mm (25 for 55mm/50 for 20mm)		18.50 14.86 (18.40) 14.86 18.50 - 28.20 100 % Water	Stiff brown slightly sandy gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone. 18.62 - 18.76m: Light grey fine sandstone cobble.		18.50					
C C	18.70 - 18.80 19.20 - 20.70 19.20 - 20.70			19			(1.28)					
		100 0 0										
		100 81 60										
		N/A										
				20	Stiff grey gravelly CLAY. Gravel is angular to subangular, fine		19.78					
				Continued on next sheet								
Ground Water (m)				Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m 2. Groundwater entry at 10.50m overnight.	
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)
10.50	9.80	9.96	8		13.30	13.50	01:00	150	18.40	150		18.50
					18.30	18.50	01:00	121	18.50	116		28.20
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH14					
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				Scale 1:50 Easting: 433759.87 Northing: 559617.72					
Client: Sunderland City Council				Driller: PK/AC		Logged By: BC		Sheet 3 of 3			
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 29/08/2017					
SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %						
C	20.70 - 22.20						to coarse of mudstone.	(0.55)			
							Very weak to weak partially weathered weak thinly laminated grey MUDSTONE. Fractures are very closely to closely spaced subhorizontal, planar, smooth, clean.	20.33			
C	22.20 - 23.70						Fractures are subhorizontal, planar, smooth, undulose, clean. 22.51 - 22.72m: Fractures are subvertical, planar, smooth, undulose, clean.	(2.51)			
	22.20 - 23.70						Very weak distinctly weathered dark grey MUDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth, clean. 22.84 - 22.96m: Occasional coal fragments noted within mudstone.	22.84			
							Very weak to weak partially weathered light grey SILTSTONE. Fractures are subhorizontal, planar, smooth, clean.	23.46			
C	23.70 - 25.20						24.52 - 24.56m: Fractures are subhorizontal, planar, smooth with light grey sandstone gravel infill.	24.70			
	23.90 - 24.00						Very weak partially weathered dark grey/black MUDSTONE with frequent thin laminations of coal. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean. 24.70 - 24.76m: Very weak black coal. 24.88 - 25.02m: Fractures are subvertical, stepped, smooth, clean. 24.95 - 25.02m: Very weak black coal.	(0.32)			
							Weak partially weathered light grey SILTSTONE. Fractures are closely spaced subhorizontal, planar, smooth, clean.	(1.68)			
							26.19 - 26.35m: Fractures are subhorizontal, planar, smooth with light grey fine sandstone gravel infill. 26.35 - 26.52m: Weak, light grey fine grained sandstone.	26.70			
	25.20 - 26.70						Weak to medium strong partially weathered light grey SILTSTONE. Fractures are closely to medium spaced, subhorizontal planar, smooth, clean. (drillers description) 26.90 - 27.18m: Fractures are subvertical, stepped, smooth, clean.	(1.50)			
							27.85 - 27.94m: Weak grey sandstone.				
							End of Borehole at 28.20 m	28.20			
	26.70 - 28.20										

Ground Water (m)					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)	
10.50	9.80				13.30	13.50	01:00	150	18.40	150	18.50	
					18.30	18.50	01:00	121	18.50	116	28.20	



Log last updated 24/01/2018

 		BOREHOLE RECORD				Borehole BH15			
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -	Scale 1:50		
						Easting: 434016.64	Northing: 559601.44		
Client: Sunderland City Council				Driller: PM/AC	Logged By: BC	Sheet 1 of 2			
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 15/09/2017 - 18/09/2017			
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	Insitu Testing							
B BRE D ES B BRE D ES B BRE D ES U D	0.20 0.20 0.20 0.20 0.50 0.50 0.50 0.50 1.00 1.00 1.00 1.00 1.00 1.20 - 1.65 1.65		1	Dark brown, slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone. Stiff brown slightly sandy, slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.35) 0.35				
B BRE D SPT (S)	2.00 - 2.50 2.00 2.00 2.00 - 2.45	N=21 (4,5/5,5,6,5)	2 (2.00) Dry		(2.85)				
D BRE D	2.75 3.00 3.00		3						
D	3.45			Stiff thinly laminated greyish brown silty CLAY.	3.20				
D	3.75								
B D SPT (S)	4.00 - 4.50 4.00 4.00 - 4.45	N=19 (3,4/4,5,5,5)	4 (4.00) Dry						
BRE D B U	4.75 4.75 4.80 5.00 - 5.45	40 blows	5		(3.60)				
D	5.45								
BRE D B B D SPT (S)	5.75 5.75 5.80 6.00 - 6.50 6.00 6.00 - 6.45	N=17 (3,3/4,4,4,5)	6 (5.50) Dry						
BRE D D U	6.75 6.75 6.80 7.00 - 7.45	71 blows	7	Stiff brownish grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, siltstone and coal.	6.80				
D	7.45								
BRE D B B D SPT (S)	7.75 7.75 7.80 8.00 - 8.45 8.00 8.00 - 8.45	N=32 (6,6/7,7,8,10)	8 (6.30) Dry		(3.00)				
BRE D D U	8.75 8.75 8.80 9.00 - 9.45	91 blows	9						
D	9.45								
BRE D D	9.75 9.75 9.80		10	Very dense light brown sandy GRAVEL. Sand is fine to	9.80 (0.20) 10.00				
Ground Water (m)			Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	
					9.80	10.00	01:00	140	
								150 140 115	
Log last updated 24/01/2018									

 		BOREHOLE RECORD				Borehole BH15						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				Scale 1:50 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						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %	FI						
D SPT (S)	10.00 10.00 - 10.11 10.00 - 10.95	N=0 (25.0 for 35mm)	100	34	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 to coarse of sandstone, mudstone, and siltstone. Cobbles are of sandstone. <u>10.00 - 10.12m: Sandstone cobble.</u> Weak fresh reddish brown fine grained SANDSTONE. Fractures are closely to medium spaced subhorizontal, planar, smooth, clean with discolouration of fracture surface. <u>11.64 - 11.83m: Fractures are subvertical, planar, smooth, clean.</u>	10.00			
C	10.75 - 10.95								10.62			
C	10.95 - 12.45								10.62			
C	11.15 - 11.57		100	100	100		11 10.95 - 12.45 100 % Water					
C	12.45 - 12.62 12.45 - 13.95					4 12	12.45 - 15.45 90 % Water	<u>12.42m: Medium strong.</u>	(3.22)			
C	13.95 - 14.09 13.95 - 15.45					13						
C						14	Very weak partially weathered reddish grey SILTSTONE. Fractures are very closely to closely spaced, subhorizontal planar, smooth, clean. <u>13.98 - 14.06m: Very weak reddish brown mudstone.</u> <u>14.44 - 14.61m: Fractures are subvertical, planar, smooth, clean.</u>	13.84				
		100	100	33	7	15		(1.61)				
						16	End of Borehole at 15.45 m		15.45			
						17						
						18						
						19						
						20						

Ground Water (m)					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)		
					9.80	10.00	01:00	140	10.50	150	10.00		1. Hand dug inspection pit to 1.20m
										140	10.50		
										115	15.45		

Log last updated 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							
SAMPLE DETAILS				(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10				Firm dark brown slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of coal and sandstone.	(0.30) 0.30	37.53					
B D ES	0.50 - 1.00 0.50 0.50				Stiff, brown sandy gravelly CLAY of intermediate plasticity. Gravel is angular to subrounded, fine to coarse of coal, sandstone and siltstone.							
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=19 (3,4/4,5,4,6)		2 (2.00) Dry								
D UT	3.00 3.00 - 3.45	80 blows		3								
D	3.50				Firm thinly laminated brown silty CLAY with silty partings. Light brown and grey silt dustings/partings on laminae surfaces.	3.30	34.53					
B D SPT (S)	4.00 - 4.50 4.00 4.00 - 4.45	N=14 (2,3/3,3,4,4)		4 (3.00) Dry								
D UT	5.00 5.00 - 5.45	60 blows		5	5.00m: Clay of low plasticity.							
D	5.50											
B D SPT (S)	6.00 - 6.50 6.00 6.00 - 6.45	N=15 (3,4/4,3,4,4)		6								
D UT	7.00 7.00 - 7.45	60 blows		7	Brown clayey fine to medium SAND.	7.00	30.83					
D	7.50				Brown sandy SILT. Sand is fine to medium.	7.50	30.33					
B D SPT (S)	8.00 - 8.50 8.00 8.00 - 8.45	N=13 (2,2/3,3,4,3)		8	Medium dense brown clayey fine to medium SAND.	8.00	29.83					
B D UF	9.00 - 9.50 9.00 9.00 - 9.45	70 blows		9	Firm thinly laminated brown silty CLAY with silty partings. Light brown and grey silt dusting/partings on laminae surfaces.	9.00	28.83					
B	10.00 - 10.50			10								
Continued on next sheet												
Ground Water (m)					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)
13.10	4.50	4.9	20	6.00	15.00	15.30	01:00	200	4.50	200		11.50
	13.00	12.1	20					150	15.30	150		15.30
Log last updated 24/01/2018												



Borehole BH16

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
37.83	
Easting:	Northing:
433594.41	559449.20

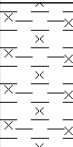
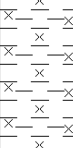
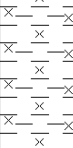
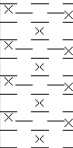
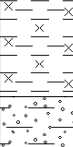
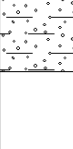
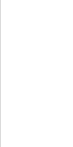
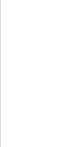
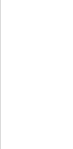
Driller: SK

Logged By: ST

Sheet 2 of 2

Checked By: JH

Dates:	31/07/2017 - 01/08/2017
--------	-------------------------

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
D SPT (S)	10.00 10.00 - 10.45	N=23 (3,3/4,6,6,7)		Firm thinly laminated brown silty CLAY with silty partings. Light brown and grey silt dusting/partings on laminae surfaces.				
D UT	11.00 11.00 - 11.45	80 blows	11	11.00m: Soft clay of intermediate plasticity.	(5.50)			
D	11.50							
B D SPT (S)	12.00 - 12.50 12.00 12.00 - 12.45	N=24 (4,4/5,6,6,7)	12					
D UF	13.00 13.00 - 13.45	50 blows	13					
D	13.50							
B D SPT (S)	14.00 - 14.50 14.00 14.00 - 14.45	N=22 (3,5/4,5,7,6)	14 (14.00) 3.90	14.00m: Clay of low plasticity.				
SPT (S)	15.00 - 15.33	N=50+ (10,11/14,26,10 for 30mm)	15 (15.00) 1.80	Very stiff grey gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone. (Possible weathered rockhead).	14.50	23.33		
SPT (C)	15.30 - 15.39	N=50+ (25 for 60mm/50 for 30mm)	01/08/2017 1700 (15.30) 3.60 (15.30) 3.60	End of Borehole at 15.30 m	15.30	22.53		
			16					
			17					
			18					
			19					
			20					

Ground Water (m)					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)			
	4.50	4.9	20	6.00	15.00	15.30	01:00	200	4.50	200	11.50			
13.10	13.00	12.1	20							150	15.30		150	15.30
Log last updated 24/01/2018														



**Borehole
BH16A**

Scale 1:50

Sheet 1 of 1

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

Ground Water (m)					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)	
								121	9.00	121	9.00	
Log last updated 24/01/2018												



**Borehole
BH16B**

Scale 1:50

Sheet 1 of 3

Dates:	17/08/2017 - 21/08/2017
--------	-------------------------

Continued on next sheetLog last updated 24/01/2018

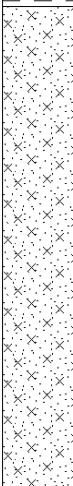
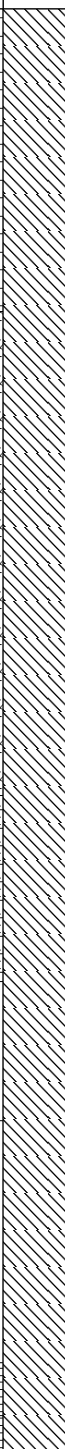
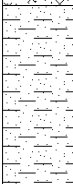
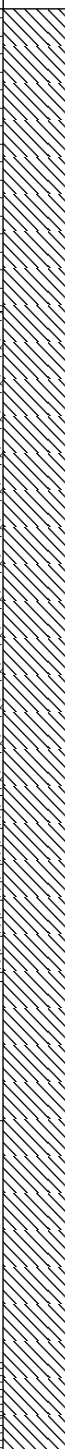
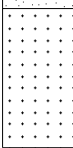
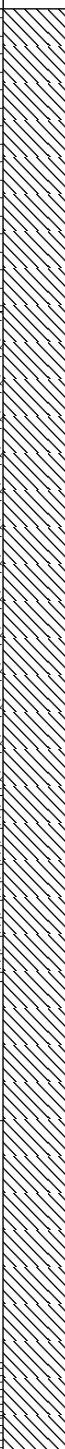
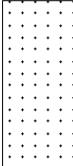
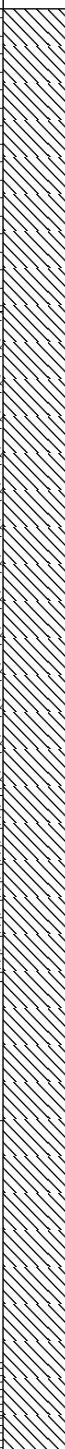

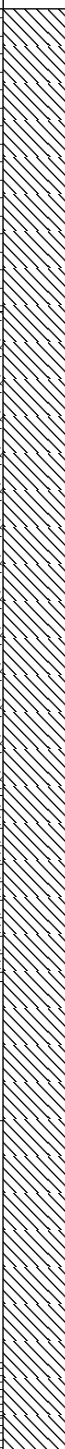

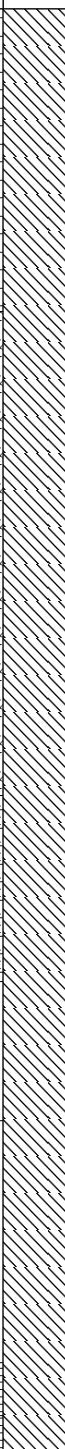


**Borehole
BH16B**

Scale 1:50

Sheet 2 of 3

Dates:	17/08/2017 - 21/08/2017
--------	-------------------------

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
C	15.30 - 16.80						11	Silty SAND. (Driller's Description).	12.10			
							12					
							13					
							14					
							15					
							16					
	16.80 - 18.30						AZC L	Grey brown sandy CLAY. ASSESSED ZONE OF CORE LOSS. Description taken from cuttings.	15.30			
							N/A					
							4					
							A...					
							NI					
							10					
17.80 - 18.10							Weak, locally extremely weak, distinctly weathered, orange brown, locally dark grey, fine to medium grained SANDSTONE. Fractures are closely spaced subhorizontal, planar, smooth and clean.	16.53				
												17
												17.30 - 17.40m: Dark brown silty fine to coarse sand.
												17.40 - 17.45m: Dark brown sandy clay.
												Weak, partially weathered, dark grey fine to medium grained SANDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth and clean.
												17.75m: Weak.
18.10 - 18.30							17.85 - 18.05m: Orange staining.	17.45				
												18
												18.30 - 19.30
												100
												72
												73
19.30 - 20.80							Extremely weak, partially weathered orange dark grey MUDSTONE. Fractures are very closely spaced, subhorizontal, planar and clean.	19.05				
												19
												40
												NI
												100
												86
							Extremely weak to very weak, partially weathered, dark grey MUDSTONE thinly interbedded with dark grey siltstone. Fractures are very closely to closely spaced, subhorizontal, planar, smooth and clean.	19.40				
												20

Ground Water (m)					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)	
								121	19.30	121	22.30	
Log last updated 24/01/2018												1. Hand dug inspection pit to 1.20m.





**Borehole
BH16B**




Scale 1:50



Sheet 3 of 3

Dates:	17/08/2017 - 21/08/2017
--------	-------------------------

Ground Water (m)					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)	
								121	19.30	121	22.30	1. Hand dug inspection pit to 1.20m.
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH17						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 36.46 Easting: 433736.59 Scale 1:50 Northing: 559451.89						
Client: Sunderland City Council				Driller: SK/DC	Logged By: ST/BC	Sheet 1 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 01/08/2017 - 09/08/2017						
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10			Firm dark brown slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of coal and sandstone.	(0.30) 0.30	36.16						
B D ES	0.50 - 1.00 0.50 0.50			Stiff dark brown slightly sandy, slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to medium of coal and sandstone.								
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)	202/08/2017 0800 (2.00) Dry (2.00) Dry		(4.30)							
D UT	3.00 3.00 - 3.45	70 blows	3									
D	3.50			3.50m: Becomes firm.								
B D SPT (S)	4.00 - 4.50 4.00 4.00 - 4.45	N=12 (2,3/3,3,3,3)	4 (3.00) Dry									
D UT	5.00 5.00 - 5.45	70 blows	5	Firm thinly laminated brown silty CLAY of intermediate plasticity, with silty partings. Light brown and grey silt dusting/partings on laminae surfaces.	4.60	31.86						
D	5.50											
B D SPT (S)	6.00 - 6.50 6.00 6.00 - 6.45	N=14 (3,4/3,3,4,4)	6 (3.00) Dry		(4.40)							
D UT	7.00 7.00 - 7.45	80 blows	7	7.00m: Clay of high plasticity.								
D	7.50											
B D SPT (S)	8.00 - 8.50 8.00 8.00 - 8.45	N=16 (3,3/4,5,4,3)	8 (3.00) Dry									
D UT	9.00 9.00 - 9.45	75 blows	9	Firm, brown, slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subangular, fine of sandstone and coal.	9.00	27.46						
D	9.50											
B	10.00 - 10.50		10 (3.00) Dry									
				Continued on next sheet								
Ground Water (m)					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)	
16.30		14.2	20		17.00	17.30	01:00	200	17.00	200	17.30	
								140	21.00	140	24.20	
Log last updated 24/01/2018												

				BOREHOLE RECORD						Borehole BH17					
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation						GL (m AOD) 36.46 Scale 1:50 Easting: 433736.59 Northing: 559451.89					
Client: Sunderland City Council						Driller: SK/DC		Logged By: ST/BC		Sheet 2 of 3					
Method: Cable Percussive Drilling with Rotary Core Drilling						Checked By: JH		Dates: 01/08/2017 - 09/08/2017							
SAMPLE DETAILS										(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing													
D SPT (S)	10.00 10.00 - 10.45	N=17 (3,4/3,4,4,6)					Firm, brown, slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subangular, fine of sandstone and coal.								
D UT	11.00 11.00 - 11.45	80 blows					11								
D	11.50														
B D SPT (S)	12.00 - 12.50 12.00	N=25 (4,5/5,6,6,8)					12 (3.00) Dry		(6.00)						
D UT	13.00 13.00	110 blows					13								
D	13.50														
B D SPT (S)	14.00 - 14.50 14.00	N=22 (3,4/5,5,6,6)					14 (14.00) Dry								
B D UT	15.00 - 15.50 15.00	100 blows					15	Firm brown silty CLAY of intermediate plasticity.	15.00	21.46					
B D SPT (S)	16.00 - 16.50 16.00	N=39 (4,6/7,7,10,15)					16 (16.00) Dry	Dense brown silty fine to medium SAND.	16.00	20.46					
B D SPT (S)	17.00 - 17.30 17.00	N=50+ (21,4 for 15mm/39,11 for 17mm)					17 (17.00) 1.90	Grey SILTSTONE. Recovered as gravel size fragments.	17.00 (0.30)	19.46					
C	17.30 - 17.90					17.30 - 17.90 17.00 - 17.00 17.30 - 18.70 85 % Mud	Medium strong, partially weathered, light grey fine to coarse grained SANDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth and clean. 17.30 - 17.60m: Frequent randomly orientated interlocking fractures.	17.30	19.16						
C	17.60 - 17.85	100 50 50				1									
C	17.90 - 18.70						18								
C	18.30 - 18.45	100 100 91					18.30m: Weak								
C	18.70 - 19.30						18.70 - 19.14m: Frequent randomly orientated interlocking fractures.								
C	19.15 - 19.25	100 27 27				1									
C	19.30 - 20.05						19								
		100 100 100					19.30 - 20.05 10 % Mud								
						20									
Continued on next sheet															
Ground Water (m)					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)				
16.30		14.2	20		17.00	17.30	01:00	200 140	17.00 21.00	200 140	17.30 24.20				
Log last updated 24/01/2018												1. Hand dug inspection pit to 1.20m. 2. Water added between 16.50 and 17.30m.			

 		BOREHOLE RECORD				Borehole BH17						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 36.46		Scale 1:50				
						Easting: 433736.59		Northing: 559451.89				
Client: Sunderland City Council				Driller: SK/DC		Logged By: ST/BC		Sheet 3 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 01/08/2017 - 09/08/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	ROD %	FI						
C	20.05 - 21.00						20.05 - 21.00 85 % Mud					
	20.40 - 20.50		100	100	100			20.63 - 20.70m: Frequent randomly orientated interlocking fractures. AZCL.	20.70 (0.30)	15.76		
C	21.00 - 22.00		70	63	63		21 21.00 - 24.20 100 % Mud	Weak, partially weathered, light grey fine grained SANDSTONE. 21.26m: Fracture is 10 degree, planar, smooth, undulose and clean.	21.00	15.46		
	22.00 - 23.50					1	22	22.29m: Fracture is 14 degree, planar, smooth, undulose and clean.	(2.46)			
	22.50 - 22.65		100	100	100							
	23.50 - 24.70							Very weak to weak, unweathered, dark grey MUDSTONE. Coal fragments noted within mudstone. AZCL. Very weak to weak, unweathered, dark grey MUDSTONE. 23.55 - 23.87m: Coal fragment noted within mudstone.	23.46 (0.04) 23.50 (0.05) 23.55 (0.65)	13.00 12.96 12.91		
								End of Borehole at 24.20 m	24.20	12.26		
							25					
							26					
							27					
							28					
							29					
							30					
Ground Water (m)					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)	
16.30					17.00	17.30	01:00	200	17.00	200	17.30	
								140	21.00	140	24.20	
Log last updated 24/01/2018												



Borehole BH21

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
-	
Easting:	Northing:
434376.00	559521.71

Driller: PK/DC	Logged By: BC/AH
----------------	------------------

Sheet 1 of 2




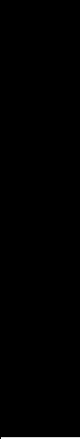
Checked By: JH



Dates:	04/09/2017 - 05/09/2017
--------	-------------------------

SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing								
D ES	0.10 0.10				1	(1.30)				
B ES	0.50 - 1.00 0.50									
BRE	0.80									
ES	1.00									
U	1.20 - 1.65	18 blows								
D	1.65				2 (1.40) Dry	(1.10)				
BRE	1.90									
B D	2.00 - 2.45 2.00									
SPT (S)	2.00 - 2.45	N=12 (1,2/2,2,4,4)								
BRE	2.50									
U	3.00 - 3.45	50 blows			3	(1.10)				
D	3.45									
BRE	3.70									
B D	4.00 - 4.40 4.00									
SPT (S)	4.00 - 4.17	N=50+ (14,11 for 30mm/30,20 for 55mm)								
BRE	4.40				4 (1.40) Dry	(1.20)				
D	4.40									
SPT (S)	4.40 - 4.50	N=50+ (15,10 for 40mm/23,24,3 for 5mm)								
	4.70 - 6.00									
C	5.60 - 5.70	100	46	34	NI	5	(0.20)			
					30					
					40					
					20					
					NI					
C	6.00 - 7.30	100	100	31	NI	6	(0.25)			
					12					
					NI					
					40					
					NI					
C	7.23 - 7.30 7.30 - 8.60	100	100	92	NI	7	(1.12)			
					NI					
					NI					
					NI					
					NI					
C	8.00 - 8.08	100	100	92	5	8	(2.15)			
					NI					
					NI					
					NI					
					NI					
C	8.60 - 9.90	100	40	26	20	9				
					10					
					30					
					20					
					NI					
C	9.67 - 9.85					10				
	9.90 - 11.40									

Continued on next sheet

Ground Water (m)					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)	
					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 updated 24/01/2018												

				BOREHOLE RECORD						Borehole BH21					
Contract No: D8044					Site: IAMP - Preliminary Ground Investigation						Scale 1:50 Easting: 434376.00 Northing: 559521.71				
Client: Sunderland City Council					Driller: PK/DC		Logged By: BC/AH		Sheet 2 of 2						
Method: Cable Percussive Drilling with Rotary Core Drilling					Checked By: JH		Dates: 04/09/2017 - 05/09/2017								
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	ROD %	FI									
C	10.95 - 11.10		100	100	80		11	9.55 - 9.75m: Subvertical undulating, smooth, clean fracture. 9.65 - 9.75m: Subvertical undulating, smooth fracture.	(2.05)						
	11.40 - 12.90					7	Very weak, partially weathered, dark grey MUDSTONE. Fractures are very closely spaced subhorizontal, undulating, smooth. 11.90 - 12.00m: Subvertical planar, smooth, clean fractures.	11.60							
			86	86	33		12		(1.30)						
							13	End of Borehole at 12.90 m	12.90						
							14								
							15								
							16								
							17								
							18								
							19								
							20								
Ground Water (m)					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.			
					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 updated 24/01/2018															

 		BOREHOLE RECORD				Borehole BH22						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 434340.89		Northing: 559600.77				
Client: Sunderland City Council				Driller: PK/DC		Logged By: AH		Sheet 1 of 2				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 01/09/2017 - 05/09/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
B D ES	0.10 - 0.40 0.10 0.10				1	MADE GROUND: Dark brown silty gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of sandstone, brick, and concrete. Cobbles of concrete noted. Rare pottery fragments noted. MADE GROUND: Dark brown, sandy, slightly gravelly clay of intermediate plasticity. Gravel is angular to subangular, fine to coarse of brick.	(0.40)					
B D ES	0.50 - 1.00 0.50 0.50					0.40						
ES	1.00					(1.00)						
U	1.20 - 1.65	28 blows				1.40						
D BRE ES	1.65 1.70 1.70				2 (1.40) Dry	Firm dark brown slightly sandy, slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subangular, fine to coarse of sandstone, mudstone and coal.						
B D SPT (S)	2.00 - 2.45 2.00 2.00 - 2.45	N=13 (2,3/3,3,3,4)										
BRE	2.50											
B UF	3.00 - 3.50 3.00 - 3.10	20 blows			3		(3.20)					
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=29 (4,4/5,5,8,11)			4 (1.40) Dry	4.00m: Stiff.						
BRE D	4.50 4.60				5 (1.40) Dry	Weak orange brown fine to coarse grained SANDSTONE with bands of orange brown very silty fine to medium sand. Recovered as sandy gravel.	4.60					
B D SPT (S)	5.00 - 5.40 5.00 5.00 - 5.25	N=50+ (8,9/18,25,7 for 25mm)				(1.20)						
BRE	5.40											
B SPT (S)	5.80 - 7.00	N=50+ (18,7 for 30mm/45,5 for 15mm)			6 (1.40) Dry	Extremely weak, partially weathered, orange brown clayey SANDSTONE.	5.80					
					100 % Mud (1.40) Dry (1.40) Dry (1.40) Dry (1.40) Dry 5.80 - 7.00 0 % Water	Very weak, unweathered, orange brown fine to coarse grained SANDSTONE, fractures are extremely closely to very closely spaced subhorizontal, undulose, smooth, clean.	(0.10)					
					100 91 83 2	5.98 - 6.12m: Subvertical undulose, rough, clean, fracture.	(0.70)					
					7	Weak, unweathered, dark grey fine to medium grained SANDSTONE, fractures are closely to medium planar, smooth, clean.	6.60					
					NI	Very weak, partially weathered dark grey fine to medium grained SANDSTONE. Fractures are subhorizontal extremely closely to very close planar, rough with orange staining.	(0.50)					
					100 66 0 15	7.20 - 7.50m: Planar rough with orange staining.	7.10					
					NI		(1.60)					
					15							
					AZC L							
					NI							
C	8.90 - 9.00	100 80 40			9	Weak, partially weathered, thinly laminated dark grey MUDSTONE. Fractures are extremely closely to very close subhorizontal planar smooth, clean	8.70					
					15	9.10 - 9.20m: Subvertical undulating, smooth, clean, fracture.						
SPT (C)	9.50 - 9.57 9.50 - 10.60	N=50+ (25 for 30mm/50 for 40mm)			10	(8.50) Dry 9.50 - 10.60 10 % Mud	(1.90)					
						9.80 - 9.90m: Subvertical planar, smooth, clean fracture.						
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m	
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)
					3.00	3.20	00:30	200	1.40	200		5.80
					3.40	3.50	00:30	140	10.40	140		10.40
					4.70	5.00	01:00			116		15.10
					5.40	5.80	01:00					
Log last updated 24/01/2018												



Borehole BH22



Scale 1:50



Easting:	Northing:
434340.89	559600.77



Sheet 2 of 2



Dates:	01/09/2017 - 05/09/2017
--------	-------------------------

Ground Water (m)					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)	
					3.00	3.20	00:30	200	1.40	200	5.80	1. Hand dug inspection pit to 1.20m
					3.40	3.50	00:30	140	10.40	140	10.40	
					4.70	5.00	01:00			116	15.10	
					5.40	5.80	01:00					
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH23						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) - Easting: 434418.27		Scale 1:50 Northing: 559446.08				
Client: Sunderland City Council				Driller: PK/DC		Logged By: AH		Sheet 1 of 2				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 05/09/2017 - 07/09/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10				1	MADE GROUND: Dark brown sandy slightly gravelly CLAY of high plasticity. Gravel is angular to subangular, fine to coarse of brick, sandstone and concrete.						
B D ES	0.50 - 1.00 0.50 0.50											
D ES U	1.00 1.00 1.20 - 1.65	40 blows										
D	1.65						MADE GROUND: Orange brown mottled grey slightly sandy clay. Sand is fine to coarse.					
D ES B D SPT (S)	1.90 1.90 2.00 - 2.50 2.00 2.00 - 2.45	N=5 (1,0/1,1,1,2)				2 (1.60) Dry	MADE GROUND: Dark brown mottled grey slightly sandy slightly gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone and coal.					
D	2.50							MADE GROUND: Very thinly laminated dark brown mottled grey slightly sandy CLAY. Sand is fine to coarse.				
D	2.70							MADE GROUND: Orange, slightly sandy, slightly gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone and dolomite.				
D U	3.00 3.00 - 3.65	40 blows				3	MADE GROUND: Dark brown sandy gravelly clay of intermediate plasticity. Gravel is angular to subangular, fine to coarse of sandstone and brick.					
D	3.40											
D	3.70											
B D SPT (S)	4.00 - 4.50 4.00 4.00 - 4.33	N=44 (22,3 for 15mm/24,9,6,5)			4 (1.60) Dry	Stiff thinly laminated, dark brown, slightly sandy, slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subangular, fine to coarse of quartz and sandstone.						
D	4.50											
D U	5.00 5.00 - 5.50	40 blows				5	5.00m: Clay of low plasticity.					
D	5.60						Extremely weak thinly laminated dark grey MUDSTONE. Recovered as subangular fine to coarse gravel					
B D SPT (S)	6.00 - 6.40 6.00 6.00 - 6.39	N=50+ (11,13 for 65mm/14,18,18 for 65mm)			6 (1.60) Dry							
D SPT (S)	6.70 6.70 - 6.94	N=50+ (14,11 for 45mm/30,20)										
C	7.30 - 7.40	100 91 0				7	6.90 - 7.90 50 % Water	Extremely weak to very weak, partially weathered, dark grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth and clean	6.91			
C	7.90 - 9.40 8.10 - 8.20	100 93 80			8	7.90 - 9.40 95 % Water						
C	8.90 - 9.00				9							
C	9.40 - 10.90 9.58 - 9.68				10	9.40 - 19.80 100 % Water						
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m	
Depth Struck (m)	Casing Depth (m)	Water Level (m)	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)		Depth (m)
6.70	1.60	5.80	20		6.40		01:00	200	1.60	200		6.91
					4.00	4.30	00:30	140	9.10	140		9.10
Log last updated 24/01/2018												

 		<h1 style="text-align: center;">BOREHOLE RECORD</h1>				<h2 style="text-align: center;">Borehole BH23</h2>						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				Scale 1:50 Easting: 434418.27 Northing: 559446.08						
Client: Sunderland City Council				Driller: PK/DC Logged By: AH		Sheet 2 of 2						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 05/09/2017 - 07/09/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %	FI						
C	10.50 - 10.60		100	93	20		11	Black COAL Very weak, partially weathered, black carbonaceous MUDSTONE. Fractures are very closely spaced, subhorizontal, planar, smooth and clean	10.26 (0.08)			
	10.90 - 12.40											
C	11.50 - 11.60		100	93	13		12	Weak, partially weathered, dark grey MUDSTONE. Fractures are closely spaced subhorizontal, planar, smooth and clean.	(1.96)			
	12.40 - 13.90											
C	12.70 - 12.80		100	93	80		13		12.30			
	13.40 - 13.50											
C	13.90 - 15.40		93	93	33		14		(4.40)			
	15.40 - 16.70											
	16.70 - 18.30		86	86	33		16					
	16.70 - 18.30		100	100	73		17	Very weak to weak, partially weathered, black carbonaceous MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth and clean	16.70			
	18.30 - 19.80						18	Medium strong, partially weathered, dark grey fine to medium grained SANDSTONE. Weak, partially weathered, dark grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth and clean.	17.90 (0.10)			
			100	100	80		19		(1.80)			
							20	End of Borehole at 19.80 m	19.80			
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m
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)	
6.70	1.60				6.40		01:00	200	1.60	200	6.91	
					4.00	4.30	00:30	140	9.10	140	9.10	
										116	19.80	
Log last updated 24/01/2018												

				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		Sheet 1 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL				Dates: 01/08/2017 - 16/08/2017				
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10					Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, limestone and mudstone.	(0.30) 0.30	35.18				
D ES B BRE	0.40 0.40 0.50 - 1.00 0.50			1		Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and limestone.	(0.90)					
UT	1.20 - 1.65	18 blows				Stiff, dark brown slightly sandy slightly gravelly silty CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone and coal.	1.20	34.28				
ES D	1.50 1.65											
BRE B D SPT (S)	1.90 2.00 - 2.45 2.00 2.00 - 2.45	N=15 (2,3/4,4,3,4)		2 (1.80) Dry								
BRE	2.50											
UT	3.00 - 3.45	22 blows		3								
D	3.45											
BRE	3.70						(4.80)					
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=7 (1,1/2,1,2,2)		4 (3.90) Dry		4.00m: Soft.						
BRE	4.50											
UT	5.00 - 5.45	28 blows		5		Occasional thinly laminated bands noted from 4.90m.						
D	5.45											
BRE D	5.70 5.80											
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=12 (1,2/2,3,3,4)		6 (5.90) Dry		Soft dark brown, silty, sandy CLAY of low plasticity. Sand is fine to coarse.	6.00 (0.30)	29.48				
BRE	6.50					Firm dark brown, silty, slightly sandy CLAY of high plasticity. Sand is fine to coarse.	6.30	29.18				
UT	7.00 - 7.45	12 blows		7								
D	7.45						(2.10)					
BRE	7.70											
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=8 (2,2/2,2,2,2)		8 (8.00) Dry		8.00m: Soft.						
BRE	8.50					Very soft dark brown silty, slightly sandy CLAY of high plasticity. Sand is fine to coarse.	8.40	27.08				
UT	9.00 - 9.45	12 blows		9								
D	9.45											
BRE	9.70											
B	10.00 - 10.45				01/08/2017 1700 (8.90) Dry 02/08/2017 0800 10 (8.90) 2.60							
					Continued on next sheet							
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m. 2. No groundwater observed.
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)	
					13.80	14.10	00:45	200	5.90	200	5.90	
					15.60	15.90	01:00	150	13.50	150	16.80	
								140	16.50	121	21.50	
Log last updated 24/01/2018												

				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		Sheet 2 of 3					
Method: Cable Percussive Drilling with Rotary Core Drilling						Checked By: BL				Dates: 01/08/2017 - 16/08/2017					
SAMPLE DETAILS										(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing													
D SPT (S)	10.00 10.00 - 10.45	N=8 (2,2/2,2,2,2)				(9.90) 9.70	Very soft dark brown silty, slightly sandy CLAY of high plasticity. Sand is fine to coarse.	(4.30)							
BRE	10.50														
D	10.70					11									
B UF	11.00 - 11.65 11.00 - 11.65	3 blows													
BRE	11.70					12(11.80) 11.70									
B D SPT (S)	12.00 - 12.45 12.00 - 12.45	N=5 (1,2/1,1,1,2)													
BRE	12.50					13 (12.90) Dry	Stiff greyish brown slightly sandy slightly gravelly CLAY of low plasticity. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	12.70	22.78						
D	12.70														
B D SPT (S)	13.00 - 13.45 13.00 - 13.45	N=33 (3,5/7,8,9,9)				14									
BRE	13.50														
B D SPT (S)	14.10 - 14.55 14.10 - 14.55	N=41 (5,5/8,10,11,12)				15									
BRE	14.60														
B D SPT (S)	15.00 - 15.45 15.00 - 15.45	N=36 (8,15/10,9,8,9)				16	Dense light grey clayey GRAVEL. Gravel is subangular to angular, fine to coarse of siltstone. (Weathered SILTSTONE).	14.50	20.98						
BRE	15.50														
D SPT (S)	15.90 15.90 - 16.20 16.00 - 17.00	N=50+ (13,12 for 50mm/20,19,11 for 25mm)				(13.50) Dry	Extremely weak, partially weathered, dark grey MUDSTONE. Fractures are extremely closely spaced, subhorizontal, planar, smooth and clean. <u>16.68 - 16.71m: Extremely weak black carbonaceous mudstone.</u>	16.25	19.23						
	16.00 - 17.00					02/08/2017 1700 (13.50) Dry 02/08/2017 1700 (13.50) Dry									
	17.00 - 18.50					17	Very weak, locally extremely weak, partially weathered, dark grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth and clean. <u>17.28 - 17.42m: Subvertical, planar, smooth clean fracture.</u> <u>17.65 - 17.75m: Orange ironstone.</u> <u>17.65 - 17.95m: Subvertical, planar, smooth, clean fracture.</u>	17.20	18.28						
						A...									
						6									
						87 87 13									
						18									
						40									
	18.50 - 20.00					19	<u>18.40 - 18.45m: Very weak, black carbonaceous mudstone.</u>	(3.40)							
C	18.95 - 19.05					10									
						40									
C	19.45 - 19.60					20									
						5									
	20.00 - 21.50					20									
										Continued on next sheet					
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m. 2. No groundwater observed.			
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)				
					13.80	14.10	00:45	200	5.90	200	5.90				
					15.60	15.90	01:00	150	13.50	150	16.80				
								140	16.50	121	21.50				
Log last updated 24/01/2018															



Borehole BH24

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
35.48	
Easting:	Northing:
433429.81	559234.30

Driller: PK/DC

Logged By: BC



Sheet 3 of 3



Checked By: BL

Dates:	01/08/2017 - 16/08/2017
--------	-------------------------

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
						40	<div>20.50 - 20.58m: 40 to 60 degree planar, smooth, clean fracture.</div> <div>Very weak to weak, partially weathered, dark grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth and clean. Occasional thin laminae of sandstone.</div> <div>Weak, partially weathered, dark grey SILTSTONE. Fractures are closely spaced, planar, smooth.</div> <div>Very weak, partially weathered, dark grey MUDSTONE. Fractures are extremely closely to very closely spaced, subhorizontal, planar and smooth.</div> <div>End of Borehole at 21.50 m</div>					
			100	100	40	12		20.60 (0.40)	14.88			
						6		21.00 (0.30)	14.48			
								21.30 (0.20)	14.18			
								21.50	13.98			
						22						
						23						
						24						
						25						
						26						
						27						
						28						
						29						
						30						

Ground Water (m)					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)	
					13.80	14.10	00:45	200	5.90	200	5.90	
					15.60	15.90	01:00	150	13.50	150	16.80	
								140	16.50	121	21.50	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH25						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 36.57		Scale 1:50				
						Easting: 433589.11		Northing: 559280.69				
Client: Sunderland City Council				Driller: PK/DC		Logged By: BC		Sheet 1 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 31/07/2017 - 15/08/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10					Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	(0.30)					
D ES B	0.40 0.40 0.50 - 1.00				1	Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone and coal.	0.30	36.27				
UT	1.20 - 1.65	18 blows				Stiff dark brown slightly sandy slightly gravelly CLAY of high plasticity. Gravel is angular, fine to coarse of sandstone, mudstone and coal.	0.90	35.67				
ES D	1.50 1.65											
BRE B D SPT (S)	1.90 2.00 - 2.45 2.00 2.00 - 2.45	N=19 (3,4/4,4,5,6)			2 (1.80) Dry		(2.50)					
BRE	2.50											
UT	3.00 - 3.45	18 blows			3	3.00m: Clay of intermediate plasticity.						
D BRE	3.45 3.70					Firm thinly laminated slightly sandy slightly gravelly CLAY of high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone and limestone.	3.40	33.17				
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=11 (2,2/2,3,3,3)			4 (3.90) Dry							
BRE	4.50											
UT	5.00 - 5.45	22 blows			5	5.00m: Clay of intermediate plasticity.						
D BRE	5.45 5.70											
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=10 (1,1/2,2,3,3)			6 (5.90) Dry							
BRE	6.50											
U	7.00 - 7.45	10 blows			7	7.00m: Clay of high plasticity.	(7.60)					
D BRE	7.45 7.70											
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=11 (2,2/2,3,3,3)			8 (7.80) Dry							
BRE	8.50											
U	9.00 - 9.45	18 blows			9							
D BRE	9.45 9.70											
B	10.00 - 10.45				10 (9.90) Dry							
Continued on next sheet												
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.	
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)
					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 updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH25						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 36.57		Scale 1:50				
						Easting: 433589.11		Northing: 559280.69				
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: 31/07/2017 - 15/08/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=8 (2,2/2,2,2,2)			11	Firm thinly laminated slightly sandy slightly gravelly CLAY of high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone and limestone.						
BRE	10.50											
B UF	11.00 - 11.65 11.00 - 11.45	2 blows				11.00	25.57					
BRE	11.70						(0.80)					
D B UF	11.90 12.00 - 12.65 12.00 - 12.45	58 blows			12	Firm, thinly laminated, dark brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	11.80	24.77				
								(0.30)				
						12.10	24.47					
BRE	12.70											
B D SPT (S)	13.00 - 13.45 13.00 - 13.45	N=33 (5,5/6,8,9,10)			13 (12.90) Dry							
BRE	13.50											
U	14.00 - 14.45	49 blows				01/08/2017 0800 (12.90) Dry 31/07/2017 1700 (12.90) Dry						
D	14.45				14	14.00m: Clay of low plasticity.						
BRE	14.70							(4.10)				
B D SPT (S)	15.00 - 15.45 15.00 - 15.45	N=41 (5,6/8,9,12,12)										
BRE	15.50				15 (13.50) Dry							
U	16.00 - 16.45	63 blows										
D	16.45											
BRE	16.70				16	Very stiff grey gravelly CLAY of intermediate plasticity. Gravel is angular to subangular, fine to coarse of mudstone. (Possible rockhead).	16.20	20.37				
								(0.90)				
B D SPT (S)	17.10 - 17.33 17.10 - 17.33 17.10 - 18.50	N=50+ (25, -1 for 30mm/26, 24 for NA, 50mm), 125, -1 for 30mm/26, 24 for 50mm)			17 (13.50) Dry 17.00 - 22.90 95 % Water (13.50) Dry 01/08/2017 1700 (13.50) Dry	Firm grey slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone.	17.10	19.47				
							Very weak to weak, partially weathered, grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, stepped, smooth and clean.	(0.23)	19.24			
								(0.86)				
					18	18.06 - 18.11m: Fractures are subhorizontal, planar, smooth with light grey siltstone gravel infill.						
							Very weak, partially weathered, dark grey black MUDSTONE. Frequent randomly orientated interlocking fractures.	18.20	18.37			
							18.20 - 18.33m: Thin laminae (less than 5mm thick) of coal noted.	(0.13)	18.24			
					19	Very weak to weak, partially weathered, grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth and clean.	18.33	18.07				
							Very weak, partially weathered thinly laminated dark grey MUDSTONE. Fractures are closely spaced subhorizontal, smooth, undulose and clean.	(0.17)				
							Very weak to weak, partially weathered, light grey MUDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth and clean.	18.50	17.71			
					20		(0.36)					
								18.86				
								(0.65)				
							19.51	17.06				
							(0.39)					
							19.90	16.67				
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
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)	
					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 updated 24/01/2018												



Borehole BH25

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
36.57	
Easting:	Northing:
433589.11	559280.69

Driller: PK/DC



Logged By: BC



Sheet 3 of 3






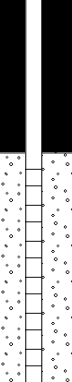
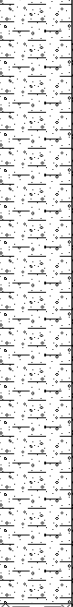

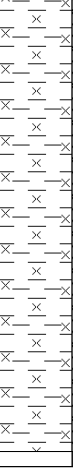







Checked By: BL















Dates:	31/07/2017 - 15/08/2017
--------	-------------------------

Ground Water (m)					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)	
					16.80	17.10	01:00	200	10.90	200	10.90	1. Hand dug inspection pit to 1.20m.
								150	12.90	150	17.10	
								140	17.00	116	22.90	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH27						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.65 Easting: 433955.67	Scale 1:50 Northing: 559279.64					
Client: Sunderland City Council				Driller: PK/DC	Logged By:	Sheet 1 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL	Dates: 24/07/2017 - 03/08/2017							
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10			MADE GROUND: Dark brown slightly sandy slightly gravelly slightly clayey topsoil. Gravel is subangular to subrounded, fine to coarse of sandstone, coal, limestone and brick. Firm, light brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.20) 0.20	35.45						
B D ES	0.50 - 1.00 0.50 0.50 0.50	HVP=26 kPa	1									
B D SPT (S)	1.20 - 1.70 1.20 1.20 - 1.65	N=12 (2,2/3,3,3,3)	(1.20) Dry									
D U	2.00 2.00 - 2.45 2.00	80 blows HVP=52 kPa	2		(3.90)							
D	2.50											
B D SPT (S)	3.00 - 3.50 3.00 3.00 - 3.45	N=15 (2,3/3,4,4,4)	3 (3.00) Dry									
D U	4.00 4.00 - 4.45	100 blows	4	Firm, thinly laminated brown slightly sandy silty CLAY. Sand is fine to coarse.	4.10	31.55						
D	4.50											
B D SPT (S)	5.00 - 5.50 5.00 5.00 - 5.45 5.00	N=14 (2,4/3,3,4,4) HVP=53 kPa	5 (5.00) Dry									
D U	6.00 6.00 - 6.45	80 blows	6									
D	6.50											
B D SPT (S)	7.00 - 7.50 7.00 7.00 - 7.45	N=14 (2,3/3,4,4,3)	7 (4.50) Dry		(6.90)							
D U	8.00 8.00 - 8.45 8.00	60 blows HVP=41 kPa	8									
D	8.50											
B D SPT (S)	9.00 - 9.50 9.00 9.00 - 9.45	N=17 (3,3/5,4,4,4)	9 (4.50) Dry									
D	10.00		10									
Continued on next sheet												
Ground Water (m)					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)	
17.20	15.00	6.1	20		17.40	17.50	01:00	200	4.50	200	4.50	
								150	15.00	150	17.40	
										116	26.00	
Log last updated 24/01/2018												

 		BOREHOLE RECORD						Borehole BH27									
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation						GL (m AOD) 35.65		Scale 1:50							
								Easting: 433955.67		Northing: 559279.64							
Client: Sunderland City Council						Driller: PK/DC		Logged By:		Sheet 2 of 3							
Method: Cable Percussive Drilling with Rotary Core Drilling						Checked By: BL		Dates:		24/07/2017 - 03/08/2017							
SAMPLE DETAILS																	
Type	Depth From-To (m)	Insitu Testing				(Casing) Groundwater	STRATA RECORD Description				Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
U	10.00 - 10.45	75 blows					Firm, thinly laminated brown slightly sandy silty CLAY. Sand is fine to coarse.										
D	10.50					24/07/2017 1700 (4.50) Dry 25/07/2017 0800 (4.50) Dry					11.00	24.65					
B D SPT (S)	11.50 - 12.00 11.50 11.50 - 11.95 11.50	N=18 (3,4/4,4,5,5) HVP=56 kPa				(11.50) Dry	Stiff, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal. Occasional thinly laminated bands noted.										
B D UF	12.50 - 13.00 12.50 12.50 - 12.95	100 blows															
B D SPT (S)	13.50 - 14.00 13.50 13.50 - 13.95	N=21 (3,4/4,5,5,7)				(13.50) Dry											
D U	14.50 14.50 - 14.95	80 blows															
D	15.00 15.00	HVP=75 kPa															
B D SPT (S)	15.50 - 16.00 15.50 15.50 - 15.95	N=24 (3,4/4,5,7,8)				(15.00) Dry											
B D UF	16.50 - 17.00 16.50 16.50 - 16.95	130 blows															
D SPT (S)	17.40 - 17.90 17.50 17.50 - 17.81 17.90 - 18.50 18.50 - 19.20 19.20 - 19.50 19.50 - 20.50	N=50+ (10,14/17,30,3 for 8mm)				02/08/2017 0800 (15.00) 1.70 25/07/2017 1800 (15.00) 6.30 (15.00) 6.30 17.90 - 19.20 50 % Water	Brown slightly gravelly SAND. Sand is fine to coarse. Gravel is subrounded to rounded, fine to coarse of sandstone and limestone. Very dense light grey sandy GRAVEL. Gravel is subangular to angular, fine to coarse of siltstone. (Weathered SILTSTONE). Very strong to extremely strong, partially weathered, light grey medium grained SANDSTONE. Fractures are subhorizontal, closely to medium spaced, rough stepped with occasional localised clay infill. Occasional subvertical, smooth stepped fractures.				17.20 (0.20) 17.40 (0.10) 17.50	18.45 18.25 18.15					
		TCR%SCR%ROD%FI				Continued on next sheet											
Ground Water (m)						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)						
17.20	15.00	6.1	20		17.40	17.50	01:00	200	4.50	200	4.50	1. Hand dug inspection pit to 1.20m. 2. Water added between 1.20 and 10.00m.					
								150	15.00	150	17.40						
										116	26.00						
Log last updated 24/01/2018																	

 		BOREHOLE RECORD				Borehole BH28						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 434207.09		Northing: 559273.51				
Client: Sunderland City Council					Driller: SK/DC		Logged By: ST		Sheet 1 of 3			
Method: Cable Percussive Drilling with Rotary Core Drilling					Checked By: BL		Dates: 27/07/2017 - 08/08/2017					
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10			1	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)						
B D ES	0.50 - 1.00 0.50 0.50				MADE GROUND: Orangish brown slightly sandy gravelly clay of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of coal, sandstone and brick.	0.50						
UT	1.20 - 1.65	60 blows		2 (1.50) Dry								
D B D SPT (S)	1.70 2.00 - 2.50 2.00 2.00 - 2.45	N=16 (3,3/3,4,4,5)				(2.50)						
D UT	3.00 3.00 - 3.45	70 blows		3	Firm brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded, fine to medium of coal and sandstone.	3.00						
B D SPT (S)	4.00 - 4.50 4.00 4.00 - 4.45	N=11 (2,3/3,2,3,3)		4 (3.00) Dry								
D UT	5.00 5.00 - 5.45	75 blows		5	5.00m: Clay of intermediate plasticity.	(4.00)						
D	5.50											
B D SPT (S)	6.00 - 6.50 6.00 6.00 - 6.45	N=14 (3,3/3,3,4,4)		6 (3.00) Dry								
D UT	7.00 7.00 - 7.45	80 blows		7	Firm thinly laminated brown silty CLAY of low plasticity, with silt partings. Light brown silt dusting on laminae surfaces.	7.00						
D	7.50			8 (3.00) Dry								
B D SPT (S)	8.00 - 8.50 8.00 8.00 - 8.45	N=18 (3,4/4,5,4,5)										
D UT	9.00 9.00 - 9.45	75 blows		9								
D	9.50											
B	10.00 - 10.50			10 (3.00) Dry		(6.00)						
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.	
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)
					14.50	14.80	01:00	200	12.00	150		14.70
								150	14.00	200		14.80
								140	14.70	116		28.85
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH28						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) -		Scale 1:50				
						Easting: 434207.09		Northing: 559273.51				
Client: Sunderland City Council					Driller: SK/DC		Logged By: ST		Sheet 2 of 3			
Method: Cable Percussive Drilling with Rotary Core Drilling					Checked By: BL		Dates: 27/07/2017 - 08/08/2017					
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=19 (3,4/5,4,5,5)			11	Firm thinly laminated brown silty CLAY of low plasticity, with silt partings. Light brown silt dusting on laminae surfaces.						
D UT	11.00 11.00 - 11.45	80 blows				5.00m: Clay of intermediate plasticity.						
D	11.50											
B D SPT (S)	12.00 - 12.50 12.00 - 12.45	N=25 (4,4/5,6,6,8)			12 (12.00) Dry							
D UT	13.00 13.00 - 13.45	90 blows			13	Very stiff reddish brown gravelly CLAY of high plasticity. Gravel is angular to subangular, fine to coarse of siltstone.	13.00					
D	13.50						(1.00)					
B D SPT (S)	14.00 - 14.50 14.00 - 14.39	N=50+ (10,11/13,15,16,6 for 15mm)			14 (12.00) Dry	Very stiff grey gravelly clay. Gravel is angular to subangular, fine to medium of siltstone. (Weathered SILTSTONE).	14.00					
D UT	14.78 - 15.30 14.80	N=50+ (21,4 for 10mm/29, 21 for 57mm)			15	Firm grey, locally mottled brown, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of mudstone lithorelics. Rare angular gravel size fragments of coal.	14.78					
C	15.20 - 15.30 15.30 - 16.45 15.50 - 15.75	100	0	0	NA	15.24						
C	16.00 - 16.10	100	92	92	1	16	15.88 - 15.97m: 40 degree, planar, smooth, undulose fracture.	(1.21)				
C	16.45 - 17.10 16.70 - 16.80	89	0	0	NA	17	Firm grey, locally mottled brown, slightly sandy slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics.	16.45				
C	17.10 - 18.60				NI	17.20	Very weak to weak, partially weathered, grey SILTSTONE. Fractures are very closely to closely spaced, subhorizontal, planar and smooth.	(0.58)				
C	18.60 - 19.35				8	18	Very weak, partially weathered, grey MUDSTONE. Frequent randomly orientated interlocking fractures.	17.78				
C	19.00 - 19.13	100	40	29	NA	19	Firm grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics.	18.60				
C	19.22 - 19.30 19.35 - 20.85				3	19	Very weak black COAL. Frequent randomly orientated interlocking fractures.	18.98				
C	19.65 - 19.80				NI	20	Medium strong, partially weathered, grey fine grained SANDSTONE. Fractures are closely spaced, subhorizontal, planar and smooth.	19.05				
							Very weak black COAL. Frequently randomly orientated interlocking fractures.	19.30				
								19.45				
TCR% SCR% ROD% FI					Continued on next sheet							
Ground Water (m)					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)	
					14.50	14.80	01:00	200	12.00	150	14.70	
								150	14.00	200	14.80	
								140	14.70	116	28.85	
Log last updated 24/01/2018												























Borehole BH28



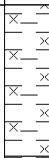
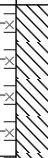
















Northing:
559273.51
















Sheet 3 of 3

Dates:	27/07/2017 - 08/08/2017
--------	-------------------------

Ground Water (m)					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)	
					14.50	14.80	01:00	200	12.00	150	14.70	
								150	14.00	200	14.80	
								140	14.70	116	28.85	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH30						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.62	Scale 1:50					
						Easting: 434010.92	Northing: 559179.86					
Client: Sunderland City Council				Driller: SK/DC	Logged By: BC	Sheet 1 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 26/07/2017 - 31/07/2017						
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10		1	MADE GROUND: Brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of coal and sandstone. Rootlets noted.	(0.35)	35.27						
D ES	0.50 0.50			MADE GROUND: Firm orangish brown slightly sandy gravelly clay. Gravel is subangular to subrounded, fine to coarse of coal, sandstone and brick.	0.35							
U	1.20 - 1.65	120 blows	2 (2.00) Dry	Firm, reddish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded, fine to medium of coal and sandstone.	(1.35)	33.92						
B D SPT (S)	2.00 - 2.50 2.00 2.00 - 2.45	N=14 (2,3/2,4,3,5)		Firm brown slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subrounded, fine to medium of coal and sandstone.	(0.30) 2.00							
D U	3.00 3.00 - 3.45	110 blows	3	3.00m: Stiff	(2.70)	33.62						
D	3.50											
B D SPT (S)	4.00 - 4.50 4.00 4.00 - 4.45	N=14 (3,3/3,4,4,3)	4 (3.00) Dry	4.00m: Firm		30.92						
D U	5.00 5.00 - 5.45	80 blows		Firm thinly laminated brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded, fine to medium of coal and sandstone.	4.70							
D	5.50		5			33.62						
B D SPT (S)	6.00 - 6.50 6.00 6.00 - 6.45	N=14 (3,4/3,4,4,3)			(3.30)							
D U	7.00 7.00 - 7.45	75 blows	6 (4.50) Dry	7.00m: Clay of intermediate plasticity.		30.92						
D	7.50											
B D SPT (S)	8.00 - 8.50 8.00 8.00 - 8.45	N=15 (3,4/3,4,3,5)	7	Firm thinly laminated brown silty slightly sandy CLAY. Sand is fine to coarse. Light brown and grey silt dustings/partings on laminae surfaces.	8.00	27.62						
D U	9.00 9.00 - 9.45	75 blows		9.00m: Soft clay of intermediate plasticity.	(3.00)							
D	9.50		8 (4.50) Dry			27.62						
B D SPT (S)	10.00 - 10.50											
B	10.00 - 10.50		10 (4.50) Dry									
Continued on next sheet												
Ground Water (m)					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)
					16.10	16.30	01:00	200	4.50	200		16.30
								140	16.00	121		28.60
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH30						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.62 Easting: 434010.92		Scale 1:50 Northing: 559179.86				
Client: Sunderland City Council				Driller: SK/DC		Logged By: BC		Sheet 2 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 26/07/2017 - 31/07/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=17 (3,3/4,4,4,5)			11	Firm thinly laminated brown silty slightly sandy CLAY. Sand is fine to coarse. Light brown and grey silt dustings/partings on laminae surfaces. <u>10.00m: Stiff.</u>	11.00	24.62				
D U	11.00 11.00 - 11.45	70 blows				Stiff thinly laminated reddish brown silty CLAY of low plasticity, with silt partings. Light brown and grey silt dustings/partings on laminae surfaces.						
D	11.50											
B D SPT (S)	12.00 - 12.50 12.00 - 12.45	N=21 (3,4/4,5,5,7)			12 (4.50) Dry							
D U	13.00 13.00 - 13.45	75 blows			13		(4.40)					
D	13.50											
B D SPT (S)	14.00 - 14.50 14.00 - 14.45	N=23 (4,5/5,5,6,7)			14 (4.50) Dry							
D UF	15.00 15.00 - 15.45	140 blows			15							
					16	Very stiff grey gravelly clay. Gravel is angular to subangular, fine to medium of mudstone and siltstone. (Weathered MUDSTONE).	15.40 (0.60)	20.22				
						Weak, grey, medium grained SANDSTONE. Recovered as sandy gravel.	16.00 (0.30)	19.62				
	16.30 - 16.90	100	40	20	NA	16.30 - 18.40 75 % Water	16.30 (0.36)	19.32				
	16.90 - 18.40				3		16.66 (0.24)	18.96				
		100	0	0		Weak to medium strong, distinctly weathered, light grey fine to medium grained SANDSTONE. <u>16.81m: Fractures are subhorizontal, planar, smooth, undulose with brown clay infill.</u>	16.90 (0.24)	18.72				
SPT (S)	18.40 - 18.45 18.40 - 18.60 18.60 - 19.10	N=50+ (25 for 25mm/50 for 30mm)			17	Soft to firm light grey slightly sandy gravelly CLAY with frequent subrounded cobbles of sandstone. Gravel is angular to subangular, fine to coarse of sandstone.						
C	19.00 - 19.10 19.10 - 20.00	72	0	0	NA	(16.30) 1.50 18.40 - 18.60 60 % Water 18.60 - 25.00 100 % Water	(2.57)					
C	19.60 - 19.75	98	0	0	NI		19.47 (0.12)	16.15				
					NA	Very weak to weak black COAL. Frequent randomly orientated interlocking fractures.	19.59 (0.21)	15.82				
	20.00 - 21.00				FI	Soft to firm light grey slightly sandy gravelly CLAY.	19.80 (0.13)	15.69				
					Continued on next sheet							
Ground Water (m)					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)	
					16.10	16.30	01:00	200	4.50	200	16.30	
								140	16.00	121	28.60	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH30									
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.62 Easting: 434010.92		Scale 1:50 Northing: 559179.86							
Client: Sunderland City Council					Driller: SK/DC		Logged By: BC		Sheet 3 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling					Checked By: BL		Dates: 26/07/2017 - 31/07/2017								
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %	FI									
C	21.00 - 21.50		100	100	86	3	21	Gravel is angular to subangular, fine to coarse of sandstone and coal. Very weak black COAL. Frequent randomly orientated interlocking fractures.	19.93	14.25					
			82	56	22	Very weak to weak, partially weathered, grey MUDSTONE. Fractures are closely medium spaced, subhorizontal planar, smooth and clean. <i>20.61m: Fracture is 30 degree, planar, smooth with grey siltstone gravel infill.</i> <i>21.00 - 21.09m: AZCL.</i>		(1.44)							
	21.50 - 22.80		86	86	75	4		22	Weak to medium strong, partially weathered, grey SILSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth with light grey staining on surface.				21.37		
			22.80 - 24.00	96	96	57			6				23		
	24.00 - 25.00		100	74	71	6		24	Very weak to weak, partially weathered, grey MUDSTONE. Fractures are closely spaced, 10-15 degree, planar, smooth and clean. <i>23.30 - 23.43m: Fractures are subvertical, planar, smooth and clean.</i> Very weak, partially weathered, dark grey to black MUDSTONE. Thin laminations of coal noted throughout. Fractures are subhorizontal, planar, smooth, clean with light grey staining on surface.					23.29	
			25.00 - 26.50	100	47	25			NI				25	Very weak dark grey to black MUDSTONE. Thin laminae of coal noted throughout. Frequent randomly orientated interlocking fractures.	
	26.05 - 26.30		100	100	65	8		26	Very weak grey MUDSTONE. Fractures are very closely spaced, subhorizontal, planar, smooth and undulose with localised light brown sandstone gravel infill. <i>26.43m: Fracture is 30 degree, planar, smooth, undulose.</i>					23.82	
			26.50 - 27.05 26.60 - 26.70	100	100	100			0				27	Weak, partially weathered, light grey SILSTONE. Fractures are closely spaced, planar, smooth and clean. <i>26.43m: Fracture is 30 degree, planar, smooth, undulose.</i> Medium strong to strong, partially weathered, light grey fine to medium SANDSTONE.	
	27.05 - 27.20 27.05 - 27.65		100	73	0	21		27	Very weak, partially weathered, light grey MUDSTONE. Fractures are very closely spaced, subhorizontal, planar, smooth, undulose.					24.19	
			27.65 - 27.95	74	46	34			6				28	Weak, partially weathered, grey SILSTONE. Fractures are subhorizontal planar, rough, clean with dark grey staining. <i>27.95 - 28.12m: AZCL.</i>	
27.95 - 28.60						28	End of Borehole at 28.60 m	(0.60)							
		28.50 - 28.60						29				7.97			
C	28.50 - 28.60						29			27.95	7.67				
									30					(0.68)	
										28.60	7.02				

Ground Water (m)					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)	
					16.10	16.30	01:00	200	4.50	200	16.30	
								140	16.00	121	28.60	

Log last updated 24/01/2018



Borehole BH31

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
35.18	
Easting:	Northing:
433642.91	559031.39



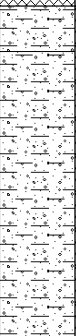
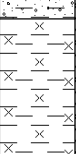
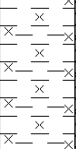
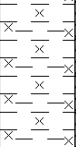
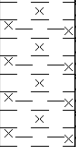
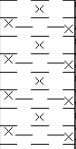
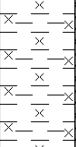


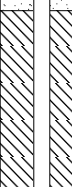
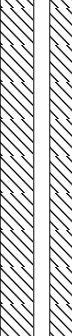
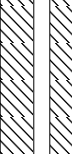
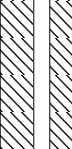
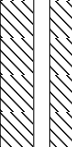
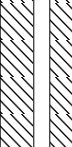
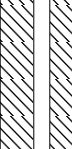
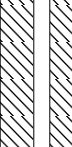

Driller: PK/DC

Logged By: ST/
BC



Sheet 1 of 3

Checked By: BL

Dates:	26/07/2017 - 11/08/2017
--------	-------------------------

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill					
Type	Depth From-To (m)	Insitu Testing											
D ES BRE D ES B D ES D ES B BRE D B UT BRE D D B BRE D ES SPT (S) BRE D	0.10 0.10 0.20 0.20 0.20 0.40 - 0.90 0.40 0.40 0.70 0.70 0.80 - 1.20 0.80 0.80 1.00 - 1.50 1.20 - 1.65 1.50 1.50 1.65 2.00 - 2.45 2.00 2.00 2.00 2.00 - 2.45 2.50 2.50	6 blows	1	(1.80) Dry	(0.50) 0.50 (1.20) 1.70 (0.30) 2.00	34.68 33.48 33.18	         	         					
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.													
MADE GROUND: Orangish brown slightly sandy gravelly clay of high plasticity. Gravel is subangular to subrounded, fine to coarse of coal, sandstone and brick.													
Firm reddish brown slightly sandy gravelly CLAY. Gravel is 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.													
26/07/2017 1700 (1.80) Dry 27/07/2017 0800 (1.80) Dry													
3.00m: Stiff													
B UT	3.00 - 3.50 3.00 - 3.45								9 blows	3	(3.10) Dry	(2.00)	
D BRE D BRE	3.45 3.50 3.50 3.70								N=5 (1,1/1,2,1,1)	4	(3.10) Dry	4.00	31.18
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45												
B BRE	4.40 - 4.90 4.50												
Soft, thinly laminated brown silty CLAY. Light brown and grey silt dustings/partings on laminae surfaces.													
5.00m: Clay of intermediate plasticity.													
BRE D UT	5.00 5.00 5.00 - 5.45	15 blows	5										
D	5.45	N=8 (1,2/1,2,2,3)	6	(3.10) Dry	(8.60)								
BRE	5.70												
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45												
BRE	6.50												
UT	7.00 - 7.45						15 blows	7					
D	7.45						N=7 (1,1/2,1,2,2)	8	(3.10) Dry	(8.60)			
BRE	7.70												
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45												
BRE	8.50												
D	8.70												
UT	9.00 - 9.45	10 blows	9										
D	9.45	10 (9.90) Dry	10	(9.90) Dry									
BRE	9.70												
B	10.00 - 10.45												

Ground Water (m)					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)	
					13.80	14.00	00:30	200	15.00	200	15.00	
					18.50	18.70	01:00	150	18.10	150	19.00	
								140	18.70	116	24.70	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH31						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.18 Easting: 433642.91		Scale 1:50 Northing: 559031.39				
Client: Sunderland City Council				Driller: PK/DC		Logged By: ST/BC		Sheet 2 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 26/07/2017 - 11/08/2017						
SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=6 (1,1/1,1,2,2)				11	Soft, thinly laminated brown silty CLAY. Light brown and grey silt dustings/partings on laminae surfaces.					
BRE	10.50											
UT	11.00 - 11.45	8 blows										
D	11.45					12 (10.90) Dry	11.00m: Clay of high plasticity.					
BRE	11.70											
B D SPT (S)	12.00 - 12.45 12.00 - 12.45	N=7 (1,1/2,1,2,2)										
BRE	12.50					13	Firm thinly laminated reddish brown silty CLAY. Light grey silty dustings/partings on laminae surfaces.	12.60	22.58			
D	12.70											
UT	13.00 - 13.45	40 blows										
D	13.45					14 (10.90) Dry	14.00m: Stiff.					
BRE	13.70											
B D SPT (S)	14.00 - 14.45 14.00 - 14.45	N=32 (9,7/7,8,8,9)										
BRE	14.50					15	15.00m: Clay of low plasticity.					
UT	15.00 - 15.45	70 blows										
D	15.45											
BRE	15.70					16						
B D SPT (S)	16.30 - 16.75 16.30 - 16.75	N=41 (5,7/8,11,11,11)										
BRE	16.80											
UT	17.00 - 17.45	80 blows				17						
D	17.45											
BRE	17.70											
D B D SPT (S)	17.90 18.00 - 18.45 18.00 - 18.40	N=50+ (7,9/11,15,15,9 for 30mm)				18 (17.90) Dry	Very stiff, grey, slightly sandy, slightly gravelly, CLAY. Gravel is angular to subangular, fine to medium of mudstone and siltstone.	17.80	17.38			
BRE	18.50											
D SPT (S)	18.70 18.70 - 18.88	N=50+ (25 for 70mm/30,20 for 35mm)										
C	19.00 - 20.30					20	Firm to stiff reddish grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of sandstone, mudstone, lithorelics.	19.00	16.18			
		19.50 - 19.75										
TCR%SCR%ROD%FI						Continued on next sheet						
Ground Water (m)						Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
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)	
					13.80	14.00	00:30	200	15.00	200	15.00	
					18.50	18.70	01:00	150	18.10	150	19.00	
								140	18.70	116	24.70	
Log last updated 24/01/2018												



Borehole BH31

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
35.18	
Easting:	Northing:
433642.91	559031.39

Driller: PK/DC	Logged By: ST/ BC
----------------	----------------------



Sheet 3 of 3



Checked By: BL

Dates:	26/07/2017 - 11/08/2017
--------	-------------------------

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
C	20.30 - 21.80						20.30 - 21.70 95 % Water	infill.	(3.57)			
	20.80 - 21.00		100	100	93	21						
C	21.75 - 21.85 21.80 - 23.20						21.70 - 23.20 95 % Water	21.59 - 21.63m: Subvertical fracture, planar, smooth, undulose with soft grey infill.				
			100	100	100	22						
C	23.20 - 24.70 23.30 - 23.45						23.20 - 24.70 95 % Water	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. 23.72 - 23.87m: Greenish grey surface staining.	23.07 (0.81)	12.11		
			100	100	100	23						
C	24.40 - 24.55							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.	23.88 (0.29) 24.17	11.30 11.01		
						24						
							11/08/2017 1700 (18.70) 2.60	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. End of Borehole at 24.70 m	24.70	10.48		
							25					
							26					
							27					
							28					
							29					
							30					

Ground Water (m)					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)	
					13.80	14.00	00:30	200	15.00	200	15.00	
					18.50	18.70	01:00	150	18.10	150	19.00	
								140	18.70	116	24.70	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH32						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 36.15	Scale 1:50					
						Easting: 433925.45	Northing: 559106.83					
Client: Sunderland City Council				Driller: PK/DC	Logged By: BC	Sheet 1 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 26/07/2017 - 04/08/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10				1	MADE GROUND: Dark brown slightly clayey, slightly gravelly sandy topsoil. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone and brick. MADE GROUND: Dark grey gravelly sand. Gravel is angular to subrounded, fine to coarse of brick, sandstone, limestone and slag. Soft light brown slightly sandy, slightly gravelly CLAY of very high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.20)					
B D ES	0.30 - 0.60 0.30 0.30						0.20	35.95				
B D ES	0.70 - 1.20 0.70 0.70				2 (1.80) Dry		(0.40)					
U	1.20 - 1.65	5 blows					0.60	35.55				
D	1.65				3							
BRE ES B D SPT (S) BRE	1.90 1.90 2.00 2.00 2.00 - 2.45 2.50	N=4 (1,1/1,1,1,1)					(2.70)					
U	3.00 - 3.45	14 blows			4 (2.90) Dry							
D BRE	3.45 3.70						3.30	32.85				
B D SPT (S) BRE	4.00 - 4.45 4.00 4.00 - 4.45 4.50	N=7 (1,1/1,2,2,2)			5							
U	5.00 - 5.45	10 blows					5.00m: Firm					
D BRE	5.45 5.70				6 (2.90) Dry							
D SPT (S) BRE	6.00 6.00 - 6.45 6.60	N=8 (1,1/2,2,2,2)					6.10	30.05				
U	7.00 - 7.45	12 blows			7							
B D SPT (S) BRE	8.00 - 8.45 8.00 8.00 - 8.45 8.50	N=8 (1,2/2,2,2,2)					7.00m: Clay of intermediate plasticity.					
U	9.00 - 9.45	10 blows			8 (2.90) Dry							
D BRE	9.45 9.70											
B	10.00 - 10.45				10 (2.90) Dry		(7.70)					
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m	
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)
13.80	13.50	13.5	20	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 updated 24/01/2018												

 		BOREHOLE RECORD				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 2 of 3			
Method: Cable Percussive Drilling with Rotary Core Drilling					Checked By: BL		Dates: 26/07/2017 - 04/08/2017					
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=6 (1,2/1,2,1,2)			11	Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and limestone. Occasional thinly laminated bands noted.						
BRE	10.50											
U	11.00 - 11.45	10 blows										
D BRE	11.45 11.70											
B D SPT (S)	12.00 - 12.45 12.00 - 12.45	N=12 (1,2/2,3,3,4)			12 (2.90) Dry							
BRE	12.50											
U	13.00 - 13.45	10 blows			13							
D BRE	13.45 13.70											
B D SPT (S)	14.00 - 14.45 14.00 - 14.45	N=16 (3,3/3,4,4,5)										
BRE	14.50											
U	15.00 - 15.45	50 blows			14 (2.90) Dry	Brown gravelly SAND. Gravel is subangular to rounded, fine to coarse of sandstone and limestone. Stiff greyish brown slightly sandy, slightly gravelly CLAY of low plasticity. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone and coal.	13.80 (0.10) 13.90	22.35 22.25				
D BRE	15.45 15.70											
B D SPT (S)	16.00 - 16.45 16.00 - 16.45	N=48 (5,5/7,9,10,22)										
BRE	16.50											
D SPT (S)	17.00 - 17.19	N=50+ (18,7 for 30mm/45,5 for 8mm)			15		(2.45)					
C	17.60 - 17.70	100	83	60							8	
C	17.90 - 19.30										NI	
C	18.40 - 18.50	100	94	44							9	
	19.30 - 20.80				10	16 (15.90) Dry	16.35	19.80				
					NI							
					8							
					19							
					50	17 (16.90) Dry	(0.95)					
					10							
					50							
					20							
						17.30 - 19.30 90 % Water	17.30	18.85				
						19.30 - 20.80 100 % Water	19.32	16.83				
							19.82 (0.15) 19.97	16.33 16.18				
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m
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)	
13.80	13.50	13.5	20	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 updated 24/01/2018												



**Borehole
BH32**

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
36.15	
Easting:	Northing:
433925.45	559106.83


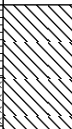



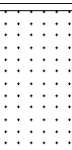



Driller: PK/DC

Logged By: BC



Sheet 3 of 3



Checked By: BL





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























SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill						
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI												
C	20.50 - 20.70		99	99	72	11	20.80 - 23.40 80 % Water	Occasional subhorizontal, very closely to closely spaced, rough undulating with localised clay infill.	(0.51)	15.67								
			6	Highly weathered from 19.60m. Very weak to weak black COAL.	20.48													
	20.80 - 22.20		7	100	86	64		21	Extremely weak to very weak, partially weathered, dark grey MUDSTONE. Fractures are subhorizontal, very closely to closely spaced, rough undulating with localised clay infill.				(0.32)					
			NI						Occasional subhorizontal, very closely to closely spaced, rough undulating with localised clay infill.				20.80					
			6						Weak to medium strong, partially weathered, light grey SILTSTONE. Fractures are subhorizontal, closely to medium spaced, rough undulating with localised clay infill.				(0.88)					
C	22.00 - 22.20	50	100	89	89	22	Medium strong to strong, partially weathered, grey MUDSTONE.	21.68	14.47									
	5	Medium strong to strong, partially weathered, grey MUDSTONE.					(0.26)											
C	22.20 - 22.50	NI					Very weak to weak black COAL.	21.94	14.21									
C	22.20 - 23.40	NI					100	89	89			23	Medium strong to strong, partially weathered, grey MUDSTONE. Fractures are subhorizontal, very closely to closely spaced, rough undulating, clean.	(1.76)	12.45			
C	23.00 - 23.10 23.05	7											24	Strong to very strong, partially weathered, grey fine grained SANDSTONE. Fractures are subhorizontal, closely to medium spaced, rough, undulating.				23.70
		NI	(1.05)															
C	23.40 - 24.90	12	100	93	85	25				Medium strong to strong, partially weathered, grey MUDSTONE. Fractures are subhorizontal, very closely to closely spaced, rough undulating, clean. Occasional subvertical closely to medium spaced, smooth stepped with local clay infill.	24.75		11.40					
		5																
	6	27																
	C	24.90 - 26.40	6	100	94	75	28											
			NI										29					
	25.70 - 25.80	0				30												



Ground Water (m)					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)	
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 updated 24/01/2018												





 		BOREHOLE RECORD				Borehole BH35						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 34.46 Easting: 433863.41	Scale 1:50 Northing: 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			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.20			MADE GROUND: Slightly sandy slightly gravelly, clayey topsoil with some rootlets present. Gravel is angular to subrounded, fine to coarse of coal and sandstone.	(0.50)							
B BRE D ES B U	0.60 - 1.00 0.60 0.60 0.60 1.00 - 10.45 1.20 - 1.65	15 blows	1	MADE GROUND: Orangeish brown locally grey slightly sandy, slightly gravelly clay of intermediate plasticity. Gravel is subangular to subrounded, fine to medium of coal and sandstone.	0.50 (1.15)	33.96						
D BRE ES B D SPT (S) BRE	1.65 1.90 1.90 2.00 - 2.45 2.00 2.00 - 2.45 2.50	N=16 (2,3/3,4,4,5)	2 (1.80) Dry	Stiff brown slightly sandy gravelly CLAY of intermediate plasticity. Gravel is angular to subrounded, fine to coarse of coal and sandstone.	1.65 (1.80)	32.81						
U	3.00 - 3.45	17 blows	3									
D BRE B D SPT (S) BRE	3.45 3.70 4.00 4.00 4.00 - 4.45 4.50	N=10 (2,1/2,2,3,3)	4 (3.10) Dry	Firm laminated brown, slightly sandy, slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to medium of coal and sandstone.	3.45 (2.55)	31.01						
U	5.00 - 5.45	12 blows	5									
D BRE B D SPT (S) BRE	5.45 5.70 6.00 - 6.45 6.00 6.00 - 6.45 6.50	N=5 (1,2/1,1,2,1)	6 (3.10) Dry	Soft laminated brown silty slightly gravelly CLAY with occasional gravel bands. Gravel is subangular, fine of coal and sandstone.	6.00	28.46						
U	7.00 - 7.45	13 blows	7	7.00m: Clay of high plasticity.								
D BRE B D SPT (S) BRE	7.45 7.70 8.00 - 8.45 8.00 8.00 - 8.45 8.50	N=6 (1,1/2,1,1,2)	8 (7.80) Dry									
U	9.00 - 9.45	12 blows	9									
D BRE	9.45 9.70				(6.70)							
D	10.00		10 (9.90) Dry									
Continued on next sheet												
Ground Water (m)					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)	
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 updated 24/01/2018												























 		BOREHOLE RECORD				Borehole BH35						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 34.46 Easting: 433863.41		Scale 1:50 Northing: 558923.32				
Client: Sunderland City Council				Driller: PK/DC		Logged By: ST		Sheet 2 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 19/07/2017 - 21/07/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
SPT (S)	10.00 - 10.45	N=6 (1,2/1,2,2,1)			11	Soft laminated brown silty slightly gravelly CLAY with occasional gravel bands. Gravel is subangular, fine of coal and sandstone.						
BRE	10.50											
U	11.00 - 11.45	12 blows										
D	11.45											
BRE	11.70				12 (11.90) Dry							
B	12.00 - 12.45											
D	12.00											
SPT (S)	12.00 - 12.45	N=7 (1,2/2,1,2,2)										
BRE	12.70				13	Stiff brown slightly sandy gravelly CLAY. Gravel is angular to subrounded, fine to coarse of coal and sandstone.	12.70	21.76				
D	12.80											
U	13.00 - 13.45	60 blows										
D	13.45											
BRE	13.70				14 (13.90) Dry							
B	14.00 - 14.45											
D	14.00											
SPT (S)	14.00 - 14.45	N=33 (5,5/7,7,8,11)										
BRE	14.50				15							
U	15.00 - 15.45	70 blows										
D	15.45											
BRE	15.70											
B	16.00 - 16.36				16 (15.90) Dry							
D	16.00											
SPT (S)	16.00 - 16.36	N=50+ (7,12/13,14,23 for 60mm)										
BRE	16.50											
B	16.70 - 17.04				17							
D	16.70											
SPT (S)	16.70 - 17.04	N=50+ (9,11/16,19,15 for 35mm)										
BRE	17.20											
D	17.80				18 (17.80) Dry	Reddish brown weathered SILTSTONE. Recovered as gravel.	17.70	16.76				
B	18.00 - 18.34											
D	18.00											
SPT (S)	18.00 - 18.34	N=50+ (9,12/14,18,18 for 40mm)										
BRE	18.50				19							
B	18.90											
SPT (S)	18.90 - 18.96											
D	18.90											
C	19.00 - 19.20				20	Medium strong, partially weathered, reddish brown fine to medium grained SANDSTONE. Fractures are very closely spaced, undulose, rough with localised clay infill.	18.96	15.50				
	19.40 - 20.90											
					Continued on next sheet							
Ground Water (m)					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)	
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 updated 24/01/2018												



				BOREHOLE RECORD										Borehole BH35				
Contract No: D8044					Site: IAMP - Preliminary Ground Investigation										GL (m AOD) 34.46 Easting: 433863.41 Scale 1:50 Northing: 558923.32			
Client: Sunderland City Council										Driller: PK/DC		Logged By: ST		Sheet 3 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling										Checked By: BL		Dates: 19/07/2017 - 21/07/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill						
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	ROD %	FI												
C	20.90 - 22.40		100	100	55		21	Medium strong, partially weathered, yellowish brown medium to coarse grained SANDSTONE	20.52	13.94								
						7												
C	22.40 - 22.60 22.40 - 23.90		100	93	72		22		(3.38)									
						5												
C	23.30 - 23.75		100	100	62		23											
						6												
							24	End of Borehole at 23.90 m	23.90	10.56								
							25											
							26											
							27											
							28											
							29											
							30											
Ground Water (m)					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.						
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 updated 24/01/2018																		




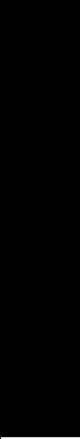


 		BOREHOLE RECORD				Borehole BH36				
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.96 Easting: 434057.88 Northing: 559025.36 Scale 1:50				
Client: Sunderland City Council				Driller: RL/DC	Logged By: ST/BC	Sheet 1 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 21/07/2017 - 24/07/2017				
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing								
ES	0.20		1	MADE GROUND: Brown slightly sandy, slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of coal, sandstone and brick. Rootlets noted.	(0.50)	35.46				
ES	0.50			MADE GROUND: Orangeish brown locally grey gravelly clay. Gravel is angular to subrounded, fine to medium of coal, sandstone and brick.	0.50 (0.50)					
U	1.20 - 1.65	32 blows		Firm brown slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of coal and sandstone.	1.00					
B	2.00		2		(2.00)	34.96				
D	2.20									
SPT (S)	2.20 - 2.65	N=11 (2,2/2,3,3,3)								
B	3.00		3	Firm brown slightly sandy, slightly gravelly CLAY, with occasional gravel bands. Gravel is subangular to subrounded, fine of coal and sandstone.	3.00	32.96				
U	3.20 - 3.65	45 blows		3.20m: Clay of intermediate plasticity.						
D	3.70									
D	4.20 - 4.65		4							
SPT (S)	4.20 - 4.65	N=15 (3,3/4,3,4,4)								
B	5.00		5							
U	5.20 - 5.65	45 blows		5.20m: Clay of high plasticity.						
D	5.65									
D	6.50 - 6.95		6							
SPT (S)	6.50 - 6.95	N=13 (4,3/4,3,3,3)								
B	7.00 - 7.50		7							
U	8.00 - 8.45	55 blows	8	8.00m: Clay of low plasticity.						
D	8.50									
D	9.50		9							
SPT (S)	9.50 - 9.95	N=14 (4,4/4,3,4,3)								
B	10.00 - 10.50		10							
Ground Water (m)				Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	
					17.00	17.20	01:30	200	7.50	
								140	16.80	
								150	17.20	
Log last updated 24/01/2018										













 		BOREHOLE RECORD				Borehole BH36		
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.96 Easting: 434057.88	Scale 1:50 Northing: 559025.36	
Client: Sunderland City Council				Driller: RL/DC	Logged By: ST/BC	Sheet 2 of 3		
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 21/07/2017 - 24/07/2017		
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
U	11.00 - 11.45	42 blows	11	Firm brown slightly sandy, slightly gravelly CLAY, with occasional gravel bands. Gravel is subangular to subrounded, fine of coal and sandstone.				
D	11.50			11.00m: Clay of high plasticity.				
SPT (S)	12.50 - 12.95	N=27 (5,6/6,7,7,7)	12					
D B	12.95 13.00 - 13.50			12.50m: Stiff				
UF	14.00 - 14.45	65 blows	14					
B D	14.50 - 16.00 14.50			Grey weathered MUDSTONE. Recovered as a gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone.	14.25	21.71		
D SPT (S)	15.50 15.50 - 15.95	N=45 (7,9/9,12,12,12)	15		(2.55)			
D	16.00 16.30 - 18.00							
D SPT (S)	16.30 - 18.00 17.00 17.00 - 17.18	N=50+ (10,15/50 for 27mm)	17	Medium strong to strong, partially weathered, light grey SILTSTONE. Fractures are subhorizontal, closely to medium spaced, smooth stepped with occasional clay infill. Occasional subvertical, medium spaced, rough, undulating fractures.	16.80 (0.82)	19.16		
D SPT (S)	17.20 17.20 - 17.25 18.00 - 19.30	N=50+ (25 for 35mm/50 for 15mm)		Very weak to weak black COAL. Weak to medium strong, partially weathered, grey SILTSTONE. Fractures are subhorizontal, closely to medium spaced, smooth stepped, clean.	17.62 (0.12) 17.74 (0.59)	18.34 18.22		
			18	Medium strong to strong, partially weathered, light grey SILTSTONE. Fractures are subhorizontal, closely to medium spaced, rough undulating.	18.33	17.63		
			19					
			20	Medium strong to strong, partially weathered, dark grey MUDSTONE. Fractures are subhorizontal, very closely to closely spaced, rough, undulating, clean.	19.42 (0.66)	16.54		
				19.42 - 21.06m: Organic matter noted.				
Ground Water (m)			Chiselling / Hard Strata		Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)
					17.00	17.20	01:30	200
								140
								150
Log last updated 24/01/2018				General Remarks				
				1. Hand dug inspection pit to 1.20m.				



				BOREHOLE RECORD										Borehole BH36				
Contract No: D8044					Site: IAMP - Preliminary Ground Investigation										GL (m AOD) 35.96 Easting: 434057.88 Scale 1:50 Northing: 559025.36			
Client: Sunderland City Council										Driller: RL/DC		Logged By: ST/BC		Sheet 3 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling										Checked By: BL		Dates: 21/07/2017 - 24/07/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill						
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	ROD %	FI												
C	20.80 - 22.00		100	97	87	7	21	Medium strong to strong, partially weathered, light grey SILTSTONE. Fractures are subhorizontal, closely to medium spaced, smooth stepped, clean.	20.08	15.88								
	21.52 - 21.62		100	97	79	4		Strong to very strong, partially weathered, light grey SILTSTONE. Fractures are subhorizontal, closely to medium spaced, rough stepped, partly open to open, clean. Occasional subvertical, smooth stepped, fractures	21.06	14.90								
								2224/07/2017 1700 (16.80)	End of Borehole at 22.00 m	22.00			13.96					
							23											
							24											
							25											
							26											
							27											
							28											
							29											
							30											
Ground Water (m)					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.						
					17.00	17.20	01:30	200	7.50	200	7.50							
								140	16.80	150	17.20							
								150	17.20	140	22.00							
Log last updated 24/01/2018																		

				BOREHOLE RECORD				Borehole BH37				
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 33.86		Scale 1:50		
								Easting: 433894.58		Northing: 558838.05		
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: 21/07/2017 - 26/07/2017				
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10				1	MADE GROUND: Dark brown, slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, limestone, brick and coal. Firm, light brown, slightly sandy, slightly gravelly CLAY of intermediate plasticity. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and coal.	(0.40)	33.46				
B D ES	0.50 - 1.00 0.50 0.50 0.50	HVP=51 kPa										
U	1.20 - 1.65	15 blows			2 (1.80) Dry		(2.40)	31.06				
D BRE B D SPT (S)	1.65 1.90 2.00 - 2.45 2.00 2.00 - 2.45	N=14 (3,4/3,3,4,4)										
BRE	2.50				3	Soft, greyish brown, silty CLAY of intermediate plasticity. Occasional thinly laminated silt bands noted.	2.80					
D U	2.90 2.90 3.00 - 3.45	HVP=21 kPa 16 blows										
D BRE	3.45 3.70				4 (3.10) Dry							
B D SPT (S)	4.00 - 4.45 4.00 4.00 - 4.45	N=6 (1,2/1,2,1,2)										
BRE	4.50				5							
U	5.00 - 5.45	14 blows										
D BRE	5.45 5.70				6 (3.10) Dry							
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45	N=6 (1,1/2,1,1,2)										
BRE	6.50				7							
U	7.00 - 7.45	12 blows										
D BRE	7.45 7.70				8 (3.10) Dry	7.00m: Firm						
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45	N=7 (1,1/2,1,2,2)										
BRE	8.50				9	8.00m: Sof						
U	9.00 - 9.45	10 blows										
D BRE	9.45 9.70				10 (3.10) Dry							
D B	9.90 10.00 - 10.45											
					Continued on next sheet							
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. 3. CP section terminated at 12.00m on cobble/ boulder obstruction.
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)	
					11.70	12.00	01:00	200	12.00	200	12.00	
					12.00	12.20	01:00	140	15.00	140	22.90	
Log last updated 24/01/2018												

				BOREHOLE RECORD						Borehole BH37		
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation						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 2 of 3		
Method: Cable Percussive Drilling with Rotary Core Drilling						Checked By: BL		Dates: 21/07/2017 - 26/07/2017				
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45 10.00	N=19 (2,3/4,4,5,6) HVP=30 kPa			11	Stiff, brownish grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and limestone.	(2.10)					
BRE	10.50											
U	11.00	70 blows										
D BRE	11.45 11.70											
D SPT (S)	12.00 12.00 - 12.45 12.00 - 13.10	N=28 (4,6/7,7,6,8) (4,6/7,7,6,8)			12 (3.10) Dry (3.10) Dry 12.00 - 17.10 100 % Water	Stiff dark brown slightly sandy slightly gravelly CLAY with frequent cobbles. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, siltstone and coal. Cobbles are of sandstone.	12.00	21.86				
SPT (S)	13.10 - 13.55 13.10 - 14.10	N=29 (4,5/5,7,8,9)			13 (12.00) 0.00							
SPT (S)	14.10 - 14.55 14.10 - 14.90	N=50+ (4,6/8,17,21,4)			14 (12.00) 0.00							
SPT (S)	14.90 - 15.18 14.90 - 16.10	N=50+ (5,6/12,38 for 50mm)			15 (12.00) 0.00							
C SPT (S)	16.00 - 16.10 16.10 - 16.27 16.10 - 16.50 16.50 - 17.10	N=50+ (5,20 for 45mm/50 for 50mm)			N/A	(6.70)						
SPT (S)	17.10 - 17.22 17.10 - 17.30 17.30 - 17.50 17.50 - 19.00	N=50+ (15,10 for 10mm/50 for 30mm)			16 (15.00) 0.00							
					17 (15.00) 0.00 17.10 - 17.50 80 % Water 17.50 - 22.90 100 % Water							
					18							
C	19.00 - 19.80 19.20 - 19.40 19.80 - 21.30				19 20	Strong to very strong, partially weathered, yellowish brown fine grained SANDSTONE. Fractures are subhorizontal, closely to medium spaced, smooth undulating, clean.	18.70	15.16				
TCR%SCR%ROD%FI					Continued on next sheet							
Ground Water (m)					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)	
					11.70	12.00	01:00	200	12.00	200	12.00	
					12.00	12.20	01:00	140	15.00	140	22.90	
Log last updated 24/01/2018												

				BOREHOLE RECORD										Borehole BH37				
Contract No: D8044					Site: IAMP - Preliminary Ground Investigation										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 3 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling										Checked By: BL		Dates: 21/07/2017 - 26/07/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill						
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	ROD %	FI												
C	20.66 - 20.89		100	100	60	3	21		(4.20)	10.96								
C	20.90 - 21.30																	
C	21.30 - 21.54																	
C	21.30 - 22.80																	
C	21.50 - 21.70																	
C	21.70 - 21.85		100	100	36	7	22	End of Borehole at 22.90 m	22.90	10.96								
							23											
							24											
							25											
							26											
							27											
							28											
							29											
							30											
Ground Water (m)					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)							
					11.70 12.00	12.00 12.20	01:00 01:00	200 140	12.00 15.00	200 140	12.00 22.90							
Log last updated 24/01/2018																		

				BOREHOLE RECORD				Borehole BH38				
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.74		Scale 1:50		
								Easting: 433694.57		Northing: 558749.55		
Client: Sunderland City Council						Driller: PK/DC		Logged By: BC		Sheet 1 of 3		
Method: Cable Percussive Drilling with Rotary Core Drilling						Checked By: JH		Dates:		10/08/2017 - 11/08/2017		
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES D ES B BRE	0.10 0.10 0.30 0.40 0.40 0.50 - 1.00 0.50	HVP=70 kPa		1	MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, brick and coal. Stiff, 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.	(0.30) 0.30	35.44					
U	1.20 - 1.65	22 blows										
D BRE B D SPT (S) BRE	1.65 1.90 2.00 - 2.45 2.00 2.00 - 2.45 2.50	N=13 (2,3/3,3,3,4)		2 (1.60) Dry	2.00m: Firm	(2.50)	32.94					
D UT	2.90 3.00 - 3.45	29 blows		3	Soft, thinly laminated, greyish brown, silty, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	2.80 (0.80)						
D BRE	3.45 3.70			4 (1.60) Dry	Soft greyish brown slightly sandy slightly clayey SILT. Soft, thinly laminated greyish brown sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	3.60 (0.30) 3.90	32.14					
D B D SPT (S) BRE	3.90 4.00 - 4.45 4.00 4.00 - 4.45 4.50	N=7 (1,1/2,2,1,2)				5	5.00m: Firm			(4.80)	31.84	
UT	5.00 - 5.45	12 blows		6 (1.60) Dry			27.04					
D BRE	5.45 5.70			7								
B D SPT (S) BRE	6.00 - 6.45 6.00 6.00 - 6.45 6.50	N=10 (1,2/2,2,3,3)		8 (1.60) Dry			8.70					
UT	7.00 - 7.45	12 blows		9	Stiff, brownish grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, limestone, siltstone and coal. 9.00m: Clay of low plasticity.	8.70						
D BRE	7.45 7.70			10 (9.10) Dry								
B D SPT (S) BRE	8.20 - 8.65 8.20 8.20 - 8.65 8.70	N=16 (2,2/3,3,4,6)										
U	9.00 - 9.45	42 blows										
D BRE	9.45 9.70											
B	10.00 - 10.45											
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.	
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)
					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
Log last updated 24/01/2018												

				BOREHOLE RECORD				Borehole BH38				
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.74		Scale 1:50		
								Easting: 433694.57		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				
SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=34 (4,5/6,8,9,11)				11	Stiff, brownish grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, limestone, siltstone and coal.	(6.00)				
BRE	10.50											
U	11.00 - 11.45	59 blows				10/08/2017 1700 (9.10) Dry 11/08/2017 0800 (9.10) Dry (11.90) Dry						
D BRE	11.45 11.70											
B D SPT (S)	12.00 - 12.45 12.00 12.00 - 12.41	N=49 (19,6 for 35mm/9,10,15,15)				12						
BRE	12.50											
U	13.00 - 13.45	52 blows				13						
D BRE	13.45 13.70											
B D SPT (S)	14.00 - 14.45 14.00 14.00 - 14.30	N=50+ (5,7/10,40 for 70mm)				14 (12.10) Dry						
BRE	14.50 14.65 - 16.15 14.80											
B D SPT (S)	15.00 - 15.50 15.00 15.00 - 15.32	N=50+ (8,11/14,26,10 for 25mm)				15 (12.10) Dry	Very dense light grey, slightly clayey, slightly sandy, GRAVEL. Gravel is angular to subangular, fine to coarse of mudstone (Weathered MUDSTONE).	14.70	21.04			
BRE	15.70 15.70 - 15.90											
D B D SPT (S)	14.65 - 16.15 14.80 15.00 - 15.50 15.00 - 15.32	N=50+ (8,11/14,26,10 for 25mm)	100	70	0	20	11/08/2017 1700 (12.10) Dry 15.70 - 15.90 90 % Water 11/08/2017 1700 (12.10) Dry	Extremely weak, partially weathered, dark red brown MUDSTONE. Fractures are very closely spaced subhorizontal, planar, smooth, clean. 15.90 - 16.15m: Subvertical planar, smooth, clean fracture Stiff dark reddish brown gravelly CLAY. Gravel is is angular to subangular, fine to coarse of sandstone. Extremely weak, partially weathered, dark red brown MUDSTONE. Fractures are extremely closely to very closely spaced subhorizontal, planar, smooth, clean. 17.30 - 17.45m: Subvertical planar, smooth, clean fracture.	15.85 (0.30)	19.89		
D SPT (S)	15.70 15.70 - 15.90 16.15 - 17.45											
D SPT (S)	17.45 - 18.95	N=50+ (8,11/14,26,10 for 25mm)	100	100	0	40		16.45	19.29			
C	18.35 - 18.55											N=50+ (9,16 for 35mm/42,8 for 15mm)
C	18.65 - 18.95	N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
	18.95 - 20.35											N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm/42,8 for 15mm)
		N=50+ (9,16 for 35mm/42,8 for 15mm)	100	100	0	40						
												N=50+ (9,16 for 35mm



Borehole BH38

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
35.74	
Easting:	Northing:
433694.57	558749.55

Driller: PK/DC

Logged By: BC

Sheet 3 of 3

Checked By: JH

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

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
C	20.35 - 21.60		100	100	82	20	subhorizontal, planar, smooth. <div>19.95 - 20.05m: Subvertical planar, smooth, clean fracture.</div> <div>20.45 - 20.50m: Subvertical planar, smooth fracture.</div>	(2.00)				
	20.75 - 21.05					6						
C	21.45 - 21.60					21	21.35 - 21.55m: Subvertical undulating, smooth, clean fractures.	21.60	14.14			
						22	End of Borehole at 21.60 m					
						23						
						24						
						25						
						26						
						27						
						28						
						29						
						30						

Ground Water (m)					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.
					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	
Log last updated 24/01/2018												



Borehole BH39

Contract No: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	
------------	--

Scale 1:50

37.84

Northing:

Easting:
433520.01

Northing:
558654.45

Client: Sunderland City Council

Driller: PK/DC

Logged By: BC



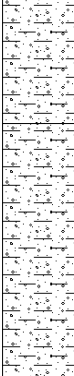

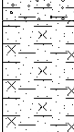

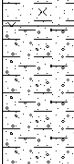

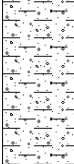

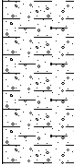

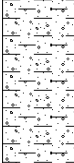

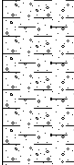
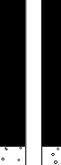
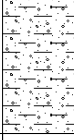
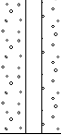
Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: JH



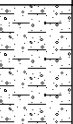
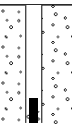
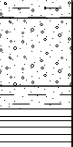
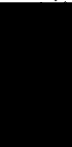
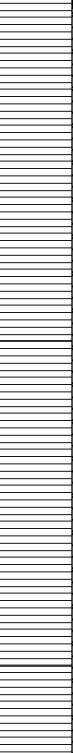



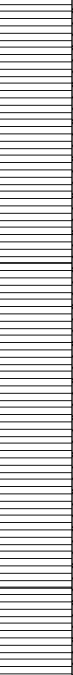





Dates:	11/08/2017 - 24/08/2017
--------	-------------------------

SAMPLE DETAILS

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES B D ES	0.20 0.20 0.20 0.50 - 1.20 0.50 0.50 0.70	HVP=24 kPa HVP=67 kPa	1	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	(0.30) 0.30	37.54		
BRE D D UT	1.00 1.00 1.20 1.20 - 1.65	22 blows		Firm light brown slightly sandy slightly gravelly CLAY of very high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.90)			
D BRE B D SPT (S)	1.65 1.90 2.00 - 2.45 2.00 2.00 - 2.45	N=10 (1,2/2,2,3,3)	2	Firm brown mottled dark grey, slightly sandy slightly gravelly CLAY of high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	1.20	36.64		
BRE	2.50							
UT	3.00 - 3.30	23 blows	3	11/08/2017 1700 (1.60) Dry 23/08/2017 0800 (1.60) Dry	3.00	34.84		
D B BRE	3.35 3.40 - 3.90 3.50			Firm greyish brown silty, slightly sandy CLAY of intermediate plasticity.	(0.90)			
D B D SPT (S)	3.90 4.00 - 4.50 4.00 4.00 - 4.45	N=16 (3,3/4,4,3,5)	4	(3.90) Dry	3.90	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							
UT	7.00 - 7.45	80 blows	7					
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	9.00 - 9.30	100 blows	9	9.00m: Clay of intermediate plasticity.				
D BRE	9.35 9.70							
B	10.00 - 10.50		10	(9.90) Dry				

Continued on next sheet

Ground Water (m)					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)	
					9.90	10.10	00:30	200	10.50	200	11.35	
					11.00	11.30	01:00	140	13.00	140	13.00	
										116	16.75	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH39						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 37.84 Easting: 433520.01 Scale 1:50 Northing: 558654.45						
Client: Sunderland City Council				Driller: PK/DC	Logged By: BC	Sheet 2 of 2						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 11/08/2017 - 24/08/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.45	N=26 (10,12/5,6,6,9)			11 (10.50) Dry	Stiff, greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone, siltstone and coal.	10.90 (0.45)	26.94				
BRE	10.70					10.70m: Firm.						
D B	10.90 11.00 - 11.30				12 (10.50) Dry	Very dense reddish brown sandy GRAVEL. Gravel is angular to subangular, fine to coarse of mudstone. (Weathered MUDSTONE).	11.35 (0.15)	26.49 26.34				
D SPT (S) BRE	11.00 11.00 - 11.32 11.25	N=50+ (4,10/15,24,11 for 20mm)				11.50 - 16.75 100 % Water						
D SPT (S) C	11.30 11.30 - 11.44 11.70 - 11.85	N=50+ (25 for 70mm/50 for 70mm)			13	Brown gravelly sandy CLAY. (Weathered mudstone). Very weak to weak, partially weathered, reddish brown sandy MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean.	14.00	23.84				
						11.68 - 11.75m: Subvertical planar, smooth, clean fracture. 12.05 - 12.40m: Subvertical undulating, rough, clean fracture						
C	12.60 - 12.75				14	13.28 - 13.36m: Firm red brown sandy gravel.	16.15 (0.60)	21.69				
						13.50 - 13.56m: Extremely closely spaced subhorizontal planar, smooth, clean fracture. 13.75 - 13.85m: Subvertical undulating, smooth, clean fracture.						
C	13.00 - 13.70				15	Very weak to weak, partially weathered, dark reddish brown MUDSTONE. Fractures are subhorizontal, closely spaced, planar, smooth, clean.	16.75	21.09				
						End of Borehole at 16.75 m						
C	13.60 - 13.75 13.70 - 15.25				16	Extremely weak to very weak, partially weathered, dark grey MUDSTONE. Fractures are extremely closely to very closely spaced subhorizontal, planar, smooth, clean.	17					
C	13.95 - 14.25											
C	14.60 - 14.75				17		18					
C	15.25 - 16.75 15.40 - 15.60				18		19					
					19		20					
					20							
TCR% SCR% ROD% FI												
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
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)	
					9.90	10.10	00:30	200	10.50	200	11.35	
					11.00	11.30	01:00	140	13.00	140	13.00	
										116	16.75	
Log last updated 24/01/2018												



Borehole BH40

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
38.97	
Easting:	Northing:
433340.02	558582.52

Driller: RH/DC

Logged By: BC

Sheet 1 of 2

Checked By: JH

Dates:	25/08/2017 - 04/09/2017
--------	-------------------------

[illegible]

Ground Water (m)					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)	
					6.00	6.20	01:00	200	3.00	116	6.30	
								140	7.50	200	6.30	
										116	11.85	
Log last updated 24/01/2018												



Borehole BH40

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
38.97	
Easting:	Northing:
433340.02	558582.52

Driller: RH/DC

Logged By: BC



Sheet 2 of 2



















Checked By: JH



Dates:	25/08/2017 - 04/09/2017
--------	-------------------------

[illegible]

Ground Water (m)					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.
					6.00	6.20	01:00	200	3.00	116	6.30	
								140	7.50	200	6.30	
										116	11.85	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH45						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.63		Scale 1:50				
						Easting: 433350.81		Northing: 559060.39				
Client: Sunderland City Council				Driller: PK/DC		Logged By: BC		Sheet 1 of 2				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: BL		Dates: 02/08/2017 - 17/08/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES D B	0.10 0.10 0.30 0.50 - 1.00					Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, limestone, mudstone and coal.	(0.25) 0.25	35.38				
B UF	1.20 - 1.65 1.20 - 1.65	49 blows	1	(1.60) Dry		Firm brown slightly sandy slightly gravelly CLAY of high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.95) 1.20	34.43				
BRE	1.70											
B D SPT (S)	2.00 - 2.45 2.00 - 2.45	N=15 (3,5/4,4,3,4)	2	(1.60) Dry								
BRE	2.50											
U	3.00 - 3.45	22 blows	3									
D BRE	3.45 3.70											
B D SPT (S)	4.00 - 4.45 4.00 - 4.45	N=7 (1,2/2,2,1,2)	4	(1.60) Dry								
BRE	4.50											
U	5.00 - 5.45	16 blows	5									
D BRE	5.45 5.70											
B D SPT (S)	6.00 - 6.45 6.00 - 6.45	N=9 (3,2/3,2,2,2)	6	(1.60) Dry								
BRE	6.50											
U	7.00 - 7.45	12 blows	7			7.00m: Clay of high plasticity.						
D BRE	7.45 7.70											
B D SPT (S)	8.00 - 8.45 8.00 - 8.45	N=7 (3,2/2,1,2,2)	8	(1.60) Dry								
BRE	8.50											
B D SPT (S)	9.00 - 9.45 9.00 - 9.45	N=9 (2,3/2,2,3,2)	9	(1.60) Dry								
BRE D	9.50 9.50					Firm, greyish brown slightly sandy clayey SILT. Sand is fine to coarse.	9.50	26.13				
B	10.00 - 10.65		10									
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.	
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)
13.20	12.00	3.4	20		13.60	13.80	01:00	200	1.60	200		1.60
								150	13.80	150		13.60
								140	13.80	121		19.10
Log last updated 24/01/2018												

				BOREHOLE RECORD				Borehole BH46					
Contract No: D8044				Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 38.56		Scale 1:50			
								Easting: 433172.22		Northing: 558831.72			
Client: Sunderland City Council						Driller: RH/DC		Logged By: BC		Sheet 1 of 4			
Method: Cable Percussive Drilling with Rotary Core Drilling						Checked By: JH		Dates: 10/08/2017					
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
Type	Depth From-To (m)	Insitu Testing											
ES	0.20	HVP=57 kPa			1	Dark brown slightly sandy slightly gravelly slightly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, siltstone and coal. Firm brownish grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, siltstone and coal. Occasional rootlets noted.	(0.10)	38.46					
ES	0.40												
B	0.50												
D	0.60 - 1.20												
BRE	1.00	54 blows			2	Stiff orangish brown, mottled grey, slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.10	38.06					
D	1.00												
UT	1.20 - 1.65												
D	1.65												
BRE	2.00	N=50+ (25 for 40mm/50 for 50mm)			(2.00) Dry	Stiff greyish brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, siltstone and coal. Cobbles are of sandstone.	0.40	36.36					
D	2.00												
B	2.20 - 2.70												
D	2.20												
SPT (S)	2.20 - 2.29												
B	3.00	94 blows			3	3.20m: Clay of low plasticity.							
BRE	3.00												
D	3.00												
B	3.20 - 3.70												
UT	3.20 - 3.65												
U	3.80 - 4.25	150 blows			4								
D	4.25												
BRE	4.80	N=31 (5,7/7,7,8,9)			5 (4.50) Dry			(5.70)					
D	4.80												
B	5.00 - 5.50												
D	5.00												
SPT (S)	5.00 - 5.45												
BRE	5.80	135 blows			6	6.00m: Clay of intermediate plasticity.							
D	5.80												
U	6.00 - 6.45												
D	6.45												
BRE	6.80	N=50+ (7,9/9,12,15,14 for 60mm)			7 (6.00) Dry	6.45 - 6.80m: Firm.							
D	6.80												
B	7.00 - 7.50												
D	7.00												
SPT (S)	7.00 - 7.44												
BRE	7.80				8 (7.50) Dry (6.60) 2.00	Very dense reddish brown sandy GRAVEL. Gravel is angular to subangular, fine to coarse of siltstone. (Weathered	7.90	30.66					
D	7.80												
D	7.90												
D	8.00												
SPT (S)	8.20 - 8.60	N=50+ (12,13 for 10mm/50 for 20mm)											
SPT (C)	8.10 - 8.17	N=0 (25 for 40mm, 0 for 30mm)											
	8.20 - 9.60												
C	9.50 - 9.60												
	9.60 - 11.10												
TCR%SCR%ROD%FI					Continued on next sheet								
Ground Water (m)					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)		
					2.20	2.60	00:45	200	7.50	200	8.20		
					8.00	8.20	01:00	140	11.00	116	30.60	1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered.	
Log last updated 24/01/2018													

 		BOREHOLE RECORD				Borehole BH46						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 38.56 Easting: 433172.22	Scale 1:50 Northing: 558831.72					
Client: Sunderland City Council				Driller: RH/DC	Logged By: BC	Sheet 2 of 4						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH	Dates: 10/08/2017							
SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	ROD %							FI
C	10.10 - 10.22							10.07	28.49	XXXXXX		
			100	100	97		3					
	11.10 - 12.60						11	11.10 - 30.60 95 % Water	(1.84)			
			100	95	84			11.32 - 11.34m: Subhorizontal, planar, smooth with light grey clay infill.				
							4					
C	12.20 - 12.35						12	11.88 - 11.91m: Subhorizontal, planar, smooth with light grey clay infill. Very weak to weak, partially weathered, thinly laminated grey MUDSTONE. Fractures are closely spaced subhorizontal, planar, smooth, clean. (Drillers description).	11.91	26.65		
	12.60 - 14.10							12.53 - 12.60m: Fractures are frequent, interlock and orientated.				
			100	100	97		13	12.93 - 12.95m: 15 degree, planar, smooth with light grey clay infill.				
C	13.30 - 13.40						3		(2.95)			
							14	13.96 - 13.98m: 15 degree, planar, smooth with light grey clay infill.				
C	14.10 - 15.60 14.20 - 14.30							14.37m: Subhorizontal, stepped, smooth, clean fractures.				
			100	100	100		15	14.70 - 14.71m: 20 degree planar, smooth with light grey sandstone gravel infill. Medium strong to strong, unweathered, grey fine grained SANDSTONE. Fractures are closely to medium spaced between 20-30 degrees, planar, smooth, clean.	14.86	23.70		
								15.28 - 15.33m: Very weak to weak blue, grey mudstone band.				
C	15.60 - 17.10 15.70 - 16.05						16	16.05 - 16.08m: Subhorizontal planar, smooth with light grey clay infill.				
			100	100	87			16.58 - 16.62m: Weak blue, grey mudstone band.				
	17.10 - 18.60						17	17.10 - 17.27m: Subvertical, planar, smooth, undulose, clean fracture				
			100	100	61		2		(5.48)			
	18.60 - 20.10						18					
							19					
			100	100	93							
							20	19.70 - 19.74m: Weak thinly laminated blue, grey mudstone band.				
	20.10 - 21.60											
Continued on next sheet												
Ground Water (m)					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)	
					2.20	2.60	00:45	200	7.50	200	8.20	
					8.00	8.20	01:00	140	11.00	116	30.60	
Log last updated 24/01/2018												



Borehole BH46

Site: IAMP - Preliminary Ground Investigation

Scale 1:50

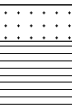

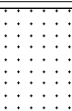


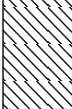
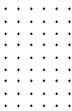

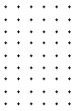

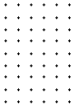

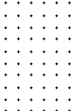
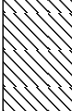
Northing:
558831.72

Logged By: BC





Sheet 3 of 4



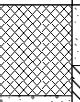
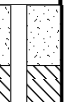
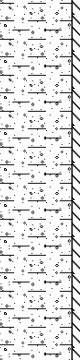

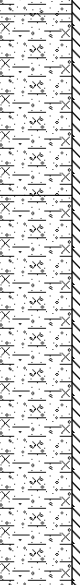

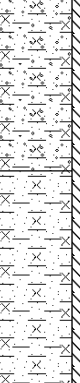


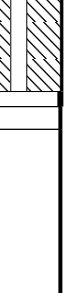
Checked By: JH



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

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI										
	21.60 - 23.10		100	100	90	4	21	Very weak, partially weathered, grey MUDSTONE. Fractures are closely spaced between 5 - 20 degree, planar, smooth, clean.	20.34	18.22						
									(0.51)							
			23.10 - 24.60	100	100	100		2	23	Medium strong to strong, partially weathered, grey fine to medium grained SANDSTONE. Fractures are subhorizontal, planar, smooth, clean.			20.85	17.71		
	24.60 - 26.10		100	100	0	2		25	22.38m: Fractures are subhorizontal, planar, smooth, undulose with grey clay infill. 22.59 - 22.88m: Subvertical planar, smooth, undulose, clean fractures.							
	26.10 - 27.60		100	100	0	2		26	25.60m: Fractures are subhorizontal, planar, smooth, undulose with light grey clay infill.	(9.75)						
	27.60 - 29.10		100	100	100	2		27	26.89m: Fractures are subhorizontal, planar, smooth with light grey clay infill. 26.96m: Fractures are subhorizontal, planar, rough with grey clay infill.							
	29.10 - 30.60		100	100	100	2		28	27.20m: Fractures are subhorizontal, planar, smooth with light grey sandstone gravel infill.							
							30									

Ground Water (m)					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)	
					2.20	2.60	00:45	200	7.50	200	8.20	
					8.00	8.20	01:00	140	11.00	116	30.60	
Log last updated 24/01/2018												

				BOREHOLE RECORD										Borehole BH46				
Contract No: D8044					Site: IAMP - Preliminary Ground Investigation										GL (m AOD) 38.56 Easting: 433172.22 Scale 1:50 Northing: 558831.72			
Client: Sunderland City Council										Driller: RH/DC		Logged By: BC		Sheet 4 of 4				
Method: Cable Percussive Drilling with Rotary Core Drilling										Checked By: JH		Dates: 10/08/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill						
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %	FI												
								End of Borehole at 30.60 m	30.60	7.96								
							31											
							32											
							33											
							34											
							35											
							36											
							37											
							38											
							39											
							40											
Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered.						
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)							
					2.20 8.00	2.60 8.20	00:45 01:00	200 140	7.50 11.00	200 116	8.20 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						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 07/08/2017 - 18/08/2017						
SAMPLE DETAILS				(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10 0.30	HVP=25 kPa	1	MADE GROUND: Brown slightly sandy slightly gravelly clayey topsoil. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, coal and brick.	(0.60)	35.94						
D ES B BRE U	0.70 0.70 0.70 0.80 - 1.20 0.80 1.20 - 1.65	HVP=66 kPa 29 blows		Firm, dark brown mottled grey, slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone, siltstone and coal. <u>1.20m: Stiff</u>	0.60							
D BRE D SPT (S)	1.65 1.90 2.00 2.00 - 2.45	N=14 (2,2/3,3,4,4)		(1.60) Dry	(2.50)				33.44			
BRE	2.50											
U	3.00 - 3.45	22 blows										
D BRE	3.45 3.70	N=12 (1,2/2,3,4,3)		4 (1.60) Dry	(1.20)				32.24			
B D SPT (S) D BRE	4.00 - 4.45 4.00 4.00 - 4.45 4.30 4.50											
UT	5.00 - 5.45											12 blows
D BRE	5.45 5.70											
B D SPT (S) BRE	6.00 - 6.45 6.00 6.00 - 6.45 6.50	N=13 (2,3/3,3,4)		6 (1.20) Dry	(3.70)				28.54			
UT	7.00 - 7.45	22 blows										
D BRE	7.45 7.70											
B D SPT (S) BRE	8.00 - 8.45 8.00 8.00 - 8.45 8.50	N=20 (5,5/6,5,5,4)										
UT	9.00 - 9.45	18 blows	9	(1.50)	27.04							
D BRE	9.45 9.70											
B D SPT (S) BRE	10.00 - 10.45											
UT	10.00 - 10.45	18 blows										
10 (9.90) Dry				Continued on next sheet								
Ground Water (m)					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)	
15.30	14.90	11.8	20		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					
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 2 of 3						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH	Dates: 07/08/2017 - 18/08/2017							
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D SPT (S)	10.00 10.00 - 10.37	N=50+ (5,9/12,11,27 for 70mm)			11	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. <u>10.00m: Very stiff.</u>						
BRE	10.50											
U	11.00 - 11.45	56 blows				<u>11.00m: Clay of low plasticity.</u>						
D BRE	11.45 11.70											
B D SPT (S)	12.00 - 12.45 12.00 - 12.44	N=50+ (7,10/12,14,14,10 for 70mm)			07/08/2017 (10.90) Dry 08/08/2017 0800 12 (10.90) Dry (11.90) Dry	(5.30)						
BRE	12.50											
D	12.70											
B D SPT (S)	13.00 - 13.45 13.00 - 13.38	N=49 (25/12,11,11,15)			13 (12.90) Dry							
BRE	13.50				14 (13.90) Dry							
D	13.80											
B D SPT (S)	14.00 - 14.40 14.00 - 14.22	N=50+ (21,4 for 10mm/21,29 for 60mm)										
D	14.80											
D	15.20 - 16.70				15	Very dense yellowish brown sandy GRAVEL. Gravel is subangular to angular, fine to coarse of sandstone. (Weathered sandstone, rockhead).	14.80	21.74				
D SPT (S)	15.30 - 16.70	N=50+ (25 for 45mm/50 for 45mm)			08/08/2017 1700 (15.00) Dry 18.70 (15.00) Water 08/08/2017 1700 (15.00) Dry (15.00) Dry	Weak, partially weathered, light brown fine to medium SANDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth and clean. Below 16.62m fractures are medium to widely spaced.	15.30	21.24				
SPT (S)	15.30 - 15.39											
C	15.47 - 15.89											
C	16.10 - 16.29											
C	16.70 - 16.83				16	<u>16.25 - 16.70m: Subvertical, planar, smooth, clean fracture.</u> <u>16.40 - 16.62m: Frequent subvertical fractures with brown clay infill.</u>	(2.75)					
C	16.70 - 18.20				16.70 - 18.20 60 % Water							
C	17.70 - 17.84											
C	18.20 - 19.70											
C	18.20 - 19.70				17	<u>17.50 - 18.00m: Dark red staining.</u>	18.05	18.49				
C	18.20 - 19.70				18.20 - 19.70 45 % Water							
C	18.20 - 19.70											
C	18.20 - 19.70											
C	18.20 - 19.70				18	Weak, partially weathered, orange brown fine, predominantly medium to coarse, micaceous SANDSTONE. Fractures are subhorizontal, planar, smooth with dark red staining. <u>18.05 - 19.05m: Subvertical, undulose fracture with orange staining.</u>	(1.00)					
C	18.20 - 19.70											
C	18.20 - 19.70											
C	18.20 - 19.70											
C	18.20 - 19.70				19	<u>19.04 - 19.06m: Dark red brown clay.</u> Extremely weak, partially weathered, thinly to thickly bedded red brown MUDSTONE with occasional thin laminae of siltstone. Fractures are very closely spaced, subhorizontal, planar, smooth and clean. <u>19.38m: Subvertical, planar, smooth, clean fracture.</u>	19.05	17.49				
C	18.20 - 19.70											
C	18.20 - 19.70											
C	18.20 - 19.70											
C	18.20 - 19.70				20		(0.95)					
C	18.20 - 19.70											
C	18.20 - 19.70											
C	18.20 - 19.70											
C	18.20 - 19.70				20		20.00	16.54				
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.	
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)
15.30	14.90	11.8	20		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 updated 24/01/2018												



Borehole BH47

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
36.54	
Easting:	Northing:
433430.80	558934.44

Driller: PK/DC

Logged By: AH



Sheet 3 of 3

Checked By: JH

Dates:	07/08/2017 - 18/08/2017
--------	-------------------------

[illegible]

Ground Water (m)					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)	
15.30	14.90				10.30	10.50	00:30	200	1.60	200	1.60	1. Hand dug inspection pit to 1.20m.
					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 updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH48						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 35.44		Scale 1:50				
						Easting: 433655.60		Northing: 558895.29				
Client: Sunderland City Council				Driller: PK/DC		Logged By: BC		Sheet 1 of 3				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 08/08/2017 - 18/08/2017						
SAMPLE DETAILS					(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill		
Type	Depth From-To (m)	Insitu Testing										
D ES	0.10 0.10					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)					
D ES B BRE	0.40 0.50 0.50 0.60 - 1.20 0.60 0.70	HVP=26 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.	0.50 (0.80)	34.94				
U	1.20 - 1.65	29 blows				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.	1.30	34.14				
D BRE B D SPT (S)	1.65 1.90 2.00 - 2.45 2.00 2.00 - 2.45				2 (1.60) Dry	2.00m: Stiff						
BRE	2.50	N=17 (2,3/3,4,5,5)					(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				4 (1.60) Dry							
BRE	4.50	N=9 (1,2/2,2,2,3)										
UT	5.00 - 5.45	9 blows			5	5.00m: Clay of intermediate plasticity.						
D BRE	5.45 5.70											
B D SPT (S)	6.00 - 6.45 6.00 6.00 - 6.45				6 (1.60) Dry							
BRE	6.50	N=10 (2,2/2,2,3,3)										
UT	7.00 - 7.45	12 blows			7							
D BRE	7.45 7.70											
B D SPT (S)	8.00 - 8.45 8.00 8.00 - 8.45				8 (1.60) Dry	8.00m: Clay of high plasticity.						
BRE	8.50	N=9 (2,2/2,2,3)										
UT	9.00 - 9.45	10 blows			9							
D BRE	9.45 9.70											
B	10.00 - 10.45				10 (9.90) Dry							
					Continued on next sheet							
Ground Water (m)					Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.	
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)
18.00	12.40	5.3	20		14.90	15.10	00:20	200	1.60	200		10.00
					17.10	17.20	00:20	150	11.50	150		18.50
					18.00	18.30	01:00	140	22.50	121		23.50
Log last updated 24/01/2018												



**Borehole
BH48**

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
35.44	
Easting:	Northing:
433655.60	558895.29

Logged By: BC

Sheet 2 of 3

Checked By: JH

Dates:	08/08/2017 - 18/08/2017
--------	-------------------------

(Casing)
Groundwater

Depth
(m)Level
(m AOD)

Legend

Well/
Backfill[illegible]

Continued on next sheet

Ground Water (m)

Chiselling / Hard Strata

Casing Depths

Hole Diameter

el	
	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)
18.00	12.40	5.3	20		14.90	15.10	00:20	200	1.60	200	10.00
					17.10	17.20	00:20	150	11.50	150	18.50
					18.00	18.30	01:00	140	22.50	121	23.50
Log last updated 24/01/2018											

1. Hand dug inspection pit to 1.20m.



Borehole BH48

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
35.44	
Easting:	Northing:
433655 60	558895 29

Logged By: BC

Sheet 3 of 3

Checked By: JH

Dates:	08/08/2017 - 18/08/2017
--------	-------------------------

[illegible]

Ground Water (m)					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)	
18.00	12.40				14.90	15.10	00:20	200	1.60	200	10.00	
					17.10	17.20	00:20	150	11.50	150	18.50	
					18.00	18.30	01:00	140	22.50	121	23.50	
Log last updated 24/01/2018												



Borehole BH49

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
39.21	
Easting:	Northing:
433226.03	558647.01

Driller: RH/DC

Logged By: BC

Sheet 1 of 4



Checked By: JH



Dates:	11/08/2017 - 24/08/2017
--------	-------------------------

SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing									
D ES B D ES	0.20 0.20 0.20 0.50 - 1.20 0.50 0.50 0.70	HVP=24 kPa				1	Dry	(0.30) 0.30	38.91		
BRE D B D SPT (S)	1.00 1.00 1.20 - 1.60 1.20 1.20 - 1.65	HVP=65 kPa									
BRE	1.75	N=10 (2,2/2,2,3,3)				2		(1.45)	37.46		
U	2.20 - 2.45	100 blows									
D BRE	2.50 2.70	N=12 (2,2/3,3,3,3)				3	(2.90) Dry	(1.55)	35.91		
D B D SPT (S)	2.90 3.00 - 3.50 3.00 3.00 - 3.45	N=12 (2,2/3,3,3,3)									
BRE	3.75					4		3.30	32.71		
UF	4.20 - 4.70	100 blows									
B SPT (S) BRE	4.70 - 5.20 4.70 - 4.91 4.75	N=50+ (3,3/50 for 60mm)				5	(4.60) Dry	(2.70)	33.21		
BRE	5.20										
B D SPT (S)	5.75 - 6.25 5.75 5.75 - 6.20	N=42 (5,5/8,10,10,14)				6	(5.70) Dry	6.00	32.46		
BRE	6.20										
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)				7	(6.70) Dry	(6.85) (6.85) (6.78) 6.88	32.51 32.46 32.33		
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)									
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)				8		(0.82)	31.51		
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)									
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)				9		7.70	30.61		
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)									
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)				10		(0.90)	29.91		
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)									
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)				11		(0.70)	30.61		
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)									
B D SPT (S)	6.75 - 7.14 6.75 - 7.14 6.75 - 8.00	N=50+ (10,13/16,21,13,8) N=50+ (10,13/16,21,13,8)				12		8.60	30		

Continued on next sheet

Ground Water (m)					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)	
					4.90	5.10	00:30	150	6.70	150	6.85	
					6.70	7.00	01:00	140	11.00	121	30.30	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH49						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 39.21 Easting: 433226.03	Scale 1:50 Northing: 558647.01					
Client: Sunderland City Council				Driller: RH/DC	Logged By: BC	Sheet 2 of 4						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 11/08/2017 - 24/08/2017						
SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %							FI
C	10.30 - 10.45		100	100	53		9.95 - 10.10m: Subvertical planar, smooth, clean fracture. 10.05 - 10.30m: Weak grey mudstone.					
	11.00 - 11.30		100	83	83		10.70 - 10.80m: Subvertical planar, smooth, clean fracture.	(3.30)				
	11.30 - 12.80					11	11.12 - 11.15m: Subvertical planar, smooth, clean fracture 11.24 - 11.27m: Subvertical undulating, smooth, clean fracture. 11.40 - 11.45m: Subhorizontal planar, smooth fracture. 11.40 - 11.50m: Subvertical undulating, smooth, clean fracture.					
C	11.83 - 11.93		100	100	80							
C	12.50 - 12.90											
C	12.55 - 12.80						12.55m: Medium strong.	12.60	26.61			
	12.80 - 14.30					40	Weak, partially weathered, orange brown medium grained SANDSTONE. Fractures are closely spaced, subhorizontal planar, smooth.					
			100	96	80		12.94 - 13.00m: Subvertical planar, smooth, clean fracture.					
C	13.90											
	14.30 - 15.80					20		(3.40)				
C	14.80 - 15.00		100	96	93							
	15.80 - 17.00						15.55 - 15.60m: Subrounded to rounded, medium to coarse of grout.					
C	15.90 - 16.00											
			100	83	28	20	Very weak, partially weathered, thinly bedded, dark grey MUDSTONE. Fractures are extremely closely to very closely spaced, planar with clay infill.	16.00	23.21			
						NI	16.00 - 16.10m: Subvertical planar, smooth, clean fracture.	(1.50)				
	17.00 - 17.80		87	66	22	12						
							17.45 - 17.55m: Subvertical planar, smooth, clean, fracture.	17.50	21.71			
	17.80 - 19.00						Very weak, partially weathered black carbonated MUDSTONE. Fractures are very closely spaced, subhorizontal planar, smooth, clean.					
			100	86	13	20	18.20 - 18.35m: Subvertical undulating, smooth, fracture.	(1.90)				
	19.00 - 20.80						18.75 - 18.95m: Subvertical, stepped, smooth, clean, fracture.					
							19.15 - 19.30m: Subvertical planar, smooth, clean fracture.	19.40	19.81			
			100	93	90		Weak, partially weathered dark grey SILTSTONE with bands of fine to medium sandstone. Fractures are closely to medium spaced, subhorizontal planar, smooth, clean.					
Continued on next sheet												
Ground Water (m)					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)	
					4.90	5.10	00:30	150	6.70	150	6.85	
					6.70	7.00	01:00	140	11.00	121	30.30	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH49						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 39.21 Easting: 433226.03		Scale 1:50 Northing: 558647.01				
Client: Sunderland City Council				Driller: RH/DC		Logged By: BC		Sheet 3 of 4				
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 11/08/2017 - 24/08/2017						
SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %	FI						
	20.80 - 22.30						21	20.30 - 20.45: Dark grey fine to medium sandstone. 20.70 - 20.80m: Dark grey fine to medium sandstone.	(2.05)			
	22.30 - 23.80		100	100	83	6	22	21.22 - 21.36m: Subvertical undulating, smooth, clean fracture. Weak, partially weathered dark grey fine to medium SANDSTONE. Fractures are closely to medium spaced, subhorizontal planar, smooth, clean.	21.45 (1.15)	17.76		
	23.80 - 24.80		100	93	73		23	Weak, partially weathered thinly bedded dark grey SILSTONE. Fractures are closely to medium spaced, subhorizontal planar, smooth, clean. 22.90 - 23.00m: Subvertical stepped, smooth, clean fracture. 23.20 - 23.50m: Subvertical undulating, smooth, clean fracture.	22.60 (1.35)	16.61		
	24.80 - 26.30		95	75	70	15	24	Weak, partially weathered dark grey SILSTONE. Fractures are very closely to closely spaced, planar, smooth. 24.55m: Subvertical planar, smooth, clean fracture.	23.95 (4.30)	15.26		
	26.30 - 27.80		96	96	86	12	25	25.80 - 26.00m: Subvertical planar, smooth, clean fracture. 26.30 - 26.45m: Subvertical planar, smooth, clean fracture. 26.58 - 26.62m: Subvertical planar, smooth, clean fracture.				
	27.80 - 29.30		100	100	73	4	26					
	29.30 - 30.30		100	85	30	15	27	Very weak, partially weathered dark grey MUDSTONE. Fractures are very closely to closely spaced 28.90 - 29.50m: Subvertical planar, smooth, clean fracture.	28.25 (2.05)	10.96		
							28					
							29					
							30					

Continued on next sheet

Ground Water (m)					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)	
					4.90	5.10	00:30	150	6.70	150	6.85	
					6.70	7.00	01:00	140	11.00	121	30.30	
Log last updated 24/01/2018												1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered.



Borehole BH49

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
39.21	
Easting:	Northing:
433226.03	558647.01

Driller: RH/DC

Logged By: BC



Sheet 4 of 4

Checked By: JH

Dates:	11/08/2017 - 24/08/2017
--------	-------------------------

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
						A...						
								30.18 - 30.24m: Subvertical planar, smooth, clean fracture. End of Borehole at 30.30 m	30.30	8.91		
							31					
							32					
							33					
							34					
							35					
							36					
							37					
							38					
							39					
							40					

Ground Water (m)					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)	
					4.90	5.10	00:30	150	6.70	150	6.85	
					6.70	7.00	01:00	140	11.00	121	30.30	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH50						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 38.09	Scale 1:50					
						Easting: 433419.38	Northing: 558721.55					
Client: Sunderland City Council				Driller: CT/DC	Logged By: BC	Sheet 1 of 4						
Method: Cable Percussive Drilling with Rotary Core Drilling				Checked By: JH		Dates: 24/08/2017 - 25/08/2017						
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill				
Type	Depth From-To (m)	Insitu Testing										
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			Brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, siltstone and coal. Firm brown mottled light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	(0.35) 0.35 (0.75)	37.74						
ES B D SPT (S)	1.00 1.20 - 1.70 1.20 1.20 - 1.65	N=11 (2,2/2,3,3,3)	1 Dry	Firm dark brown mottled dark grey slightly sandy, slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, siltstone, mudstone and coal.	1.10	36.99						
BRE	1.75		2		(2.00)							
U	2.20 - 2.65	76 blows		2.20m: Stiff.								
D BRE	2.70 2.75		3									
B D SPT (S)	3.20 3.20 3.20 - 3.65	N=17 (4,4/4,4,4,5)	(3.10) Dry	Stiff greyish brown silty slightly sandy CLAY of low plasticity. Sand is fine to medium. 3.20-4.70m: Silt bands noted.	3.10	34.99						
BRE	3.75		4									
U	4.20 - 4.65	57 blows		4.20m: Firm silt of low plasticity.								
D BRE	4.70 4.90		5		(3.30)							
B D SPT (S)	5.20 - 5.70 5.20 5.20 - 5.65	N=11 (1,3/3,2,2,4)	(4.50) Dry									
BRE	5.90		6									
U	6.20 - 6.50	100 blows										
D BRE	6.60 6.90		7			31.69						
B D SPT (S)	7.20 - 7.70 7.20 7.20 - 7.46	N=50+ (5,7/26,24 for 40mm)	(4.50) Dry	Stiff brownish grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	6.40							
BRE	7.90		8									
U	8.20 - 8.70	100 blows		7.90m: Very soft band noted.								
B D SPT (S) BRE	8.70 - 9.20 8.70 8.70 - 9.14 8.90	N=50+ (6,7/8,11,16,15 for 70mm)	(4.50) Dry		(4.20)							
B D SPT (S) BRE	9.70 - 10.20 9.70 9.70 - 10.15 9.90	N=42 (6,9/9,10,10,13)	(4.50) Dry									
Continued on next sheet												
Ground Water (m)					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)	
					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 updated 24/01/2018												



Borehole BH50

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
38.09	
Easting:	Northing:
433419.38	558721.55

Logged By: BC

Sheet 2 of 4



Checked By: JH

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

SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill			
Type	Depth From-To (m)	Insitu Testing												
	10.60 - 11.40						Stiff brownish grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.							
D SPT (S)	10.60 - 11.40 10.70 10.70 - 10.91	N=50+ (7,11/9,2 3,18 for 20mm)				NI	10.60 - 15.40 80 % Water (4.50) Dry	Very dense reddish grey sandy GRAVEL. Gravel is angular to subangular, fine to coarse of sandstone. (Weathered SANDSTONE). Weak, partially weathered, reddish brown SANDSTONE. Weak, partially weathered, reddish brown fine to medium grained SANDSTONE. Fractures are very closely to closely spaced, subhorizontal planar, smooth, clean. Very weak, partially weathered, reddish brown thinly interbedded MUDSTONE and SILTSTONE. Fractures are subangular, closely to very closely spaced, subhorizontal planar, smooth, clean.	10.60 (0.35)	27.49				
						18 6			11		10.95 (0.06)	27.14 27.08		
	11.40 - 12.40					28					10.95 (0.39)	26.69		
C	12.20 - 12.40 12.40 - 13.90		100	40	0				12					
			100	9	0				7					
C	13.20 - 13.40		100	100	95				13					
C	13.90 - 15.40 14.00 - 14.15					20			14			(6.00)		
			100	93	86									
C	14.85 - 15.15								4					
C	15.20 - 15.40 15.40 - 16.35									15.40 - 19.35 100 % Water				
C	16.00 - 16.10 16.35 - 17.85	46	43	43		16								
					AZC L									
		100	100	70	6	17								
	17.85 - 19.35				20		Extremely weak, partially weathered, dark grey MUDSTONE. Fractures are extremely closely spaced, planar, smooth.	17.40	20.69					
					12 NI NI 6 NI	18	18.05m: Subvertical, planar, clean fracture.							
		96	70	6				(2.35)						
	19.35 - 20.85				40	19								
					A 46 NI									
						20	Very weak, partially weathered, dark grey MUDSTONE.	19.75	18.34					
							Continued on next sheet							

Continued on next sheet

Ground Water (m)					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)	
					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 updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH50						
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) 38.09		Scale 1:50				
						Easting: 433419.38		Northing: 558721.55				
Client: Sunderland City Council					Driller: CT/DC		Logged By: BC		Sheet 3 of 4			
Method: Cable Percussive Drilling with Rotary Core Drilling					Checked By: JH		Dates: 24/08/2017 - 25/08/2017					
SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RCD %							FI
	20.85 - 22.35		90	46	0		Fractures are very closely to subhorizontal, planar, smooth, clean. (drillers description). 20.30 - 20.35m: Medium strong dark grey fine to medium sandstone. 20.66 - 20.76m: Weak dark grey siltstone. 21.00 - 21.15m: Subvertical planar, smooth fracture.	(1.95)				
	22.35 - 23.85		100	100	33		21.50 - 21.70m: Subvertical undulating, smooth, rough, clean fracture. Weak, partially weathered, dark grey MUDSTONE. Fractures are subhorizontal planar, smooth, clean. 21.75 - 21.90m: Subvertical undulating, smooth, clean fracture. Weak to medium strong, partially weathered, dark grey SILTSTONE with bands of sandstone. Fractures are very closely to closely subhorizontal planar, clean.	21.70 (0.30) 22.00	16.39 16.09			
	23.85 - 25.35		100	73	73		22.35 - 23.85 100 % Water 22.95 - 23.10m: Subvertical planar, smooth, clean fracture.	(3.15)				
	25.35 - 26.85		100	95	53		23.85 - 25.35 95 % Water Extremely weak, partially weathered, dark grey MUDSTONE. Fractures are very closely subhorizontal, planar, smooth, clean.	25.15 (0.65)	12.94			
	26.85 - 28.20		100	73	66		25.35 - 26.85 100 % Water Very weak, partially weathered, dark grey SILTSTONE. Fractures are closely subhorizontal, planar, smooth, clean. 25.85 - 26.00m: Subvertical planar, smooth, clean fracture 26.60 - 26.75m: Subvertical planar, smooth, clean fracture.	25.80 (0.90) 26.70	12.29 11.39			
	28.20 - 29.70		88	88	26		26.85 - 31.20 100 % Water Extremely weak, partially weathered, dark grey MUDSTONE. Fractures are very closely subhorizontal, planar, smooth, clean.	(2.90)				
	29.70 - 31.20		100	46	10		28.20 - 28.70m: Subvertical planar, smooth, tight, clean fracture. 29.00 - 29.25m: Subvertical undulating, smooth, clean fracture 29.32 - 29.42m: Medium strong dark grey sandstone. Weak dark grey SILTSTONE with occasional thin beds of mudstone. Fractures are closely subhorizontal planar, smooth, clean.	29.60	8.49			
Continued on next sheet												
Ground Water (m)					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)	
					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 updated 24/01/2018												



Borehole BH50

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:50
38.09	
Easting:	Northing:
433419.38	558721.55

Driller: CT/DC

Logged By: BC

Sheet 4 of 4

Checked By: JH

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

[illegible]

Ground Water (m)					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)	
					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 updated 24/01/2018												



Borehole BH51

Site: IAMP - Preliminary Ground Investigation

Sheet 1 of 2

Client: Sunderland City Council

Driller: PM/DC

Logged By: BC

Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: JH

Dates:	12/09/2017 - 14/09/2017
--------	-------------------------

SAMPLE DETAILS						(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing									
D B BRE D ES B BRE D ES D ES U D	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 1.65	69 blows				1	Dark brown sandy slightly gravelly, slightly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone. Stiff brown mottled grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of mudstone and siltstone.	(0.25) 0.25			
BRE SPT (S)	2.00 2.00 - 2.45	N=28 (3,5/5,7,7,9)				2					
BRE D B D SPT (S)	2.75 2.75 3.00 - 3.50 3.00 3.00 - 3.24	N=50+ (7,18/20,30 for 10mm)				3 (1.20) Dry	Firm to stiff reddish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone and siltstone.	2.35 (0.85)			
D SPT (S)	3.50 3.50 - 3.72	N=50+ (5,20/50)				(1.70) Dry	Very dense light grey sandy GRAVEL. Gravel is angular to subangular of siltstone. (Weathered SILTSTONE).	3.20 (0.95)			
C	4.15 - 4.75 4.42 - 4.57	98	98	72		3.15 - 4.75 70 % Water (1.70) Dry	Weak partially weathered, grey fine grained SANDSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth with light grey clay infill.	4.15			
C	4.75 - 5.65 5.00 - 5.30	100	100	79		4.75 - 13.20 90 % Water					
C	5.65 - 7.15 5.81 - 6.00	97	97	97			5.23 - 5.34m: Fractures are subvertical, planar, smooth, clean. 5.65 - 5.70m: AZCL.				
C	6.73 - 6.97 7.15 - 8.65	100	100	77			6.52 - 6.56m: Weak thinly laminated grey siltstone. 6.73: Medium Strong. 7.30 - 7.33m: Weak grey siltstone. 7.58 - 7.70m: Fractures are subvertical, stepped, smooth, clean. 7.95 - 7.98m: Weak grey siltstone.	(4.20)			
C	8.20 - 8.37 8.65 - 10.15	100	100	88			Weak to medium strong, partially weathered, grey SILTSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, clean. 8.80 - 8.84m: Weak grey mudstone. 8.84 - 8.87m: Medium strong brown fine grained sandstone. Medium strong, partially weathered, light grey fine grained SANDSTONE. Fractures are medium spaced subhorizontal, planar, smooth, undulose, clean. 9.59 - 9.65m: Weak grey siltstone.	8.35 (0.76) 9.11			
TCP%SCB%bow						10	Continued on next sheet				

Continued on next sheet

Ground Water (m)					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)	
					3.20	3.50	01:00	200	3.00	200	3.15	
								140	4.50	116	7.15	
Log last updated 24/01/2018												





Borehole BH51

Scale 1:50

Sheet 2 of 2

Dates:	12/09/2017 - 14/09/2017
--------	-------------------------

Ground Water (m)					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)	
					3.20	3.50	01:00	200	3.00	200	3.15	
								140	4.50	116	7.15	
Log last updated 24/01/2018												

 		BOREHOLE RECORD				Borehole BH52			
Contract No: D8044		Site: IAMP - Preliminary Ground Investigation				GL (m AOD) _____ Scale 1:50 Easting: _____ Northing: _____			
Client: Sunderland City Council				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			
SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill	
Type	Depth From-To (m)	Insitu Testing							
B BRE ES BRE D ES	0.20 0.20 0.20 0.50 0.50 0.50			Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone.	(0.25) 0.25				
B BRE D ES U	1.00 1.00 1.00 1.00 1.20 - 1.60	91 blows	1	Stiff brown mottled light grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and siltstone.	(1.10)				
B D SPT (S)	1.60 - 2.10 1.60 1.60 - 2.05	N=38 (4,6/8,10,10,10)	(1.50) Dry	Firm to stiff grey mottled brown slightly sandy gravelly CLAY. Gravel is angular to subrounded, fine to coarse of mudstone and siltstone.	1.35 (1.25)				
D	2.35								
B BRE D SPT (S)	2.60 - 3.10 2.60 2.60 2.60 - 3.05	N=25 (3,4/5,6,6,8)	(1.70) Dry	Stiff grey slightly sandy gravelly CLAY. Gravel is angular to subangular of mudstone and siltstone. (Weathered SILTSTONE).	2.60 (1.00)				
D	3.30								
B D SPT (S)	3.60 - 4.00 3.60 3.60 - 3.78 3.60 - 4.70	N=50+ (19,6/50 for 25mm)	(1.70) Dry	Stiff, grey mottled brown slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular of mudstone and siltstone. (Weathered SILTSTONE).	3.60 (0.34) 3.94				
D SPT (S)	4.00 4.00 - 4.16 4.00 4.00 - 4.16	N=50+ (10,15/50 for 10mm)	4 (1.70) Dry	Very weak to weak, partially weathered, grey SILTSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean.					
D SPT (S)	4.00 4.00 - 4.16 4.70 - 6.20	N=50+ (10,15/50 for 10mm)	5	3.94 - 4.84m: NI, frequent randomly orientate interlocking fractures.	(1.62)				
		100 0 0	NI						
			6	5.40 - 5.48m: Fractures are subvertical, planar, smooth, undulose, clean.	5.56				
		100 91 84	5	Very weak, partially weathered, grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, undulose and clean.	(0.64)				
			6	Soft to firm grey slightly sandy gravelly CLAY. Gravel is angular to subangular of mudstone and siltstone.	6.20 (0.24)				
			4	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.	6.44 (0.55)				
		100 37 37	7	Firm to stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics.	6.99 (0.71)				
			NA						
			6	Weak to medium strong, partially weathered, grey SILTSTONE. Fractures are closely to medium spaced, subhorizontal, planar, smooth, clean.	7.70 (0.50)				
		97 82 75	8	8.02 - 8.14m: Fractures are subhorizontal, planar, smooth with light grey siltstone gravel.	8.20				
			5	Very weak to weak, partially weathered, grey MUDSTONE. Fractures are very closely to closely spaced, subhorizontal, planar, smooth, clean.	(1.00)				
			NI	8.80 - 8.90m: AZCL.					
			9	8.80 - 9.20m: NI, frequent randomly spaced interlocking fractures.					
		90 30 24	NA	Firm to stiff greyish brown slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone lithorelics.	9.20 (0.30)				
			6	Weak, partially weathered, light grey MUDSTONE. Fractures are closely spaced, subhorizontal, planar, smooth, undulose, clean with grey discolouration on fracture surface.	9.50 (0.30) 9.80				
C	9.67 - 9.80 9.80 - 11.30		10						
Ground Water (m)			Chiselling / Hard Strata		Casing Depths		Hole Diameter		General Remarks 1. Hand dug inspection pit to 1.20m.
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	
					4.60	4.90	01:00	200 140	
								1.70 7.50	
								200 116	
								4.00 16.20	
Log last updated 24/01/2018									



Borehole BH52

Scale 1:50

Sheet 2 of 2

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

Ground Water (m)					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)	
					4.60	4.90	01:00	200	1.70	200	4.00	
								140	7.50	116	16.20	
Log last updated 24/01/2018												





TRIAL PIT RECORD

TP No.
CPT14

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 37.20
Easting: 433510.61
Scale 1:25
Northing: 559351.79

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit

Checked By: BL

Dates: 27/07/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
			1	Dark brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	(0.30)	36.90		
				Firm light brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.30			
					(0.90)			
				End of Trial Pit at 1.20 m	1.20	35.99		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.30m x 0.30m	<div><div>A C</div><div>D B</div><div>°</div></div>
			Stability: Stable	
			Weather: Fine	
			Remarks: Hand Excavated Inspection Pit	

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)	Scale 1:25
36.80	
Easting:	Northing:
433726.28	559368.00

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit

Checked By: BL

Dates: 31/07/2017

[illegible]

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.30m x 0.30m	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 10px; margin: 0 10px;"> <div style="display: flex; justify-content: space-between;"> A B </div> <div style="display: flex; justify-content: space-between;"> D C </div> </div> ° </div>
			Stability: Stable	
			Weather: Fine	
			Remarks: Hand Excavated Inspection Pit	





TRIAL PIT RECORD

TP No.
CPT19

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.96
Easting: 433666.30
Scale 1:25
Northing: 559132.48

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit


Checked By: BL

Dates: 31/07/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
HVP	0.30	HVP: 67kPa	<div><div></div></div>	Dark brown slightly sandy slightly gravelly, clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, limestone, mudstone and coal.	(0.30)	35.66		
				Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.30			
			1		(0.90)			
			2					
			3					
			4					
			5					
				End of Trial Pit at 1.20 m	1.20	34.76		

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth	Strike	Remarks	<div><div>DACB</div></div>



			TRIAL PIT RECORD			TP No. CPT24			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 35.44 Easting: 434156.61 Scale 1:25 Northing: 559116.26			
Client: Sunderland City Council					Logged By: BC		Sheet 1 of 1		
Method: Hand Excavated Inspection Pit					Checked By: BL		Dates: 27/07/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
				Dark brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	(0.25)				
				Firm brown mottled light grey, slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.25	35.19			
					(0.95)				
			1						
				End of Trial Pit at 1.20 m	1.20	34.24			
			2						
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered.				Depth Strike	Remarks	Dimensions: 0.30m x 0.30m			
						Stability: Stable			
						Weather: Fine			
						Remarks: Hand Excavated Inspection Pit			
						<div><div>A</div><div>D C B</div><div>°</div></div>			



TRIAL PIT RECORD

TP No.
CPT27

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 34.88
Easting: 433754.12
Scale 1:25
Northing: 558817.36

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit

Checked By: BL

Dates: 27/07/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
			1	Dark brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone, mudstone and coal.	(0.30)	34.58		
				Firm brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone, mudstone and coal.	0.30			
					(0.90)			
				End of Trial Pit at 1.20 m	1.20	33.68		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.30m x 0.30m	
			Stability: Stable	
			Weather: Fine	
			Remarks: Hand Excavated Inspection Pit	



TRIAL PIT RECORD

TP No.
CPT28

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 37.38
Easting: 433608.92
Scale 1:25
Northing: 558690.36

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit


Checked By: BL




Dates: 27/07/2017


SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
				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					
				End of Trial Pit at 1.20 m	1.20	36.18		
			2					
			3					
			4					
			5					




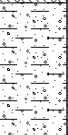
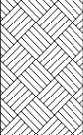
Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth	Strike	Dimensions: 0.30m x 0.30m	<div><div>A C</div><div>D B</div><div>°</div></div>
		Remarks	Stability: Stable	
			Weather: Fine	
			Remarks: Hand Excavated Inspection Pit	



			TRIAL PIT RECORD			TP No. CPT30			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 39.52 Easting: 433239.82 Scale 1:25 Northing: 558526.88			
Client: Sunderland City Council					Logged By: BC		Sheet 1 of 1		
Method: Hand Excavated Inspection Pit					Checked By: BL		Dates: 27/07/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
				Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	(0.25)				
				Firm light brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, limestone, mudstone and coal.	0.25	39.27			
					(0.95)				
			1						
				End of Trial Pit at 1.20 m	1.20	38.32			
			2						
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered.				Depth Strike	Remarks	Dimensions: 0.30m x 0.30m		<div><div>D</div><div>A C</div><div>B</div><div>°</div></div>	
						Stability: Stable			
						Weather: Overcast			
						Remarks: Hand Excavated Inspection Pit			

			TRIAL PIT RECORD			TP No. CPT31			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 39.07 Easting: 433201.82 Scale 1:25 Northing: 558727.90			
Client: Sunderland City Council				Logged By: BC		Sheet 1 of 1			
Method: Hand Excavated Inspection Pit				Checked By: BL		Dates: 28/07/2017			
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
			1	Dark brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.25)	38.82			
				Stiff dark brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, limestone and coal.	0.25				
					(0.95)				
			2						
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered.				Depth Strike	Remarks	Dimensions: 0.30m x 0.30m		<div><div>D</div><div>A C</div><div>B</div><div>°</div></div>	
						Stability: Stable			
						Weather: Fine			
						Remarks: Hand Excavated Inspection Pit			

			TRIAL PIT RECORD			TP No. CPT32			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 37.13 Easting: 433351.04 Scale 1:25 Northing: 558864.47			
Client: Sunderland City Council					Logged By: BC		Sheet 1 of 1		
Method: Hand Excavated Inspection Pit					Checked By: BL		Dates: 28/07/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
				Dark brown slightly sandy, slightly gravelly, clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, limestone and coal.	(0.30)				
				Stiff brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone and coal.	0.30	36.83			
					(0.90)				
			1						
				End of Trial Pit at 1.20 m	1.20	35.93			
			2						
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered.				Depth Strike	Remarks	Dimensions: 0.30m x 0.30m			
						Stability: Stable			
						Weather: Fine			
						Remarks: Hand Excavated Inspection Pit			
						<div><div>D</div><div>A</div><div>C</div><div>B</div><div>°</div></div>			

			TRIAL PIT RECORD			TP No. CPT33			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			Scale 1:25			
Client: Sunderland City Council				Logged By: BC		Sheet 1 of 1			
Method: Hand Excavated Inspection Pit				Checked By: BL		Dates: 28/07/2017			
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
				Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone, limestone and coal.	(0.30)				
				Stiff dark brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, limestone, mudstone and coal.	0.30				
					(0.90)				
			1						
				End of Trial Pit at 1.20 m	1.20				
			2						
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered.				Depth Strike	Remarks	Dimensions: 0.30m x 0.30m		<div><div>D</div><div>A C</div><div>B</div><div>°</div></div>	
						Stability: Stable			
						Weather: Fine			
						Remarks: Hand Excavated Inspection Pit			







TRIAL PIT RECORD

TP No.
CPTM6

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit

Checked By: BL

Dates: 27/07/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
				MADE GROUND: Dark brown slightly sandy, slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of brick, sandstone, mudstone and coal.	(0.30)			
				Firm to stiff brown mottled light grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.30			
					(0.90)			
			1					
				End of Trial Pit at 1.20 m	1.20			
			2					
			3					
			4					
			5					

Remarks		Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered.		Depth	Strike	Remarks	Dimensions: 0.30m x 0.30m	<div><div>A C</div><div>D B</div><div>°</div></div>	
					Stability: Stable		
					Weather: Overcast		
					Remarks: Hand Excavated Inspection Pit		



TRIAL PIT RECORD

TP No.
CPTM7

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit

Checked By: BL

Dates: 27/07/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
				Dark brown slightly sandy, slightly gravelly clayey topsoil. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.30)			
				Firm brown mottled light grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, limestone, mudstone and coal.	0.30			
					(0.90)			
			1					
				End of Trial Pit at 1.20 m	1.20			
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.30m x 0.30m	<div><div>DACB</div><div>°</div></div>
			Stability: Stable	
			Weather: Drizzle	
			Remarks: Hand Excavated Inspection Pit	



TRIAL PIT RECORD

TP No.
CPTM9

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25
Easting: 433418.99
Northing: 558718.55

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Hand Excavated Inspection Pit

Checked By: BL

Dates: 28/07/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
				Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subrounded to subangular, fine to coarse of sandstone, limestone, mudstone and coal.	(0.25)			
				Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	0.25			
					(0.95)			
			1					
				End of Trial Pit at 1.20 m	1.20			
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.30m x 0.30m	<div><div>DACB</div><div>°</div></div>
			Stability: Stable	
			Weather: Fine	
			Remarks: Hand Excavated Inspection Pit	



TRIAL PIT RECORD

TP No.
TP01

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Easting:
433197.39

Scale 1:25

Northing:
560216.69

Client: Sunderland City Council

Logged By: FR

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 10/11/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20		1	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.	(0.40)			
B	0.40				0.40			
BRE D ES	0.50 0.50 0.50			Stiff light brown slightly sandy, slightly gravelly CLAY. Sand is fine to 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.	0.70			
BRE D	1.70 1.70			<u>1.70m: Brown fine to coarse sand. Sand lens at 1.70m.</u>				
B	2.00 - 2.50			<u>2.00m: Becoming thinly laminated</u>				
BRE D	2.50 2.50				(3.80)			
B BRE D	3.40 - 3.80 3.50 3.50							
B	4.40 - 4.50			<u>4.40m: Thin laminae of sandy silt noted.</u>				
				End of Trial Pit at 4.50 m	4.50			
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation	
	Depth	Strike			
1. No groundwater encountered.			Dimensions: 3.60m x 0.70m		
			Stability: Stable		
			Weather: Sunny/ Cold		
			Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP02

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Easting:
433775.43

Scale 1:25

Northing:
560241.80

Client: Sunderland City Council

Logged By: FR

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 14/11/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
BRE D ES B D BRE ES	0.20 0.20 0.20 0.30 - 0.70 0.40 0.50 0.50		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.	(0.30)			
				Firm light brown mottled grey and orange, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal.	0.30 (0.45)			
D BRE B	0.80 0.90 1.00 - 1.50			Stiff dark grey, mottled dark brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and occasional coal.	0.75			
				1.20m: Becoming sandy				
B BRE D	2.00 - 2.50 2.00 2.00		2					
					(3.75)			
B BRE D	3.00 - 3.50 3.00 3.00		3	Below 3.00m thinly laminated.				
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			
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 3.30m x 6.00m	<div><div>DACB°</div></div>
			Stability: Stable	
			Weather: Cloudy	
			Remarks: Machine Excavated Trial Pit	



TRIAL PIT RECORD

TP No.
TP03

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Easting:
433335.84

Scale 1:25

Northing:
560104.99

Client: Sunderland City Council

Logged By: FR

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 13/11/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20	HVP: 97kPa	1	MADE GROUND: Dark brown, slightly sandy, slightly gravelly, clayey topsoil. Gravel is fine to coarse, subangular to subrounded of coal, sandstone. Rare glass and ceramic fragments noted. Rootlets noted.	(0.35)			
B D ES HVP BRE	0.40 - 0.70 0.40 0.40 0.40 0.50			Firm brown mottled grey slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular to subrounded of sandstone and coal. Rootlets noted.	0.35 (0.40)			
B D HVP	0.80 - 1.20 0.80 0.80			Stiff dark grey mottled brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal. Low cobble content of subangular to subrounded sandstone at 1.50m.	0.75			
BRE	1.20							
B D	1.80 - 2.50 1.80	HVP: 139kPa	2	1.80m: Pocket of sand noted, becoming sandy.				
BRE	2.30				(3.35)			
B	2.60 - 3.20							
BRE D	3.20 3.20							
B	3.80 - 4.10		3	3.50m: Becoming thinly laminated with silt.				
D	4.00							
BRE	4.10			End of Trial Pit at 4.10 m	4.10			
			4					
			5					

Remarks	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks			
1. No groundwater encountered.				Dimensions: 3.10m x 6.00m	<div>D A B C 350°</div>	
				Stability: Very Stable		
				Weather: Overcast		
				Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP04

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Easting:
433667.30

Scale 1:25

Northing:
560093.08

Client: Sunderland City Council

Logged By: FR

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 14/11/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
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 (0.30)			
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							
				<i>Below 2.00m: Thinly laminated.</i>				
B BRE D	2.50 - 3.00 2.50 2.50				(3.85)			
BRE D	3.00 3.00							
B	3.80 - 4.20			<i>3.80m: Thin bands of silt noted.</i>				
B BRE D	4.00 - 4.50 4.00 4.00							
D	4.50			End of Trial Pit at 4.50 m	4.50			

Remarks	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks			
1. No groundwater encountered.				Dimensions: 3.50m x 6.00m	<div>D A B C 360°</div>	
				Stability: Stable		
				Weather: Cloudy		
				Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP05

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25
Easting: 433903.42
Northing: 560153.12

Client: Sunderland City Council

Logged By: FR

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 14/11/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
BRE D ES	0.20 0.20 0.20		1	Dark brown slightly sandy slightly gravelly, clayey TOPSOIL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of sandstone, coal and occasional mudstone. Rootlets noted.	(0.40)			
BRE D ES B	0.40 0.40 0.40 0.50 - 0.90			Firm brown mottled orange sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and coal. Rootlets noted. <u>0.70m: Becoming very sandy.</u>	0.40 (0.50)			
D BRE	0.90 1.00			Firm dark grey mottled brown sandy slightly gravelly, CLAY. <u>1.00m: Clay of intermediate plasticity.</u> <u>1.20m: Becoming slightly sandy.</u>	0.90			
B	1.50 - 2.00							
BRE D	2.00 2.00			<u>2.00m: Becoming stiff.</u>				
B	2.50 - 3.00							
BRE D	3.00 3.00			<u>3.00m: Becoming thinly laminated with silt bands.</u>	(3.60)			
B	3.50 - 4.00							
BRE D	4.00 4.00							
D	4.50			End of Trial Pit at 4.50 m	4.50			
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation	
	Depth	Strike			
1. No groundwater encountered			Dimensions: 5.70m x 6.00m	<div>D A B C °</div>	
			Stability: Stable		
			Weather: Cloudy		
			Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP07

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Easting:
433429.40

Scale 1:25

Northing:
559973.13

Client: Sunderland City Council

Logged By: FR

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 13/11/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20	HVP: 129kPa	<div></div>	MADE GROUND: Dark brown slightly sandy, slightly gravelly, clayey topsoil. Gravel is fine to coarse, subangular to subrounded of sandstone, coal and brick. Occasional glass and ceramic fragments noted. Rootlets noted.	(0.40)		<div></div>	<div></div>
B	0.40 - 0.60			Firm light brown mottled grey slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal. Low cobble content. Cobbles are subangular to subrounded of sandstone.	0.40			
D ES HVP B	0.50 0.50 0.50 0.60 - 1.10			<u>0.60m: Becoming dark brown. and sandy.</u>				
D	1.10			<u>1.00m: Clay of low plasticity.</u>	(1.50)			
BRE	1.30							
B	1.90 - 2.30	HVP: 102kPa	<div></div>	Stiff dark grey, mottled brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, coal and mudstone.	1.90		<div></div>	<div></div>
D	2.00							
BRE	2.10			<u>2.50m: Becoming stiff.</u>				
B D HVP	2.90 - 3.30 2.90 2.90				(2.20)			
BRE	3.20							
D HVP B BRE	3.60 3.60 3.70 - 4.00 3.70	HVP: 99kPa	<div></div>				<div></div>	<div></div>
D	4.00 - 4.30							
BRE D	4.10 4.10			Firm thinly laminated silty slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of coal.	4.10			
B D BRE	4.40 - 4.60 4.40 4.50				(0.50)			
				End of Trial Pit at 4.60 m	4.60			
			<div></div>					

Remarks

1. No groundwater encountered.

Ground Water (m)

Depth Strike

Remarks

Excavation Details

Dimensions: 3.70m x 6.50m

Stability: Very Stable

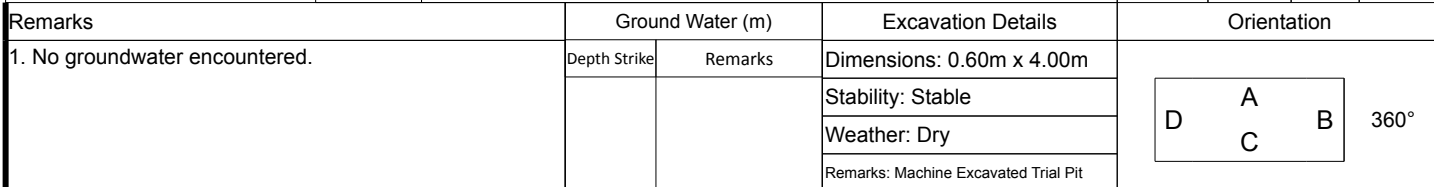
Weather: Overcast

Remarks: Machine Excavated Trial Pit

Orientation

D	A	B
	C	

30°





TRIAL PIT RECORD

TP No.
TP10

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 37.01
Easting: 433662.00
Scale 1:25
Northing: 559544.50

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 22/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20	HVP: 53kPa	1	MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone and brick.	(0.25)	36.76		
D ES HVP B	0.40 0.40 0.40 0.50 - 0.70			Firm light grey and brown mottled slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone, coal and limestone.	0.25			
BRE D	1.00 1.00			Stiff thinly laminated dark grey slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	(0.85)			
B	1.50				1.10			
BRE D	2.10 2.10	HVP: 120kPa	2		(2.40)	35.91		
B HVP	2.50 2.50							
BRE D HVP	3.00 3.00 3.00	HVP: 55kPa	3	<u>Below 3.00m Rare cobbles noted. Cobbles are subangular to subrounded of mudstone.</u>		33.51		
B	3.50			Firm brown slightly clayey slightly sandy slightly gravelly SILT. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	3.50			
BRE D	4.00 4.00	HVP: 31kPa	4	<u>3.90m: 1 No. Subrounded boulder of sandstone.</u>	(1.00)	32.51		
B HVP	4.50 4.50			End of Trial Pit at 4.50 m	4.50			
			5					

Remarks	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks			
1. No groundwater encountered.				Dimensions: 0.60m x 3.90m	<div><div>D</div><div>A</div><div>C</div><div>B</div></div> 83°	
				Stability: Good		
				Weather: Overcast		
				Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP13

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.47
Easting: 433861.00
Scale 1:25
Northing: 559478.70

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 23/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20	HVP: 90kPa	1	MADE GROUND: Dark brown slightly sandy slightly gravelly clay. Gravel is angular to subrounded, fine to coarse of sandstone and occasional mudstone.	(0.30)	35.16		
BRE D ES HVP B	0.40 0.40 0.40 0.40 0.50 - 0.70			Stiff grey mottled brown slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal. <u>0.50m: Becoming dark greyish brown.</u>	0.30			
BRE D	1.00 1.00			<u>1.00m: Clay of low plasticity.</u>				
B	1.50			<u>1.50m: Occasional subrounded cobbles of sandstone.</u>	(2.30)			
BRE D	2.00 2.00							
HVP	2.20	HVP: 108kPa	2			32.86		
B	2.50				2.60			
BRE D	3.00 3.00			<u>3.00m: Becoming firm.</u>				
HVP	3.30	HVP: 41kPa	3			(2.10)		
B	3.50							
BRE D HVP	4.20 4.20 4.30							
B	4.60	HVP: 31kPa	4			30.76		
			5	End of Trial Pit at 4.70 m	4.70			

Remarks	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks	Dimensions: 0.60m x 3.80m	<div>D A B C 136°</div>	
1. No groundwater encountered.				Stability: Good		
				Weather: Overcast		
				Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP16

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.98
Easting: 433688.72
Scale 1:25
Northing: 559238.29

Client: Sunderland City Council

Logged By: AH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 08/09/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
			1	MADE GROUND: Brown, slightly sandy, slightly gravelly, clayey topsoil. Gravel is angular to subangular, fine to coarse of mudstone and coal.	(0.30)	35.68		
				Firm orangeish brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone sandstone and limestone.	0.30 (0.70)			
				End of Trial Pit at 1.00 m	1.00	34.98		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks	Dimensions: 0.60m x 3.00m	<div><div>D A B</div><div> C</div></div> 360°	
				Stability: Stable		
				Weather: Dry		
				Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP16A

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council

Logged By: AH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 08/09/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
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) 0.40			
B BRE D ES HVP	0.50 0.50 0.50 0.50 0.50	HVP: 93kPa		Stiff, dark brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.				
B BRE D ES HVP	1.00 1.00 1.00 1.00 1.00	HVP: 90kPa	1		(1.70)			
B BRE D	2.00 2.00 2.00		2	Very stiff, brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone, sandstone and coal.	2.10			
B BRE D	3.00 3.00 3.00		3		(1.80)			
B BRE D	4.00 4.00 4.00		4	Very stiff, dark brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone and coal.	3.90 (0.70)			
				End of Trial Pit at 4.60 m	4.60			
			5					

Remarks	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks	Dimensions: 0.60m x 4.00m	D A C B	360°
1. No groundwater encountered.				Stability: Stable		
				Weather: Dry		
				Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP17

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.68
Easting: 433946.39
Scale 1:25
Northing: 559241.92

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 24/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20			MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone, coal and brick.	(0.30)			
BRE D ES HVP	0.50 0.50 0.50 0.50	HVP: 93kPa		Stiff brown slightly sandy slightly gravelly CLAY of high plasticity. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	0.30	35.38		
B	0.80 - 1.00		1		(0.90)			
BRE D HVP	1.50 1.50 1.50	HVP: 61kPa		Firm dark brown slightly sandy slightly gravelly CLAY of high plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	1.20	34.48		
B	1.80 - 2.00		2	1.50m: Occasional subangular to subrounded cobbles and boulders of sandstone and rare basalt.				
				1.70m: Becoming dark grey.				
BRE D HVP	2.50 2.50 2.50	HVP: 83kPa		2.50m: Becoming stiff.				
B	2.80 - 3.00		3		(3.40)			
B BRE D HVP	3.50 - 4.00 3.50 3.50 3.50	HVP: 90kPa	4					
HVP	4.20	HVP: 93kPa						
BRE D	4.50 4.50							
			5	End of Trial Pit at 4.60 m	4.60	31.08		

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.60m x 2.80m	<div><div><div>A</div><div>C</div></div><div><div>D</div><div>B</div></div></div> <div>354°</div>
			Stability: Stable	
			Weather: Fine	
			Remarks: Machine Excavated Trial Pit	



TRIAL PIT RECORD

TP No.
TP18

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.57
Easting: 433988.44
Scale 1:25
Northing: 559229.79

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 24/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.10 0.10			MADE GROUND: Dark brown slightly gravelly sandy clayey topsoil. Gravel is angular to subrounded, fine to coarse of brick coal and concrete. Occasional glass and tile. Stiff orange and greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional mudstone and coal.	(0.20) 0.20	35.37		
BRE D ES HVP B	0.30 0.30 0.30 0.30 0.50 - 0.70	HVP: 87kPa						
BRE D HVP	1.00 1.00 1.00	HVP: 97kPa	1					
B	1.50				(2.90)			
BRE D	2.00 2.00		2					
B HVP	2.50 2.60	HVP: 87kPa						
			3					
BRE D	3.20 3.20			Stiff, locally firm, dark grey silty slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	3.10	32.47		
B HVP	3.60 3.80	HVP: 70kPa			(1.40)			
BRE D	4.00 4.00		4					
B	4.40							
			5					
				End of Trial Pit at 4.50 m	4.50	31.07		

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth	Strike	Dimensions: 0.60m x 3.70m	<div>D A B C 149°</div>
		Remarks	Stability: Good	
			Weather: Overcast	
			Remarks: Machine Excavated Trial Pit	



TRIAL PIT RECORD

TP No.
TP19

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.65
Easting: 433558.57
Scale 1:25
Northing: 559178.56

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 23/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20			MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone and mudstone.	(0.30)			
BRE D ES HVP B	0.40 0.40 0.40 0.40 0.50 - 0.70	HVP: 56kPa		Firm light orangish brown mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional mudstone and coal. <u>0.40m: Clay of very high plasticity.</u>	0.30	35.35		
HVP	0.80	HVP: 68kPa						
BRE D	1.00 1.00		1					
B	1.50				(2.60)			
BRE D	2.00 2.00		2	<u>2.00m: Clay of intermediate plasticity.</u>				
B	2.50			<u>2.30m: Occasional sandstone and rare mudstone subrounded cobbles.</u>				
BRE D HVP	3.00 3.00 3.00	HVP: 69kPa	3	Firm dark grey silty slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional mudstone and coal.	2.90	32.75		
				Dark grey slightly clayey fine to medium silty SAND.	3.20 (0.30)	32.45		
B	3.50			Firm grey slightly sandy SILT. Sand is fine to coarse. <u>3.50m: Firm grey slightly sandy SILT. Sand is fine to corse.</u>	3.50	32.15		
				<u>3.80m: Becoming sandy.</u>	(0.80)			
BRE D	4.00 4.00		4					
B	4.20							
				End of Trial Pit at 4.30 m	4.30	31.35		
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. Seepage at 3.80m.	Depth Strike	Remarks	Dimensions: 0.60m x 4.00m	<div><div>D A B</div><div> C </div></div> 73°
	3.80		Stability: Poor from 3.20m.	
			Weather: Overcast	
			Remarks: Machine Excavated Trial Pit	



TRIAL PIT RECORD

TP No.
TP21

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.83
Easting: 434023.31
Scale 1:25
Northing: 559100.27

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 21/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
ES	0.30			MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone and mudstone.	(0.40)			
B ES HVP	0.50 - 0.70 0.50 0.50	HVP: 65kPa		Firm greyish brown slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional coal and mudstone.	0.40	35.43		
BRE D HVP	1.00 1.00 1.00	HVP: 78kPa	1	1.00m: Becoming stiff.				
B	1.50 - 1.70							
				1.80m: Becoming dark grey.				
BRE D	2.00 2.00		2	2.00m: Occasional subrounded cobbles of sandstone.				
B	2.50 - 2.70				(4.30)			
BRE D	3.00 3.00		3					
B	3.50 - 3.70							
BRE D	4.00 4.00		4					
B	4.50 - 4.70			4.50m: Occasional lenses of silty clay.				
				End of Trial Pit at 4.70 m	4.70	31.13		
			5					

Remarks	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks	Dimensions: 0.60m x 3.40m		
1. No groundwater encountered.				Stability: OK	<div>D A B C 81°</div>	
				Weather: Sunny		
				Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP22

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 35.92
Easting: 434147.44
Scale 1:25
Northing: 559062.56

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 21/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20	HVP: 69kPa	1	MADE GROUND: Dark brown slightly gravelly slightly sandy clayey topsoil. Gravel is subangular to subrounded, fine to coarse of sandstone and brick. Rare clay pipe and metal fragments noted.	(0.40)	35.52		
B ES HVP	0.50 - 0.70 0.50 0.50			Firm grey brown slightly sandy slightly gravelly CLAY of intermediate plasticity with low cobble content. Gravel is subangular to subrounded, fine to coarse of sandstone and coal. Cobbles are subangular to subrounded of sandstone.	0.40			
				<u>Below 1.00m stiff.</u>				
D	1.20							
B	1.50 - 1.70		2			(3.80)		
				<u>Below 1.70m becoming grey.</u>				
D	2.00							
B	2.50 - 2.70							
D	3.00		3					
B	3.50 - 3.70							
D	4.00							
B	4.30 - 4.50							
			4	Firm dark grey silty CLAY.	4.20	31.72		
					(0.30)			
			5	End of Trial Pit at 4.50 m	4.50	31.42		

Remarks	Ground Water (m)		Excavation Details	Orientation	
	Depth	Strike			
1. No groundwater encountered.			Dimensions: 0.60m x 3.70m	<div>D A B C 50°</div>	
			Stability: OK		
			Weather: Sunny		
			Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP24

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD)

34.36

Scale 1:25

Easting:

433933.59

Northing:

558906.53

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 22/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D	0.10			MADE GROUND: Dark brown slightly gravelly slightly sandy clayey topsoil. Gravel is angular to subrounded, fine to coarse of brick and sandstone.	(0.20)			
ES	0.30			Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of sandstone and mudstone.	0.20	34.16		
B	0.50 - 0.70			Stiff orangish and greyish brown slightly sandy slightly gravelly CLAY.	(0.20)			
D	0.50			Gravel is subangular to subrounded, fine to coarse of sandstone.	0.40	33.96		
ES	0.50			0.50 - 0.60m: Lens of sandy clay of intermediate plasticity.				
HVP	0.50	HVP: 74kPa		0.60m Mottled dark brown.				
BRE	1.00		1					
D	1.00							
B	1.50 - 1.70							
HVP	1.50	HVP: 92kPa			(2.60)			
BRE	2.00		2					
D	2.00							
B	2.50 - 2.70							
BRE	3.00		3	Firm grey mottled brown silty, slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	3.00	31.36		
D	3.00							
B	3.50 - 3.70							
HVP	3.50	HVP: 48kPa			(1.60)			
BRE	4.00		4	Below 4.00m soft.				
D	4.00							
B	4.40 - 4.60							
HVP	4.60	HVP: 22kPa		End of Trial Pit at 4.60 m	4.60	29.76		
			5					

Remarks

1. No groundwater encountered.

Ground Water (m)

Depth Strike

Remarks

Excavation Details

Dimensions: 0.60m x 4.20m

Stability: Good

Weather: Overcast

Remarks: Machine Excavated Trial Pit

Orientation

D A B
C

57°



TRIAL PIT RECORD

TP No.
TP25

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

GL (m AOD) 37.51
Easting: 433503.76
Scale 1:25
Northing: 558776.40

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 23/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20	HVP: 62kPa	1	MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone. Rare clay tiles fragments noted.	(0.30)	37.21		
BRE D ES HVP B	0.40 0.40 0.40 0.40 0.60			Firm light orange and greyish brown slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional coal and mudstone.	0.30			
				0.60m: Becoming dark grey and brown mottled.				
				0.80m: Becoming stiff with occasional subangular to subrounded cobbles and boulders of sandstone.				
BRE D	1.10 1.10							
B	1.50	HVP: 83kPa	2		(2.60)	34.61		
BRE D	2.00 2.00							
B HVP	2.50 2.50							
D	3.00	HVP: 53kPa	3	Stiff dark grey silty slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	2.90	32.91		
B HVP	3.50 3.60			3.50m: Becoming firm.				
BRE D	4.10 4.10	HVP: 34kPa	4		(1.70)			
B HVP	4.50 4.60							
			5	End of Trial Pit at 4.60 m	4.60			

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.60m x 3.80m	<div><div><div>A</div><div>C</div></div><div><div>D</div><div>B</div></div></div> <div>65°</div>
			Stability: Good	
			Weather: Rain	
			Remarks: Machine Excavated Trial Pit	



TRIAL PIT RECORD

TP No.
TP30

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Easting:
433194.96

Scale 1:25

Northing:
559632.82

Client: Sunderland City Council

Logged By: FR

Sheet 1 of 1



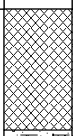
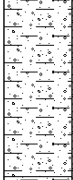
Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 15/11/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
BRE D ES	0.20 0.20 0.20		1	MADE GROUND: Dark brown slightly sandy, slightly gravelly, clayey topsoil. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone. Rare ceramic fragments noted.	(0.40)			
B BRE D ES	0.40 - 0.70 0.40 0.40 0.40			Stiff light brown mottled grey and orange, sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal.	0.40 (0.30)			
B D	0.70 - 1.10 0.70			Stiff dark brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and coal.	0.70			
B BRE D	1.50 - 2.00 1.50 1.50			1.50m: Becoming sandy. Sandstone cobble noted.				
				1.70m: Becoming very stiff.				
B BRE D	2.50 - 3.00 2.50 2.50		2		(2.80)			
BRE D	3.30 3.30		3	3.30m: Thin lamination of silt noted.				
B	3.50 - 4.00			Dark grey clayey sandy SILT. Sand is fine to coarse.	3.50			
BRE D	4.00 4.00		4		(1.30)			
D	4.50		5					
				End of Trial Pit at 4.80 m	4.80			

Remarks	Ground Water (m)		Excavation Details	Orientation	
	Depth	Strike			
1. No groundwater encountered.			Dimensions: 3.70m x 6.00m	<div>D A B C °</div>	
			Stability: Stable		
			Weather: Cloudy		
			Remarks: Machine Excavated Trial Pit		

			TRIAL PIT RECORD			TP No. TP31		
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			Scale 1:25		
						Easting: 433158.62 Northing: 559508.73		
Client: Sunderland City Council				Logged By: FR		Sheet 1 of 1		
Method: Machine Excavated Trial Pit				Checked By: JH		Dates: 15/11/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
BRE D ES	0.20 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, brick. Rare ceramic fragments noted.	(0.40)			
B D ES HVP	0.40 - 0.90 0.40 0.40 0.40	HVP: 114kPa		Stiff light brown mottled grey and orange, slightly gravelly, sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of sandstone and coal.	0.40 (0.60)			
D HVP	0.80 0.80	HVP: 97kPa						
B	1.00 - 1.50			Stiff dark brown mottled grey, slightly sandy, slightly gravelly CLAY. subangular to subrounded of sandstone, coal and occasional mudstone.	1.00			
BRE D	1.50 1.50							
B	2.00 - 2.50							
BRE D	2.50 2.50							
B	3.00 - 3.50							
BRE D	3.50 3.50							
D	4.00 - 5.00			3.90m: Thin laminations of sandy silt noted. Becoming firm.	(3.50)			
B	4.40 - 4.90		Grey clayey slightly sandy SILT. Sand is fine to coarse. 4.50m: Thin bands of clay noted.	4.50 (0.50)				
			End of Trial Pit at 5.00 m	5.00				
Remarks				Ground Water (m)	Excavation Details		Orientation	
				Depth Strike	Remarks	Dimensions: 3.30m x 0.60m		<div>D<div>A C</div>B°</div>
				4.70	Seepage	Stability: Stable		
						Weather: Cloudy		
						Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP32

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council














Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 22/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.10 0.20			MADE GROUND: Dark brown sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of concrete, pottery, occasional brick and sandstone.	(0.30)			
D ES B	0.40 0.40 0.50 - 0.70			MADE GROUND: Dark grey and brown slightly sandy slightly gravelly clay with high cobble content. Gravel is angular to subangular, fine to coarse of brick, concrete and sandstone. Cobbles are angular of brick and concrete.	0.30 (0.40)			
				Firm brown slightly sandy slightly gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional mudstone and coal.	0.70			
B ES HVP	1.50 - 1.70 1.50 1.50	HVP: 53kPa	1					
				1.80m: Becoming stiff.				
BRE D	2.00 2.00							
B	2.50 - 2.70		2					
				2.90m: Becoming silty.				
BRE D HVP	3.00 3.00 3.00	HVP: 85kPa						
B HVP	3.50 - 3.70 3.50	HVP: 48kPa	3					
				3.50m: Becoming firm.				
BRE D	4.00 4.00		4					
B	4.30 - 4.50							
HVP	4.50	HVP: 34kPa						
			5	End of Trial Pit at 4.50 m	4.50			

Remarks

Ground Water (m)

Excavation Details

Orientation

1. Seepage at 0.30m.

Depth Strike

Remarks

Dimensions: 0.60m x 3.90m
Stability: Ok in natural, poor in
made ground
Weather: Overcast
Remarks: Machine Excavated Trial PitD A B
C

17°



TRIAL PIT RECORD

TP No.
TP33

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 22/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D	0.10			MADE GROUND: Brown slightly clayey slightly gravelly sandy topsoil. Gravel is angular to subrounded, fine to coarse of coal, occasional brick and mudstone.	(0.20)			
B	0.20 - 0.40				0.20			
ES	0.30			MADE GROUND: Dark grey slightly clayey gravelly sand. Gravel is angular to subrounded, fine to coarse of mudstone, slate and clinker. Occasional pottery fragments noted.	(0.20)			
B	0.50 - 0.70			Stiff light grey and brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional mudstone, coal and limestone. Cobbles are subrounded of sandstone and limestone.	0.40			
BRE	0.50							
ES	0.50							
HVP	0.50	HVP: 79kPa						
BRE	1.00		1					
D	1.00			0.40 - 0.60m: Firm. 0.50m: Clay of high plasticity. 1.00m: Clay of intermediate plasticity.				
				1.30m: Becoming dark grey.				
B	1.50 - 1.70							
BRE	2.00		2					
D	2.00							
B	2.50 - 2.70				(4.30)			
BRE	3.00		3					
D	3.00			3.00m: Becoming firm.				
HVP	3.00	HVP: 50kPa						
BRE	3.50			3.50m: Becoming slightly sandy silty clay.				
BRE	4.00		4					
D	4.00							
B	4.50 - 4.70							
HVP	4.50	HVP: 33kPa						
				End of Trial Pit at 4.70 m	4.70			
			5					

Remarks

1. No groundwater encountered.

Ground Water (m)

Depth Strike

Remarks

Excavation Details

Dimensions: 0.60m x 4.10m

Stability: Good

Weather: Overcast/humid

Remarks: Machine Excavated Trial Pit

Orientation

D A B
C

66°



TRIAL PIT RECORD

TP No.
TP34

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council

Logged By: AB

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: JH

Dates: 21/08/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
B	0.20 - 0.40	HVP: 100kPa	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>					

Remarks	Ground Water (m)		Excavation Details	Orientation	
1. Seepage at 2.80m.	Depth Strike	Remarks	Dimensions: 0.60m x 7.00m	<div><div><div>A</div><div>C</div></div><div><div>D</div><div>B</div></div></div> <div>20°</div>	
	2.80		Stability: OK		
			Weather: Sunny		
			Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No.
TP35

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 21/09/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
D ES	0.20 0.20			Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, siltstone and mudstone.	(0.30)			
BRE D ES B	0.40 0.40 0.40 0.50 - 0.70			Stiff brownish grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and siltstone.	0.30			
HVP	0.80	HVP: 101kPa						
BRE D	1.00 1.00		1		(1.90)			
B	1.50 - 1.70							
BRE D	2.00 2.00		2		2.20			
B	2.50 - 2.70			Grey clayey slightly sandy GRAVEL. Gravel is angular to subangular of siltstone. (Possible weathered SILTSTONE).				
BRE D	3.00 3.00		3		(2.30)			
B	3.50 - 3.70							
BRE D	4.00 4.00		4					
B	4.30 - 4.40							
			▼	End of Trial Pit at 4.50 m	4.50			
			5					

Remarks

Ground Water (m)

Excavation Details

Orientation

1. Seepage at 4.50m.

Depth Strike

Remarks

Dimensions: 2.30m x 0.80m

4.50

Stability: Stable

Weather: Overcast

Remarks: Machine Excavated Trial Pit

D	A	B
	C	

86°

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Logged By: BC

Sheet 1 of 1

Checked By: BL

Dates: 21/09/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
BRE D ES	0.20 0.20 0.20	HVP: 91kPa		Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone, coal, mudstone and siltstone.	(0.30)				
	BRE D ES HVP B			0.50 0.50 0.50 0.60 0.70 - 0.80	Stiff brown sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone.				0.30 (0.60)
				BRE D	1.00 1.00				Stiff light brown mottled light grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and siltstone.
D	1.50	HVP: 126kPa		Stiff becoming firm with depth slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, siltstone and coal.	1.90				
BRE D HVP	2.00 2.00 2.00				HVP: 62kPa				(1.70)
D	2.50								
HVP	2.80	HVP: 62kPa		End of Trial Pit at 3.60 m	3.60				
BRE D	3.00 3.00				3				
B	3.40 - 3.50								4
		5							

Remarks	Ground Water (m)		Excavation Details	Orientation
1. Ground water struck at 3.40m rose to 2.10m. 2. Terminated at 3.60m due to groundwater.	Depth Strike	Remarks	Dimensions: 2.50m x 0.60m	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 10px; text-align: center;"> D A B C </div> <div style="margin-left: 10px;">92°</div> </div>
	3.40		Stability: Stable	
			Weather: Overcast	
			Remarks: Machine Excavated Trial Pit	



TRIAL PIT RECORD

TP No.
TP38

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Client: Sunderland City Council

Logged By: BC

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 21/09/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
BRE D ES	0.20 0.20 0.20			Dark brown slightly sandy, slightly gravelly clayey TOPSOIL. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	(0.30)			
BRE D ES	0.50 0.50 0.50			Stiff brown mottled light grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded sandstone, mudstone and siltstone.	0.30			
B	0.70 - 0.80							
HVP	0.90	HVP: 105kPa	1					
BRE D	1.00 1.00				(1.60)			
B	1.50 - 1.70							
HVP	1.70	HVP: 84kPa						
BRE D	2.00 2.00		2	Stiff brownish grey slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone, siltstone and coal.	1.90			
B	2.50 - 2.70							
BRE D	3.00 3.00		3		(2.00)			
B	3.50 - 3.70							
B BRE D	4.00 - 4.05 4.00 4.00		4	Grey slightly sandy, slightly clayey GRAVEL. Gravel is angular to subangular, fine to coarse siltstone. (Possible weathered rockhead).	3.90 (0.20)			
				End of Trial Pit at 4.10 m	4.10			
			5					

Remarks

Ground Water (m)

Excavation Details

Orientation

- Groundwater struck at 3.80m rose to 3.00m.
- Terminated at 4.10m due to groundwater.

Depth Strike

Remarks

Dimensions: 3.10m x 0.90m






Stability: Overcast





Weather: Overcast


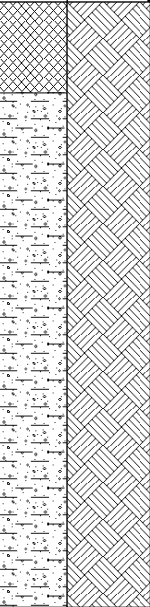

Remarks: Machine Excavated Trial Pit




D	A	B
	C	





96°

			TRIAL PIT RECORD			TP No. TPS-01			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 38.57 Easting: 433408.79 Scale 1:25 Northing: 558610.29			
Client: Sunderland City Council					Logged By: AB		Sheet 1 of 1		
Method: Machine Excavated Trial Pit					Checked By: JH		Dates: 25/08/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
HVP	0.50	HVP: 58kPa		MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone, mudstone and coal. Rare clay tile fragments noted.	(0.30)	38.27			
				Firm dark orangey and greyish brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.30				
HVP	1.20	HVP: 84kPa	1	1.10m: Becoming stiff dark greyish brown.	(1.70)	36.57			
			2	End of Trial Pit at 2.00 m	2.00				
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered. 2. Soakaway test carried out at 2.00m.				Depth Strike	Remarks	Dimensions: 0.65m x 2.00m		<div><div>A</div><div>B</div><div>C</div><div>D</div><div>59°</div></div>	
						Stability: Good			
						Weather: Sunny			
						Remarks: Machine Excavated Trial Pit			

			TRIAL PIT RECORD			TP No. TPS-02			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 35.68 Easting: 433549.01 Scale 1:25 Northing: 558961.59			
Client: Sunderland City Council					Logged By: AB		Sheet 1 of 1		
Method: Machine Excavated Trial Pit					Checked By: JH		Dates: 25/08/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
HVP	0.50	HVP: 57kPa		MADE GROUND: Dark brown slightly gravelly sandy clayey topsoil. Gravel is angular to subrounded, fine to coarse of mudstone and coal.	(0.30)	35.38			
				Firm dark orangey, greyish brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.30				
HVP	1.00	HVP: 80kPa		1	0.70m: Becoming stiff dark greyish brown.	(1.80)			
			2	End of Trial Pit at 2.10 m	2.10	33.58			
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered. 2. Soakaway test carried out at 2.10m.				Depth Strike	Remarks	Dimensions: 0.65m x 2.00m		<div><div>A C</div><div>D B</div>158°</div>	
						Stability: Stable			
						Weather: Overcast			
						Remarks: Machine Excavated Trial Pit			

			TRIAL PIT RECORD			TP No. TPS-03			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 35.58 Easting: 433468.90 Scale 1:25 Northing: 559142.80			
Client: Sunderland City Council				Logged By: AB		Sheet 1 of 1			
Method: Machine Excavated Trial Pit				Checked By: JH		Dates: 25/08/2017			
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
HVP	0.50	HVP: 46kPa	1	MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone, occasional mudstone, rare coal, glass, clay tile and pot. Firm orangish brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, occasional mudstone and coal. <u>0.60m: Becoming slightly sandy gravelly clay.</u> <u>0.70m: Becoming dark grey.</u>	(0.30) 0.30	35.28			
HVP	1.00	HVP: 63kPa			(1.70)				
HVP	1.50	HVP: 88kPa		<u>Below 1.50m: Stiff.</u>					
			2	End of Trial Pit at 2.00 m	2.00	33.58			
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered. 2. Soakaway test carried out at 2.00m.				Depth	Strike	Remarks		<div><div>A C</div><div>D B</div><div>81°</div></div>	
						Dimensions: 0.65m x 2.10m			
						Stability: Stable			
						Weather: Sunny			
						Remarks: Machine Excavated Trial Pit			

			TRIAL PIT RECORD			TP No. TPS-04			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 35.73 Easting: 433794.09 Scale 1:25 Northing: 559250.90			
Client: Sunderland City Council					Logged By: AB		Sheet 1 of 1		
Method: Machine Excavated Trial Pit					Checked By: JH		Dates: 25/08/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
HVP	0.40	HVP: 51kPa		MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subrounded, fine to coarse of sandstone, occasional mudstone, rare coal and brick fragments.	(0.25)	35.48			
				Firm orangish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	0.25				
				0.70m: Becoming dark greyish brown.					
				0.90m: Occasional subangular to subrounded sandstone cobbles.	(1.75)				
				1.40m: Stiff.					
			1						
			2	End of Trial Pit at 2.00 m	2.00	33.73			
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered. 2. Soakaway test carried out at 2.00m.				Depth	Strike	Remarks		<div><div>D</div><div>A C</div><div>B</div></div> 126°	
						Dimensions: 0.65m x 2.00m			
						Stability: Stable			
						Weather: Overcast			
						Remarks: Machine Excavated Trial Pit			

			TRIAL PIT RECORD			TP No. TPS-05			
Contract No.: D8044			Site: IAMP - Preliminary Ground Investigation			GL (m AOD) 35.66 Easting: 433966.48 Scale 1:25 Northing: 559279.24			
Client: Sunderland City Council					Logged By: AB		Sheet 1 of 1		
Method: Machine Excavated Trial Pit					Checked By: JH		Dates: 24/08/2017		
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
HVP	0.50	HVP: 48kPa		MADE GROUND: Dark brown clayey slightly gravelly sandy topsoil. Gravel is angular to subrounded, fine to coarse of brick, concrete and sandstone. Occasional tiles noted.	(0.20)	35.46			
				MADE GROUND: Dark brown clayey slightly gravelly sand. Gravel is angular to subrounded, fine to coarse of brick, concrete, sandstone and coal.	(0.20) 0.40				
				Firm dark orangish and greyish brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(1.50)				
				Firm dark brownish grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	1.90 (0.10) 2.00	33.76 33.66			
				End of Trial Pit at 2.00 m					
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered. 2. Soakaway test carried out at 2.00m.				Depth	Strike	Remarks		<div><div>A C</div><div>D B</div><div>175°</div></div>	
						Dimensions: 0.65m x 2.00m			
						Stability: Good			
						Weather: Overcast			
						Remarks: Machine Excavated Trial Pit			

134°

Contract No.: D8044

Site: IAMP - Preliminary Ground Investigation

Scale 1:25

Easting:
433887.50

Northing:
559726.61

Client: Sunderland City Council




Logged By: BC

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 22/09/2017

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
			<div><div></div><div>1</div></div>	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone.	(0.30)			
				Firm to stiff brown mottled light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and siltstone.	(0.90)			
				Stiff dark brown slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and coal.	(0.80)			
			End of Trial Pit at 2.00 m	2.00				
					<div><div></div><div>2</div></div>			
<div><div></div><div>3</div></div>								
					<div><div></div><div>4</div></div>			
<div><div></div><div>5</div></div>								

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered. 2. Soakaway test carried out at 2.00m.	Depth Strike	Remarks	Dimensions: 3.30m x 0.80m	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 10px; text-align: center;"> D A B C </div> <div style="margin-left: 10px;">176°</div> </div>
			Stability: Stable	
			Weather: Fine	
			Remarks: Machine Excavated Trial Pit	

APPENDIX C

Photographs



Photographs



BH03 20.50-22.20m



BH03 22.20-23.50m

Notes:



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

Plate 1

Photographs



BH03 23.50-25.00m

Notes:



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

Plate 2

Photographs



BH04 15.10-16.30m



BH04 16.30-17.80m

Photographs



BH04 17.80-19.30m



BH04 19.30-20.50m

Notes:



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

Plate 4

Photographs



BH04 20.50-21.50m



BH04 21.50-23.00m

Notes:



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

Plate 5

Photographs



BH04 23.00-24.50m

Notes:



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

Plate 6

Photographs



BH08 12.00-13.50m



BH08 13.50-15.00m

Notes:



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

Plate 7

Photographs



BH08 15.00-16.50m



BH08 16.50-18.00m

Notes:



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

Plate 8

Photographs



BH09 10.50-12.00m



BH09 12.00-13.50m

Notes:



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

Plate 9

Photographs



BH09 13.50-15.00m



BH09 15.00-16.50m

Notes:



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

Plate 10

Photographs



BH09 16.50-18.00m



BH09 18.00-19.50m

Photographs



BH09 19.00-19.80m



BH09 21.00-22.50m

Photographs



BH09 22.50-24.00m



BH09 24.00-25.50m

Notes:



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

Plate

13

Photographs



BH09 25.50-27.00m



BH09 27.00-28.00m

Photographs



BH09 28.00-29.50m



BH09 29.50-31.00m

Notes:



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

Plate 15

Photographs



BH10 9.50-11.00m



BH10 11.00-12.50m

Notes:



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

Plate 16

Photographs



BH10 12.50-14.00m



BH10 14.00-15.50m

Notes:



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

Plate

17

Photographs



BH10 17.00-18.50m



BH10 18.50-20.00m

Notes:



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

Plate 18

Photographs



BH10 20.00-21.50m



BH10 21.50-23.00m

Notes:



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

Plate

Photographs



BH10 23.00-24.50m

Notes:



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

Plate 20

Photographs



BH11 13.00-13.30m



BH11 13.30-14.30m

Photographs



BH11 14.80-16.30m



BH11 16.30-17.80m

Notes:



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

Plate 22

Photographs



BH11 17.80-18.80m



BH11 18.80-20.30m

Notes:



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

Plate

23

Photographs



BH11 20.30-21.80m

Notes:



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

Plate 24