

Concorde Residential Development – Ground Investigation

Client:

Silvermount Ltd.

Client's Representative: Barrett Mahony Consulting Engineers

Report No.:

Date:

Status:

18-1234

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Final for Issue

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Document Control Sheet

Report No.:		Concorde Residential Development						
Project Title:		18-1234						
Client:		Silvermount Ltd.						
Client's Repres	entative:	Barrett Mahony	Barrett Mahony Consulting Engineers					
Revision:	A00	Status:	Final for Issue	Issue Date:	12 December 2018			
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The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015, Code of practice for site investigations.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9



METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015, The Code of Practice for Site Investigation.

U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler)
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler)
Р	Nominal 100mm diameter undisturbed piston sample
В	Bulk disturbed sample
LB	Large bulk disturbed sample
D	Small disturbed sample
С	Core sub-sample (displayed in the Field Records column on the logs)
L	Liner sample from dynamic sampled borehole
W	Water sample
ES / EW	Soil sample for environmental testing / Water sample for environmental testing
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained)
SPT (c)	Standard penetration test using 60 degree solid cone
x,x/x,x,x,x	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length. The length achieved is stated (mm) for any test increment less than 75mm
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm)
N=X/Z	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given test length 'Z' (mm)
V VR	Shear vane test (borehole)Hand vane test (trial pit)Shear strength stated in kPaV: undisturbed vane shearstrengthVR: remoulded vane shear strength
dd/mm/yy:1.0dd/mm/yy: dry	Date & water level at the borehole depth at the end of shif and the start of the following shift
\bigtriangledown	Water strike: initial depth of strike
▼	Water strike: depth water rose to
Abbreviations relating	to rock core – reference Clause 36.4.4 of BS 5930: 2015
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length o core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum).



Concorde Residential Development

1 AUTHORITY

On the instructions of Barrett Mahony Consulting Engineers Consulting Engineers, ("the Client's Representative"), acting on the behalf of Silvermount Ltd. ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the design and construction of a proposed residential development.

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included boreholes, soil and rock sampling, in-situ and laboratory testing, and the preparation of a factual report on the findings.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were on the site of the existing Concorde Industrial Estate, on the Naas Road, Dublin 12. The site is bounded by the Naas Road to the north, industrial units to the east and a car showroom to the south.





4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between 7th and 16th November 2018, comprised:

- Four light cable percussion boreholes, two of which were completed by rotary drilling methods;
- four boreholes by dynamic (windowless) sampling methods;
- a standpipe installation in two boreholes;
- two dynamic probes; and
- an infiltration test performed in two boreholes.

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

4.2 Boreholes

A total of eight boreholes were put down in a minimum diameter of 150mm through soils and rock strata to their completion depths by a combination of methods, including light percussion boring using a Dando Terrier rig, light cable percussion boring using a Dando 2500 rig, and rotary drilling by a Comacchio 205 tracked rotary drilling rigs.

The borehole logs state the methodology and plant used for each location, as well as the appropriate depth ranges.

A summary of the boreholes, subdivided by category in accordance with the methods employed for their completion, is presented in the following sub-sections.

Appendix B presents the borehole logs.

4.2.1 Light cable percussion boreholes

Two boreholes (BH02-BH03) were put down to completion in minimum 200mm diameter using a Dando 2500 light cable percussion boring rig. All boreholes were terminated on encountering virtual refusal on obstructions or in stiff deposits above their scheduled depth.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions.





Disturbed (bulk and small bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals within the overburden.

Standard penetration tests were carried out in accordance with BS EN 22476-3: 2005 at standard depth intervals using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix G.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded.

Where water was added to assist with boring, a note has been added to the log to account for same.

Appendix B presents the borehole logs.

4.2.2 Boreholes by combined percussion boring and rotary follow-on drilling

Two boreholes (BH01-BH03A) were put down by a combination of light cable percussion boring and rotary follow-on drilling techniques with core recovery in bedrock. Where the cable percussion borehole had not been advanced onto bedrock, rotary percussive methods were employed to advance the borehole to completion/bedrock. Symmetrix cased full-hole drilling was used, with SPTs carried out at standard intervals as required.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions.

Disturbed (bulk and small bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals within the overburden.

Standard penetration tests were carried out in accordance with BS EN 22476-3: 2005 at standard depth intervals throughout the overburden using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix G.

Where coring was carried out within bedrock strata, conventional coring methods were used with a metric T2-101 core barrel, which produced core of nominal 84mm diameter, and was placed in triple channel wooden core boxes.





The core was subsequently photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with *BS 5930: 2015: Code of practice for ground investigations*.

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

4.2.3 Dynamic sampled boreholes

Four boreholes (WS01-WS04) were put down to completion by light percussion boring techniques using a Dando Terrier dynamic sampling rig. The boreholes were put down initially in 150mm diameter, reducing in diameter with depth as required, down to 50mm by use of the smallest sampler.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down clear of services or subsurface obstructions. The boreholes were taken to depths ranging between 2.80m and 3.00m where they were terminated at their scheduled depths, or else they were terminated on encountering virtual refusal on obstructions above this depth.

Disturbed (bulk and small bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals throughout the overburden.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded. Details of the water strikes are presented on the individual borehole logs.

Appendix B presents the borehole logs.

4.3 Dynamic probes

Two dynamic probes were conducted as a follow on from boreholes WS01 – WS02 using the DPSHB method as described in BS EN ISO 22476-2: 2005. The method entails a 63.5kg hammer falling 0.75m onto a 50.5mm diameter cone with an apex angle of 90°.

Appendix B provides the dynamic probe logs on the sheet following the relevant borehole log in the form of plots, against depth, of the number of blows per 100mm penetration.

4.4 Standpipe installations

A groundwater monitoring standpipe was installed in boreholes BH01 and BH03A.

Details of the installations, including the depth range of the response zone, are provided in Appendix B on the individual borehole logs.





4.5 Infiltration tests

An infiltration/soakaway test was carried out in two boreholes (WS01- WS02) in accordance with BRE Digest 365 - Soakaways (BRE, 2016).

Appendix D presents the results and analysis of the infiltration test. The absence of the outflow from the borehole precluded calculation of infiltration coefficients.

4.6 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R6 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish National Grid) and ground elevation (mOD Malin) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these asbuilt positions.

4.7 Groundwater monitoring

Following completion of site works, groundwater monitoring was conducted on two rounds. Ground water monitoring was carried out using a water interface probe.

Details of groundwater and gas monitoring are presented in the Table 2 Section 6.3 of this report.

5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.

5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.
- soil chemistry: pH and water soluble sulphate content

Laboratory testing of soils samples was carried out in accordance with British Standards Institute: *BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (2016), and Parts 2-9 (1990).*





The test results are presented in Appendix E.

5.2 Environmental laboratory testing of soils

Environmental testing was conducted on selected environmental soil samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out according to Suite I of Engineer's Ireland Specification for Ground Investigation which includes testing for the following determinants:

- Metals
- Speciated total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- Cyanides
- Asbestos screen
- pH.

Waste acceptance criteria (WAC) testing was carried out on eight samples.

Results of environmental laboratory testing are presented in Appendix H.

6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise Glacial Till. These deposits are underlain by limestones and shales of the Lucan Formation.

6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Paved surface:** all boreholes encountered macadam surfacing ranging in thickness between 50 150mm. Additionally concrete was encountered in BH01 and BH02 with a thickness of 300 350mm.
- **Made Ground (sub-base):** WS02 WS04 encountered 200 850mm of subangular fine to coarse gravel.
- **Made Ground (fill):** reworked sandy gravelly clay fill/gravelly sand/sandy gravel encountered in WS01 and WS04, extending to a depth of 2.50m in both boreholes.



- **Glacial Till:** sandy gravelly clay/silt, frequently with low cobble content, typically firm or stiff in upper horizons, becoming very stiff with increasing depth. Encountered to a maximum depth of 10.00m in BH01. Note, however that this was the maximum extent of the borehole. Therefore, the extent of this strata was unable to be determined at this location.
- **Bedrock (Limestone):** Rockhead was encountered at a depth of 8.50m in BH03A.

6.3 Groundwater

Groundwater was encountered during percussion boring as groundwater strikes as shown in Table 1 below.

GI Ref.	Water I (mbgl)	Level	Comments				
BH03A	8.20		No rise after 20 mins				
WS04	1.20		Rose to 1.10 after 20 mins				

Table 1: Groundwater strikes encountered during ground investigation

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Groundwater was not noted during drilling at any of the other borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any/additional groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out.

It should be noted that any groundwater strikes within bedrock may have been masked by the fluid used as the drilling flush medium.

Subsequent groundwater monitoring of the standpipe installations recorded water levels as shown in Table 2.

Table 2.	Table 2. droundwater monitoring (mbgr)												
GI Ref.	BH01	BH03A											
27/11/2018	2.38	2.45											
11/12/2018	2.10	2.48											

Table 2: Groundwater monitoring (mbgl)





Seasonal variation in groundwater levels should also be factored into design considerations, and continued monitoring of the two installed standpipes will give an indication of the seasonal variation in groundwater level.

7 **REFERENCES**

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930: 2015: Code of practice for ground investigations. British Standards Institution.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description.

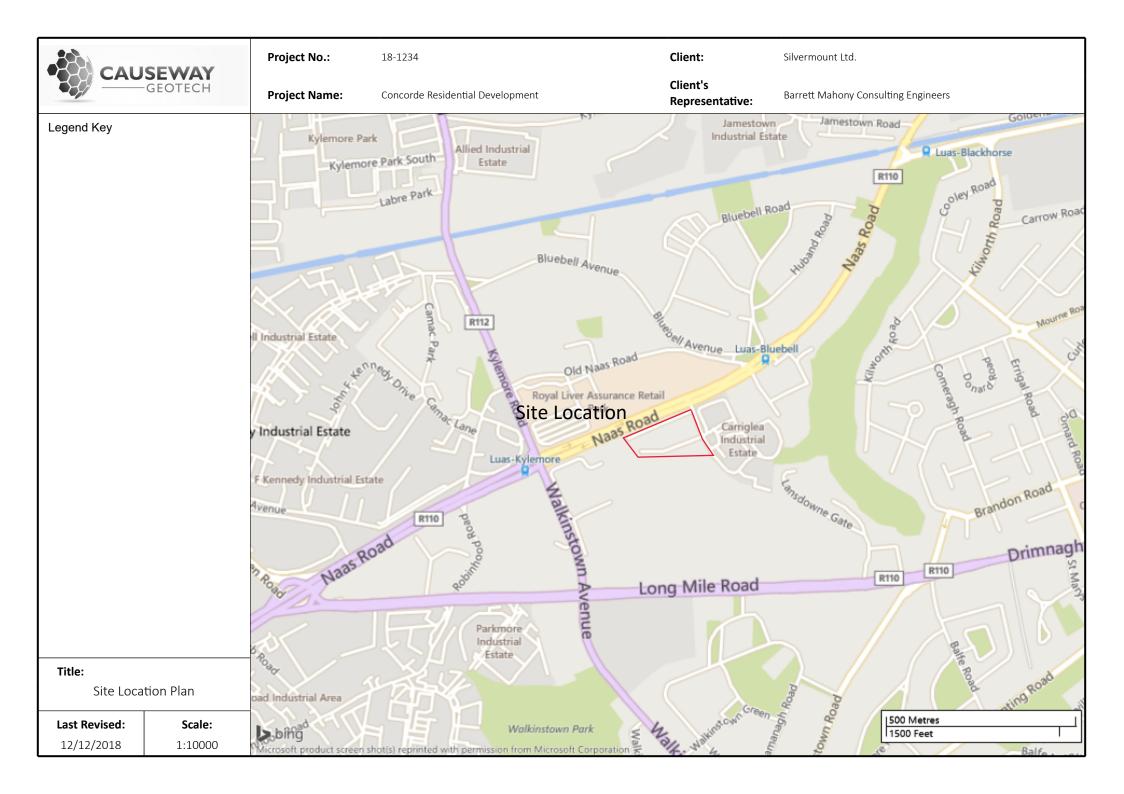
BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.

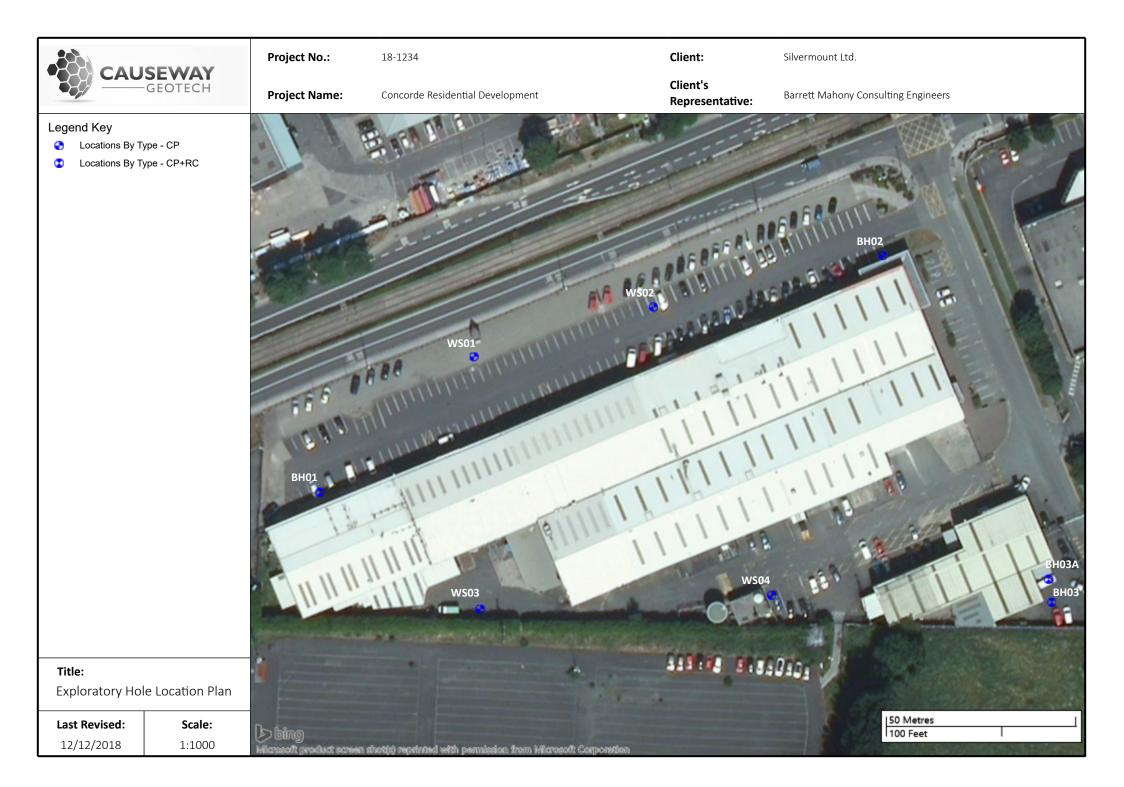
Building Research Establishment (2007), BRE Digest 365: Soakaways.



APPENDIX A SITE AND EXPLORATORY HOLE LOCATION PLANS









APPENDIX B BOREHOLE AND DYNAMIC PROBE LOGS



						Project		-	t Name:	В		ole No.:	
KXX I	CAL	JS	E	VAY		18-123			de Residential Development		BI	101	
		—G	EC	TECH		Coordi		Client:	nount Ltd.		Sheet	t 1 of 1	
Method	Dia	nt U		Ton Pr	ise	31071	0.97 E			Scale: 1:50			
Cable Percussion		do 2			40	23205	1.31 N		s Representative: Mahony Consulting Engineers				
Rotary Drilling					50	Ground	d Level:	Dates:		D	riller	RN+K\	
Rotary Coring	Coma	icchi	205	8.50 10	.00		3 mOD	07/11/	2018 - 12/11/2018	L	Logger: Si		
	Sample /	Casing Depth	Water Depth (m)	Field Record	s	Level	Depth (m)	Legend	Description		Bac	kfill	
(m)	Tests	(m)	(m)			(mOD) 39.68	(Thickness)		BITMAC		\$		
0.40 1.40	D1					39.58	(0:20) (0.20) 0.40		CONCRETE Concrete with boulders	_/			
0.40 - 1.40	B1 D2					39.38	c 0.40		Firm becoming stiff brown slightly sandy gravelly CLAY with low cobble	-1		0.5	
0.50	ES5							4. 10°°	content. Sand is fine to coarse. Gravel is subangular to subrounded fine coarse. Cobbles are subangular	to			
1.00	ES6						(1.00)					1.0 -	
1.20 - 1.65	SPT (S) N=18	1.20		N=18 (2,3/3,5,4,	6)			4 10°°					
1.40 - 2.00	В3					38.38	1.40		Stiff becoming very stiff dark grey slightly sandy slightly gravelly CLAY .			1.5	
	B4								Sand is fine to coarse. Gravel is subangular to subrounded fine to mediu	m.			
2.00 - 2.40	B7						(1.00)					2.0 -	
	D8												
2.00 - 2.38	SPT (S)	2.00		N=50 (4,5/50 for		37.38	2.40		Very stiff dark grey sandy gravelly CLAY with low cobble and boulder	-		2.5	
		2.00		225mm) 07-11-2018			Ē		content. (Driller's description)				
		2.00	Dry	08-11-2018			-					3.0 -	
2.40 - 2.42	SPT (S)	2.40		N=50 (25 for 10mm/50 for 5n	וm)			0.0					
		2.50		08-11-2018	,							35	
		2.50	Dry	12-11-2018				\mathbf{O}				3.5	
	aa= (a)												
4.00 - 4.02	SPT (S)	4.00	Dry	N=50 (15 for 10mm/50 for			-	0.0				4.0 -	
				10mm)				0.0					
								O = O				4.5	
								\overline{O}					
							<u>-</u>				• .° _	• • 5.0 -	
							[(6.10)					5.5	
							-	O = O				6.0 -	
								\overline{O}					
							-	\overline{O}				6.5	
7.00 - 7.22	SPT (S)	7.00	Dry	N=50 (25 for								7.0 -	
				75mm/50 for 150mm)									
				13011111)			È					7.5	
							-						
							-	$\mathbf{\hat{0}}$				8.0 -	
								0.0					
							8.50					8.5	
						31.28	0.30		Stiff black slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of predominate	Iv		8.5	
								م ،۵۰۰ م ، ۵۰۰ م ، ۰۰۰	limestone. Cobbles are subrounded.	· /			
												9.0 -	
	85						(1.50)						
												9.5	
10.00				12-11-2018		29.78	- 10.00	<u>yar 112 - ,</u>	End of Borehole at 10.00m			10.0 -	
				12 11 2010			-						
Remarks	TCR SCR	RQD	FI						Core Borrel Water Strikes C	hisell	ing De	tails	
Hand dug inspec				to 1.20m.					Core Barrel Struck at (m) Casing to (m) Time (min) Rose to (m) From (m		To (m)	Time (hh:mn	
No groundwater	encount	ered.							T2101				
									Flush Type Water Added Casing Details				
									Polymer 1.20 2.40 2.50 200				
Terminated at sc	neduled	aept	٦.						8.50 10.00 10.00 200				

						Probe No:
	GEOTECH		Probe	e Log		DPWS01
						Sheet 1 of 1
Project Name	: Concorde Residential Development	Project No . 18-1234	Co-ords:			
Client:	Silvermount Ltd.	10-1234	L ovol:			Scale:
			Level.			
Client's Rep:	Barrett Mahony Consulting Engine	ers	JC			
Depth (m)	10	Blows/1		4	0	Torque (Nm)
-						
-						
1						
-						
-2-						
_						
3		16				
		19	24 28			
				37	44	50
4						30
- '						
-						
_						
5						
-						
_						
6						
-						
- - ,						
7						
8						
9						
Remarks:			Probe Log DPWS01 Shet 1 of 1 Hole Type: DP Scale: Level: 1:50 Date: 15/11/2018 30 40 30 40 24 28 37 44 24 28 30 40 24 37 40 Torque (Nm) 24 37 40 Torque (Nm) 50 Torque (Nm) 24 37 40 Torque (Nm) 50 Torque (Nm)			
				Final Depth	3.70	AGS
		Probe Type D	PSH-B			

	_	10	_		r	Project 18-123			t Name: de Residential Development	Bor	ehole No BH02		
	CAL	JS	E	VAY TECH		Coordi		Client:					
		-G	ΕO	TECH		31085		Silverm	oount Ltd.		eet 1 of 2		
Method Cable Percussior	_	Plant Use Dando 25		Top 0.00	Base 2.40	23211	7.42 N		s Representative:	Scale:			
		uo 2.	500	0.00	2.40	Ground	Level:	Dates:	Mahony Consulting Engineers	Dril	ler: RN		
							3 mOD		2018 - 08/11/2018	Log	ger: SR		
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Re	ecords	Level (mOD)	Depth (m) (Thickness) (0:05)	Legend	Description	Water	Backfill		
						39.63	(0.35)		BITMAC CONCRETE with rebar	-1			
0.50	ES5					39.28	0.40		Stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse.	_	0.5		
	B1 D2						-		Gravel is subangular to subrounded fine to coarse.				
00	ES6						-				1.0		
	B3 D4						- (2.00)						
	SPT (C) N=16	1.20	Dry	N=16 (2,3/3	3,4,4,5)		- (2.00) -				1.9		
							-						
	ES7 SPT (C)	2.00	Dry	N=50 (6,8/5	50 for						2.0		
		2.15		40mm) N=50 (25 fc		37.28	2.40	 	End of Borehole at 2.40m	_ [
				25mm/50 f 35mm)			-				2.5		
		2.20 2.20		08-11-2018			-				3.0		
			ŕ				-						
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							-				4.0		
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		8 50	5 00	13-11-2018			-						
marks		0.50	5.00	15 11-2010							Details		
ind dug inspect				o 1.20m.					Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) 2.15		n) Time (hh		
groundwater	encounte	ered.											
									Water Added Casing Details From (m) To (m) To (m) Diam (mm) 1.20 2.20 200				
rminated in stif	ff deposi	ts.							8.50 10.00 2.20 2.00 200				

							Pi	obe No:
	CAUSEWAY GEOTECH			Pro	be Log			PWS02
-07								eet 1 of 1
Project Nam	ne: Concorde Resident Development		Project No. 18-1234	Co-o	rds:		H	ole Type: DP
Client:	Silvermount Ltd.		10-1234	Leve				Scale:
	Silvermount Etd.					1:50		
Client's Rep	Barrett Mahony Cor	nsulting Enginee	rs		perator: JC			
Depth (m)	10		Blow		Torque (Nm)			
-	10		20	3	0	40		· · ·
- - 1 -								
-								
2								
-3				27		38		
								50
4								-
5								-
-								
6								-
7								
8								
E								
F								
9								
E								
				750		Diament		
Remarks:			Fall Height Hammer Wt	750 64	Cone Base			AGS
			Probe Type	DPSH-B	Final Dept		,	AGS
				_D				

						Project	No.:	Project	Name:					Borehol	e No.:
	- 11	IC		WAY		18-123	4	Concor	de Residential Deve	elopment				BH	03
KH		-0	FO	TECH		Coordii	nates:	Client:						Sheet	1 of 1
		0	LO	I LCII		310905	5.50 E	Silverm	ount Ltd.					JICCL	1011
Method	Plar	nt Us	sed	Тор	Base	1		Client's	Representative:					Scale:	1:50
Cable Percussion	Dan	do 2!	500	0.00	0.50	232026	5.76 N	Barrett	Mahony Consulting	g Engineers	;			Driller:	RN
						Ground	Level:	Dates:							
						39.08	3 mOD	09/11/2	2018 - 09/11/2018					Logger:	SR
Depth S (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Re	cords	Level (mOD)	Depth (m) (Thickness)	Legend		Desc	cription			Back	fill
(11)	Tests	(m)	(,			38.98	(0: <u>10</u>)		BITMAC					>	
							(0.40)		MADE GROUND: Cons plastic	struction fill w	ith cobbles, boul	lders and fragr	ments of		-
						38.58	0.50		plastic	End of Bore	ehole at 0.50m				0.5
							-								-
							_								1.0
							-								
							-								1.5 -
							-								-
															-
															2.0 -
															2.5 -
							<u>-</u>								3.0
							-								
															3.5 -
							-								-
							-								4.0
															-
							-								4.5 —
							-								-
															5.0 -
															-
															5.5 -
							-								-
							-								6.0
															-
							-								6.5
															-
															7.0
															7.5 —
															-
															8.0
															-
															8.5
															-
															-
															9.0
															-
															9.5 —
							-								10.0 -
							-								
Remarks											Water Strikes		Chie	elling Deta	ails
Hand dug inspect	ion pit e:	xcava	ated t	o 1.20m.					Core Barrel		ising to (m) Time (min)	Rose to (m)	From (m)	To (m)	fime (hh:mm)
No groundwater e	encounte	ered.													
									Flush Type	Water Ad		g Details			
										From (m)	To (m) To (m)	Diam (mm)			
Terminated on co	ncrete o	pstru	ictior	n. Moved to	o rebore	position l	вн03А.								

					Projec			Name: de Residential Development		Bor		ole I 034	No.:
	CAL	JS	E	VAY	Coordi		Client: Silvermount Ltd.						-
		-G	EC	TECH								t10	of 1
Method	Pla	nt Us	sed	Top Base	_	- 722022 04 N		Client's Representative:					50
Cable Percussio	n Dan	do 2	500	0.00 3.30	23203			• Mahony Consulting Engineers	-				
Rotary Drilling Rotary Coring	Coma Coma				Group	d Level:	Dates:			Drii	ler:		N+KW
Notary coming	come	cenic	5 205	0.50 10.00		2 mOD	09/11/	018 - 12/11/2018		Log	ger	:SF	R+GH
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description		Water	Bac	kfill	
0.10 - 0.50	B7	(,			39.07	(8: <u>1</u> 5)		BITMAC		-			-
	D8							Firm becoming stiff brown slightly sandy gravelly CLAY. Sand is fin coarse. Gravel is subangular to subrounded fine to coarse.	ne to				-
0.50 0.50 - 1.50	ES1 B9												0.5 —
	D10					(1.35)							-
1.00	ES2					-							1.0 -
1.20 - 1.65	SPT (S) N=16	1.20 1.20		N=16 (,3/5,4,3,4) 09-11-2018									-
1.50 - 2.00		1.20		12-11-2018	37.72	1.50		Stiff grey slightly sandy gravelly SILT with low cobble content. Sa	nd is fine				1.5 —
1.50 - 2.00	B11 D12					(0.50)	$\times \times $	to coarse. Gravel is subangular to subrounded fine to coarse. Co subangular					-
2.00	ES3				37.22	2.00	××××	Stiff becoming very stiff grey slightly sandy gravelly SILT with low	cobble				2.0
2.00 - 3.00	B13 D14					-	$\times \times $	content. Sand is fine to coarse. Gravel is subangular to subround coarse. Cobbles are subangular					-
2.00 - 2.45	SPT (S) N=20	2.00	Dry	N=20 (2,3/4,4,7,5)			$\times \times $	נטמוזב. נטטטובי מוב געטמווצעומו					2.5
	11-20					(1.30)	$\times \times \times \times$						=
3.00	ES4						$\times \times \times \times$						3.0
3.00 - 3.30	B15				25.25	3.30	$\times \times \times$						=
	D16 SPT (S)	3.00	Dry	N=50 (4,7/50 for	35.92		0-0	Very stiff brown sandy gravelly CLAY with medium cobble conten description)	t (Driller's				3.5
3.30 - 3.34	SPT (S)	3.30	Dry	155mm) N=50 (25 for		-	0-0-						-
5.50 - 3.34	511 (5)	J.5U	y I'	20mm/50 for		-	$O^{-}O^{-}$						4.0
		3.30	Drv	15mm) 12-11-2018			0-0-						=
4.00 - 4.45		4.00		N=37 (8,8/8,10,10,	9)		0-0-						4.5 —
	N=37					(2.60)	0-0-						-
						-	00-						5.0 -
							00-						<u> </u>
5.50 - 5.95	SPT (S)	5 50	Dry	N=38 (10,8/8,9,9,1	2)	-							55 -
5.50 - 5.55	N=38	0.50	y I'	··	-/								-
					33.32	5.90	0°-0°	Very stiff dark grey sandy gravelly CLAY with high cobble and bou	lder				60
							0°-0° ***0°-9° **	content (Driller's description)		•	Ē		
							<u>U</u> 2007 2007			4	ł		-
										4	þ		0.5 -
7.00 7.00		7 00	D			-				4	÷		-
7.00 - 7.02	SPT (S)	7.00	Ury	N=50 (25 for 10mn 50 for 10mm)	1/	(2.60)				4	ŀ		- 1.0
						(2.00)				4	ľ		-
										4	ł		7.5 -
										4	ŀ		-
										_	Ê		8.0 -
										-	ľ		-
					30.72	8.50		Medium strong black argillaceous LIMESTONE. Partially weathered	ed: slightly	4			8.5 -
						-		reduced strength, closer fracture spacing. Discontinuities:		4	۰E		
						-		1. 10 to 20 degree closely spaced fractures (40/90/170) undulation	ng, rough.	4	•		9.0 -
	100					(1.50)		2. 70 to 90 degree closely spaced joint, undulating, rough. 8.50m: Some clay infill					
										4			9.5 -
								9.80m: Some clay infill					-
10.00	\vdash		1		29.22	10.00		End of Borehole at 10.00m		4	•	1	10.0 -
					_	-							
Domortic	TCR SCR	RQD	FI					Water Strikes	Chise	lling		taile	<u> </u>
Remarks Hand dug inspec	tion pit e	xcava	ated	to 1.20m.				Core Barrel Struck at (m) Casing to (m) Time (min) Rose to (m)	From (m) 3.30	To (1 3.3	- m)	Time) (hh:mm) 01:00
								T2101 8.20 8.20 8.20	5.50	5.5	-		
								Flush Type Water Added Casing Details					
T	had to the		_					Polymer 1.20 3.30 3.30 200					
Terminated at sc	neduled	dept	n.					10.00 200					

						Project		Project			hole No
	CAL	JS	E)	NAY		18-123			de Residential Development		WS01
		-G	EO	TECH		Coordi		Client:	ount Ltd.	She	eet 1 of
Method	Pla	nt U	bos	Тор	Base	310753	1.01 E		s Representative:	Scale	e: 1:50
Light Percussion				0.00	3.00	232088	3.12 N		Mahony Consulting Engineers		
						Ground	Level:	Dates:	, , ,	Drill	er: JC
						40.58	3 mOD	15/11/	2018 - 15/11/2018	Logg	er: SR
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Re	cords	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.20	B1	(,	(,				(0.20) 0.20		MADE GROUND: Grey angular to subangular fine to coarse GRAVEL	-	
0.20 - 1.70 0.50	B2 ES5					40.38	- 0.20		MADE GROUND: Soft locally firm brown sandy gravelly CLAY with low cobble content. Sand is fine. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded		0.1
1.00	ES6						(1.50) 				1.0
1.70 - 2.50 2.00	B3 ES7					38.88	1.70		MADE GROUND: Brown slightly gravelly fine to medium SAND. Gravel is subangular to subrounded fine to medium		2.0
2.50 - 3.00	В4					38.08	(0.80) - 2.50		Stiff dark grey slightly sandy gravelly silty CLAY. Sand is fine. Gravel is	_	2.5
							(0.50)	× ×	subangular to subrounded fine to coarse		
3.00	ES8	2.00	Dry	15-11-2018		37.58	- 3.00 -	×-:	End of Borehole at 3.00m		3.0
							-				3.
							-				4.0
							-				4.
							-				5.1
							-				6.
							-				6.
							-				7.0
							-				7.
							- - - -				8.
											8.
							- - - -				9
											9.
							-				
emarks		<u> </u>							Water Strikes Chi	selling	Details
and dug inspec				o 1.20m.					Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)	To (m)	
o groundwater	encount	ered.							Water Added Casing Details From (m) To (m) To (m)		

						Project		-	Name:	Во	rehole	
	CAL	JS	E)	NAY		18-123 Coordi		Concor	de Residential Development	+	WS	02
		-0	EO	TECH					nount Ltd.	S	heet 1	1 of 1
Method	Pla	nt U	sed	Тор	Base	31079	8.13 E		s Representative:	Sci	ale:	1:50
Light Percussion		do Te		0.00	3.00	23210	2.33 N		Mahony Consulting Engineers	_		
						Ground	d Level:	Dates:		_Dri	iller:	JC
						39.6	7 mOD		2018 - 15/11/2018	Lo	gger:	SR
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Re	cords	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfi	fill
0.15 - 0.60	B2					39.52	(8:15)		MADE GROUND: BITMAC			
							(0.45)		MADE GROUND: Grey angular to subangular fine to coarse GRAVEL			
0.50 0.60 - 1.00	ES1 B3					39.07	- 0.60		MADE GROUND: Brown silty sandy subangular to subrounded fine to	_		0.5
							(0.40)		coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles			
L.00 L.00 - 1.90	ES4 B5					38.67	- 1.00		are subangular to subrounded Stiff brown sandy gravelly CLAY. Sand is fine. Gravel is subangular to	-		1.0
1.00 1.50	00								subrounded fine to coarse			
							(0.90)					1.5
1.90 - 3.00	B6					37.77	1.90					
2.00	ES7					57.77	- 1.90	×	Stiff dark grey slightly sandy silty gravelly CLAY. Sand is fine. Gravel is subangular to subrounded fine to coarse			2.0
							-	×				
							(1.10)	×				2.5
							-	×				
3.00	ES8	2.00		45 44 2040		36.67	3.00	×	End of Borehole at 3.00m	-		3.0
		2.00		15-11-2018			-					
												3.5
							-					
												4.0
							-					
												4.5
							-					
							-					5.0
							-					
												5.5
							-					
							-					6.0
							-					
							-					6.5
							-					
							-					7.0
							-					
							-					7.5
							-					8.0
							Ę					
							-					8.5
							-					9.0
							-					9.5
							-					
										\perp	<u> </u>	
emarks									Water Strikes Ch	isellir	ng Deta	ails
and dug inspec				o 1.20m.					Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)			Time (hh:
o groundwater	encount	ered										
									Water Added Casing Details From (m) To (m) Diam (mm)			
prehole continu	ied hu di	unam	ic pro	hing					2.00 150			

	24					Project			: Name:		nole No.
HAH .	CAL	JS	E)	VAY TECH		18-123			de Residential Development		NS03
		-G	EO	TECH		Coordi		Client:	nount Ltd.	She	et 1 of 1
Method	Plar	nt U	sed	Тор	Base	31075	4.08 E		s Representative:	Scale	: 1:50
Light Percussion	-			0.00	2.80	23202	1.47 N		· Mahony Consulting Engineers		
						Groun	d Level:	Dates:		Drille	
2 11			Water				1 mOD	15/11/	2018 - 15/11/2018		er: SR
Depth (m)	Sample / Tests	Casing Depth (m)	Depth (m)	Field Re	cords	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	ackfill
0.15 - 0.35	B1					39.96	(0.15) 0.15 (0.20) 0.35		MADE GROUND: BITMAC MADE GROUND: Grey angular to subangular fine to coarse GRAVEL		
0.35 - 1.70 0.50	B3 ES2					39.76	0.35		Stiff brown sandy gravelly CLAY with low cobble content. Sand is fine.		0.5
0.50	232						-		Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded		
1.00	ES5						- (1.25)				1.0 -
1.00	235						_ (1.35) -				
								م مربقہ میں مربقہ م			1.5
1.70 - 2.80	B4					38.41	1.70		Stiff dark grey slightly sandy gravelly CLAY with low cobble content. Sand is		
2.00	ES6						-		fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles		2.0 -
							[(1.10)		are subangular to subrounded		2.0
							- (1.10)				2.5
							-				2.3
2.80	ES7		Dry	15-11-2018		37.31	- 2.80 -		End of Borehole at 2.80m	[3.0 -
							-				
							-				3.5
							-				
							-				4.0 -
							-				
							-				4.5
							-				5.0 -
							-				5.5
							-				
							-				6.0 -
							-				
							-				6.5
							-				
							-				7.0 -
							-				
							-				7.5
							-				
							-				8.0 -
							-				
											8.5
							-				
							-				9.0 -
							ŀ				
							-				9.5
							ŀ				
							<u> </u>				
emarks	hier - ''		and a	1.20					Water Strikes Chis Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)	elling D To (m)	
land dug inspect Io groundwater				o 1.20m.							
									Water Added Casing Details		
									From (m) To (m) To (m) Diam (mm)		
erminated at scl	heduled	dept	h.								

						Project		-	t Name:		ehole N	
KK .	CAL	JS	E	WAY TECH		18-123			de Residential Development		WS04	
		-0	EC	TECH		Coordi		Client: Silverm	nount Ltd.	Sh	eet 1 of	f 1
Method	Plai	nt U	sed	Тор	Base	31083			s Representative:	Scal	e: 1:5	50
Light Percussion	Danc	do Te	rrier	0.00	3.00	23202			Mahony Consulting Engineers	Drill	er: JC	
							d Level: 3 mOD	Dates:	2018 - 16/11/2018		ger: SR	
	Sample /	Casing Depth	Depth	Field Re	cords	Level	Depth (m)	Lagand		5	Backfill	
(m) 0.15 - 0.40	Tests B1	(m)	(m)			(mOD) 39.58	(Thickness)	gene	MADE GROUND: BITMAC	× .		
1.13 - 0.40	DI					39.33	(0.25)		MADE GROUND: Grey angular to subangular fine to coarse GRAVEL			
).50).60 - 2.50	ES2 B3					39.13	- 0.40 - (0.20) - 0.60		MADE GROUND: Firm brown sandy gravelly CLAY with low cobble content. Sand is fine. Gravel is subangular to subrounded fine to coarse. Cobbles			0.5
							-		are subangular to subrounded Brown sandy subangular to subrounded fine to coarse GRAVEL. Sand is			
00	ES4			Water Strik	e at		-		fine to coarse.	Ł		1.0
				1.20m			-					1.5
							(1.90)					1
00	ES5						-					2.0
							-					
						37.23	- 2.50		Soft locally firm grey sandy gravelly CLAY. Sand is fine. Gravel is			2.5
							(0.50)		subangular to subrounded fine to coarse			
.00	ES6		1.00	16-11-2018		36.73	- 3.00	······································	End of Borehole at 3.00m			3.0
							-					
							-					3.
							-					4.0
							-					4.0
							-					4.5
							-					
							-					5.0
							-					
							-					5.5
							-					
							-					6.0
							-					
							-					6.
							-					7.0
							-					
							-					7.
							-					
							-					8.(
							-					
							-					8.
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							-					9.
							-					9.
							-					
							-			\square		
emarks		<u> </u>	<u> </u>			1		<u> </u>			Details	
and dug inspect o groundwater				to 1.20m.					Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) 1.20 20 1.10	To (m)) Time (h	nh:
ot enough sam				or D sample	s below (0.60m.			Water Added Casing Details			
									From (m) To (m) To (m) Diam (mm)			
rminated at scl	heduled	dept	h.									_



APPENDIX C CORE PHOTOGRAPHS

Concorde Residential Development Report No.: 18-1234 CAUSEWAY Project: Concorde Dublin Project No.: 18-1234 BH No.: BHI Box: Depth: 8.5 - 10.0m 1 (m) 0.1 0.3 0.5 0.6 0.7 0.4 X 5

BH01 Box 1 8.5 - 10.0m



BH03 Box 1 8.5 - 10.0m





APPENDIX D INFILTRATION TEST RESULTS



Soakaway Infiltration Test



Site: Concorde, Naas Road Test Location: WS01 **Test Date:** 15 November 2018 Borehole diameter 0.125 m Cross sectional Area 0.01 m^2 2.00 mbgl Soakage Top depth Soakage Bottom depth 3.00 mbgl Soakage Length 1.00 m Saoakge medium **Boulder Clay**

18-1234

Project No.:

Analysis using method as described in BRE Digest 365 and CIRIA Report C697-The SUDS Manual

depth to groundwater before adding water (m) = Dry

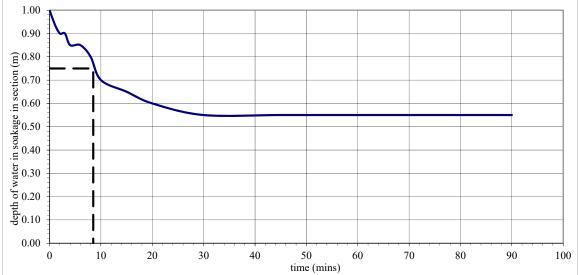
		depth of	1
	depth to	water in	
	water surface	soakage	
time (mins)	(m)	section (m)	
0	2.00	1.00	From
1	2.06	0.94	
2	2.10	0.90	
3	2.10	0.90	
4	2.15	0.85	
6	2.15	0.85	
8	2.20	0.80	
10	2.30	0.70	
15	2.35	0.65	
20	2.40	0.60	
30	2.45	0.55	
45	2.45	0.55	
60	2.45	0.55	
75	2.45	0.55	
90	2.45	0.55	
	depth to	depth of	time
time	water	water in pit	elapsed
(mins)	(m)	(m)	(mins)
8.5	0.25	0.75	

graph below: test start - 75% depth at 0.75 m water depth time is 8.5 minutes

test end - 25% depth at 0.25 m water depth time is not determined

infiltration rate (q) is very low

	depth to	depth of	time	volume of	Area of walls and		
time	water	water in pit	elapsed	water lost	base at 50% drop	q	q
(mins)	(m)	(m)	(mins)	(m ³)	(m ²)	(m/min)	(m/h)
8.5	0.25	0.75					



Soakaway Infiltration Test



90

80

100

q

(m/h)

Site: Concorde, Naas Road Test Location: WS02 **Test Date:** 15 November 2018 Borehole diameter 0.125 m Cross sectional Area 0.01 m^2 2.00 mbgl Soakage Top depth Soakage Bottom depth 3.00 mbgl Soakage Length 1.00 m Saoakge medium **Boulder Clay**

18-1234

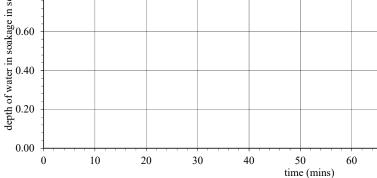
Project No.:

Analysis using method as described in BRE Digest 365 and CIRIA Report C697-The SUDS Manual

depth to groundwater before adding water (m) = Dry

70

depth to water surface (m)	depth of water in soakage						
water surface (m)	U						
(m)	U						
. ,	section (m)						
2.00	1.00	From	graph bel	ow:			
2.00	1.00			t - 75% d	lepth at		
2.00	1.00			0.75	m water de	epth	
2.00	1.00			time is	not detern	nined	
2.00	1.00						
2.00	1.00		test end	- 25% de	epth at		
2.00	1.00			0.25	m water de		
2.00	1.00			time is	not detern	nined	
2.00	1.00						
2.00	1.00						
2.00	1.00		infiltr	ation ra	ıte (q) is v	ery low	
2.00	1.00						
2.00	1.00						
2.00	1.00						
2.00	1.00						
depth to	-						
water	water in pit	elapsed			base at 50	% drop	q
(m)	(m)	(mins)	(n	1 ³)	(m ²	²)	(m/m
	2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00	2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 2.00 1.00 depth to depth of water water in pit	2.00 1.00 2.00 1.00	2.00 1.00 2.00 1.00	2.00 1.00 time is 2.00 1.00 test end - 25% de 2.00 1.00 0.25 2.00 1.00 time is 2.00 1.00 0.25 2.00 1.00 time is 2.00 time is	2.00 1.00 time is not determ 2.00 1.00 test end - 25% depth at 0.25 m water determ 2.00 1.00 0.25 m water determ 0.25 m water determ 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 2.00 1.00 1.00 1.00 </td <td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td>	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$





APPENDIX E GEOTECHNICAL LABORATORY TEST RESULTS







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10122

SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

Project Name:	Concorde Residential Development
Project No.:	18-1234
Client:	Barrett Mahony Consulting Engineers
Date:	11/12/18

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s).

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Approved Signatory

topan Wotin

Stephen Watson Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd

Causeway Geotech Ltd 8 Drumahiskey Road, Ballymoney Co. Antrim, N. Ireland, BT53 7QL

Registered in Northern Ireland. Company Number: NI610766















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10122

Project Name: Concorde Residential Development

Report Reference: Soil Schedule 1

The table below details the tests carried out, the specifications used, and the number of tests included in this report.

Tests marked with* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	10
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	7
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	7
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	7

SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – Subcontracted to Pro Soils Limited (UKAS 2183)	pH Value of Soil		3
SOIL – Subcontracted to Chemtest Ltd <i>(UKAS 2183)</i>	Sulphate Content water extract		3

Causeway Geotech Ltd 8 Drumahiskey Road, Ballymoney Co. Antrim, N. Ireland, BT53 7QL











CA	USE GE	WAY OTECH			Summar	y of C	f Classification Test Results								
Project No.			Project	Name											
18-1	234		nple			Concord				•					
Hole No.	Ref	Тор	Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification	
BH01	1	0.40		в	Brown slightly sandy gravelly silty CLAY with some cobbles.			8.2	62	29 -1pt	16	13		CL	
BH01	3	1.40		в	Dark grey slightly sandy gravelly silty CLAY.			9.8							
BH01	7	2.00		в	Dark grey sandy gravelly silty CLAY.			15.0	57	29 -1pt	15	14		CL	
BH02	1	0.50		в	Brown sandy gravelly silty CLAY.			14.0	60	29 -1pt	17	12		CL	
BH02	3	1.00		В	Brown sandy gravelly silty CLAY.			14.0	68	31 -1pt	17	14		CL	
BH03A	7	0.10		в	Brown sandy gravelly silty CLAY.			15.0	49	37 -1pt	22	15		CI	
вноза	8	0.10		D	Brown sandy gravelly silty CLAY.			19.0							
вноза	11	1.50		в	Grey slightly sandy gravelly clayey SILT.			18.0	56	43 -1pt	28	15		MI	
вноза	14	2.00		D	Grey slightly sandy gravelly clayey SILT.			28.0							
вноза	15	3.00		в	Grey slightly sandy gravelly SILT/CLAY.			15.0	54	46 -1pt	27	19		MI/CI	
All tests perfe	ormed	in acco	rdance v	vith BS	61377:1990 unless specifie	d otherw	ise						LAB	01R Version 4	
Key Density Linear m wd - wat wi - imm	neasurer er displa		s :	cas - C		e density nall pyknom s jar	neter	Date F 12/1	Printed 1/2018		Appr		By Watson		

- KX	CALISEWAY		ARTICLE SIZE	יפיפדטוס			Job Ref			18-1234
-07	GEOTECH	P	ARTICLE SIZE	DISTRIBU			Borehole	/Pit No.		BH01
Site	Name	Concorde Resid	ential Developmer	nt			Sample N	lo.		1
Soil	Description	Brown slightly san	dy gravelly silty CLA	Y with some c	obbles.		Depth, m			0.40
Spec	cimen Reference	6	Specimen Depth		0.4	m	Sample T	уре		В
Test	t Method	BS1377:Part 2:199	90, clauses 9.2 and 9	.5			KeyLAB II	D	Ca	aus2018111912
	CLAY	SILT		SAND	-		GRAVEL		COBBLES	BOULDERS
1		ine Medium	Coarse Fine	Medium	Coarse	Fine	Medium	Coarse	CODDEED	BOOLDERG
I									$I \square$	
	90									
	80									
%	70									
ing	60									
oass	50									
age	50									
Percentage Passing	40									
Perc	30									
	30									
	20			_						
	10									
	0.001	0.01	0.1		1		illi i			
			0.1	Par	ticle Size	mm	10		100	1000
[Si	eving		Par	•			nnle g	100	
ŀ	Si Particle Size mm				ticle Size		10 Mass of san	nple, g	100	1000
-			Sedime	entation	ticle Size	Dry N Sample Prop	Mass of san	nple, g	100	
	Particle Size mm 125 90	% Passing 100 100	Sedime Particle Size mm 0.0609 0.0460	ntation % Passin 27 25	ticle Size	Dry N Sample Prop Cobbles	Mass of san	nple, g		11633 % dry mass 15
	Particle Size mm	% Passing 100	Sedime Particle Size mm 0.0609 0.0460 0.0330	entation % Passin 27	ticle Size	Dry N Sample Prop Cobbles Gravel	Mass of san	nple, g		11633 % dry mass
	Particle Size mm 125 90 75	 % Passing 100 100 100 	Sedime Particle Size mm 0.0609 0.0460	entation % Passin 27 25 24	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt	Mass of san	nple, g		11633 % dry mass 15 39
	Particle Size mm 125 90 75 63 50 37.5	 % Passing 100 100 100 85 78 74 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091	entation % Passin 27 25 24 21 19 16	ticle Size	Dry N Sample Prop Cobbles Gravel Sand	Mass of san	nple, g		11633 % dry mass 15 39 19
•	Particle Size mm 125 90 75 63 50 37.5 28	 % Passing 100 100 100 85 78 74 73 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047	entation % Passin 27 25 24 21 19 16 12	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay	Mass of san	nple, g		11633 % dry mass 15 39 19 21
- - - - - - - - - - - - - - - - - 	Particle Size mm 125 90 75 63 50 37.5	 % Passing 100 100 100 85 78 74 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091	entation % Passin 27 25 24 21 19 16	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt	Mass of san	nple, g		11633 % dry mass 15 39 19 21
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10	 % Passing 100 100 100 85 78 74 73 69 62 59 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028	entation % Passin 27 25 24 21 19 16 12 9	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60	Mass of san	mm		11633 % dry mass 15 39 19 21 6 11.3
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3	 % Passing 100 100 100 100 85 78 74 73 69 62 59 54 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028	entation % Passin 27 25 24 21 19 16 12 9	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30	Mass of san	mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10	 % Passing 100 100 100 85 78 74 73 69 62 59 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028	entation % Passin 27 25 24 21 19 16 12 9	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60	Mass of san	mm		11633 % dry mass 15 39 19 21 6 11.3
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2	 % Passing 100 100 100 85 78 74 73 69 62 59 54 52 49 46 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028	entation % Passin 27 25 24 21 19 16 12 9	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Mass of san	mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104 0.00363
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18	 % Passing 100 100 100 100 85 78 74 73 69 62 59 54 52 49 46 44 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028 0.0015	entation % Passin 27 25 24 21 19 16 12 9 4	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co	Mass of san	mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104 0.00363 3100
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2	 % Passing 100 100 100 85 78 74 73 69 62 59 54 52 49 46 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028 0.0015	entation % Passin 27 25 24 21 19 16 12 9 4 4	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C	Mass of san	mm mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104 0.00363 3100 0.26
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	 % Passing 100 100 100 85 78 74 73 69 62 59 54 52 49 46 44 41 39 37 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028 0.0015	entation % Passin 27 25 24 21 19 16 12 9 4	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104 0.00363 3100 0.26
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	 % Passing 100 100 100 85 78 74 73 69 62 59 54 52 49 46 44 41 39 37 35 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028 0.0015	entation % Passin 27 25 24 21 19 16 12 9 4 4	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104 0.00363 3100 0.26
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212 0.15	 % Passing 100 100 100 85 78 74 73 69 62 59 54 52 49 46 44 41 39 37 35 33 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028 0.0015	entation % Passin 27 25 24 21 19 16 12 9 4 4	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104 0.00363 3100 0.26
	Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	 % Passing 100 100 100 85 78 74 73 69 62 59 54 52 49 46 44 41 39 37 35 	Sedime Particle Size mm 0.0609 0.0460 0.0330 0.0239 0.0172 0.0091 0.0047 0.0028 0.0015	entation % Passin 27 25 24 21 19 16 12 9 4 4	ticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		11633 % dry mass 15 39 19 21 6 11.3 0.104 0.00363 3100 0.26

		ARTICLE SIZE	ידייסופדטוס	ואר	Job Ref	18-1234	
GEOTECH	P	ARTICLE SIZE	DISTRIBUTI	Л	Borehole/Pit No.	BH01	
Site Name	Concorde Resid	ential Developmer	nt		Sample No.	7	
Soil Description	Dark grey sandy g	ravelly silty CLAY.			Depth, m	2.00	
Specimen Reference	6	Specimen 2 m Depth			Sample Type	В	
Test Method	BS1377:Part 2:199	90, clauses 9.2 and 9	.5		KeyLAB ID	Caus2018111914	
CLAY	SILT ne Medium	Coarse Fine	SAND Medium C	Coarse Fine	GRAVEL Medium Coarse	COBBLES BOULDERS	
100							
90							
2 70							
60 50 40							
20							
10							
Sig	ving	II Sodime	Particle s	7			
510	1115	Scanne		Dry I	Mass of sample, g	560	
Particle Size mm	% Passing	Particle Size mm	% Passing				
Particle Size mm	% Passing 100	Particle Size mm 0.0628	% Passing 41	Sample Pro	portions	% dry mass	
125 90	100 100	0.0628 0.0474	41 38	Cobbles	oortions	0	
125 90 75	100 100 100	0.0628 0.0474 0.0340	41 38 35	Cobbles Gravel	portions	0 34	
125 90	100 100	0.0628 0.0474	41 38	Cobbles	portions	0	
125 90 75 63	100 100 100 100	0.0628 0.0474 0.0340 0.0244	41 38 35 33	Cobbles Gravel Sand	portions	0 34 25	
125 90 75 63 50 37.5 28	100 100 100 100 100 100 100	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047	41 38 35 33 30 25 20	Cobbles Gravel Sand Silt Clay		0 34 25 29	
125 90 75 63 50 37.5 28 20	100 100 100 100 100 100 100 100	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028	41 38 35 33 30 25 20 15	Cobbles Gravel Sand Silt Clay Grading Ana	llysis	0 34 25 29 11	
125 90 75 63 50 37.5 28 20 14	100 100 100 100 100 100 100 100 94	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047	41 38 35 33 30 25 20	Cobbles Gravel Sand Silt Clay Grading An D100	Ilysis mm	0 34 25 29 11	
125 90 75 63 50 37.5 28 20 14 10	100 100 100 100 100 100 100 100 94 87	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028	41 38 35 33 30 25 20 15	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60	ilysis mm mm	0 34 25 29 11	
125 90 75 63 50 37.5 28 20 14	100 100 100 100 100 100 100 100 94	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028	41 38 35 33 30 25 20 15	Cobbles Gravel Sand Silt Clay Grading An D100	Ilysis mm	0 34 25 29 11 11	
125 90 75 63 50 37.5 28 20 14 10 6.3	100 100 100 100 100 100 100 100 94 87 82	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028	41 38 35 33 30 25 20 15	Cobbles Gravel Sand Silt Clay Grading And D100 D60 D30	alysis mm mm mm mm	0 34 25 29 11 11	
125 90 75 63 50 37.5 28 20 14 10 6.3 5	100 100 100 100 100 100 100 100 94 87 82 82 79	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028	41 38 35 33 30 25 20 15	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10	alysis mm mm mm Coefficient	0 34 25 29 11 11 	
$ \begin{array}{r} 125 \\ 90 \\ 75 \\ 63 \\ 50 \\ 37.5 \\ 28 \\ 20 \\ 14 \\ 10 \\ 6.3 \\ 5 \\ 3.35 \\ 2 \\ 1.18 \\ \end{array} $	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 94 87 82 79 74 66 61	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028 0.0015	41 38 35 33 30 25 20 15 8	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C	alysis mm mm mm Coefficient	0 34 25 29 11 11 0.0171 0.00179 560	
$ \begin{array}{r} 125 \\ 90 \\ 75 \\ 63 \\ 50 \\ 37.5 \\ 28 \\ 20 \\ 14 \\ 10 \\ 6.3 \\ 5 \\ 3.35 \\ 2 \\ 1.18 \\ 0.6 \\ \end{array} $	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 94 87 82 79 74 66 61 56	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028 0.0015	41 38 35 33 30 25 20 15 8 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C Remarks	alysis mm mm coefficient coefficient	0 34 25 29 11 1 0.0171 0.00179 560 0.16	
$ \begin{array}{r} 125 \\ 90 \\ 75 \\ 63 \\ 50 \\ 37.5 \\ 28 \\ 20 \\ 14 \\ 10 \\ 6.3 \\ 5 \\ 3.35 \\ 2 \\ 1.18 \\ 0.6 \\ 0.425 \\ \end{array} $	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 94 87 82 79 74 66 61 56 54	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028 0.0015	41 38 35 33 30 25 20 15 8	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C Remarks	alysis mm mm mm Coefficient	0 34 25 29 11 1 0.0171 0.00179 560 0.16	
$ \begin{array}{r} 125 \\ 90 \\ 75 \\ 63 \\ 50 \\ 37.5 \\ 28 \\ 20 \\ 14 \\ 10 \\ 6.3 \\ 5 \\ 3.35 \\ 2 \\ 1.18 \\ 0.6 \\ 0.425 \\ 0.3 \\ \end{array} $	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 94 87 82 79 74 66 61 56 54 51	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028 0.0015	41 38 35 33 30 25 20 15 8 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C Remarks	alysis mm mm coefficient coefficient	0 34 25 29 11 1 0.0171 0.00179 560 0.16	
125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 94 87 82 79 74 66 61 56 54 51 48	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028 0.0015	41 38 35 33 30 25 20 15 8 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C Remarks	alysis mm mm coefficient coefficient	0 34 25 29 11 1 0.0171 0.00179 560 0.16	
125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212 0.15	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 94 87 82 79 74 66 61 56 54 51 48 46	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028 0.0015	41 38 35 33 30 25 20 15 8 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C Remarks	alysis mm mm coefficient coefficient	0 34 25 29 11 1 0.0171 0.00179 560 0.16	
125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 94 87 82 79 74 66 61 56 54 51 48	0.0628 0.0474 0.0340 0.0244 0.0175 0.0093 0.0047 0.0028 0.0015	41 38 35 33 30 25 20 15 8 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C Remarks	alysis mm mm coefficient coefficient	0 34 25 29 11 1 0.0171 0.00179 560 0.16	

- 828 -	CAUSEWAY		ARTICLE SIZE I	ידייפוסדטוס			Job Ref	18-1234	
	GEOTECH	P.	ARTICLE SIZE I	DISTRIBUTI	ION		Borehole/Pit No.	BH02	
Site Na	lame	Concorde Reside	ential Development	t			Sample No.	1	
Soil De	escription	Brown sandy grave	elly silty CLAY.				Depth, m	0.50	
Specin	men Reference	6	Specimen Depth		0.5	m	Sample Type	В	
Test N	vlethod	BS1377:Part 2:199	0, clauses 9.2 and 9.5	uses 9.2 and 9.5			KeyLAB ID	Caus2018111915	
	CLAY	SILT ne Medium	Coarse Fine	SAND Medium	Coarse	Fine	GRAVEL Medium Coarse	COBBLES BOULDERS	
100	0								
90	0								
80	0								
70 %	0								
buisse Lassing 50 40	0								
ອ ອີ ອີ	0								
eura 20	0								
ב מ ס	0								
20	0								
10	0								
C	0								
_		_	11	Particle	e Size m	ım			
		ving	Sedimer	ntation					
	Darticla Siza mm	% Dessing				Dry N	Aass of sample, g	605	
Р	Particle Size mm	% Passing	Particle Size mm	% Passing					
P	125 90	100 100	Particle Size mm 0.0614 0.0460	% Passing 45 44		Sample Prop Cobbles		% dry mass 0	
P	125	100	Particle Size mm 0.0614	% Passing 45		Sample Prop		% dry mass	
P	125 90 75 63 50	100 100 100 100 100	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170	% Passing 45 44 41 39 36		Gample Prop Cobbles Gravel Gand Gilt		% dry mass 0 32 22 32	
P	125 90 75 63 50 37.5	100 100 100 100 100 100	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090	% Passing 45 44 41 39 36 31		Gample Prop Cobbles Gravel Gand		% dry mass 0 32 22	
P	125 90 75 63 50	100 100 100 100 100	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170	% Passing 45 44 41 39 36		Gample Prop Cobbles Gravel Gand Gilt	portions	% dry mass 0 32 22 32	
P	125 90 75 63 50 37.5 28 20 14	100 100 100 100 100 100 100 96 90	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047	% Passing 45 44 41 39 36 31 23		Gample Prop Cobbles Gravel Gand Clay Grading Ana D100	portions Ilysis mm	% dry mass 0 32 22 32 13	
	125 90 75 63 50 37.5 28 20 14 10	100 100 100 100 100 100 100 96 90 85	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028	% Passing 45 44 41 39 36 31 23 18		Sample Prop Cobbles Gravel Sand Clay Clay Grading Ana D100 D60	Diportions	% dry mass 0 32 22 32 13 0.695	
	125 90 75 63 50 37.5 28 20 14	100 100 100 100 100 100 100 96 90	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028	% Passing 45 44 41 39 36 31 23 18		Gample Prop Cobbles Gravel Gand Clay Grading Ana D100	portions Ilysis mm	% dry mass 0 32 22 32 13 0.695	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35	100 100 100 100 100 100 100 96 90 85 80 77 74	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028	% Passing 45 44 41 39 36 31 23 18		Sample Prop Cobbles Gravel Sand Clay Grading Ana D100 D60 D30 D10 Jniformity C	oortions Ilysis mm mm coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154 450	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2	100 100 100 100 100 100 100 96 90 85 80 77 74 68	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028	% Passing 45 44 41 39 36 31 23 18		Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10	oortions Ilysis mm mm coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35	100 100 100 100 100 100 100 96 90 85 80 77 74	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028 0.0015	% Passing 45 44 41 39 36 31 23 18 10		Sample Prop Cobbles Gravel Sand Clay Grading Ana D100 D60 D30 D10 Jniformity C	oortions Ilysis mm mm coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154 450	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18	100 100 100 100 100 100 100 96 90 85 80 77 74 68 64	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028 0.0015	% Passing 45 44 41 39 36 31 23 18		Sample Prop Cobbles Gravel Gand Clay Grading Ana D100 D60 D30 D10 D10 D10 D10 D10 D10 D10 Curvature Co Remarks	oortions Ilysis mm mm coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154 450 0.066	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3	100 100 100 100 100 100 100 100 100 100 100 100 100 96 90 85 80 77 74 68 64 59 57 54	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028 0.0015	% Passing 45 44 41 39 36 31 23 18 10 10 (assumed)		Sample Prop Cobbles Gravel Gand Clay Grading Ana D100 D60 D30 D10 D10 D10 D10 D10 D10 D10 Curvature Co Remarks	oortions Ilysis mm mm coefficient coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154 450 0.066	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	100 100 100 100 100 100 100 100 100 100 100 100 96 90 85 80 77 74 68 64 59 57 54 51	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028 0.0015	% Passing 45 44 41 39 36 31 23 18 10 10 (assumed)		Sample Prop Cobbles Gravel Gand Clay Grading Ana D100 D60 D30 D10 D10 D10 D10 D10 D10 D10 Curvature Co Remarks	oortions Ilysis mm mm coefficient coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154 450 0.066	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3	100 100 100 100 100 100 100 100 100 100 100 100 100 96 90 85 80 77 74 68 64 59 57 54	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028 0.0015	% Passing 45 44 41 39 36 31 23 18 10 10 (assumed)		Sample Prop Cobbles Gravel Gand Clay Grading Ana D100 D60 D30 D10 D10 D10 D10 D10 D10 D10 Curvature Co Remarks	oortions Ilysis mm mm coefficient coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154 450 0.066	
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212 0.15	100 100 100 100 100 100 100 100 100 100 100 100 96 90 85 80 77 74 68 64 59 57 54 51 49	Particle Size mm 0.0614 0.0460 0.0330 0.0237 0.0170 0.0090 0.0047 0.0028 0.0015	% Passing 45 44 41 39 36 31 23 18 10 10 (assumed)		Sample Prop Cobbles Gravel Gand Clay Grading Ana D100 D60 D30 D10 D10 D10 D10 D10 D10 D10 Curvature Co Remarks	oortions Ilysis mm mm coefficient coefficient	% dry mass 0 32 22 32 13 0.695 0.00843 0.00154 450 0.066	

CAUSEWAY	n	ARTICLE SIZE	רי ופוסדצוח			Job Ref			18-1234
GEOTECH		ANTICLE SIZE				Borehole	/Pit No.		BH02
Site Name	Concorde Resid	ential Developmer	nt			Sample N	lo.		3
Soil Description	Brown sandy grav	elly silty CLAY.				Depth, m	1		1.00
Specimen Reference	6	Specimen Depth		1	m	Sample T	уре		В
Test Method	BS1377:Part 2:19	90, clauses 9.2 and 9	.5			KeyLAB I	D	Caus2018111916	
CLAY	SILT		SAND			GRAVEL		COBBLES	BOULDERS
100 Fir	ne Medium	Coarse Fine	Medium	Coarse	Fine	Medium	Coarse		
							/		
90						/			
80			_						
70									
2 70									
60									
50									
40									
40									
30									
20									
10									
	0.01	0.1		1		10	•	100	10
0.001	0.01	0.1	Partic	1 le Size i	mm	10		100	10
			Partic	-			· · · · · ·	100	
Sie	eving	Sedime	entation	-		10 Nass of san	nple, g	100	941
Sie Particle Size mm	ving % Passing	Sedime Particle Size mm	ntation % Passing	le Size	Dry N	Aass of san	nple, g	100	941
Sie Particle Size mm 125	wing % Passing 100	Sedime Particle Size mm 0.0619	ntation % Passing 46		Dry N Sample Prop	Aass of san	nple, g	100	941 % dry mass
Sie Particle Size mm 125 90	wing % Passing 100 100	Particle Size mm 0.0619 0.0467	ntation % Passing 46 43		Dry N Sample Prop Cobbles	Aass of san	nple, g		941 % dry mass 0
Sie Particle Size mm 125	wing % Passing 100	Sedime Particle Size mm 0.0619	ntation % Passing 46		Dry N Sample Prop	Aass of san	nple, g		941 % dry mass
Particle Size mm 125 90 75	% Passing 100 100 100	Sedime Particle Size mm 0.0619 0.0467 0.0335	ntation % Passing 46 43 41		Dry N Sample Prop Cobbles Gravel	Aass of san	nple, g		941 % dry mass 0 27
Sie Particle Size mm 125 90 75 63 50 37.5	wing % Passing 100 100 100 100 100 100	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092	entation % Passing 46 43 41 38 35 28		Dry N Sample Prop Cobbles Gravel Sand	Aass of san	nple, g		941 % dry mass 0 27 27 27
Sie Particle Size mm 125 90 75 63 50 37.5 28	% Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047	ntation % Passing 46 43 41 38 35 28 28 23		Dry N Sample Prop Cobbles Gravel Sand Silt Clay	Aass of san	nple, g		941 % dry mass 0 27 27 27 33
Sie Particle Size mm 125 90 75 63 50 37.5 28 20	% Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028	entation % Passing 46 43 41 38 35 28 23 23 17		Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana	Aass of san			941 % dry mass 0 27 27 33
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14	% Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 95 95	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047	ntation % Passing 46 43 41 38 35 28 28 23		Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100	Aass of san	mm		941 % dry mass 0 27 27 33 13
Sie Particle Size mm 125 90 75 63 50 37.5 28 20	% Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028	entation % Passing 46 43 41 38 35 28 23 23 17		Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana	Aass of san			941 % dry mass 0 27 27 27 33
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10	ving % Passing 100 100 100 100 100 100 100 95 95 90	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028	entation % Passing 46 43 41 38 35 28 23 23 17		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60	Aass of san	mm		941 % dry mass 0 27 27 33 13 13 0.394
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95 95 90 86	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028	entation % Passing 46 43 41 38 35 28 23 23 17		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30	Aass of san	mm mm		941 % dry mass 0 27 27 33 13 13 0.394
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95 95 90 86 83 79 73	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028	entation % Passing 46 43 41 38 35 28 23 23 17		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Aass of san	mm mm		941 % dry mass 0 27 27 33 13 13 0.394
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95 90 86 83 79 73 68	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028 0.0015	entation % Passing 46 43 41 38 35 28 23 17 10 10		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co	Aass of san	mm mm		941 % dry mass 0 27 27 33 13 13 0.394
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95 95 90 86 83 79 73 68 63	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028 0.0015	entation % Passing 46 43 41 38 35 28 23 17 10 		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Aass of san	mm mm mm		941 % dry mass 0 27 27 33 13 0.394 0.0108
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95 95 90 86 83 79 73 68 63 61	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028 0.0015	entation % Passing 46 43 41 38 35 28 23 17 10 10		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Aass of san	mm mm		941 % dry mass 0 27 27 33 13 0.394 0.0108
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95 95 90 86 83 79 73 68 63 61 58	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028 0.0015	entation % Passing 46 43 41 38 35 28 23 17 10 		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Aass of san	mm mm mm		941 % dry mass 0 27 27 33 13 0.394 0.0108
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 95 95 90 86 83 79 73 68 63 61	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028 0.0015	entation % Passing 46 43 41 38 35 28 23 17 10 		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Aass of san	mm mm mm		941 % dry mass 0 27 27 33 13 0.394 0.0108
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	wing % Passing 100 95 90 86 83 79 73 68 63 61 58 55	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0028 0.0015	entation % Passing 46 43 41 38 35 28 23 17 10 		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Aass of san	mm mm mm		941 % dry mass 0 27 27 33 13 0.394 0.0108
Sie Particle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212 0.15	wing % Passing 100 <td>Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0015 Particle density 2.65</td> <td>entation % Passing 46 43 41 38 35 28 23 17 10 </td> <td></td> <td>Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks</td> <td>Aass of san</td> <td>mm mm mm</td> <td></td> <td>941 % dry mass 0 27 27 33 13 0.394 0.0108</td>	Sedime Particle Size mm 0.0619 0.0467 0.0335 0.0240 0.0172 0.0092 0.0047 0.0015 Particle density 2.65	entation % Passing 46 43 41 38 35 28 23 17 10 		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Aass of san	mm mm mm		941 % dry mass 0 27 27 33 13 0.394 0.0108

CA CA	USEWAY		ARTICLE SIZE	יפופדטוח			Job Ref	18-1234
	GEOTECH		ANTICLE SIZE	DISTRIBU			Borehole/Pit No.	вноза
Site Nam	ne	Concorde Reside	ential Developmer	nt			Sample No.	7
Soil Desc	cription	Brown sandy grav	elly silty CLAY.				Depth, m	0.10
Specime	en Reference	6	Specimen Depth		0.1	m	Sample Type	В
Test Met	thod	BS1377:Part 2:199	90, clauses 9.2 and 9	.5			KeyLAB ID	Caus2018111917
_	CLAY Fin	SILT e Medium	Coarse Fine	SAND Medium	Coarse	Fine	GRAVEL Medium Coarse	COBBLES BOULDERS
100 -								
90 -							/ /	
80 -							/	
70 - ج								
60 - 50 - 40 -								
∟ 50 - ຼີ								
40 -								
- 30 -								
20 -								
40								
10 -								
0 -								
	001	0.01	0.1	Part	1 icle Size	mm	10	100 100
					-			
0.0	Sie	ving	Sedime	entation	icle Size		10 10 Mass of sample, g	100 100 2129
0.0	Sie rticle Size mm	ving % Passing	Sedime Particle Size mm	entation % Passin	g	Dry N	Nass of sample, g	2129
0.0	Sie	ving % Passing 100	Sedime Particle Size mm 0.0630	entation % Passin 29	g	Dry N Sample Proj	Nass of sample, g	
0.0	Sie rticle Size mm 125	ving % Passing	Sedime Particle Size mm	entation % Passin	g	Dry N	Nass of sample, g	2129 % dry mass
0.0	Sie rticle Size mm 125 90 75 63	ving % Passing 100 100 100 100	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250	entation % Passin 29 28 26 22	g	Dry N Sample Proj Cobbles Gravel Sand	Nass of sample, g	2129 % dry mass 0 49 22
0.0	Sie rticle Size mm 125 90 75 63 50	ving % Passing 100 100 100 100 100	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179	entation % Passin, 29 28 26 22 20	g	Dry N Sample Proj Cobbles Gravel Sand Silt	Nass of sample, g	2129 % dry mass 0 49 22 26
0.0	Sie rticle Size mm 125 90 75 63	ving % Passing 100 100 100 100	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250	entation % Passin 29 28 26 22	g	Dry N Sample Proj Cobbles Gravel Sand	Nass of sample, g	2129 % dry mass 0 49 22
0.0	Sie rticle Size mm 125 90 75 63 50 37.5	ving % Passing 100 100 100 100 100 100 100 83	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0049 0.0029	entation % Passin 29 28 26 22 20 16	g	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana	Mass of sample, g	2129 % dry mass 0 49 22 26
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14	ving % Passing 100 100 100 100 100 100 83 75	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0049	entation % Passin 29 28 26 22 20 16 10	g	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100	Mass of sample, g	2129 % dry mass 0 49 22 26 3
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10	ving % Passing 100 100 100 100 100 100 83 75 70	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0049 0.0029	entation % Passin 29 28 26 22 20 16 10 5	g	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60	Mass of sample, g	2129 % dry mass 0 49 22 26 3
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14	ving % Passing 100 100 100 100 100 100 83 75	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0049 0.0029	entation % Passin 29 28 26 22 20 16 10 5	g	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100	Mass of sample, g	2129 % dry mass 0 49 22 26 3
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3	ving % Passing 100 100 100 100 100 100 83 75 70 64	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0049 0.0029	entation % Passin 29 28 26 22 20 16 10 5	g	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30	Mass of sample, g	2129 % dry mass 0 49 22 26 3
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 3.35 2	ving % Passing 100 100 100 100 100 100 100 83 75 70 64 61 61 57 51	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0049 0.0029	entation % Passin 29 28 26 22 20 16 10 5	g	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Mass of sample, g	2129 % dry mass 0 49 22 26 3
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 3.35 2 1.18	ving % Passing 100 100 100 100 100 100 100 100 64 61 61 57 51 47	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0049 0.0029 0.0016	entation % Passin, 29 28 26 22 20 16 10 5 1	g	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature C	Mass of sample, g	2129 % dry mass 0 49 22 26 3
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 3.35 2 1.18 0.6	ving % Passing 100 100 100 100 100 100 100 100 64 61 57 51 51 47 42	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0029 0.0016	entation % Passin, 29 28 26 22 20 16 10 5 1 1 1 	g	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature C Remarks	Mass of sample, g	2129 % dry mass 0 49 22 26 3 4.7 0.0777 0.00516 910 0.25
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 3.35 2 1.18	ving % Passing 100 100 100 100 100 100 100 100 64 61 61 57 51 47	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0029 0.0016	entation % Passin, 29 28 26 22 20 16 10 5 1	g	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature C Remarks	Mass of sample, g	2129 % dry mass 0 49 22 26 3 4.7 0.0777 0.00516 910 0.25
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	ving % Passing 100 100 100 100 100 100 100 100 40 64 61 61 57 51 47 42 42 41 38 36	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0029 0.0016	entation % Passin, 29 28 26 22 20 16 10 5 1 1 1 	g	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature C Remarks	Mass of sample, g	2129 % dry mass 0 49 22 26 3 4.7 0.0777 0.00516 910 0.25
0.0	Sie 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212 0.15	ving % Passing 100 100 100 100 100 100 100 83 75 70 64 61 61 57 51 47 64 61 57 51 47 42 41 38 36 34	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0029 0.0016	entation % Passin, 29 28 26 22 20 16 10 5 1 1 1 	g	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature C Remarks	Mass of sample, g	2129 % dry mass 0 49 22 26 3 4.7 0.0777 0.00516 910 0.25
0.0	Sie rticle Size mm 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212	ving % Passing 100 100 100 100 100 100 100 100 40 64 61 61 57 51 47 42 42 41 38 36	Sedime Particle Size mm 0.0630 0.0481 0.0345 0.0250 0.0179 0.0095 0.0029 0.0016	entation % Passin, 29 28 26 22 20 16 10 5 1 1 1 	g	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature C Remarks	Mass of sample, g	2129 % dry mass 0 49 22 26 3 4.7 0.0777 0.00516 910 0.25

	CAUSEWA	Y	-	יסידסאמ	ב נוסר י	DISTRIBU			Job Ref			18-1234	
	GEOTEC		P	PARTICI	LE SIZE L	JSTRIBU	TION		Borehole/Pit	: No.		BH03A	
Site Na	ame		Concorde Resic	dential De	velopment				Sample No.			11	
Soil De	escription		Grey slightly sand	dy gravelly	clayey SILT.				Depth, m			1.50	
Specin	men Referei	nce	6		Specimen Depth		1.5	m	Sample Type	2		В	
Test N	/lethod		BS1377:Part 2:19	90, clauses	s 9.2 and 9.5	, ,			KeyLAB ID		Ca	us201811191	9
	CLAY	Fine	SILT e Medium	Coarse	Fine	SAND Medium	Coarse	Fine	GRAVEL Medium (Coarse	COBBLES	BOULDERS	6
100	0					Medidin							
90	0										/		
										/			
80	0												
70	o	_											
	0									/			
50	0												
60 50 40	o					_							
· 30													
30													
20	0	_				_							
10	0												
	0	_											
(0 04		0.4								40
	0.001		0.01		0.1	Parti	1 cle Size	mm	10		100		10
	0.001	Siev		1	0.1 Sedimen		-				100	10045	10
Ρ	Particle Size			Particle			cle Size		10 Nass of sample	e, g	100	10045	10
P	Particle Size 125		/ing % Passing 100	0.0	Sedimen Size mm 0630	itation % Passing 16	cle Size	Dry N Sample Proj	Nass of sample	e, g		% dry mass	10
P	Particle Size 125 90		/ing % Passing 100 96	0.0	Sedimen Size mm 0630 0476	tation % Passing 16 15	cle Size	Dry N Sample Proj Cobbles	Nass of sample	e, g		% dry mass 18	10
P	Particle Size 125		/ing % Passing 100	0.0	Sedimen Size mm 0630	itation % Passing 16		Dry N Sample Proj	Nass of sample	e, g		% dry mass	10
P	Particle Size 125 90 75 63 50		ving % Passing 100 96 91 82 77	0.0 0.0 0.0 0.0 0.0	Sediment Size mm 0630 0476 00341 00245 00245	tation % Passing 16 15 14 13 11		Dry N Sample Proj Cobbles Gravel Sand Silt	Nass of sample	e, g		% dry mass 18 50 16 15	10
P	Particle Size 125 90 75 63 50 37.5		ving % Passing 100 96 91 82 77 71	0.0 0.0 0.0 0.0 0.0 0.0	Sediment Size mm 0630 0476 0 0341 0 0245 0 0177 0	tation % Passing 16 15 14 13 11 7		Dry N Sample Proj Cobbles Gravel Sand	Nass of sample	e, g		% dry mass 18 50 16	10
P	Particle Size 125 90 75 63 50		ving % Passing 100 96 91 82 77	0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sediment Size mm 0630 0476 00341 00245 00245	tation % Passing 16 15 14 13 11		Dry N Sample Proj Cobbles Gravel Sand Silt	Mass of sample	e, g		% dry mass 18 50 16 15	10
P	Particle Size 125 90 75 63 50 37.5 28 20 14		ving % Passing 100 96 91 82 77 82 71 64 59 52		Sediment Size mm 0630 0476 0 0341 0 0245 0 0177 0 0096 0 0049 0	tation % Passing 16 15 14 13 11 7 4		Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100	Mass of sample			% dry mass 18 50 16 15 1 1 125	10
P	Particle Size 125 90 75 63 50 37.5 28 20 14 10		Ving % Passing 100 96 91 82 77 71 64 59 52 47		Sediment Size mm 0 0630 0 02476 0 0341 0 02455 0 0177 0 0096 0 0049 0 0029 0	tation % Passing 16 15 14 13 11 7 4 2		Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100 D60	Mass of sample	mm mm		% dry mass 18 50 16 15 1 1 125 21.6	10
P	Particle Size 125 90 75 63 50 37.5 28 20 14		ving % Passing 100 96 91 82 77 82 71 64 59 52		Sediment Size mm 0 0630 0 02476 0 0341 0 02455 0 0177 0 0096 0 0049 0 0029 0	tation % Passing 16 15 14 13 11 7 4 2		Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100	Mass of sample			% dry mass 18 50 16 15 1 1 125	10
P	Particle Size 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35		ving % Passing 100 96 91 82 77 71 64 59 52 47 42 40 37		Sediment Size mm 0 0630 0 02476 0 0341 0 02455 0 0177 0 0096 0 0049 0 0029 0	tation % Passing 16 15 14 13 11 7 4 2		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity 0	Vlass of sample	mm mm mm		% dry mass 18 50 16 15 1 125 21.6 1.4 0.0157 1400	10
P	Particle Size 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2		ving % Passing 100 96 91 82 77 71 64 59 52 47 42 40 37 32		Sediment Size mm 0 0630 0 02476 0 0341 0 02455 0 0177 0 0096 0 0049 0 0029 0	tation % Passing 16 15 14 13 11 7 4 2		Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Vlass of sample	mm mm mm		% dry mass 18 50 16 15 1 125 21.6 1.4 0.0157	10
P	Particle Size 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35		ving % Passing 100 96 91 82 77 71 64 59 52 47 42 40 37		Seediment Size mm 0 0630 0 0476 0 0341 0 0245 0 0096 0 0049 0 0029 0 0015 0 0 0	tation % Passing 16 15 14 13 11 7 4 2		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity 0	Vlass of sample	mm mm mm		% dry mass 18 50 16 15 1 125 21.6 1.4 0.0157 1400	10
	Particle Size 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425		ving % Passing 100 96 91 82 77 71 64 59 52 47 42 40 40 37 32 29 25 23	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sediment Size mm 0 0630 0 0476 0 0341 0 0245 0 0177 0 0096 0 0029 0 0015 0 0015 0 0	tation % Passing 16 15 14 13 11 7 4 2 1		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Vlass of sample	mm mm mm		% dry mass 18 50 16 15 1 125 21.6 1.4 0.0157 1400 5.8	10
	Particle Size 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6		ving % Passing 100 96 91 82 77 71 64 59 52 47 42 40 37 32 29 25	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sediment Size mm 0 0630 0 0476 0 0341 0 0245 0 0177 0 0096 0 0029 0 0015 0 0015 0 0	tation % Passing 16 15 14 13 11 7 4 2 1 1 3 3 3 11 7 4 2 1 3 3 3 3 11 7 4 3 3 3 11 7 4 3 3 11 7 4 3 3 11 7 4 3 3 11 7 7 4 3 3 10 10 10 10 10 10 10 10 10 10 10 10 10		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Vlass of sample	mm mm mm		% dry mass 18 50 16 15 1 125 21.6 1.4 0.0157 1400 5.8	
	Particle Size 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3		ving % Passing 100 96 91 82 77 71 64 59 52 47 42 40 40 37 42 40 37 32 29 25 23 23 22	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sediment Size mm 0 0630 0 0476 0 0341 0 0245 0 0177 0 0096 0 0029 0 0015 0 0015 0 0	tation % Passing 16 15 14 13 11 7 4 2 1 1 3 3 3 11 7 4 2 1 3 3 3 3 11 7 4 3 3 3 11 7 4 3 3 11 7 4 3 3 11 7 4 3 3 11 7 7 4 3 3 10 10 10 10 10 10 10 10 10 10 10 10 10		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Vlass of sample	mm mm mm		% dry mass 18 50 16 15 1 125 21.6 1.4 0.0157 1400 5.8	
	Particle Size 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212		ving % Passing 100 96 91 82 77 71 64 59 52 47 64 59 52 47 42 40 37 32 29 25 23 23 22 20	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sediment Size mm 0 0630 0 0476 0 0341 0 0245 0 0177 0 0096 0 0029 0 0015 0 0015 0 0	tation % Passing 16 15 14 13 11 7 4 2 1 1 3 3 3 11 7 4 2 1 3 3 3 3 11 7 4 3 3 3 11 7 4 3 3 11 7 4 3 3 11 7 4 3 3 11 7 7 4 3 3 10 10 10 10 10 10 10 10 10 10 10 10 10		Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Vlass of sample	mm mm mm		% dry mass 18 50 16 15 1 125 21.6 1.4 0.0157 1400 5.8	10

Stephen.Watson

LAB 05R Version 4

10122

	CAUSEWAY	,		DISTRIBUTIO	N	Job Ref	18-1234	
580	GEOTECH				• 	Borehole/Pit No.	BH03A	
Site N	lame	Concorde Resid	lential Developme	nt		Sample No.	15	
Soil D	Description	Grey slightly sand	ly gravelly SILT/CLAY			Depth, m	3.00	
Speci	men Reference	6	Specimer Depth	3	m	Sample Type	В	
Test N	Method	BS1377:Part 2:19	90, clauses 9.2 and 9	9.5		KeyLAB ID	Caus2018111921	
	CLAY	SILT Fine Medium	Coarse Fine	SAND Medium Coa	irse Fine	GRAVEL Medium Coarse	COBBLES BOULDERS	
10	00							
9	00						1	
8	80					/		
7	/0					/		
° 6∎ 6	80							
	50							
4	ю — — —							
- 3	50							
2	20							
1	0							
F			11 - 11					
H		Sieving		entation	Dry N	lass of sample, g	9981	
Ľ	Particle Size m	Ū.	Particle Size mm	% Passing				
	125 90	100	0.0618	19 19	Sample Prop Cobbles	ortions	% dry mass 12	
⊢	75	88	0.0332	19 17	Gravel		59	
F	63	88	0.0240	16	Sand		10	
┝	50 37.5	71 64	0.0173	14 9	Silt Clay		18	
E	28	58	0.0049	4			· · · · · · · · · · · · · · · · · · ·	
┝	20 14	54 46	0.0029	2	Grading Ana D100			
	14	46	0.0015	<u> </u>	D100 D60	mm mm	30.8	
⊢		37			D30	mm	2.32	
	6.3		11		D10	mm	0.0106	
	5	35			Unitormity			
		35 33 29			Uniformity C Curvature Co		16	
	5 3.35 2 1.18	33 29 27			Curvature Co			
	5 3.35 2	33 29 27 25	Particle density 2.65	(assumed) Mg/m3	Curvature Co Remarks		16	
	5 3.35 2 1.18 0.6 0.425 0.3	33 29 27 25 24 23		(assumed) Mg/m3	Curvature Co Remarks	pefficient	16	
	5 3.35 2 1.18 0.6 0.425 0.3 0.212	33 29 27 25 24 23 22			Curvature Co Remarks	pefficient	16	
	5 3.35 2 1.18 0.6 0.425 0.3	33 29 27 25 24 23			Curvature Co Remarks	pefficient	16	
	5 3.35 2 1.18 0.6 0.425 0.3 0.212 0.15	33 29 27 25 24 23 22 21	2.65		Curvature Co Remarks	pefficient	16	



Chemistry to deliver results Chemistry to deliver results Chemistry Ltd. Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemitest.com

Report No.:	18-37527-1		
Initial Date of Issue:	03-Dec-2018		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Ciaran Doherty Colm Hurley Darren O'Mahony Gabriella Horan John Cameron Lucy Newland Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Sean Ross Sean Toomey Stephen Watson Stuart Abraham		
Project	18-1234 Concorde Residential Development		
Quotation No.:		Date Received:	29-Nov-2018
Order No.:		Date Instructed:	29-Nov-2018
No. of Samples:	3		
Turnaround (Wkdays):	3	Results Due:	03-Dec-2018
Date Approved:	03-Dec-2018		
Approved By:			

Ah.



Chemtest Ltd. Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Chemtest The right chemistry to deliver results Project: 18-1234 Concorde Residential Development

Results - Soil

Client: Causeway Geotech Ltd		Che	mtest J	ob No.:	18-37527	18-37527	18-37527
Quotation No.:	(Chemte	est Sam	ple ID.:	732979	732980	732981
Order No.:		Client Sample Ref.:			8	4	12
		Sample Location:			BH01	BH02	BH03A
			Sampl	е Туре:	SOIL	SOIL	SOIL
			Top De	oth (m):	2	1	1.5
			Date Sa	ampled:	28-Nov-2018	28-Nov-2018	28-Nov-2018
Determinand	Accred.	SOP	Units	LOD			
Moisture	Ν	2030	%	0.020	11	12	24
рН	U	2010		N/A	8.3	8.6	7.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.13	< 0.010	0.45

The right chemistry to deliver results

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



APPENDIX F ENVIRONMENTAL LABORATORY TEST RESULTS





st right chemistry to deliver results Chemtest Ltd. Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	18-35678-1		
Initial Date of Issue:	23-Nov-2018		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan John Cameron Lucy Peaker Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Sean Ross Stephen Franey Stephen Watson Stuart Abraham Lucy Newland		
Project	18-1234 Concorde Dublin		
Quotation No.:	Q18-13245	Date Received:	13-Nov-2018
Order No.:		Date Instructed:	16-Nov-2018
No. of Samples:	3		
Turnaround (Wkdays):	4	Results Due:	21-Nov-2018
Date Approved:	23-Nov-2018		
Approved By:			
M.J.			
Details:	Martin Dyer, Laboratory Manager		

Martin Dyer, Laboratory Manager



The right chemistry to deliver results Chemtest Ltd. Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

The right chemistry to deliver results Project: 18-1234 Concorde Dublin

Results - Soil

Client: Causeway Geotech Ltd			mtest Jo		18-35678	18-35678	18-35678
Quotation No.: Q18-13245	(st Sam		724616	724619	724621
Order No.:			nt Samp		ES1	ES1	ES3
		Sa	ample Lo		BH1	BH2	BH2
			-	e Type:	SOIL	SOIL	SOIL
			Top Dep	()	0.5	0.5	2.0
			Date Sa		07-Nov-2018	08-Nov-2018	08-Nov-2018
				os Lab:	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units				
АСМ Туре	U	2192		N/A	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	12	11
рН	U	2010		N/A	8.8	8.5	8.5
Arsenic	U	2450	mg/kg	1.0	17	17	19
Barium	U	2450	mg/kg	10	69	52	96
Cadmium	U	2450	mg/kg	0.10	1.9	2.4	2.5
Chromium	U	2450	mg/kg	1.0	12	14	14
Molybdenum	U	2450	mg/kg	2.0	4.8	4.3	5.0
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	21	28	33
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	39	51	53
Lead	U	2450	mg/kg	0.50	23	17	23
Selenium	U	2450	mg/kg	0.20	0.70	0.71	1.5
Zinc	U	2450	mg/kg	0.50	65	87	95
Chromium (Trivalent)	N	2490	mg/kg	1.0	12	14	14
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Total Organic Carbon	U	2625	%	0.20	0.74	0.89	0.39
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0

The right chemistry to deliver results Project: 18-1234 Concorde Dublin

Results - Soil

Client: Causeway Geotech Ltd			mtest Jo		18-35678	18-35678	18-35678
Quotation No.: Q18-13245	(est Sam		724616	724619	724621
Order No.:			nt Samp		ES1	ES1	ES3
		Sa	ample Lo		BH1	BH2	BH2
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top Dep	oth (m):	0.5	0.5	2.0
			Date Sa	mpled:	07-Nov-2018	08-Nov-2018	08-Nov-2018
			Asbest	os Lab:	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg		< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg		< 0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg		< 0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg		< 0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	N		mg/kg	0.10	< 0.10	< 0.10	< 0.10



Chemtest Job No:	18-35678				Landfill	Waste Acceptanc	e Criteria
Chemtest Sample ID:	724616					Limits	
Sample Ref:	ES1					Stable, Non-	
Sample ID:						reactive	
Sample Location:	BH1					hazardous	Hazardous
Top Depth(m):	0.5				Inert Waste	waste in non-	Waste
Bottom Depth(m):					Landfill	hazardous	Landfill
Sampling Date:	07-Nov-2018					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	0.74	3	5	6
Loss On Ignition	2610	U	%	2.2			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
рН	2010	U		8.8		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.038		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance	leaching test
			mg/l	mg/kg	using B	S EN 12457 at L/	S 10 I/kg
Arsenic	1450	U	0.0013	< 0.050	0.5	2	25
Barium	1450	U	0.0019	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0013	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0078	0.078	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	2.9	29	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	5.2	52	1000	20000	50000
Total Dissolved Solids	1020	Ν	44	440	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	13	130	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria



Chemtest Job No:	18-35678				Landfill \	Naste Acceptanc	e Criteria
Chemtest Sample ID:	724619					Limits	
Sample Ref:	ES1					Stable, Non-	
Sample ID:						reactive	
Sample Location:	BH2					hazardous	Hazardous
Top Depth(m):	0.5				Inert Waste	waste in non-	Waste
Bottom Depth(m):					Landfill	hazardous	Landfill
Sampling Date:	08-Nov-2018					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	0.89	3	5	6
Loss On Ignition	2610	U	%	2.5			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
рН	2010	U		8.5		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.072		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance	eaching test
			mg/l	mg/kg	using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0014	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0012	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	4.3	43	800	15000	25000
Fluoride	1220	U	0.13	1.3	10	150	500
Sulphate	1220	U	4.4	44	1000	20000	50000
Total Dissolved Solids	1020	N	46	460	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.4	84	500	800	1000

Solid Information							
Dry mass of test portion/kg	0.090						
Moisture (%)	12						

Waste Acceptance Criteria



Project: 18-1234 Concorde Dublin	
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Chemtest Job No:	18-35678 724621				Landfill \	Naste Acceptanc	e Criteria
Chemtest Sample ID: Sample Ref:	ES3					Limits Stable, Non-	
Sample ID:	200					reactive	
Sample Location:	BH2					hazardous	Hazardous
Top Depth(m):	2.0				Inert Waste	waste in non-	Waste
Bottom Depth(m):	2.0				Landfill	hazardous	Landfill
Sampling Date:	08-Nov-2018				Lunann	Landfill	Lanam
Determinand	SOP	Accred.	Units	1			
Total Organic Carbon	2625	U	%	0.39	3	5	6
Loss On Ignition	2610	U	%	2.3			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
pH	2010	U		8.5		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.062		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance l	eaching test
-			mg/l	mg/kg	using BS EN 12457 at L/S 10 I/kg		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0027	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0020	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	3.4	34	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	4.6	46	1000	20000	50000
Total Dissolved Solids	1020	Ν	48	470	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.6	66	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria

The right chemistry to deliver results

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



Chemistry to deliver results The right chemistry to deliver results Chemtest Ltd. Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	18-36454-1		
Initial Date of Issue:	29-Nov-2018		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan John Cameron Lucy Newland Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Sean Ross Stephen Franey Stephen Watson Stuart Abraham		
Project	18-1234 Concorde Dublin		
Quotation No.:	Q18-13245	Date Received:	20-Nov-2018
Order No.:		Date Instructed:	22-Nov-2018
No. of Samples:	5		
Turnaround (Wkdays):	4	Results Due:	27-Nov-2018
Date Approved:	29-Nov-2018		
Approved By:			
M.J.			

Details:

Martin Dyer, Laboratory Manager

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Total Aromatic Hydrocarbons

Results - Soil

Client: Causeway Geotech Ltd		Che	mtest J	ob No.:	18-36454	18-36454	18-36454	18-36454	18-36454
Quotation No.: Q18-13245	(Chemte	est Sam	ple ID.:	728229	728231	728233	728238	728242
Order No.:		Clie	nt Samp	ole Ref.:	ES1	ES3	ES1	ES2	ES2
		Sa	ample Lo	ocation:	WS01	WS01	WS02	WS03	WS04
			Sampl	e Type:	SOIL	SOIL	SOIL	SOIL	SOIL
			Top De	pth (m):	0.5	2.0	0.5	1.0	1.0
				ampled:		15-Nov-2018	15-Nov-2018	15-Nov-2018	16-Nov-2018
				tos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	-					
АСМ Туре	U	2192		N/A	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected				
Moisture	N	2030	%	0.020	20	9.3	5.0	11	4.3
pН	U	2010	Ī	N/A	7.8	8.5	9.3	8.6	9.0
Arsenic	U	2450	mg/kg	1.0	21	17	20	19	13
Barium	U	2450	mg/kg	10	92	84	75	90	36
Cadmium	U	2450	mg/kg	0.10	1.9	2.1	0.37	2.2	0.71
Chromium	U	2450	mg/kg	1.0	21	19	13	17	8.5
Molybdenum	U	2450	mg/kg	2.0	2.7	3.2	< 2.0	4.1	< 2.0
Antimony	N	2450	mg/kg	2.0	2.6	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	41	27	16	33	8.0
Mercury	U	2450	mg/kg	0.10	0.46	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	53	53	18	59	19
Lead	U	2450	mg/kg	0.50	89	19	6.5	18	12
Selenium	U	2450	mg/kg	0.20	0.84	0.55	0.55	2.1	< 0.20
Zinc	U	2450	mg/kg	0.50	140	82	36	76	28
Chromium (Trivalent)	Ν	2490	mg/kg	1.0	21	19	13	17	8.5
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Organic Carbon	U	2625	%	0.20	4.4	1.0	5.0	0.68	2.1
Aliphatic TPH >C5-C6	N		mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	3 3	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	0 0	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U		mg/kg		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U		mg/kg		< 1.0	< 1.0	80	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	3 3		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	00	5.0	< 5.0	< 5.0	80	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	0 0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	00		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	-	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U		mg/kg		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	0 0		< 1.0	< 1.0	250	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

2680 mg/kg 5.0

Ν

250

< 5.0

< 5.0

< 5.0

< 5.0

Chemtest The right chemistry to deliver results

<u>Results - Soil</u>

		The fight	Chieffilduy	to deliver	100
Pr	oject:	18-1234	Concorde	Dublin	

Client: Causeway Geotech Ltd		Che	mtest Jo	b No.:	18-36454	18-36454	18-36454	18-36454	18-36454
Quotation No.: Q18-13245	(est Sam		728229	728231	728233	728238	728242
Order No.:			nt Samp		ES1	ES3	ES1	ES2	ES2
		Sa	ample Lo		WS01	WS01	WS02	WS03	WS04
				e Type:	SOIL	SOIL	SOIL	SOIL	SOIL
			Тор Dep		0.5	2.0	0.5	1.0	1.0
			Date Sa	mpled:	15-Nov-2018	15-Nov-2018	15-Nov-2018	15-Nov-2018	16-Nov-2018
			Asbest	os Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	330	< 10	< 10
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	0.54	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	N		mg/kg		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10



Chemtest Job No:	18-36454				Landfill	Waste Acceptanc	e Criteria
Chemtest Sample ID:	728229					Limits	
Sample Ref:	ES1					Stable, Non-	
Sample ID:						reactive	
Sample Location:	WS01					hazardous	Hazardous
Top Depth(m):	0.5				Inert Waste	waste in non-	Waste
Bottom Depth(m):					Landfill	hazardous	Landfill
Sampling Date:	15-Nov-2018					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	4.4	3	5	6
Loss On Ignition	2610	U	%	8.5			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
рН	2010	U		7.8		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.039		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance	leaching test
			mg/l	mg/kg	using B	S 10 I/kg	
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0030	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0032	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	2.1	21	800	15000	25000
Fluoride	1220	U	0.53	5.3	10	150	500
Sulphate	1220	U	14	140	1000	20000	50000
Total Dissolved Solids	1020	Ν	140	1400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	27	270	500	800	1000

Solid Information							
Dry mass of test portion/kg	0.090						
Moisture (%)	20						

Waste Acceptance Criteria



Chemtest Job No:	18-36454				LandfIII Waste Acceptance Criteria		
Chemtest Sample ID:	728231					Limits	
Sample Ref:	ES3					Stable, Non-	
Sample ID:						reactive	
Sample Location:	WS01					hazardous	Hazardous
Top Depth(m):	2.0				Inert Waste	waste in non-	Waste
Bottom Depth(m):					Landfill	hazardous	Landfill
Sampling Date:	15-Nov-2018					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	1.0	3	5	6
Loss On Ignition	2610	U	%	2.0			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
рН	2010	U		8.5		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.078		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values for compliance leaching tes using BS EN 12457 at L/S 10 l/kg		leaching test
			mg/l	mg/kg			S 10 I/kg
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0041	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0096	0.096	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.3	13	800	15000	25000
Fluoride	1220	U	0.23	2.3	10	150	500
Sulphate	1220	U	14	140	1000	20000	50000
Total Dissolved Solids	1020	Ν	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	11	110	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.3

Waste Acceptance Criteria



Chemtest Job No:	18-36454 728233				Landfill	Waste Acceptanc	e Criteria
Chemtest Sample ID: Sample Ref:	728233 ES1					Limits Stable, Non-	
Sample ID:	201					reactive	
Sample Location:	WS02					hazardous	Hazardous
Top Depth(m):	0.5				Inert Waste	waste in non-	Waste
Bottom Depth(m):	0.0				Landfill	hazardous	Landfill
Sampling Date:	15-Nov-2018				Lanam	Landfill	Lanam
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	5.0	3	5	6
Loss On Ignition	2610	U	%	0.94			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	310	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
pH	2010	U		9.3		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.69		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance	eaching test
			mg/l	mg/kg	using BS EN 12457 at L/S 10 l/kg		S 10 I/kg
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.025	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	0.0011	0.011	0.01	0.2	2
Molybdenum	1450	U	0.0094	0.094	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0016	0.016	0.1	0.5	7
Zinc	1450	U	0.0025	< 0.50	4	50	200
Chloride	1220	U	5.7	57	800	15000	25000
Fluoride	1220	U	0.61	6.1	10	150	500
Sulphate	1220	U	170	1700	1000	20000	50000
Total Dissolved Solids	1020	Ν	270	2700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.1	81	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	5.0

Waste Acceptance Criteria



Chemtest Job No:	18-36454				Landfill	Naste Acceptanc	e Criteria
Chemtest Sample ID:	728238					Limits	
Sample Ref:	ES2					Stable, Non-	
Sample ID:						reactive	
Sample Location:	WS03					hazardous	Hazardous
Top Depth(m):	1.0				Inert Waste	waste in non-	Waste
Bottom Depth(m):					Landfill	hazardous	Landfill
Sampling Date:	15-Nov-2018					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	0.68	3	5	6
Loss On Ignition	2610	U	%	2.1			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
рН	2010	U		8.6		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.31		To evaluate	To evaluate
luate Analysis 10:1		10:1 Eluate	10:1 Eluate	Limit values for compliance leaching test		eaching test	
			mg/l	mg/kg	using BS EN 12457 at L/S 10 l/kg		S 10 I/kg
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0048	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.015	0.15	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.9	19	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	6.4	64	1000	20000	50000
Total Dissolved Solids	1020	Ν	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria



Chemtest Job No:	18-36454				Landfill	Waste Acceptanc	e Criteria
Chemtest Sample ID:	728242					Limits	
Sample Ref:	ES2					Stable, Non-	
Sample ID:						reactive	
Sample Location:	WS04					hazardous	Hazardous
Top Depth(m):	1.0				Inert Waste	waste in non-	Waste
Bottom Depth(m):					Landfill	hazardous	Landfill
Sampling Date:	16-Nov-2018					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	2.1	3	5	6
Loss On Ignition	2610	U	%	1.0			10
Total BTEX	2760	U	mg/kg	< 0.010	6		
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500		
Total (Of 17) PAH's	2800	Ν	mg/kg	< 2.0 < 2.0	100		
рН	2010	U		9.0		>6	
Acid Neutralisation Capacity	2015	Ν	mol/kg	0.36		To evaluate	To evaluate
Eluate Analysis	uate Analysis 10:1 Eluate		10:1 Eluate	10:1 Eluate	Limit values for compliance leaching test		leaching test
			mg/l	mg/kg	using BS EN 12457 at L/S 10 l/k		S 10 I/kg
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0025	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0079	0.079	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.012	0.12	0.5	10	30
Nickel	1450	U	0.0019	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	6.9	69	800	15000	25000
Fluoride	1220	U	0.47	4.7	10	150	500
Sulphate	1220	U	8.1	81	1000	20000	50000
Total Dissolved Solids	1020	Ν	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	10	100	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	4.3

Waste Acceptance Criteria

The right chemistry to deliver results

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



APPENDIX G SPT HAMMER ENERGY MEASUREMENT REPORT





SPT Hammer Energy Test Report

14/04/2018

15/04/2018

in accordance with BSEN ISO 22476-3:2005

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

Instrumented Rod Data

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

Nanthano inte	55 (1975)
Test Operator:	CAUSEWAY
File Name:	NT5spt

SPT Hammer Ref: NT5.

Test Date:

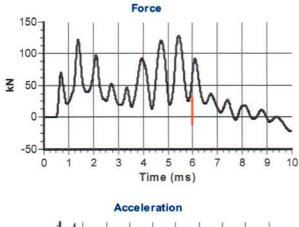
Report Date:

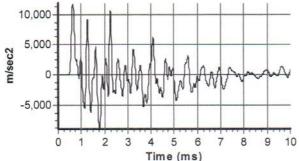
SPT Hammer Information

Hammer Mass	m (kg):	63.5
Falling Height	n (mm):	760
SPT String Lengt	th L (m):	10.5

Comments / Location

Causeway Yard





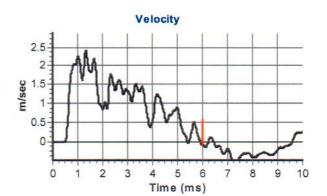
Calculations

Area of Rod A (mm2):		905	
Theoretical Energy E _{theor}	(J):	473	
Measured Energy E _{meas}	(J):	299	
		· · · · · · · · · · · · · · · · · · ·	

Energy Ratio Er (%):

63	
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The recommended calibration interval is 12 months





Signed: N P Burrows Field Operations Manager Title:



SPT Hammer Energy Test Report

NT4

14/04/2018

15/04/2018

CAUSEWAY

NT4.spt

in accordance with BSEN ISO 22476-3:2005

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

Instrumented Rod Data

Diameter dr (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 Len	gth L (m):	10.5

Comments / Location

Causeway Yard

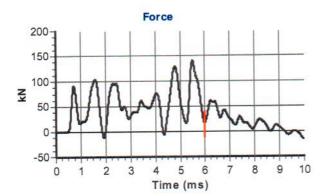
SPT Hammer Ref:

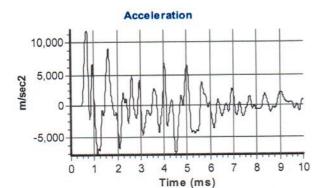
Test Date:

File Name:

Report Date:

Test Operator:





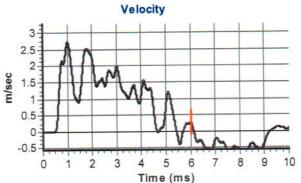
Calculations

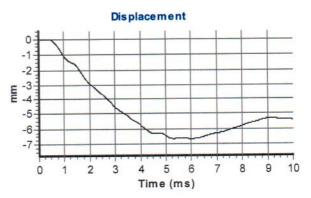
Area of Rod A (mm2):		905	
Theoretical Energy E _{theor}	(J):	473	
Measured Energy E _{meas}	(J):	307	

Energy Ratio Er (%):

The recommended calibration interval is 12 months

65





a

Signed:N P BurrowsTitle:Field Operations Manager