

**Factual Ground
Investigation Report**

Project Name: Southampton International Airport Runway Extension

Location: Southampton International Airport, Southampton, SO18 2NL

Client: Dyer and Butler Ltd.

Project ID: J14044

Report Date: 25th July 2019

Report Issue: 6

SUMMARY

The site comprises the grass area to the north of the runway at Southampton International Airport.

Geological records indicate the site to be underlain by River Terrace Deposits, overlying London Clay Formation.

An intrusive investigation was designed by Mott MacDonald, who acted as Investigation Supervisor. Southern Testing were employed as a sub-contractor to Dyer and Butler Ltd, who were the Principal Contractor for the Ground Investigation. A single phase of intrusive investigation was carried out, comprising a series of trial pits, soakage tests to BRE365, plate loads, and boreholes. The exploratory hole logs, field test results and laboratory test results are presented within this report.

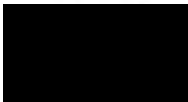
The soils encountered comprised 'Brickearth' (sandy clays), over River Terrace Deposits (Sands and Gravels), over London Clay Formation (thinly laminated sandy clays / clayey sands).

Geotechnical laboratory testing was specified by Mott MacDonald. The results are presented within this report.

Groundwater was encountered in the two boreholes. Groundwater monitoring, via a standpipe within the River Terrace Deposits and two vibrating wire piezometers within the London Clay Formation, is ongoing.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Dyer and Butler Ltd. This report shall not be relied upon or transferred to any other parties without the express written authorization of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

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For and on behalf of Southern Testing Laboratories Limited

Ref: STL J14044	Issue 1 (Draft)	Issue Date	13 th June 2019
	Issue 2 (Revised draft, updating DCP CBR results)		18 th June 2019
	Issue 3 (containing geotechnical test results, AGS data, and monitoring results to date)		27 th June 2019
	Issue 4 (containing Appendix D – geotechnical test results)		28 th June 2019
	Issue 5 (containing updated groundwater monitoring results and Modulus of Subgrade Reaction test results)		10 th July 2019
	Issue 6 (containing updated groundwater monitoring results and revisions as per Mott MacDonald suggestions)		25 th July 2019

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in an email from William Brock for Dyer and Butler Ltd. dated 9th April 2019 enclosing a Sub-Contract Order No. WB/AP1821/13908 dated 9th April 2019. The order refers to our quotation ref Q181753(a), dated 5th February 2019.

2 Location

The site is located airside within Southampton International Airport. The approximate National Grid Reference of the site centre is SU 45567 17842. The site location is indicated on Figure 1 within Appendix A.

3 Purpose

The purpose of the investigation is to inform Southampton International Airport Ltd. of the ground conditions in the northern part of the airfield, where an extension to the runway is planned. This will include a new highway tunnel, and new drainage systems.

4 Object

A Geotechnical Investigation Specification (Dated 28-01-2019) was prepared by Mott MacDonald (ref. 400602-MMD-00-XX-SP-Z-0002).

The object of the survey was to confirm Mott MacDonald's assumed geotechnical design parameters for the proposed runway extension design and pre-feasibility study of the tunnel design. Geo-environmental testing and investigation was also requested within the specification.

This is a factual ground investigation report.

5 Scope

This report presents our exploratory hole logs, and field and laboratory test results.

As with any site there may be differences in ground conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The ground investigation has been completed with reference to BS 5930 Ref [1] and BS 10175 Ref [2].

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Dyer and Butler Ltd., Southampton International Airport Ltd. and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

B SITE SETTING AND WALKOVER SURVEY

6 Geology

The British Geological Survey Map No. 315 (Southampton) indicates that the superficial site geology consists of River Terrace Deposits 1 – Clay and Silt. The Bedrock geology is the London Clay Formation.

6.1.1 River Terrace Deposits

The River Terrace Deposits consist of sheets of gravel and sand often with an overlying deposit of Brickearth (really an ancient alluvium). Some variability in soils is to be expected at junctions with the various terraces, as riverbanks existed there. The remains of these former riverbanks can be soft and silty or contain clay.

6.1.2 London Clay Formation

The London Clay of the Hampshire Basin is quite different from the stiff fissured clay of the London area. It consists of blue, brown and grey clay, and yellow and grey sands, interspersed with pebble beds. It includes local developments of sandstones and is a shallow sea deposit as compared with the deeper sea deposits of the London Basin.

At the base the beds are sandy and generally contain rounded flints.

7 Site Walkover Survey

7.1 General Site Description

The subject site comprises an area of grass to the north of the existing runway. The site is generally flat and level, and is remote from buildings.

C GROUND INVESTIGATION

8 Strategy and Method

The strategy adopted for the intrusive investigation comprised the following:

Hole reference / Method	In Situ Tests	Purpose	Max Depth Range (mbgl)	Installations / Notes
TP1 – TP6 / 21t tracked excavator	Plate CBR (Modulus of Subgrade Reaction) Hand Vane DCP CBR (TRL Method)	To determine soil properties in relation to pavement design. Collect geotechnical and geo-environmental samples.	1.0	Reinstatement by Dyer and Butler Ltd.
TP7 & TP8 / 21t tracked excavator	DCP CBR (TRL Method) Hand Vane	To determine soils properties in relation to proposed tunnel portals. Collect geotechnical and geo-environmental samples.	3.5	Reinstatement by Dyer and Butler Ltd.
PT1 – PT3 / 	DCP CBR (TRL Method) Hand Vane BRE365 Soakage Test	To determine soakage characteristic of the River Terrace Deposits.	3.0	Reinstatement by Dyer and Butler Ltd.

Hole reference / Method	In Situ Tests	Purpose	Max Depth Range (mbgl)	Installations / Notes
21t tracked excavator		Collect geotechnical and geo-environmental samples.		
BH7 & BH8 / Cable Percussive Rig	SPTs UT100s Hand Penetrometer	To determine groundwater conditions and properties of soils in relation to the proposed tunnel. Collect geotechnical and geo-environmental samples.	20.0	Reinstatement by Dyer and Butler Ltd. BH7: 2 No Vibrating Wire Piezometers (tips at 8m bgl and 14m bgl). BH8: 50mm diameter HDPE pipe installed with base at 5m bgl.

Due to the presence of utilities it was not possible to excavate TP1 and TP2 in the locations as specified by the Investigation Supervisor. By agreement with the Investigation Supervisor, the trial pits were relocated further away from the edge of the runway (see TP1A and TP2A). TP1 and TP2 were excavated by hand to expose the runway construction. 'De-lethalisation' concrete skirting was encountered in the location of TP2, extending away from the runway. As a result it was not possible to deepen this trial pit beyond 0.2m.

The Principal Contractor was Dyer and Butler Limited. Southern Testing Ltd. were employed as the ground investigation sub-contractor. The Engineer was Mott MacDonald.

All works were completed airside on night work between 22:30 and 05:00 hrs. Site access and security clearance was organised by Dyer and Butler Ltd.

All exploratory hole locations were set out and subsequently surveyed in by Dyer and Butler Ltd. who also undertook service clearance.

UXO watching brief and magnetometer clearance was undertaken by EOD Contracts Ltd. Instrumentation installation and monitoring has been undertaken by Southern Testing Ltd.

Exploratory hole locations are shown in Figure 2 in Appendix A.

In-situ test and sampling methods descriptions employed are given in Appendix B together with the test results.

9 Weather Conditions

The fieldwork was carried out between 14th April and 10th May 2019. The weather in this period was variable, with dry, wet, warm and cold conditions.

10 Ground Conditions as Found

11 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A), but in general comprised a covering River Terrace Deposits (sandy CLAY), overlying River Terrace Deposits (SAND and GRAVEL), overlying London Clay Formation (sandy CLAY). A summary is given below.

Depth to base (m)	Thickness (m)	Strata	Description
0.2 – 0.3	0.2 – 0.3	TOPSOIL	Grass over slightly sandy silty clay topsoil.
1.2 – 1.9	1.2 – 1.9	RIVER TERRACE DEPOSITS	Firm to stiff silty sandy clays / clayey silts. With greater depth becoming gravelly, and very gravelly towards the base.
5.4 – 5.6	3.6 – 3.7	RIVER TERRACE DEPOSITS	Medium dense gravelly sands and sandy flint gravels.
20.0 +	Base not reached	LONDON CLAY FORMATION	Thinly to thickly laminated fissured sandy clays, with laminations of fine sand.

11.1 Visual and Olfactory Evidence of Contamination

With the exception of the Made Ground soils described in our field logs, there was no other visual or olfactory evidence of possible contamination in any of the exploratory holes.

12 Groundwater Observations

Groundwater was observed in the exploratory holes as follows:

Hole ID	Water Depth (m BGL)	Comment	Stratum
BH7	7.7	Rose to 5.2m within 20 minutes.	London Clay Formation
	15.0	Rose to 9.0m within 20 minutes.	London Clay Formation
	4.1 4.3 3.4	Water depths recorded at start of shift on 25 th , 29 th and 3 th April 2019 respectively.	River Terrace Deposits London Clay Formation
	4.5 4.6 5.8	Water depths recorded at start of shift on 3 rd , 7 th and 8 th May 2019 respectively.	River Terrace Deposits London Clay Formation

13 Field Tests

13.1 DCP CBR (TRL Method)

DCP CBR tests (following the TRL Method) were undertaken within trial pits at a depth of 1.0m bgl. Where trial pits were deeper than this (TP7, TP8, PT1, PT2 & PT3) an additional DCP CBR was undertaken at 1.5m bgl.

Tests were also undertaken from ground level adjacent to TP1-8.

The results of the DCP CBR testing are attached in Appendix B.

13.2 Modulus of Subgrade Reaction

The modulus of subgrade reaction (K_{762} value) was determined using the testing procedure outlined in Mott MacDonald's document ref 400602-MMD-00-XX-SP-Z-0004 'Determination of Modulus of Sub-Grade Reaction'.

Tests were undertaken on the River Terrace Deposits at a depth of 1.0m in TP1 – TP6. The results are attached in Appendix B.

13.3 Soakage Testing

Soakage testing was undertaken in PT1, PT2 and PT3 in accordance with BRE365. The results are attached in Appendix B.

The trial pits were gravel-filled due to the anticipated instability of the River Terrace Deposits during testing.

13.4 Permeability Testing

A falling head permeability test was undertaken within the installation in BH8 following the intrusive investigation. During the test it was not possible to raise the head above the standing water level. The test results sheet is included in Appendix B.

D LABORATORY TEST RESULTS

14 Geotechnical Laboratory Tests

The following laboratory testing was carried out on selected samples in order to aid material classification and characterise soil properties as specified by Mott MacDonald. The test method references and results are given in Appendix D.

Laboratory Test	Number of Samples Tested	Stratum
BRE Suite D Brownfield Site – Pyrite Present	7	River Terrace Deposits, London Clay Formation
Particle Size Distribution (wet sieve)	11	River Terrace Deposits, London Clay Formation
Particle Size Distribution (pipette)	10	River Terrace Deposits, London Clay Formation
Atterberg Limits	13	River Terrace Deposits, London Clay Formation
Unconsolidated Undrained Triaxial	9	London Clay Formation
One-dimensional Consolidation	1	London Clay Formation
Swelling Pressure Test	1	London Clay Formation
Moisture Content	13	River Terrace Deposits, London Clay Formation

15 Geo-Environmental Laboratory Tests

The following geo-environmental laboratory testing was carried out on samples selected by Mott MacDonald. The test results are attached in Appendix E.

Laboratory Test	Number of Samples Tested	Stratum
Mott MacDonald Comprehensive Soil Suite	16	River Terrace Deposits
Mott MacDonald Comprehensive Leachate Suite	9	River Terrace Deposits

Laboratory Test	Number of Samples Tested	Stratum
Mott MacDonald Comprehensive Water Suite	2	Groundwater from BH8

E GROUNDWATER MONITORING

16 Standpipe Installation (BH8)

The groundwater level within BH8 was recorded on monitoring visits following the intrusive investigation as shown in the table below:

Date	Time	Groundwater level (m BGL)	Groundwater level (mAOD)
23 rd May 2019	23:30	4.21	9.52
30 th May 2019	09:54	4.22	9.51
6 th June 2019	Visit cancelled by agreement with Dyer and Butler Ltd. and Mott MacDonald		
13 th June 2019	22:40	4.20	9.53
20 th June 2019	11:31	4.12	9.61
27 th June 2019	11:37	4.16	9.62
4 th July 2019	22:58	4.15	9.58
11 th July 2019	10:50	4.16	9.57

The standpipe within BH8 was installed at a depth of about 5.0m bgl, with the response zone within the River Terrace Deposits.

17 Vibrating Wire Piezometers

The interpreted groundwater levels recorded from the two vibrating wire piezometers within BH7 are shown in the tables below. Calibration records are included within Appendix F.

17.1 Piezometer Installation (8m bgl)

Date	Time	Interpreted piezometric groundwater level (m BGL)	Interpreted piezometric groundwater level (m AOD)
1 st May 2019 (post-install)	-	3.54	9.58
19 th May 2019	-	3.97	9.15
24 th May 2019	01:36	Data not available	
30 th May 2019	10:05	3.68	9.44
6 th June 2019	Visit cancelled by agreement with Dyer and Butler Ltd. and Mott MacDonald		

Date	Time	Interpreted piezometric groundwater level (m BGL)	Interpreted piezometric groundwater level (m AOD)
13 th June 2019	23:49	3.80	9.32
20 th June 2019	11:47	3.67	9.45
27 th June 2019	11:30	3.53	9.59
5 th July 2019	00:14	3.63	9.49
11 th July 2019	10:57	3.72	9.40

17.2 Piezometer Installation (14m bgl)

Date	Time	Interpreted piezometric groundwater level (m BGL)	Interpreted piezometric groundwater level (m AOD)
1 st May 2019 (post-install)	-	3.94	9.18
19 th May 2019	-	4.11	9.01
24 th May 2019	01:30	4.05	9.07
30 th May 2019	09:54	4.05	9.07
6 th June 2019	Visit cancelled by agreement with Dyer and Butler Ltd. and Mott MacDonald		
13 th June 2019	23:47	4.16	8.96
20 th June 2019	11:49	4.07	9.05
27 th June 2019	11:28	3.93	9.19
5 th July 2019	00:12	4.03	9.09
11 th July 2019	10:55	4.16	8.96

REFERENCES

- [1] BSI Standards, "BS 5930 Code of practice for ground investigations," 2015.
- [2] BSI Standards, "BS10175 Investigation of potentially contaminated sites – Code of practice," 2013.
- [3] BSI Standards, "BS 3882:2015 Specification for Topsoil," 2015.
- [4] BSI Standards, "BS10175 Investigation of potentially contaminated sites – Code of practice," 2013.
- [5] BSI Standards, "BS ISO 18400-100:2017 Soil quality. Sampling. Guidance on the selection of sampling standards," 2017.
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- [8] BSI Standards, "BS ISO 18400-105:2017 Soil quality. Sampling. Packaging, transport, storage and preservation of samples," 2017.
- [9] BSI Standards, "BS ISO 18400-107:2017 Soil quality. Sampling. Recording and reporting," 2017.
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- [11] BSI Standards, "BS EN ISO 22475-1:2006 Geotechnical investigation and testing. Sampling methods and groundwater measurements. Technical principles for execution.," 2006.
- [12] Building Research Establishment (BRE), "DG365 Soakaway Design," 2016.
- [13] BSI Standards, "BS EN ISO 22282-2:2012 Geotechnical investigation and testing. Geohydraulic testing. Water permeability tests in a borehole using open systems," 2012.
- [14] CIRIA, "C574 Engineering in Chalk," 2002.



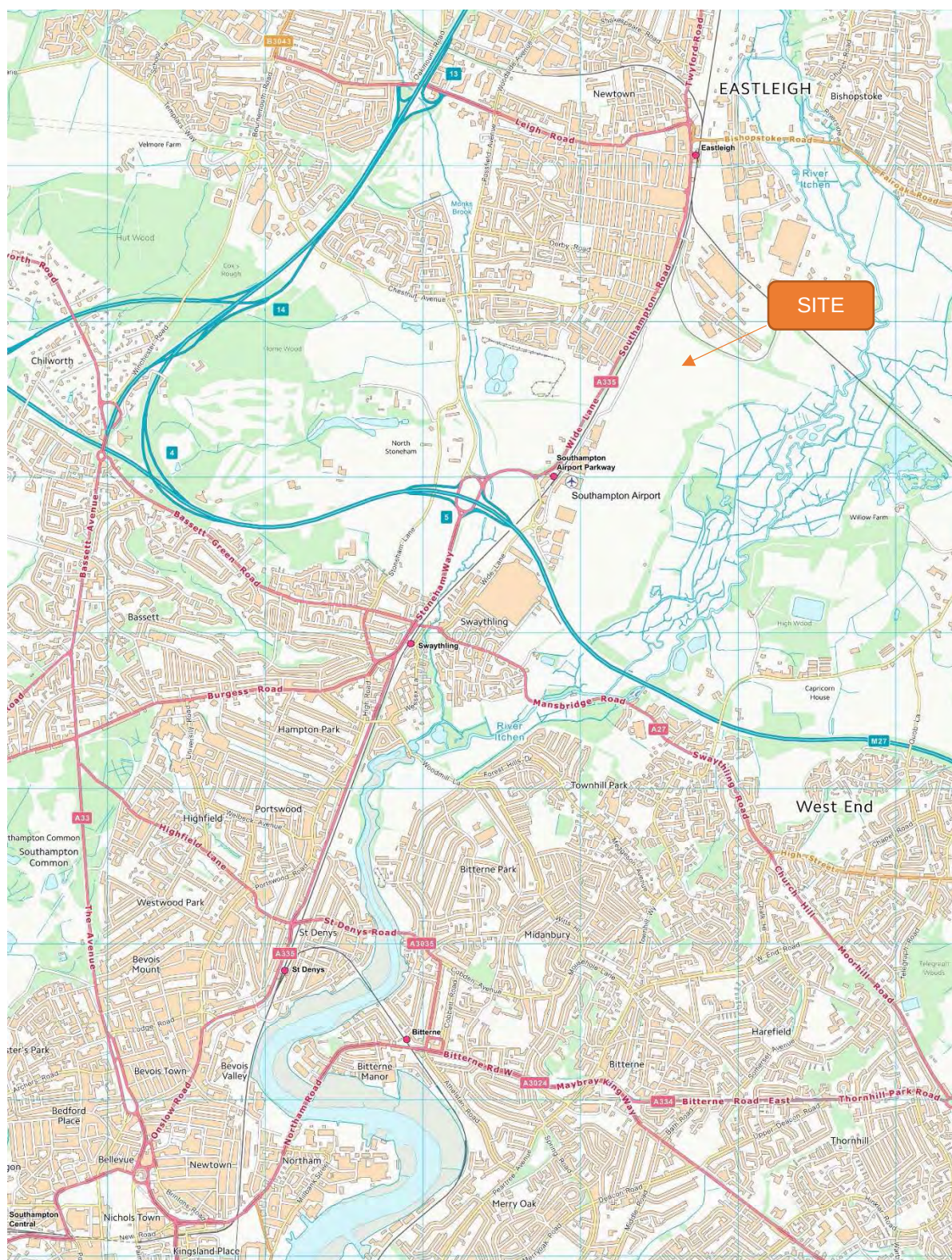
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APPENDIX A

Site Plans and Exploratory
Hole Logs

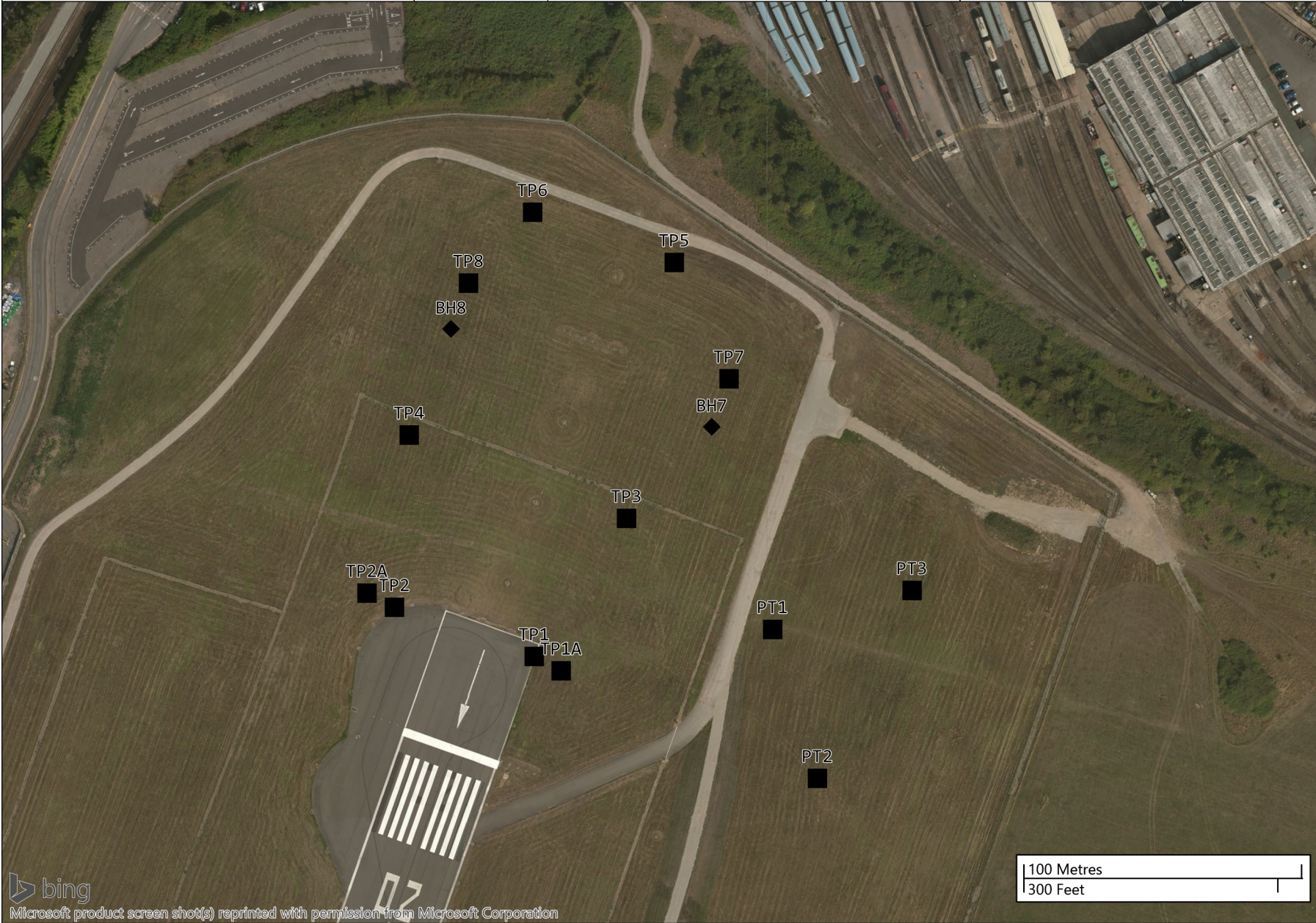




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Site:	Southampton Runway Extensions	Project ID	J14044
Figure 1	Site Location Plan	Date:	29 th April 2019

Project Name:	Southampton Runway Extension	Project ID:	J14044	Exploratory Hole Location Plan
Location:	Southampton International Airport	Figure No:	2	
Client:	Dyer & Butler Ltd	Scale:	1:2000	



Legend Key

- Trial Pits - Trial Pits
- ◆ Boreholes - Boreholes

Key to Exploratory Hole Logs, Plans and Sections

Backfill Symbols		Pipe Symbols		Principal Soil Types		Principal Rock Types		Drilling Records	
Arisings		Plain Pipe		Topsoil		Mudstone		Water Strike	
Concrete		Slotted Pipe		Made Ground		Claystone		Depth Water Rose	
Blacktop		Piezometer		Clay		Siltstone		Total Core Recovery (%) [TCR]	
Bentonite		Piezometer Tip		Silt		Sandstone		Solid Core Recovery (%) [SCR]	
Gravel Filter		Filter Tip		Sand		Limestone		Rock Quality Index (%) RQD]	
Sand Filter		Extensometer		Gravel		Chalk		Fracture Index (fractures / m) [FI]	
		Inclinometers		Peat					

All soil and rock descriptions are in general accordance with BS5930 2015, BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. Chalk descriptions are also based on CIRIA C574 and "Logging the Chalk – R.N. Mortimer 2015". The Geology Code is only provided where a positive identification of the sample strata has been made.

Location / Method Identifiers		In-situ Test Location / Method	
BH	Borehole (undefined)	DP	Dynamic Probe
CP	Cable Percussive	CPT	Cone Penetration Test
RC	Rotary Core	CBR	In-situ CBR Test
RO	Rotary Open Hole	DCP	CBR using Dynamic Cone Penetrometer
ODC	Rotary Odex/Symmetrix drilling cased	CBRT	CBR using TRL Probe
CP+RC	Cable Percussive to Rotary Core	PB	Plate Bearing Test
SNC	Sonic	SPT (S)	Standard Penetration Test (Split Barrel Sampler)
CFA	Continuous Flight Auger	SPT (C)	Standard Penetration Test (Solid Cone)
FA	Flight Auger	N	SPT Result
VC	Vibro Core	-/-	Blows/Penetration (mm) after seating drive
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core	-*/-	Total Blows / Penetration (mm)
WLS	Windowless Sampler	()	Extrapolated Value
WS	Window Sampler	PPT	Perth Penetration (In-House Method - Equivalent N Value)
HA	Hand Auger	HP / UCS	Strength from Hand Penetrometer (kN/m ²)
C	Road / Pavement Core	IVN	Strength from Hand Vane ((kN/m ²)
IP	Inspection Pit (Hand Excavation)	PID	Photo Ionisation Detector (ppm)
TP	Trial Pit (Machine Excavated)	MEXE	Mexi-Cone CBR (%)
OP	Observation Pit (Supported Excavation Hand or Machine)		

Samples / Test Type		Samples / Test Type	
B	Bulk Sample	SPTLS	Standard Penetration Test Split Barrel Sample
BLK	Block Sample	TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
C	Core Sample	U	Undisturbed Open Drive Sample (blows to take)
CBRS	CBR Mould Sample	UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
D	Small Disturbed Sample	W	Water Sample (Geotechnical)
ES	Environmental Sample (Soil)	SP	Sample from Stockpile
EW	Environmental Sample (Water)	P	Piston Sample
GS	Environmental Sample (Gas)	AMAL	Amalgamated Sample

 www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020				Start - End Date		Project ID:		Hole Type:		BH7			
				24/04/2019		J14044		CP		Sheet 1 of 2			
Project Name:				Southampton Runway Extension		Remarks:		Co-ordinates:		Level:		Logger:	
								445637E - 117843N		13.12		TRL/JMW	
Location:				Southampton International Airport		Hole set out by Dyer & Butler Ltd. SPT Hammer SEDS 10. Vibrating wire piezometers installed upon completion, with tips at 8m bgl and 14m bgl. The tips were installed within a filter sand cell, with the remainder of the borehole backfilled with cement-bentonite grout and bentonite granules as specified by the Engineers.							
Client:				Dyer & Butler Ltd.									
Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
		Depth (m bgl)	Type	Results									
		0.10	B ES		12.9	(0.20)		0.20	TOPSOIL: firm brown silty sandy CLAY with roots. Firm yellowish brown mottled greyish brown silty sandy CLAY. Occasionally slightly gravelly. Gravel is fine to coarse subangular to subrounded flint. RIVER TERRACE DEPOSITS			1	
		0.50	B ES		(1.00)								
		1.00	B ES			11.9	(0.60)		1.20	Soft brown silty CLAY. RIVER TERRACE DEPOSITS			
						11.3			1.80	Medium dense mid brown very sandy clayey GRAVEL. Gravel is fine to medium subangular to subrounded flint. Sand is medium to coarse. RIVER TERRACE DEPOSITS			2
		2.20 2.20 - 2.70 2.20	D B SPT(C)	N=13 (4,4/3,4,3,3)		(1.20)							
					10.1			3.00	Medium dense light brown clayey GRAVEL. Gravel is fine to coarse subangular flint and fine subrounded chalk. RIVER TERRACE DEPOSITS			3	
		3.20 3.20 - 3.70 3.20	ES B SPT(C)	N=24 (4,4/6,6,6,6)	9.5	(0.60)		3.60	Medium dense mid brown and white slightly sandy GRAVEL. Gravel is fine to medium rounded to subangular flint and rounded chalk. Sand is coarse. RIVER TERRACE DEPOSITS			4	
		4.20 - 4.70 4.20	B SPT(C)	N=14 (1,3/3,3,4,4)		(1.80)							5
		5.20 - 5.70 5.20	B SPT(C)	N=15 (1,2/2,4,4,5)	7.7			5.40	Firm becoming stiff grey fissured silty CLAY with with frequent thick laminae of light grey silty fine sand. LONDON CLAY			6	
		5.70	W										
		6.00	D ES										
		6.50 - 6.95 6.50	HP SPTLS SPT(S)	UCS(kPa)=150 N=17 (2,3/3,4,4,6)									
		7.00 - 7.50	B										7
		8.00 - 8.45	U	Ublow=25									8
		8.50	D										
		9.00	D							At 19.0m: Sample water-softened, occasional sand interlaminae.			9
		9.50 - 9.95 9.50	SPTLS SPT(S)	N=27 (3,5/7,7,6,7)									10
Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
13.00 20.00	200 150	13.00 15.00	200 150	26-04-2019 30-04-2019	7.70 15.00	5.50 13.00		5.20 9.00	20 20				

 www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020					Start - End Date		Project ID:		Hole Type:		BH7		
					24/04/2019		J14044		CP		Sheet 2 of 2		
Project Name:		Southampton Runway Extension			Remarks:		Co-ordinates:			Level:		Logger:	
							445637E - 117843N			13.12		TRL/JMW	
Location:		Southampton International Airport			Hole set out by Dyer & Butler Ltd. SPT Hammer SEDS 10. Vibrating wire piezometers installed upon completion, with tips at 8m bgl and 14m bgl. The tips were installed within a filter sand cell, with the remainder of the borehole backfilled with cement-bentonite grout and bentonite granules as specified by the Engineers.								
Client:		Dyer & Butler Ltd.											
Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
		Depth (m bgl)	Type	Results									
 		10.50	D		-6.9	(14.60)			Firm becoming stiff grey fissured silty CLAY with frequent thick laminae of light grey silty fine sand. LONDON CLAY				
		11.00 - 11.45	U	Ublow=30									
		11.50	D										
		12.00	D HP	UCS(kPa)=190									
		12.50 - 12.95	SPTLS										
		12.50	SPT(S)	N=20 (3,4/5,4,5,6)									
		13.50 - 13.95	U	Ublow=55									
		14.00	D HP	UCS(kPa)=580									
		14.50 - 14.95	SPTLS										
		14.50	SPT(S)	N=41 (6,6/10,10,10,11)									
		15.00	D HP	UCS(kPa)=450									
		15.50 - 15.95	U	Ublow=45									
		16.00	D HP	UCS(kPa)=340									
		16.50 - 16.95	SPTLS										
		16.50	SPT(S)	N=34 (6,6/6,10,8,10)									
		17.00	D										
		17.50 - 17.95	U	Ublow=70									
17.50 - 18.00	B												
18.50 - 18.95	SPTLS												
18.50	SPT(S)	N=35 (6,7/10,9,8,8)											
19.00	D												
19.50 - 19.95	U	Ublow=35											
19.50 - 20.00	B												
19.95	D												
									End of Borehole at 20.00m				
Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
13.00	200	13.00	200	26-04-2019	7.70	5.50		5.20	20				
20.00	150	15.00	150	30-04-2019	15.00	13.00		9.00	20				

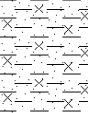
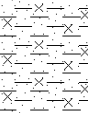
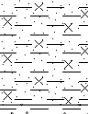
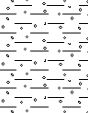
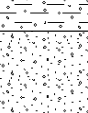
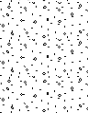
				Start - End Date:		Project ID:		Machine Type:		BH7		
				24/04/2019		J14044		Dando 2000		Sheet 1 of 1		
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020												
Project Name:		Southampton Runway Extension			Remarks:		Co-ordinates:		Level (m AOD)		Logger:	
							E445637 - N117843		13.12		TRL/JMW	
Location:		Southampton International Airport			Hole set out by Dyer & Butler Ltd. SPT Hammer SEDS 10. Vibrating wire piezometers installed upon completion, with tips at 8m bgl and 14m bgl. The tips were installed within a filter sand cell, with the remainder of the borehole backfilled with cement-bentonite grout and bentonite granules as specified by the Engineers.							
Client		Dyer & Butler Ltd.										
Drilling Progress by Time												
Date and Time		Depth (m bgl)	Casing (m bgl)	Water (m bgl)	Remarks							
30/01/2019 23:00:00		18.00	15.00	3.4	Start of shift.							
25/04/2019 22:30:00		4.70	4.70	4.1	Start of shift.							
29/04/2019 23:00:00		13.50	8.50	4.3	Start of shift.							
Rotary Coring Information												
Depth Top	Depth Base	Diameter	Duration	TCR	SCR	RQD	Remarks					

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				Start - End Date: 26/04/2019 - 09/05/2019		Project ID: J14044		Machine Type: Dando 2000		BH8 Sheet 1 of 1	
www.southern-testing.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020											
Project Name: Southampton Runway Extension				Remarks:		Co-ordinates: E445542 - N117877		Level (m AOD): 13.68		Logger: JMW	
Location: Southampton International Airport				Hole set out by Dyer & Butler Ltd. SPT Hammer SEDS 10. 50mm standpipe installed upon completion. GL to 3.5m: bentonite. 3.5m to 5.0m: gravel. GL to 4.0m: plain pipe. 4.0m to 5.0m: slotted pipe as specified by the Engineers. No water strikes recorded.							
Client: Dyer & Butler Ltd.											
Drilling Progress by Time											
Date and Time		Depth (m bgl)	Casing (m bgl)	Water (m bgl)	Remarks						
03/05/2019 22:45:00		7.50	6.00	4.5	Start of shift.						
07/05/2019 22:30:00		11.00	9.00	4.6	Start of shift.						
08/05/2019 22:30:00		15.50	9.00	5.8	Start of shift.						
Rotary Coring Information											
Depth Top	Depth Base	Diameter	Duration	TCR	SCR	RQD	Remarks				
Standard Penetration Test Summary											
Depth Top (m bgl)	Test Type	Depth Casing (m bgl)	Depth Water (m bgl)	Reported Result							
2.50	C	2.50	1.0	N=41 (7,7/9,10,12,10)							
3.50	C	3.00	3.0	N=26 (2,4/6,6,7,7)							
4.50	C	4.00	None recorded	N=14 (3,4/3,4,3,4)							
5.50	C	5.50	2.5	N=13 (1,2/2,3,5,3)							
7.50	S	6.00	5.5	N=28 (2,4/7,7,6,8)							
9.50	S	7.50	5.5	N=25 (3,5/6,7,6,6)							
11.50	S	9.00	4.5	N=50 (4,7/50 for 230mm)							
13.50	S	10.50	7.5	50 (5,7/50 for 190mm)							
15.50	S	13.50	9.0	50 (7,12/50 for 185mm)							
17.50	S	16.50	10.0	N=35 (5,7/8,9,9,9)							
19.50	S	16.50	9.50	N=35 (7,7/8,9,9,9)							

				Start - End Date: 24/04/2019		Project ID: J14044		Machine Type: 21t tracked		PT2 Sheet 1 of 1	
Project Name: Southampton Runway Extension				Remarks:		Co-ordinates: E 445676 - N 117716		Level (m AOD): 12.81		Logger: TL	
Location: Southampton International Airport				Hole set out by Dyer & Butler Ltd. Hole excavated by D&B with STL in attendance.							
Client: Dyer & Butler Ltd.											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.30	B		12.6	(0.20)		0.20	TOPSOIL: firm brown silty sandy CLAY with roots.	
0.50	B						Firm to stiff yellowish brown mottled greyish brown silty sandy CLAY. Sand is fine. Rarely to occasionally slightly gravelly. Gravel is fine to coarse subangular to subrounded flint.	
	ES						RIVER TERRACE DEPOSITS	
1.00	B			(1.10)				1
1.50	B		11.5	(0.50)		1.30	Stiff brown gravelly CLAY. Gravel is fine to coarse subangular to subrounded flint. With occasional pockets of sandy gravelly CLAY.	
	ES						RIVER TERRACE DEPOSITS	
2.10	B		11.0	(1.20)		1.80	Yellowish brown gravelly fine to coarse SAND. Gravel is fine to coarse subangular to subrounded flint.	2
	ES						RIVER TERRACE DEPOSITS	
			9.8			3.00	Pit terminated at 3.000m.	3
								4
								5

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:	0.55	Pit stable on completion.		Dry.	
Length:	5.80				
Depth:	3.00				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
Depth (m)	Type	Results									
0.10	B ES	P= 105	12.4	(0.25)		0.25	TOPSOIL: firm brown sandy SILT/CLAY with rootlets.	1			
0.30	B ES						12.0		(0.45)	0.70	Firm brown sandy SILT/CLAY, with rootlets and rare to occasional fine to coarse subangular flint gravel. RIVER TERRACE DEPOSITS
0.50	B ES IVN										11.5
1.00	B ES IVN	9.5	(2.00)	3.20	Light yellowish brown gravelly fine to coarse SAND. Gravel is fine to coarse subrounded to subangular flint. Rare flint cobbles. RIVER TERRACE DEPOSITS	3					
1.50	B ES				P= 100		11.5	1.20	Pit terminated at 3.200m.	4	
2.00	B										P= 100
2.50	B ES	P= 100	11.5	1.20	Pit terminated at 3.200m.	5					
Pit Dimension (m)							Pit Stability:				Water Strikes:
Width:		2.30	Slight instability below 1.5m.				Dry.				
Length:		4.10									
Depth:		1.50									

Logger:

TRL

Hole set out by Dyer & Butler Ltd. Hole excavated by D&B with STL in attendance. Hole was dry upon completion. Hand dug pit in original TP1 location. DCP CBR (TRL Method) undertaken at ground level, and at base of pit.

Client:	Dyer & Butler Ltd.
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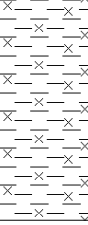
[illegible]

Water Strikes:

	Dry.
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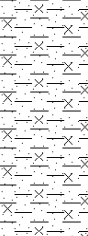
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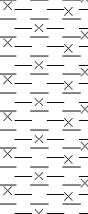
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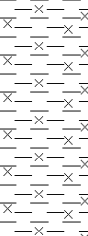
				Start - End Date: 15/04/2019 - 16/04/2019		Project ID: J14044		Machine Type: Komatsu 21t		TP1A Sheet 1 of 1						
Project Name: Southampton Runway Extension				Remarks:		Co-ordinates: E 445583 - N 117754		Level (m AOD): 13.24		Logger: TRL						
Location: Southampton International Airport				Hole set out by Dyer & Butler Ltd. Moved east by approx. 10m due to presence of utilities. Hole excavated by D&B with STL in attendance. Plate load test undertaken at base of trial pit. Hole reinstated by D&B. Hole was dry upon completion. DCP CBR (TRL Method) undertaken at base of pit.												
Client: Dyer & Butler Ltd.																
Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description									
Depth (m)	Type	Results														
0.10	D	P= 90	13.0	(0.25)		0.25	TOPSOIL: firm brown SILT/CLAY with rootlets. Rarely slightly gravelly, comprising fine to coarse subangular flint.									
0.30	D						Firm to stiff yellowish brown SILT/CLAY. RIVER TERRACE DEPOSITS									
0.50	D															
	ES	P= 105		(0.75)			0.6m to 1.0m: becoming silty slightly sandy CLAY. Sand is fine.									
	IVN						Pit terminated at 1.000m.									
1.00	D											P= 85	12.2			1.00
	ES															
	IVN															
Pit Dimension (m)			Pit Stability:				Water Strikes:									
Width:		3.90	Stable				Dry.									
Length:		5.80														
Depth:		1.00														

				Start - End Date: 16/04/2019 - 17/04/2019		Project ID: J14044		Machine Type: Komatsu 21t		TP2A Sheet 1 of 1	
Project Name: Southampton Runway Extension				Remarks:		Co-ordinates: E 445512 - N 117782		Level (m AOD): 13.60		Logger: TRL	
Location: Southampton International Airport				Hole set out by Dyer & Butler Ltd. Moved west by approx. 10m due to presence of utilities. Hole excavated by D&B with STL in attendance. Plate load test undertaken at base of trial pit. Hole reinstated by D&B. Hole was dry upon completion. DCP CBR (TRL Method) undertaken at ground level, and at base of pit.							
Client: Dyer & Butler Ltd.											
Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
Depth (m)	Type	Results									
0.10	D	P= 135	13.4	(0.25)		0.25	TOPSOIL: Firm brown SILT/CLAY with rootlets		1		
0.30	D						Firm to stiff brown to yellowish brown silty CLAY to SILT/CLAY. RIVER TERRACE DEPOSITS 0.4m to 0.6m: becoming silty slightly sandy CLAY. 0.6m to 1.0m: sandy (fine), and rarely slightly gravelly. Gravel is fine to medium subangular flint.				
0.50	D										
	ES	P= 95		(0.75)					2		
	IVN										
	D	P= 115	12.6			1.00	Pit terminated at 1.000m.		3		
	ES										
	IVN										
									4		
									5		
Pit Dimension (m)			Pit Stability:				Water Strikes:				
Width:	3.80		Stable				Dry.				
Length:	5.50										
Depth:	1.00										

Depth:	1.00
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				Start - End Date: 23/04/2019 - 24/04/2019		Project ID: J14044		Machine Type: 21t Tracked.		TP4 Sheet 1 of 1	
Project Name: Southampton Runway Extension				Remarks:		Co-ordinates: E 445527 - N 117839		Level (m AOD): 13.71		Logger: TR:	
Location: Southampton International Airport				Hole set out by Dyer & Butler Ltd. Hole excavated by D&B with STL in attendance. Plate load test undertaken at base of trial pit. Hole reinstated by D&B. Hole was dry upon completion. DCP CBR (TRL Method) undertaken at ground level, and at base of pit.							
Client: Dyer & Butler Ltd.											
Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
Depth (m)	Type	Results									
0.10	B	P= 100	13.5	(0.20)		0.20	TOPSOIL: firm brown silty sandy CLAY. Sand is fine. With rootlets. Rarely gravelly. Gravel is fine to coarse subrounded flint. Firm brown and greyish brown silty sandy CLAY. Sand is fine. RIVER TERRACE DEPOSITS 0.35 to 1.0m: yellowish brown mottled brown.		1		
0.30	B										
0.50	B										
	ES	P= 115		(0.80)							
	IVN										
1.00	B	P= 110	12.7			1.00	Pit terminated at 1.000m.		5		
	ES										
	IVN										
Pit Dimension (m)			Pit Stability:				Water Strikes:				
Width:		3.20	Stable.				Dry.				
Length:		5.50									
Depth:		1.00									

				Start - End Date: 24/04/2019 - 25/04/2019		Project ID: J14044		Machine Type: 		TP5 Sheet 1 of 1	
Project Name: Southampton Runway Extension				Remarks:		Co-ordinates: E 445622 - N 117902		Level (m AOD): 13.20		Logger: TL	
Location: Southampton International Airport				Hole set out by Dyer & Butler Ltd. Hole excavated by D&B with STL in attendance. DCP CBR (TRL Method) undertaken at ground level, and at base of pit.							
Client: Dyer & Butler Ltd.											
Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
Depth (m)	Type	Results									
0.10	B		13.0	(0.25)		0.25	TOPSOIL: Firm brown silty CLAY. Rarely slightly gravelly. Gravel is fine to coarse subangular to subrounded flint. With roots.		1		
0.30	B						Firm to stiff yellowish brown silty CLAY/ clayey SILT.				
0.50	B						RIVER TERRACE DEPOSITS				
	ES			(0.75)			0.5m to 1.0m: Becoming silty CLAY.		2		
	ES						0.8m to 1.0m: With pockets of silty gravel. Gravel is fine to coarse subangular flint.				
1.00	B		12.2			1.00	Pit terminated at 1.000m.		3		
	ES										
									4		
									5		
Pit Dimension (m)			Pit Stability:				Water Strikes:				
Width:		3.20	Pit stable on completion.				Dry				
Length:		5.50									
Depth:		1.00									

				Start - End Date: 14/04/2019 - 15/04/2019		Project ID: J14044		Machine Type: Komatsu 21t		TP6 Sheet 1 of 1		
Project Name: Southampton Runway Extension				Remarks:		Co-ordinates: E 445571 - N 117920		Level (m AOD): 13.50		Logger: TRL		
Location: Southampton International Airport				Hole set out by Dyer & Butler Ltd. Hole excavated by D&B with STL in attendance. Plate load test undertaken at base of trial pit. Hole reinstated by D&B. Hole was dry upon completion. DCP CBR (TRL Method) undertaken at ground level, and at base of pit.								
Client: Dyer & Butler Ltd.												
Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description					
Depth (m)	Type	Results										
0.10	D	P= 60	13.3	(0.20)		0.20	TOPSOIL: Firm brown silty slightly gravelly CLAY. Gravel is fine to coarse subangular flint.					1 2 3 4 5
0.30	D						Firm yellowish brown silty CLAY. Rarely slightly gravelly. Gravel is fine to coarse subangular flint.					
0.50	D						RIVER TERRACE DEPOSITS 0.5 to 1.0m: becoming firm to stiff.					
	ES	P= 105		(0.80)			Pit terminated at 1.000m.					
	IVN											
1.00	D											P= 95
	ES											
	IVN											
Pit Dimension (m)			Pit Stability:				Water Strikes:					
Width:		3.80	Stable				Dry.					
Length:		5.90										
Depth:		1.00										

Logger:

JMW

Hole set out by Dyer & Butler Ltd. Hole excavated by D&B with STL in attendance. Hole reinstated by D&B. Hole was dry upon completion. DCP CBR (TRL Method) undertaken at ground level, at 1.0m bgl, and at 1.5m bgl.

Depth:	3.50
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Logger:

JMW

Hole set out by Dyer & Butler Ltd. Hole excavated by D&B with STL in attendance. DCP CBR (TRL Method) undertaken at ground level, at 1.0m bgl, and at 1.5m bgl.

Dyer & Butler Ltd.

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description			
Depth (m)	Type	Results								
0.10	B	UCS(kPa)=220	13.2	(0.30)		0.30	TOPSOIL: Grass over dark brown slightly sandy silty CLAY with abundant rootlets. Rare gravel sized brick.	1		
0.30	B						ES			Stiff mid brown mottled grey CLAY/SILT. RIVER TERRACE DEPOSITS
0.50	B									
	ES									
	HP	UCS(kPa)=240		(1.10)			0.9m to 1.4m: becoming slightly gravelly. Gravel is fine to medium subrounded.			
0.90	B									
1.00	ES									
	B		12.1	(0.20)		1.40	Mid to dark brown slightly sandy very clayey GRAVEL. Gravel is fine to coarse subrounded to angular flint. Sand is coarse flint. RIVER TERRACE DEPOSITS	2		
1.50	ES									
			11.9			1.60	Light to mid brown slightly sandy clayey GRAVEL with rare flint cobbles. Gravel is fine to coarse subangular to angular flint. Sand is medium to coarse. RIVER TERRACE DEPOSITS			
2.00	B			(0.80)		2.40	Mid to orange brown slightly sandy silty GRAVEL. Gravel is fine to medium angular flint. Sand is fine to medium. RIVER TERRACE DEPOSITS	3		
	ES									
			11.1				2.8m to 3.5m: Light brown, with frequent cobbles of flint.			
2.50	B			(1.10)		3.50	Pit terminated at 3.500m.	4		
	ES									
3.00	B			(1.10)				5		
	ES									
3.50	B		10.0	(1.10)						
	ES									
Pit Dimension (m)			Pit Stability:				Water Strikes:			
Width:	0.60		Some spalling of pit sides below 1.6mbgl.				Dry.			
Length:	3.50									
Depth:	3.50									



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APPENDIX B

Field Sampling and In-Situ Test Methods and Results



B

Soil and Rock Descriptions

All soil and rock descriptions are in general accordance with BS5930 Ref [1].

Anthropogenic soils ('made ground' or 'fill') describe materials which have been placed by man and can be divided into those composed of reworked natural soils and those composed of or containing man-made materials. 'Fill' is used to describe material placed in a controlled manner and 'made ground' is used to describe materials placed without strict engineering control.

The classification of materials such as topsoil is based on visual description only and should not be interpreted to mean that the material complies with criteria used in BS 3882 Ref [3].

The geology code is only provided on logs where a positive identification of the sample strata has been made.

Inspection Pit

Inspection pits are hand excavated from the surface (maximum depth 1.2 – 1.5m) using appropriate tools to locate and avoid existing buried services at exploratory hole positions. They are also regularly used as part of investigations on existing structures to expose and determine foundation detail.

Trial Pits and Trenches

Trial pits and trenches are unsupported excavations, mechanically excavated by machine to the required depth to enable visual examination, in situ testing and sampling as required from outside the excavation.

Hand Penetrometer Test

The handheld soil penetrometer consists of a spring loaded and calibrated plunger which is forced into cohesive soil. A reading of unconfined compression strength (equal to twice cohesion) is given on a calibrated scale. The average of a set of three readings shall be recorded.

In common with other hand methods of strength assessment it does not give an accurate indication of bearing capacity in stiff or fissured soils, because of the small test area.

Hand Vane Test

The hand shear vane test provides a means of determining an estimate of the undrained shear strength of the tested soil. The apparatus consists of a cruciform vane on an extensible shaft. The vane is inserted into the cohesive soil and torque applied to the shaft until the soil fails, as indicated by a constant or dropping torque, by shearing on a circumscribing cylindrical surface. The average of a set of three readings shall be recorded.

It should be noted that it does not give an accurate indication of bearing capacity in stiff or fissured soils, because of the small test area.

Plate Bearing Test

This test is specified within BS 1377 Part 9, and is generally undertaken within an excavation made to the required depth. In the test, a steel plate usually 300 to 750mm in diameter, is loaded by a hydraulic jack in line with a calibrated load cell bearing against a dead load. Settlement readings are taken at regular time intervals for each load increment, by means of gauges. When the settlement under a particular load is substantially complete the load is increased and further settlement readings taken. On conclusion of the series of load increments, the load is taken off and recovery monitored. Graphs of deflection against time, and maximum settlement under each loading stage against load are drawn.

Environmental Samples

Environmental samples were taken from the boreholes at regular intervals in the made ground and natural soils as indicated on the exploratory hole logs. The sampling strategy was in general accordance with BS10175 Ref [4] and BS ISO 18400 Refs [5], [6], [7], [8] & [9].

These samples were collected and stored in glass jars or plastic pots and transferred to the laboratory in cool boxes as appropriate to the proposed laboratory testing.

Dynamic Cone Penetrometer (DCP) Test - TRL Method

The Dynamic Cone Penetrometer is a hand held instrument which can be used for the assessment of the in situ strength of existing flexible pavements constructed with unbound materials. Where the pavement layers have different strengths, the boundaries between them can be identified and the thickness of each layer determined.

The test is undertaken to the methodology outlined within TRL technical Information Note, but involves an 8 Kg hammer dropping through a height of 575mm and a 60° cone having a maximum diameter of 20mm. The resulting penetration of the rod is measured and the number of blows recorded for a penetration of about 10mm. After the test the DCP is carefully withdrawn.

A plot of the cumulative number of blows versus depth penetrated is drawn. This plot usually takes the form of a series of straight lines, the slopes of which are measured and expressed as penetration in mm per blow. The CBR Value is calculated from the mm/blow using a relationship developed by the Transport Research Laboratory Ref [10].

Disturbed Samples

Disturbed samples were taken from exploratory holes in general accordance with BS 5930 [1] and BS EN ISO 22475-1 Ref [11] as required and stored in appropriately labelled containers. Details of the type, size and depth of sample will be recorded within the exploratory hole record. Such samples can be regarded as being between Class 5 up to Class 3 quality depending upon their method of sampling.

Soakage Tests (after BRE DG365 2016)

The BRE DG365 Ref [12] paper on soakaway design allows for the design of trench soakaways as well as traditional square and circular soakaways.

The test to measure the soil infiltration rate is carried out in pits which are excavated to the full depth of the proposed soakaway. The trial pits are filled and allowed to drain to empty or near empty, three times, on the same day or on consecutive days. Water levels are recorded against time. Where the sides are unstable the pit should be filled with granular material to provide stability during the test.

Calculated soakage rates are expressed as l/m²/minute, which is a convenient rate to use. The BRE use a unit of m/sec, which is the value in l/m²/minute divided by 60,000.

Monitoring Well

A groundwater and/or ground gas monitoring well consists of a perforated pipe, which is installed in the ground. The standpipe is typically 50mm nominal in diameter and is installed in a lined borehole. It is perforated from the base with a sand/gravel surround through the soil horizon of interest to an appropriate depth below ground level. Above this there is a bentonite seal with solid pipework and is provided with an end cap or a gas valve at the top as appropriate.

Groundwater Monitoring – Dip Meter

The dip meter is used to measure standing water levels within boreholes. The probe is lowered into the borehole until the meter detects the groundwater with an audible 'beep'. The level is then read from the tape.

In-situ Permeability Tests (after BS EN ISO 22282)

Testing within boreholes can either be a variable head test (falling or rising head) where the hydraulic pressure within the borehole during the test is either increased or lowered or a constant head where the hydraulic pressure is held constant. During boring when the required depth for testing has been reached, the borehole casing is withdrawn by one metre and the borehole cleaned out if necessary. Testing can alternatively be undertaken within a piezometer sealed into the strata of interest.

Detailed guidance for such tests are given within BS EN ISO 22282 Ref [13], and are summarised below.

- **Falling Head Test** - the borehole is filled with water and the head loss is then recorded either until the level falls to the standing water level (or until dry), or a maximum two-hour period.

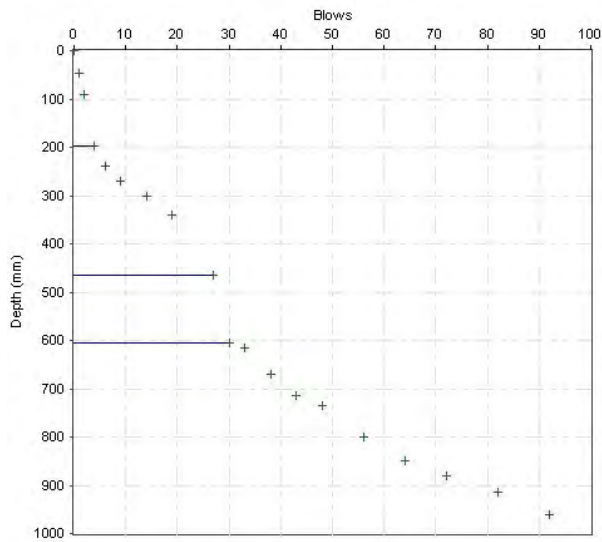
DCP Layer Strength Analysis Report

Project Name: J14044(b)

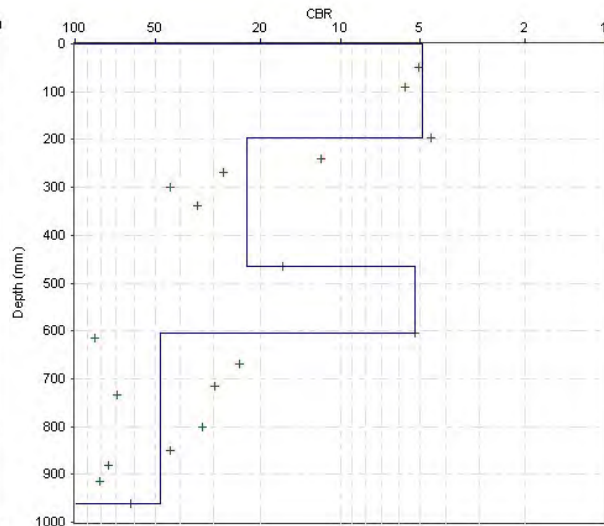
Chainage (km): 101.000
 Direction: TP1
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 15/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 101.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	49.25	5	197	197
2	11.65	23	268	465
3	46.67	5	140	605
4	5.73	48	355	960

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

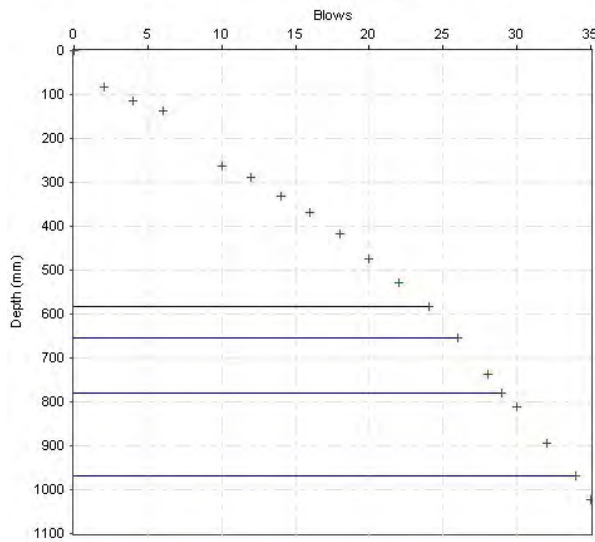
DCP Layer Strength Analysis Report

Project Name: J14044(b)

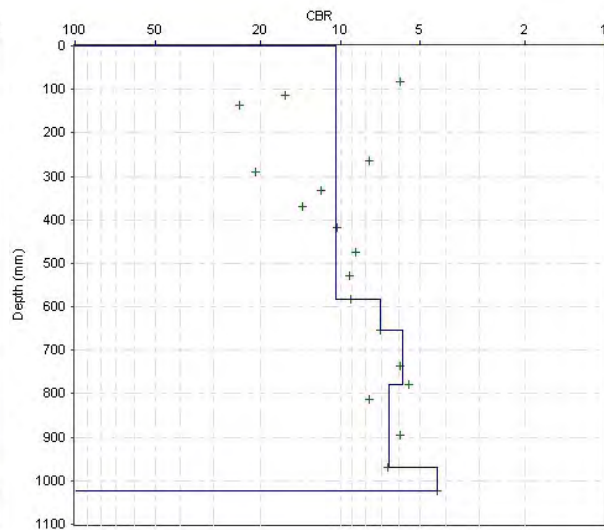
Chainage (km): 101.200
 Direction: TP1
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 01/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 101.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	24.33	10	584	584
2	35.00	7	70	654
3	42.00	6	126	780
4	37.60	7	188	968
5	56.00	4	56	1024

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

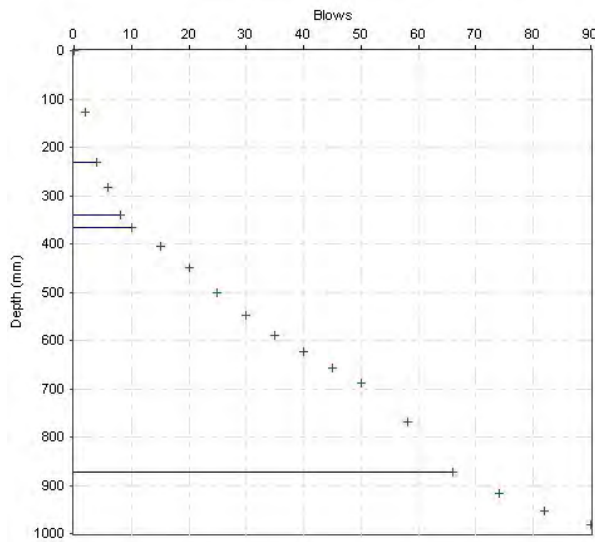
DCP Layer Strength Analysis Report

Project Name: J14044(b)

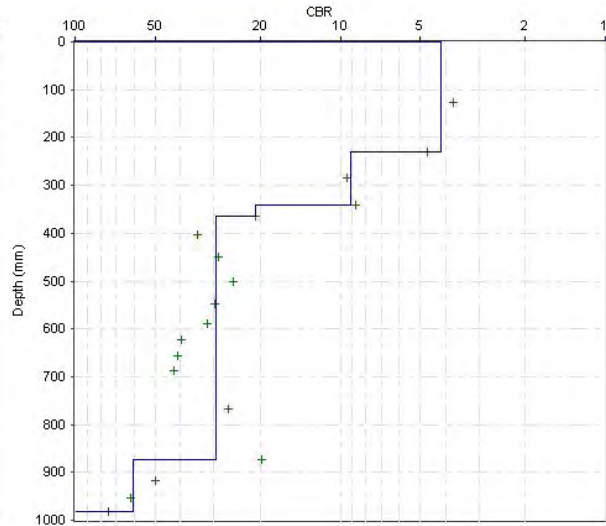
Chainage (km): 101.500
 Direction: TP1A
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 15/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 101.500



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	57.50	4	230	230
2	27.50	9	110	340
3	12.50	21	25	365
4	9.07	29	508	873
5	4.58	60	110	983

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

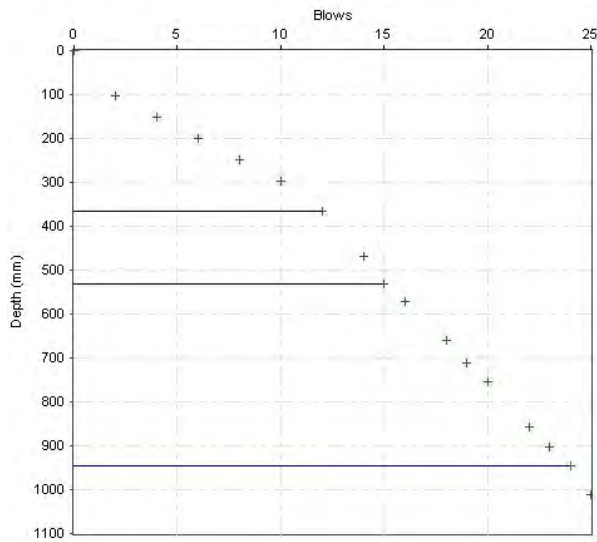
DCP Layer Strength Analysis Report

Project Name: J14044(b)

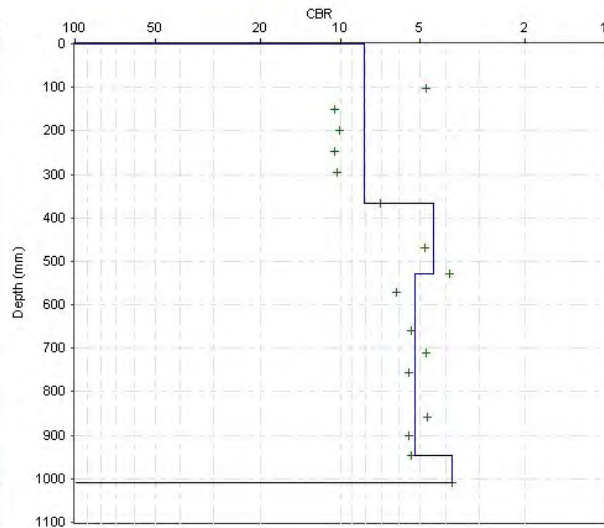
Chainage (km): 102.200
 Direction: TP2
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 01/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 102.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	30.58	8	367	367
2	54.33	4	163	530
3	46.33	5	417	947
4	63.00	4	63	1010

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

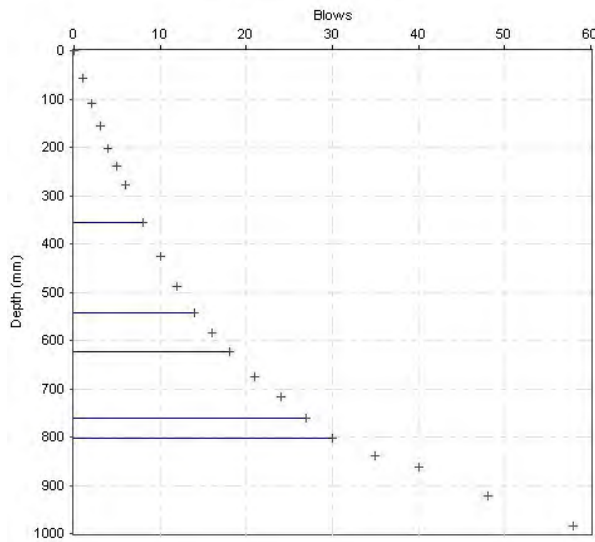
DCP Layer Strength Analysis Report

Project Name: J14044(b)

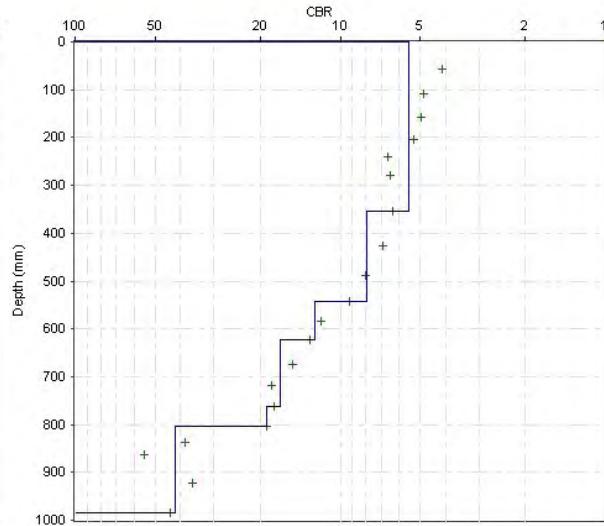
Chainage (km): 102.500
 Direction: TP2A
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 16/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 102.500



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	44.38	5	355	355
2	31.17	8	187	542
3	20.50	12	82	624
4	15.33	17	138	762
5	13.67	19	41	803
6	6.50	42	182	985

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

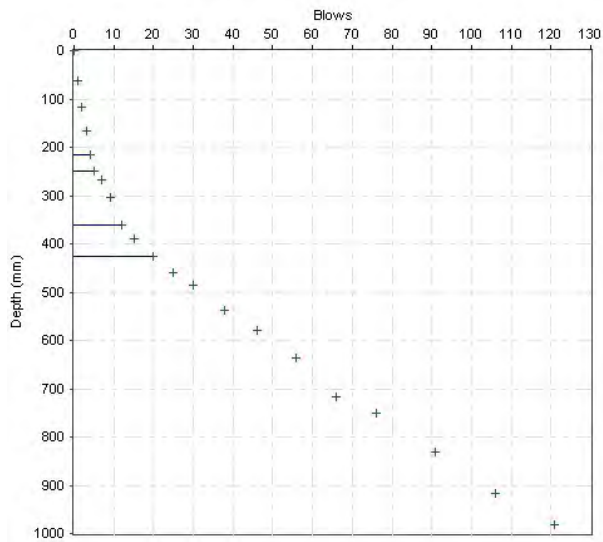
DCP Layer Strength Analysis Report

Project Name: J14044(b)

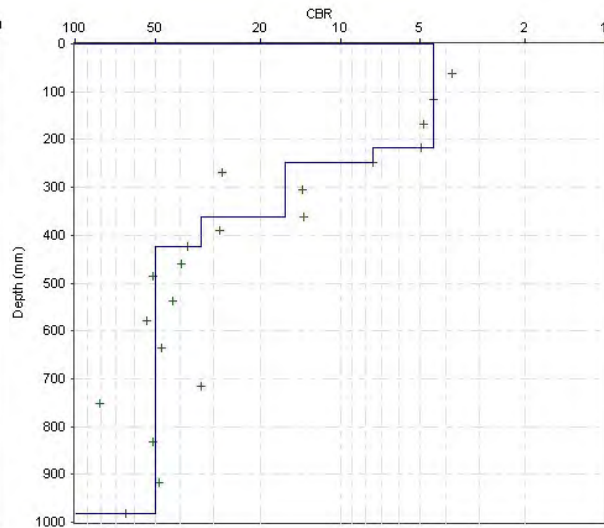
Chainage (km): 103.000
 Direction: TP3
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 17/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 103.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	54.00	4	216	216
2	33.00	7	33	249
3	16.00	16	112	361
4	8.00	34	64	425
5	5.51	50	557	982

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

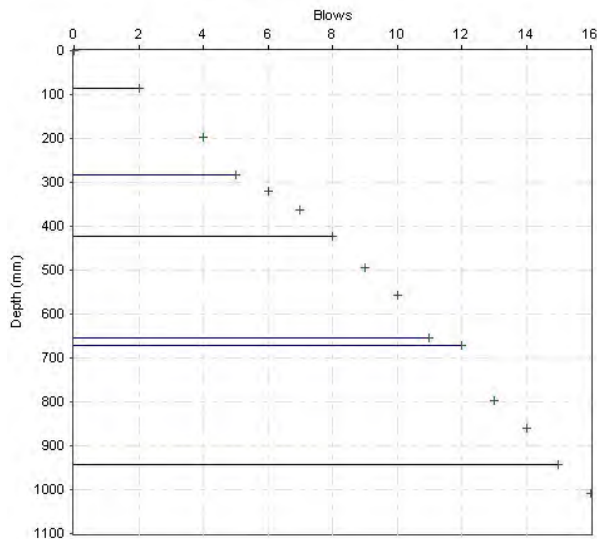
DCP Layer Strength Analysis Report

Project Name: J14044(b)

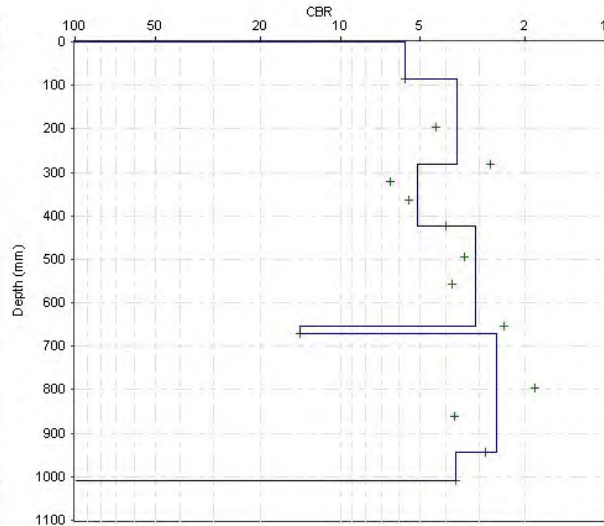
Chainage (km): 103.200
 Direction: TP3
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 103.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	43.00	6	86	86
2	65.33	4	196	282
3	47.33	5	142	424
4	76.67	3	230	654
5	18.00	14	18	672
6	90.67	3	272	944
7	65.00	4	65	1009

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

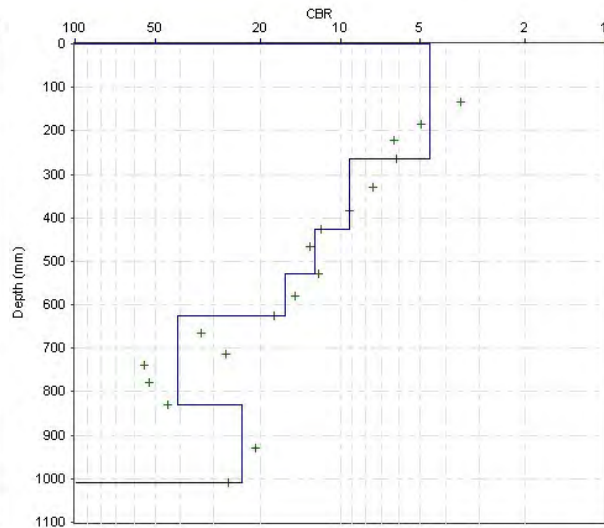
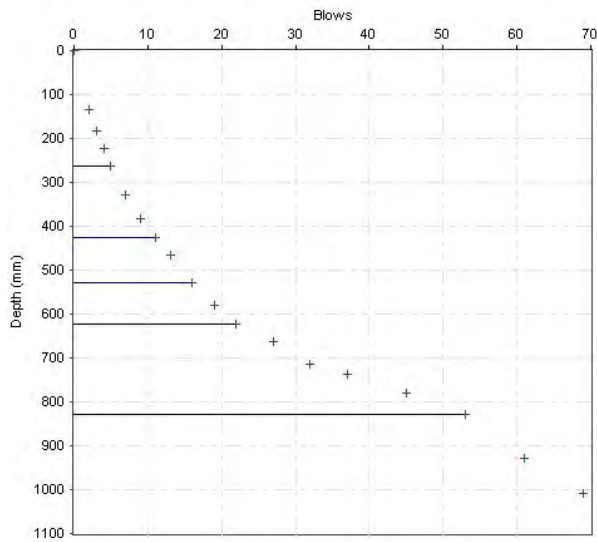
DCP Layer Strength Analysis Report

Project Name: J14044(b)

Chainage (km): 104.000
 Direction: TP4
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 24/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 104.000



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	52.60	5	263	263
2	27.17	9	163	426
3	20.40	12	102	528
4	16.00	16	96	624
5	6.61	41	205	829
6	11.25	23	180	1009

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

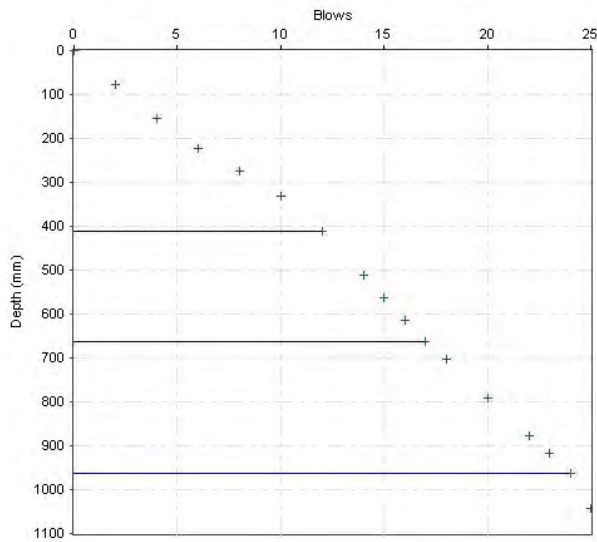
DCP Layer Strength Analysis Report

Project Name: J14044(b)

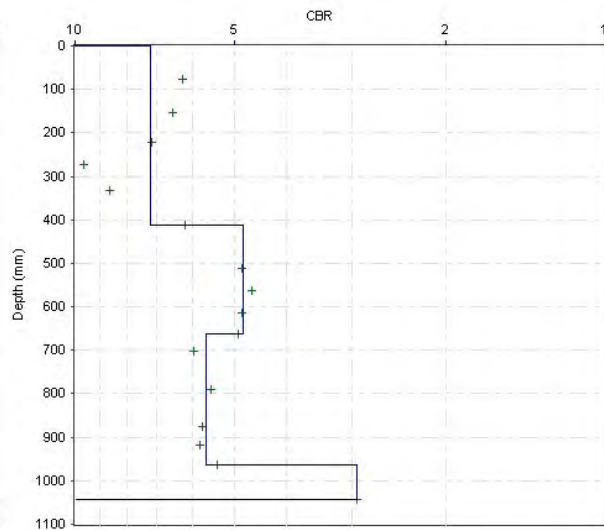
Chainage (km): 104.200
 Direction: TP4
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 104.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	34.25	7	411	411
2	50.20	5	251	662
3	43.00	6	301	963
4	80.00	3	80	1043

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

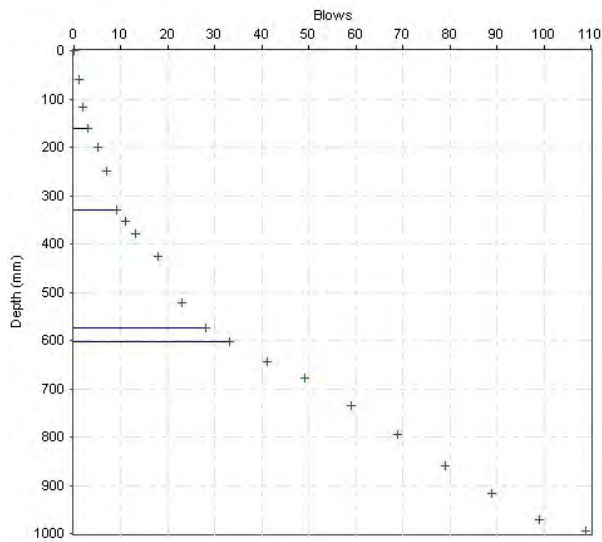
DCP Layer Strength Analysis Report

Project Name: J14044(b)

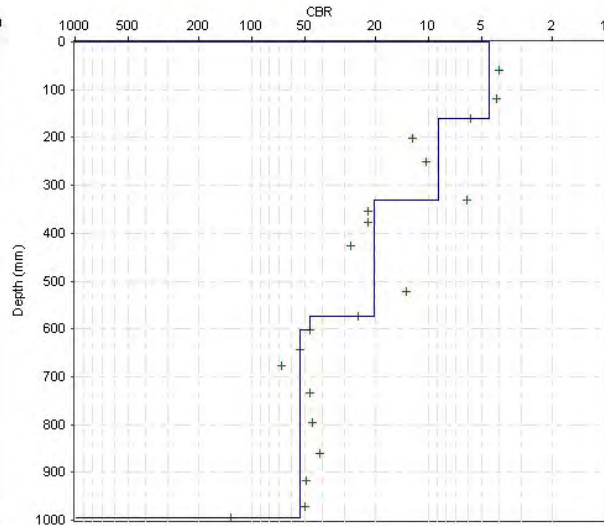
Chainage (km): 105.000
 Direction: TP5
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 25/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 105.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	53.33	5	160	160
2	28.33	9	170	330
3	12.84	20	244	574
4	5.80	47	29	603
5	5.14	53	391	994

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

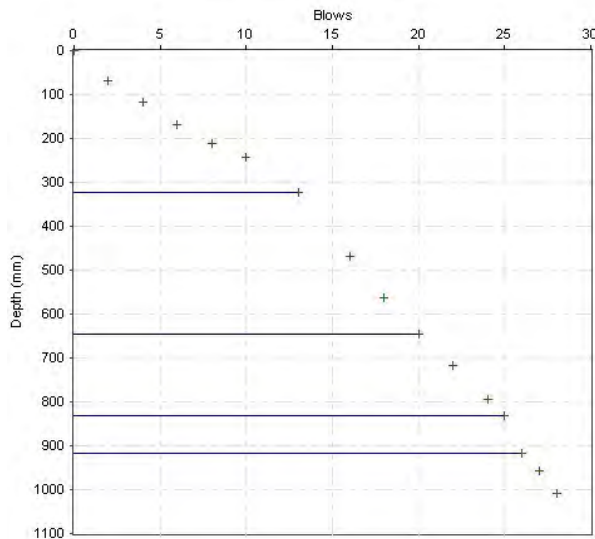
DCP Layer Strength Analysis Report

Project Name: J14044(b)

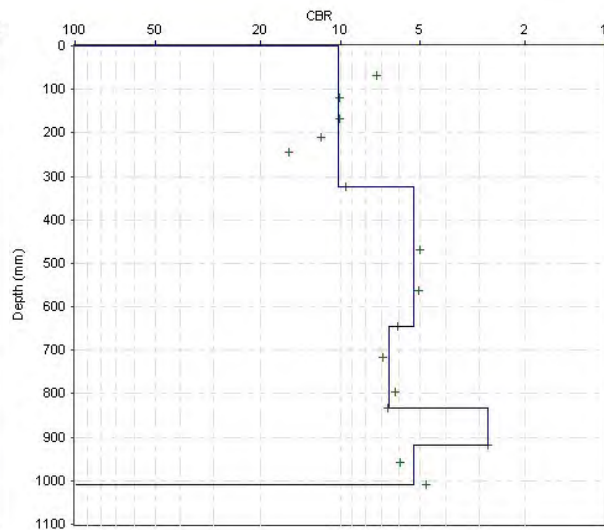
Chainage (km): 105.200
 Direction: TP5
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 105.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	24.85	10	323	323
2	46.00	5	322	645
3	37.40	7	187	832
4	85.00	3	85	917
5	46.00	5	92	1009

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

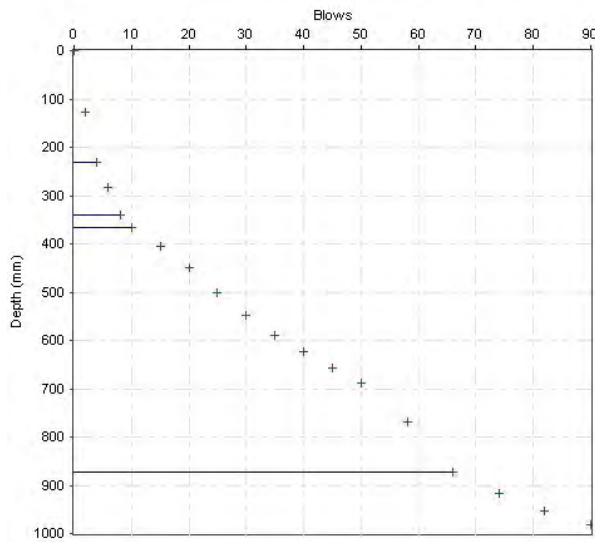
DCP Layer Strength Analysis Report

Project Name: J14044(b)

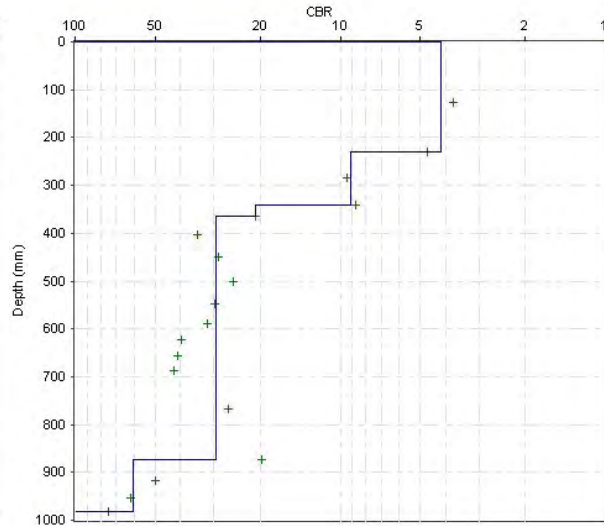
Chainage (km): 106.000
 Direction: TP6
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 15/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 106.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	57.50	4	230	230
2	27.50	9	110	340
3	12.50	21	25	365
4	9.07	29	508	873
5	4.58	60	110	983

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

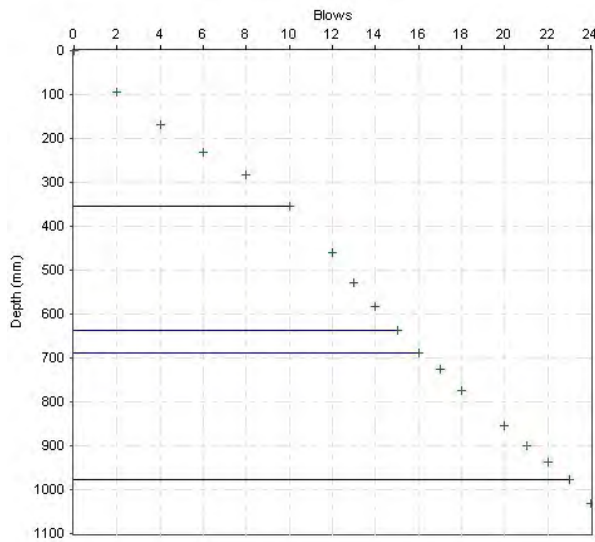
DCP Layer Strength Analysis Report

Project Name: J14044(b)

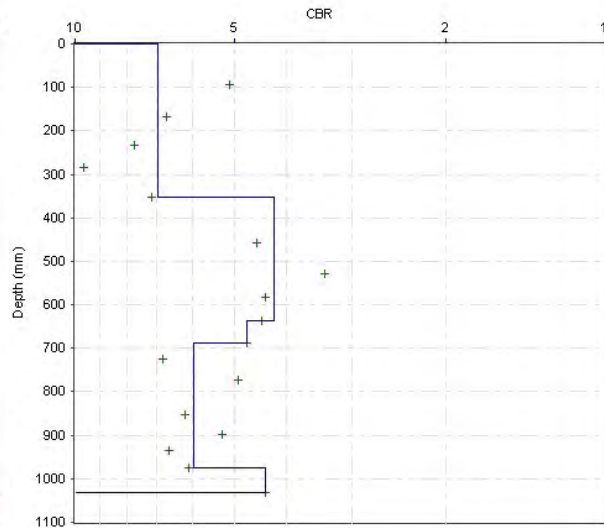
Chainage (km): 106.200
 Direction: TP6
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 106.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	35.30	7	353	353
2	57.00	4	285	638
3	51.00	5	51	689
4	41.00	6	287	976
5	55.00	4	55	1031

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

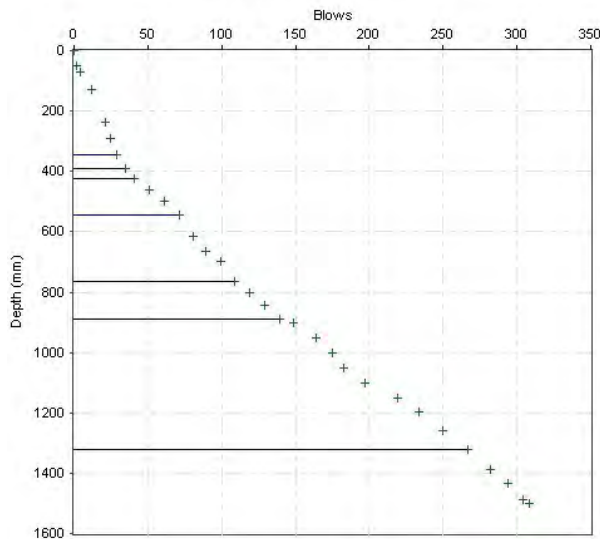
DCP Layer Strength Analysis Report

Project Name: J14044(b)

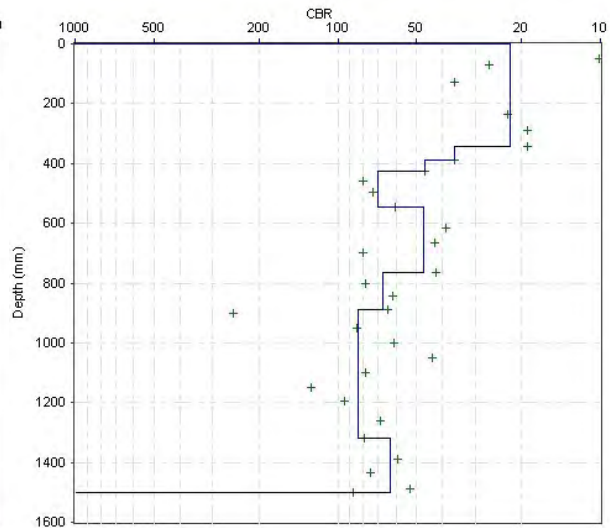
Chainage (km): 107.000
 Direction: TP7
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 107.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	11.90	22	345	345
2	7.50	36	45	390
3	5.83	47	35	425
4	3.97	70	119	544
5	5.79	47	220	764
6	4.13	67	124	888
7	3.38	83	432	1320
8	4.39	63	180	1500

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

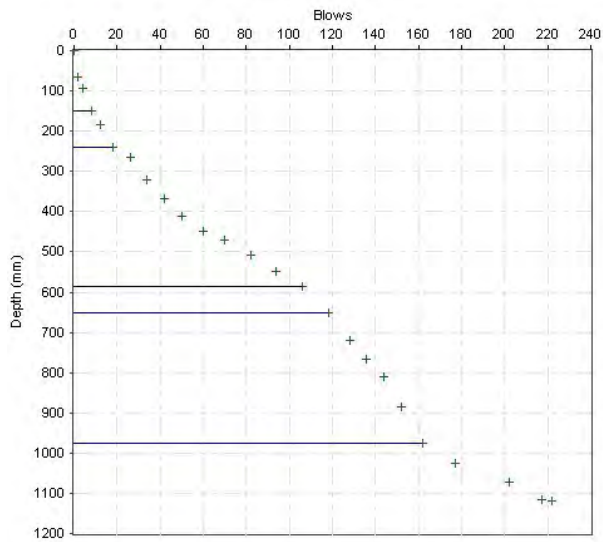
DCP Layer Strength Analysis Report

Project Name: J14044(b)

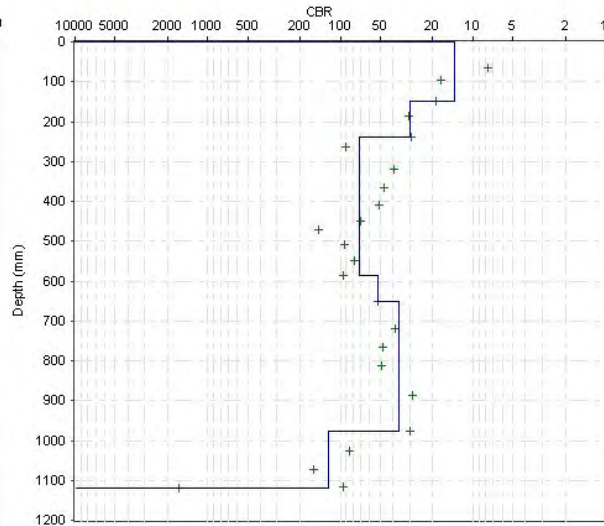
Chainage (km): 107.100
 Direction: TP7
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.5m BGL

Layer Boundaries: Chainage 107.100



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	18.75	14	150	150
2	9.00	30	90	240
3	3.93	71	346	586
4	5.33	51	64	650
5	7.41	36	326	976
6	2.37	121	142	1118

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

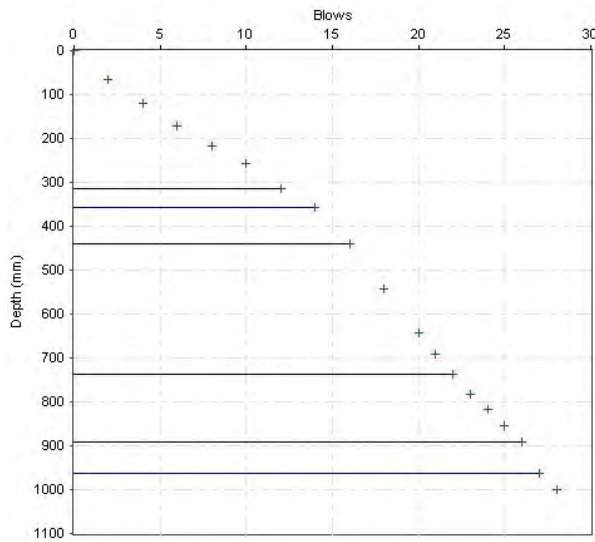
DCP Layer Strength Analysis Report

Project Name: J14044(b)

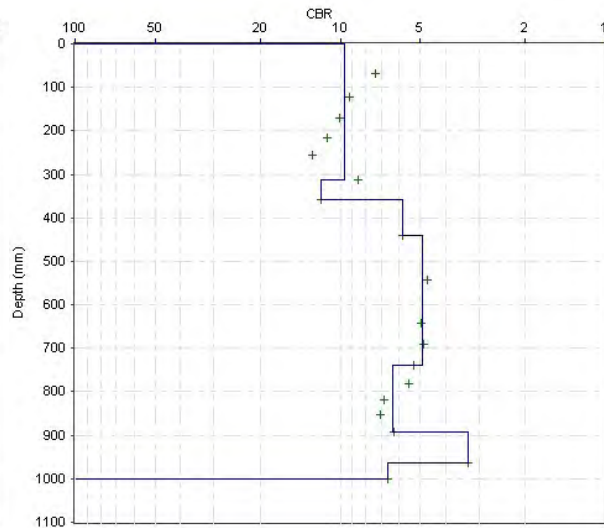
Chainage (km): 107.200
 Direction: TP7
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 107.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	26.17	10	314	314
2	21.50	12	43	357
3	42.00	6	84	441
4	49.50	5	297	738
5	38.50	6	154	892
6	72.00	3	72	964
7	37.00	7	37	1001

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

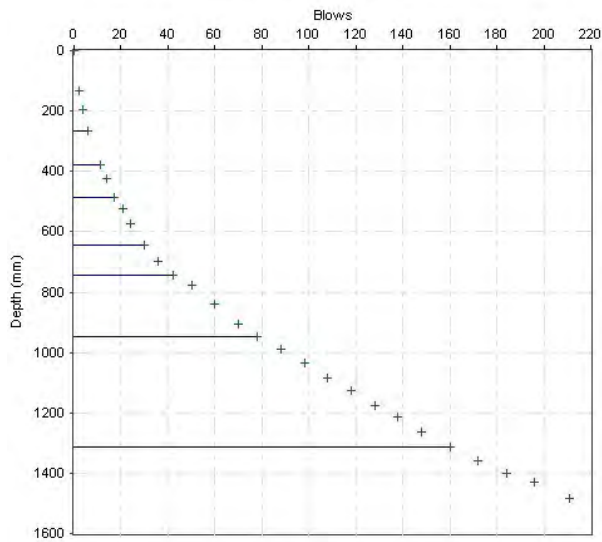
DCP Layer Strength Analysis Report

Project Name: J14044(b)

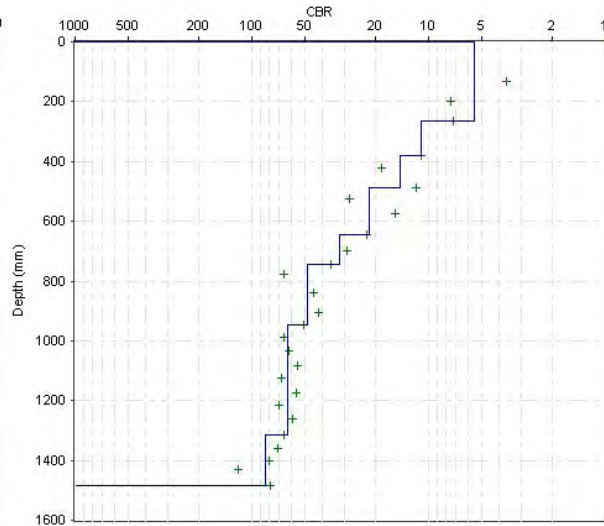
Chainage (km): 108.000
 Direction: TP8
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 108.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	44.17	6	265	265
2	23.00	11	115	380
3	17.83	14	107	487
4	12.15	22	158	645
5	8.33	32	100	745
6	5.64	49	203	948
7	4.45	62	365	1313
8	3.37	84	172	1485

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

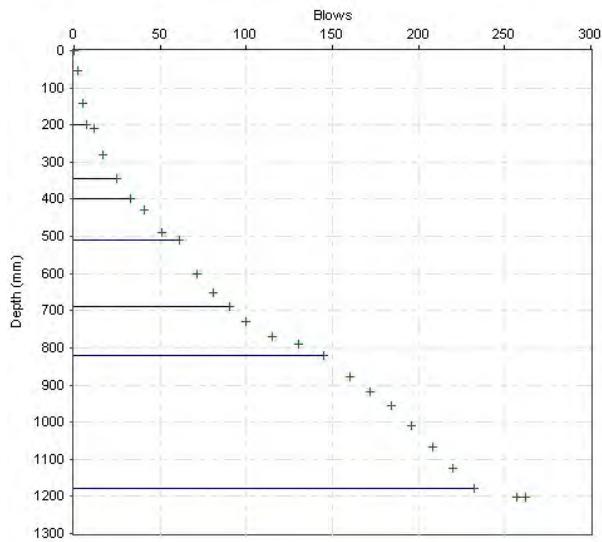
DCP Layer Strength Analysis Report

Project Name: J14044(b)

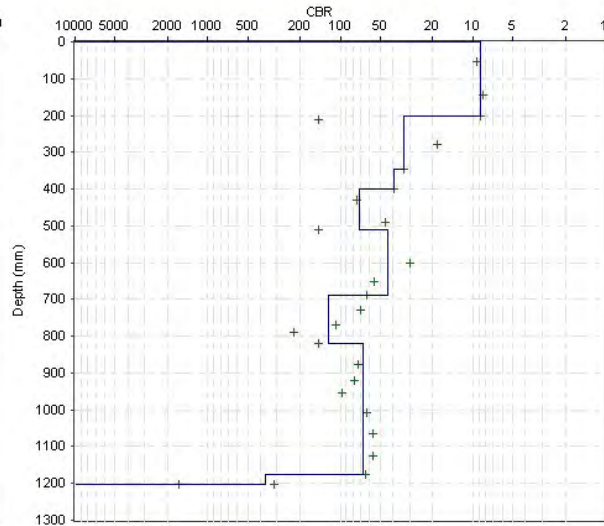
Chainage (km): 108.100
 Direction: TP8
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.5m BGL

Layer Boundaries: Chainage 108.100



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	28.57	9	200	200
2	8.06	33	145	345
3	6.88	39	55	400
4	3.93	71	110	510
5	6.21	44	180	690
6	2.36	122	130	820
7	4.10	68	357	1177
8	0.83	366	25	1202

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

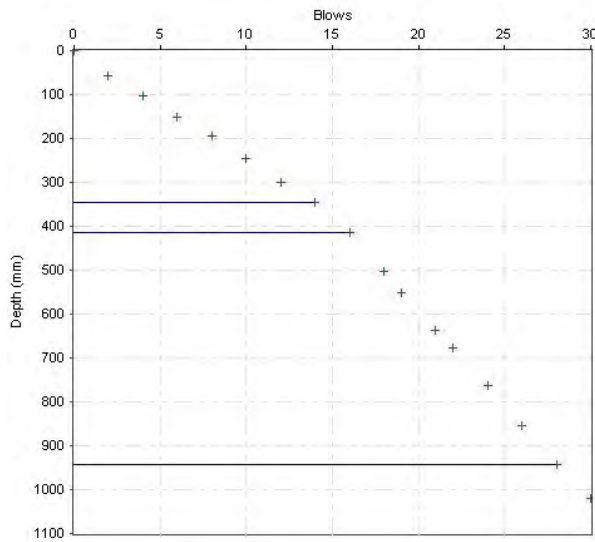
DCP Layer Strength Analysis Report

Project Name: J14044(b)

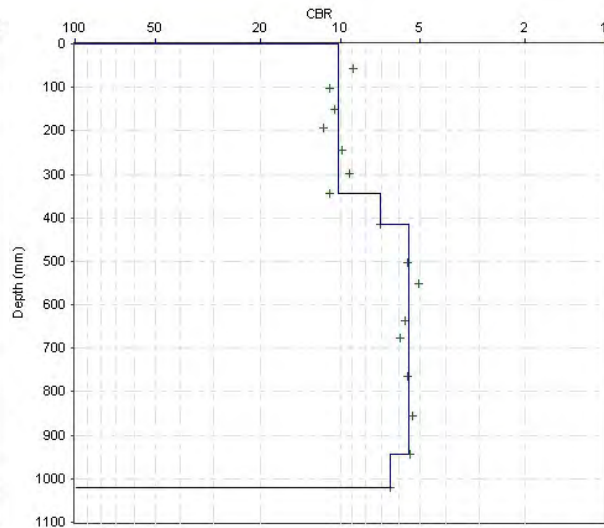
Chainage (km): 108.200
 Direction: TP8
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: Ground level

Layer Boundaries: Chainage 108.200



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	24.64	10	345	345
2	35.00	7	70	415
3	44.08	6	529	944
4	38.00	6	76	1020

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

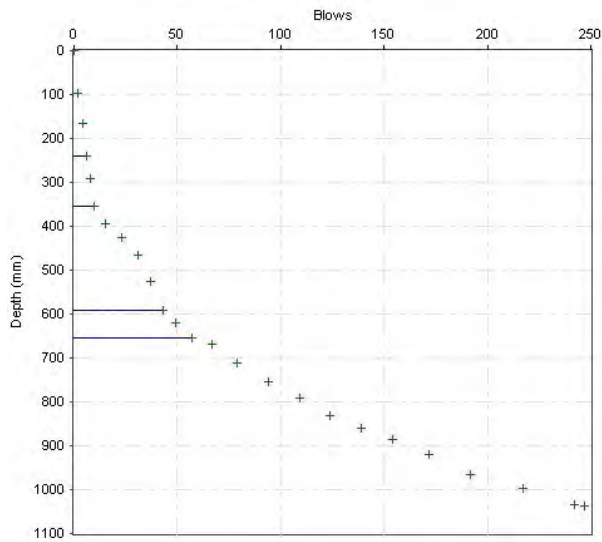
DCP Layer Strength Analysis Report

Project Name: J14044(b)

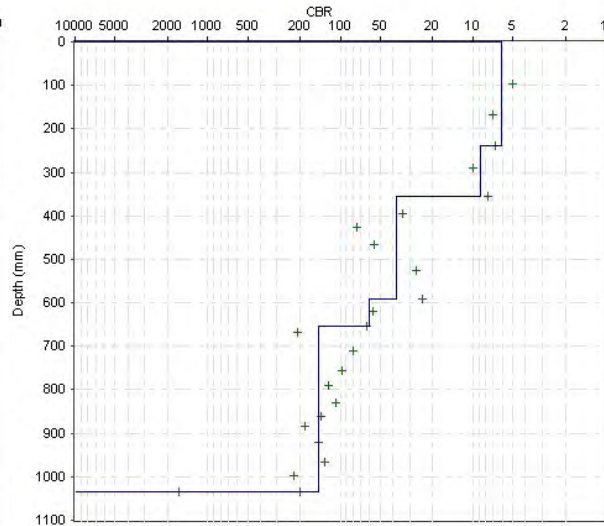
Chainage (km): 201.000
 Direction: PT1
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 201.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	40.00	6	240	240
2	28.75	9	115	355
3	7.15	38	236	591
4	4.57	61	64	655
5	2.01	145	381	1036

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

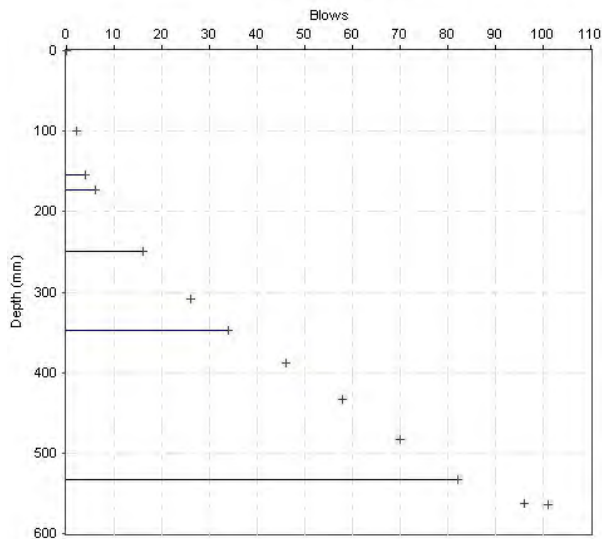
DCP Layer Strength Analysis Report

Project Name: J14044(b)

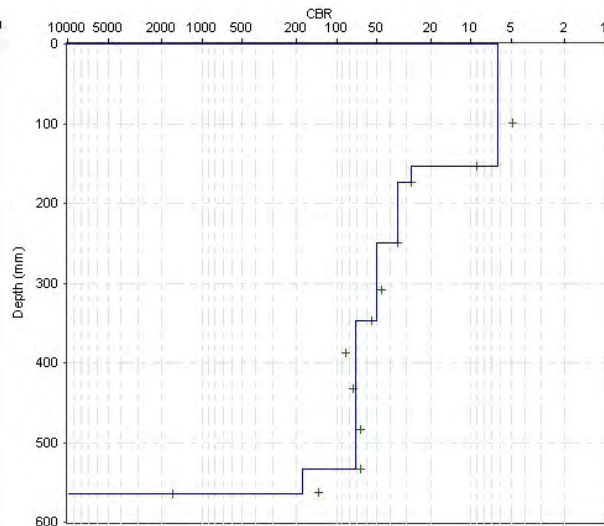
Chainage (km): 201.100
 Direction: PT1
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.5m BGL

Layer Boundaries: Chainage 201.100



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	38.50	6	154	154
2	9.50	28	19	173
3	7.60	35	76	249
4	5.50	50	99	348
5	3.85	73	185	533
6	1.63	180	31	564

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

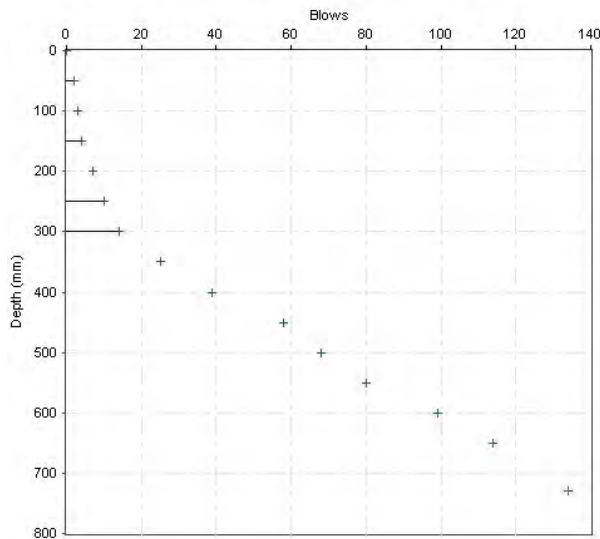
DCP Layer Strength Analysis Report

Project Name: J14044(b)

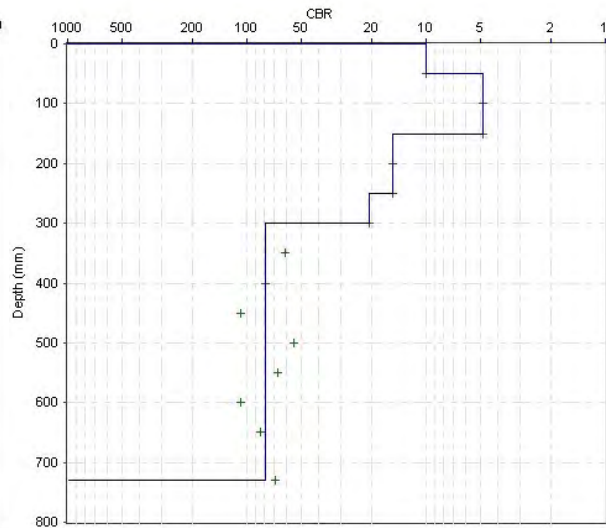
Chainage (km): 202.000
 Direction: PT2
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 25/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 202.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	25.00	10	50	50
2	50.00	5	100	150
3	16.67	15	100	250
4	12.50	21	50	300
5	3.58	78	430	730

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

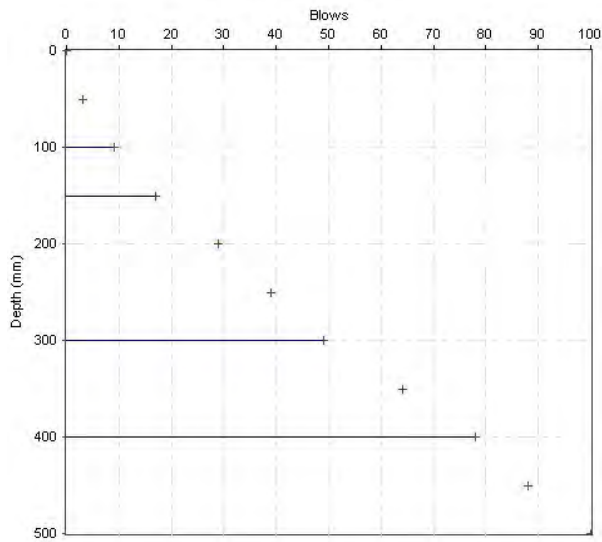
DCP Layer Strength Analysis Report

Project Name: J14044(b)

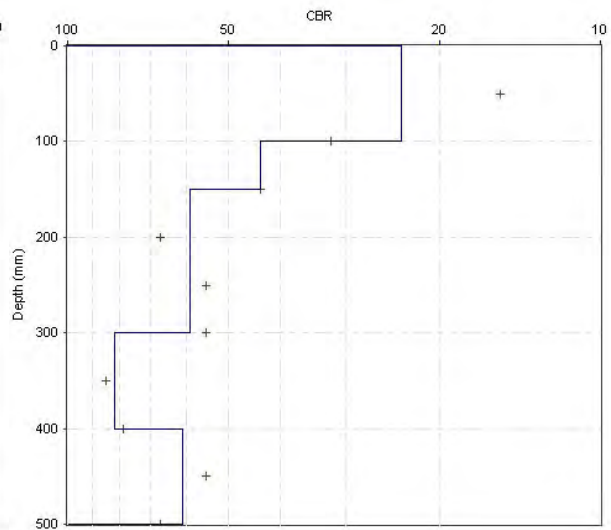
Chainage (km): 202.100
 Direction: PT2
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 25/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.5m BGL

Layer Boundaries: Chainage 202.100



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	11.11	24	100	100
2	6.25	44	50	150
3	4.69	59	150	300
4	3.45	82	100	400
5	4.55	61	100	500

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

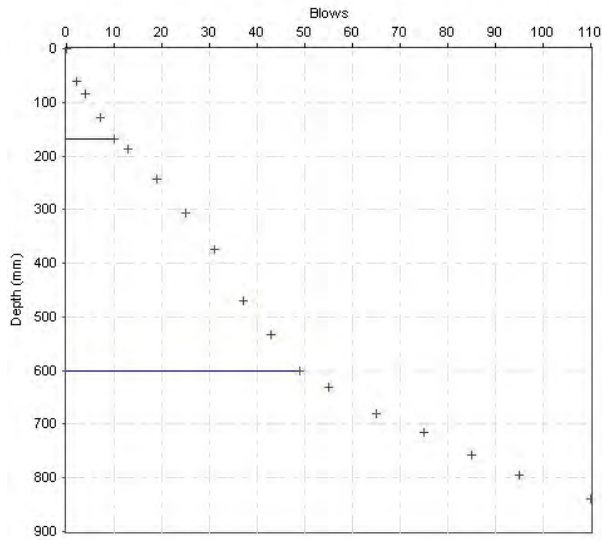
DCP Layer Strength Analysis Report

Project Name: J14044(b)

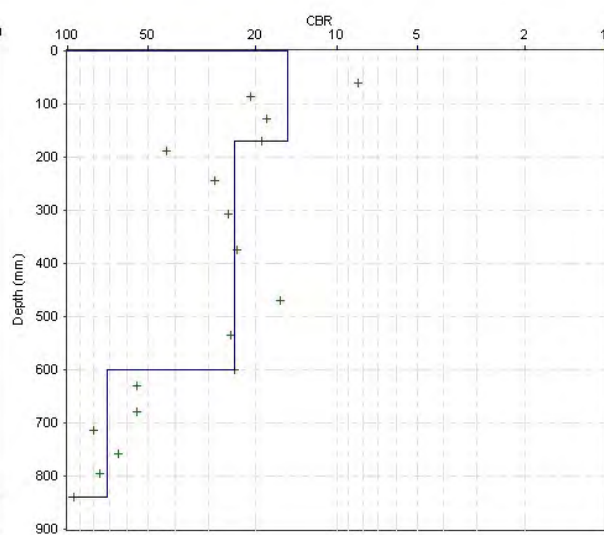
Chainage (km): 203.000
 Direction: PT3
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 24/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.0m BGL

Layer Boundaries: Chainage 203.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	16.90	15	169	169
2	11.05	24	431	600
3	3.93	71	240	840

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

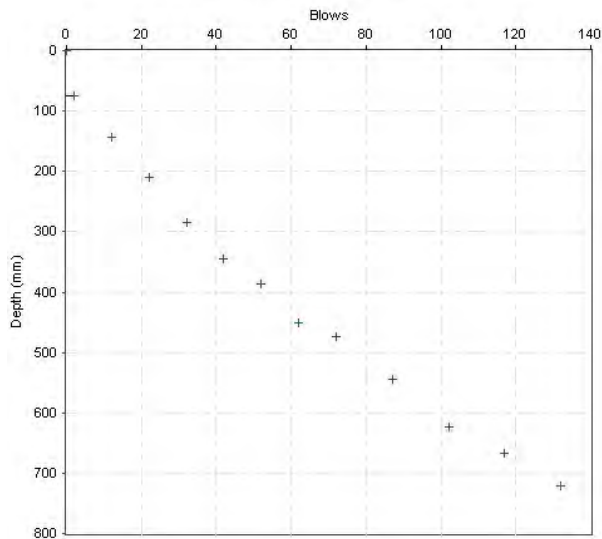
DCP Layer Strength Analysis Report

Project Name: J14044(b)

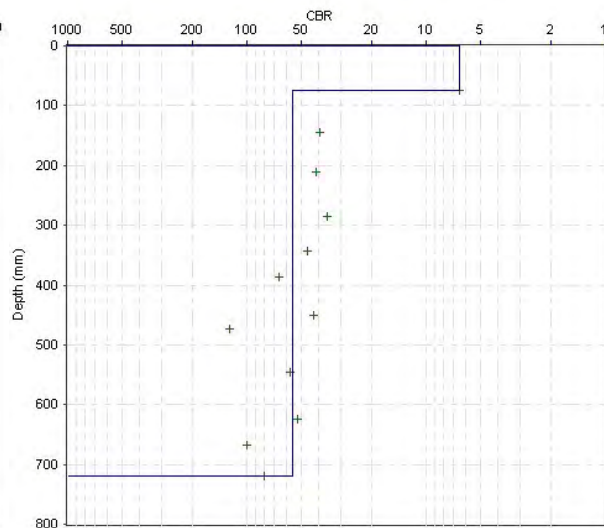
Chainage (km): 203.100
 Direction: PT3
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 24/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted
 Start Depth: 1.5m BGL

Layer Boundaries: Chainage 203.100



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	37.50	7	75	75
2	4.96	56	645	720

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 101.000
 Direction: TP1
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 15/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	1	1	48	48.00					
3	1	2	91	43.00					
4	2	4	197	53.00					
5	2	6	240	21.50					
6	3	9	269	9.67					
7	5	14	300	6.20					
8	5	19	339	7.80					
9	8	27	465	15.75					
10	3	30	605	46.67					
11	3	33	615	3.33					
12	5	38	670	11.00					
13	5	43	715	9.00					
14	5	48	735	4.00					
15	8	56	800	8.13					
16	8	64	850	6.25					
17	8	72	880	3.75					
18	10	82	915	3.50					
19	10	92	960	4.50					

Start Depth: 1.0m BGL

Remarks: Undertaken a 1.0m bgl in TP1

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 101.200
 Direction: TP1
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 01/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	82	41.00					
3	2	4	114	16.00					
4	2	6	136	11.00					
5	4	10	264	32.00					
6	2	12	289	12.50					
7	2	14	332	21.50					
8	2	16	369	18.50					
9	2	18	418	24.50					
10	2	20	475	28.50					
11	2	22	529	27.00					
12	2	24	584	27.50					
13	2	26	654	35.00					
14	2	28	736	41.00					
15	1	29	780	44.00					
16	1	30	812	32.00					
17	2	32	894	41.00					
18	2	34	968	37.00					
19	1	35	1024	56.00					

Start Depth: Ground level

Remarks: Ground level at TP1

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 101.500
 Direction: TP1A
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 15/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	127	63.50					
3	2	4	230	51.50					
4	2	6	283	26.50					
5	2	8	340	28.50					
6	2	10	365	12.50					
7	5	15	404	7.80					
8	5	20	450	9.20					
9	5	25	502	10.40					
10	5	30	547	9.00					
11	5	35	589	8.40					
12	5	40	623	6.80					
13	5	45	656	6.60					
14	5	50	688	6.40					
15	8	58	768	10.00					
16	8	66	873	13.13					
17	8	74	917	5.50					
18	8	82	953	4.50					
19	8	90	983	3.75					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl in base of TP1A

Penetration Data Report

Project Name: J14044(b)

Chainage (km):	102.200
Direction:	TP2
Location/Offset:	Verge
Cone Angle:	60 degrees
Zero Error (mm):	0
Test Date:	01/05/2019

Surface Type:	Unpaved
Thickness (mm):	0
Base Type:	
Thickness (mm):	
Surface Moisture:	Moderate
Moisture adjustment factor:	Not adjusted

[illegible]

Start Depth: Ground level

Remarks: Ground level at TP2

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 102.500
 Direction: TP2A
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 16/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	1	1	58	58.00					
3	1	2	108	50.00					
4	1	3	157	49.00					
5	1	4	203	46.00					
6	1	5	240	37.00					
7	1	6	278	38.00					
8	2	8	355	38.50					
9	2	10	426	35.50					
10	2	12	488	31.00					
11	2	14	542	27.00					
12	2	16	585	21.50					
13	2	18	624	19.50					
14	3	21	675	17.00					
15	3	24	718	14.33					
16	3	27	762	14.67					
17	3	30	803	13.67					
18	5	35	838	7.00					
19	5	40	863	5.00					
20	8	48	923	7.50					
21	10	58	985	6.20					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl in base of TP2A

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 103.000
 Direction: TP3
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 17/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	1	1	63	63.00					
3	1	2	117	54.00					
4	1	3	167	50.00					
5	1	4	216	49.00					
6	1	5	249	33.00					
7	2	7	268	9.50					
8	2	9	305	18.50					
9	3	12	361	18.67					
10	3	15	389	9.33					
11	5	20	425	7.20					
12	5	25	459	6.80					
13	5	30	486	5.40					
14	8	38	537	6.38					
15	8	46	578	5.13					
16	10	56	636	5.80					
17	10	66	716	8.00					
18	10	76	751	3.50					
19	15	91	832	5.40					
20	15	106	917	5.67					
21	15	121	982	4.33					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl at base of TP3

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 104.000
 Direction: TP4
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 24/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	135	67.50					
3	1	3	184	49.00					
4	1	4	223	39.00					
5	1	5	263	40.00					
6	2	7	329	33.00					
7	2	9	383	27.00					
8	2	11	426	21.50					
9	2	13	465	19.50					
10	3	16	528	21.00					
11	3	19	580	17.33					
12	3	22	624	14.67					
13	5	27	664	8.00					
14	5	32	713	9.80					
15	5	37	738	5.00					
16	8	45	780	5.25					
17	8	53	829	6.13					
18	8	61	929	12.50					
19	8	69	1009	10.00					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl at base of TP4

Penetration Data Report

Project Name: J14044(b)

Chainage (km):	104.200
Direction:	TP4
Location/Offset:	Verge
Cone Angle:	60 degrees
Zero Error (mm):	0
Test Date:	02/05/2019

Surface Type:	Unpaved
Thickness (mm):	0
Base Type:	
Thickness (mm):	
Surface Moisture:	Moderate
Moisture adjustment factor:	Not adjusted

[illegible]

Start Depth: Ground level

Remarks: Ground level at TP4

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 105.000
 Direction: TP5
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 25/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	1	1	60	60.00					
3	1	2	118	58.00					
4	1	3	160	42.00					
5	2	5	201	20.50					
6	2	7	250	24.50					
7	2	9	330	40.00					
8	2	11	354	12.00					
9	2	13	378	12.00					
10	5	18	426	9.60					
11	5	23	521	19.00					
12	5	28	574	10.60					
13	5	33	603	5.80					
14	8	41	644	5.13					
15	8	49	677	4.13					
16	10	59	735	5.80					
17	10	69	795	6.00					
18	10	79	861	6.60					
19	10	89	917	5.60					
20	10	99	972	5.50					
21	10	109	994	2.20					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl at base of TP5

Penetration Data Report

Project Name: J14044(b)

Chainage (km):	105.200
Direction:	TP5
Location/Offset:	Verge
Cone Angle:	60 degrees
Zero Error (mm):	0
Test Date:	02/05/2019

Surface Type:	Unpaved
Thickness (mm):	0
Base Type:	
Thickness (mm):	
Surface Moisture:	Moderate
Moisture adjustment factor:	Not adjusted

[illegible]

Start Depth: Ground level

Remarks: Ground level at TP5

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 106.000
 Direction: TP6
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 15/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	127	63.50					
3	2	4	230	51.50					
4	2	6	283	26.50					
5	2	8	340	28.50					
6	2	10	365	12.50					
7	5	15	404	7.80					
8	5	20	450	9.20					
9	5	25	502	10.40					
10	5	30	547	9.00					
11	5	35	589	8.40					
12	5	40	623	6.80					
13	5	45	656	6.60					
14	5	50	688	6.40					
15	8	58	768	10.00					
16	8	66	873	13.13					
17	8	74	917	5.50					
18	8	82	953	4.50					
19	8	90	983	3.75					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl at base of TP6

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 106.200
 Direction: TP6
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	95	47.50					
3	2	4	168	36.50					
4	2	6	232	32.00					
5	2	8	284	26.00					
6	2	10	353	34.50					
7	2	12	459	53.00					
8	1	13	529	70.00					
9	1	14	584	55.00					
10	1	15	638	54.00					
11	1	16	689	51.00					
12	1	17	725	36.00					
13	1	18	774	49.00					
14	2	20	853	39.50					
15	1	21	899	46.00					
16	1	22	936	37.00					
17	1	23	976	40.00					
18	1	24	1031	55.00					

Start Depth: Ground level

Remarks: Ground level at TP6

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 107.000
 Direction: TP7
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00	26	15	234	1195	3.00
2	2	2	50	25.00	27	16	250	1260	4.06
3	2	4	70	10.00	28	17	267	1320	3.53
4	8	12	130	7.50	29	15	282	1390	4.67
5	9	21	235	11.67	30	12	294	1435	3.75
6	4	25	290	13.75	31	10	304	1487	5.20
7	4	29	345	13.75	32	4	308	1500	3.25
8	6	35	390	7.50					
9	6	41	425	5.83					
10	10	51	460	3.50					
11	10	61	498	3.80					
12	10	71	544	4.60					
13	10	81	614	7.00					
14	8	89	665	6.38					
15	10	99	700	3.50					
16	10	109	764	6.40					
17	10	119	800	3.60					
18	10	129	845	4.50					
19	10	139	888	4.30					
20	10	149	900	1.20					
21	15	164	950	3.33					
22	11	175	1000	4.55					
23	8	183	1050	6.25					
24	14	197	1100	3.57					
25	22	219	1150	2.27					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl in TP7

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 107.100
 Direction: TP7
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	65	32.50					
3	2	4	95	15.00					
4	4	8	150	13.75					
5	4	12	185	8.75					
6	6	18	240	9.17					
7	8	26	265	3.13					
8	8	34	320	6.88					
9	8	42	367	5.88					
10	8	50	410	5.38					
11	10	60	450	4.00					
12	10	70	470	2.00					
13	12	82	507	3.08					
14	12	94	550	3.58					
15	12	106	586	3.00					
16	12	118	650	5.33					
17	10	128	720	7.00					
18	8	136	766	5.75					
19	8	144	811	5.63					
20	8	152	886	9.38					
21	10	162	976	9.00					
22	15	177	1026	3.33					
23	25	202	1072	1.84					
24	15	217	1117	3.00					
25	5	222	1118	0.20					

Start Depth: 1.5m BGL

Remarks: Undertaken at 1.5m bgl in TP7

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 107.200
 Direction: TP7
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 02/05/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	67	33.50					
3	2	4	121	27.00					
4	2	6	171	25.00					
5	2	8	216	22.50					
6	2	10	256	20.00					
7	2	12	314	29.00					
8	2	14	357	21.50					
9	2	16	441	42.00					
10	2	18	544	51.50					
11	2	20	642	49.00					
12	1	21	692	50.00					
13	1	22	738	46.00					
14	1	23	782	44.00					
15	1	24	818	36.00					
16	1	25	853	35.00					
17	1	26	892	39.00					
18	1	27	964	72.00					
19	1	28	1001	37.00					

Start Depth: Ground level

Remarks: Ground level at TP7

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 108.000
 Direction: TP8
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00	26	12	184	1402	3.50
2	2	2	131	65.50	27	12	196	1431	2.42
3	2	4	197	33.00	28	15	211	1485	3.60
4	2	6	265	34.00					
5	5	11	380	23.00					
6	3	14	422	14.00					
7	3	17	487	21.67					
8	4	21	525	9.50					
9	3	24	575	16.67					
10	6	30	645	11.67					
11	6	36	700	9.17					
12	6	42	745	7.50					
13	8	50	779	4.25					
14	10	60	840	6.10					
15	10	70	905	6.50					
16	8	78	948	5.38					
17	10	88	990	4.20					
18	10	98	1035	4.50					
19	10	108	1085	5.00					
20	10	118	1126	4.10					
21	10	128	1175	4.90					
22	10	138	1215	4.00					
23	10	148	1262	4.70					
24	12	160	1313	4.25					
25	12	172	1360	3.92					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m bgl in TP8

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 108.100
 Direction: TP8
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00	26	25	257	1201	0.96
2	2	2	54	27.00	27	5	262	1202	0.20
3	3	5	143	29.67					
4	2	7	200	28.50					
5	5	12	210	2.00					
6	5	17	280	14.00					
7	8	25	345	8.13					
8	8	33	400	6.88					
9	8	41	430	3.75					
10	10	51	490	6.00					
11	10	61	510	2.00					
12	10	71	600	9.00					
13	10	81	650	5.00					
14	9	90	690	4.44					
15	10	100	730	4.00					
16	15	115	770	2.67					
17	15	130	790	1.33					
18	15	145	820	2.00					
19	15	160	877	3.80					
20	12	172	920	3.58					
21	12	184	955	2.92					
22	12	196	1008	4.42					
23	12	208	1066	4.83					
24	12	220	1125	4.92					
25	12	232	1177	4.33					

Start Depth: 1.5m BGL

Remarks: Undertaken at 1.5m bgl in TP8

Penetration Data Report

Project Name: J14044(b)

Chainage (km):	108.200
Direction:	TP8
Location/Offset:	Verge
Cone Angle:	60 degrees
Zero Error (mm):	0
Test Date:	02/05/2019

Surface Type:	Unpaved
Thickness (mm):	0
Base Type:	
Thickness (mm):	
Surface Moisture:	Moderate
Moisture adjustment factor:	Not adjusted

[illegible]

Start Depth: Ground level

Remarks: Ground level at TP8

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 201.000
 Direction: PT1
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 26/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	97	48.50					
3	2	4	167	35.00					
4	2	6	240	36.50					
5	2	8	291	25.50					
6	2	10	355	32.00					
7	5	15	395	8.00					
8	8	23	425	3.75					
9	8	31	465	5.00					
10	6	37	525	10.00					
11	6	43	591	11.00					
12	6	49	620	4.83					
13	8	57	655	4.38					
14	10	67	669	1.40					
15	12	79	711	3.50					
16	15	94	755	2.93					
17	15	109	790	2.33					
18	15	124	830	2.67					
19	15	139	861	2.07					
20	15	154	885	1.60					
21	18	172	921	2.00					
22	20	192	965	2.20					
23	25	217	998	1.32					
24	25	242	1035	1.48					
25	5	247	1036	0.20					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m in PT1

Penetration Data Report

Project Name: J14044(b)

Chainage (km):	201.100
Direction:	PT1
Location/Offset:	Verge
Cone Angle:	60 degrees
Zero Error (mm):	0
Test Date:	26/04/2019

Surface Type:	Unpaved
Thickness (mm):	0
Base Type:	
Thickness (mm):	
Surface Moisture:	Moderate
Moisture adjustment factor:	Not adjusted

[illegible]

Start Depth: 1.5m BGL

Remarks: Undertaken at 1.5m in PT1

Penetration Data Report

Project Name: J14044(b)

Chainage (km):	202.000
Direction:	PT2
Location/Offset:	Verge
Cone Angle:	60 degrees
Zero Error (mm):	0
Test Date:	25/04/2019

Surface Type:	Unpaved
Thickness (mm):	0
Base Type:	
Thickness (mm):	
Surface Moisture:	Moderate
Moisture adjustment factor:	Not adjusted

[illegible]

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m in PT2

Penetration Data Report

Project Name: J14044(b)

Chainage (km): 203.000
 Direction: PT3
 Location/Offset: Verge
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 24/04/2019

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Moderate
 Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	0	0.00					
2	2	2	60	30.00					
3	2	4	85	12.50					
4	3	7	128	14.33					
5	3	10	169	13.67					
6	3	13	188	6.33					
7	6	19	244	9.33					
8	6	25	307	10.50					
9	6	31	374	11.17					
10	6	37	470	16.00					
11	6	43	534	10.67					
12	6	49	600	11.00					
13	6	55	630	5.00					
14	10	65	680	5.00					
15	10	75	715	3.50					
16	10	85	758	4.30					
17	10	95	795	3.70					
18	15	110	840	3.00					

Start Depth: 1.0m BGL

Remarks: Undertaken at 1.0m in PT3

Penetration Data Report

Project Name: J14044(b)

Chainage (km):	203.100
Direction:	PT3
Location/Offset:	Verge
Cone Angle:	60 degrees
Zero Error (mm):	0
Test Date:	24/04/2019

Surface Type:	Unpaved
Thickness (mm):	0
Base Type:	
Thickness (mm):	
Surface Moisture:	Moderate
Moisture adjustment factor:	Not adjusted

[illegible]

Start Depth: 1.5m BGL

Remarks: Undertaken at 1.5m in PT3

Plate Bearing Results Table

Based on BS1377-9:4.1

Project Name	Southampton Airport, Southampton, SO97 4AA	Project No.	J14044
Client:	Dyer and Butler	Test No	TP1A
Soil Type & Condition:	Orange brown silty sandy CLAY	Depth BGL (m)	1.00
Moisture Content (%)	19	Plate Dia. (mm)	600
Test Type:	Plate CBR	Tested By	FTD
		Checked By	
		Project Engineer	TL
		Test Date	16-Apr-19

Pressure (kPa)	Time (minute)	Settlement			Average Settlement (mm)
		Gauge (a) (mm)	Gauge (b) (mm)	Gauge (c) (mm)	
10.3	1.0	0.26	0.28	0.29	0.28
	2.0	0.27	0.29	0.30	0.29
	3.0	0.27	0.30	0.30	0.29
	4.0	0.28	0.30	0.31	0.30
	5.0	0.28	0.30	0.31	0.30
17.7	6.0	0.50	0.51	0.49	0.50
	7.0	0.51	0.52	0.50	0.51
	8.0	0.52	0.53	0.51	0.52
	9.0	0.53	0.54	0.51	0.53
	10.0	0.53	0.54	0.51	0.53
29.7	11.0	0.83	0.83	0.75	0.80
	12.0	0.85	0.85	0.77	0.82
	13.0	0.86	0.86	0.78	0.83
	14.0	0.87	0.87	0.79	0.84
	15.0	0.87	0.87	0.79	0.84
42.8	16.0	1.18	1.08	1.07	1.11
	17.0	1.20	1.15	1.08	1.14
	18.0	1.21	1.16	1.09	1.15
	19.0	1.22	1.17	1.10	1.16
	20.0	1.22	1.17	1.10	1.16
55.5	21.0	1.50	1.39	1.26	1.38
	22.0	1.53	1.41	1.28	1.41
	23.0	1.54	1.43	1.29	1.42
	24.0	1.56	1.44	1.30	1.43
	25.0	1.57	1.45	1.31	1.44
	26.0	1.58	1.46	1.32	1.45
	27.0	1.58	1.46	1.32	1.45
	28.0	1.97	1.76	1.65	1.79
73.6	29.0	1.99	1.80	1.68	1.82
	30.0	2.01	1.80	1.68	1.83
	31.0	2.03	1.83	1.71	1.86
	32.0	2.05	1.84	1.72	1.87
	33.0	2.05	1.84	1.72	1.87
	34.0	2.22	1.99	1.89	2.03
	35.0	2.25	2.01	1.92	2.06
83.1	36.0	2.28	2.03	1.92	2.08
	37.0	2.29	2.05	1.95	2.10
	38.0	2.31	2.06	1.96	2.11
	39.0	2.31	2.06	1.96	2.11

Plate Bearing Results Table

Based on BS1377-9:4.1

Project Name	Southampton Airport, Southampton, SO97 4AA	Project No.	J14044
Client:	Dyer and Butler	Test No	TP2A
Soil Type & Condition:	Orange brown silty sandy CLAY	Depth BGL (m)	1.00
Moisture Content (%)	14	Plate Dia. (mm)	600
Test Type:	Plate CBR	Tested By	FTD
		Checked By	
		Project Engineer	TL
		Test Date	17-Apr-19

Pressure (kPa)	Time (minute)	Settlement			Average Settlement (mm)
		Gauge (a) (mm)	Gauge (b) (mm)	Gauge (c) (mm)	
11.3	1.0	0.48	0.43	0.29	0.40
	2.0	0.50	0.45	0.31	0.42
	3.0	0.52	0.47	0.32	0.44
	4.0	0.53	0.47	0.32	0.44
	5.0	0.53	0.47	0.32	0.44
22.3	6.0	0.97	0.86	0.57	0.80
	7.0	0.99	0.88	0.58	0.82
	8.0	1.01	0.89	0.59	0.83
	9.0	1.01	0.90	0.59	0.83
	10.0	1.01	0.90	0.59	0.83
31.5	11.0	1.35	1.20	0.82	1.12
	12.0	1.37	1.22	0.84	1.14
	13.0	1.38	1.22	0.84	1.15
	14.0	1.39	1.24	0.85	1.16
	15.0	1.39	1.24	0.85	1.16
43.9	16.0	1.81	1.63	1.13	1.52
	17.0	1.84	1.66	1.15	1.55
	18.0	1.83	1.67	1.16	1.55
	19.0	1.88	1.69	1.18	1.58
	20.0	1.88	1.69	1.18	1.58
49.5	21.0	2.03	1.85	1.31	1.73
	22.0	2.06	1.87	1.33	1.75
	23.0	2.08	1.90	1.35	1.78
	24.0	2.09	1.90	1.36	1.78
	25.0	2.09	1.90	1.36	1.78
61.5	26.0	2.43	2.25	1.65	2.11
	27.0	2.47	2.29	1.69	2.15
	28.0	2.50	2.31	1.71	2.17
	29.0	2.53	2.34	1.73	2.20
	30.0	2.53	2.34	1.73	2.20
72.9	31.0	2.81	2.65	2.01	2.49
	32.0	2.87	2.71	2.05	2.54
	33.0	2.90	2.73	2.08	2.57
	34.0	2.92	2.74	2.09	2.58
	35.0	2.92	2.74	2.09	2.58

Plate Bearing Results Table

Based on BS1377-9:4.1

Project Name	Southampton Airport, Southampton, SO97 4AA	Project No.	J14044
Client:	Dyer and Butler	Test No	TP3
Soil Type & Condition:	Orange brown silty sandy CLAY	Depth BGL (m)	1.00
Moisture Content (%)	20	Plate Dia. (mm)	600
Test Type:	Plate CBR	Tested By	FTD
		Checked By	
		Project Engineer	TL
		Test Date	18-Apr-19

Pressure (kPa)	Time (minute)	Settlement			Average Settlement (mm)
		Gauge (a) (mm)	Gauge (b) (mm)	Gauge (c) (mm)	
10.6	1.0	0.52	0.42	0.26	0.40
	2.0	0.55	0.45	0.27	0.42
	3.0	0.55	0.47	0.27	0.43
	4.0	0.58	0.47	0.29	0.45
	5.0	0.58	0.47	0.29	0.45
17.7	6.0	0.94	0.73	0.48	0.72
	7.0	0.97	0.76	0.51	0.75
	8.0	0.99	0.77	0.51	0.76
	9.0	0.99	0.78	0.52	0.76
	10.0	0.99	0.78	0.52	0.76
24.8	11.0	1.27	1.02	0.71	1.00
	12.0	1.29	1.03	0.71	1.01
	13.0	1.31	1.05	0.72	1.03
	14.0	1.32	1.06	0.74	1.04
	15.0	1.32	1.06	0.74	1.04
37.1	16.0	1.79	1.48	1.08	1.45
	17.0	1.82	1.50	1.11	1.48
	18.0	1.84	1.53	1.12	1.50
	19.0	1.86	1.54	1.13	1.51
	20.0	1.86	1.54	1.13	1.51
47.4	21.0	2.17	1.82	1.37	1.79
	22.0	2.20	1.85	1.39	1.81
	23.0	2.22	1.87	1.41	1.83
	24.0	2.24	1.89	1.41	1.85
	25.0	2.25	1.89	1.41	1.85
58.4	26.0	2.57	2.19	1.67	2.14
	27.0	2.60	2.21	1.68	2.16
	28.0	2.63	2.24	1.72	2.20
	29.0	2.64	2.25	1.73	2.21
	30.0	2.64	2.25	1.73	2.21
69.7	31.0	2.93	2.53	1.95	2.47
	32.0	2.99	2.59	1.99	2.52
	33.0	3.01	2.59	2.00	2.53
	34.0	3.02	2.60	2.01	2.54
	35.0	3.02	2.60	2.01	2.54

Plate Bearing Results Table

Based on BS1377-9:4.1

Project Name	Southampton Airport, Southampton, SO97 4AA	Project No.	J14044
Client:	Dyer and Butler	Test No	TP4
Soil Type & Condition:	Orange brown silty sandy CLAY	Depth BGL (m)	1.00
Moisture Content (%)	21	Plate Dia. (mm)	600
Test Type:	Plate CBR	Tested By	FTD
		Checked By	
		Project Engineer	TL
		Test Date	24-Apr-19

Pressure (kPa)	Time (minute)	Settlement			Average Settlement (mm)
		Gauge (a) (mm)	Gauge (b) (mm)	Gauge (c) (mm)	
10.6	1.0	0.27	0.20	0.24	0.24
	2.0	0.31	0.21	0.27	0.26
	3.0	0.40	0.28	0.40	0.36
	4.0	0.41	0.29	0.41	0.37
	5.0	0.44	0.30	0.42	0.39
	6.0	0.44	0.30	0.42	0.39
18.4	7.0	0.68	0.48	0.61	0.59
	8.0	0.70	0.50	0.63	0.61
	9.0	0.71	0.51	0.64	0.62
	10.0	0.71	0.51	0.64	0.62
28.3	11.0	1.03	0.73	0.86	0.87
	12.0	1.05	0.74	0.88	0.89
	13.0	1.06	0.75	0.89	0.90
	14.0	1.07	0.76	0.90	0.91
	15.0	1.07	0.76	0.90	0.91
37.5	16.0	1.34	0.94	1.07	1.12
	17.0	1.36	0.96	1.09	1.14
	18.0	1.38	0.96	1.09	1.14
	19.0	1.39	0.97	1.10	1.15
	20.0	1.39	0.97	1.10	1.15
56.6	21.0	2.00	1.36	1.34	1.57
	22.0	2.04	1.38	1.35	1.59
	23.0	2.06	1.41	1.37	1.61
	24.0	2.07	1.41	1.37	1.62
	25.0	2.07	1.41	1.37	1.62
67.9	26.0	2.37	1.61	1.56	1.85
	27.0	2.44	1.67	1.59	1.90
	28.0	2.46	1.68	1.60	1.91
	29.0	2.47	1.68	1.61	1.92
	30.0	2.47	1.68	1.61	1.92
90.5	31.0	3.21	2.18	2.07	2.49
	32.0	3.28	2.23	2.11	2.54
	33.0	3.34	2.27	2.14	2.58
	34.0	3.37	2.30	2.16	2.61
	35.0	3.38	2.31	2.16	2.62
	36.0	3.39	2.32	2.18	2.63
	37.0	3.39	2.32	2.18	2.63

Plate Bearing Results Table

Based on BS1377-9:4.1

Project Name	Southampton Airport, Southampton, SO97 4AA	Project No.	J14044
Client:	Dyer and Butler	Test No	TP5
Soil Type & Condition:	Orange brown silty sandy CLAY	Depth BGL (m)	1.00
Moisture Content (%)	20	Plate Dia. (mm)	600
Test Type:	Plate CBR	Tested By	FTD
		Checked By	
		Project Engineer	TL
		Test Date	25-Apr-19

Pressure (kPa)	Time (minute)	Settlement			Average Settlement (mm)
		Gauge (a) (mm)	Gauge (b) (mm)	Gauge (c) (mm)	
3.5	1.0	0.40	0.08	0.04	0.17
	2.0	0.43	0.08	0.05	0.19
	3.0	0.44	0.09	0.05	0.19
	4.0	0.45	0.09	0.05	0.20
	5.0	0.45	0.09	0.05	0.20
34.0	6.0	2.67	0.70	0.42	1.26
	7.0	2.71	0.71	0.43	1.28
	8.0	2.74	0.72	0.44	1.30
	9.0	2.76	0.73	0.45	1.31
	10.0	2.76	0.73	0.45	1.31
45.3	11.0	3.22	0.91	0.56	1.56
	12.0	3.29	0.93	0.58	1.60
	13.0	3.31	0.93	0.59	1.61
	14.0	3.33	0.94	0.59	1.62
	15.0	3.33	0.94	0.75	1.67
60.8	16.0	3.92	1.20	0.75	1.96
	17.0	3.96	1.22	0.78	1.99
	18.0	4.03	1.25	0.78	2.02
	19.0	4.05	1.26	0.78	2.03
	20.0	4.05	1.26	0.78	2.03
92.0	21.0	4.99	1.80	1.02	2.60
	22.0	5.24	1.98	1.12	2.78
	23.0	5.31	2.01	1.13	2.82
	24.0	5.35	2.02	1.14	2.84
	25.0	5.36	2.02	1.14	2.84
	26.0	5.36	2.02	1.14	2.84
	27.0	6.04	2.54	1.37	3.32
109.6	28.0	6.12	2.61	1.40	3.38
	29.0	6.21	2.67	1.43	3.44
	30.0	6.26	2.70	1.44	3.47
	31.0	6.30	2.73	1.46	3.50
	32.0	6.34	2.76	1.48	3.53
	33.0	6.35	2.77	1.48	3.53
	34.0	6.35	2.77	1.48	3.53
	35.0	7.09	3.39	1.71	4.06
130.2	36.0	7.26	3.50	1.78	4.18
	37.0	7.34	2.67	1.82	3.94
	38.0	7.39	3.63	1.85	4.29
	39.0	7.48	3.68	1.88	4.35

Pressure (<i>kPa</i>)	Time (<i>minute</i>)	Settlement			Average Settlement (<i>mm</i>)
		Gauge (a) (<i>mm</i>)	Gauge (b) (<i>mm</i>)	Gauge (c) (<i>mm</i>)	
	40.0	7.54	3.73	1.90	4.39
	41.0	7.58	3.76	1.92	4.42
	42.0	7.63	3.79	1.94	4.45
	43.0	7.66	3.80	1.96	4.47
	44.0	7.68	3.85	1.97	4.50
	45.0	7.71	3.85	1.97	4.51

Plate Bearing Results Table

Based on BS1377-9:4.1

Project Name	Southampton Airport, Southampton, SO97 4AA	Project No.	J14044
Client:	Dyer and Butler	Test No	TP6
Soil Type & Condition:	Orange brown silty sandy CLAY	Depth BGL (m)	1.00
Moisture Content (%)	21	Plate Dia. (mm)	600
Test Type:	Plate CBR	Tested By	FTD
		Checked By	
		Project Engineer	TL
		Test Date	15-Apr-19

Pressure (kPa)	Time (minute)	Settlement			Average Settlement (mm)
		Gauge (a) (mm)	Gauge (b) (mm)	Gauge (c) (mm)	
9.5	1.0	0.32	0.24	0.26	0.27
	2.0	0.31	0.25	0.27	0.28
	3.0	0.31	0.26	0.27	0.28
	4.0	0.32	0.26	0.28	0.29
	5.0	0.32	0.26	0.28	0.29
17.7	6.0	0.53	0.48	0.46	0.49
	7.0	0.55	0.49	0.47	0.50
	8.0	0.55	0.49	0.48	0.51
	9.0	0.55	0.50	0.48	0.51
	10.0	0.55	0.50	0.48	0.51
28.6	11.0	0.81	0.73	0.73	0.76
	12.0	0.83	0.75	0.75	0.78
	13.0	0.84	0.76	0.76	0.79
	14.0	0.84	0.76	0.76	0.79
	15.0	0.84	0.76	0.76	0.79
40.0	16.0	1.09	1.03	1.01	1.04
	17.0	1.10	1.04	1.03	1.06
	18.0	1.11	1.05	1.03	1.06
	19.0	1.12	1.06	1.05	1.08
	20.0	1.12	1.06	1.05	1.08
50.6	21.0	1.30	1.30	1.27	1.29
	22.0	1.32	1.33	1.28	1.31
	23.0	1.32	1.34	1.30	1.32
	24.0	1.33	1.36	1.30	1.33
	25.0	1.33	1.36	1.30	1.33
62.2	26.0	1.53	1.61	1.55	1.56
	27.0	1.55	1.64	1.54	1.58
	28.0	1.57	1.68	1.57	1.61
	29.0	1.58	1.69	1.57	1.61
	30.0	1.58	1.69	1.57	1.61
72.9	31.0	1.73	1.92	1.75	1.80
	32.0	1.76	1.96	1.78	1.83
	33.0	1.80	1.99	1.80	1.86
	34.0	1.79	2.01	1.81	1.87
	35.0	1.80	2.03	1.82	1.88
	36.0	1.80	2.04	1.83	1.89
	37.0	1.80	2.04	1.83	1.89

Report on the Determination of the Californian Bearing Ratio using the Plate Load Test

BS 1377: Part 9: 1990: Clause 4.1, Design Manual for Roads & Bridges Chapter 7, IAN 73/06 (rev 1)

Project Name: *Southampton Airport, Southampton,
SO97 4AA*

Project No.: *J14044*

Client: *Dyer and Butler*

Project Eng: *TL*

Test Location / Ref: *TP1A*

Date Tested: *16-Apr-2019*

Material Description: *Orange brown silty sandy CLAY*

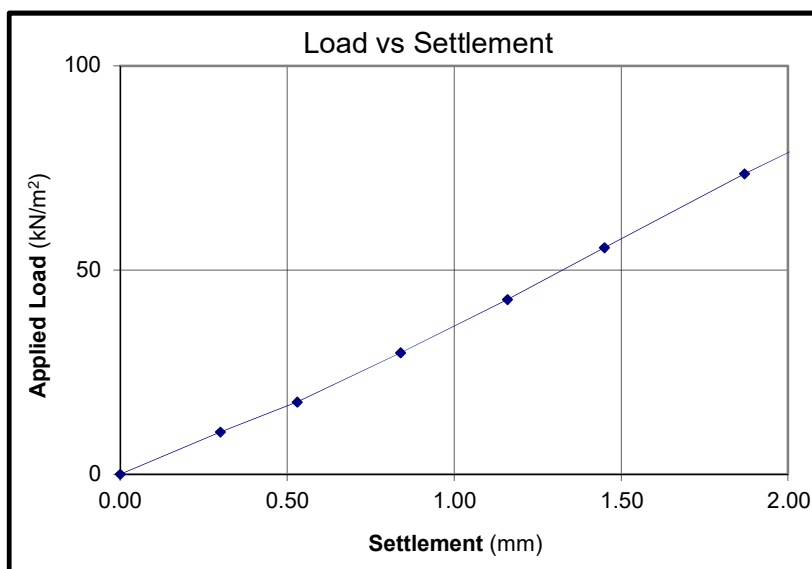
Source (if known):

Depth Below Ground Level: *1.0m*

Reaction Load (kg): *22000*

Plate Diameter (mm): *600*

Settlement (mm)	Load (kN/m ²)
0.00	0
0.30	10.3
0.53	17.7
0.84	29.7
1.16	42.8
1.45	55.5
1.87	73.6
2.11	83.1



Apparent Modulus of Subgrade Reaction (kN/m²/mm)

37

(k) Modified for Plate Diameter (k₇₆₂)

30

Equivalent CBR Value (%)

3.5

* >1.25mm settlement achieved

Remarks: Equivalent CBR calculated to Design Manual and Bridges Vol 7 Section 2 Part 2 IAN 73/06 Rev 1. Modulus calculated at 1.25mm penetration. If 1.25mm penetration not achieved, modulus calculated at maximum obtained penetration.

Checked By: NPB

Dated: 08-Jul-19

Report on the Determination of the Californian Bearing Ratio using the Plate Load Test

BS 1377: Part 9: 1990: Clause 4.1, Design Manual for Roads & Bridges Chapter 7, IAN 73/06 (rev 1)

Project Name: *Southampton Airport, Southampton,
SO97 4AA*

Project No.: *J14044*

Client: *Dyer and Butler*

Project Eng: *TL*

Test Location / Ref: *TP2A*

Date Tested: *17-Apr-2019*

Material Description: *Orange brown silty sandy CLAY*

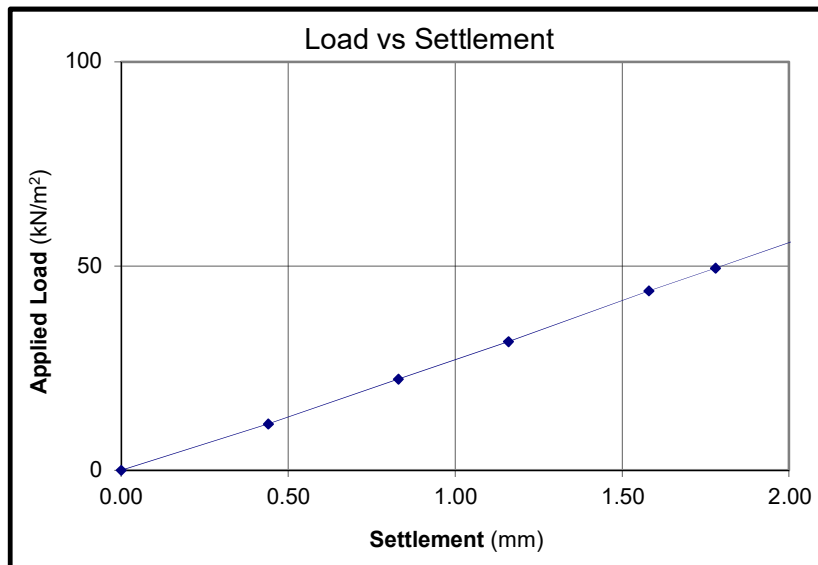
Source (if known):

Depth Below Ground Level: *1.0m*

Reaction Load (kg): *22000*

Plate Diameter (mm): *600*

Settlement (mm)	Load (kN/m ²)
0.00	0
0.44	11.3
0.83	22.3
1.16	31.5
1.58	43.9
1.78	49.5
2.20	61.5
2.58	72.9



Apparent Modulus of Subgrade Reaction (kN/m²/mm)

27

(k) Modified for Plate Diameter (k₇₆₂)

22

Equivalent CBR Value (%)

2.0

* >1.25mm settlement achieved

Remarks: Equivalent CBR calculated to Design Manual and Bridges Vol 7 Section 2 Part 2 IAN 73/06 Rev 1. Modulus calculated at 1.25mm penetration. If 1.25mm penetration not achieved, modulus calculated at maximum obtained penetration.

Checked By: NPB

Dated: 08-Jul-19

Report on the Determination of the Californian Bearing Ratio using the Plate Load Test

BS 1377: Part 9: 1990: Clause 4.1, Design Manual for Roads & Bridges Chapter 7, IAN 73/06 (rev 1)

Project Name: *Southampton Airport, Southampton,
SO97 4AA*

Project No.: *J14044*

Client: *Dyer and Butler*

Project Eng: *TL*

Test Location / Ref: *TP3*

Date Tested: *18-Apr-2019*

Material Description: *Orange brown silty sandy CLAY*

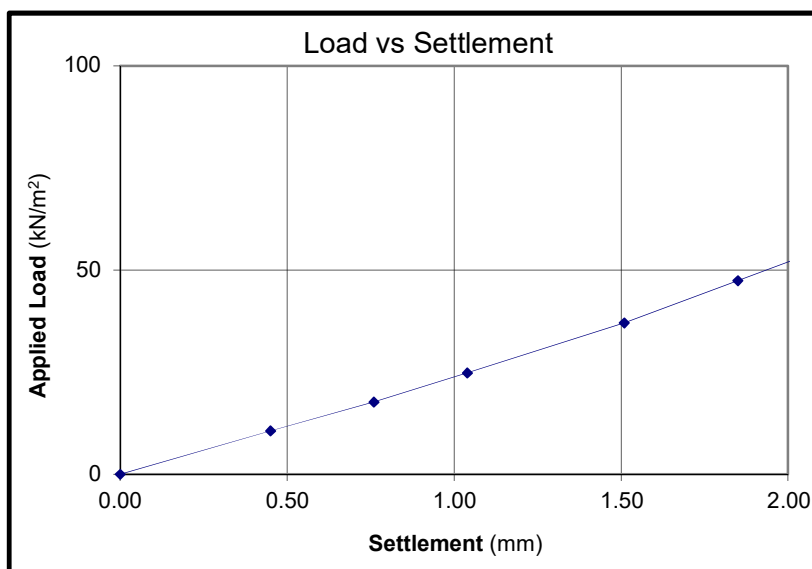
Source (if known):

Depth Below Ground Level: *1.0m*

Reaction Load (kg): *22000*

Plate Diameter (mm): *600*

Settlement (mm)	Load (kN/m ²)
0.00	0
0.45	10.6
0.76	17.7
1.04	24.8
1.51	37.1
1.85	47.4
2.21	58.4
2.54	69.7



Apparent Modulus of Subgrade Reaction (kN/m²/mm)

24

(k) Modified for Plate Diameter (k₇₆₂)

19

Equivalent CBR Value (%)

1.7

* >1.25mm settlement achieved

Remarks: Equivalent CBR calculated to Design Manual and Bridges Vol 7 Section 2 Part 2 IAN 73/06 Rev 1. Modulus calculated at 1.25mm penetration. If 1.25mm penetration not achieved, modulus calculated at maximum obtained penetration.

Checked By: NPB

Dated: 08-Jul-19

Report on the Determination of the Californian Bearing Ratio using the Plate Load Test

BS 1377: Part 9: 1990: Clause 4.1, Design Manual for Roads & Bridges Chapter 7, IAN 73/06 (rev 1)

Project Name: *Southampton Airport, Southampton,
SO97 4AA*

Project No.: *J14044*

Client: *Dyer and Butler*

Project Eng: *TL*

Test Location / Ref: *TP4*

Date Tested: *23-Apr-2019*

Material Description: *Orange brown slightly sandy clay*

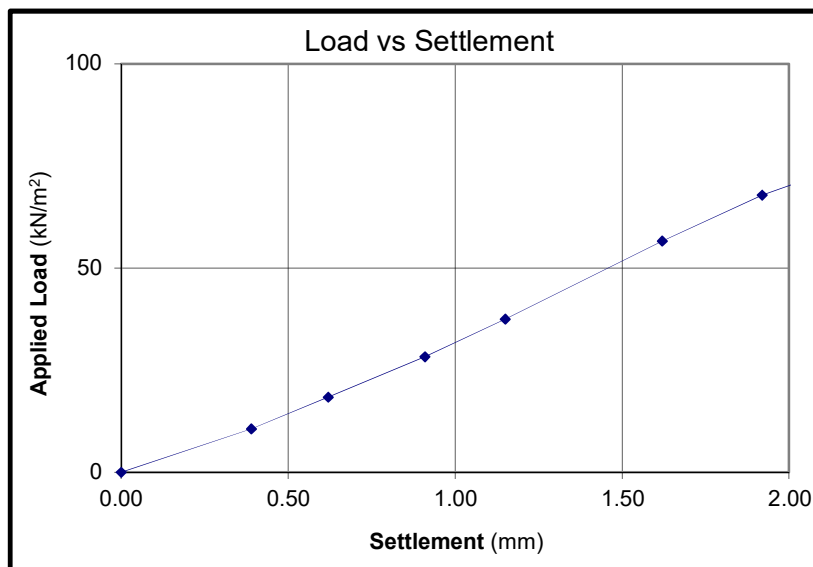
Source (if known):

Depth Below Ground Level: *1.0m*

Reaction Load (kg): *22500*

Plate Diameter (mm): *600*

Settlement (mm)	Load (kN/m ²)
0.00	0
0.39	10.6
0.62	18.4
0.91	28.3
1.15	37.5
1.62	56.6
1.92	67.9
2.63	88.4



Apparent Modulus of Subgrade Reaction (kN/m²/mm)

33

(k) Modified for Plate Diameter (k₇₆₂)

27

Equivalent CBR Value (%)

2.9

* >1.25mm settlement achieved

Remarks: Equivalent CBR calculated to Design Manual and Bridges Vol 7 Section 2 Part 2 IAN 73/06 Rev 1. Modulus calculated at 1.25mm penetration. If 1.25mm penetration not achieved, modulus calculated at maximum obtained penetration.

Checked By: N P Burrows

Dated: 08-Jul-19

Report on the Determination of the Californian Bearing Ratio using the Plate Load Test

BS 1377: Part 9: 1990: Clause 4.1, Design Manual for Roads & Bridges Chapter 7, IAN 73/06 (rev 1)

Project Name: *Southampton Airport, Southampton,
SO97 4AA*

Project No.: *J14044*

Client: *Dyer and Butler*

Project Eng: *TL*

Test Location / Ref: *TP5*

Date Tested: *24-Apr-2019*

Material Description: *Orange brown slightly sandy clay*

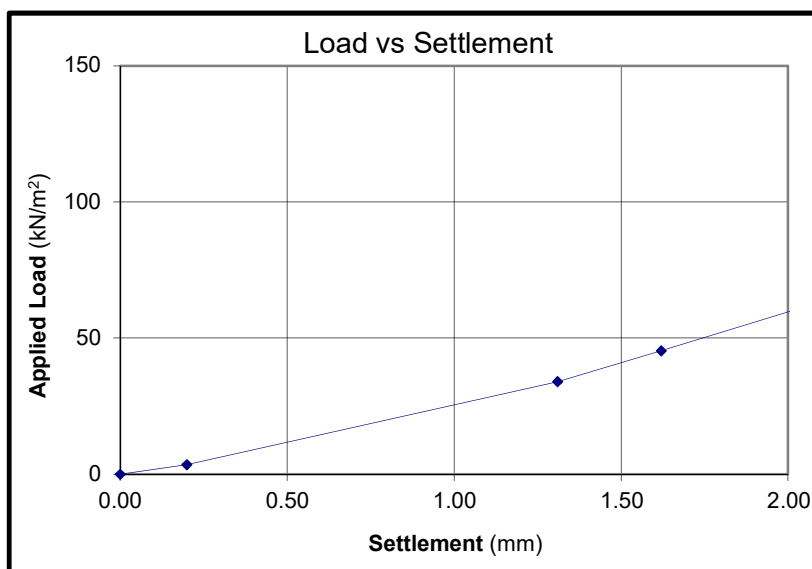
Source (if known):

Depth Below Ground Level: *1.0m*

Reaction Load (kg): *22500*

Plate Diameter (mm): *600*

Settlement (mm)	Load (kN/m ²)
0.00	0
0.20	3.5
1.31	34.0
1.62	45.3
2.03	60.8
2.84	92.0
3.53	109.6
4.51	130.2



Apparent Modulus of Subgrade Reaction (kN/m²/mm)

26

(k) Modified for Plate Diameter (k₇₆₂)

21

Equivalent CBR Value (%)

1.9

* >1.25mm settlement achieved

Remarks: Equivalent CBR calculated to Design Manual and Bridges Vol 7 Section 2 Part 2 IAN 73/06 Rev 1. Modulus calculated at 1.25mm penetration. If 1.25mm penetration not achieved, modulus calculated at maximum obtained penetration.

Checked By: N P Burrows

Dated: 08-Jul-19

Report on the Determination of the Californian Bearing Ratio using the Plate Load Test

BS 1377: Part 9: 1990: Clause 4.1, Design Manual for Roads & Bridges Chapter 7, IAN 73/06 (rev 1)

Project Name: *Southampton Airport, Southampton,
SO97 4AA*

Project No.: *J14044*

Client: *Dyer and Butler*

Project Eng: *TL*

Test Location / Ref: *TP6*

Date Tested: *15-Apr-2019*

Material Description: *Orange brown silty sandy CLAY*

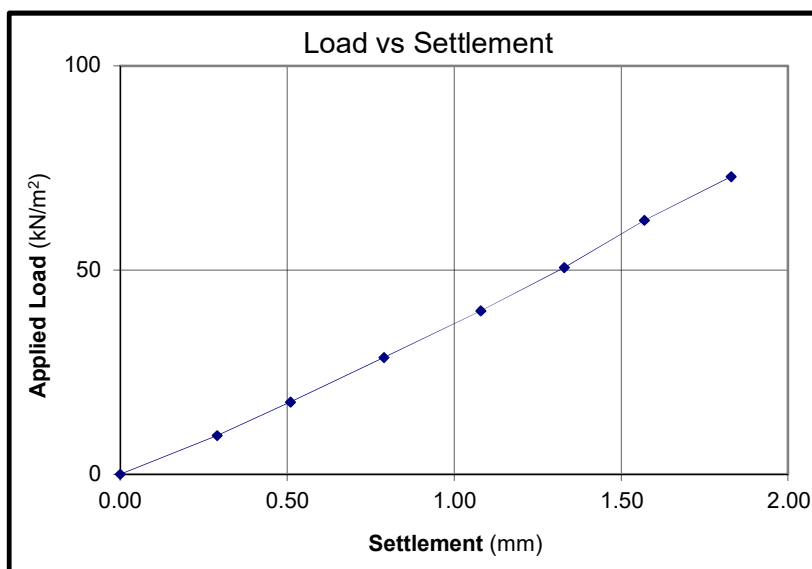
Source (if known):

Depth Below Ground Level: *1.0m*

Reaction Load (kg): *22000*

Plate Diameter (mm): *600*

Settlement (mm)	Load (kN/m ²)
0.00	0
0.29	9.5
0.51	17.7
0.79	28.6
1.08	40.0
1.33	50.6
1.57	62.2
1.83	72.9



Apparent Modulus of Subgrade Reaction (kN/m²/mm)

38

(k) Modified for Plate Diameter (k₇₆₂)

30

Equivalent CBR Value (%)

3.6

* >1.25mm settlement achieved

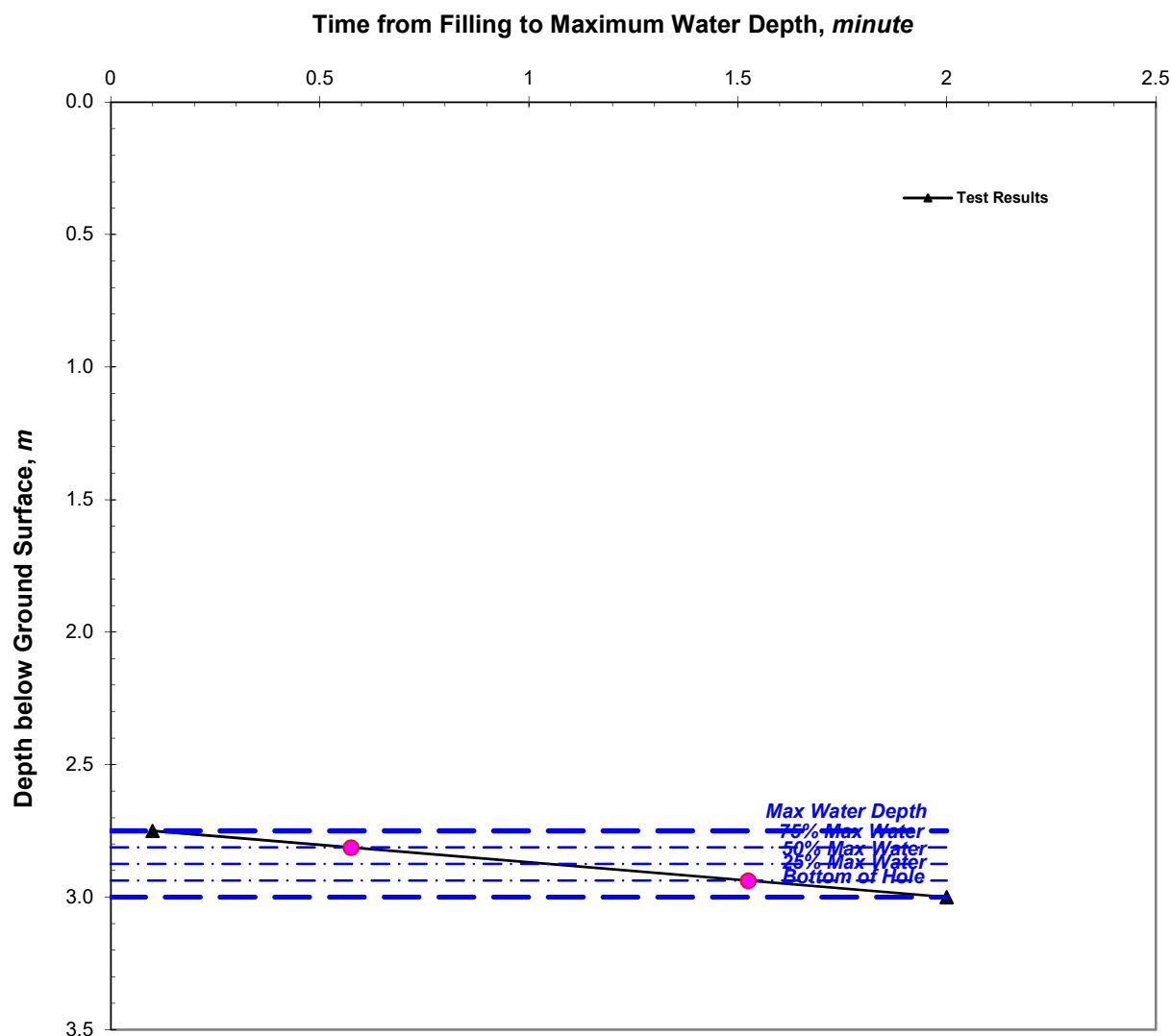
Remarks: Equivalent CBR calculated to Design Manual and Bridges Vol 7 Section 2 Part 2 IAN 73/06 Rev 1. Modulus calculated at 1.25mm penetration. If 1.25mm penetration not achieved, modulus calculated at maximum obtained penetration.

Checked By: NPB

Dated: 08-Jul-19

BRE Digest DG365 Soakage Test

Test Hole No: PT1
Test No: Test No 1 (Initial)



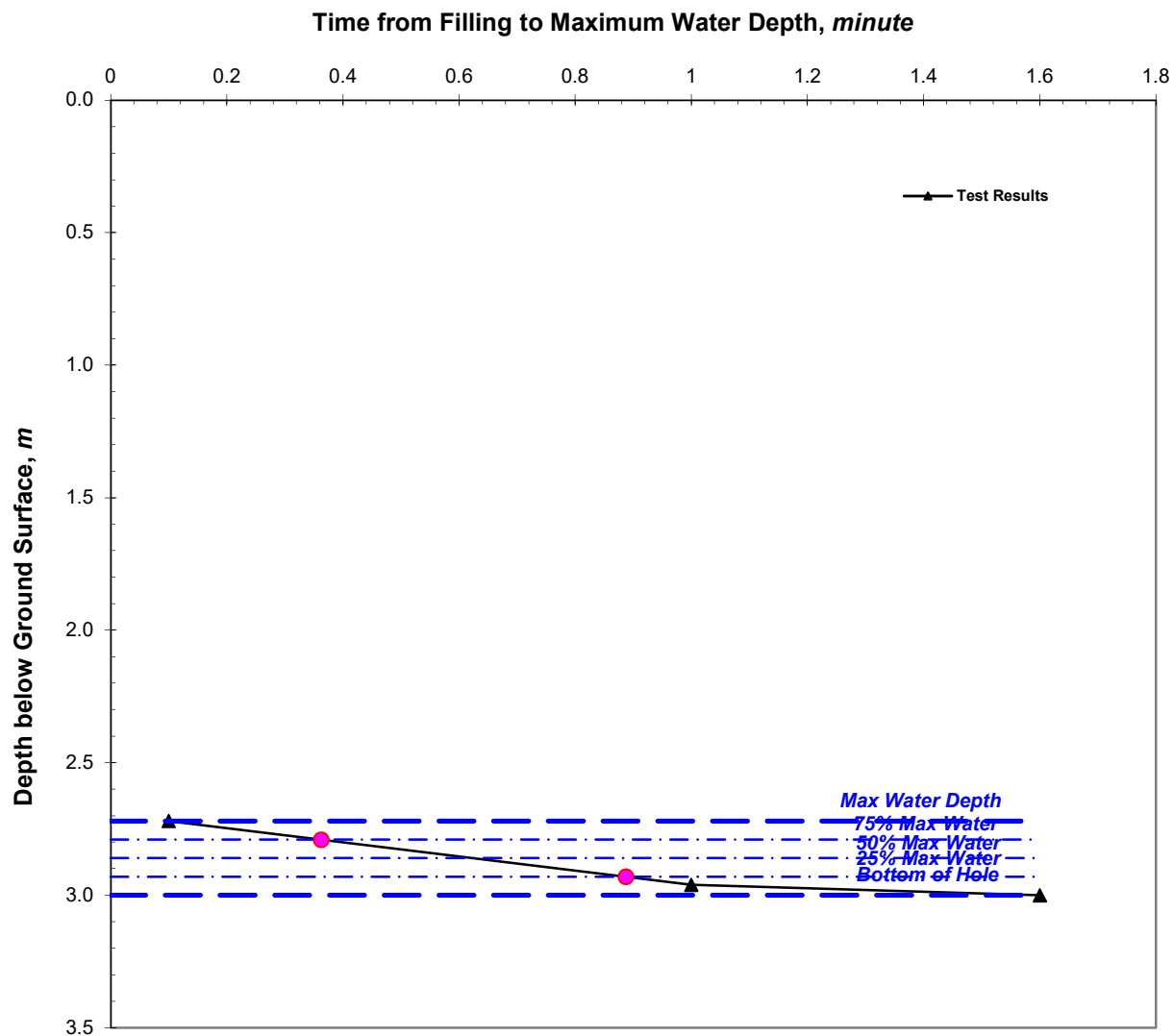
Pit Length, <i>m</i>	3.000	Depth to Water at Start of Test, <i>m</i>	2.750
Pit Width, <i>m</i>	0.600	Max Water Dropdown during Test, <i>m</i>	0.250
Depth to Pit Base, <i>m</i>	3.000	Total Soakage Test Time, <i>min</i>	2.0
Depth to Top of Permeable Soils, <i>m</i>		Mean Internal Discharge Area, <i>m</i> ²	2.700
Depth to Groundwater Surface, <i>m</i>		Discharge Rate, <i>litre/min</i>	82.895
Depth to Top of Granular Fill, <i>m</i>	1.600	Soakage Rate, <i>litre/m</i> ² / <i>min</i>	30.70
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, <i>m/sec</i>	5.12E-04

Comments: 1800L
Pit was emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 24/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S7

BRE Digest DG365 Soakage Test

Test Hole No: PT1
Test No: Test No 2 (Repeated)



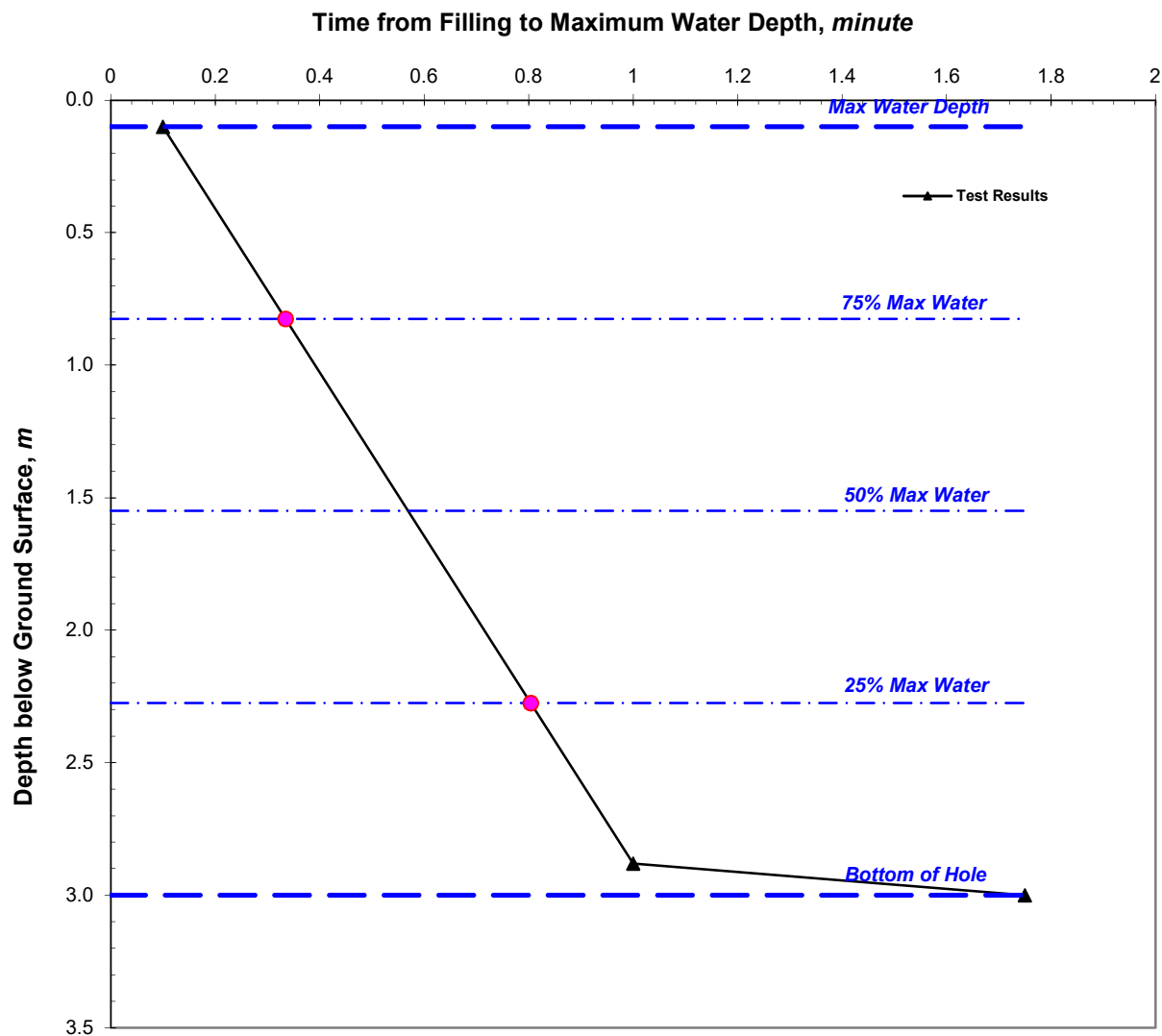
Pit Length, m	3.000	Depth to Water at Start of Test, m	2.720
Pit Width, m	0.600	Max Water Dropdown during Test, m	0.280
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	1.6
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	2.808
Depth to Groundwater Surface, m		Discharge Rate, litre/min	168.000
Depth to Top of Granular Fill, m	1.600	Soakage Rate, litre/m ² /min	59.83
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	9.97E-04

Comments: 1800L
Pit was emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 24/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S8

BRE Digest DG365 Soakage Test

Test Hole No: PT1
Test No: Test No 3 (Repeated)



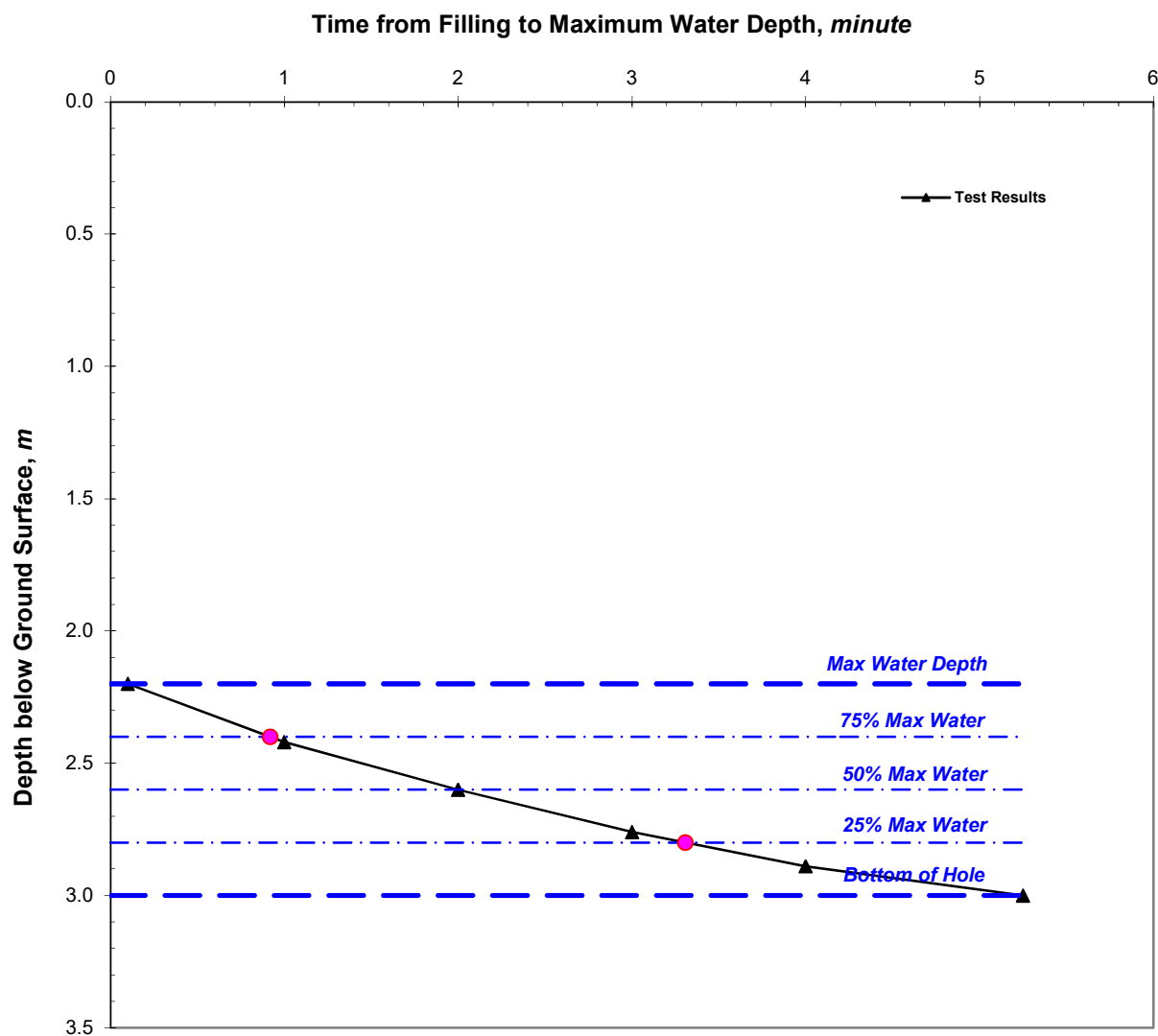
Pit Length, m	3.000	Depth to Water at Start of Test, m	0.100
Pit Width, m	0.600	Max Water Dropdown during Test, m	2.900
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	1.8
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	12.240
Depth to Groundwater Surface, m		Discharge Rate, litre/min	3877.621
Depth to Top of Granular Fill, m	1.600	Soakage Rate, litre/m ² /min	316.80
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	5.28E-03

Comments: 1900L
Pit was emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 24/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S9

BRE Digest DG365 Soakage Test

Test Hole No: PT2
Test No: Test No 1 (Initial)



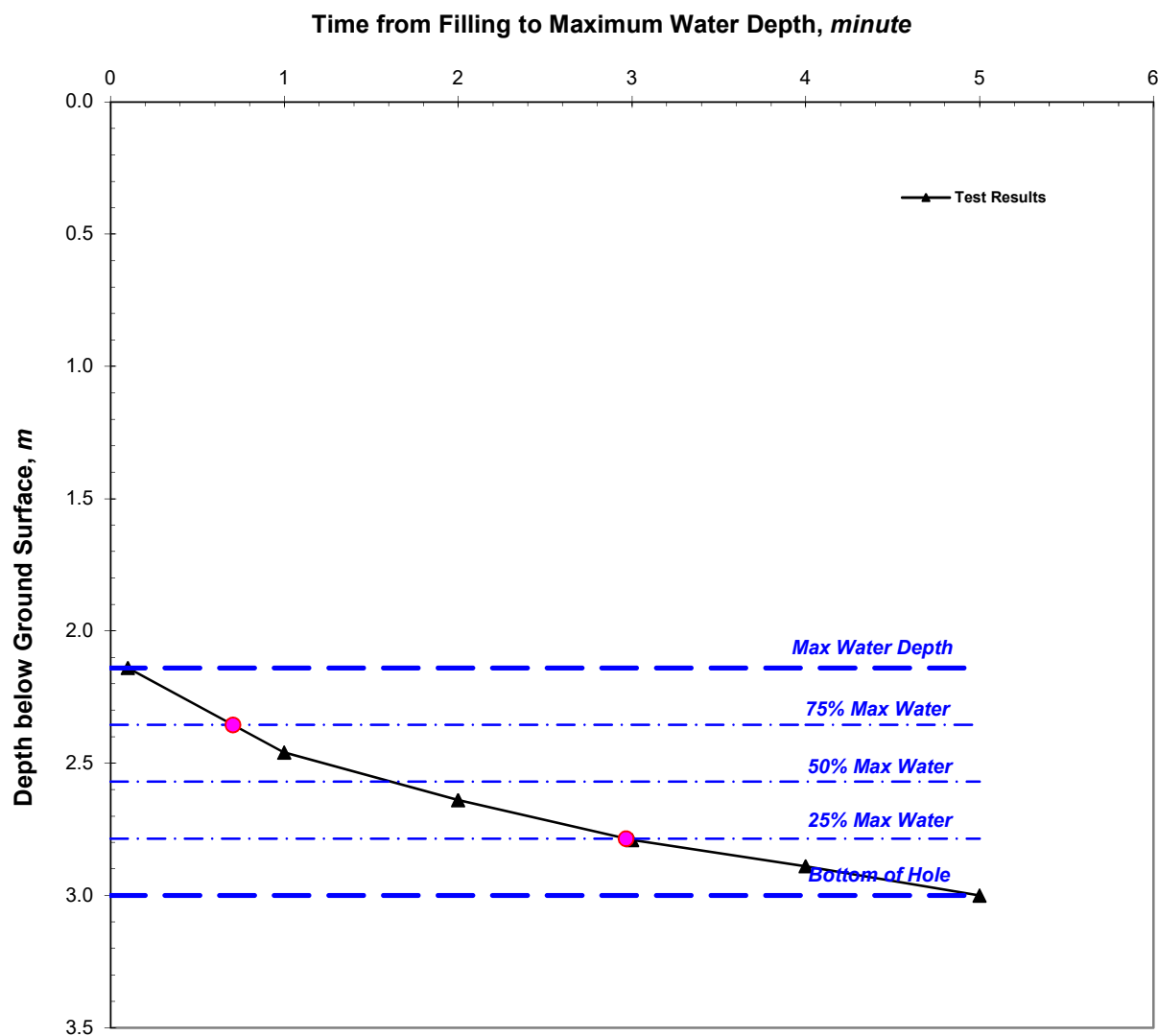
Pit Length, m	2.800	Depth to Water at Start of Test, m	2.200
Pit Width, m	0.550	Max Water Dropdown during Test, m	0.800
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	5.3
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	4.220
Depth to Groundwater Surface, m		Discharge Rate, litre/min	90.228
Depth to Top of Granular Fill, m	1.300	Soakage Rate, litre/m ² /min	21.38
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	3.56E-04

Comments: 1800L
Pit was emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 29/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S4

BRE Digest DG365 Soakage Test

Test Hole No: PT2
Test No: Test No 2 (Repeated)



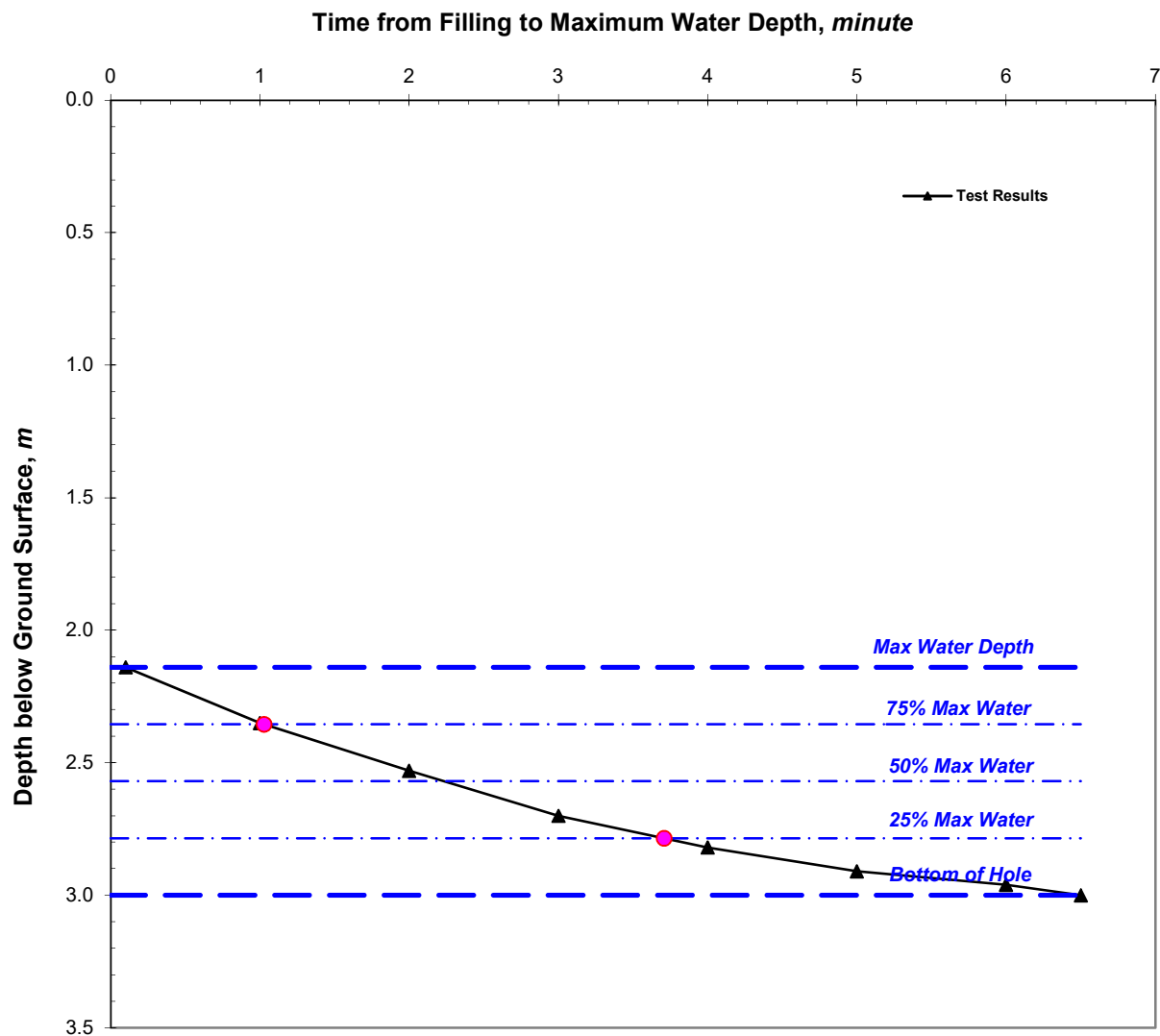
Pit Length, m	2.800	Depth to Water at Start of Test, m	2.140
Pit Width, m	0.550	Max Water Dropdown during Test, m	0.860
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	5.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	4.421
Depth to Groundwater Surface, m		Discharge Rate, litre/min	102.463
Depth to Top of Granular Fill, m	1.300	Soakage Rate, litre/m ² /min	23.18
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	3.86E-04

Comments: 1800L
Pit was emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 29/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S5

BRE Digest DG365 Soakage Test

Test Hole No: PT2
Test No: Test No 3 (Repeated)



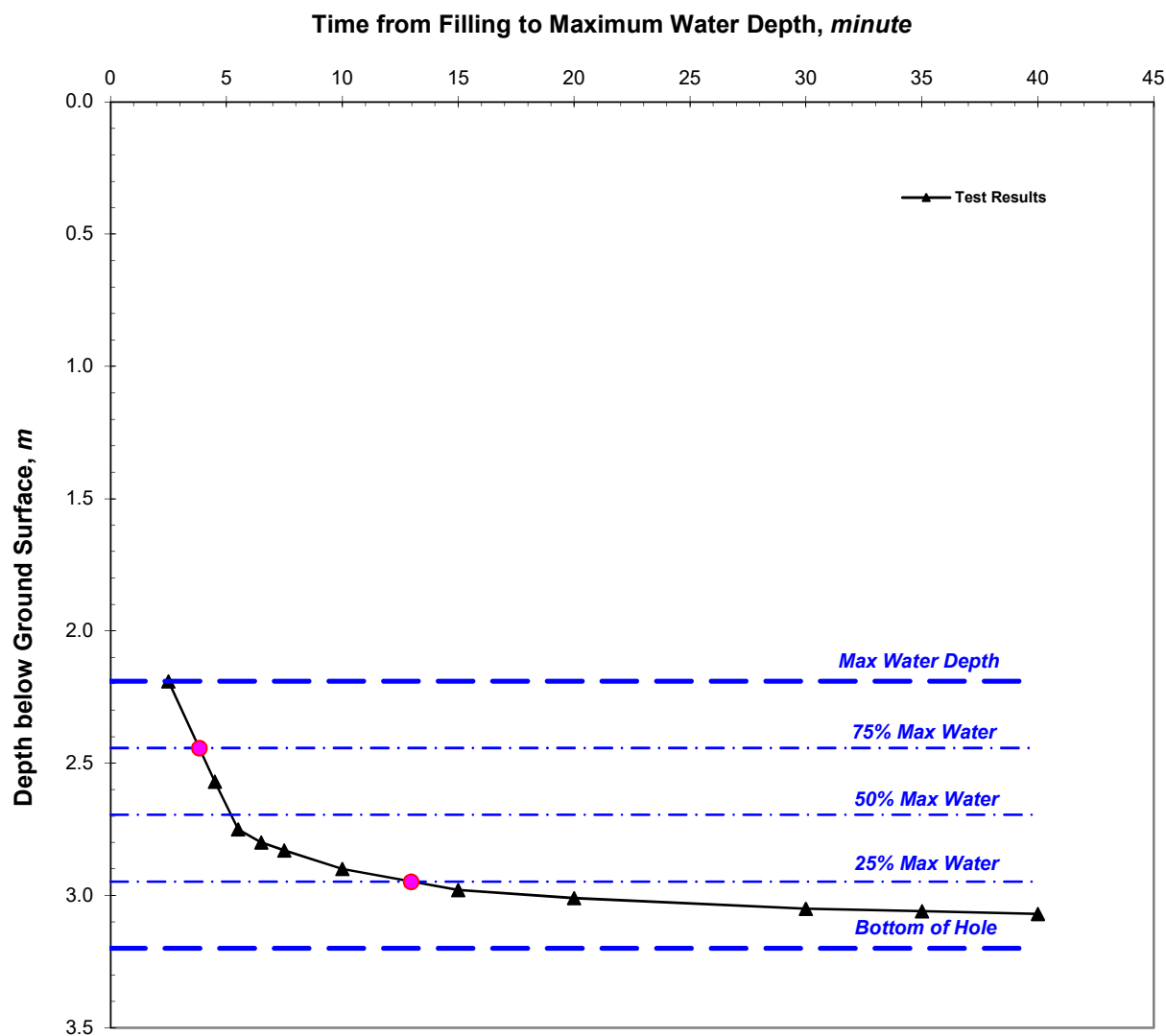
Pit Length, m	2.800	Depth to Water at Start of Test, m	2.140
Pit Width, m	0.550	Max Water Dropdown during Test, m	0.860
Depth to Pit Base, m	3.000	Total Soakage Test Time, min	6.5
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	4.421
Depth to Groundwater Surface, m		Discharge Rate, litre/min	86.463
Depth to Top of Granular Fill, m	1.300	Soakage Rate, litre/m ² /min	19.56
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	3.26E-04

Comments: 1700L
Pit was emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 29/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S6

BRE Digest DG365 Soakage Test

Test Hole No: PT3
Test No: Test No 1 (Initial)



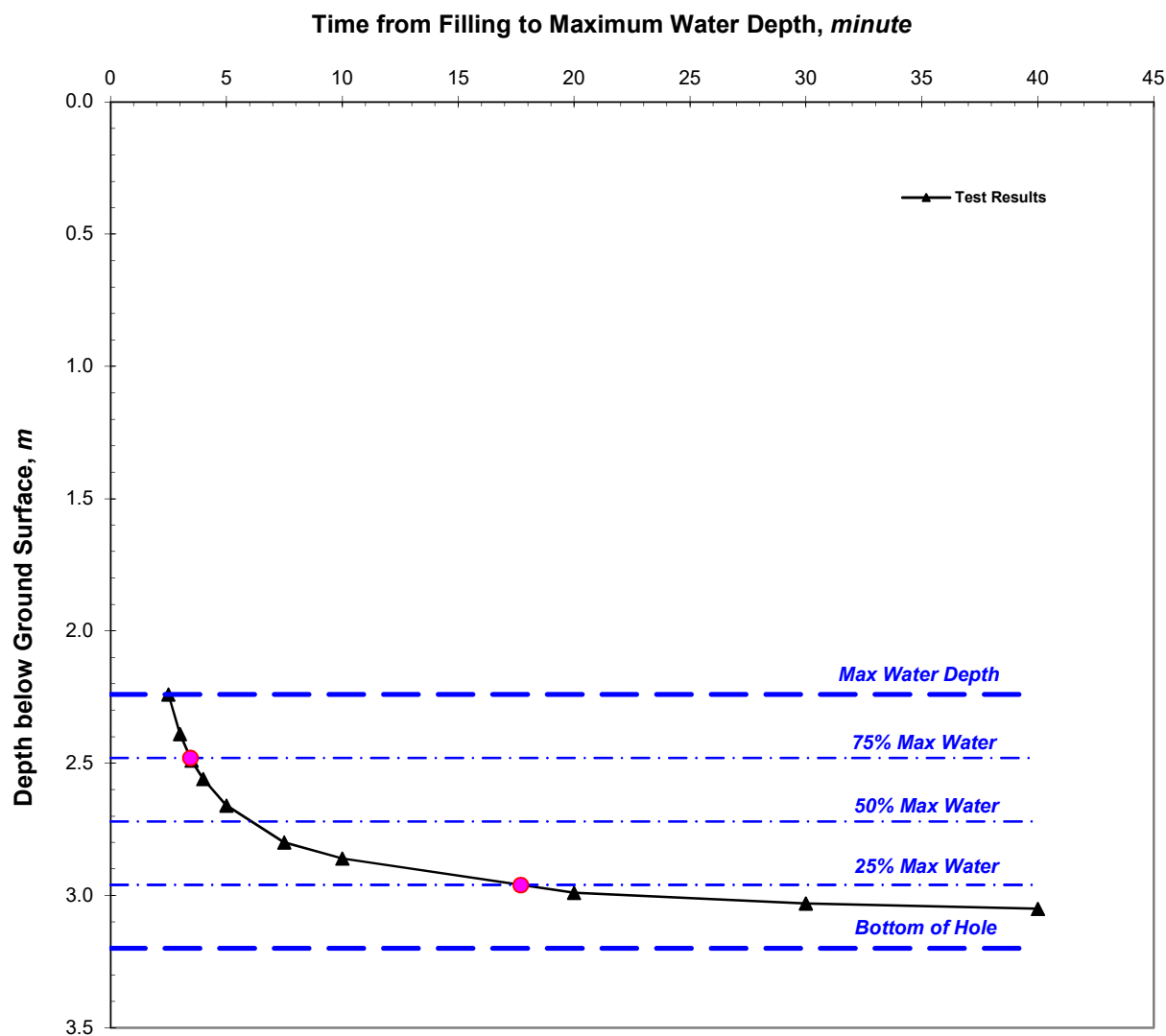
Pit Length, m	4.100	Depth to Water at Start of Test, m	2.190
Pit Width, m	0.600	Max Water Dropdown during Test, m	0.880
Depth to Pit Base, m	3.200	Total Soakage Test Time, <i>min</i>	40.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m^2	7.207
Depth to Groundwater Surface, m		Discharge Rate, <i>litre/min</i>	47.573
Depth to Top of Granular Fill, m	1.500	Soakage Rate, $litre/m^2/min$	6.60
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, <i>m/sec</i>	1.10E-04

Comments: 2000L
Pit was nearly emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 24/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S1

BRE Digest DG365 Soakage Test

Test Hole No: PT3
Test No: Test No 2 (Repeated)



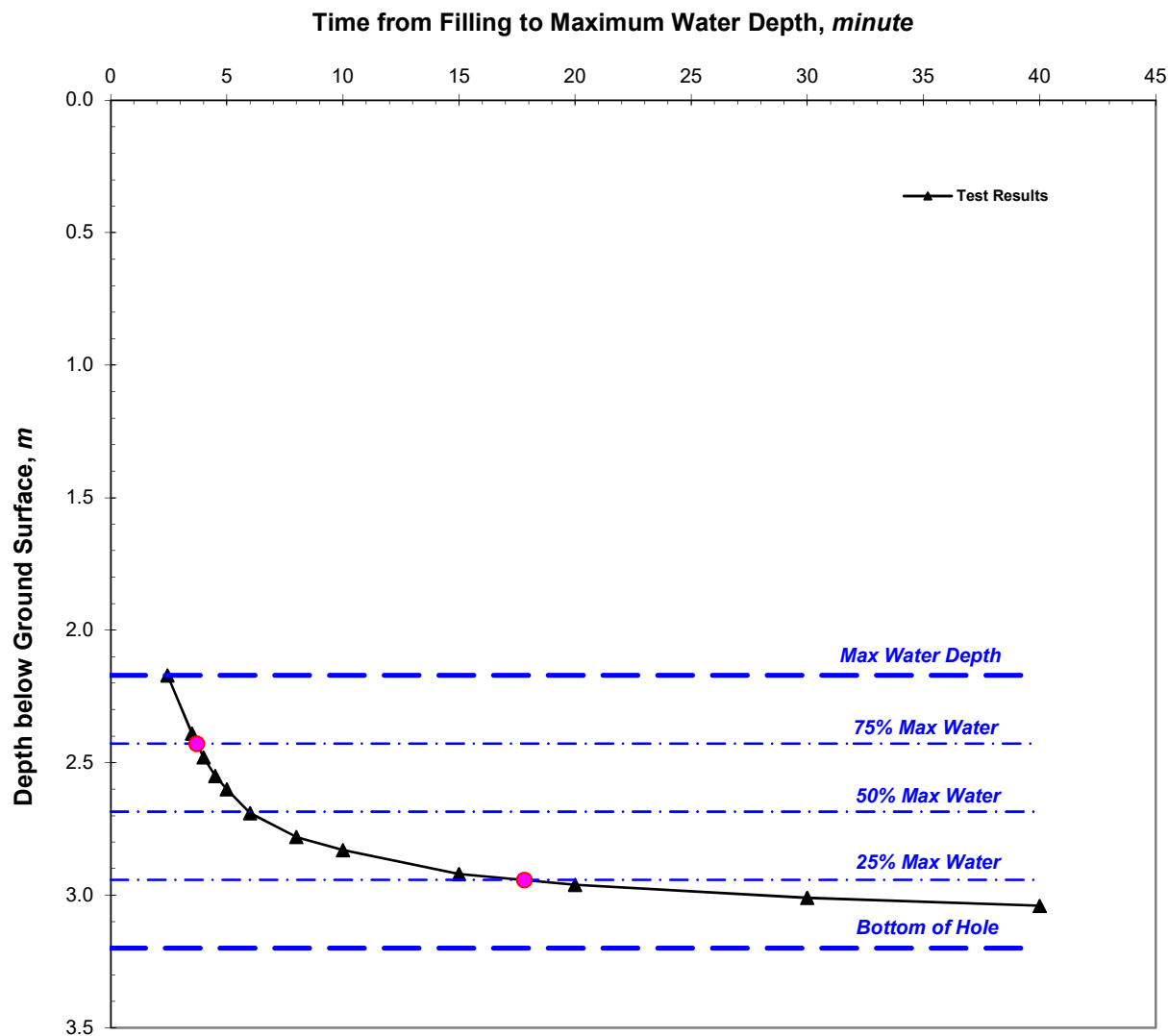
Pit Length, m	4.100	Depth to Water at Start of Test, m	2.240
Pit Width, m	0.600	Max Water Dropdown during Test, m	0.810
Depth to Pit Base, m	3.200	Total Soakage Test Time, min	40.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	6.972
Depth to Groundwater Surface, m		Discharge Rate, litre/min	29.018
Depth to Top of Granular Fill, m	1.500	Soakage Rate, litre/m ² /min	4.16
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	6.94E-05

Comments: 1800L
Pit was nearly emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 24/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S2

BRE Digest DG365 Soakage Test

Test Hole No: PT3
Test No: Test No 3 (Repeated)



Pit Length, m	4.100	Depth to Water at Start of Test, m	2.170
Pit Width, m	0.600	Max Water Dropdown during Test, m	0.870
Depth to Pit Base, m	3.200	Total Soakage Test Time, min	40.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	7.301
Depth to Groundwater Surface, m		Discharge Rate, litre/min	31.439
Depth to Top of Granular Fill, m	1.500	Soakage Rate, litre/m ² /min	4.31
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	7.18E-05

Comments: 1900L
Pit was nearly emptied at finish of test.

Client: Dyer and Butler	Job No: J14044	Test Date: 24/Apr/2019
Site: Southampton Airport	Tested By: FTD/JS	Engineer: TL Fig. S3

Summary Sheet

Results of BRE Digest DG365 Soakage Tests

Site : Southampton Airport				Job No : J14044			
Client : Dyer and Butler				O S Reference : SU 45111 16818			
Tested By : FTD/JS			Engineer: TL		Test Date : 24/04/2019		
Hole No	Test No	Hole Depth <i>m</i>	Soakage Rate for Each Test <i>litre/m²/min</i>	Soakage Rate for Each Hole <i>litre/m²/min m/sec</i>		Water Level at Finish of Test	Remarks
PT3	No 1	3.20	6.60	4.16	6.94E-5	Nearly empty pit.	2000L
PT3	No 2	3.20	4.16			Nearly empty pit.	1800L
PT3	No 3	3.20	4.31			Nearly empty pit.	1900L
PT2	No 1	3.00	21.38	19.56	3.26E-4	Empty pit.	1800L
PT2	No 2	3.00	23.18			Empty pit.	1800L
PT2	No 3	3.00	19.56			Empty pit.	1700L
PT1	No 1	3.00	30.70	30.70	5.12E-4	Empty pit.	1800L
PT1	No 2	3.00	59.83			Empty pit.	1800L
PT1	No 3	3.00	316.80			Empty pit.	1900L
Mean Value of All Calculated Soakage Rates :				18.14 <i>litre/m²/min</i>	3.02E-4 <i>m/sec</i>		

Constant rate and Variable head tests								
Client	Dyer and Butler Ltd.				Project Eng.	TL	Project No.:	J14044
Project Name	Southampton Runway Extension - Southampton International Airport				Tested By	PG	Checked By	TL
Borehole details								
BH No.	BH8	BH depth	5.0m	Approx Vol BH (total)	0.22 m3 (22 litres)		Approx Hole Vol above SWL	0.015 m3 (15 litres)
Notes: Test undertaken in existing standpipe installation. Hole diameter = 200mm. Pipe diameter = 50mm. Installation details: GL to 3.5m bentonite backfill, 3.5m to 5.0m gravel backfill (35% porosity assumed). GL to 4.0m plain pipe, 4.0 to 5.0m slotted pipe. Volume of borehole from GL to base is about 0.022m3 (22 litres), allowing for bentonite backfill.								
Test Data								
Date of Test	Times		Volumes of water in litres			Soakage Rate	Level water in Borehole	Corrected Soakage Rate
	Clock	Time from start	In bowser	In Hole	Used (diff)			
23/05/2019		00:00:00	600				4.25	
(test 1)		00:01:00	500		100		4.25	
		00:01:30	400		100		4.25	
		00:02:00	300		100	200	4.25	
		00:02:30	300				4.25	200
23/05/2019		00:00:01	2100				4.25	
(test 2)		00:00:30	1800		300		4.25	
		00:01:00	1500		300	600	4.25	
		00:01:30	1500				4.25	600
24/05/2019		00:00:01	1500				4.25	
(test 3)		00:00:30	1250		250		4.25	
		00:01:00	1000		250	500	4.25	
		00:01:20	1000				4.25	500
24/05/2019		00:00:01	1000				4.25	
(test 4)		00:00:30	900		100		4.25	
		00:01:00	800		100	200	4.25	
		00:01:30	700		100		4.25	
		00:02:00	650		50	150	4.25	
		00:03:00	550		100		4.25	
		00:04:00	400		150	250	4.25	
		00:05:00	400				4.25	200

Neil Burrows
Southern Testing Laboratories
Unit 11
Charlwoods Road
East Grinstead
RH19 2HU

SPT Hammer Ref: SEDS10
Test Date: 05/05/2018
Report Date: 15/05/2018
File Name: SEDS10.spt
Test Operator: CHARLWOODS

Instrumented Rod Data

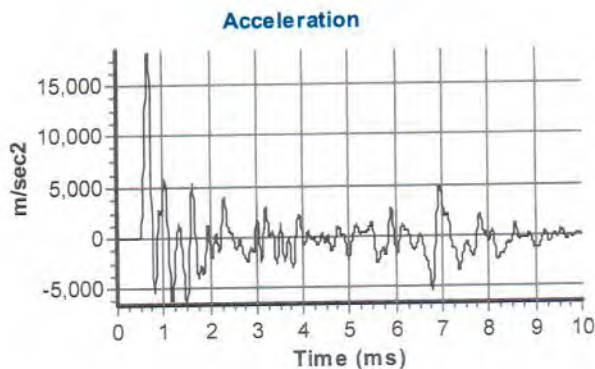
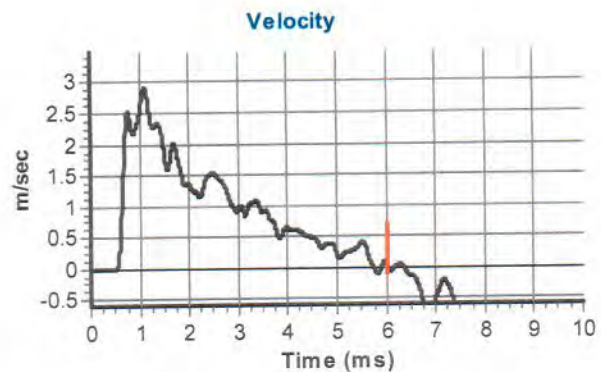
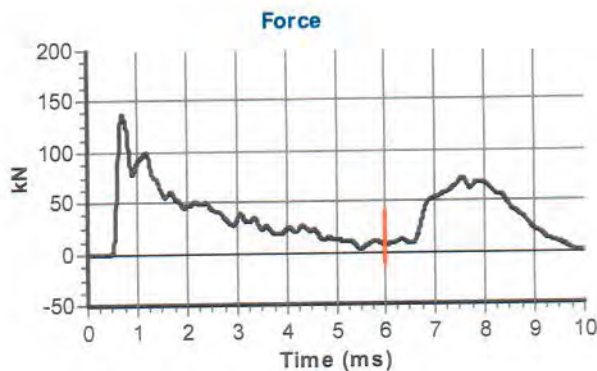
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 6458
Accelerometer No.2: 9607

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.5

Comments / Location

Charlwoods



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 315

Energy Ratio E_r (%): **67**

Signed: [Redacted Signature]
Title: Field Operations Manager

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Keeble House
Stuart Way
East Grinstead
West Sussex
RH19 4QA

SPT Hammer Ref: SEDS10
Test Date: 04/05/2019
Report Date: 04/05/2019
File Name: SEDS10.spt
Test Operator: NPB

Instrumented Rod Data

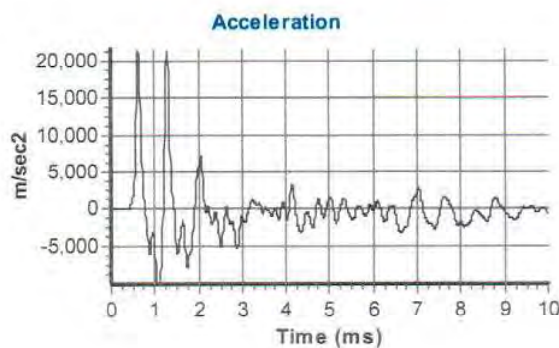
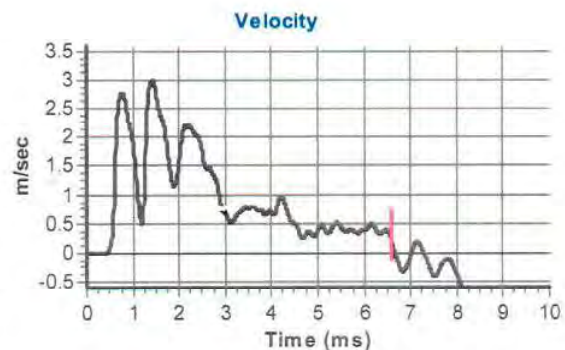
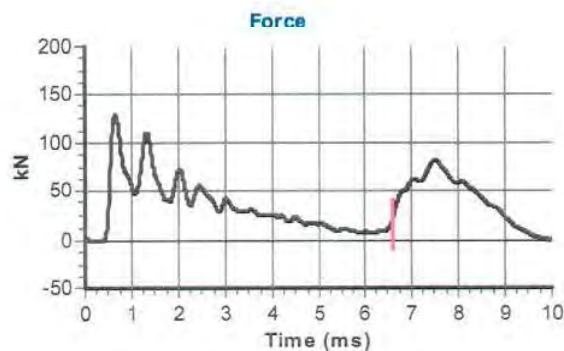
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 6458
Accelerometer No.2: 9607

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.5

Comments / Location

CHARLWOODS



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 285

Energy Ratio E_r (%): **60**

Signed: [Redacted Signature]
Title: Field Operations Manager

The recommended calibration interval is 12 months

Project Northern Runway Extension
Client Dyer & Butler

Project ID
Project Engineer

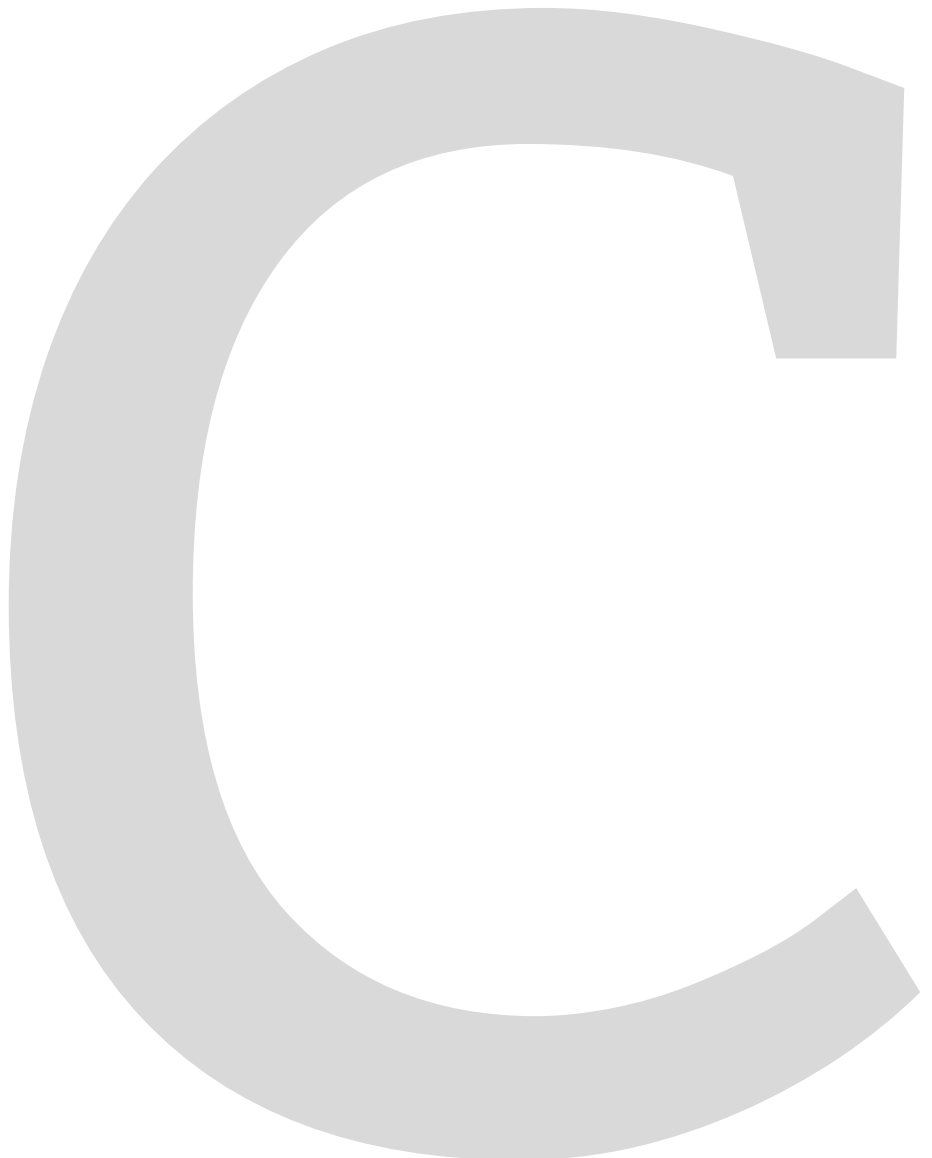
J14044
TRL

STANDARD PENETRATION TEST RESULTS

Location ID	Test Depth (m bgl)	Test Type	SPT Hammer Ref.	Energy Ratio %	Seating Blows/Penetration				Main Test Blows/Penetration								N Value	N60	Reported Result
					SB1	SP1	SB2	SP2	MB1	MP1	MB2	MP2	MB3	MP3	MB4	MP4			
BH7	2.2	C	SEDS 10	60	4	75	4	75	3	75	4	75	3	75	3	75	13	13	N=13 (4,4/3,4,3,3)
BH7	3.2	C	SEDS 10	60	4	75	4	75	6	75	6	75	6	75	6	75	24	24	N=24 (4,4/6,6,6,6)
BH7	4.2	C	SEDS 10	60	1	75	3	75	3	75	3	75	4	75	4	75	14	14	N=14 (1,3/3,3,4,4)
BH7	5.2	C	SEDS 10	60	1	75	2	75	2	75	4	75	4	75	5	75	15	15	N=15 (1,2/2,4,4,5)
BH7	6.5	S	SEDS 10	60	2	75	3	75	3	75	4	75	4	75	6	75	17	17	N=17 (2,3/3,4,4,6)
BH7	9.5	S	SEDS 10	60	3	75	5	75	7	75	7	75	6	75	7	75	27	27	N=27 (3,5/7,7,6,7)
BH7	12.5	S	SEDS 10	60	3	75	4	75	5	75	4	75	5	75	6	75	20	20	N=20 (3,4/5,4,5,6)
BH7	14.5	S	SEDS 10	60	6	75	6	75	10	75	10	75	10	75	11	75	41	41	N=41 (6,6/10,10,10,11)
BH7	16.5	S	SEDS 10	60	6	75	6	75	6	75	10	75	8	75	10	75	34	34	N=34 (6,6/6,10,8,10)
BH7	18.5	S	SEDS 10	60	6	75	7	75	10	75	9	75	8	75	8	75	35	35	N=35 (6,7/10,9,8,8)
BH8	2.5	C	SEDS 10	60	7	75	7	75	9	75	10	75	12	75	10	75	41	41	N=41 (7,7/9,10,12,10)
BH8	3.5	C	SEDS 10	60	2	75	4	75	6	75	6	75	7	75	7	75	26	26	N=26 (2,4/6,6,7,7)
BH8	4.5	C	SEDS 10	60	3	75	4	75	3	75	4	75	3	75	4	75	14	14	N=14 (3,4/3,4,3,4)
BH8	5.5	C	SEDS 10	60	1	75	2	75	2	75	3	75	5	75	3	75	13	13	N=13 (1,2/2,3,5,3)
BH8	7.5	S	SEDS 10	60	2	75	4	75	7	75	7	75	6	75	8	75	28	28	N=28 (2,4/7,7,6,8)
BH8	9.5	S	SEDS 10	60	3	75	5	75	6	75	7	75	6	75	6	75	25	25	N=25 (3,5/6,7,6,6)
BH8	11.5	S	SEDS 10	60	4	75	7	75	10	75	15	75	17	75	8	5	50	50	N=50 (4,7/50 for 230mm)
BH8	13.5	S	SEDS 10	60	5	75	7	75	10	75	18	75	22	40			50	50	50 (5,7/50 for 190mm)
BH8	15.5	S	SEDS 10	60	7	75	12	75	12	75	24	75	14	35			50	50	50 (7,12/50 for 185mm)
BH8	17.5	S	SEDS 10	60	5	75	7	75	8	75	9	75	9	75	9	75	35	35	N=35 (5,7/8,9,9,9)
BH8	19.5	S	SEDS 10	60	7	75	7	75	8	75	9	75	9	75	9	75	35	35	N=35 (7,7/8,9,9,9)

APPENDIX C

Photographs





PT1 long face (a)



PT1 long face (b)



PT1 short face



PT2 southern face



PT2 eastern face



PT2 northern face



PT2 western face



PT3 northern face

J14044 – Southampton Airport Northern Runway Extension



PT3 western face



PT3 southern face



PT3 eastern face



TP1 eastern face



TP1 southern face



TP1 western face (runway edge)



TP1 northern face



TP1A northern face



TP1A western face



TP1A southern face



TP1A eastern face and base



TP1A spoil



TP2 eastern face (runway edge)



TP2 eastern face and de-lethalisation concrete



TP2A northern face



TP2A eastern face



TP2A southern face



TP2A western face and spoil



TP3 northern face



TP3 western face



TP3 southern face



TP3 eastern face



TP3 spoil



TP4 northern face



TP4 eastern face



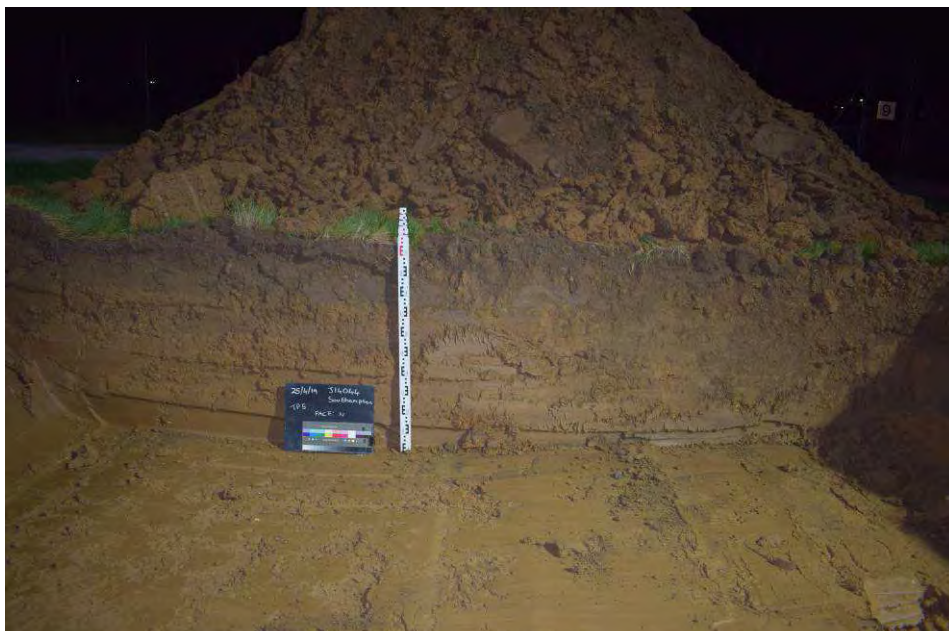
TP4 southern face



TP4 western face and base



TP4 spoil



TP5 northern face and base



TP5 eastern face



TP5 southern face



TP5 western face



TP5 spoil



TP6 northern face and spoil



TP6 eastern face



TP6 southern face



TP6 western face



TP6 base



TP7 southern face



TP7 western face



TP7 eastern face



TP7 northern face



TP8 northern face (top)



TP8 northern face (base)



TP8 eastern face



TP8 southern face



TP8 western face



TP8 spoil

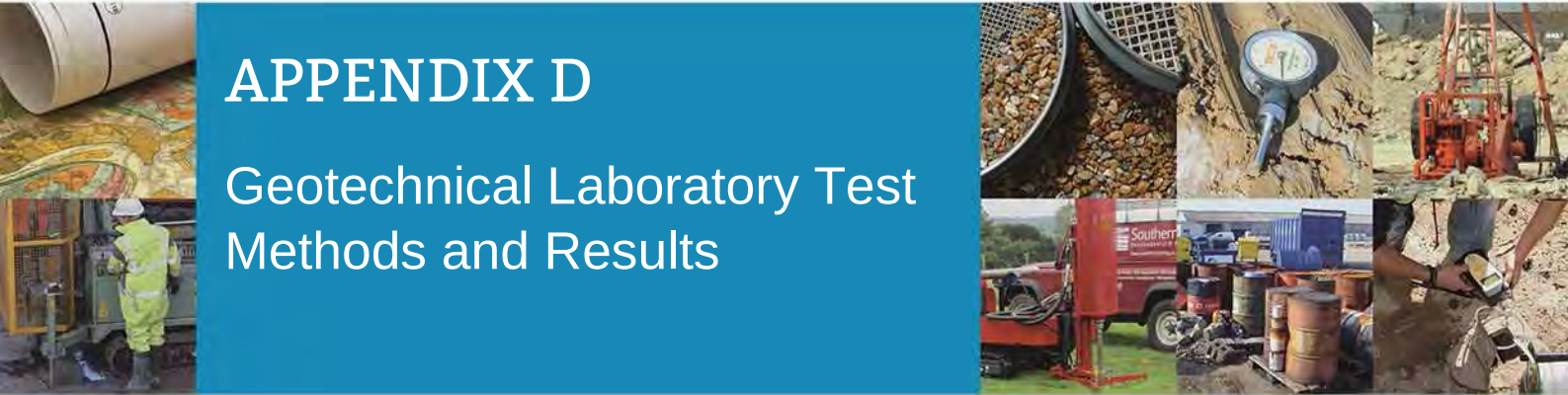


Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

APPENDIX D

Geotechnical Laboratory Test Methods and Results



D

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 825225-1

Date of Report: 06-Jun-2019

Customer: Southern Testing Laboratories
Keeble House
Stuart Way
East Grinstead
West Sussex
RH19 4QA

Customer Contact: Mr Tom Lees

Customer Job Reference: J14044

Customer Purchase Order: J14044_7 Tom

Customer Site Reference: Southampton Airport, Southampton

Date Job Received at Concept: 31-May-2019

Date Analysis Started: 31-May-2019

Date Analysis Completed: 06-Jun-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual



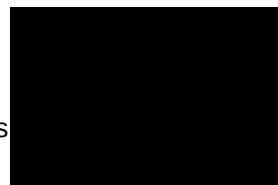
1549

Report checked
and authorised by :
Mr Simon Wicks
Technical Lead

Issued by :

[Redacted]

[Redacted] Advis



Concept Reference: 825225										
Project Site: Southampton Airport, Southampton										
Customer Reference: J14044										
Soil					Analysed as Soil					
Suite D - Brownfield Site (pyrite present)										
Concept Reference					825225 001	825225 003	825225 005	825225 006	825225 007	
Customer Sample Reference					BH7 @ 3.20m	BH7 @ 6.00m	BH8 @ 8.00m	TP7 @ 3.50m	TP8 @ 3.00m	
Date Sampled					25-APR-2019	26-APR-2019	30-APR-2019	26-APR-2019	26-APR-2019	
Determinand		Method	Test Sample	LOD	Units					
pH		T7	A40			8.7	7.9	8.0	8.4	8.8
(Water Soluble) SO4 expressed as SO4		T242	A40	0.01	g/l	0.07	0.47	0.60	0.02	<0.01
(Acid Soluble) SO4		T192	A40	0.02	%	0.05	0.14	0.22	0.03	0.04
Sulphur (total)		T6	A40	0.01	%	0.01	0.34	0.43	0.01	0.01

Concept Reference: 825225 Project Site: Southampton Airport, Southampton Customer Reference: J14044 Water Analysed as Water Suite D - Brownfield Site (pyrite present)						
Concept Reference		825225 002	825225 004			
Customer Sample Reference		BH7 @ 5.70m	BH8 @ 7.00m			
Date Sampled		27-APR-2019	03-MAY-2019			
Determinand	Method	Test Sample	LOD	Units		
pH	T7	AR			7.25	7.11
Sulphate	T686	F	0.5	mg/l	42	60

Index to symbols used in 825225-1

Value	Description
AR	As Received
F	Filtered
A40	Assisted dried < 40C
U	Analysis is UKAS accredited

Method Index

Value	Description
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T6	ICP/OES
T686	Discrete Analyser
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T7	Probe

Accreditation Summary

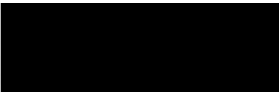
Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
pH	T7	AR			U	002,004
Sulphate	T686	F	0.5	mg/l	U	002,004
pH	T7	A40			U	001,003,005-007
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	U	001,003,005-007
(Acid Soluble) SO4	T192	A40	0.02	%	U	001,003,005-007
Sulphur (total)	T6	A40	0.01	%	U	001,003,005-007

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Borehole / Trial Pit	Depth (m)	Sample Ref	Type	Description	WC	LL	PL	PI	<425 μm	Bulk	Dry	Condition	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	W/S Mg	
					(%)	(%)	(%)	(%)	(%)	Mg/m³	Mg/m³								
BH7	0.50		B	Brown slightly sandy clayey SILT with rare rootlets.															Particle Size Distribution
BH7	1.00		B	Brown silty CLAY with rare fine gravel and rootlets.	20.6	42	18	24	99										
BH7	2.20		B	Light brown very sandy GRAVEL with silty clay lumps.															Particle Size Distribution
BH7	8.00		U	Firm friable grey clayey fine to medium SAND.	27.6	73	29	44	98	1.88	1.48	Undisturbed	160	197	99				
BH7	10.50		D	Grey mottled brownish grey sandy clayey SILT.															Particle Size Distribution
BH7	11.00		U	Firm fissured grey silty CLAY with pockets of fine grey sand.	30.4	77	25	52	99	1.89	1.45	Undisturbed	220	83	42				
BH7	13.50		U	Very stiff fissured dark grey silty CLAY.	33.7	90	36	54	100	1.88	1.40	Undisturbed	270	351	176				
BH7	17.50		B	Grey SAND, SILT and CLAY.															Particle Size Distribution
BH7	19.50		U	Very stiff fissured dark grey silty CLAY with patches of soft clay.	30.1	70	26	44	100	1.91	1.47	Undisturbed	310	57	28				
BH8	1.50		U	Light brown sandy gravelly CLAY. Gravel is flint.	4.0	25	17	8.0	22										

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

NP=Non Plastic

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	Project Name:		

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Borehole / Trial Pit	Depth (m)	Sample Ref	Type	Description	WC (%)	LL (%)	PL (%)	PI (%)	<425 µm (%)	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 (g/L)	W/S Mg (mg/L)	
BH8	5.00		B	Flint GRAVEL.															
BH8	6.50		U	Very stiff friable dark grey silty CLAY with pockets of fine to medium sand.	30.5	63	25	38	100	1.90	1.46	Undisturbed	130	109	54				
BH8	7.50		D	Greyish brown silty CLAY with rare fine gravel.	27.0	78	30	48	99										
BH8	8.50		U	Medium dense dark greenish grey SAND with stiff light grey clay laminations															One Dimensional Consolidation
BH8	8.50		U	Medium dense greenish grey SAND with stiff grey clay laminations															One Dimensional Consolidation
BH8	10.50		U	Very stiff fissured grey silty CLAY with rare soft patches.	30.8	49	19	30	100	1.84	1.41	Undisturbed	210	63	32				
BH8	12.50		U	Grey friable clayey fine to medium SAND.	24.9	49	23	26	100	1.96	1.57	Undisturbed	250	52	26				
BH8	14.50		B	Grey silty clayey fine SAND.															Particle Size Distribution
BH8	16.50		U	Stiff friable bluish grey clayey fine to medium SAND. Clay is light brown.	20.8		NP		95	2.01	1.66	Undisturbed	330	289	144				
BH8	18.50		U	Stiff friable dark grey silty CLAY.	21.2	46	25	21	99	2.02	1.67	Undisturbed	370	406	203				

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

NP=Non Plastic

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SUMMARY OF GEOTECHNICAL TESTING

[illegible]

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

NP=Non Plastic

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

BH7
0.50
B

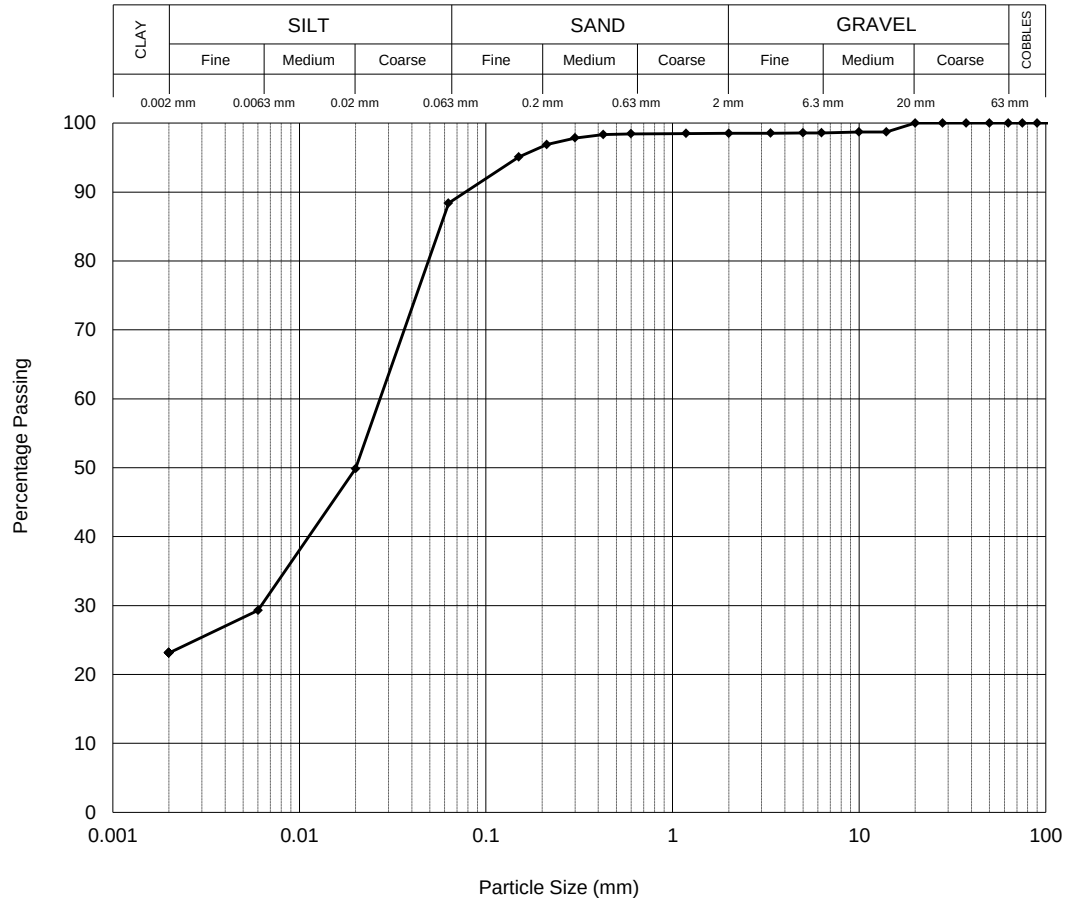
Description

Brown slightly sandy clayey SILT with rare rootlets.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	99
10.0 mm	99
6.30 mm	99
5.00 mm	99
3.35 mm	99
2.00 mm	99
1.18 mm	98
600 µm	98
425 µm	98
300 µm	98
212 µm	97
150 µm	95
63 µm	88



Sedimentation	
Pre-treatment used	
Temp (°C)	24.4
Size	% Pass
20 µm	50
6 µm	29
2 µm	23

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0
Gravel	1
Sand	10
Silt	65
Clay	24

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S Burke - Senior Technician
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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

BH7
2.20
B

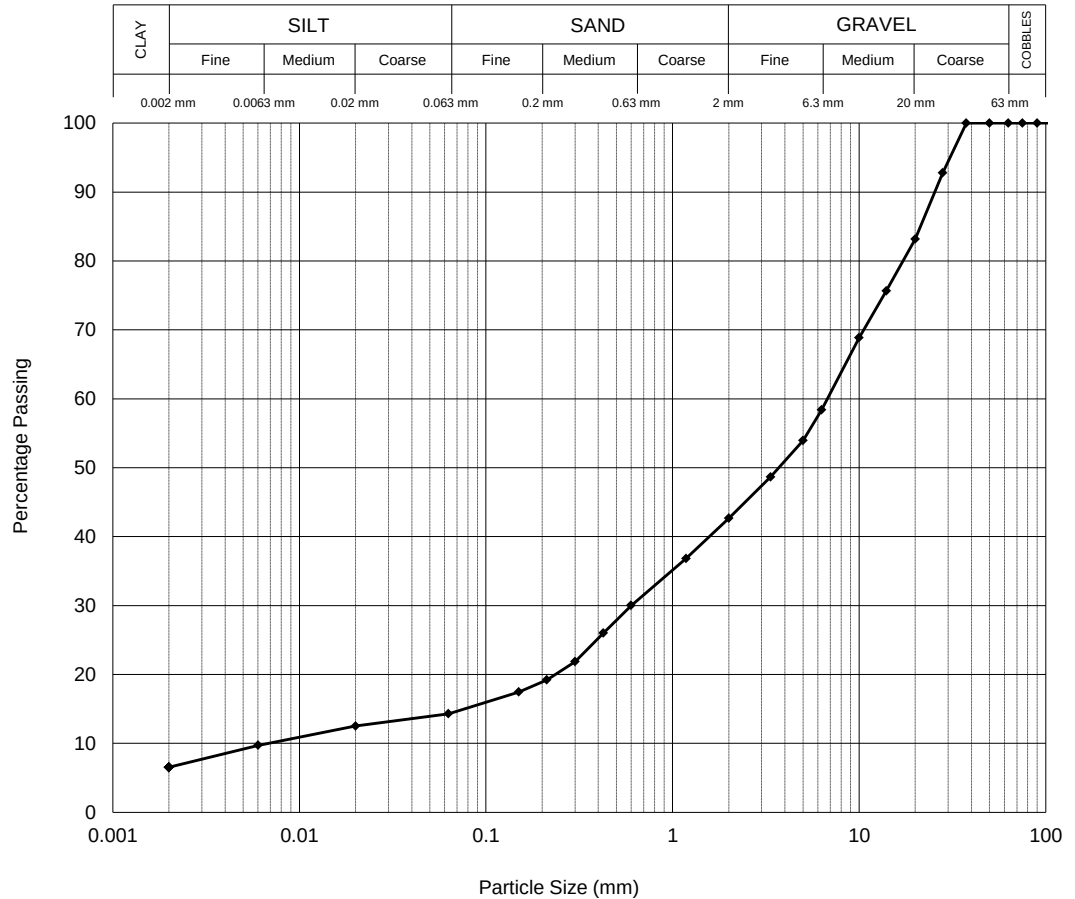
Description

Light brown very sandy GRAVEL with silty clay lumps.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	93
20.0 mm	83
14.0 mm	76
10.0 mm	69
6.30 mm	58
5.00 mm	54
3.35 mm	49
2.00 mm	43
1.18 mm	37
600 µm	30
425 µm	26
300 µm	22
212 µm	19
150 µm	17
63 µm	14



Sedimentation	
Pre-treatment used	
Temp (°C)	25.4
Size	% Pass
20 µm	13
6 µm	10
2 µm	7

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0
Gravel	57
Sand	28
Silt	8
Clay	7

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(Ref 1560866715)

PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

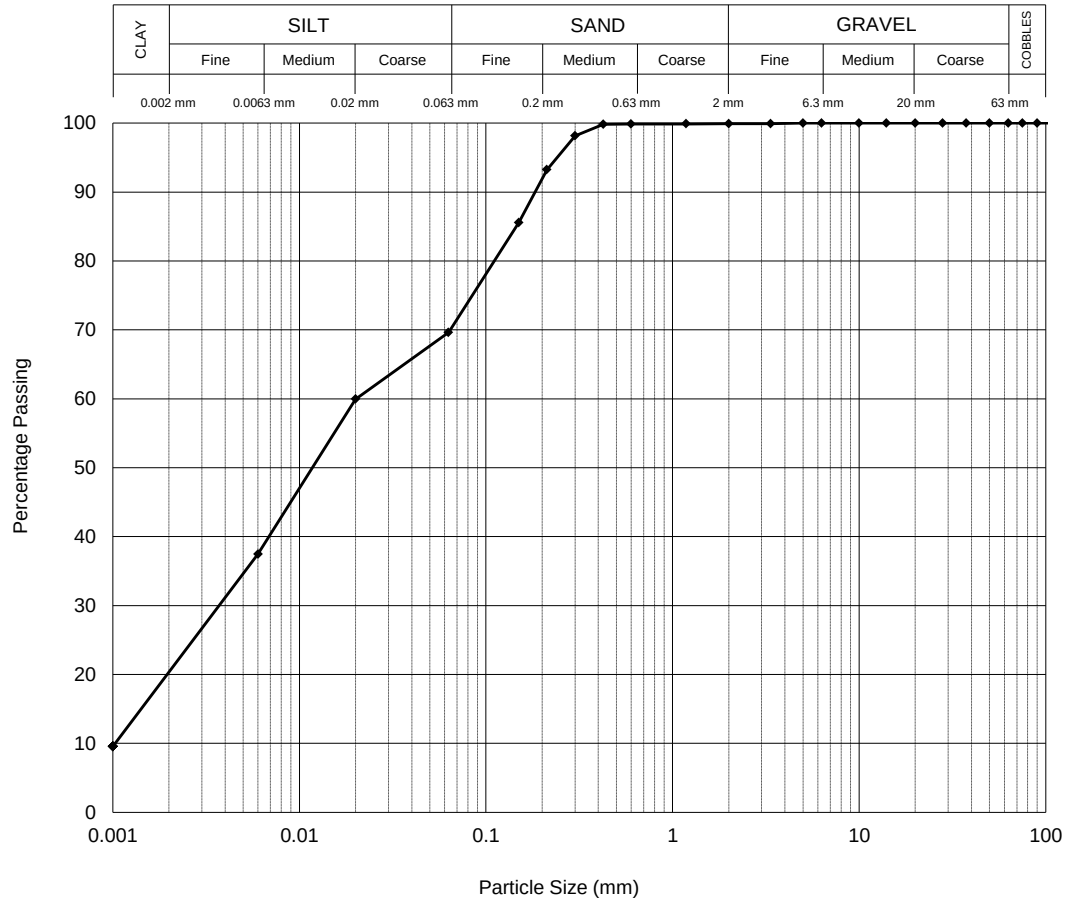
BH7
10.50
D

Description

Grey mottled brownish grey sandy clayey SILT.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	100
425 µm	100
300 µm	98
212 µm	93
150 µm	86
63 µm	70

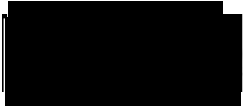


Sedimentation	
Pre-treatment used	
Temp (°C)	25.2
Size	% Pass
20 µm	60
6 µm	37
1 µm	10

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0
Gravel	0
Sand	30
Silt	55
Clay	15

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S Burke - Senior Technician
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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

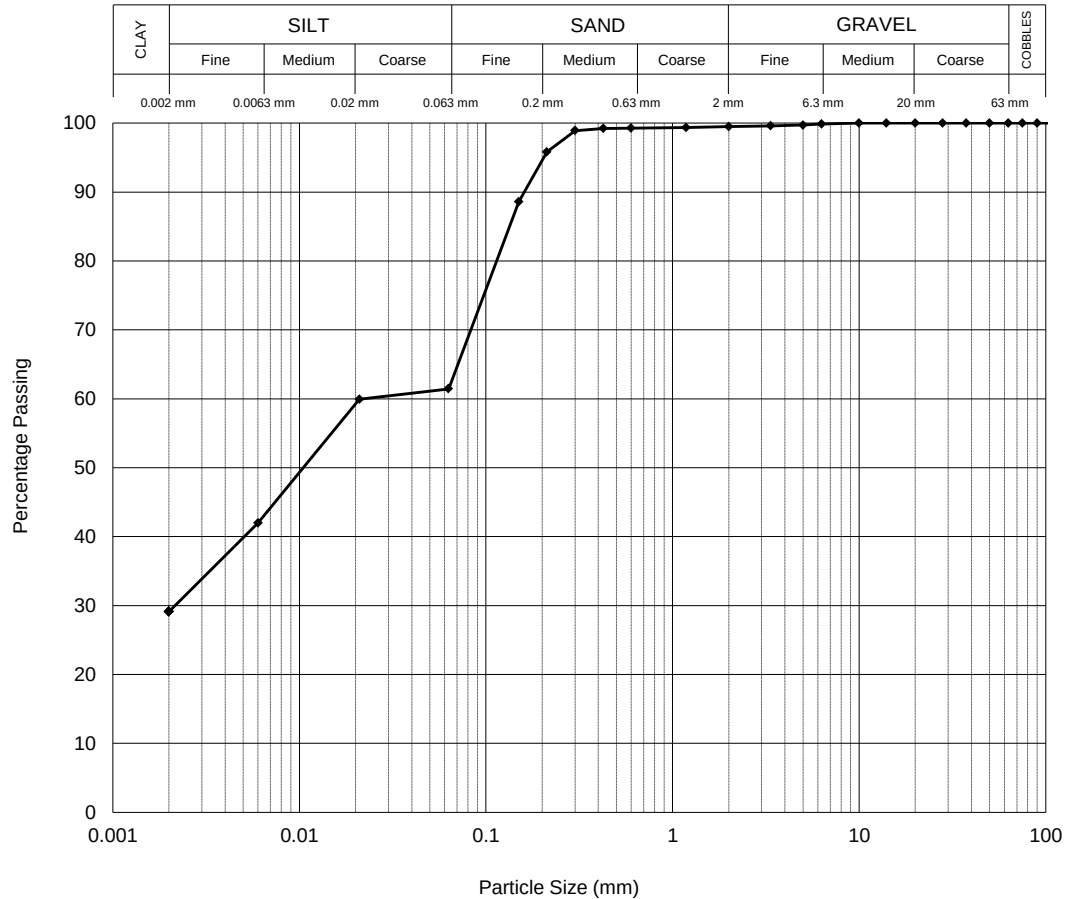
BH7
17.50
B

Description

Grey SAND, SILT and CLAY.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	99
600 µm	99
425 µm	99
300 µm	99
212 µm	96
150 µm	89
63 µm	61



Sedimentation	
Pre-treatment used	
Temp (°C)	21.4
Size	% Pass
21 µm	60
6 µm	42
2 µm	29

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0
Gravel	0
Sand	38
Silt	32
Clay	30

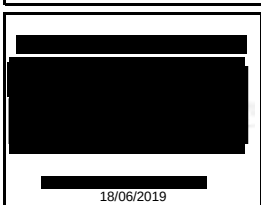
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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

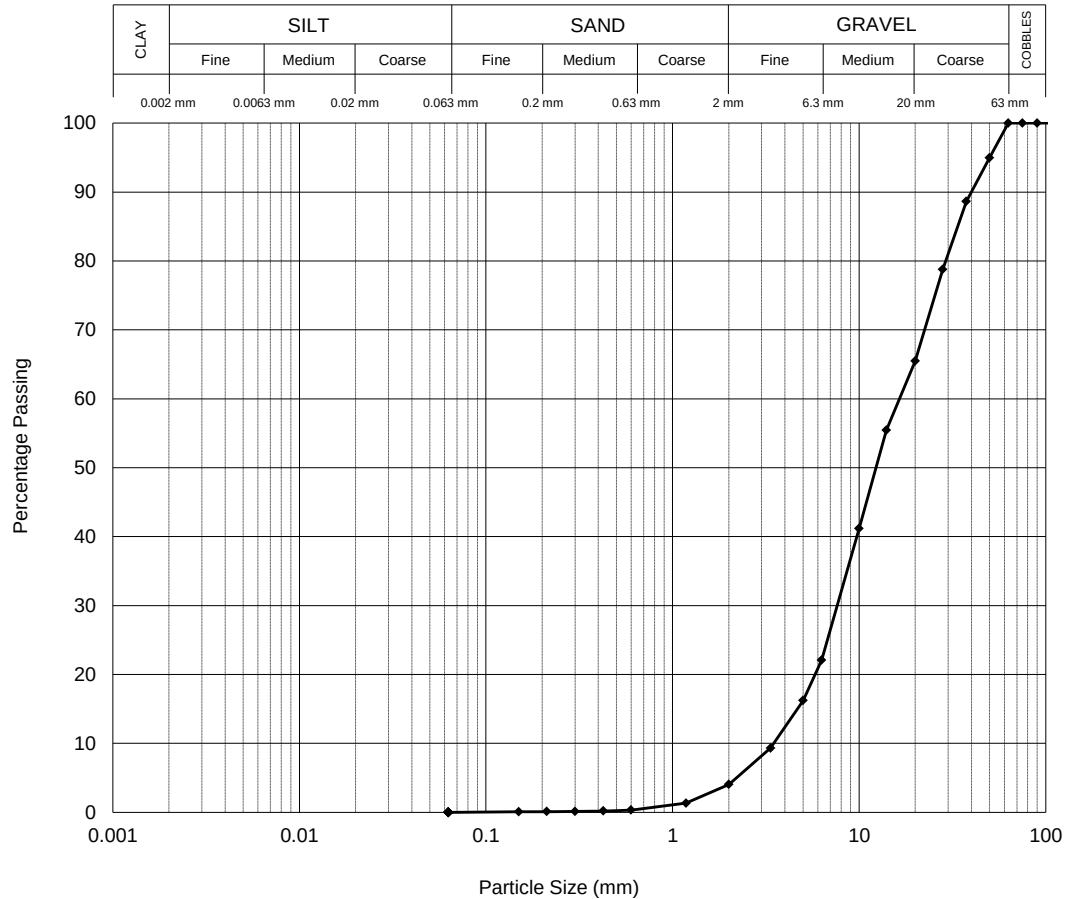
BH8
5.00
B

Description

Flint GRAVEL.

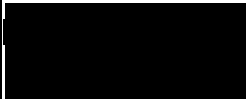
BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	95
37.5 mm	89
28.0 mm	79
20.0 mm	65
14.0 mm	55
10.0 mm	41
6.30 mm	22
5.00 mm	16
3.35 mm	9
2.00 mm	4
1.18 mm	1
600 µm	0
425 µm	0
300 µm	0
212 µm	0
150 µm	0
63 µm	0



Particle Proportions	
Cobbles	0
Gravel	96
Sand	4
Silt & Clay	0

Checked and Approved by



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18/06/2019

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(Ref 1560866725)

PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

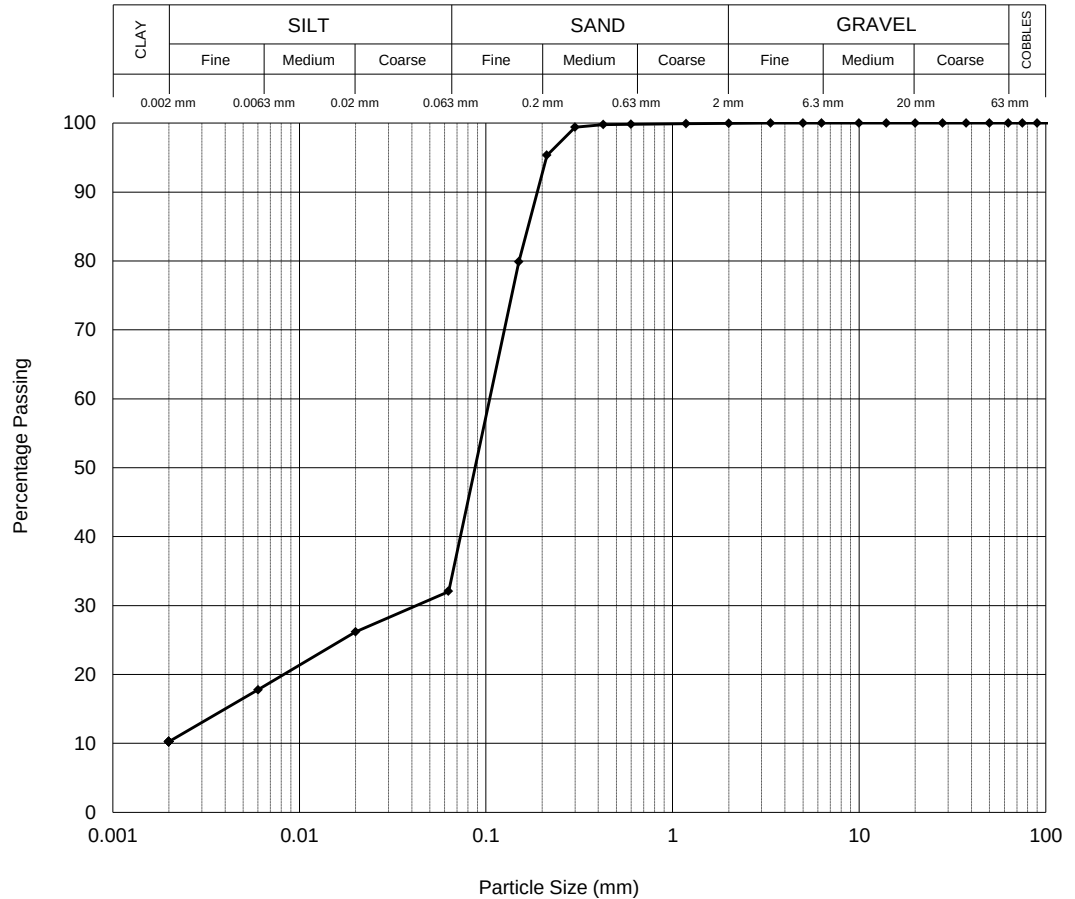
BH8
14.50
B

Description

Grey silty clayey fine SAND.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	100
425 µm	100
300 µm	99
212 µm	95
150 µm	80
63 µm	32

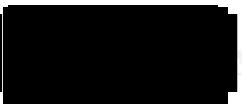


Sedimentation	
Pre-treatment used	
Temp (°C)	24.4
Size	% Pass
20 µm	26
6 µm	18
2 µm	10

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0
Gravel	0
Sand	68
Silt	22
Clay	10

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

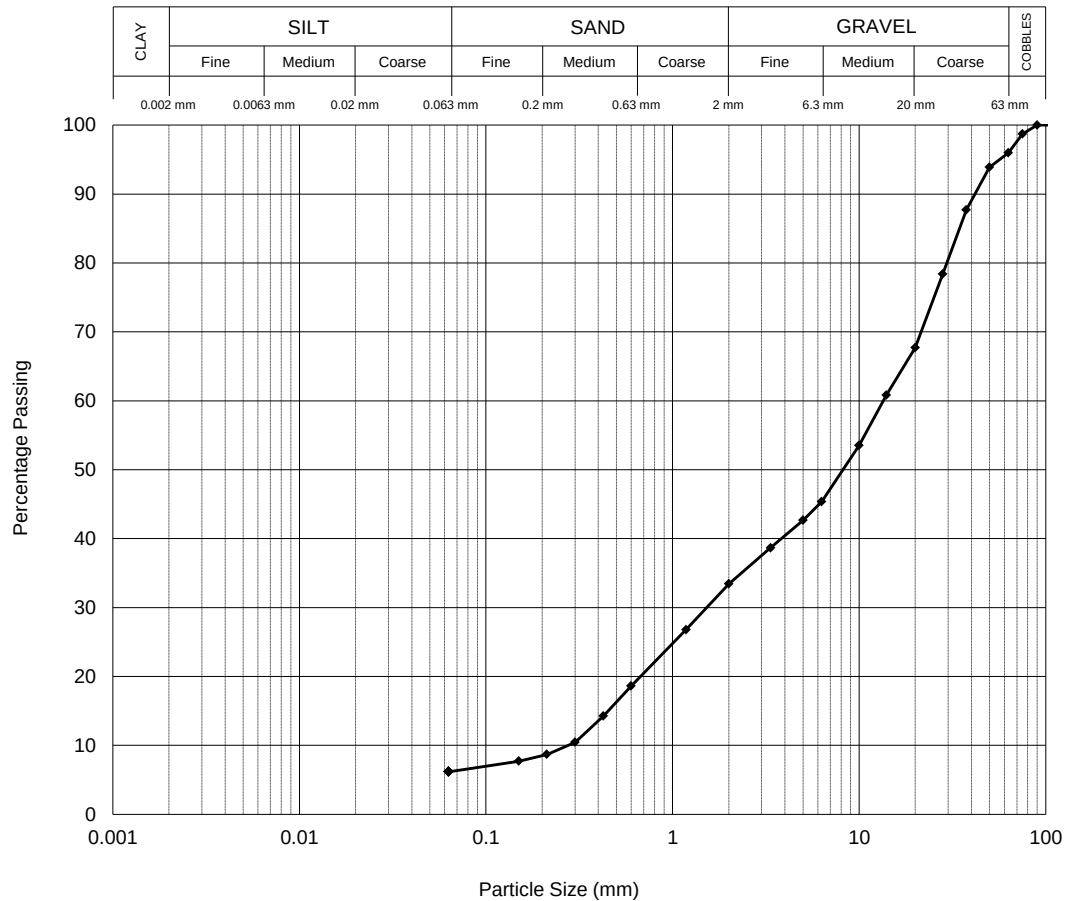
TP7
2.50
B

Description

Light brown clayey very sandy GRAVEL with rare cobbles.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	99
63.0 mm	96
50.0 mm	94
37.5 mm	88
28.0 mm	78
20.0 mm	68
14.0 mm	61
10.0 mm	54
6.30 mm	45
5.00 mm	43
3.35 mm	39
2.00 mm	33
1.18 mm	27
600 µm	19
425 µm	14
300 µm	10
212 µm	9
150 µm	8
63 µm	6



Particle Proportions	
Cobbles	4
Gravel	63
Sand	27
Silt & Clay	6

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

TP7
3.50
B

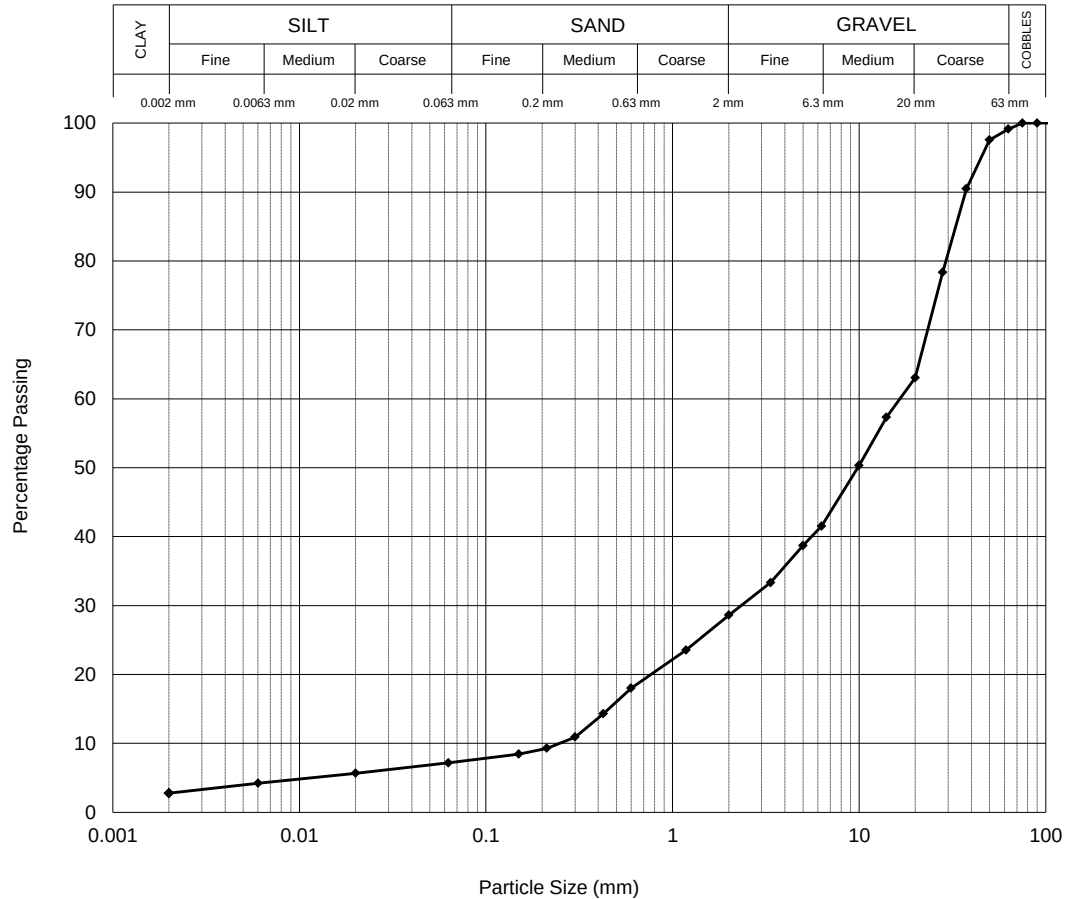
Description

Brown silty sandy GRAVEL with rare cobbles.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	99
50.0 mm	98
37.5 mm	90
28.0 mm	78
20.0 mm	63
14.0 mm	57
10.0 mm	50
6.30 mm	42
5.00 mm	39
3.35 mm	33
2.00 mm	29
1.18 mm	24
600 µm	18
425 µm	14
300 µm	11
212 µm	9
150 µm	8
63 µm	7

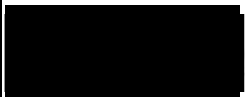


Sedimentation	
Pre-treatment used	
Temp (°C)	25.4
Size	% Pass
20 µm	6
6 µm	4
2 µm	3

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	1
Gravel	71
Sand	21
Silt	4
Clay	3

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S Burke - Senior Technician
18/06/2019

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(Ref 1560866735)

PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

TP8
1.50
B

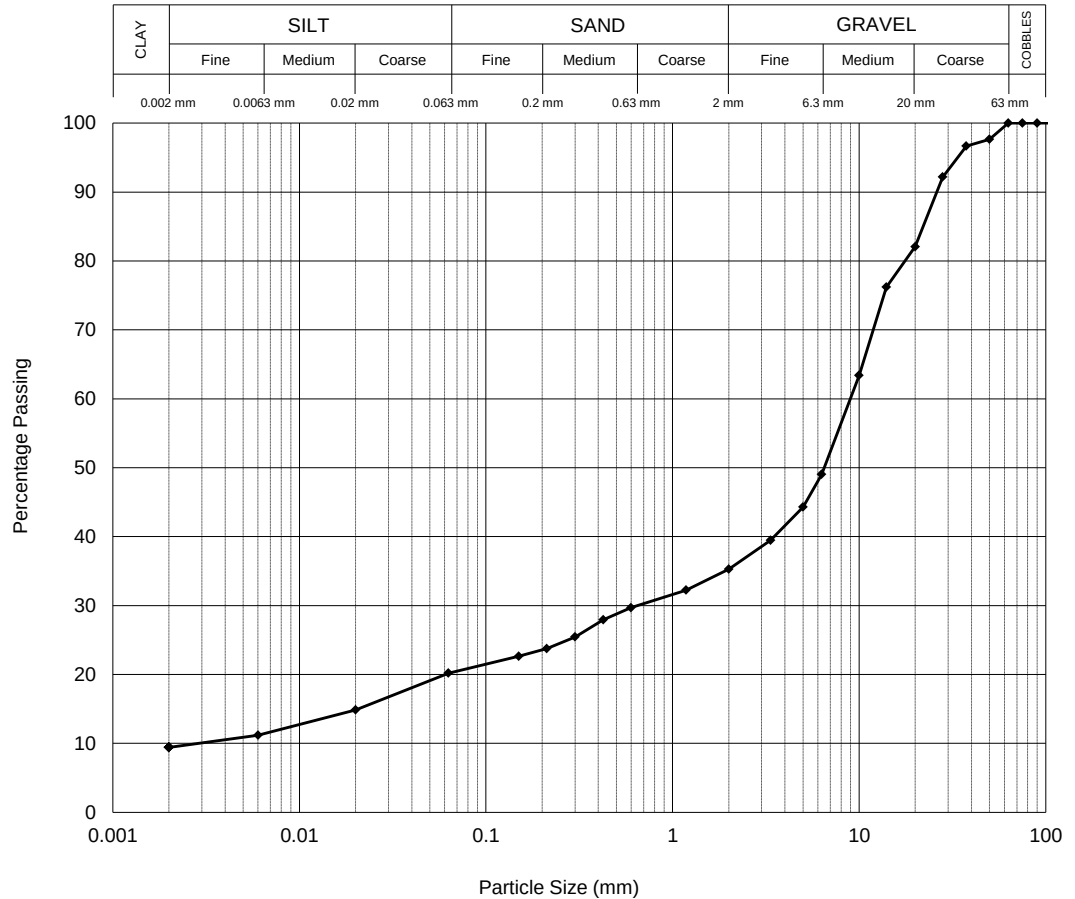
Description

Brown clayey silty sandy flint GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	98
37.5 mm	97
28.0 mm	92
20.0 mm	82
14.0 mm	76
10.0 mm	63
6.30 mm	49
5.00 mm	44
3.35 mm	39
2.00 mm	35
1.18 mm	32
600 µm	30
425 µm	28
300 µm	25
212 µm	24
150 µm	23
63 µm	20



Sedimentation	
Pre-treatment used	
Temp (°C)	25.2
Size	% Pass
20 µm	15
6 µm	11
2 µm	9

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0
Gravel	65
Sand	15
Silt	11
Clay	9

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S Burke - Senior Technician
18/06/2019

Project Number:

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(Ref 1560866738)

PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

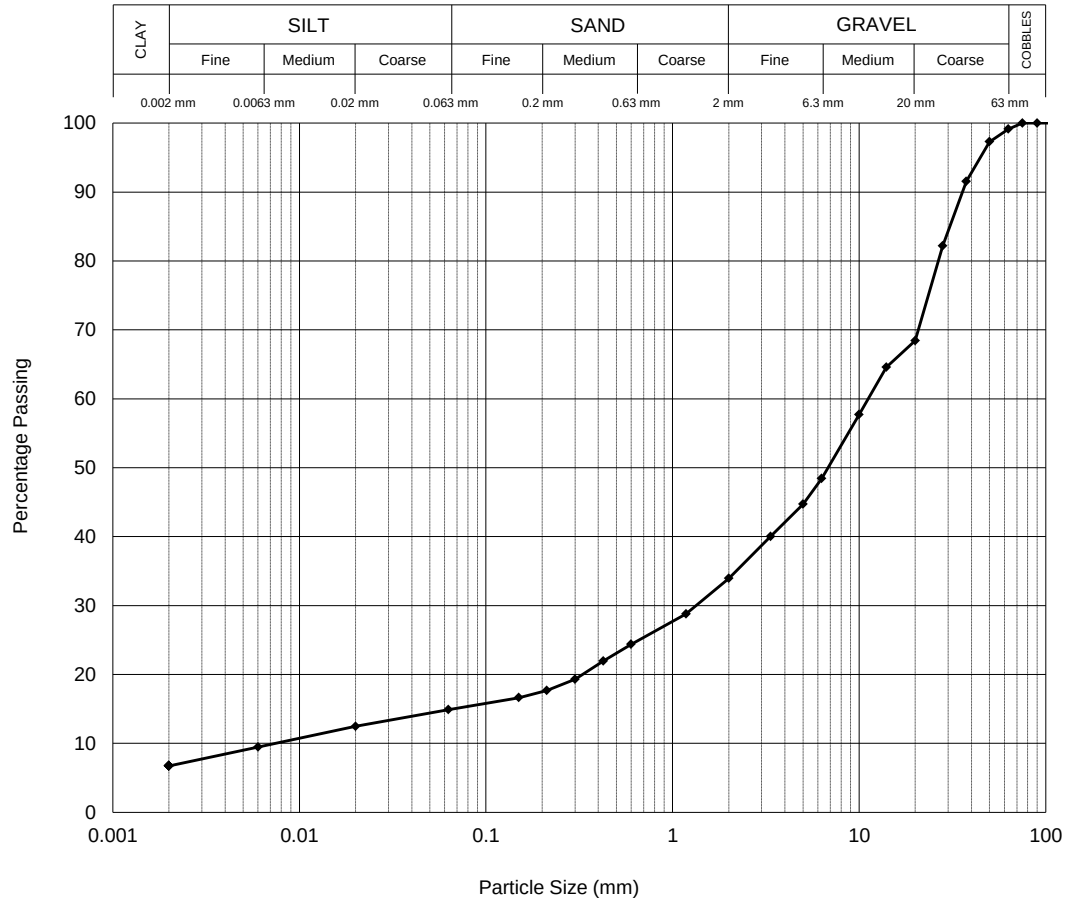
TP8
2.00
B

Description

Brown clayey silty sandy GRAVEL with rare cobbles.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	99
50.0 mm	97
37.5 mm	92
28.0 mm	82
20.0 mm	68
14.0 mm	65
10.0 mm	58
6.30 mm	48
5.00 mm	45
3.35 mm	40
2.00 mm	34
1.18 mm	29
600 µm	24
425 µm	22
300 µm	19
212 µm	18
150 µm	17
63 µm	15

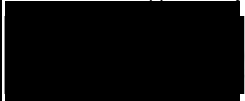


Sedimentation	
Pre-treatment used	
Temp (°C)	24.4
Size	% Pass
20 µm	12
6 µm	9
2 µm	7

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	1
Gravel	65
Sand	19
Silt	8
Clay	7

Checked and Approved by



S Burke - Senior Technician
18/06/2019

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

TP8
3.00
B

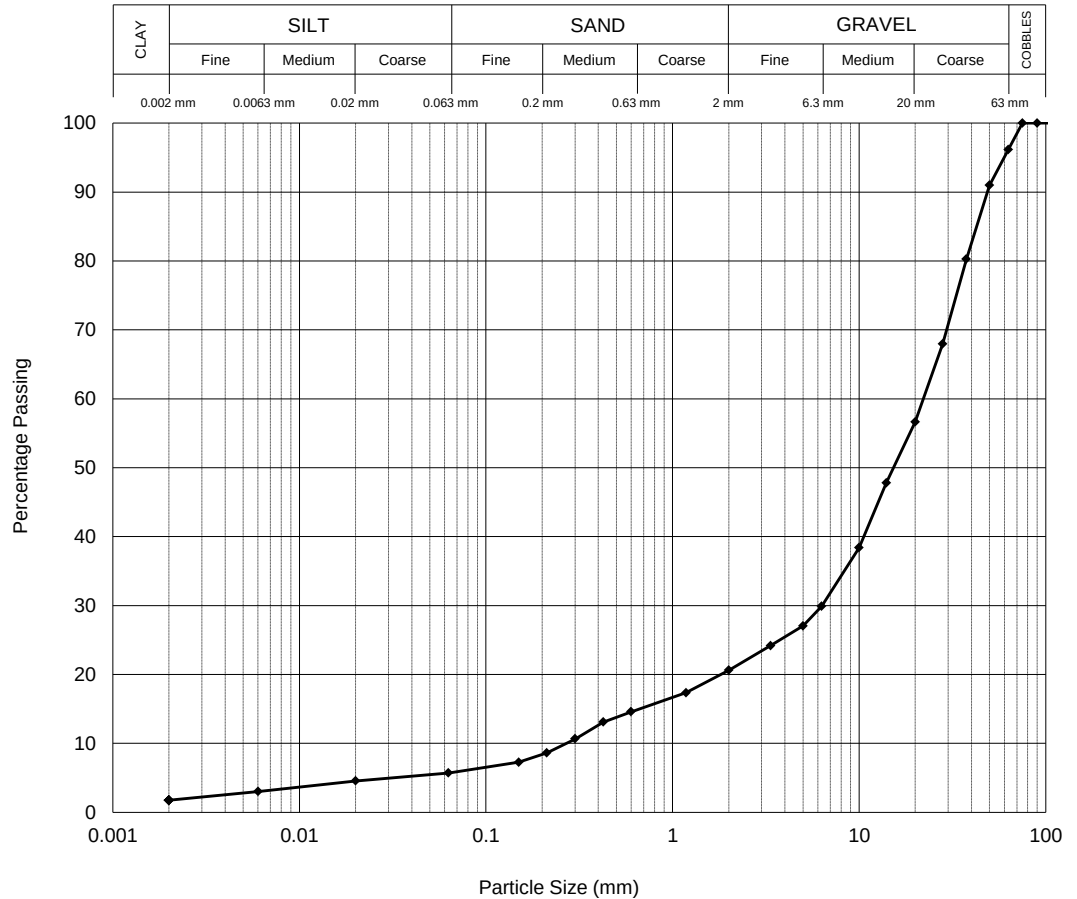
Description

Light brown sandy GRAVEL with rare cobbles and rare clayey silty lumps.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	96
50.0 mm	91
37.5 mm	80
28.0 mm	68
20.0 mm	57
14.0 mm	48
10.0 mm	38
6.30 mm	30
5.00 mm	27
3.35 mm	24
2.00 mm	21
1.18 mm	17
600 µm	15
425 µm	13
300 µm	11
212 µm	9
150 µm	7
63 µm	6

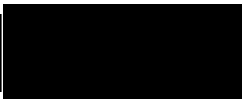


Sedimentation	
Pre-treatment used	
Temp (°C)	25.2
Size	% Pass
20 µm	5
6 µm	3
2 µm	2

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	4
Gravel	76
Sand	15
Silt	4
Clay	1

Checked and Approved by



S Burke - Senior Technician
18/06/2019

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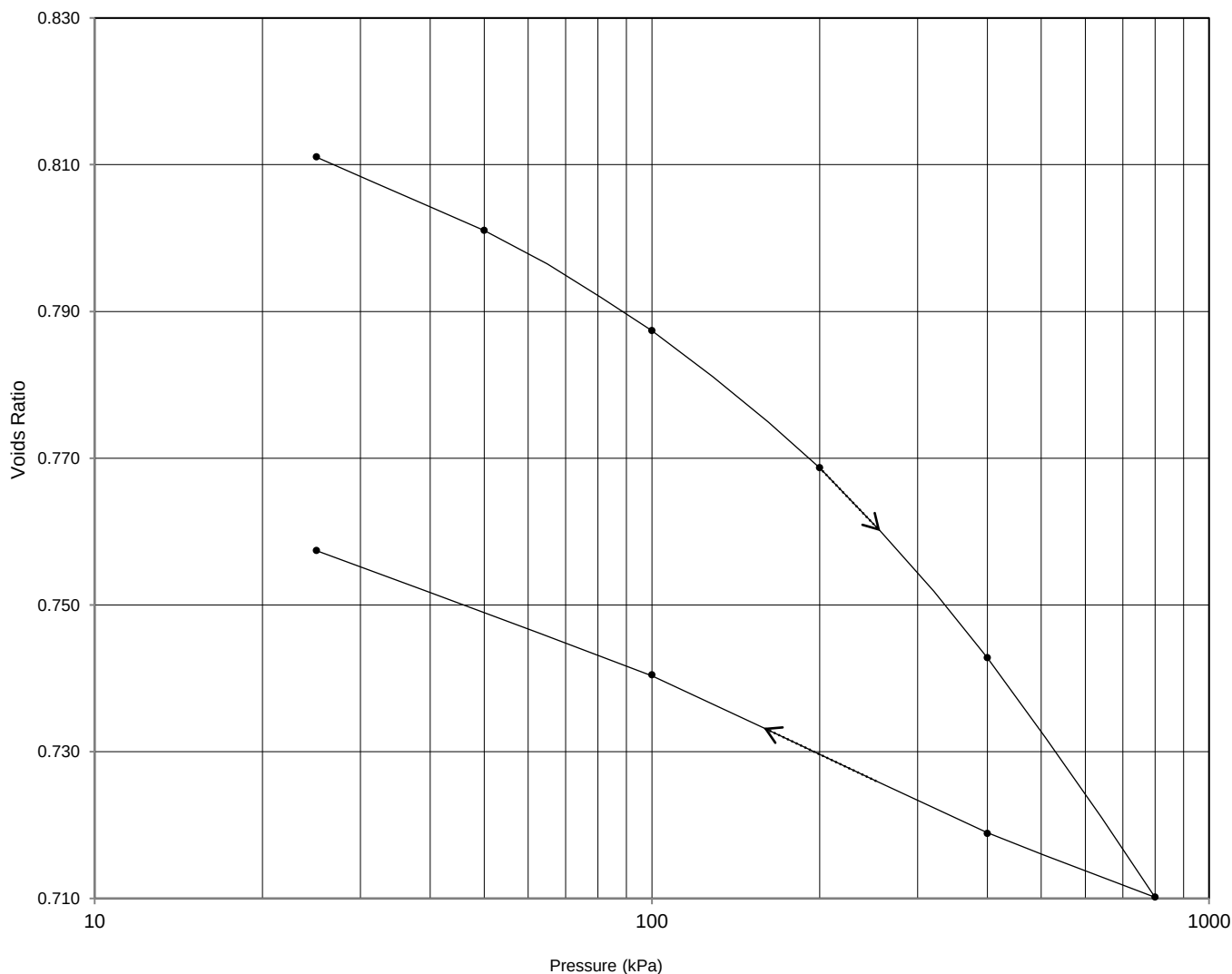
(Ref 1560866745)

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH8
Depth (m)	8.50
Sample Type	U
Specimen Ref	1
Depth within original (mm)	10
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Medium dense dark greenish grey SAND with stiff light grey clay laminations



Initial Conditions:

Height	(mm)	18.97	Water Content	(%)	31.9	(from trimmings)
Diameter	(mm)	74.89	Voids Ratio		0.826	
Area	(mm ²)	4405	Bulk Density	(Mg/m ³)	1.91	
Volume	(cm ³)	83.56	Dry Density	(Mg/m ³)	1.45	
Laboratory Temperature	(°C)	20.0	Particle density	(Mg/m ³)	2.65 (Assumed)	
			Degree of Saturation	(%)	100.0	

Results have been corrected for equipment deformation

Checked and Approved by

J Sturges - Operations Manager
18/06/2019

Project Number:

GEO / 29339

Project Name:

**SOUTHAMPTON AIRPORT, SOUTHAMPTON
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INCREMENTAL LOADING OEDOMETER TEST

BH / TP BH8
 Depth (m) 8.50
 Sample Type U
 Specimen Ref 1
 Depth within original (mm) 10
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Medium dense dark greenish grey SAND with stiff light grey clay laminations

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 25	0.33	31	t90	1.28	0.811
25 - 50	0.22	20	t90	1.99	0.801
50 - 100	0.15	17	t90	2.33	0.787
100 - 200	0.10	22	t90	1.75	0.769
200 - 400	0.073	18	t90	2.07	0.743
400 - 800	0.047	18	t90	1.97	0.710
800 - 400	0.013	19 (Sv)	t90	1.86	0.719
400 - 100	0.042	15 (Sv)	t90	2.35	0.740
100 - 25	0.13	12 (Sv)	t90	2.95	0.757

Checked and Approved by



J Sturges - Operations Manager
18/06/2019

Project Number:

GEO / 29339

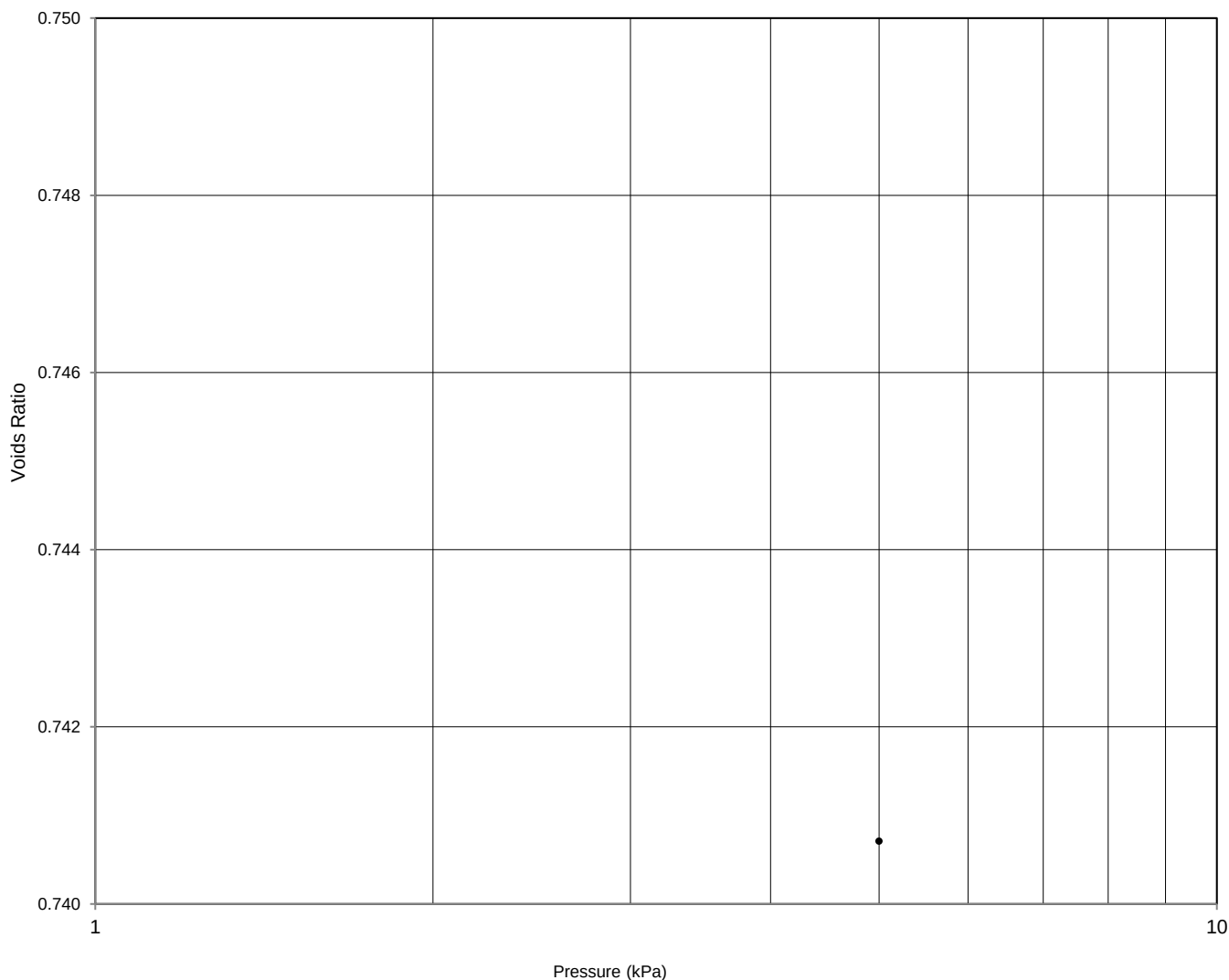
Project Name:

SOUTHAMPTON AIRPORT, SOUTHAMPTON
J14044

GEOLABS®

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH8	Description:
Depth (m)	8.50	
Sample Type	U	
Specimen Ref	2	Medium dense greenish grey SAND with stiff grey clay laminations
Depth within original (mm)	60	
Orientation within original	Vertical	
Specimen preparation	Undisturbed	Note: Consolidated a lowest possible test pressure



Initial Conditions:

Height	(mm)	18.96	Water Content	(%)	31.9	(from trimmings)
Diameter	(mm)	74.90	Voids Ratio		0.743	
Area	(mm ²)	4406	Bulk Density	(Mg/m ³)	2.00	
Volume	(cm ³)	83.54	Dry Density	(Mg/m ³)	1.52	
Laboratory Temperature	(°C)	20.0	Particle density	(Mg/m ³)	2.65 (Assumed)	
			Degree of Saturation	(%)	100.0	

Swelling Pressure (kPa) <5

Results have been corrected for equipment deformation

Checked and Approved by

J Sturges - Operations Manager
18/06/2019

Project Number:

GEO / 29339

Project Name:

**SOUTHAMPTON AIRPORT, SOUTHAMPTON
J14044****GEOLABS**®

INCREMENTAL LOADING OEDOMETER TEST

BH / TP BH8
 Depth (m) 8.50
 Sample Type U
 Specimen Ref 2
 Depth within original (mm) 60
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Medium dense greenish grey SAND with stiff grey clay laminations

Note: Consolidated a lowest possible test pressure

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 5	0.30	2.8	t90	14.0	0.741

Checked and Approved by



J Sturges - Operations Manager
18/06/2019

Project Number:

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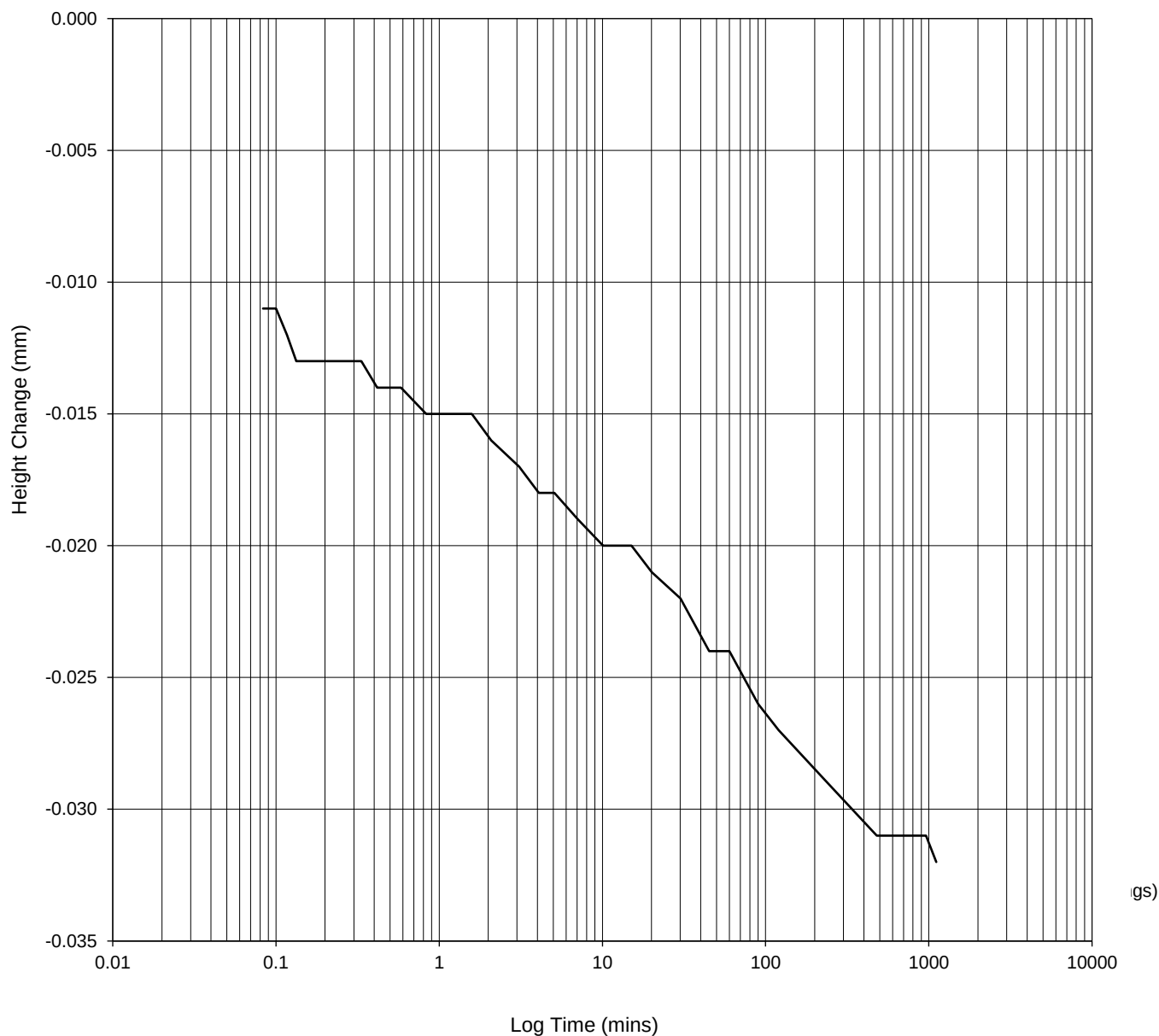
Project Name:

SOUTHAMPTON AIRPORT, SOUTHAMPTON
J14044

GEOLABS®

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH8	Description: Medium dense greenish grey SAND with stiff grey clay laminations Note: Consolidated a lowest possible test pressure
Depth (m)	8.50	
Sample Type	U	
Specimen Ref	2	
Depth within original (mm)	60	
Orientation within original	Vertical	
Specimen preparation	Undisturbed	

Stage No.: 1**Pressure: 5 kPa****Height Change vs Log Time**

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Project Number:

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Project Name:

SOUTHAMPTON AIRPORT, SOUTHAMPTON
J14044

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

BH/TP No BH7
 Depth (m) 8.00
 Sample Type U

Description:

Firm friable grey clayey fine to medium SAND.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	201.5
Diameter (mm)	101.4
Moisture content (%)	27.6
Bulk density (Mg/m ³)	1.88
Dry density (Mg/m ³)	1.48
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	201.5
Membrane correction (kPa)	1.1
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	160
Strain at failure (%)	19.9
Maximum deviator stress (kPa)	197
Shear Stress Cu (kPa)	99

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

55

Processed by DD
 Checked and Approved by

S Burke - Senior Technician
 18/06/2019

Project Number:

GEO / 29339

Project Name:

**SOUTHAMPTON AIRPORT, SOUTHAMPTON
 J14044**

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

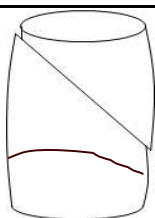
BH/TP No BH7
 Depth (m) 11.00
 Sample Type U

Description:

Firm fissured grey silty CLAY with pockets of fine grey sand.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	202.0
Diameter (mm)	103.2
Moisture content (%)	30.4
Bulk density (Mg/m ³)	1.89
Dry density (Mg/m ³)	1.45
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	202.0
Membrane correction (kPa)	1.1
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	220
Strain at failure (%)	19.8
Maximum deviator stress (kPa)	83
Shear Stress Cu (kPa)	42

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	170

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Project Number:

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Project Name:

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

BH/TP No BH7
 Depth (m) 13.50
 Sample Type U

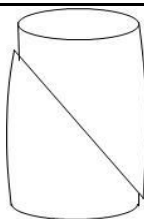
Description:

Very stiff fissured dark grey silty CLAY.

Remarks : Sample had a pre existing horizontal crack.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	203.1
Diameter (mm)	99.1
Moisture content (%)	33.7
Bulk density (Mg/m ³)	1.88
Dry density (Mg/m ³)	1.40
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	203.1
Membrane correction (kPa)	0.6
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	270
Strain at failure (%)	8.9
Maximum deviator stress (kPa)	351
Shear Stress Cu (kPa)	176

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

160

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 18/06/2019

Project Number:

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Project Name:

**SOUTHAMPTON AIRPORT, SOUTHAMPTON
 J14044**

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

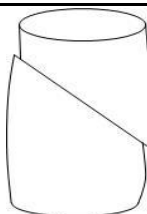
BH/TP No BH7
 Depth (m) 19.50
 Sample Type U

Description:

V Stiff fissured dark grey silty CLAY with patches of soft clay.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	202.6
Diameter (mm)	103.7
Moisture content (%)	30.1
Bulk density (Mg/m ³)	1.91
Dry density (Mg/m ³)	1.47
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	202.6
Membrane correction (kPa)	0.7
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	310
Strain at failure (%)	11.8
Maximum deviator stress (kPa)	57
Shear Stress Cu (kPa)	28

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	125

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Project Number:

GEO / 29339

Project Name:

**SOUTHAMPTON AIRPORT, SOUTHAMPTON
 J14044**

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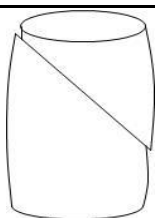
BH/TP No BH8
 Depth (m) 6.50
 Sample Type U

Description:

Very stiff friable dark grey silty CLAY with pockets of fine to medium sand.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	192.5
Diameter (mm)	103.4
Moisture content (%)	30.5
Bulk density (Mg/m ³)	1.90
Dry density (Mg/m ³)	1.46
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	192.5
Membrane correction (kPa)	0.2
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	130
Strain at failure (%)	2.6
Maximum deviator stress (kPa)	109
Shear Stress Cu (kPa)	54

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	100

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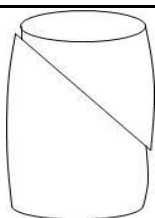
BH/TP No BH8
 Depth (m) 10.50
 Sample Type U

Description:

Very stiff fissured grey silty CLAY with rare soft patches.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	192.1
Diameter (mm)	104.1
Moisture content (%)	30.8
Bulk density (Mg/m ³)	1.84
Dry density (Mg/m ³)	1.41
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	192.1
Membrane correction (kPa)	1.1
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	210
Strain at failure (%)	19.3
Maximum deviator stress (kPa)	63
Shear Stress Cu (kPa)	32

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	105

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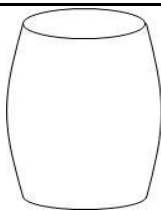
BH/TP No BH8
 Depth (m) 12.50
 Sample Type U

Description:

Grey friable clayey fine to medium SAND.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	200.5
Diameter (mm)	102.8
Moisture content (%)	24.9
Bulk density (Mg/m ³)	1.96
Dry density (Mg/m ³)	1.57
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	200.5
Membrane correction (kPa)	0.6
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	250
Strain at failure (%)	8.0
Maximum deviator stress (kPa)	52
Shear Stress Cu (kPa)	26

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

75

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Project Name:

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 J14044**

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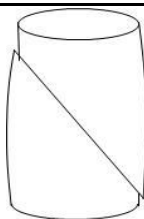
BH/TP No BH8
 Depth (m) 16.50
 Sample Type U

Description:

Stiff friable bluish grey clayey fine to medium SAND. Clay is light brown.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	201.7
Diameter (mm)	104.3
Moisture content (%)	20.8
Bulk density (Mg/m ³)	2.01
Dry density (Mg/m ³)	1.66
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	201.7
Membrane correction (kPa)	1.1
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	330
Strain at failure (%)	19.8
Maximum deviator stress (kPa)	289
Shear Stress Cu (kPa)	144

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

80

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 18/06/2019

Project Number:

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Project Name:

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J14044

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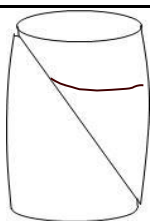
BH/TP No BH8
 Depth (m) 18.50
 Sample Type U

Description:

Stiff friable dark grey silty CLAY.

Specimen Details

Specimen conditions	Undisturbed
Length (mm)	202.3
Diameter (mm)	103.1
Moisture content (%)	21.2
Bulk density (Mg/m ³)	2.02
Dry density (Mg/m ³)	1.67
Test Details	
Latex membrane thickness (mm)	0.3
Specimen height prior to shearing (mm)	202.3
Membrane correction (kPa)	1.0
Mean rate of shear (%/min)	1.0
Cell pressure (kPa)	370
Strain at failure (%)	17.3
Maximum deviator stress (kPa)	406
Shear Stress Cu (kPa)	203

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

60

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 18/06/2019

Project Number:

GEO / 29339

Project Name:

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J14044

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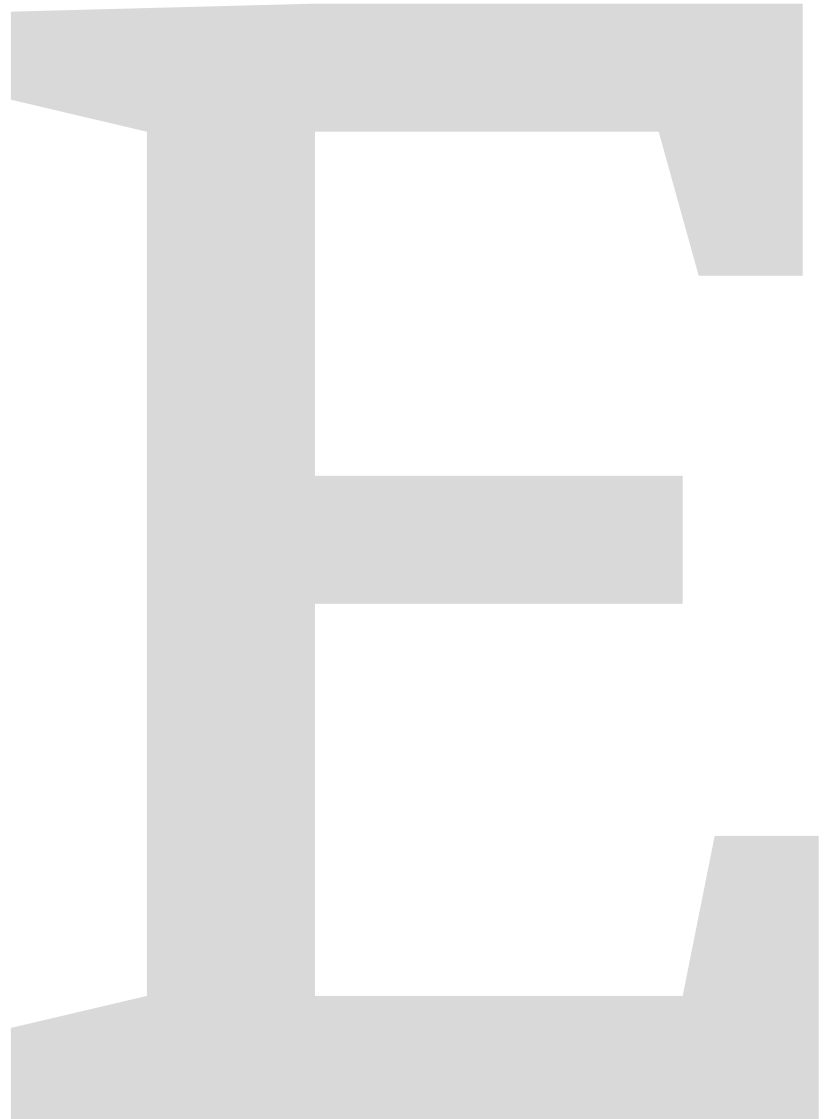


Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

APPENDIX E

Geo-Environmental Laboratory Test Results





Tom Lees

Southern Testing Laboratories Ltd
Keeble House
Stuart Way
East Grinstead
West Sussex
RH19 4QA

t: 01342 333100
f: 01342 410321
e: contamresults@southerntesting.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 19-39117

Project / Site name:	Southampton Airport, Southampton	Samples received on:	30/04/2019
Your job number:	J14044	Samples instructed on:	30/04/2019
Your order number:	J14044-1	Analysis completed by:	09/05/2019
Report Issue Number:	1	Report issued on:	09/05/2019
Samples Analysed:	2 leachate samples - 6 soil samples		

Signed:

Assistant Quality/Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210671	1210672	1210673	1210674	1210675
Sample Reference				PT3	TP1A	TP2A	TP3	TP4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.50	1.00	0.30	0.10
Date Sampled				24/04/2019	16/04/2019	16/04/2019	17/04/2019	23/04/2019
Time Taken				0100	0000	2330	2330	2330
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	< 0.1	< 0.1
Moisture Content				%	N/A	NONE	8.0	15
Total mass of sample received				kg	0.001	NONE	2.0	2.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	7.3	7.5	6.6	5.6
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	43	28	24	24	32
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.022	0.014	0.012	0.012	0.016
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	21.5	14.2	12.0	12.0	15.9
Total Sulphur	%	0.005	MCERTS	0.016	0.015	0.008	0.021	0.027
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0032	0.0070	0.0019	0.012	0.018

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210671	1210672	1210673	1210674	1210675
Sample Reference				PT3	TP1A	TP2A	TP3	TP4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.50	1.00	0.30	0.10
Date Sampled				24/04/2019	16/04/2019	16/04/2019	17/04/2019	23/04/2019
Time Taken				0100	0000	2330	2330	2330
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	1.3	1.3
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.0	9.3	6.2	11	7.4
Barium (aqua regia extractable)	mg/kg	1	MCERTS	41	64	59	42	50
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.47	0.67	0.79	0.53	0.42
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	0.7	0.6	0.8	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	< 0.2	0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	23	27	27	21	19
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	28	28	24	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	13	13	11	13	16
Iron (aqua regia extractable)	mg/kg	40	MCERTS	17000	24000	21000	19000	13000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	12	13	11	19	32
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	260	150	64	140	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.38	< 0.25	< 0.25	< 0.25	< 0.25
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	17	17	15	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	38	33	29	29
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	42	48	33	35	43

Monoaromatics & Oxygenates

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/kg	1	MCERTS	5.1	3.1	< 1.0	< 1.0	11
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	9.7
o-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	0.005	0.003	< 0.001	< 0.001	0.011
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	0.010
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10

Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210671	1210672	1210673	1210674	1210675
Sample Reference				PT3	TP1A	TP2A	TP3	TP4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.50	1.00	0.30	0.10
Date Sampled				24/04/2019	16/04/2019	16/04/2019	17/04/2019	23/04/2019
Time Taken				0100	0000	2330	2330	2330
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	5.1	3.1	< 1.0	< 1.0	11
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	9.7
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210671	1210672	1210673	1210674	1210675
Sample Reference				PT3	TP1A	TP2A	TP3	TP4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.50	1.00	0.30	0.10
Date Sampled				24/04/2019	16/04/2019	16/04/2019	17/04/2019	23/04/2019
Time Taken				0100	0000	2330	2330	2330
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210676				
Sample Reference				TP6				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				14/04/2019				
Time Taken				2330				
Analytical Parameter (Soil Analysis)								
	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	19				
Total mass of sample received	kg	0.001	NONE	2.0				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.9				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	83				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.042				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	41.6				
Total Sulphur	%	0.005	MCERTS	0.034				
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.021				

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10				
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10				
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30				
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20				
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10				
Phenol	mg/kg	0.1	ISO 17025	< 0.10				
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10				
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30				

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	0.21				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	0.38				
Pyrene	mg/kg	0.05	MCERTS	0.32				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	0.91				
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Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210676				
Sample Reference				TP6				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				14/04/2019				
Time Taken				2330				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)				mg/kg	1	ISO 17025	1.4	
Arsenic (aqua regia extractable)				mg/kg	1	MCERTS	7.5	
Barium (aqua regia extractable)				mg/kg	1	MCERTS	52	
Beryllium (aqua regia extractable)				mg/kg	0.06	MCERTS	0.50	
Boron (water soluble)				mg/kg	0.2	MCERTS	0.5	
Cadmium (aqua regia extractable)				mg/kg	0.2	MCERTS	0.3	
Chromium (hexavalent)				mg/kg	4	MCERTS	< 4.0	
Chromium (III)				mg/kg	1	NONE	18	
Chromium (aqua regia extractable)				mg/kg	1	MCERTS	18	
Copper (aqua regia extractable)				mg/kg	1	MCERTS	25	
Iron (aqua regia extractable)				mg/kg	40	MCERTS	15000	
Lead (aqua regia extractable)				mg/kg	1	MCERTS	57	
Manganese (aqua regia extractable)				mg/kg	1	MCERTS	130	
Mercury (aqua regia extractable)				mg/kg	0.3	MCERTS	< 0.3	
Molybdenum (aqua regia extractable)				mg/kg	0.25	MCERTS	< 0.25	
Nickel (aqua regia extractable)				mg/kg	1	MCERTS	13	
Selenium (aqua regia extractable)				mg/kg	1	MCERTS	< 1.0	
Vanadium (aqua regia extractable)				mg/kg	1	MCERTS	28	
Zinc (aqua regia extractable)				mg/kg	1	MCERTS	75	

Monoaromatics & Oxygenates

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic > EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic > EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic > EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic > EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic > EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic > EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic > EC21 - EC35	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	11				

Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210676				
Sample Reference				TP6				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				14/04/2019				
Time Taken				2330				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0				
Chloroethane	µg/kg	1	NONE	< 1.0				
Bromomethane	µg/kg	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/kg	1	NONE	< 1.0				
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0				
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0				
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloromethane	µg/kg	1	MCERTS	< 1.0				
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0				
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0				
Benzene	µg/kg	1	MCERTS	< 1.0				
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloroethene	µg/kg	1	MCERTS	< 1.0				
Dibromomethane	µg/kg	1	MCERTS	< 1.0				
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0				
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/kg	1	NONE	< 1.0				
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0				
Chlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-Xylene	µg/kg	1	MCERTS	< 1.0				
Styrene	µg/kg	1	MCERTS	< 1.0				
Tribromomethane	µg/kg	1	NONE	< 1.0				
o-Xylene	µg/kg	1	MCERTS	< 1.0				
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0				
Bromobenzene	µg/kg	1	MCERTS	< 1.0				
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0				
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0				



Analytical Report Number: 19-39117
 Project / Site name: Southampton Airport, Southampton
 Your Order No: J14044-1

Lab Sample Number				1210676				
Sample Reference				TP6				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				14/04/2019				
Time Taken				2330				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					



Analytical Report Number: 19-39117

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-1

Lab Sample Number				1210677	1210678			
Sample Reference				TP1A	TP4			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.50	0.30			
Date Sampled				16/04/2019	23/04/2019			
Time Taken				0000	2330			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.3	7.1			
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Sulphate as SO ₄	mg/l	0.1	ISO 17025	0.9	0.9			
Sulphide	µg/l	5	NONE	< 5.0	< 5.0			
Chloride	mg/l	0.15	ISO 17025	0.47	0.57			
Fluoride	µg/l	50	ISO 17025	570	570			
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15	30			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	mg/l	0.0005	NONE	< 0.0005	< 0.0005			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7			
Arsenic (dissolved)	µg/l	1.1	ISO 17025	3.6	< 1.1			
Barium (dissolved)	µg/l	0.05	ISO 17025	2.3	0.26			
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Boron (dissolved)	µg/l	10	ISO 17025	< 10	< 10			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0			
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0			
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.4	0.5			
Copper (dissolved)	µg/l	0.7	ISO 17025	3.0	2.6			
Iron (dissolved)	mg/l	0.004	ISO 17025	0.28	0.023			
Lead (dissolved)	µg/l	1	ISO 17025	1.1	< 1.0			
Manganese (dissolved)	µg/l	0.06	ISO 17025	1.4	4.1			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4			
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.4	1.3			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7			
Zinc (dissolved)	µg/l	0.4	ISO 17025	4.2	2.1			
Calcium (dissolved)	mg/l	0.012	ISO 17025	2.7	1.2			
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.35	0.21			



Analytical Report Number : 19-39117

Project / Site name: Southampton Airport, Southampton

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1210671	PT3	None Supplied	1.50	Brown clay and sand with gravel.
1210672	TP1A	None Supplied	0.50	Brown loam and clay with gravel and vegetation.
1210673	TP2A	None Supplied	1.00	Brown loam and clay with gravel and vegetation.
1210674	TP3	None Supplied	0.30	Brown loam and clay with gravel and vegetation.
1210675	TP4	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1210676	TP6	None Supplied	0.10	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 19-39117

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS

Iss No 19-39117-1 Southampton Airport, Southampton J14044

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-39117

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
TP1A		S	19-39117	1210672	c	Free cyanide in soil	L080-PL	c
TP2A		S	19-39117	1210673	c	Free cyanide in soil	L080-PL	c
TP3		S	19-39117	1210674	c	Free cyanide in soil	L080-PL	c
TP6		S	19-39117	1210676	c	Free cyanide in soil	L080-PL	c
TP6		S	19-39117	1210676	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
TP6		S	19-39117	1210676	c	Volatile organic compounds in soil	L073B-PL	c



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Analytical Report Number : 19-39600

Project / Site name:	Southampton Airport, Southampton	Samples received on:	01/05/2019
Your job number:	J14044	Samples instructed on:	01/05/2019
Your order number:	J14044-2	Analysis completed by:	13/05/2019
Report Issue Number:	1	Report issued on:	13/05/2019
Samples Analysed:	3 leachate samples - 6 soil samples		

Signed:



Head of Customer Services
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-39600

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-2

Lab Sample Number				1213042	1213043	1213044	1213045	1213046
Sample Reference				BH7	BH7	PT1	PT2	TP5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.10	2.10	0.30
Date Sampled				25/04/2019	25/04/2019	25/04/2019	25/04/2019	25/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	< 0.1	< 0.1
Moisture Content				%	N/A	NONE	14	14
Total mass of sample received				kg	0.001	NONE	2.0	2.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	7.6	7.6	8.4	7.0
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	64	31	53	87	37
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.032	0.015	0.026	0.044	0.019
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	32.2	15.3	26.3	43.7	18.7
Total Sulphur	%	0.005	MCERTS	0.015	0.010	0.024	0.019	0.014
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0049	0.0033	0.015	< 0.0010	0.0067

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 19-39600

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-2

Lab Sample Number				1213042	1213043	1213044	1213045	1213046
Sample Reference				BH7	BH7	PT1	PT2	TP5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.10	2.10	0.30
Date Sampled				25/04/2019	25/04/2019	25/04/2019	25/04/2019	25/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	1.3	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.8	8.8	11	5.9	6.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	61	72	53	24	48
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.68	0.97	0.44	0.30	0.55
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	0.5	0.5	0.3	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.4	0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	23	34	15	12	19
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	34	16	12	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	18	16	11	16
Iron (aqua regia extractable)	mg/kg	40	MCERTS	22000	32000	22000	8400	17000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	13	13	24	5.2	16
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	200	170	140	550	170
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	22	11	10	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	42	26	15	25
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	35	35	36	17	34

Monoaromatics & Oxygenates

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10

Analytical Report Number: 19-39600

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-2

Lab Sample Number				1213042	1213043	1213044	1213045	1213046
Sample Reference				BH7	BH7	PT1	PT2	TP5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.50	0.10	2.10	0.30
Date Sampled				25/04/2019	25/04/2019	25/04/2019	25/04/2019	25/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 19-39600

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-2

Lab Sample Number				1213047				
Sample Reference				TP7				
Sample Number				None Supplied				
Depth (m)				3.50				
Date Sampled				25/04/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	31	
Moisture Content				%	N/A	NONE	6.7	
Total mass of sample received				kg	0.001	NONE	2.0	

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	240				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	121				
Total Sulphur	%	0.005	MCERTS	0.029				
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.0020				

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10				
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10				
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30				
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20				
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10				
Phenol	mg/kg	0.1	ISO 17025	< 0.10				
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10				
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30				

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Pyrene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80				
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Analytical Report Number: 19-39600

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-2

Lab Sample Number				1213047				
Sample Reference				TP7				
Sample Number				None Supplied				
Depth (m)				3.50				
Date Sampled				25/04/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	1.3				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.1				
Barium (aqua regia extractable)	mg/kg	1	MCERTS	29				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.43				
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (III)	mg/kg	1	NONE	17				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14				
Iron (aqua regia extractable)	mg/kg	40	MCERTS	18000				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11				
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	440				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.40				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	22				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	22				

Monoaromatics & Oxygenates

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic > EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic > EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic > EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic > EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic > EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic > EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic > EC21 - EC35	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				

Analytical Report Number: 19-39600

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-2

Lab Sample Number				1213047				
Sample Reference				TP7				
Sample Number				None Supplied				
Depth (m)				3.50				
Date Sampled				25/04/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0				
Chloroethane	µg/kg	1	NONE	< 1.0				
Bromomethane	µg/kg	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/kg	1	NONE	< 1.0				
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0				
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0				
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloromethane	µg/kg	1	MCERTS	< 1.0				
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0				
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0				
Benzene	µg/kg	1	MCERTS	< 1.0				
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloroethene	µg/kg	1	MCERTS	< 1.0				
Dibromomethane	µg/kg	1	MCERTS	< 1.0				
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0				
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/kg	1	NONE	< 1.0				
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0				
Chlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-Xylene	µg/kg	1	MCERTS	< 1.0				
Styrene	µg/kg	1	MCERTS	< 1.0				
Tribromomethane	µg/kg	1	NONE	< 1.0				
o-Xylene	µg/kg	1	MCERTS	< 1.0				
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0				
Bromobenzene	µg/kg	1	MCERTS	< 1.0				
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0				
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0				



Analytical Report Number: 19-39600
Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-2

Lab Sample Number				1213048	1213049	1213050		
Sample Reference				BH7	PT1	TP5		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.10	0.10	0.30		
Date Sampled				25/04/2019	25/04/2019	25/04/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	6.8	6.6	6.6		
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Sulphate as SO ₄	mg/l	0.1	ISO 17025	1.3	1.2	1.2		
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0		
Chloride	mg/l	0.15	ISO 17025	0.47	0.76	0.77		
Fluoride	µg/l	50	ISO 17025	670	370	820		
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15	< 15	< 15		

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5		
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7		
Arsenic (dissolved)	µg/l	1.1	ISO 17025	2.7	5.3	3.0		
Barium (dissolved)	µg/l	0.05	ISO 17025	1.8	5.3	2.7		
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2		
Boron (dissolved)	µg/l	10	ISO 17025	< 10	< 10	< 10		
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08		
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0		
Chromium (III)	µg/l	1	NONE	< 1.0	1.0	< 1.0		
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	1.0	< 0.4		
Copper (dissolved)	µg/l	0.7	ISO 17025	4.6	17	7.3		
Iron (dissolved)	mg/l	0.004	ISO 17025	0.036	0.60	0.057		
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	1.1		
Manganese (dissolved)	µg/l	0.06	ISO 17025	1.5	8.2	1.9		
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5		
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4	< 0.4		
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.1	2.9	1.6		
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0		
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	3.8		
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.2	8.3	4.7		
Calcium (dissolved)	mg/l	0.012	ISO 17025	1.3	2.3	1.9		
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.22	0.43	0.24		



Analytical Report Number : 19-39600

Project / Site name: Southampton Airport, Southampton

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1213042	BH7	None Supplied	0.10	Brown clay and sand with gravel and vegetation.
1213043	BH7	None Supplied	0.50	Brown clay with vegetation.
1213044	PT1	None Supplied	0.10	Brown clay and loam with vegetation.
1213045	PT2	None Supplied	2.10	Light brown sand with gravel and stones.
1213046	TP5	None Supplied	0.30	Brown clay and sand with vegetation.
1213047	TP7	None Supplied	3.50	Light brown sand with gravel and stones.

Analytical Report Number : 19-39600

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS

Iss No 19-39600-1 Southampton Airport, Southampton J14044

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The results included within the report are representative of the samples submitted for analysis.

Page 10 of 11

Analytical Report Number : 19-39600

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
pH at 20°C in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.



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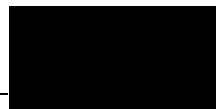
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Analytical Report Number : 19-42012

Project / Site name:	Southampton Airport, Southampton	Samples received on:	20/05/1917
Your job number:	J14044	Samples instructed on:	20/05/2019
Your order number:	J14044-4A	Analysis completed by:	30/05/2019
Report Issue Number:	1	Report issued on:	30/05/2019
Samples Analysed:	2 leachate samples - 4 soil samples		

Signed:



Head of Customer Services
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-42012

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-4A

Lab Sample Number				1225828	1225829	1225830	1225831	
Sample Reference				BH8	BH8	TP8	TP8	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				1.00	5.00	0.30	1.50	
Date Sampled				27/05/2019	27/05/2019	27/05/2019	27/05/2019	
Time Taken				0100	1200	1200	1200	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	15	2.6	15	15	
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6	8.4	7.1	7.8	
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Water Soluble Sulphate as SO ₄ , 16hr extraction (2:1)	mg/kg	2.5	MCERTS	13	32	14	25	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0064	0.016	0.0070	0.012	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	6.4	16.1	7.0	12.3	
Total Sulphur	%	0.005	MCERTS	0.006	0.008	0.012	0.018	
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	< 0.0010	0.0017	0.0044	0.0034	

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	< 1.3	
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.33	< 0.05	< 0.05	
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.79	< 0.05	< 0.05	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	1.12	< 0.80	< 0.80	
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Analytical Report Number: 19-42012

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-4A

Lab Sample Number				1225828	1225829	1225830	1225831	
Sample Reference				BH8	BH8	TP8	TP8	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				1.00	5.00	0.30	1.50	
Date Sampled				27/05/2019	27/05/2019	27/05/2019	27/05/2019	
Time Taken				0100	1200	1200	1200	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.1	2.9	6.5	13	
Barium (aqua regia extractable)	mg/kg	1	MCERTS	66	10	69	98	
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	0.16	0.79	1.3	
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.3	0.6	0.6	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.4	
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	
Chromium (III)	mg/kg	1	NONE	35	23	30	45	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	23	30	45	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	12	13	25	
Iron (aqua regia extractable)	mg/kg	40	MCERTS	28000	8100	28000	38000	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	2.9	11	17	
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	120	380	140	390	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	< 0.25	3.9	< 0.25	0.54	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	35	16	35	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	48	11	39	48	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	43	15	45	74	

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	

Analytical Report Number: 19-42012

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-4A

Lab Sample Number				1225828	1225829	1225830	1225831	
Sample Reference				BH8	BH8	TP8	TP8	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				1.00	5.00	0.30	1.50	
Date Sampled				27/05/2019	27/05/2019	27/05/2019	27/05/2019	
Time Taken				0100	1200	1200	1200	
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	



Analytical Report Number: 19-42012

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-4A

Lab Sample Number				1225828	1225829	1225830	1225831	
Sample Reference				BH8	BH8	TP8	TP8	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				1.00	5.00	0.30	1.50	
Date Sampled				27/05/2019	27/05/2019	27/05/2019	27/05/2019	
Time Taken				0100	1200	1200	1200	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					



Analytical Report Number: 19-42012
Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-4A

Lab Sample Number				1225832	1225833			
Sample Reference				BH8	TP8			
Sample Number				None Supplied	None Supplied			
Depth (m)				1.00	0.30			
Date Sampled				27/05/2019	27/05/2019			
Time Taken				0100	1200			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.1	6.8			
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Sulphate as SO ₄	mg/l	0.1	ISO 17025	0.6	0.5			
Sulphide	µg/l	5	NONE	< 5.0	< 5.0			
Chloride	mg/l	0.15	ISO 17025	0.29	0.49			
Fluoride	µg/l	50	ISO 17025	330	710			
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15	< 15			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7			
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	< 1.1			
Barium (dissolved)	µg/l	0.05	ISO 17025	1.7	0.10			
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Boron (dissolved)	µg/l	10	ISO 17025	< 10	< 10			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0			
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0			
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4			
Copper (dissolved)	µg/l	0.7	ISO 17025	2.5	3.1			
Iron (dissolved)	mg/l	0.004	ISO 17025	0.11	0.085			
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0			
Manganese (dissolved)	µg/l	0.06	ISO 17025	1.6	1.4			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4			
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.5	0.7			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7			
Zinc (dissolved)	µg/l	0.4	ISO 17025	1.9	3.1			
Calcium (dissolved)	mg/l	0.012	ISO 17025	1.2	1.0			
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.20	0.008			



Analytical Report Number : 19-42012

Project / Site name: Southampton Airport, Southampton

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1225828	BH8	None Supplied	1.00	Brown clay.
1225829	BH8	None Supplied	5.00	Brown gravel. **
1225830	TP8	None Supplied	0.30	Brown clay.
1225831	TP8	None Supplied	1.50	Grey clay with gravel.

** Non MCerts Matrix

Analytical Report Number : 19-42012

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS

Iss No 19-42012-1 Southampton Airport, Southampton J14044

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-42012

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
pH at 20°C in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

**Tom Lees**

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Analytical Report Number : 19-45632

Replaces Analytical Report Number : 19-45632, issue no. 1

Project / Site name:	Southampton Airport, Southampton	Samples received on:	14/06/2019
Your job number:	J14044	Samples instructed on:	14/06/2019
Your order number:	J14044-9	Analysis completed by:	26/06/2019
Report Issue Number:	2	Report issued on:	26/06/2019
Samples Analysed:	1 water sample		

Signed: _____

#REF!

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number: 19-45632

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-9

Lab Sample Number				1245423				
Sample Reference				BH8				
Sample Number				None Supplied				
Depth (m)				4.25				
Date Sampled				13/06/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	7.1				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Sulphate as SO ₄	mg/l	0.045	ISO 17025	21.9				
Total Sulphur	µg/l	15	NONE	7300				
Chloride	mg/l	0.15	ISO 17025	37				
Fluoride	µg/l	50	ISO 17025	240				
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	< 15				
Nitrate as N	mg/l	0.01	ISO 17025	2.68				
Nitrate as NO ₃	mg/l	0.05	ISO 17025	11.9				
Alkalinity	mgCaCO ₃ /l	3	NONE	740				
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	1000				
Total Dissolved Solids (Gravimetric)	mg/l	4	ISO 17025	370				
Hardness - Total	mgCaCO ₃ /l	1	ISO 17025	305				
Bicarbonate	mgHCO ₃ /l	10	NONE	< 10				

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
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Analytical Report Number: 19-45632

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-9

Lab Sample Number				1245423				
Sample Reference				BH8				
Sample Number				None Supplied				
Depth (m)				4.25				
Date Sampled				13/06/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16				
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4				
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.42				
Barium (dissolved)	µg/l	0.06	ISO 17025	26				
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1				
Boron (dissolved)	µg/l	10	ISO 17025	62				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03				
Calcium (dissolved)	mg/l	0.012	ISO 17025	120				
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0				
Chromium (III)	µg/l	1	NONE	1.7				
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.7				
Copper (dissolved)	µg/l	0.5	ISO 17025	4.2				
Iron (dissolved)	mg/l	0.004	ISO 17025	0.049				
Lead (dissolved)	µg/l	0.2	ISO 17025	0.2				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	3.9				
Manganese (dissolved)	µg/l	0.05	ISO 17025	5.8				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	0.35				
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.0				
Selenium (dissolved)	µg/l	0.6	ISO 17025	3.4				
Sodium (dissolved)	mg/l	0.01	ISO 17025	15				
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.9				
Zinc (dissolved)	µg/l	0.5	ISO 17025	1.7				



Analytical Report Number: 19-45632

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-9

Lab Sample Number				1245423				
Sample Reference				BH8				
Sample Number				None Supplied				
Depth (m)				4.25				
Date Sampled				13/06/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				



Analytical Report Number: 19-45632

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044-9

Lab Sample Number				1245423				
Sample Reference				BH8				
Sample Number				None Supplied				
Depth (m)				4.25				
Date Sampled				13/06/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0				
Chloroethane	µg/l	1	ISO 17025	< 1.0				
Bromomethane	µg/l	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/l	1	NONE	< 1.0				
Trichlorofluoromethane	µg/l	1	NONE	< 1.0				
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0				
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0				
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Trichloromethane	µg/l	1	ISO 17025	< 1.0				
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0				
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0				
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0				
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0				
Benzene	µg/l	1	ISO 17025	< 1.0				
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0				
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Trichloroethene	µg/l	1	ISO 17025	< 1.0				
Dibromomethane	µg/l	1	ISO 17025	< 1.0				
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0				
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0				
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0				
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0				
Chlorobenzene	µg/l	1	ISO 17025	< 1.0				
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-Xylene	µg/l	1	ISO 17025	< 1.0				
Styrene	µg/l	1	ISO 17025	< 1.0				
Tribromomethane	µg/l	1	ISO 17025	< 1.0				
o-Xylene	µg/l	1	ISO 17025	< 1.0				
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0				
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0				
Bromobenzene	µg/l	1	ISO 17025	< 1.0				
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0				
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0				
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0				
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0				
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0				

U/S = Unsuitable Sample I/S = Insufficient Sample

Iss No 19-45632-2 Southampton Airport, Southampton J14044

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-45632

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Water (by discrete analyser)	Determination of Alkalinity by discrete analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	NONE
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025

Iss No 19-45632-2 Southampton Airport, Southampton J14044

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-45632

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Total Sulphur in water	Determination of total sulphur in water by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH8		W	19-45632	1245423	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH8		W	19-45632	1245423	c	pH at 20oC in water (automated)	L099-PL	c

**Tom Lees**

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Analytical Report Number : 19-48702

Project / Site name:	Southampton Airport, Southampton	Samples received on:	05/07/2019
Your job number:	J14044	Samples instructed on:	05/07/2019
Your order number:	J14044_10	Analysis completed by:	16/07/2019
Report Issue Number:	1	Report issued on:	16/07/2019
Samples Analysed:	1 water sample		

Signed:

Head of Reporting Section
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 19-48702

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044_10

Lab Sample Number	1260693						
Sample Reference	BH8						
Sample Number	V						
Depth (m)	4.20						
Date Sampled	05/07/2019						
Time Taken	0005						
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				

General Inorganics

pH	pH Units	N/A	ISO 17025	7.1				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Sulphate as SO ₄	mg/l	0.045	ISO 17025	21.4				
Total Sulphur	µg/l	15	NONE	7100				
Chloride	mg/l	0.15	ISO 17025	31				
Fluoride	µg/l	50	ISO 17025	170				
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	< 15				
Nitrate as N	mg/l	0.01	ISO 17025	2.28				
Nitrate as NO ₃	mg/l	0.05	ISO 17025	10.1				
Alkalinity	NONE	3	ISO 17025	290				
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	270				
Total Dissolved Solids (Gravimetric)	mg/l	4	ISO 17025	400				
Hardness - Total	mgCaCO ₃ /l	1	ISO 17025	404				
Bicarbonate	mgHCO ₃ /l	10	NONE	< 10				

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
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Analytical Report Number: 19-48702

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044_10

Lab Sample Number	1260693					
Sample Reference	BH8					
Sample Number	W					
Depth (m)	4.20					
Date Sampled	05/07/2019					
Time Taken	0005					
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01			
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01			
Fluorene	µg/l	0.01	ISO 17025	< 0.01			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	< 0.01			
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01			
Pyrene	µg/l	0.01	ISO 17025	< 0.01			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16			
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4			
Arsenic (dissolved)	µg/l	0.15	ISO 17025	< 0.15			
Barium (dissolved)	µg/l	0.06	ISO 17025	23			
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1			
Boron (dissolved)	µg/l	10	ISO 17025	67			
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02			
Calcium (dissolved)	mg/l	0.012	ISO 17025	150			
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0			
Chromium (III)	µg/l	1	NONE	< 1.0			
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3			
Copper (dissolved)	µg/l	0.5	ISO 17025	1.0			
Iron (dissolved)	mg/l	0.004	ISO 17025	0.022			
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2			
Magnesium (dissolved)	mg/l	0.005	ISO 17025	4.2			
Manganese (dissolved)	µg/l	0.05	ISO 17025	1.7			
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05			
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	0.48			
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.1			
Selenium (dissolved)	µg/l	0.6	ISO 17025	2.8			
Sodium (dissolved)	mg/l	0.01	ISO 17025	15			
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6			
Zinc (dissolved)	µg/l	0.5	ISO 17025	1.7			



Analytical Report Number: 19-48702

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044_10

Lab Sample Number				1260693				
Sample Reference				BH8				
Sample Number				W				
Depth (m)				4.20				
Date Sampled				05/07/2019				
Time Taken				0005				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				



Analytical Report Number: 19-48702

Project / Site name: Southampton Airport, Southampton

Your Order No: J14044_10

Lab Sample Number	1260693					
Sample Reference	BH8					
Sample Number	W					
Depth (m)	4.20					
Date Sampled	05/07/2019					
Time Taken	0005					
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0			
Chloroethane	µg/l	1	ISO 17025	< 1.0			
Bromomethane	µg/l	1	ISO 17025	< 1.0			
Vinyl Chloride	µg/l	1	NONE	< 1.0			
Trichlorofluoromethane	µg/l	1	NONE	< 1.0			
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0			
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0			
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0			
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0			
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0			
Trichloromethane	µg/l	1	ISO 17025	< 1.0			
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0			
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0			
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0			
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0			
Benzene	µg/l	1	ISO 17025	< 1.0			
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0			
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0			
Trichloroethene	µg/l	1	ISO 17025	< 1.0			
Dibromomethane	µg/l	1	ISO 17025	< 1.0			
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0			
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0			
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0			
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0			
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0			
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0			
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0			
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0			
Chlorobenzene	µg/l	1	ISO 17025	< 1.0			
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0			
p & m-Xylene	µg/l	1	ISO 17025	< 1.0			
Styrene	µg/l	1	ISO 17025	< 1.0			
Tribromomethane	µg/l	1	ISO 17025	< 1.0			
o-Xylene	µg/l	1	ISO 17025	< 1.0			
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0			
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0			
Bromobenzene	µg/l	1	ISO 17025	< 1.0			
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0			
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0			
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0			
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0			
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0			
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0			
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0			
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0			
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0			
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0			
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0			
Butylbenzene	µg/l	1	ISO 17025	< 1.0			
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0			
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0			
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0			
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0			

U/S = Unsuitable Sample I/S = Insufficient Sample

Iss No 19-48702-1 Southampton Airport, Southampton J14044

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The results included within the report are representative of the samples submitted for analysis.



Analytical Report Number : 19-48702

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Water (by discrete analyser)	Determination of Alkalinity by discrete analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	NONE
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L0738-PL	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L0338-PL	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L1028-PL	W	ISO 17025

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The results included within the report are representative of the samples submitted for analysis.

Page 6 of 7



Analytical Report Number : 19-48702

Project / Site name: Southampton Airport, Southampton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Total Sulphur in water	Determination of total sulphur in water by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

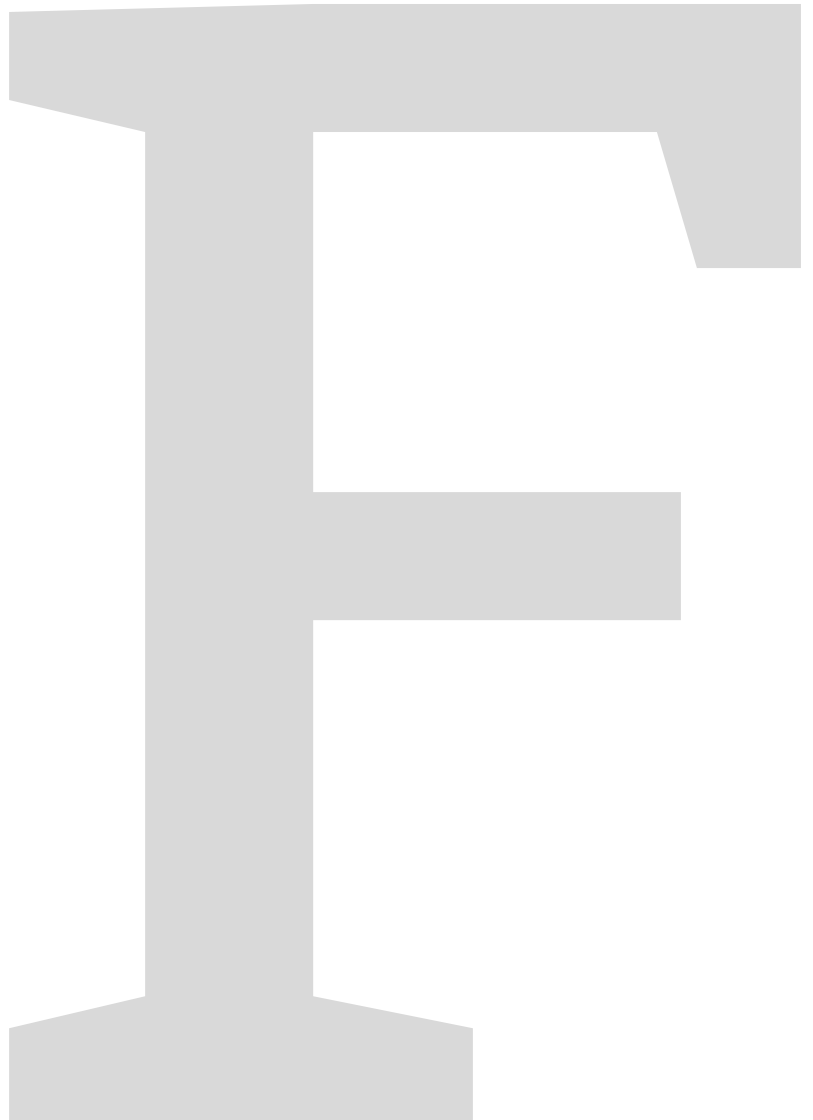
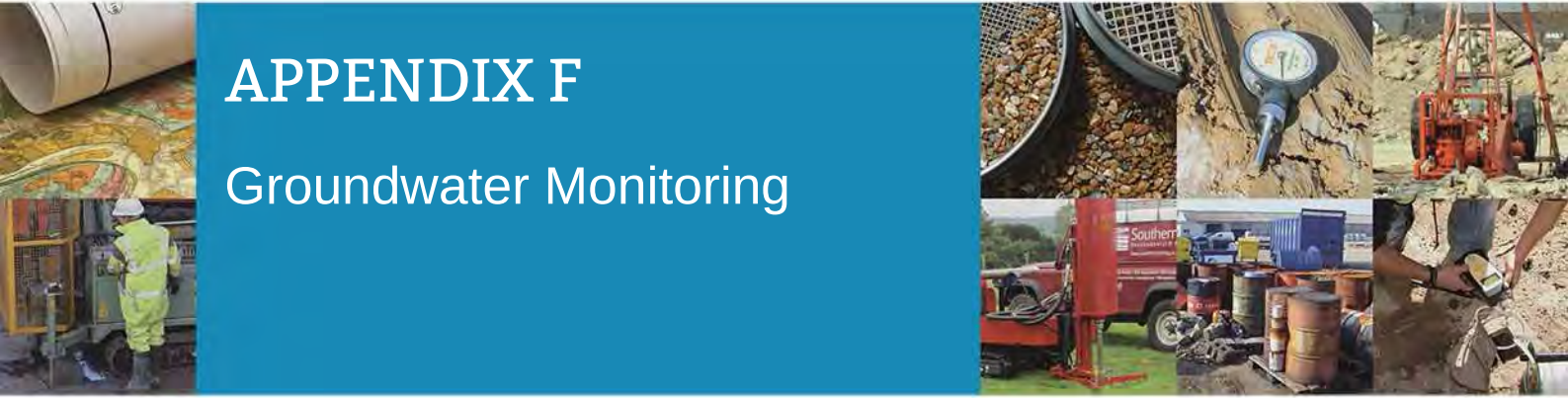
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX F

Groundwater Monitoring



GEOSENSE QUALITY FORM
FORM No G/QF/149
ISS. 8
DATE : Dec-18
SIG. GC

STANDARD VW PIEZOMETER LAE CALIBRATION

Model	VWP-3000	Cal date	22/03/2019	SN.	8233
Serial	349824	Baro	1016.0	Readout No.	2108
Works ID	G32 9 46	Temp °C	20	R/O Cal. date	09/05/2018

Applied pressure		Readings [digit]			Calculated Pressure		Error % fso	
psi	kPa	1st Cycle	2nd Cycle	avg.[digit]	lin.[kPa]	polyn.[kPa]	linear	polynomial
0.000	0.000	9696.2	9695.8	9696.0	0.37	-0.12	0.11%	-0.03%
10.007	69.000	9090.6	9090.3	9090.5	69.11	69.21	0.03%	0.06%
20.015	138.000	8487.3	8486.8	8487.1	137.62	138.00	-0.11%	0.00%
30.022	207.000	7880.3	7880.3	7880.3	206.50	206.89	-0.15%	-0.03%
40.029	276.000	7269.6	7269.2	7269.4	275.85	275.96	-0.04%	-0.01%
50.036	345.000	6655.5	6655.6	6655.6	345.54	345.06	0.16%	0.02%

Calibration of Fluke Pressure Controller PPC4EX S/N: 8233 valid from 23rd March 2018. Certificate of Calibration No 47934, Chamois Metrology UKAS No 0822

CALIBRATION FACTORS

Linear factor (k)

kPa per digit
-0.113527226

psi per digit
-0.016465

mH ₂ O per digit
-0.011577

Polynomial factors

	kPa
A	-3.92518E-07
B	-0.107108985
C	

	psi
	-5.69279E-08
	-0.015534

	mH ₂ O
	-4.0026E-08
	-0.010922

Thermal factor (T)

kPa per °C
0.24787771

psi per °C
0.035950357

mH ₂ O per °C
0.025276

Note: Digits are Hz² x 10⁻³ units.

(please consult the User Manuals for conversion of alternative reading units)

Polynomial calculation [kPa] = A * (Reading)² + B * (Reading) + C + T * (Current Temp - Site Zero Temp)

C = -A*(Site Zero Reading²) - B*(Site Zero Reading)

Linear calc = k (kPa) * (Current Reading - Site Zero Reading) + T * (Current Temp - Site Zero Temp)

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GEOSense QUALITY FORM
FORM No G/QF/149
ISS. 8
DATE : Dec-18
SIG. GC

STANDARD VW PIEZOMETER LAE CALIBRATION

Model	VWP-3000	Cal date	22/03/2019	SN.	8233
Serial	349825	Baro	1016.0	Readout No.	2108
Works ID	G32 9 47	Temp °C	20	R/O Cal. date	09/05/2018

Applied pressure		Readings [digit]			Calculated Pressure		Error % fso	
psi	kPa	1st Cycle	2nd Cycle	avg.[digit]	lin.[kPa]	polyn.[kPa]	linear	polynomial
0.000	0.000	9681.6	9681.0	9681.3	0.32	-0.09	0.09%	-0.03%
10.007	69.000	9096.8	9096.4	9096.6	69.04	69.12	0.01%	0.03%
20.015	138.000	8511.9	8511.6	8511.8	137.78	138.10	-0.07%	0.03%
30.022	207.000	7926.7	7926.5	7926.6	206.56	206.89	-0.13%	-0.03%
40.029	276.000	7337.4	7337.3	7337.4	275.81	275.90	-0.05%	-0.03%
50.036	345.000	6744.5	6744.4	6744.5	345.49	345.09	0.14%	0.02%

Calibration of Fluke Pressure Controller PPC4EX S/N: 8233 valid from 23rd March 2018. Certificate of Calibration No 47934, Chamois Metrology UKAS No 0822

CALIBRATION FACTORS

Linear factor (k)

kPa per digit
-0.117535091

psi per digit
-0.017046

mH ₂ O per digit
-0.011985

Polynomial factors

	kPa
A	-3.57102E-07
B	-0.111669347
C	

	psi
	-5.17914E-08
	-0.016196

	mH ₂ O
	-3.6414E-08
	-0.011387

Thermal factor (T)

kPa per °C
0.282113439

psi per °C
0.040915655

mH ₂ O per °C
0.028768

Note: Digits are Hz² x 10⁻³ units.

(please consult the User Manuals for conversion of alternative reading units)

Polynomial calculation [kPa] = A * (Reading)² + B * (Reading) + C + T * (Current Temp - Site Zero Temp)

C = -A*(Site Zero Reading²) - B*(Site Zero Reading)

Linear calc = k (kPa) * (Current Reading - Site Zero Reading) + T * (Current Temp - Site Zero Temp)

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GEOSENSE QUALITY FORM
FORM No G/QF/161
ISS. 2
DATE : MAR 17
SIG. GC

VWR1 Readout Certificate of Calibration

Model	VWR1
Serial No.	VWR0081
Check. Date	27/03/2019

Vibrating Wire Absolute maximum deviation detected: **0.01%**

Reference Frequency Hz	Readout Reading Hz	Error %
500.0	500.0	0.00%
1000.0	999.8	-0.01%
2000.0	1999.7	-0.01%
3000.0	2999.8	0.00%
4000.0	3999.9	0.00%

Thermistor Absolute maximum deviation detected: **0.18%**

Reference Resistor Ω	Readout Reading Ω	Error %
1000.0	999.0	-0.01%
5000.0	5010.0	0.05%
10000.0	10035.0	0.18%
15000.0	15029.0	0.15%
20000.0	19997.0	-0.02%

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FS 29280 EMS 506775 OHS 506776

