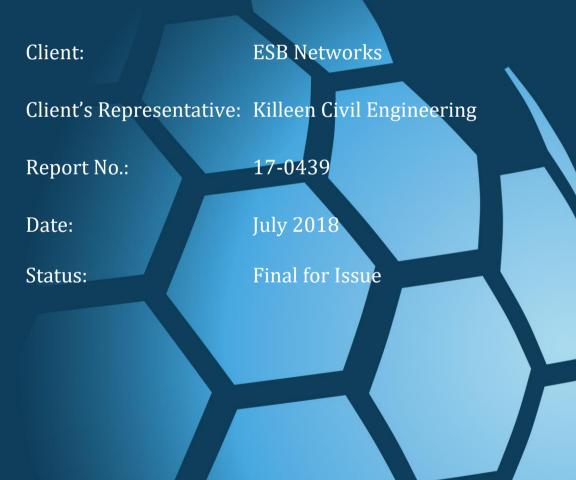


Coolnabacky – 400kV GIS Substation Ground Investigation



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stered in Northern Ireland. Company Number: NI610766 Approved: ISO 9001 • ISO 14001 • OHSAS 18001





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Document Control Sheet

Report No.:		17-0439								
Project Title:		Coolnabacky 400kV GIS Substation								
Client:		ESB Networks	ESB Networks							
Client's Repres	entative:	Killeen Civil Eng	Killeen Civil Engineering							
Revision:	A00	Status:	Final for Issue	Issue Date: 31 July 2018						
Prepared by:		Reviewed by:		Approved by:						
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The works were conducted in accordance with:

UK Specification for Ground Investigation 2nd Edition, published by ICE Publishing (2012)

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.

	on exploratory hole logs
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 shift and the start of the following shift
Abbreviations relating	g 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 of 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).





Coolnabacky - 400kV GIS Substation

1 AUTHORITY

On the instructions of Killeen Civil Engineering, ("the Client's Representative"), acting on the behalf of ESB Networks ("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 substation, accompanying structures and access roads.

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, trial pits, soil sampling, groundwater monitoring, 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 conducted on the site of agricultural fields 2.5km north of Timahoe in Co. Laois with access off the R426. The site is bounded on all sides by agricultural land. An infilled quarry bounds the site immediately south of the site. The site is undulating ranging between 98 and 101mOD.





4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between 11th June and 22nd June 2018, comprised:

- nine light cable percussion boreholes;
- a standpipe installation in two boreholes;
- sixteen machine dug trial pits;
- an infiltration test performed in two trial pits; and
- indirect CBR tests at fifteen locations.

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

Nine boreholes (BH01-BH04 and BH06-BH10) were put down to completion in minimum 200mm diameter using a Dando 2000 light cable percussion boring rig. All boreholes were terminated either at their scheduled completion depths, or else on encountering virtual refusal on obstructions or in very stiff deposits.

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. Undisturbed (U100) samples were taken where appropriate and as directed within fine soils.

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 H.

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





4.3 Standpipe installations

A groundwater monitoring standpipe was installed in BH01 and BH04.

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

4.4 Trial Pits

Seventeen trial pits (TP01–TP07, TP09-TP16 and TP28) were excavated using a 3t tracked excavator fitted with a 600mm wide bucket, to depths of 2.5m.

Disturbed (small jar and bulk bag) samples were taken at standard depth intervals and at change of strata.

Any water strikes encountered during excavation were recorded along with any changes in their levels as the excavation proceeded. The stability of the trial pit walls was noted on completion.

Appendix C presents the trial pit logs with photographs of the pits and arising provided in Appendix D.

4.5 Infiltration tests

An infiltration/soakaway test was carried out at two locations (SATP15 and SATP16) in accordance with BRE Digest 365 - Soakaways (BRE, 2016). The tests were conducted in similarly numbered trial pits.

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

4.6 Indirect CBR tests

An indirect CBR test was conducted at fifteen locations (TP01-TP07 and TP09-TP16) using a Dynamic Cone Penetrometer (DCP). The equipment was developed in conjunction with the UK Transport Research Laboratory, is used widely throughout the world, and is referred to in the UK Highway Agency Interim Advice Note 73/06.

The test results are presented in Appendix F in the form of plots of the variation with depth of the penetration per blow. Straight lines have been fitted to the plots and the CBR for each depth range estimated using the following relationship, which is derived from Kleyn & Van Heerden (1983):

Log CBR = 2.48-1.057 Log (mm/blow)

The frequently elevated CBR values are a consequence of the coarse-grained content of the penetrated soils and are often not representative of the soil matrix.





4.7 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.

4.8 Groundwater and ground gas monitoring

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

Date	Standing water levels (mbgl)								
Date	BH01	BH04							
27/06/2018	1.1	1.24							
11/07/2018	1.34	1.22							

Details of groundwater are presented in Table 1 below.

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 G.





6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise alluvium and glacial gravels. These deposits are underlain by limestones of the Ballyadams 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:

- **Topsoil:** encountered typically in 300-500mm thickness across the site.
- **Made Ground (fill):** reworked topsoil encountered to a depth of 700mm in TP10.
- **Alluvium/glacial gravels:** typically, soft to firm sandy gravelly clay/silt or medium dense sandy gravel/gravelly sand. Encountered to a depth of 3.8m in BH09.
- **Glacial Till:** sandy gravelly clay, frequently with low cobble content, typically firm or stiff in upper horizons, becoming very stiff with increasing depth.

6.3 Groundwater

Groundwater was encountered during percussion boring through soil as water strikes at a range of depths as shown in Table 2 below.

GI Location	Groundwater strikes	Comments
	(mbgl)	
BH01	1.3	Slow
BH02	1.6	Slow
BH03	5.7	Slow
BH04	1.8	Slow
TP10	1.8	Slow
TP11	1.5	Slow
TP12	1.3	Slow
TP14	2.3	Slow
TP16	1.0	Fast





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 additional groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out. Seasonal variation in groundwater levels should also be factored into design considerations.

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.

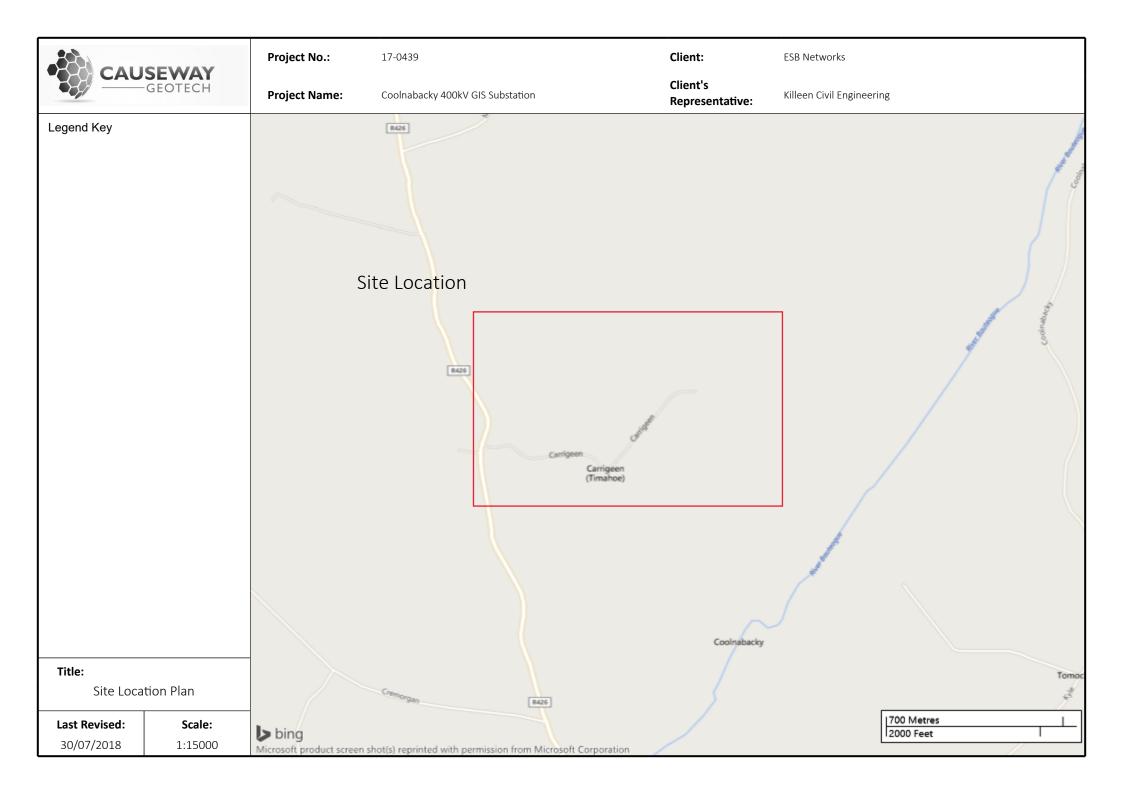
BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

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

BS EN ISO 14688-2:2004+A1:2013: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

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 B Borehole logs

	CAL	16				Project 17-043		-	t Name: backy 400kV GIS Substation	Во	rehol BH(e No. 01
	CAU	בר _(DE Geo	WAY DTECH		Coordi	nates:	Client:		s	heet	1 of 1
						65374	4.29 E	ESB Ne				1.50
Method Cable Percussion			Ised	Top 0.00	Base 6.50	69284		Killeen	s Representative: Civil Engineering		ale: iller:	
							d Level: 3 mOD	Dates: 22/06/		Log	gger:	GH
Depth	Sample /	Casing Depth (m)	g Water	Field Re	cords	Level	Depth (m)	Legend	Description	Water		
(m)	(m) Tests (m)		Depth (m)		corus	(mOD)	(Thickness)	- CBCIIG	TOPSOIL: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to	ŝ		
						101.2	(0.30) 0.30		coarse. Gravel is subangular to subrounded fine to coarse Firm grey sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is	-		
0.50	B3					3	-		subangular to subrounded fine to medium.			0.5
							-					
1.00	B4						(1.50)					• • ^{1.0}
1.20 1.20 - 1.65	D9 SPT (C)	1 20	Dry	N=11 (2,2/3	3 3 7)		-			T		•
1.20 - 1.05	N=11	1.20		Slight Trace			-				E	1.5
						99.73	- 1.80		- - - -		Ē	
2.00	B5					55175	_		Soft to firm grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		E	2.0
2.00 - 2.45	D10 SPT (C)	2 01		N=7 (2,2/2,2	1 2 21						ŀĒ	
2.00 - 2.43	N=7	2.00	1.90	(N=7 (Z,Z/Z,	±,∠,∠)		(1.20)					2.5
							-				E	
3.00	45 U1 3.00 Dry Ublow=50 50%			98.53	- 3.00					•••		
3.00 - 3.45		3.00	Dry	Ublow=50 5	0%	50.55	- 3.00		Firm to stiff grey sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.			5.0
							-		Cobbles are subangular to subrounded			
												3.5
							-					
4.00	B7 D11						-					4.0
4.00 - 4.45	SPT (S)	4.00	Dry	N=17 (3,3/4	,4,4,5)							
	N=17						-					4.5
							(3.50)					
5.00	B8						-					5.0 -
5.00 - 5.45	D12 SPT (S)	4.20	Dry	N=28 (7,4/4	,5,8,11)		-					
	N=28						-					5.5
							[
6.00 - 6.45	U2	4.20	Dry	Ublow=50 0	1%		-					6.0 -
							-					
6.50 - 6.55	SPT (S)			N=50 (25 fo	r	95.03	- 6.50	0.0.0	End of Borehole at 6.50m			6.5
				25mm/50 fc			-		End of borenole at 0.50m			
				25mm)			-					7.0 -
							-					
							E E					
							-					7.5
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							Ē					8.0 -
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		-					-			-	├──	
temarks		1	1	1		1	1	<u>.</u>			ng Deta	
land dug inspec	tion pit e	excav	ated.						Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) 1.30 <	Io	<u>un</u> 1	Time (hh:m
									Water Added Casing Details			
									Water Added Casing Details From (m) To (m) To (m) 4.50 200			
erminated in sti	ff deposi	ts							4.50 200			

						17 040	0	Carl	hadler 400k/ CIS Substation		DUAS	
	CAL	JS	E	WAY		17-043 Coordii		Coolna Client:	backy 400kV GIS Substation		BH02	
		-G	EC	TECH		653763		ESB Ne		Sh	eet 1 d	of 1
Method	Pla	nt Us	sed	Тор	Base			Client's	s Representative:	Scal	e: 1:	:50
Cable Percussion	n Dan	do 2	000	0.00	6.50	692855	5.61 N	Killeen	Civil Engineering	Dril	ler: BN	M
						Ground		Dates:	2010			
Depth	Sample /	Casing	Water			101.02	2 mOD Depth (m)	21/06/			ger: BN	1
(m)	Tests	Depth (m)	Depth (m)	Field Re	cords		(Thickness)	Legend	Description TOPSOIL: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to	Water	Backfill	
						100.7	(0.30) 0.30		coarse. Gravel is subangular to subrounded fine to coarse			
0.50	B1					2	-		Firm grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is rounded fine.			0.5 -
							-					
1.00	B2						- (1.40)					1.0 -
1.20 1.20 - 1.65	D7 SPT (C)	1.20	Drv	N=12 (3,4/4	4 2 2)		-					
	N=12	1.20	Diy	Water Strike			-			T		1.5 -
				1.60m		99.32	1.70		Firm grey sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is			
2.00	B3						-		subangular to subrounded fine to medium.			2.0 —
2.00 - 2.45	D8 SPT (C)	2.00	Dry	N=8 (4,3/2,2	2,2,2)		-	من هند و معنا محمد و محمد و ا				
	N=8						(1.90)					2.5 -
							_ (1.90) _					
3.00	B4 D9						-					3.0 —
3.00 - 3.45	SPT (S) N=8	3.00	Dry	N=8 (2,2/2,2	2,2,2)		-					
	N=8					97.42	- 3.60		Firm to stiff grey slightly sandy slightly gravelly CLAY with low cobble			3.5 -
									content. Sand is fine to coarse. Gravel is subangular to subrounded fine to			
4.00	B5 D10						-		coarse. Cobbles are subangular to subrounded			4.0 —
4.00 - 4.45 4.40 - 4.85	U12	4.00 4.20	Dry Dry	Ublow=80 0 N=18 (3,4/4			-	0-0-				
1.40 4.85	N=18	4.20	Diy	11-10 (3,4/4	,=,3,3)		-	0.0				4.5 -
							-	0-0-				
5.00	B6 D11						(2.90)					5.0 —
5.00 - 5.45	SPT (S) N=30	4.20	Dry	N=30 (25,10/5,5,6	i,14)		-					5.5 -
					÷		-	Ŏ÷Ŏ				o.o -
6.00 - 6.45	U13	4.20	Drv	Ublow=67 0	%		- -	0-0-				6.0 -
	010		- ' y	55.50-070			-					Ĩ
6.50 - 6.55	SPT (S)	4.20	Drv	N=50 (25 for	r	94.52	- 6.50	$\mathcal{O}^{\bullet}_{\bullet}\mathcal{O}^{\bullet}_{\bullet}$				6.5 -
	/		.,	25mm/50 fc 25mm)					End of Borehole at 6.50m			
				2311111)			-					7.0
							-					
							-					7.5 -
							-					
							-					8.0 —
							-					
							-					8.5 -
							-					
							-					9.0 -
							-					
							-					9.5 -
							-					
Remarks Hand dug inspec	tion nit o	XCava	ated						Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)	elling To (n	Details	6 e (hh:mm
iana aug inspec	aon pit e	vean	ateu.						1.60			
									Water Added Casing Details From (m) To (m) To (m) Diam (mm)			

	27					Project		-	t Name:	Bor	ehole I	
	CAL	JS	E	WAY TECH		17-043 Coordi		Coolna	backy 400kV GIS Substation		BH03	•
		-G	EC	TECH					tworks	Sł	neet 1 d	of 1
Method	Pla	nt U	sed	Тор	Base	653793	3.75 E		s Representative:	Sca	le: 1:	50
Cable Percussio	_	ndo 2		0.00	8.50	69287	7.00 N		Civil Engineering	<u> </u>		
						Ground	d Level:	Dates:		Dri	ler: BI	M
						100.92	2 mOD	20/06/	2018	Log	ger: Gl	Н
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Re	cords	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill	
							(0.30)		TOPSOIL: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to			
						100.6 2	0.30	× × ×	coarse. Gravel is subangular to subrounded fine to coarse Medium dense grey gravelly silty fine to coarse SAND. Gravel is subangular			
0.50	B1					2	-	$\left[\begin{array}{c} \times & \times \\ \times & \times \end{array}\right]$	to subrounded fine to medium.			0.5 -
								$\left[\begin{array}{c} \times & \times \\ \times & \times \end{array}\right]$				
1.00	B2						(1.50)	Î×××)				1.0
1.20 1.20 - 1.65	D10 SPT (C)	1.00	Drv	N=12 (2,3/2	.3.3.4)		-	Č× ×				
1.05	N=12	1.00	_ · y	(2,3/2	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Ē	×××				1.5 -
						99.12	1.80	×·×				
2.00	В3					55.12	-		Soft to firm grey sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse			2.0 -
	D11	2.00	D	N=0 (2.2.(2.)	2 2 21		F					
2.00 - 2.45	SPT (C) N=9	2.00	Dry	N=9 (2,2/3,2	∠,∠,∠)		(1.20)					2.5 -
							ļ					2.3
							-		4			
3.00 3.00 - 3.45	B4 U16	2.00	Dry	Ublow=50 6	50%	97.92	- 3.00	0.	Firm to stiff grey sandy slightly gravelly CLAY with low cobble content.	1		3.0 -
							ŀ		Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded			
							-					3.5 -
							F					
4.00	B5						F	0.0				4.0 —
4.00 - 4.45	D12 SPT (S)	4.00	Dry	N=20 (3,4/4	,5,5,6)		-	0.0				
	N=20						-	0-0				4.5 -
							ŧ	0-0				
5.00	B6						[0-0				5.0 —
	D13						-	0-0-				
5.00 - 5.45	SPT (S) N=26	4.20	Dry	N=26 (4,5/5	,6,7,8)		ŀ	0.0				
				Water Strike	∘ at		-			T		5.5 -
				5.70m			(5.50)					
6.00 6.00 - 6.45	B7 U17	4.20		Ublow=70 1	.00%		-		8			6.0 -
							-	$[\bigcirc \ \ \bigcirc \ \ \bigcirc \ \ \bigcirc \ \ \ \bigcirc \ \ \ \ \ $	8			
							-	0-0-	9			6.5
							-	$\dot{\mathbf{O}}$				
							F	0^{-0}				7.0 -
							ŀ	0.0				
7.50	D14						-	0.0				7.5 -
7.50 - 7.95	SPT (S)	4.20		N=47	2 4 5 1		-					
8.00	N=47 B8			(6,6/9,10,13	5,15)		Ľ					8.0 -
0.00	DO						ŀ					0.0
							-	$\mathbb{R}^{\mathbb{R}}$				
8.50	B9 D15					92.42	- 8.50	14.0TT 6.07	End of Borehole at 8.50m	1		8.5 -
8.50 - 8.62	SPT (S)	4.20		N=50 (34 fo			E E					
				100mm/50 25mm)	IOF		- -					9.0 -
							-					:
							[9.5 -
							ŀ					
							-					
Remarks	l		1			<u> </u>	1	<u> </u>	Water Strikes Chis		g Details	<u> </u> ;
land dug inspec	tion pit e	excava	ated.						Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) 5.70 <	To (e (hh:mm
									Water Added Casing Details From (m) To (m) To (m) Diam (mm)			
forminated in -4	iff donas!	ite							From (m) Io (m) Io (m) Diam (mm) 4.20 200			
erminated in sti	iii ueposi	ils										

Method Cable Percussion Depth (m)	Plai	JS — G nt Us do 20	sed	VAY TECH		17-043 Coordii		Coolna Client:	backy 400kV GIS Substation		BH0	4
Method Cable Percussion Depth (m)	Plai Dan Sample /	nt Us	sed	TECH		Coordi	nates:	Client				
Method Cable Percussion Depth (m)	Plai Dan Sample /	nt Us	sed							She	et 1	of 1
Cable Percussion Depth (m)	Dan Sample /					653775	5.62 E		tworks			
Depth (m)	Sample /	uU 20	111	Top 0.00	Base 9.50	692876	692876.75 N		s Representative:	Scale	: 1	1:50
(m)				0.00	9.50				Civil Engineering	Drille	er: E	3M
(m)								Dates:		Logg	er. (зн
(m)		Casing	Water			100.93	Depth (m)	22/06/				
0.50		Depth (m)	Depth (m)	Field Re	ecords		(Thickness)	Legend		Water	ackfi	11
0.50							(0.30)		TOPSOIL: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse			
0.50						100.6 3	0.30	<u> </u>	Medium dense grey sandy clayey subangular to subrounded fine to coarse			
	B1						-		GRAVEL. Sand is fine to coarse			0.5
							-					
	B2						(1.50)					1.0
-	D9 SPT (C)	1 00	Drav	N=13 (2,2/3	> > > 1)		-					
	N=13	1.00	DIY	N-15 (2,2/5	5,5,5,4)		-					1.5
						00.40	-			T		
				Slight Seepa 1.80m	age at	99.13	1.80	(Soft grey sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is			20.
	B3						-	$\times \times \times$	subrounded fine to coarse.		•	*
	D10 SPT (C)	2.00	Dry	N=8 (3,1/2,2	2,2,2)		(1.30)	(x x x			Ë	*
	N=8						_ (1.30)				ŀ	• 2.5
							-				·H.	
	B4					97.83	- - 3.10	× × × > < × × ×	d 		· H.	° 3.0
	D11 SPT (S)	3.00	Drv	N=12 (2,2/3	3,2,3.4)	57.05	3.10		Firm grey sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are		۰Ħ.	•
	N=12		,		-,-,-,		-	$\dot{\mathbf{O}}$	subangular to subrounded		.E	° 3.5
							-	0-0-			.⊟.	•
							-	0-0-				*
	B5 D12						-				Ħ.	4.0 ·
4.00 - 4.45	SPT (S)	4.00	Dry	N=22 (4,9/6	5,6,6,4)		-				È	•
	N=22						(2.90)				È	° 4.5
							-				È	*
5.00	B6						-	$O^{-}O^{-}$			È	* • 5.0 •
5.00 - 5.45	U16	4.20	Dry	Ublow=50 1	100%		-	0-0-0-			÷H	
							-	0-0-			· E.	* * = =
							-	Ô-Ô,			· E.	*
							-	\mathbf{O}			۰Ľ.	* *
	D13 SPT (S)	1 20	Drv	N=27 (4,5/6	5678)	94.93	- 6.00		Stiff grey slightly sandy slightly gravelly CLAY with low cobble content.		.E	° 6.0
	N=27	4.20	Diy	11-27 (4,3/0	5,0,7,8)		-		Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded		- °.	•
							-					6.5
							(1.50)					
7.00	B7						_					7.0 -
	-						-					
							-					
	D14 SPT (S)	4.20	Dry	N=36 (7,7/8	3,8,9,11)	93.43	- 7.50		Very stiff grey slightly sandy slightly gravelly CLAY with low cobble content.			7.5
	N=36			.,,,-			-		Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded			
							-		_			8.0 -
							-					
							- (2.00)					8.5
9.00	B8						-					9.0 -
	в8 D15						-					9.0
	SPT (S) N=45	4.20	Dry	N=45 (7,8/8,11,12	2 1/1		-					
	+-)			(7,0/0,11,12	≤,±¬)	91.43	- 9.50		End of Borehole at 9.50m			9.5
							-					
							-			$\left \cdot \right $		+
emarks									Water Strikes Chis Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)	elling I		ls me (hh:mi
land dug inspect	10n pit e	xcava	ated.						1.80 room (m) room (m)	10 (11)		touradi
									Water Added Casing Details			
									From (m) To (m) To (m) Diam (mm)			
erminated in stif	f deposi	s							9.50 200			

						Project	No.:	Project	t Name:	Bore	hole N	lo. :
	C A I	16				17-043	9	Coolna	backy 400kV GIS Substation		BH06	
KH	CAL	22	E	WAY TECH		Coordi	nates:	Client:		Shi	eet 1 of	of 1
		0				65376	1.06 E		etworks			
Method		nt Us		Тор	Base	69289	9.36 N		s Representative:	Scale	e: 1:5	50
Cable Percussio	n Dan	do 2	000	0.00	9.00				Civil Engineering	Drill	er: BM	Λ
							d Level: 2 mOD	Dates: 19/06/		Loge	er: GH	
Depth	Sample /	Casing	Water	riald Da		Level	Depth (m)					_
(m)	Tests	Depth (m)	Depth (m)	Field Red	coras	(mOD)	(Thickness)	Legend	Description TOPSOIL: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to	Water	Backfill	
						100.7	(0.30) 0.30		coarse. Gravel is subangular to subrounded fine to coarse			
0.50	B1					2	-	(Firm grey sandy SILT. Sand is fine to medium.			0.5
	ES10						-	(
1.00	B2						(1.50)	(- X		:	1.0
1.20	ES11 D12						-	(- X			
1.20 - 1.65	SPT (C)	1.00	Dry	N=14 (2,3/4,	,3,3,4)		-	(·			1.5
	N=14					99.22	1.80	$(\times \times $	×			
2.00	B3					55.22			Medium dense grey slightly sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse		:	2.0 -
2.00 - 2.45	D13 SPT (C)	2 00	1 60	N=24 (3,5/7,	.7.6 4)				9 7			
	N=24			(3,3,7,	. ,-, .,		(1.20)					2.5
3.00	B4					98.02	- 3.00		Firm to stiff grey slightly sandy slightly gravelly CLAY with low cobble	┤┃		3.0 -
3.00 - 3.45	D14 SPT (S)	3.00	2.90	N=21 (7,6/5,	,5,5.6)				content. Sand is fine to coarse. Gravel is subangular to subrounded fine to			
	N=21			(,,0,0,			-		medium. Cobbles are subangular to subrounded			3.5
4.00	B5						-	Ô-Ô-				4.0
4.00 - 4.20	U19	4.00	Dry	Ublow=60 0	%			0.0				
4.50 - 4.90	U20	4.20	Dry	Ublow=80 8	0%		-	Ô÷Q.				4.5
							-	0-0				
5.00	B6						-	0.0				5.0 -
5.00 - 5.45	D15 SPT (S)		Dry	N=39 (5,7/7,	9 10 121			O_{O}				
3.00 - 3.43	N=39		UIY	ן //,כ) בכ-אי (,///,	,,,10,13)		-	0-0-0				5.5
							ŀ	$O_{-}O_{-}O_{-}O_{-}O_{-}O_{-}O_{-}O_{-}$				
6.00	B7						(6.00)					6.0
6.00 - 6.45	D16 SPT (S)		Dry	N=47								
0.00 - 0.45	N=47		Diy	(12,8/9,12,1	2,14)		-					6.5
							-					
							-	$\left[\begin{array}{c} 0 \\ 0 \\ 0 \end{array}\right]$				7.0
							ŀ	\tilde{O}				
7.50	B8						-	0-0				7.5
7.50 - 7.90	U21		Dry	Ublow=70 9	0%			0-0				
8.00	D17						-	0-0-				8.0
							-					
							-	0.0				8.5
							-					
9.00	В9					92.02	9.00	0.0	End of Borehole at 9.00m	╡┣		9.0
9.00 - 9.07	D18 SPT (S)		Dry	N=50 (25 for			-					
5.00 - 5.07	351 (3)		UIY	50mm/50 fo			-					9.5
				25mm)			ŀ					
							[
emarks		<u> </u>									Details	
land dug inspec	tion pit e	xcava	ated.						Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)	To (m)		
									Water Added Casing Details From (m) To (m) To (m) Diam (mm)			
erminated in sti	iff deposi	ts							1.20 3.00 4.20 200			

	CAL	JS	E	WAY DTECH		Project 17-043 Coordi	9		t Name: ıbacky 400kV GIS Substation	E	ole No 3H07 et 1 of	
Method Cable Percussion	Pla	nt U do 2	sed	Top 0.00	Base 6.00	653739 69288	E 11 N	ESB Ne Client' Killeen	Scale	1:50		
						Ground	d Level:	Dates:			r: BM	
Depth	Sample /	Casing	Water	state pa		101.70 Level	D mOD Depth (m)	18/06/		5	r: GH	
(m)	Tests	Casing Depth (m)	Depth (m)	Field Re	coras	(mOD)	(Thickness)	Legend	Description TOPSOIL: Firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is	Š Da	ckfill	
0.50	B1 ES7					101.3 0	- (0.40) - 0.40		Firm brownish grey sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subrounded fine.	_	0.5	5.
1.00	В2						-	X X X X X X X X X			1.0	0 -
1.20 1.20 - 1.65	ES8 D9 SPT (C) N=10	1.00	Dry	N=10 (2,2/2	2,3,3,2)		(1.60)				1.5	5
2.00	B3 D10	2.00		N 20 (4 C/		99.70	- - 2.00	^ ^ ^ ^ * * * * * * *	Dense grey sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse		2.0	0 -
2.00 - 2.45	SPT (C) N=30	2.00	1.10	ט=ט (4,6/7	N=30 (4,6/7,9,9,5) N=52 22,9/9,14,14,15)		(0.80) - - 2.80				2.!	5 -
3.00 3.00 - 3.45	B4 D11 SPT (S) N=52	3.00	2.10	N=52 (22,9/9,14,2			-		Very stiff grey slightly sandy gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular to subrounded		3.0	
4.00	B5 U14	4 10	Dry	Ublow=80 (1%		- - - -				4.0	0 -
4.50 4.50 - 4.95	D12 SPT (S)						(3.20)				4.9	5
5.00	N=30 B6						-	0-0			5.0	0 -
5.00 - 5.45	D13 SPT (S) N=42	4.10	Dry	N=42 (6,7/7	7,9,11,15)		- - - -				5.5	5
6.00 - 6.10	SPT (S)	4.10	Dry	N=50 (25 fo 75mm/50 fo 25mm)		95.70	- - 6.00 -	0.0	End of Borehole at 6.00m		6.0	0 -
							- - - -				6.!	
							- - - - -				7.0	
							- - - -				8.0	0 -
							-				8.5	5
							- - 				9.(0 -
							- - - -				9.1	5
							-					
Remarks Hand dug inspec Terminated in sti			ated.						Water Strikes Chis Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) Water Added Casing Details From (m) To (m) To (m) Diam (mm) 1.20 3.00 4.20 200	To (m)	etails Time (hh:	mn

	20					Project 17-043			t Name:	Boreho	
	CAL	JS	E)	WAY		Coordi		Client:	backy 400kV GIS Substation		H08
		-G	EO	TECH		65372		ESB Ne		Sheet	t 1 of 1
Method	Plai	nt Us	sed	Тор	Base			Client'	s Representative:	Scale:	1:50
Cable Percussion	n Dan	do 20	000	0.00	9.00	69288	0.20 N	Killeen	Civil Engineering	Driller:	BM
						Ground		Dates:			
D 11							L mOD	15/06/	2018	Logger	:GH
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Re	ecords	Level (mOD)	Depth (m) (Thickness)	Legend		Bac	kfill
						101.6	- (0.20) - 0.20		TOPSOIL: Firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
0.50	B1					1	-		Firm brownish grey sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse.		0.5
	ES10						-				
1.00	B2						-				1.0 -
	ES11						- (1.80)		- - - -		
1.20 1.20 - 1.65	D12 SPT (C)	1.00	Dry	N=10 (1,3/3	3,3,3,1)		-		2		1.5
	N=10						-				
2.00	B3					99.81	- 2.00				2.0 -
	D13	2 00	1.00	N-19 /2 2 /2	יבעעמ				Medium dense grey sandy clayey subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse		
2.00 - 2.45	SPT (C) N=18	2.00	1.00	N=18 (2,3/3	o,4,4,7)		(1.00)				2.5
3.00	B4					98.81	- 3.00				3.0 -
3.00 - 3.45	D14 SPT (S)	3 00	1 10	N=56 (3,25,	/8 0 0 201				Very stiff grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles		
3.00 - 3.45	N=56	3.00	1.40	N=30 (3,25)	(8,9,9,30)		-		and boulders are subangular to subrounded		3.5
							-				
4.00	B5						-				4.0 -
	D15						-				
4.50 - 4.90	U20	4.00	Drv	Ublow=80 6	50%		-				4.5
4.50	020	4.00	Diy	051011-001	5070		-				
5.00	B6						-				5.0 -
	D16	4.20	Duri	N 44/5 7/4	0 44 45)		-				
5.00 - 5.45	SPT (S) N=44	4.20	Dry	N=44 (5,7/9	9,9,11,15)		-				5.5
							-				
6.00	B7						- - (6.00)				6.0 -
6.00 - 6.45	D17	4 20	Drav	N=55			-				
0.00 - 0.45	SPT (S) N=55	4.20	Dry	(8,11/11,13	8,13,18)		-				6.5
							-				
							-				7.0 -
							-				
7.50	B8						-				7.5
7.50 - 7.90	U21			Ublow=70 2	100%		-	· · · · · · · · · · · · · · · · · · ·			
8.00	D18						-				8.0 -
							-				
							-				8.5
							-				
9.00	В9					92.81	- 9.00		End of Borehole at 9.00m	┤┣┻	9.0 -
9.00 - 9.02	D19 SPT (S)			N=50 (25 fc	or		-		Lind of Dotentitie at 3.0011		
				10mm/50 f			-				9.5
				15mm)			-				
							-			\square	
Remarks										selling De	
Hand dug inspec	tion pit e	xcava	ated.						Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)	To (m)	Time (hh:mn
									Make Addad Costee Dearth		
									Water Added Casing Details From (m) To (m) To (m) Junction To (m) To (m)		
erminated in sti	ff deposi	ts							4.20 200		

						Project		-	t Name: ıbacky 400kV GIS Substation)le No.: 109
	CAL	JS	E	WAY TECH		Coordi		Client:			
		-G	EC	TECH		653714			tworks	Shee	: 1 of 2
Method	Pla	nt U	sed	Тор Ва	ise	000/14	4.90 E		s Representative:	Scale:	1:50
Cable Percussio		ndo 2			.70	692899	9.34 N		Civil Engineering		
						Ground	Level:	Dates:		Driller	BIM
						102.48		13/06/	/2018 - 14/06/2018	Logger	: GH
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Record	s	Level (mOD)	Depth (m) (Thickness)	Legend		Mater Bac	kfill
							(0.50)		TOPSOIL: Soft to firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
0.50	B1					101.9	- 0.50				0.5
0.50	ES10					8	-	000 000 000 000	Stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		0.5
1.00							-	000 000 000 000			
1.00	B2 ES11						-		8 		1.0 -
1.20 1.20 - 1.65	D12 SPT (C)	1 20	0 60	N=26 (4,4/5,7,7,	7)		(1.70)		89 		
1.20 - 1.03	N=26	1.20	0.00	11-20 (4,4/3,/,/,	1		-		約 		1.5
							-				
2.00	B3 D13						-				2.0 -
2.00 - 2.45	SPT (C)	2.00	1.30	N=31 (4,5/8,8,6,	9)	100.2 8	- 2.20		Dense brown sandy subangular to subrounded fine to coarse GRAVEL.		
	N=31						-		Sand is fine to coarse		2.5
							-		Ø 		
3.00	B4						— (1.60)		ø - -		3.0 -
3.00 - 3.45	D14 SPT (C)	3 00	1 40	N=34 (6,6/12,9,7	7 6)				o - -		
5.00 5.75	N=34	5.00	1.40		,01		-				3.5
							-				
4.00	D.C					98.68	- 3.80	0-0	Firm to stiff grey slightly sandy slightly gravelly CLAY with low cobble	1	4.0 -
4.00	B5 D15							0-0-	content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded		4.0 -
4.00 - 4.40	U20	4.00	3.6	Ublow=60 100%			-	0.0			
							-				4.5
							-	0.0	Q A		
5.00	B6 D16						-	0.0	Q A		5.0 -
5.00 - 5.45	SPT (S)	4.20	Dry	N=25 (4,5/5,5,7,	8)		-	0.0			
	N=25						-	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$			5.5
							-				
							-				6.0 -
							-				
6.50	B7						-				6.5
6.50 - 6.90	D17 U21										
6.50 - 6.90 7.00 - 7.40	U21 U22			Ublow=80 80%			- (6.90)				7.0 -
	022			00 00/0			-				7.0
							-				
							-				7.5
							-				
8.00	B8						-				8.0 -
							-				
8.50 8.50 - 8.95	D18 SPT (S)	1 20	Dry	N=25 (4,5/5,5,7,	8)		-	\mathcal{O}			8.5
0.00 - 0.90	N=25	4.20	DIY	11-23 (4,3/3,3,7,	J		-	0-0			
							-	$O^{+}O^{+}$			9.0 -
							-	$O_{-}O_{-}O_{-}O_{-}O_{-}O_{-}O_{-}O_{-}$			
9.50	В9						-	0-0			9.5
								0-0			
10.00	D19						-	0-0			
Remarks									Water Strikes Chi	selling De	tails
land dug inspec	ction pit e	excava	ated.						Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)		Time (hh:mm
									Water Added Casing Details From (m) To (m) To (m) Diam (mm)		
forminated in -+	iff dona.	te							From (m) To (m) To (m) Diam (mm) 1.00 3.80 4.20 200		
erminated in st	ini ueposi	15									

	1					Project		Project		Во		le No.:
H H	CAL	JS	E	WAY TECH	*	17-043			backy 400kV GIS Substation		BH	109
H-		-0	EC	TECH		Coordi	nates:	Client:		S	heet	2 of 2
						65371	4.90 E	ESB Ne				1.50
Method Cable Percussio		nt U ndo 2		Top	Base 10.70	69289	9.34 N		Representative:	Sca	ale:	1:50
	ii Dan	100 2	000	0.00	10.70				Civil Engineering	Dri	iller:	BM
							d Level:	Dates:			gger:	GH
Depth	Sample /	Casing	Water			102.48	3 mOD Depth (m)		2018 - 14/06/2018			
(m)	Tests	Casing Depth (m)	Water Depth (m)				(Thickness)	Legend	Description	Water	Back	fill
10.00 - 10.40 10.60 - 10.82	U23 SPT (S)	4.20	Dry	Ublow=80			-		Firm to stiff grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded			10.5
				75mm)		91.78	- 10.70 - - -		End of Borehole at 10.70m			11.0 -
							- - - -					11.5
							-					12.0 -
							-					12.5
							-					13.5
							- - - -					14.0 -
							-					14.5
							-					15.0 -
							-					16.0 -
							- - - -					16.5
							- - - -					17.0
							- - - -					17.5
							-					18.0
							- - - -					19.0
							- - - -					19.5
							-					
									Water Cerilian At-	011:	g Det	aile
emarks and dug inspec	ction pit e	excav	ated.						Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) Water Added Casing Details	To	(m)	ails Time (hh:m
erminated in sti	iff deposi	ts							From (m) To (m) To (m) Diam (mm) 1.00 3.80 4.20 200			

	2					Project 17-043			t Name:		ole No.:
	CAL	JS	E	WAY TECH	·	Coordi		Coolna	backy 400kV GIS Substation	В	110
		-C	EC	TECH					etworks	Shee	t 1 of 1
Method	Pla	nt U	sed	Тор	Base	653768	3.14 E		s Representative:	Scale:	1:50
Cable Percussion	_	ndo 2		0.00	9.30	692928	8.33 N		Civil Engineering		
						Ground	Level:	Dates:		Driller	BM
						100.77	7 mOD	12/06/	2018 - 13/06/2018	Logger	:GH
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Re	ecords	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Mater Bac	kfill
						100.5			MADE GROUND: Reworked topsoil. Soft brown sandy gravelly CLAY. Sand		
						7	- (0.20) - 0.20 - (0.20) - 0.40		is fine to coarse. Gravel is subangular to subrounded fine to coarse MADE GROUND: Soft grey sandy gravelly CLAY. Sand is fine to coarse.	1	
0.50	B1 ES9					100.3 7	-		Gravel is subangular to subrounded fine to coarse Medium dense grey very sandy clayey subangular to subrounded fine to		0.5
							-	- <u>-</u>	coarse GRAVEL. Sand is fine to coarse		
1.00	B2 D13						-				1.0 -
1.20 - 1.65	ES10 SPT (C)	1 20	0 50	N=23 (6,6/3	7 E 4 7)		-		2		
1.20 - 1.65	N=23	1.20	0.50	N=23 (0,0/	/,5,4,7)		(2.50)		2		1.5 -
							-				
2.00	B3 D14						-		9 		2.0 -
2.00. 2.45	ES11			N 22 /2			-				
2.00 - 2.45	SPT (C) N=22	2.00	1.10	N=22 (3,4/4	+,/,6,5)		-				2.5
						50 70	2.00		2 		
3.00	B4 D15					97.87	- 2.90	00	Stiff grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		3.0 -
	ES12						-	0-0	Cobbles are subangular to subrounded		
3.00 - 3.45	SPT (S) N=26	3.00	2.30	N=26 (4,3/5	5,6,9,6)		(1.10)	0-0			3.5
	-						-	0-0-			
4.00	В5					96.77	4.00	00-	Stiff grey slightly sandy slightly gravelly CLAY with low cobble content.	-	4.0 —
4.00 - 4.45	U19	4.00	3.9	Ublow=60	100%		-	00-	Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
							-	0-0	Cobbles and boulders are subangular to subrounded		4.5
							-	0.0			
5.00	B6						-	0.0			5.0 -
5.00 - 5.45	D16 SPT (S)	4.50	Dry	N=105			-				
	N=105			(10,10/19,2	20,25,41)		-				5.5 -
							-		т С		
6.00	B7						-				6.0 -
							-				
6.50 - 6.95	U20	4.50	Dry	Ublow=75 :	100%		-				6.5
							(5.30)				
7.00	D17						-				7.0
							-				
							-				7.5
							-	\mathbf{O}			
8.00	B8						-	0.0			8.0 -
	D18			N 75 (15 1			-	0-0			0.0
8.00 - 8.25	SPT (S)	4.50	Dry	N=75 (10,1 100mm)	///5 for		-	0-0-			8.5 -
							-	0-0			0.5
							-	0-0			9.0
							-	0.0			3.0 -
						91.47	9.30	<u>,</u>	End of Borehole at 9.30m		9.5 -
							-				3.5
							-				
									Notor Strikes Chi		haila
Remarks Hand dug inspec	tion pit e	excav	ated.						Water Strikes Chi: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m)	To (m)	Time (hh:mm
									Water Added Casing Details From (m) To (m) To (m) Diam (mm)		
erminated in sti	iff denosi	ts							Hom (m) Hom (m) Hom (m) Hom (m) 1.20 3.00 4.50 200		
	acposi									1	



APPENDIX C Trial pit logs

	CALISE		Projec 17-043			: Name: backy 400kV GIS Substation	n		Tri	al Pit TPC	
KH	GE	OTECH	Co-ord	inates:	Client:						
	GL	OTLETT	65276	2.54 E	ESB Ne	tworks				heet :	1 of 1
Method:				3.30 N		Representative:			c -	ale	1.25
Trial Pitting			69247	3.30 N	Killeen	Civil Engineering			SC	ale:	1:25
Plant:				d Level:	Date:				10	gger:	ST
3T Excavator				1 mOD	13/06/	2018					51
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend		Description		Water		
(m)	B2 D3 ES1		(mOD) 120.1 1 1 1 1 1 1 1 1 1 1 1 1 1	(Thickness) (0.20) 0.20 0.20 (1.80) (1.80) (0.10) 2.10 - - - - - - - - - - - - -		TOPSOIL Brown very sandy rounded fine predominantly limestone with I Cobbles are rounded	to coarse GRAVEL	. Sand is fine to coa	,		
				-							3.0 —
				-							
				-							3.5 —
				Ē							-
				-							
				-							
				-							4.0
				-							
				-							
				-							
				-							4.5 -
				-							
				-							
				-							
				-							
Remarks								Chailes	Stabilit	v:	
No groundwate	r encountered							Strikes:	Stable	<i>,</i> .	
DCP carried out							Struck at (m):	Remarks:			
Jer carried out									Width		1.20
Faunda de la	very stiff material								Length		2.00

			Project 17-043		-	Name: backy 400kV GIS Substatio	n		Tri	al Pit TPC	
	GE	WAY	Co-ord	inates:	Client:						
	GE	OTECH	65285		ESB Ne	tworks			S	heet 2	1 of 1
Method:						Representative:					
Trial Pitting			69244	9.29 N		Civil Engineering			Sca	ale:	1:25
Plant:			Ground	Level:	Date:						
3T Excavator			119.8	7 mOD	13/06/2	2018			Lo	gger:	ST
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend		Description		Water		
(,				(0.10) 0.10		TOPSOIL					
			119.7 7	0.10		Firm brown sandy gravelly CLA subangular fine to coarse of mi					
				-			ixed infilologies, pre	dominantly innestor			-
				-							-
0.50	B2			-							0.5 —
0.50 0.50	D3 ES1			(1.10)							-
				-							-
				-							-
				-							1.0
											-
			118.6 7	1.20		Grey sandy subrounded fine to		mixed lithologies,			-
			,	(0.30)		predominantly limestone. San	d is fine to coarse				-
1.50	B6		118.3	- 1.50							1.5 —
1.50	D5		7	-		End	of trial pit at 1.50m				-
1.50	ES4			-							-
				-							-
				-							2.0
				-							-
				-							-
				-							-
				-							-
				-							2.5 —
				-							_
				-							-
				-							-
				-							3.0
				-							-
				-							-
				-							-
				-							3.5 —
				-							-
				-							-
				-							-
				-							4.0
				-							-
				-							-
				-							-
				-							4.5 —
				-							-
				-							-
				-							-
				-							
Remarks							14/-1	Strikoc	Stability	/: /:	
No groundwate	er encountered							Strikes:	Unstabl		
DCP carried out	t.						Struck at (m):	Remarks:			
									Width		1.20
Terminated on	continual collapse	of pit sides							Length	:	2.00

			Projec 17-043			Name: backy 400kV GIS Substatio	n		Tria	al Pit TPO	
	GE	WAY	Co-ord	inates:	Client:						
	GE	OTECH	65295		ESB Ne	tworks			SI	neet 1	1 of 1
Method:						Representative:					
Trial Pitting			69245	1.18 N		Civil Engineering			Sca	le:	1:25
Plant:			Groun	d Level:	Date:						
3T Excavator			117.3	7 mOD	13/06/	2018			Log	ger:	ST
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)			Description		Water		
0.50 0.50 0.50	B1 D2 ES3		117.0 7	(1.40)		TOPSOIL Brown gravelly silty fine to coar subangular fine to coarse of mi Cobbles are subangular			is		
1.50 1.50 1.50	85 D6 ES4		115.6 7	- 1.70 - (0.60)		Grey very sandy subrounded fir predominantly limestone with l Cobbles are subrounded					
2.30 2.30	B7 D8		115.0 7	2.30		End o	of trial pit at 2.30m				- 2.5 — - -
				- - - - - -							3.0 — - -
				-							- 3.5 — - -
				- - - - - - - - -							- 4.0
				- - - - - - - - -							4.5 — - - -
Pomorko									tahilit	•	
	er encountered						Water Struck at (m):	•••••••	tability Instable		
DCP carried ou	ıt. Ie to continual colla								Width: .ength:		1.20 2.50

			Projec			Name:			Trial	Pit No.:
A H	CALISE		17-043			backy 400kV GIS Substation	n			ТР04
	GE	OTECH	Co-ord	inates:	Client:				ch	
	GL	OTECH	65305	9.67 E	ESB Ne	tworks			Sne	eet 1 of 1
Method:			60745	9.07 N		Representative:			Seale	1.05
Trial Pitting						Civil Engineering			Scale	:: 1:25
Plant:				d Level:	Date:	2010			Logg	er: ST
3T Excavator Depth	- I - I - I			8 mOD Depth (m)	13/06/2	2018				
(m)	Sample / Tests	Field Records	Level (mOD) 116.9	(Thickness) (0.10) 0.10	Legend	TOPSOIL	Description		Water	
0.50	B1		8			Brown very gravelly fine to coar subrounded fine to coarse of m				0.5 -
0.50 0.50	D3 ES2			- - - (1.40)						1.0 —
1.50	В4		115.5	- - - - 1.50		End c	of trial pit at 1.50m			1.5 -
1.50 1.50	D5 ES6		8	-			n ala picac 1.00m			2.0 —
				-						
				-						2.5 -
				-						3.0 —
				-						3.5 -
				-						4.0 —
				-						4.5 -
				-						
Remarks								Chailens	Stability:	
	er encountered							Strikes:	Unstable	
							Struck at (m):	Remarks:		
CD corriged and								1	1	
DCP carried ou	ι.								Width:	1.20

			Project			Name:			Tr	ial Pit	
KK	CAUSE	WAY	17-043			backy 400kV GIS Substatio	n			TPO	05
	GE	OTECH	Co-ord		Client:					Sheet	1 of 1
			65315	1.86 E	ESB Ne				`	meet	1011
Method:			69241	4.82 N		Representative:			Sr	ale:	1:25
Trial Pitting						Civil Engineering					1.25
Plant: 3T Excavator				d Level: 8 mOD	Date: 13/06/	2018			Lo	gger:	ST
Depth	Sample / Tests	Field Records	Level	Depth (m)	Lanand		Description		Water		
(m)	Sumple / Tests		(mOD)	(Thickness)	Legend	TOPSOIL	Description		ÿ		
				(0.20)							-
			115.8 8	0.20		Brown very sandy clayey suban					-
				-		lithologies predominately limes		o coarse.			-
0.50	B1										0.5 —
0.50 0.50	D2 ES3			-							-
				-							-
				-							-
				-							1.0
				(1.80)						1	-
				ŀ						1	-
											-
1.50	B4			-							1.5 —
1.50 1.50	D5 ES6										-
1.50	130			-							-
				-							-
			114.0	2.00							2.0
			8	2.00	۵.°°°	Light brown very gravelly fine to Gravel is subangular fine to coa					-
				(0.50)	۵.°°°	limestone. Cobbles are subang		-8·, p,			-
				- (0.50)	۵.°°°						-
				-	۵.°°						-
2.50 2.50	B7 D8		113.5 8	- 2.50		End o	of trial pit at 2.50m				2.5 —
				-							-
											-
				-							-
				-							3.0
				-							-
				-							-
											-
				-							3.5 —
				F						1	-
				-						1	-
				-						1	-
				 -						1	4.0
				-						1	-
				-						1	_
				ŀ						1	-
				-						1	4.5 —
				-						1	-
				-						1	-
				-							-
Remarks	r oposumt						Water	Strikes:	Stabilit		
No groundwate	r encountered						Struck at (m):	Remarks:	Unstab	le	
DCP carried out	t.						. ,		10.00		1 20
									Width		1.20
Terminated at s	cheduled depth.								Length	:	2.50

	CAUSE	WAY	Project 17-043	9	Coolna	: Name: backy 400kV GIS Substation	n		Tr	ial Pit TP(
H	GE	OTECH	Co-ord	inates:	Client:					Sheet	1 of 1
Math a di			65323	3.63 E	ESB Ne						
Method: Trial Pitting			69247	1.63 N		s Representative: Civil Engineering			Sc	ale:	1:25
Plant:			Ground	d Level:	Date:						
3T Excavator				5 mOD	13/06/	2018			Lc	ogger:	ST
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)			Description		Water		
0.50	B2 D3		111.2 5	(0.30) 0.30		TOPSOIL Brown gravelly fine to coarse S/ mixed lithologies, predominant		ounded fine to coars			- - 0.5 —
0.50	ES1		110.5 5	(0.70) - (0.70) - 1.00		Firm brown sandy CLAY. Sand is	s fine to coarse				1.0
1.50 1.50 1.50	B5 D6 ES4			- (1.00)							- 1.5 — - -
			109.5 5	- 2.00 - (0.50)		Firm light brown slightly gravell is subrounded fine to coarse of					2.0 —
2.50 2.50	B7 D8		109.0 5	- 2.50	<u>। विभाग के विभाग के</u>	End c	of trial pit at 2.50m				2.5 -
				- - - - -							3.0 —
				-							3.5 –
				- - - - - - - - - -							4.0 —
				- - - - - - - - -							4.5 -
Remarks							14/-1	Strikes	Stabili	tv:	
	er encountered								Stable	-,-	
DCP carried ou	ıt.						Struck at (m):	Remarks:			
2. Samea du									Width	:	1.50
Torminated at	scheduled depth.								Length	1 :	2.50

			Project 17-043			Name: backy 400kV GIS Substation	0		Tri	ial Pit TPC	
	GE	WAY			Coolna	υατκή 400Κν στο δάβλιαποι				IPU	,,
	GE	OTECH	Co-ord 65329		ESB Ne	tworks				Sheet 2	1 of 1
Method:				7.01 L		Representative:					
Trial Pitting			69254	7.95 N		Civil Engineering			Sc	ale:	1:25
Plant:			Ground	d Level:	Date:				<u> </u>		<u>ст</u>
3T Excavator			_	2 mOD	12/06/	2018				gger:	ST
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend		Description		Water		
			109.8 2	- (0.20) - 0.20		TOPSOIL Brown very gravelly clayey fine to coarse of mixed lithologies, p			ine		-
0.50 0.50 0.50	B2 D3 ES1			- - - - - - - - - - - - - - - - - - -							0.5
1.50 1.50 1.50	B4 D6 ES5		108.4 2	- 1.60		Firm brown slightly gravelly ver is subrounded fine to coarse of	y sandy CLAY. Sanc mixed lithologies,	l is fine to coarse. Gr predominantly limest	avel		- - 1.5 — - -
				- - (0.90) - - - -							- 2.0
2.50 2.50	B7 D8		107.5 2	- 2.50		End c	of trial pit at 2.50m				2.5
				- - - - - - - -							3.0
				- - - - - - -							3.5 — - - -
				- 							4.0
				- - - - - - - -							- 4.5 — - - -
- ·											
Remarks No groundwat	er encountered						Water	Strikes:	Stabilit	y:	
							Struck at (m):	Remarks:	Stable		
DCP carried ou	ıt.								Width	:	1.20
Terminated at	scheduled depth.								Length	:	2.00

			Project			t Name:			Tr	ial Pit	
	CALISE		17-043			backy 400kV GIS Substation	n			TPO	09
	GE	OTECH	Co-ord	inates:	Client:					Cheet	1 of 1
	01	012011	65342	7.96 E	ESB Ne					Sheet	1 01 1
Method:			69270	0 83 N		s Representative:				ale:	1:25
Trial Pitting						Civil Engineering			50	ale.	1.25
Plant: 3T Excavator				d Level: 1 mOD	Date: 12/06/	2019			Lo	ogger:	ST
Depth			Level	Depth (m)							
(m)	Sample / Tests	Field Records	(mOD)	(Thickness)	Legend	Brown gravelly silty fine to coar medium of mixed lithologies, pr			Water		-
0.50 0.50 0.50	B2 D3 ES1										0.5 —
			106.0 1	0.80 - (0.40)		Grey very gravelly fine to coarse of mixed lithologies, predomina		ubrounded fine to co	arse		1.0
			105.6 1	1.20		Light brown slightly gravelly fin to coarse of mixed lithologies, p	e to coarse SAND. predominantly lime	Gravel is subrounded stone	fine		-
1.50 1.50 1.50	B5 D6 ES4			-							1.5 —
				(1.30)							- 2.0 -
2.50 2.50	B7 D8		104.3 1	- 2.50		End c	of trial pit at 2.50m				- 2.5 — -
				-							3.0
				-							- 3.5 —
				-							-
				- - - - - -							4.0
				- - - - -							- 4.5 —
				- - - - -							-
Remarks					1				Stabili	tv:	
kemarks No groundwate	r encountered							Strikes:	Stable	.y.	
							Struck at (m):	Remarks:	Studie		
DCP carried out									Width	:	1.20
Terminated at s	cheduled dpeth.								Lengtl	n:	2.00

CAUSEWAY GEOTECH Method: Trial Pitting			Project No.: 17-0439		Project Name: Coolnabacky 400kV GIS Substation				Tr	Trial Pit No.: TP10		
			Co-ord			Client:						
			65350	4.09 E	ESB Networks Client's Representative: Killeen Civil Engineering Date:					Sheet 1 of		
				2.58 N					6	Scale:		
									50	ale:	1:25 ST	
				d Level:					Lo	gger:		
3T Excavator				5 mOD	12/06/	2018						
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend		Description		Water			
0.50 0.50 0.50	B2 D3 ES1		101.9 5	0.70		MADE GROUND: Reworked top is fine to coarse. Gravel is subro predominantly limestone Grey gravelly fine to coarse SAN mixed lithologies, predominant	ounded fine to coa	rse of mixed litholog	ies,		0.5	
1.50 1.50 1.50	B5 D6 ES4	Seepage at 1.80m		(1.30)					-	2	1.5 -	
			100.6	2.00		Ende	of trial pit at 2.00m				2.0 —	
			5	-		End	n thai pit at 2.00m					
				-								
				-								
				-							2.5 -	
				-								
				-								
				-								
				-							3.0 —	
				-								
				-								
				-								
				-							3.5	
				-								
				-								
				-								
				-							4.0 -	
				-								
				-								
				-								
				-							4.5	
				-								
				-								
				-								
				-								
emarks	1		I	I	1		Water	Strikes:	Stabili	ty:		
DCP carried out.									Unstab			
							1.80	Seepage at 1.80m				
									Width	:	1.20	
erminated due	e to influx of wa	ter.							Length	1 :	2.00	

CAUSEWAY GEOTECH Method: Trial Pitting Plant:			Project No.:		Project Name:				Trial Pit N		
			17-0439 Co-ordinates:		Coolnabacky 400kV GIS Substation				TP11		
					Client:						
			65358	000007.011		ESB Networks Client's Representative:				heet	1 of 1
										Scale: 1	
			692815.56 N		Killeen Civil Engineering			Sc	Scale:		
			Ground Level:		Date:					ст.	
3T Excavator				1 mOD	12/06/	2018				gger:	ST
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend		Description		Water		
,			(-		TOPSOIL					
				(0.30)							-
			99.91	0.30							
			55.51	-		Grey gravelly fine to coarse SAN mixed lithologies, predominant		unded fine to coarse	e of		
0.50	B2			-							0.5 —
).50).50	D3 ES1			-							
0.50	231			-							
				-							
				(1.20)							
				-							1.0
											-
				-							
1.50	В4		98.71	- 1.50		E v d a	of trial pit at 1.50m		▼	:	1.5 —
1.50 1.50	D5 ES6			Ē		End C	/ anai pit at 1.00111				-
1.30	250	Seepage at 1.50m		-							
				-							-
				-							-
				-							2.0
				-							-
				-							
				-							
				-							2.5 —
				-							-
				-							
				-							-
				-							
				-							3.0
				-							-
				-							
				-							
				-							3.5 —
				-							
				-							-
				-							-
				-							-
				-							4.0
				-							
				-							
				- -							-
											4.5 —
				-							
				-							
				-							
				-							
									C4-1-11-	1	
Remarks DCP carried out.						Water Strikes:		Stability:			
					Struck at (m): Remarks:		Unstable				
							1.50	Seepage at 1.50m	Width		1.20
erminated du	e to continual co	ollapse of pit sides.							Length	•	2.00

CAUSEWAY GEOTECH		Project		Project Name:				Tri	al Pit		
				Coolnabacky 400kV GIS Substation					TP1	.2	
	G	EOTECH			Client:				s	heet :	1 of 1
Vethod:			65368	5.71 E	ESB Ne	Representative:					
Frial Pitting			69284	3.84 N		Civil Engineering			Sca	ale:	1:25
Plant:			Groun	d Level:	Date:	en Engineering					
BT Excavator				1 mOD	12/06/	2018			LO	gger:	ST
Depth	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend		Description		Water		
(m)			100.6	- (0.30) - 0.30		TOPSOIL Grey very gravelly silty fine to c coarse of mixed lithologies, pre	parse SAND. Grave	l is subrounded fine			
9.50 9.50 9.50	B2 D3 ES1			- - - (1.00) -							0.5
50 50 50	B5 D6 ES4	Seepage at 1.30m	99.61	1.30		Stiff greyish brown sandy grave subrounded fine to coarse of m					1.5
				- (1.20) 							2.0 -
2.50 2.50	B7 D8		98.41	- 2.50		End c	of trial pit at 2.50m				2.5
				-							3.0
				-							3.5
				- - - - - - - -							4.0
				- - - - - - -							4.5
				- 							
emarks					•		Water	Strikes:	Stabilit	y:	
CP carried out.								Remarks:	Stable		
							Struck at (m): 1.30	Remarks: Seepage at 1.30m			
									Width		1.20
									Length		2.00

CAUSEWAY GEOTECH		Project 17-043	9	Coolna	Name: backy 400kV GIS Substatio	n		Tri	Trial Pit N TP13		
- 15	GE	OTECH	Co-ord		Client: ESB Networks					Sheet	1 of 1
Method:			65384	4.10 E		Representative:					
Trial Pitting			69285	6.30 N		Civil Engineering			Sc	ale:	1:25
Plant:			Ground	d Level:	Date:						
3T Excavator				3 mOD	11/06/	2018			Lo	gger:	ST
Depth (m) Sa	ample / Tests	Field Records	Level	Depth (m)	Legend		Description		Vater		
Donth	ample / Tests	Field Records	Level		Logond	Topsoil Stiff light brown slightly sandy s Gravel is subrounded fine to co Grey silty gravelly fine to coarse of limestone. Very soft grey slightly sandy slig Sand is fine to coarse. Gravel is Cobbles are of limestone.	lightly gravelly CLAY	logies. Ibrounded fine to coar with high cobble conte o coarse of limestone.	se		0.5 - 1.0 1.5 - 2.0 2.5 - 3.0
											3.5 · 4.0 4.5 ·
Remarks No groundwater er DCP carried out. Terminated at sche							Water Struck at (m):	Remarks:	Stabilit Unstab Width Length	le :	1.20 2.40

	CALIC		Project 17-043			Name: backy 400kV GIS Substatior	า		Tri	al Pit TP1	
- RH	CAUS	EWAY EOTECH	Co-ord	inates:	Client:						
	9	LOTLET	65372	7.14 E	ESB Ne	tworks				Sheet :	l of 1
Method:			69282	8.78 N		Representative:			50	ale:	1:25
Trial Pitting						Civil Engineering				aie.	1.23
Plant: 3T Tracked E	vervator			d Level: 7 mOD	Date: 12/06/	2010			Lo	gger:	ST
Depth		Statel Descenda	Level	Depth (m)			Description		ter	1	
(m)	Sample / Tests	Field Records	(mOD)	(Thickness)	Legend	TOPSOIL	Description		Water		
0.50 0.50	B2		101.2 7	- (0.30) - 0.30		Grey very gravelly fine to coarse of mixed lithologies, predomina		ubrounded fine to c	parse		0.5 -
0.50	D3 ES1		100.5 7	(0.70) 		Firm brown slightly sandy grave					1.0 —
1.50 1.50 1.50	B4 D5 ES6			(1.20)		subangular fine to coarse of mix	ed lithologies, pre	dominantly limestor	ie		1.5 -
			99.37	- 2.20		Grey very gravelly fine to coarse	SAND Gravelics	ubrounded fine to c	72750		2.0 —
		Seepage at 2.30m		- (0.30)		of mixed lithologies, predomina					
2.40 2.40	B7 D8			-							
			99.07	- 2.50		End o	f trial pit at 2.50m				2.5 -
				- - - - - - -							3.0 —
				-							
				-							3.5 -
				-							
				-							4.0 —
				-							
				-							
				-							
				-							4.5
				-							
				-							
				-							
				-							
Remarks DCP carried ou	ut.						Water	Strikes:	Stabilit Unstab		
							Struck at (m):	Remarks:	UNSTAD	ie .	
							2.30	Seepage at 2.30m	Width		1.20

	CALLE		Project 17-043			: Name: backy 400kV GIS Substatio	n		Tr	ial Pit TP:	
	CAUS	EWAY EOTECH	Co-ord	inates:	Client:					C la	1 . 5 1
-9	0	LOTLETT	65381	1.99 E	ESB Ne					Sheet	1 of 1
Method:			69289	0 35 N		Representative:			50	ale:	1:25
Trial Pitting						Civil Engineering				aic.	1.25
Plant: 3T Excavator				Level:	Date: 11/06/2	2010			Lo	gger:	RS
Depth			Level	1 mOD Depth (m)		2018					
(m)	Sample / Tests	Field Records		(Thickness)			Description		Water		
0.50 0.50	ES1	HVP=177, HVR=86	99.91 99.81	(0.30) - (0.30) - (0.10) - 0.40		TOPSOIL Stiff light brown slightly sandy s coarse. Gravel is subrounded fi Stiff grey mottled brown slightly Gravel is subrounded fine to co	ne to coarse of un y sandy gravelly CL	known			- - - 0.5
0.70 0.70	B2 D3		99.31	(0.50) 0.90		Firm grey slightly sandy gravelly	/ CLAY. Sand is fine	to coarse. Gravel is			-
				- - - - - - - - - - - - - - - - - - -		subrounded fine to coarse of lir		to coarse. Gravel Is			1.0 — — — —
1.50 1.70 1.70	ES4 B5 D6										1.5 — - -
			98.21	- - - 2.00		End c	of trial pit at 2.00m	1			2.0
				- - - - - -							-
				-							2.5 —
				- - - -							3.0
				-							-
				-							3.5 —
				- - - - -							4.0
				- - - -							- - 4.5 —
				- - - - - - -							-
Domo-ul								Г	Ch-1	<u> </u>	
Remarks No groundwate DCP carried ou							Water Struck at (m):	•••••••	Stabilit Unstab		
		ollapse of pit sides.							Width Length		1.20 2.50

	CAUS	EWAY	Projec 17-043	9	Coolna	: Name: backy 400kV GIS Substatior	n		Tri	al Pit TP1	
SH.	G	EWAY EOTECH	Co-ord	inates:	Client:					Sheet :	1 of 1
			65375	7.40 E	ESB Ne						
Method: Trial Pitting			69308	0.19 N		Representative: Civil Engineering			Sc	ale:	1:25
Plant:			Groun	d Level:	Date:						
3T Excavator				8 mOD	11/06/	2018			Lo	gger:	RS
Depth (m)	Sample / Tests	Field Records	Level	Depth (m)			Description		Vater		
	Sample / Tests	Field Records HVP=196, HVR=80 Rapid Inflow at 1.00m	_	Depth (m)	Logond	TOPSOIL Stiff light brown slightly sandy s coarse. Gravel is subrounded fir Grey slightly slity gravelly fine to to coarse of limestone Soft brownish grey slightly sand Sand is fine to coarse. Gravel is Cobbles are subrounded of lime	lightly gravelly silty ne to coarse of uni o coarse SAND. Gra y gravelly CLAY wit subrounded fine t	known avel is subrounded fir ch low cobble content o coarse of limestone	e		0.5 · · 10 1.5 · 2.0 2.5 · 3.0 3.5 ·
				-							4.5
Remarks							Water	Strikes:	Stabilit	y:	
DCP carried out	t.								Unstab		
							Struck at (m): 1.00	Remarks: Rapid Inflow at			
							1.00	1.00m	Width	:	1.40
		ollapse of pit sides.							Length	:	2.20

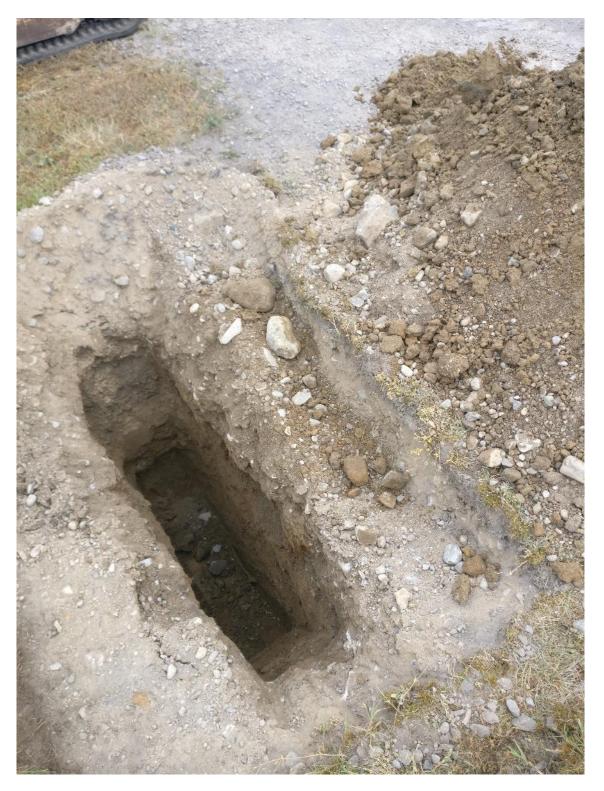
	6 A 1 1 6 F		Projec 17-043			: Name: backy 400kV GIS Substatio	n		Tri	al Pit TP2	
GEOTECH				Client: ESB Networks							
								5	heet :	1 of 1	
Method:			05575	7.40 L		Representative:					
Trial Pitting			69308	0.19 N		Civil Engineering			Sca	ale:	1:25
Plant:			Groun	d Level:	Date:	0.000 200800000					
3T Excavator			Groun	mOD	12/06/	2018			Lo	gger:	ST
Depth	Sample / Tests	Field Records	Level	Depth (m)	Lanand		Description		Water		
(m)			(mOD)	(Thickness)		TOPSOIL	2000.19000		Š		
				(0.20)							
				0.20		Brown gravelly fine to coarse SA	AND. Gravel is subi	rounded fine to coar	se of		
				-		mixed lithologies, predominant	ly limestone				
0.50	В2			(0.50)							0.5
0.50	D3			-							0.5
0.50	ES1			- 0.70			<u>())) (0.70</u>				
				-		End o	of trial pit at 0.70m				
				-							
				_							1.0 -
				-							
				-							
				-							
				-							1.5
				-							
				-							
				-							
				-							
				-							2.0 -
				-							
				-							
				-							
				-							2.5
				-							
				-							
				-							
				-							3.0 -
				-							
				-							
				-							
				-							
				-							3.5
				-							
				-							
				-							
				F							4.0 -
				-							
				-							
				-							4.5
				-							
				ŀ							
				Ē							
				-							
temarks Io groundwate	er encountered.						Water	Strikes:	Stabilit Stable	y:	
5							Struck at (m):	Remarks:	Stable		
									Width		1.20
erminated on	Archaeologists ins	tructions.							Length	:	2.00



APPENDIX D Trial pit photographs



















































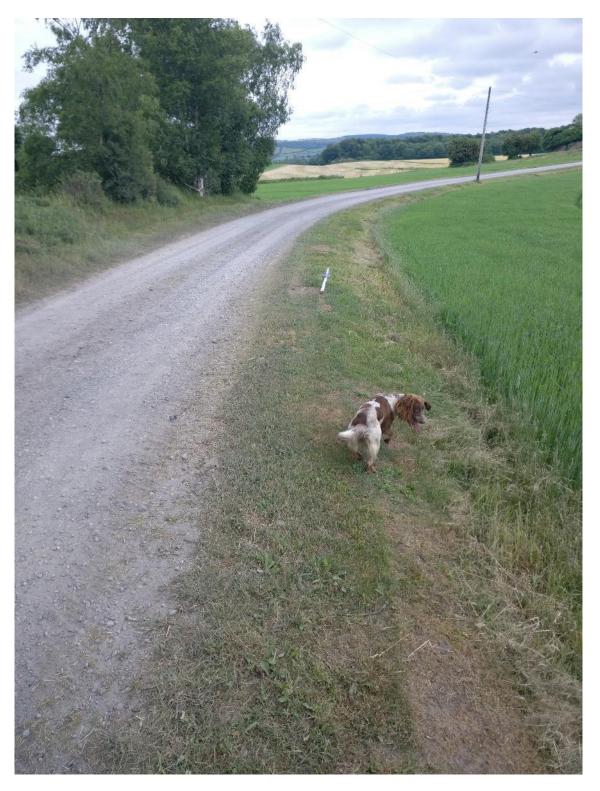


























Coolnabacky











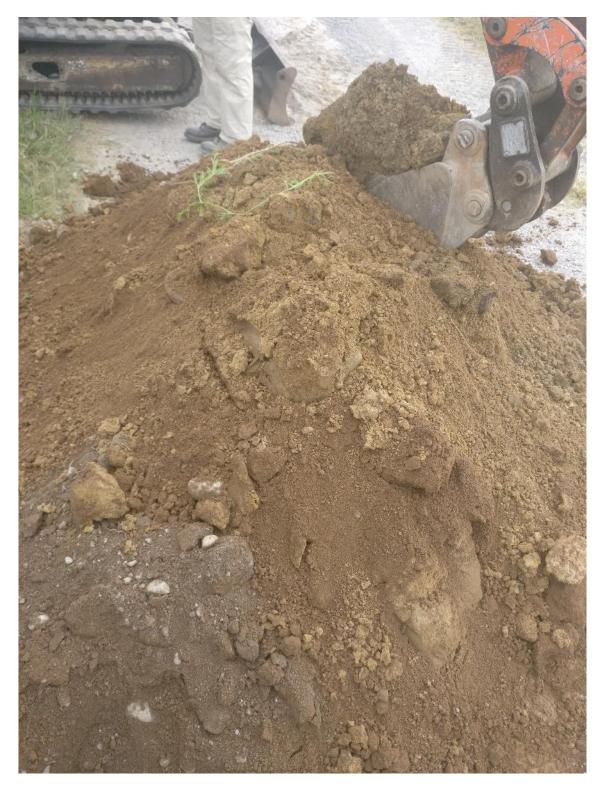




































































TP10













TP10









TP10





TP11

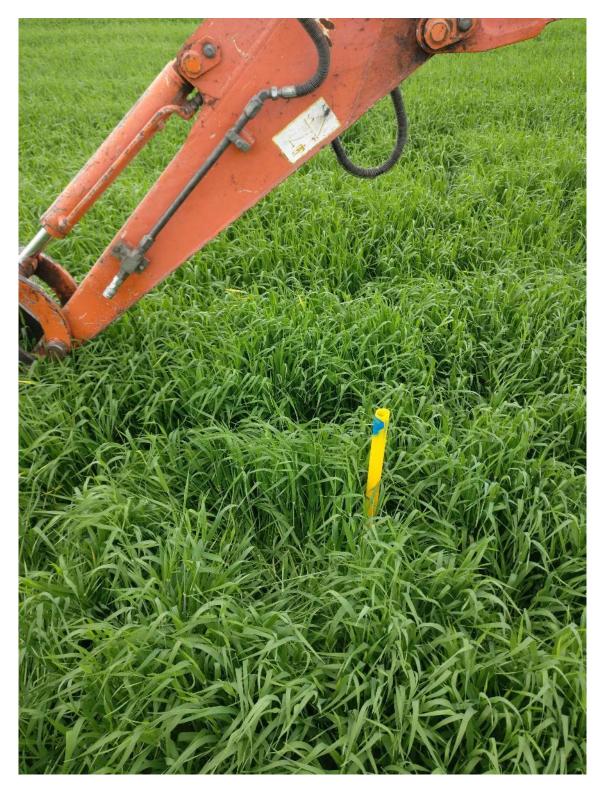
















TP11









TP12

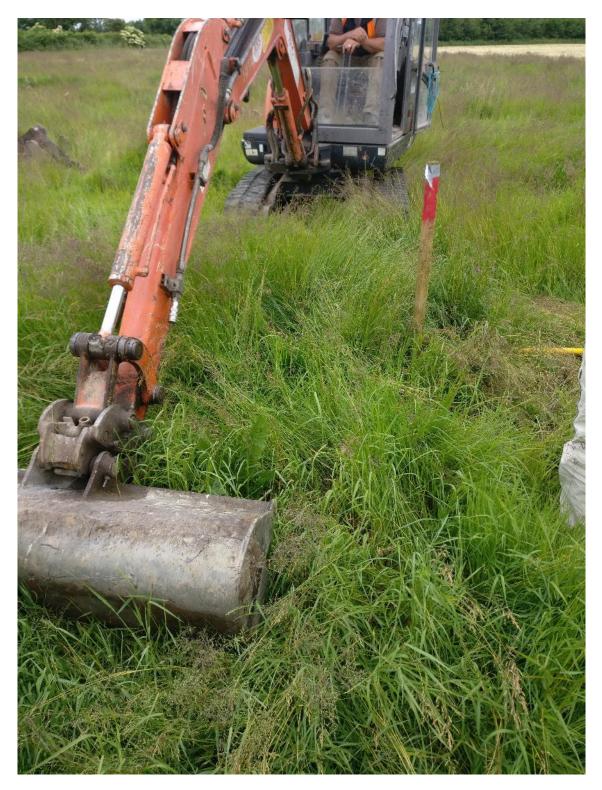












TP12





TP12





TP12





TP12













TP13





Coolnabacky



TP13





Report No.: 17-0439





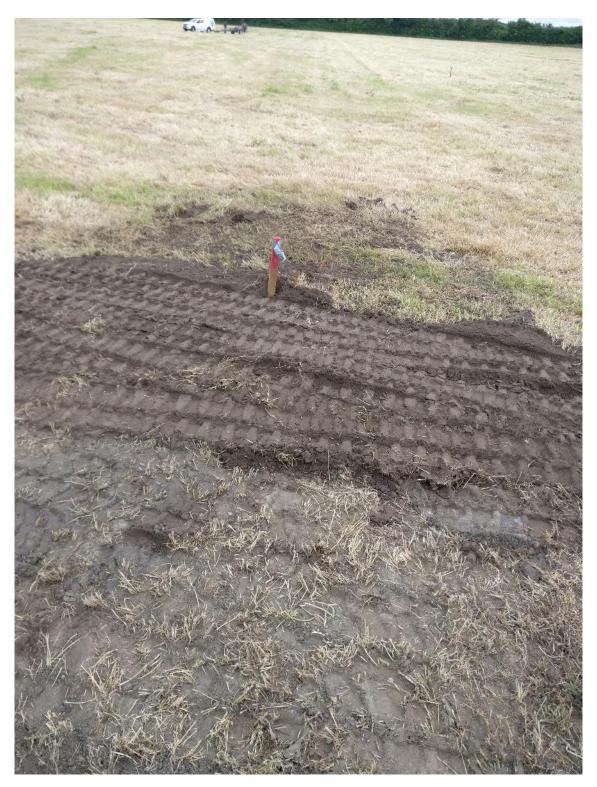
















TP14









TP14











Coolnabacky

































TP16



Coolnabacky











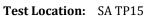


APPENDIX E Infiltration test results

Soakaway Infiltration Test

Project No.: 17-0439

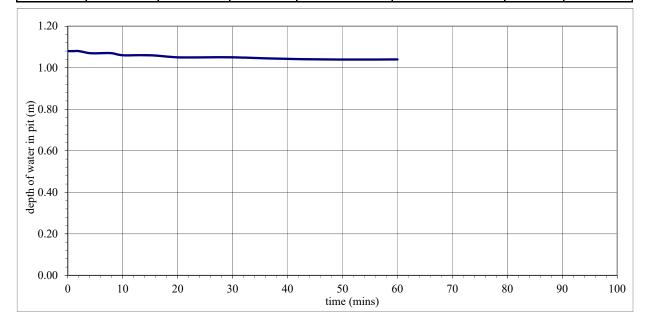
Site:	ESB Site in Coolnabacky, Co. Laois



Test Date: 19 June 2018



test pit top dimensions0.test pit base dimensions0.		width (m) 0.70 0.70 1.30	length (m)Analysis using method as described in BRE Digest1.30and CIRIA Report C697-The SUDS Ma0.50depth to groundwater before adding water (m) = Dry			SUDS Manual	
wate time (mins) / / / / / / / / / / / / / / / / / / /	epth to er surface (m) 0.22 0.22 0.23 0.23 0.23 0.23 0.24 0.24 0.25 0.25 0.25 0.26 0.26	depth of water in pit (m) 1.08 1.08 1.08 1.07 1.07 1.07 1.07 1.06 1.06 1.05 1.05 1.05 1.05 1.04 1.04		time is test end - 25% de 0.27 time is	m water depth not determined		
	epth to vater (m)	depth of water in pit (m)	time elapsed (mins)	volume of water lost (m ³)	Area of walls and base at 50% drop (m ²)	q (m/min)	q (m/h)



Soakaway Infiltration Test

Project No.: 17-0439

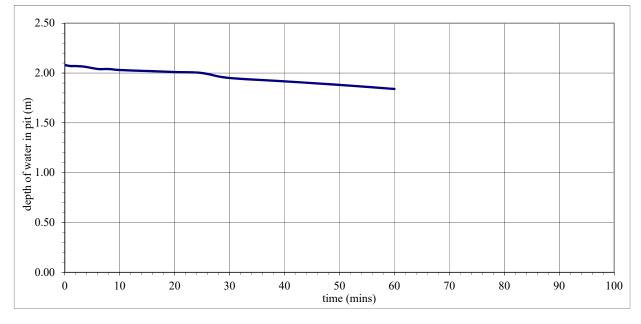
Site: ESB Site in Coolnabacky, G	Co. Laois
----------------------------------	-----------

Test Location: SA TP16

Test Date: 19 June 2018



test pit to	n dimonsions	width (m)	length (m)	Anal	lysis using method as de	escribed in BR	RE Diaest 36.
width (m) test pit top dimensions 0.80 test pit base dimensions 0.80			1.30 0.50		and CIRIA Repo	rt C697-The S	SUDS Manua
test	pit depth (m)	2.30	C	lepth to groundwa	ater before adding w	ater (m) =	Dry
time (mins) 0 1 2 4 6 8 10 15 20 25 30 45 60	depth to water surface (m) 0.22 0.23 0.23 0.24 0.26 0.26 0.26 0.27 0.28 0.29 0.30 0.35 0.40 0.46	depth of water in pit (m) 2.08 2.07 2.07 2.06 2.04 2.04 2.04 2.03 2.02 2.01 2.00 1.95 1.90 1.84	From g	time is test end - 25% de 0.52 time is	m water depth not determined		
time (mins)	depth to water (m)	depth of water in pit (m)	time elapsed (mins)	volume of water lost (m ³)	Area of walls and base at 50% drop (m ²)	q (m/min)	q (m/h)





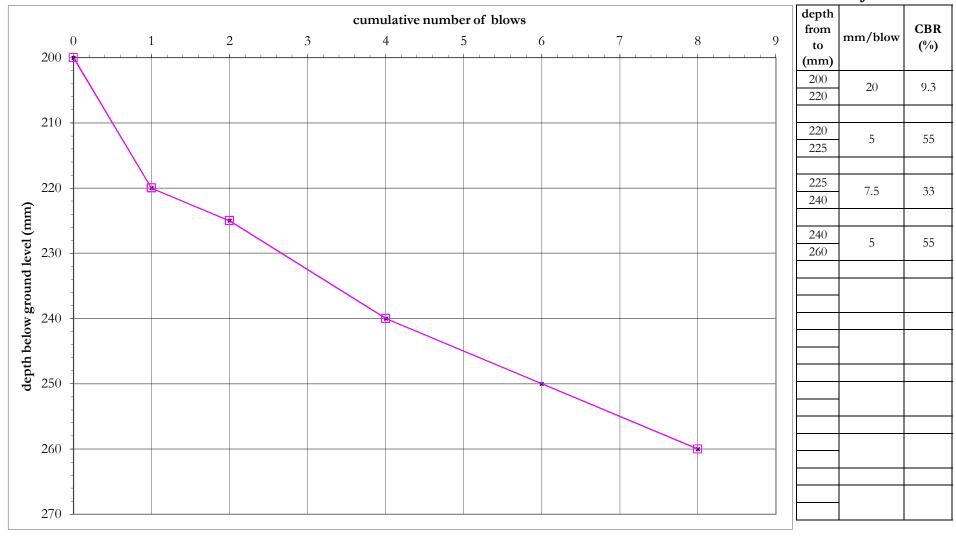
APPENDIX F Indirect CBR tests

CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBRProject:Coolnabacky 400kV GIS SubstationTest Number:TP01

Log CBR = 2.632-1.28 Log (mm/blow) **Project No: 17-0439**

Date: 13-Jun-18



CBR estimated using Kleyn & Van Heerden (1983):

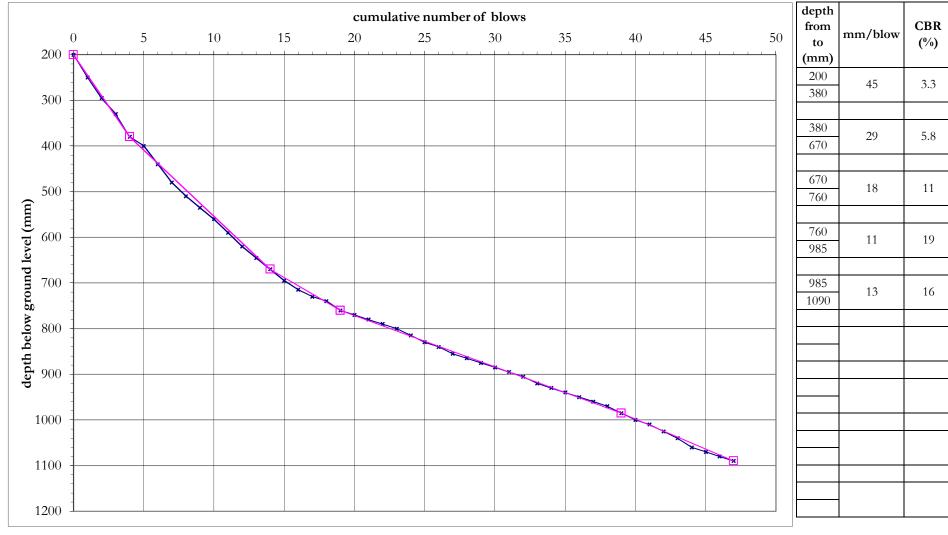
Dynamic Cone Penetrometer (DCP) test results and estimated CBRProject:Coolnabacky 400kV GIS Substation

Log CBR = 2.632-1.28 Log (mm/blow)

Date: 13-Jun-18

Project No: 17-0439

Test Number: TP02



CBR estimated using Kleyn & Van Heerden (1983):

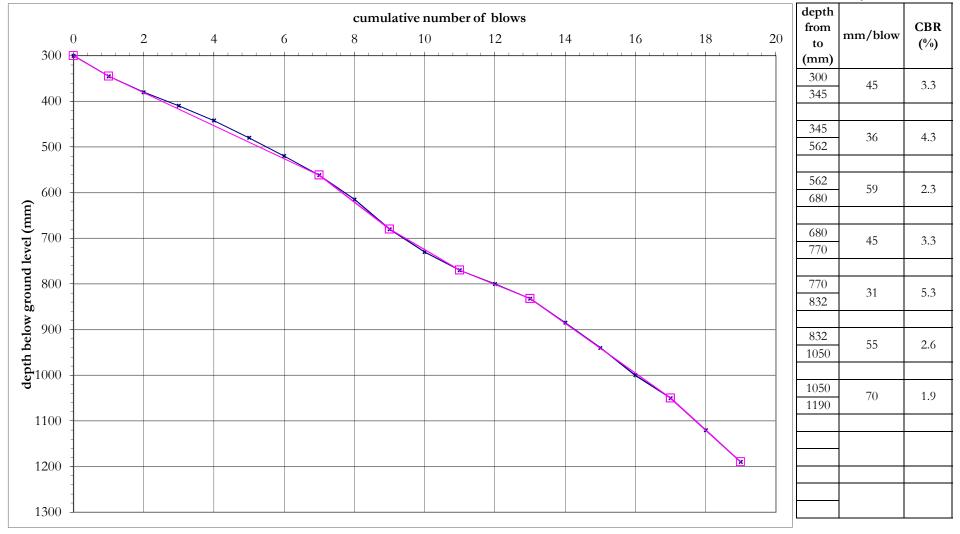
Dynamic Cone Penetrometer (DCP) test results and estimated CBRProject:Coolnabacky 400kV GIS Substation

Log CBR = 2.632-1.28 Log (mm/blow)

Test Number: TP03

Project No: 17-0439

Date: 13-Jun-18

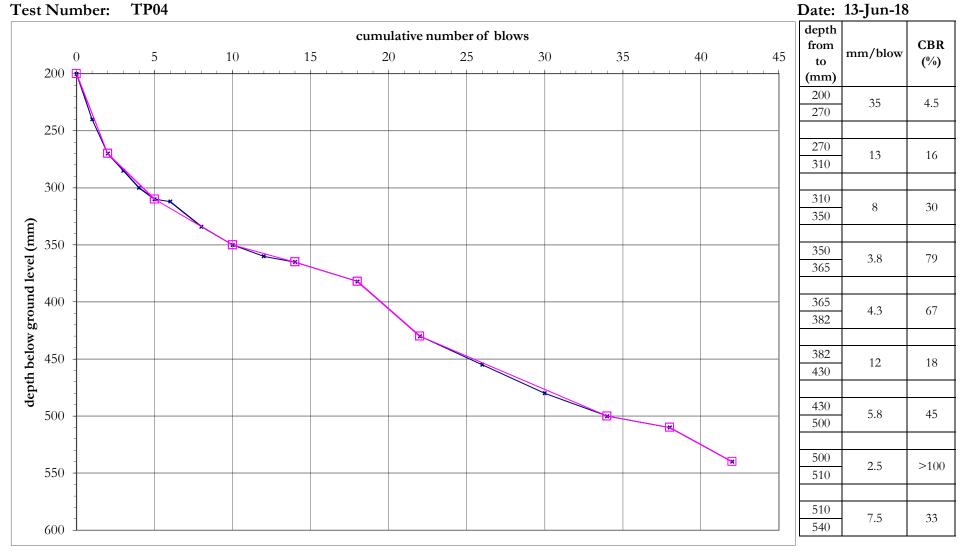


CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)Project No: 17-0439

Date: 13-Jun-18



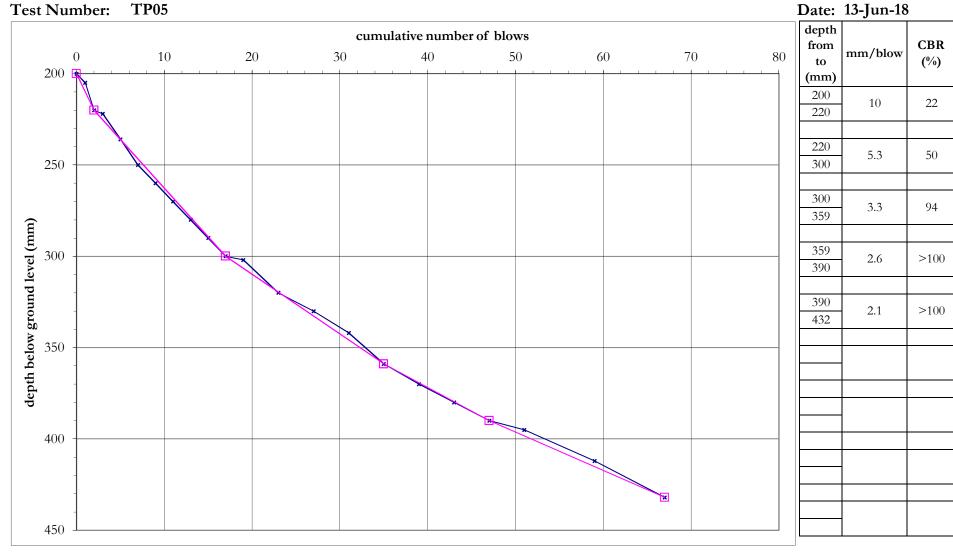
CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)

Project No: 17-0439

Test Number: **TP05**



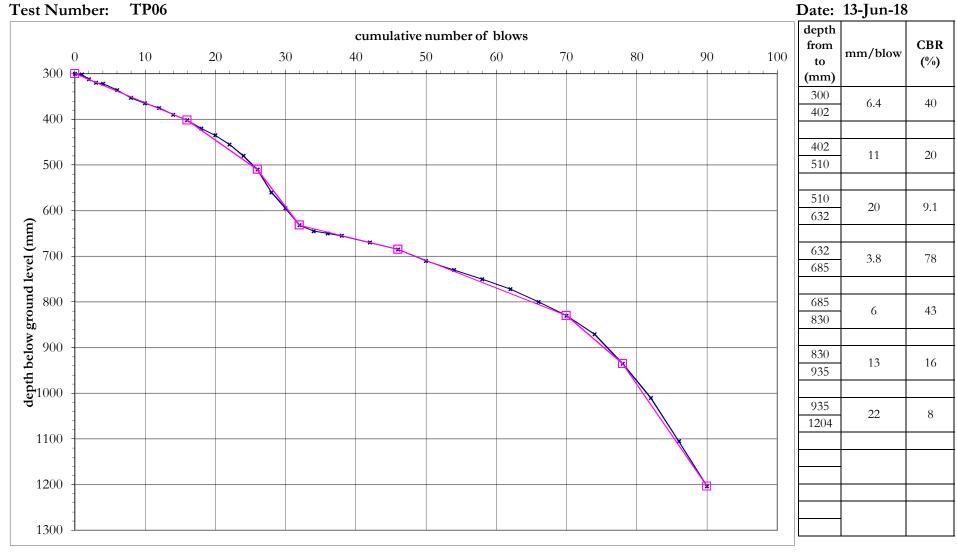
CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)

Project No: 17-0439

Test Number: **TP06**



CBR estimated using Kleyn & Van Heerden (1983):

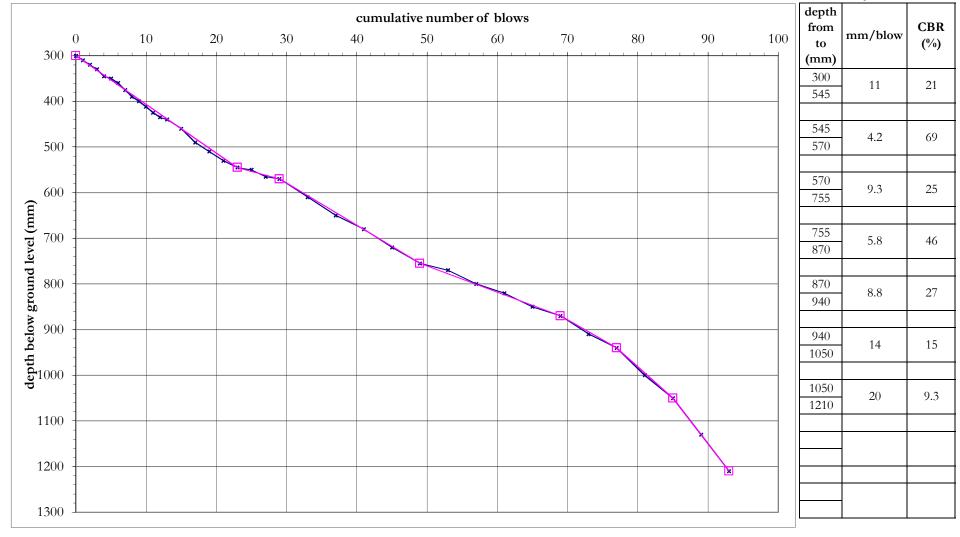
Dynamic Cone Penetrometer (DCP) test results and estimated CBRProject:Coolnabacky 400kV GIS Substation

Log CBR = 2.632-1.28 Log (mm/blow)

Date: 12-Jun-18

Project No: 17-0439

Test Number: TP07



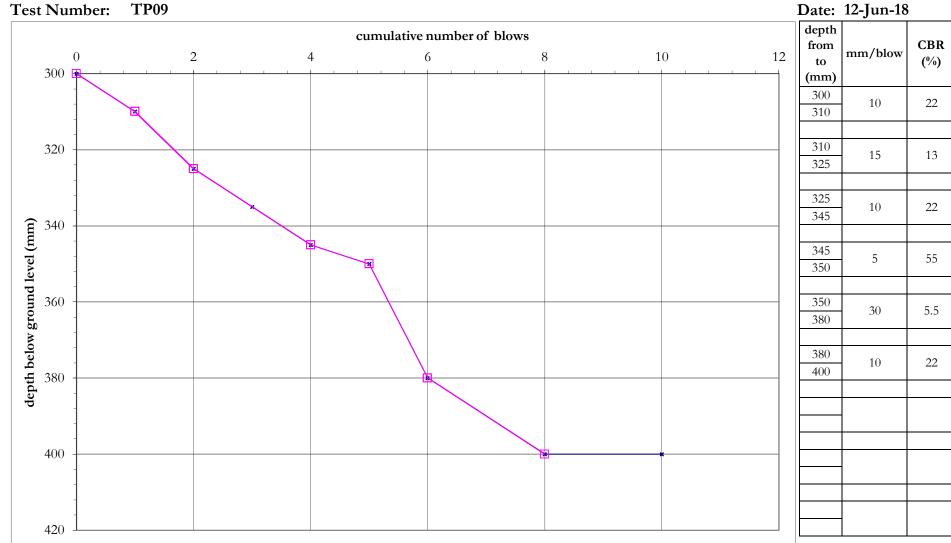
CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)Project No: 17-0439

TP09

Date: 12-Jun-18



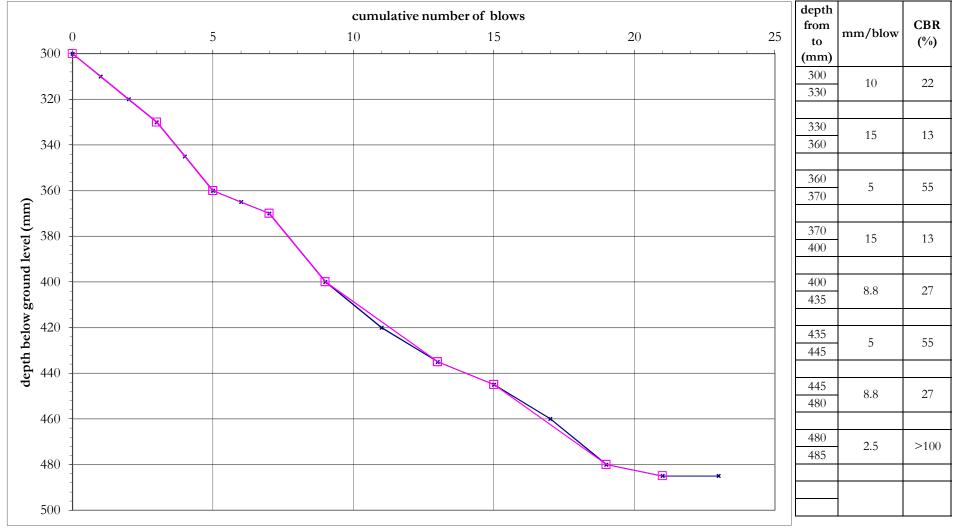
CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)Project No: 17-0439

Test Number: **TP10**

Date: 12-Jun-18



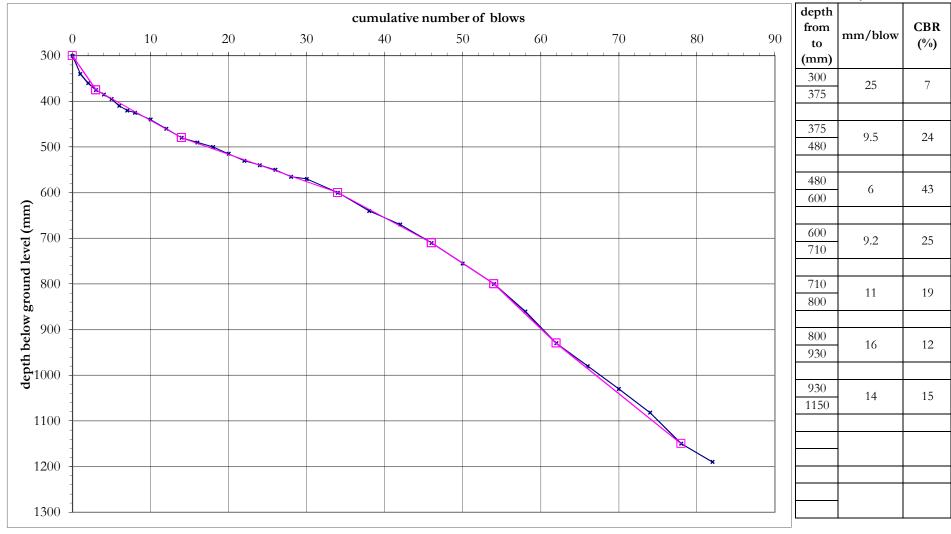
CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBRProject:Coolnabacky 400kV GIS Substation

Log CBR = 2.632-1.28 Log (mm/blow) **Project No: 17-0439**

Date: 12-Jun-18

Test Number: TP11

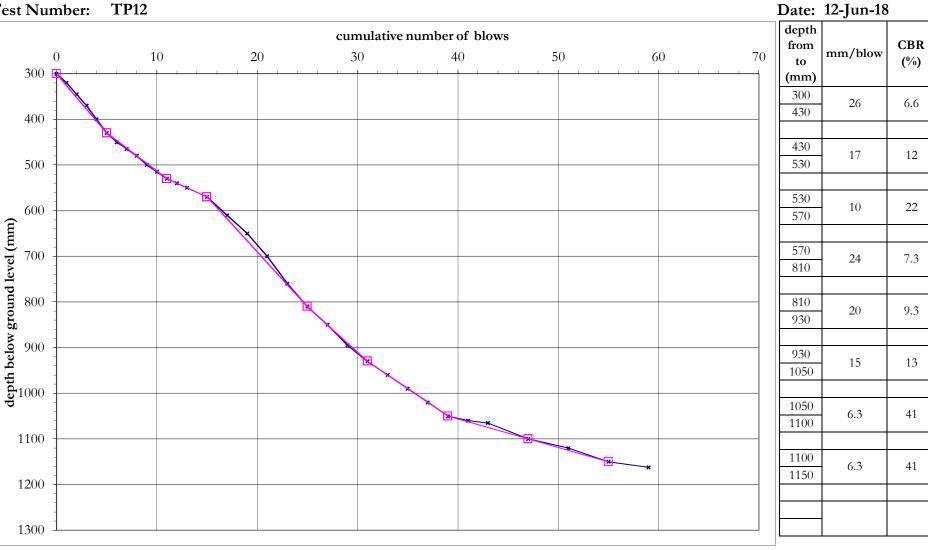


CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)Project No: 17-0439

Test Number: **TP12**



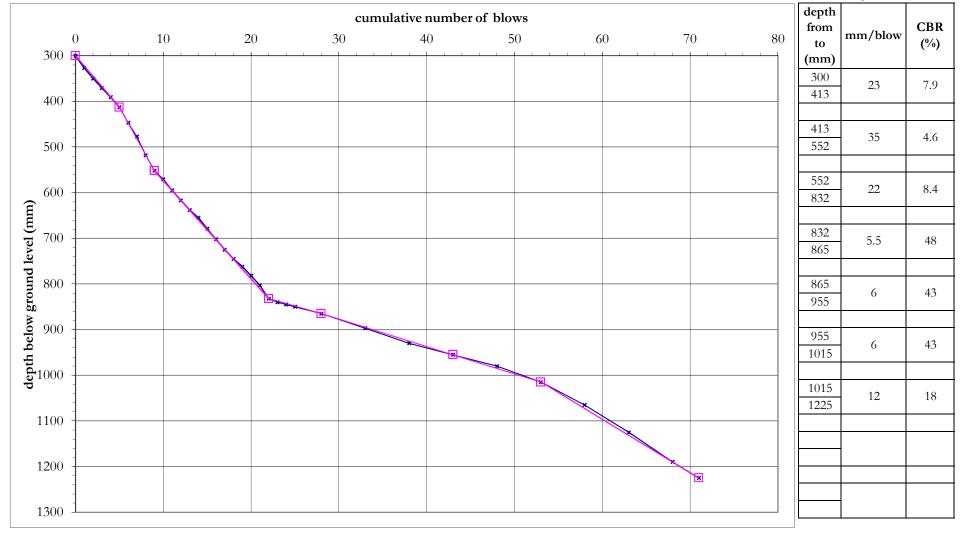
CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)

Test Number: **TP13** Project No: 17-0439

Date: 11-Jun-18



CBR estimated using Kleyn & Van Heerden (1983):

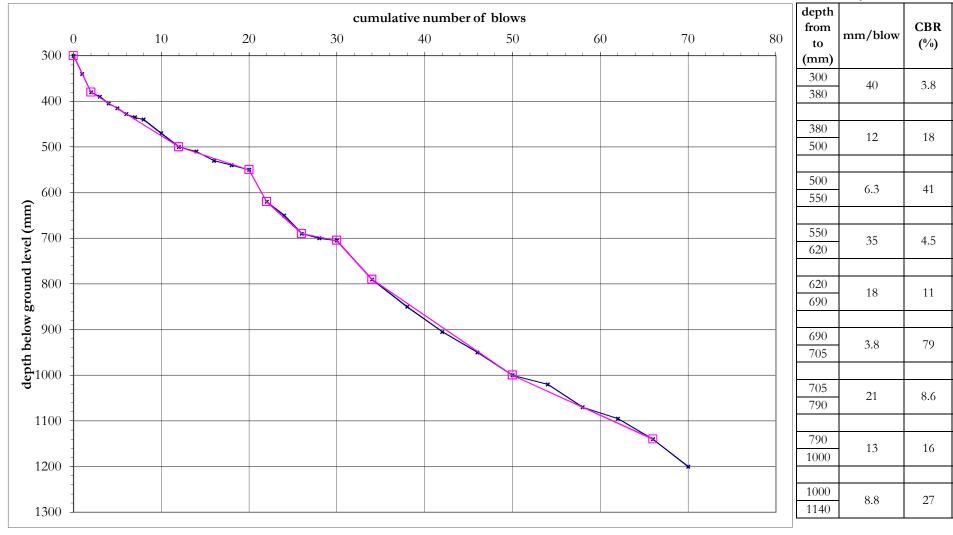
Dynamic Cone Penetrometer (DCP) test results and estimated CBRProject:Coolnabacky 400kV GIS Substation

Log CBR = 2.632-1.28 Log (mm/blow)

Date: 11-Jun-18

Project No: 17-0439

Test Number: TP14



CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBR Coolnabacky 400kV GIS Substation **Project:**

Log CBR = 2.632-1.28 Log (mm/blow)Project No: 17-0439

Test Number: **TP15**

Date: 11-Jun-18

			cumulative number o	f blows			depth from		CBR
	0	20 40	60	80	100	120	to	mm/blow	(%)
	300	× · · · · · · · · · · · · · · · · · · ·					(mm)		
	100	<u>\</u>					300 553	23	7.7
	400	¥							
	-	Ĩ, IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII					553	6.7	38
	500						633		
	600	Harris and a second sec					633	8.5	28
a l	. 600 -	The second secon					684	0.5	20
(m	700 800 900	The second secon					684	2	. 100
evel		*	*				748	3	>100
[pui	800 =		× + + + + + + + + + + + + + + + + + + +	z_			748		
prou				*			789	2.1	>100
MO	900			E Contraction of the second se					
l bel	-						789 869	5.3	50
epth	1000						007		
q	-						869 1228	18	11
	1100 +						1220		
	-								
	1200								
	-				×				
	1300 İ								

TP16

Test Number:

CBR estimated using Kleyn & Van Heerden (1983):

Dynamic Cone Penetrometer (DCP) test results and estimated CBRProject:Coolnabacky 400kV GIS Substation

Log CBR = 2.632-1.28 Log (mm/blow)

Project No: 17-0439

Date: 11-Jun-18

depth cumulative number of blows CBR from mm/blow (%) to (mm) 7.6 4.3 7.7 depth below ground level (mm) 000 1000 1000 6.9 7.5 6.2 ×



APPENDIX G

Geotechnical laboratory test results



SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

Client:	Eirgrid/Kileens Civil Engineering Ltd.		
Engineer:	Kileens Civil Engineering Ltd		
From:	Stephen Watson		
	Laboratory Manager		
	Causeway Geotech Ltd		
Tel:	+44(0)2827666640		
E-mail:	stephen.watson@causewaygeotech.com		
Date:	30/07/18		
Ref:	17-0439		

Coolnabacky 400kV GIS Substation

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

topen Wotin

Stephen Watson Laboratory Manager



Project Name Coolnabacky 400kV GIS Substation

Report Reference. 17-0439

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

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	Number of test results included in the report
SOIL	Moisture Content of Soil	BS1377: Part 2: Clause 3.2: 1990	20
SOIL	Liquid and Plastic Limits of soil -1 point cone penetrometer method	BS1377: Part 2: Clauses 4.4, 5.3 & 5.4 1990	19
SOIL	Particle size distribution - wet sieving	BS1377: Part 2: Clause 9.2: 1990	25
SOIL	Particle size distribution -sedimentation hydrometer method	BS1377: Part 2: Clause 9.5: 1990	20
SOIL – subcontracted to Chemtest Ltd	pH Value of Soil		7
SOIL – subcontracted to Chemtest Ltd	Sulphate Content water extract		7
SOIL – subcontracted to Chemtest Ltd	Water soluble chloride content		7

Causeway Geotech Ltd

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

CA	GEO	TECH			Summar	y of C	Clas	sific	ation	Test	t Re	sul	ts	
Project No.	0.40-		Project	Name		.		40.000	010.5					
17-	0439					Coolnab		<u> </u>			1			
Hole No.	Ref	Тор	mple Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH01	4	1.00		в	Grey sandy slightly gravelly silty CLAY.			8.5	51	21	14	7		CL
BH01	6	3.00		в	Grey sandy slightly gravelly silty CLAY.			9.3	70	21	17	7		CL
BH02	3	2.00		в	Grey sandy gravelly silty CLAY.			4.8	62	20	12	8		CL
BH03	2	1.00		в	Grey gravelly silty fine to coarse SAND.			12.0	37	26	NP			
BH03	5	4.00		в	Grey sandy gravelly silty CLAY.			7.0	69	24	14	10		CL
BH04	3	2.00		в	Grey sandy gravelly clayey SILT.			8.9	48	35	25	10		ML/MI
BH04	5	4.00		В	Grey sandy gravelly silty CLAY.			8.4	74	23	13	10		CL
BH06	4	3.00		в	Grey sandy gravelly silty CLAY.			11.0	67	20	13	7		CL
BH07	2	1.00		в	Brownish grey silty fine to coarse SAND.			21.0	91	20	17	3		ML
BH07	4	3.00		в	Grey slightly sandy clayey subangular fine to coarse GRAVEL with low cobble content.			12.0	69	23	10	13		CL
BH08	2	1.00		в	Brownish grey sandy gravelly silty CLAY.			12.0						
BH08	4	3.00		в	Grey slightly sandy gravelly silty CLAY with low cobble content.			6.6	58	20	13	7		CL
BH09	2	1.00		в	Brown sandy clayey silty subangular to subrounded fine to coarse GRAVEL.			6.0	48	20	14	6		ML/CL
Il tests perf	ormed	in acco	rdance v	vith BS	S1377:1990 unless specifie	d otherw	ise	-						
Key								Date F	Printed		Appr	oved	Ву	Table
Density Linear r	neasure	ment unles acement	is :			e density nall pyknom s jar	eter	;	30/07/20	18				1 sheet
	ter displ	acement	is :	cas - C			ieter		50/07/20	ıδ	Step	hen.	Watson	sheet 1

•			AY DH			Summar	y of C	Clas	sific	ation	Test	t Re	sult	ts	
roject No	0.			Project	Name										
	17-0439	9					Coolnab	acky	400kV	GIS Sul	ostation				
Hole No	D. Re	of -	Sarr Top		Туре	Soil Description	Dens bulk	ity dry	w	Passing 425µm	LL	PL	ΡI	Particle density	Casagrande Classification
			rop	Dube	турс		Mg/m	13	%	%	%	%	%	Mg/m3	
BH09	5	2	4.00		В	Grey sandy gravelly silty CLAY.			8.3	65	23	13	10		CL
BH10	2		1.00		В	Grey sandy silty subangular to subrounded fine to coarse GRAVEL.			9.0	35	19	NP			
TP02	2	(0.50		в	Brown sandy gravelly clayey SILT.			18.0	61	55	38	17		МН
TP05	1	(0.50		в	Brown sandy slightly clayey subangular fine to coarse GRAVEL.			103.0	54	32	22	10		CL
TP09	2	(0.50		В	Brown slightly gravelly silty fine to coarse SAND.			15.0	50	33	27	9		ML/CL
TP12	2	(0.50		В	Grey gravelly slightly clayey fine to coarse SAND.			7.2	31	21	14	7		CL
TP15	5		1.70		В	Grey sandy gravelly silty CLAY.			7.3	46	20	13	7		CL
ll tests p	performe	ed in	accor	dance w	vith BS	1377:1990 unless specifie	d otherwi	se	<u> </u>			1	<u> </u>	<u>ı </u>	
Line	nsity test ear measu			:		e unless : sp - sn	e density nall pyknom	eter	Date F	Printed 30/07/20	18	Appr	oved		Table 1
	- water dis immersio					asagrande method gj - gas ngle point test	s jar					Step	hen.	Watson	sheet 2

	CAUSEW	AY	D	ARTICLE SIZE				Job Ref		17-0439
	GEOTE	СН			DISTRIB			Borehole/Pit No.		BH01
Sit	e Name		Coolnabacky 40	0kV GIS Substatio	n			Sample No.		4
So	il Description		Grey sandy slightl	y gravelly silty CLAY.				Depth, m		1.00
Sp	ecimen Refere	nce	6	Specimen Depth			m	Sample Type		В
Te	st Method		BS1377:Part 2:199	90, clauses 9.2 and 9	.5			KeyLAB ID	Cau	s201807040
	CLAY	-	SILT		SAND			GRAVEL	COBBLES	BOULDERS
	100	Fin	e Medium	Coarse Fine	Medium	1 Coarse	Fine	Medium Coarse		<u>i</u>
	90									
	90									
	80									
	70									
g %										
Issin	60									
e Pa	50			/			_			
ntag	40									
Percentage Passing	40									
Ф.	30									
	20									
	10									
	0									
	·	Sie	ving	ll Sedime	Pa	article Size	mm			
	Particle Size		% Passing	Particle Size mm	% Passi	ing	Dry N	Aass of sample, g		873
			_			ing	.			
	125 90		100 100	0.0630	39 37		Sample Prop Cobbles	portions	%	o dry mass 0
	75		100	0.0360	35		Gravel			8
	63		100	0.0258	31		Sand			53
	50 37.5		100 100	0.0184 0.0097	27 21	—	Silt Clay		+	33 6
	28		100	0.0050	12					
	20 14		100 100	0.0029 0.0015	8		Grading Ana D100	alysis mm		
	14		100	0.0013	4		D100 D60	mm		0.129
	6.3		98				D30	mm		0.024
	5 3.35		96 95				D10 Uniformity C	mm		0.00364 35
	2		95				Curvature Co		1	1.2
	1.18		89						•	
	0.6		85 82	Particle density	(assumed)		Remarks	testing in accordance with BS137	7 unless noted bo	low
	0.425		78	2.65	Mg/m3	—	eparation and	accordance with D3137	. amess noted be	
	0.212		72							
	0.15		64 39							
	0.063		39	I		I				
			Approved				:	Sheet printed		
<u> </u>						4	20	/07/2018 12:10		Fig 1
1			Stephen.Wats	son			30	101/2010 12.10		Sheet

	CAUSEWAY						Job Ref	1	17-0439
	GEOTECH	P	ARTICLE SIZE	טוזוגוםט	TION		Borehole/Pit No.		BH01
Si	te Name	Coolnabacky 40	0kV GIS Substatior	า			Sample No.		6
Sc	bil Description	Grey sandy slightly	y gravelly silty CLAY.				Depth, m		3.00
Sp	becimen Reference	6	Specimen Depth			m	Sample Type		В
Te	est Method	BS1377:Part 2:199	90, clauses 9.2 and 9	.5			KeyLAB ID	Cau	201807041
	CLAY Fir	SILT ne Medium	Coarse Fine	SAND Medium	Coarse	Fine	GRAVEL Medium Coarse	COBBLES	BOULDERS
	100								
	90								
	80					/			
	70								
% ɓu	60								
Percentage Passing									
age F	50								
centa	40								
Per	30								
	20								
	10								
	0 0.001	0.01	0.1	Partie	1 cle Size r	nm	10	100	1000
	Sie	eving	Sedime	entation					
	Particle Size mm	% Passing	Particle Size mm	% Passing		Dry N	lass of sample, g		1046
	125	100	0.0630	47	- r	Sample Prop	oortions	%	dry mass
	90	100	0.0495	44 40		Cobbles			0
	75 63	100 100	0.0355 0.0254	36		Gravel Sand			18 35
	50	100	0.0182	32		Silt			39
	37.5 28	100	0.0096	25 19		Clay			9
	28	100	0.0049	13	I	Grading Ana	lysis		
	14	100	0.0015	6		D100	mm		
	10 6.3	99 95				D60 D30	mm mm	-	0.23
	5	93				D30 D10	mm	_	0.0022
	3.35	90				Uniformity C			100
	2	82				Curvature Co	pefficient		0.45
	1.18	77		ļ		. .			
	0.6	71	Particle density	(assumed)		Remarks	testing in accordance with BS13	77 unless poted b-1	0.14/
	0.425	68 63	2.65	Mg/m3	—		accordance with bS13	uniess noted bel	
	0.212	59	1						
	0.15	55	1						
	0.063	47	1						
		Approved				:	Sheet printed		Fig 1
\vdash		C L				30	/07/2018 12:10		
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	CAUSEWAY	D/	ARTICLE SIZE I				Job Ref		1	17-0439	
	GEOTECH	F7	ANTICLE SIZE I				Borehole/	Pit No.		BH02	
Si	te Name	Coolnabacky 400	kV GIS Substation				Sample No).		2	
Sc	il Description	Grey slightly sandy	silty CLAY.				Depth, m			1.00	
Sp	ecimen Reference	2	Specimen Depth			m	Sample Ty	pe		В	
T€	est Method	BS1377:Part 2:1990), clauses 9.2 and 9.5	5			KeyLAB ID		Caus	\$201807042	
	CLAY	SILT le Medium	Coarse Fine	SAND Medium	Coarse	Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS	
	100				•				•		
	90										-
	80										-
	70			_							-
% ɓu	60										
Percentage Passing											
age P	50										-
centa	40			_							-
Per	30										_
	20										
	10										-
	0.001	0.01	0.1		1		10		100		_ 000
	Sie	ving	Sedimer		ticle Size	mm					
	Particle Size mm	% Passing	Particle Size mm	% Passin	g	Dry N	Aass of sam	ple, g		980	
	125	100	0.0630	94		Sample Prop	ortions		%	dry mass	
	90	100	0.0484	90		Cobbles				0	
	75 63	100 100	0.0345 0.0245	86 83		Gravel Sand				2 4	
	50	100	0.0175	79		Silt				62	
	37.5 28	100 100	0.0092 0.0047	65 50		Clay				32	
	20	100	0.0028	40		Grading Ana	lysis				
	14	100	0.0015	25		D100 D60		mm		0.0074	
	10 6.3	100 100				D60 D30		mm mm		0.0074 0.00184	
	5	99				D10		mm			
	3.35	99 98				Uniformity C Curvature Co					
	1.18	98 97					Jennelent		1		
	0.6	96		(assumed)		Remarks					
	0.425	96 95	2.65 1	Mg/m3		Preparation and	testing in accorda	ince with BS1377	unless noted bel	ow	
	0.212	95 95									
	0.15	94									
	0.063	94									
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		AUSEW					DICT	וחוח				Job Ref			17-0439	
		GEOT			ARTIC	LE SIZE	וכוס	RIBU		N		Borehole	e/Pit No.		BH02	
Si	te Nar	me		Coolnabacky 4	00kV GIS	Substatio	n					Sample I	No.		3	
Sc	oil Des	scription		Grey sandy grave	elly silty CL	.AY.						Depth, n	I		2.00	
Sp	pecime	en Refer	ence	6		Specimer Depth	1				m	Sample 1	Гуре		В	
Τe	est Me	ethod		BS1377:Part 2:19	990, clause	es 9.2 and 9).5					KeyLAB I	D	Ca	us201807043	
	-	CLAY	Fin	SILT e Medium	Coarse	Fine		AND	Coa	irse	Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS	
	100															<u>ה</u>
	90					_										-
	80	 				_										-
	70															
%	70															
ssing	60	1														-
je Pa	50					-		\wedge								+
Percentage Passing	40	 					\checkmark									-
Perc	30															
	20	1														Ť
	10					_										-
	0	.001		0.01		0.1			1			10		100		 1000
			Sie	ving		Sedim	entatio		icle Siz		mm	Asso of say	anla a		1220	
	Ра	rticle Siz	e mm	% Passing	Particl	e Size mm	%	Passin	g		Dry N	Aass of sar	npie, g		1220	
		125		100	0	.0630		33			Sample Prop	oortions		ç	% dry mass	
		90 75		100 100		.0497 .0356		32 29			Cobbles Gravel				0 30	
		63		100		.0253		27			Sand				37	
		50 37.5		100 100		.0181		24 21			Silt Clay				24 9	
		28		100	0	.0048		18							5	
		20 14		100 97	_	.0028 .0015		14 6			Grading Ana D100	alysis	mm			
		10		93				-			D60		mm		0.773	
	-	6.3 5		86 83					-		D30 D10		mm mm		0.042	
		3.35		79							Uniformity (1	370	
		2 1.18		70 65							Curvature Co	petficient		1	1.1	
		0.6		57		cle density	(assun				Remarks	tecting in account	dance with PC123	17 unless nated -	elow	
	\vdash	0.425)	54 49	╢──	2.65	Mg/m	3	-		Freparation and	Lesting in accor	dance with BS137	7 unless noted b	eiuw	
		0.212		44												
		0.15 0.063		39 33												
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	CAUSEV							Job Ref		:	17-0439	
-85	GEOT	TECH		PARTICLE SIZ	DISTRI	BOLION		Borehole/P	Pit No.		BH03	
Si	te Name		Coolnabacky 40	00kV GIS Substati	on			Sample No			2	
Sc	oil Description	1	Grey gravelly silty	r fine to coarse SAN	D.			Depth, m			1.00	
Sp	becimen Refer	rence	6	Specime Depth	n		m	Sample Typ	pe		В	
Te	est Method		BS1377:Part 2:19	90, clauses 9.2 and	9.5			KeyLAB ID		Cau	s201807044	
	CLAY	Fir	SILT e Medium	Coarse Fine	SAN Mediu		Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS	
	100											1
	90											-
	80											
%	70											-
ing %	60						1					-
Percentage Passing	50											
itage												
ercen	40											1
ď.	30											
	20				/							-
	10											-
	0											
	·	Sie	ving	Sedin	rentation	Particle Size	mm					
	Particle Siz		% Passing	Particle Size mm		sing	Dry N	Mass of samp	ole, g		1011	
	125		100	0.0630	1	<u> </u>	Sample Pro	portions		%	dry mass	
	90		100	0.0542	14	4	Cobbles				0	
	75 63		100 100	0.0385	1		Gravel Sand				34 50	
	50		100	0.0195	g		Silt				15	
	37.5 28		100 100	0.0101 0.0051	5		Clay				1	
	20		100	0.0030	2		Grading Ana	alysis				
	14 10		95 90	0.0016	C)	D100 D60		mm mm		1.04	
	6.3		84				D30		mm		0.228	
	5 3.35	5	80 76			—	D10 Uniformity (Coefficient	mm		0.0238 44	
	2 1.18)	66				Curvature C				2.1	
	0.6		61 54	Particle density	(assumed)	Remarks					
	0.425		47 37	2.65	Mg/m3		Preparation and	testing in accordar	nce with BS1377	unless noted be	low	
	0.3		28	╢								
	0.15		22 16	-								
	0.063	5				J		Sheet printed			1	
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		AUSEW			PARTICLE SIZE	ראס				Job Ref			17-0439
		GEOT	ECH		ARTICLE SIZE	ינוס.	RIDU			Borehole	e/Pit No.		BH03
Si	te Na	ime		Coolnabacky 4	00kV GIS Substatic	n				Sample 1	۱o.		5
So	oil De	scription		Grey sandy grave	elly silty CLAY.					Depth, n	1		4.00
Sp	pecim	nen Refere	ence	6	Specimer Depth	ı			m	Sample 1	уре		В
Te	est M	ethod		BS1377:Part 2:19	990, clauses 9.2 and 9	9.5				KeyLAB I	D	Ca	us201807045
		CLAY	Fir	SILT Nedium	Coarse Fine		SAND ledium	Coarse	Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS
	100)											······································
	90	,											
	00												
	80	1											
%	70) 											
ing	60	,		<u> </u>									
Percentage Passing	50												
age I	50)											
cent	40)											
Per	30	,											
	20) 											
	10								_				
	0												
	–		Sie	ving	Sedim	entatio	'n	_					
	P	article Siz		% Passing	Particle Size mm		Passing		Dry N	Aass of sar	nple, g		4461
		125		100	0.0630	^	35		Sample Prop	ortions			% dry mass
		90		100	0.0484		34		Cobbles				0
		75		100	0.0345		32		Gravel				41
		63 50		100 89	0.0247		30 28		Sand Silt				24 22
		37.5		84	0.0092		24		Clay				13
		28		80	0.0047		19 15	_	Gradine Arr				
	\vdash	20 14		78 74	0.0028		15 11		Grading Ana D100	114212	mm		
		10		71					D60		mm		2.43
		6.3 5		67 65	_				D30 D10		mm		0.0262
	┢	3.35		65		+			Uniformity C	Coefficient	mm		
		2		59					Curvature Co				
		1.18 0.6		56 53	Particle density	(assur	mad)		Remarks				
		0.6	5	53	2.65	(assur Mg/m			Preparation and	testing in accor	dance with BS137	77 unless noted b	elow
		0.3		48									
	-	0.212		45 41									
	F	0.15		35									
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				Charles - 144	tran				30	/07/2018 1	2:10		Γ ¹ δ
				Stephen.Wa	ISON								Sheet

	CAUSEW			PARTICLE SIZE				Job Ref	1	17-0439
×,	GEOTE	СН		PARTICLE SIZE				Borehole/Pit No.		BH04
Si	te Name		Coolnabacky 4	00kV GIS Substatio	n			Sample No.		3
So	il Description		Grey sandy grave	elly clayey SILT.				Depth, m		2.00
Sp	ecimen Referer	nce	6	Specimen Depth			m	Sample Type		В
Te	est Method		BS1377:Part 2:1	990, clauses 9.2 and 9	0.5			KeyLAB ID	Caus	201807046
	CLAY	Fin	SILT e Medium	Coarse Fine	SAND Medium	Coarse	e Fine	GRAVEL Medium Coarse	COBBLES	BOULDERS
	100									
	90									
	70									
sing %	60									
e Pass	50									
Percentage Passing	40				/					
Perc	30									
	20									
	10									
	0.001		0.01	0.1		1		10	100	1000
	[Sie	ving	Sedimo	entation	ticle Size	mm	Acce of completion		5306
	Particle Size	mm	% Passing	Particle Size mm	% Passir	ng	DIYN	Aass of sample, g		5300
	125 90		100 100	0.0630 0.0485	29 27		Sample Prop Cobbles	oortions	%	dry mass 0
	75		100	0.0346	26		Gravel			28
	63 50		100 100	0.0248	24 23		Sand Silt			43 18
	37.5		98	0.0093	20		Clay			10
	28		97	0.0048	16			Luc's		
	20 14		93 89	0.0028	12 9		Grading Ana D100	ilysis mm		
	10		86				D60	mm		0.459
	6.3		81				D30	mm		0.0701
	5 3.35		79 77				D10 Uniformity C	nm `oefficient		0.00171 270
	2		72		<u> </u>		Curvature Co			6.3
	1.18		69						-	
	0.6		63 59	Particle density 2.65	(assumed)		Remarks	testing in accordance with BS137	7 unless noted bot	0.14
	0.425		59	2.05	Mg/m3		eparación anu	with D313/	. amess noted bei	
	0.212		45							
	0.15		37							
	0.063		29							
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	CAUSE				DICTOID			Job Ref		17-0439
-	GEO GEO	TECH		PARTICLE SIZE	DISTRIB	UTION		Borehole/Pit No.		BH04
Si	ite Name		Coolnabacky 4	00kV GIS Substatio	n			Sample No.		5
S	oil Description	1	Grey sandy grav	elly silty CLAY.				Depth, m		4.00
S	pecimen Refer	rence	6	Specimer Depth	1		m	Sample Type		В
Т	est Method		BS1377:Part 2:1	990, clauses 9.2 and 9	9.5			KeyLAB ID	Cau	us201807047
	CLAY	Fir	SILT ne Medium	Coarse Fine	SAND Medium	Coarse	Fine	GRAVEL Medium Coarse	COBBLES	BOULDERS
	100									
	90 -									
	80									
	70									
g %										
Percentage Passing	60 -									
Je Pa	50			·						
entaç	40									
Derce										
_	30 -									
	20									
	10	\vdash								
	0									
				0.1	Pa	1 rticle Size	mm	10	100	1000
		Sie	ving			-			100	
	Particle Siz		ving % Passing		Pa entation % Passi	rticle Size		Aass of sample, g	100	2221
	Particle Siz	ze mm		Sedim	entation	rticle Size		Nass of sample, g		
	125 90	ze mm	% Passing 100 100	Sedim Particle Size mm 0.0630 0.0478	entation % Passi 40 39	rticle Size	Dry N Sample Prop Cobbles	Nass of sample, g		2221 % dry mass 0
	125	ze mm	% Passing	Particle Size mm	entation % Passi 40	rticle Size	Dry N Sample Prop	Nass of sample, g		2221 % dry mass
	125 90 75 63 50	ze mm	% Passing 100 100 100 100 100	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176	entation % Passi 40 39 36 33 30	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt	Nass of sample, g		2221 % dry mass 0 33 27 29
	125 90 75 63 50 37.5	ze mm	% Passing 100 100 100 100 100 100	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092	entation % Passi 40 39 36 33 30 26	rticle Size	Dry N Sample Prop Cobbles Gravel Sand	Nass of sample, g		2221 % dry mass 0 33 27
	125 90 75 63 50 37.5 28 20	ze mm	% Passing 100 100 100 100 100 100 93	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0047	entation % Passi 40 39 36 33 30 26 20 16	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana	Mass of sample, g		2221 % dry mass 0 33 27 29
	125 90 75 63 50 37.5 28 20 14	ze mm	% Passing 100 100 100 100 100 100 93 89	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047	with the second secon	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100	Mass of sample, g	9	2221 % dry mass 0 33 27 29 11
	125 90 75 63 50 37.5 28 20	ze mm	% Passing 100 100 100 100 100 100 93	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0047	entation % Passi 40 39 36 33 30 26 20 16	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana	Aass of sample, g	9 	2221 % dry mass 0 33 27 29
	125 90 75 63 50 37.5 28 20 14 10 6.3 5	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0047	entation % Passi 40 39 36 33 30 26 20 16	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Mass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76 73	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0047	entation % Passi 40 39 36 33 30 26 20 16	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C	Aass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420
	125 90 75 63 50 37.5 28 20 14 10 6.3 5	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0047	entation % Passi 40 39 36 33 30 26 20 16	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Aass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76 73 67 63 58	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0028 0.0015	************************************	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420 0.2
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.42	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76 73 67 63 58 55	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0028 0.0015	************************************	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Aass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420 0.2
	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76 73 67 63 58	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0028 0.0015	************************************	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420 0.2
	125 90 75 63 50 37.5 28 20 14 14 10 6.3 5 3.35 2 1.18 0.6 0.42 0.3 0.21 0.15	ze mm	% Passing 100 100 100 100 100 100 100 10	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0028 0.0015	************************************	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420 0.2
	125 90 75 63 50 37.5 28 20 14 14 10 6.3 5 3.35 2 1.18 0.6 0.42 0.3 0.21	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76 73 67 63 58 55 51 48	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.0176 0.0092 0.0047 0.0028 0.0015	************************************	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420 0.2
	125 90 75 63 50 37.5 28 20 14 14 10 6.3 5 3.35 2 1.18 0.6 0.42 0.3 0.21 0.15	ze mm	% Passing 100 100 100 100 100 100 100 93 89 83 78 76 73 67 63 58 55 51 48 48 45 40	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.00176 0.0092 0.0047 0.00015	************************************	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Clay D100 D30 D10 Uniformity C Curvature Co Remarks Preparation and	Mass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420 0.2 elow
	125 90 75 63 50 37.5 28 20 14 14 10 6.3 5 3.35 2 1.18 0.6 0.42 0.3 0.21 0.15	ze mm	% Passing 100 100 100 100 100 100 100 10	Sedim Particle Size mm 0.0630 0.0478 0.0342 0.0245 0.00176 0.0092 0.0047 0.00015	************************************	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks Preparation and	Aass of sample, g	9 	2221 % dry mass 0 33 27 29 11 0.775 0.0168 0.00184 420 0.2

	CAUSEWA	AY		Δατιά	CLE SIZE	DISTRI	BLIT			Job Ref		-	17-0439
	GEOTEC	СН	•			DISTRI	bon			Borehole	e/Pit No.		BH06
Si	te Name		Coolnabacky 40	00kV GIS	Substatio	า				Sample N	۱o.		2
So	il Description		Grey slightly sand	ly clayey	SILT.					Depth, m	1		1.00
S	ecimen Referen	nce	2		Specimen Depth				m	Sample T	ӯре		В
Te	est Method		BS1377:Part 2:19	90, claus	es 9.2 and 9	.5				KeyLAB I	D	Cau	5201807048
	CLAY	Fin	SILT e Medium	Coarse	Fine	SAN Mediu		Coarse	Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS
	100												
	90								-				
	80												
	70			_/					_				
% ɓu	60												
Percentage Passing													
age F	50			1									
centa	40			/					_				
Pel	30	_							_				
	20												
	10												
	0.001	Cia	0.01	-11	0.1		Particle	1 e Size	mm	10		100	1000
	Particle Size		ving % Passing	Dartic	le Size mm	entation % Pa	scing	_	Dry N	Mass of san	nple, g		1135
	125	mm	[%] Passing 100		0.0630	% Pa:		_	Sample Pro	ortions		0/	dry mass
	90		100	_).0542	8			Cobbles	portions		70	0
	75		100	_	0.0385	7			Gravel				1
	63 50		100 100	_).0275).0197	5		-	Sand Silt				8 92
	37.5		100	_	0.0103	1			Clay				0
	28 20		100 100	_).0052).0030	(Grading Ana	alysis		1	
	14		100	_).0016	(D100	•	mm		
	10 6.3		100 100					-	D60 D30		mm mm	 	0.0319 0.0193
	5		100						D10		mm		0.0193
	3.35		100]	Uniformity (3.2
	2		100 99					-	Curvature Co	Demicient		l	1.2
	0.6		99	Parti	cle density	(assumed)		Remarks				
	0.425		98 97		2.65	Mg/m3		_	Preparation and	testing in accore	dance with BS1377	unless noted bel	ow
	0.3		97	╢									
	0.15		94	1									
	0.063		92										
			Approvec	1						Sheet printe			Fig 1
			Stephen.Wat	son					30	/07/2018 12	2.10		Sheet

		AUSEW				LE SIZE	DICT	DIDI					Job Ref				17-04	139	
2		GEOT			ANIC		0131	NIDU	,				Borehole	e/Pit No.			внс)6	
Si	te Nar	me		Coolnabacky 40	0kV GIS	Substatio	n						Sample I	No.			4		
Sc	oil Des	scription		Grey sandy grave	lly silty CL	AY.							Depth, n	ı			3.0	0	
Sp	pecime	en Refere	ence	6		Specimer Depth	I				m		Sample ⁻	Гуре			В		
Te	est Me	ethod		BS1377:Part 2:19	90, clause	s 9.2 and 9	0.5					1	KeyLAB I	D		C	aus2018	307049	
	-	CLAY	Fin	SILT e Medium	Coarse	Fine		AND	Co	arse	Fine		RAVEL	Coarse	_ (COBBLES	BOL	JLDERS	
	100							i											
	90												\swarrow						
	80											/							-
	70																		
g %																			
assing	60																		1
Percentage Passing	50						\checkmark												-
centa	40							_											-
Perc	30																		-
	20																		
	10																		-
			Sia	ving	<u>.</u>	Sadim	entation		icle S	ize	mm								
	Pa	rticle Size		% Passing	Particle	e Size mm		n Passing	7		Dry	/ Mas	ss of sar	nple, g			243	7	
	Рd	125	emm	100		0630	70	39	5		Sample Pr	onor	tions		-		% dry i	mass	
		90		100	0.	0495		36			Cobbles	opon	cions				0		
		75 63		100 100		0355 0254		33 30			Gravel Sand						30 31		
		50		100	0.	0182		27			Silt						33		
		37.5 28		100 100		0096 0049		22 16			Clay						6		
		20		100	0.	0029		11			Grading A	nalys	is						
	\vdash	14 10		95 90	0.	0016		3			D100 D60				nm nm		0.48	32	
		6.3		85							D30			n	nm		0.02	58	
		5 3.35		82 79							D10 Uniformity	/ Coel	fficient	n	nm		0.002		
		2		70							Curvature						0.5		
		1.18 0.6		66 62	Partic	e density	(assum	ned)			Remarks								
		0.425	5	59		2.65	Mg/m3				Preparation ar	nd testi	ing in accor	dance with B	S1377	unless noted	below		
		0.3	2	55 51	-														
		0.15		47															
		0.063)	39	Ш													<u>.</u>	
				Approved				T				She	et printe	ed				Fig	1
\vdash				Stephen.Wat	son			\neg			3	30/07	/2018 1	2:10				-	-
																	S	heet	

	CAUSEW			PARTICLE SIZE				Job Ref			17-0439
	GEOTE		ſ	ANTICLE SIZE		IBUTION		Borehole/	Pit No.		BH07
Si	te Name		Coolnabacky 40	00kV GIS Substatio	n			Sample No	0.		2
So	oil Description		Brownish grey sil	ty fine to coarse SAN	D.			Depth, m			1.00
S	becimen Refere	ence	6	Specimer Depth	1		m	Sample Ty	/pe		В
Te	est Method		BS1377:Part 2:19	90, clauses 9.2 and 9	9.5			KeyLAB ID)	Cau	s2018070410
	CLAY		SILT		SAN			GRAVEL		COBBLES	BOULDERS
	100	Fir	ne Medium	Coarse Fine	Med	ium Coarse	Fine	Medium	Coarse		
	90				\bigwedge						
	80										
	70										
g %	co										
assin	60										
Percentage Passing	50										
entaç	40			/							
erce											
ш	30										
	20										
	10										
	0										
	0.001	Sig	0.01	0.1	entation	1 Particle Size	mm	10		100	1000
	Particle Size		% Passing	Particle Size mm	1	assing	Dry N	Mass of sam	ple, g		442
	-	:				0	Converto Duor				/
	125 90		100 100	0.0630		39 35	Sample Prop Cobbles	portions		9	6 dry mass 0
	75		100	0.0369		29	Gravel				2
	63		100	0.0266		22	Sand				59
	50 37.5		100 100	0.0190		18 12	Silt Clay				35 4
	28		100	0.0050	1	10				·	
	20 14		100 100	0.0029		6 2	Grading Ana D100	alysis			
	14		100	0.0010		<u> </u>	D100 D60		mm mm		0.0998
	6.3		99				D30		mm		0.04
	5		99				D10		mm		0.0049
	3.35		99 98				Uniformity (Curvature Co			+	20 3.3
	1.18		97				L				
	0.6		94	Particle density	(assume	d)	Remarks	testing in a	man with post-	77 unless s 1	
	0.425		93 91	2.65	Mg/m3		Preparation and	testing in accorda	ance with BS137	/ unless noted b	EIUW
	0.212		87								
	0.15		79								
	0.063		39	II							
			Approved	1				Sheet printed	ł		
				-		_	20	1/07/2010 12	.10		Fig 1
			Stephen.Wat	son			30)/07/2018 12	.10		Sheet
1											•

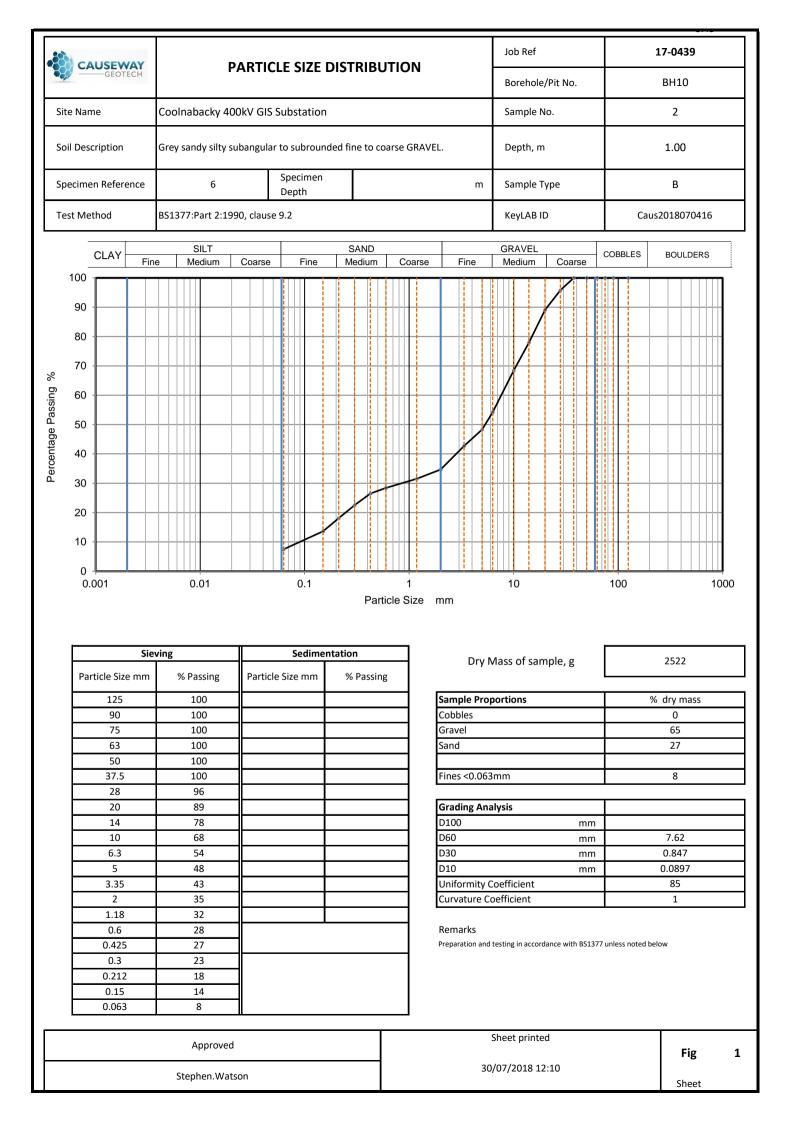
		AUSEW				DADT				ICTO		1714						Job Re	f					17-	0439	
		GEOT				PART	ICL	E SIZ	LE D	1218	(IB(110	UN					Boreho	ole/Pi	t No.				Bŀ	107	
Si	te Na	me		Coolı	nabacky	400kV G	IS Sı	ubstat	ion									Sample	e No.						4	
So	oil Des	scription		Grey : conte	slightly sa nt.	ndy claye	y sut	bangul	ar fine	e to co	arse	GRA	VEL V	with	low	cobble	e	Depth,	m					3.	00	
Sp	pecim	en Refere	ence		6			Specim Depth	ien							m		Sample	е Тур	e					В	
Te	est Me	ethod		BS137	77:Part 2:	1990, claı	uses	9.2 an	d 9.5									KeyLA	B ID				Ca	us201	807041	11
		CLAY			SILT						ND				.			GRAVE		0		СОВ	BLES	В	DULDER	s
	100	-	Fin		Medium	Coars	se	Fin	ie i	Mec	muit		Coars	se		-ine		Medium	1	Coars	e	T	Î			:
	90																									
																						/				
	80																									
%	70	-															-		_							
	60	<u> </u>																								
assi																										
Percentage Passing	50																Ť		\checkmark							
centa	40	-							_								+									
Per	30	<u> </u>												_												
											_															
	20																									
	10	-															-		_				-			
	0	0.001			0.01			0.1					1					10				10				1000
	–		Sie	ving				Sedi	iment	ation	Par	ticle	Size	e n	nm											
	Pa	article Siz		1	6 Passing	Part	icle S	Size mi	m	% P	assin	g				Dry	M	lass of s	ampl	le, g				14	350	
	-	125			100	_	0.06	530			17	-	-	F	Samp	ole Pr	оро	ortions						% dr	/ mass	
		90			100		0.05	513			15				Cobb	les								2	1	
	_	75 63			89 79		0.03		_		13 10		-	- F	Grave Sand										.5	
		50			69		0.02				7			L	Silt										.6	
		37.5 28			62 56		0.0		$-\!$		5 3		-		Clay										1	
	\vdash	28			56 49		0.00				3			F	Grad	ing Aı	nal	ysis				Ι				
		14			45		0.00	016	\top		1		1		D100						nm			_		_
	-	10 6.3		1	42 39				-				+	- F	D60 D30						nm nm	\vdash			1.4 04	
	\vdash	5			38				╋				1		D30						nm	\vdash			265	
		3.35			36									-				pefficient							00	
		2			32								4		Curva	ature	Coe	efficient						1	.2	
	\vdash	1.18 0.6			31 27	Dor	ticlo	densit	v (a	ssume	۰ <i>۲</i>		-		Rema	arko										
	\vdash	0.6	;		26		2.6			g/m3	,						nd te	esting in acc	cordanc	ce with E	35137	7 unles	s noted	below		
		0.3			23								1													
		0.212		1	21								1													
		0.15		<u> </u>	20																					
		0.063			17																					
					A	l											S	heet prir	nted							
					Approv	ea																			Fig	1
				S	tephen.W	atson										3	30/0	07/2018	12:10	0					C L -	
																									Sheet	

-	CAUSE	NAY		PARTICLE S	וסב חובי	ייסוסד			Job Ref			17-0439
-8		TECH		PARTICLE 5		IKIBU	TION		Borehole	/Pit No.		BH08
S	te Name		Coolnabacky 4	100kV GIS Subst	ation				Sample N	lo.		2
S	oil Descriptior	ı	Brownish grey s	andy gravelly silty	y CLAY.				Depth, m	I		1.00
s	pecimen Refe	rence	4	Spec Dept	imen :h			m	Sample T	уре		В
т	est Method		BS1377:Part 2:1	.990, clauses 9.2 a	and 9.5				KeyLAB II	D	Ca	us2018070412
	CLAY	Fir	SILT ne Medium	Coarse I		SAND /ledium	Coarse	Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS
	100											
	90 -											
	80											
%	70											
Percentage Passing	60					/						
age P	50					/						
ercent	40											
Ū.	30											
	20											
	10											
	0											
	0.001		0.01	C).1	Parti	1 cle Size	mm	10		100	100
	-	Sie	0.01).1		-		10 Mass of san	nple, g	100	100
	0.001 Particle Si	ze mm	ving % Passing	Particle Size	edimentatio	on 6 Passing	cle Size	Dry N	Mass of san	nple, g		10924
	0.001	ze mm	ving % Passing 100	Particle Size	edimentatio	on 6 Passing 27	cle Size		Mass of san	nple, g		10924 % dry mass
	0.001 Particle Si 125	ze mm	ving % Passing	Particle Size	edimentatio	on 6 Passing	cle Size	Dry N Sample Proj	Mass of san	nple, g		10924
	0.001 Particle Si 125 90 75 63	ze mm	wing % Passing 100 100 100 94	Particle Size 0.0630 0.0514 0.0366 0.0262	edimentatio	on 6 Passing 27 26 24 21	cle Size	Dry N Sample Proj Cobbles Gravel Sand	Mass of san	nple, g		10924 % dry mass 7 23 43
	0.001 Particle Si 125 90 75 63 50	ze mm	wing % Passing 100 100 100 94 88	Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187	edimentatio	on 6 Passing 27 26 24 21 18	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt	Mass of san	nple, g		10924 % dry mass 7 23 43 21
	0.001 Particle Si 125 90 75 63 50 37.5	ze mm	wing % Passing 100 100 100 94 88 88 88	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098	edimentatio	on 6 Passing 27 26 24 21 18 15	cle Size	Dry N Sample Proj Cobbles Gravel Sand	Mass of san	nple, g		10924 % dry mass 7 23 43
	0.001 Particle Si 125 90 75 63 50	ze mm	wing % Passing 100 100 100 94 88	Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187	edimentatio	on 6 Passing 27 26 24 21 18	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay	Mass of san	nple, g		10924 % dry mass 7 23 43 21
	0.001 Particle Si 125 90 75 63 50 37.5 28	ze mm	wing % Passing 100 100 100 94 88 88 88 88 88 85	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049	edimentatio	on 6 Passing 27 26 24 21 18 15 12	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt	Mass of san	nple, g		10924 % dry mass 7 23 43 21
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 14	ze mm	Wing % Passing 100 100 100 94 88 88 88 88 85 83 83 81 79	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049 0.0029	edimentatio	27 26 24 21 18 15 12 9	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60	Mass of san			10924 % dry mass 7 23 43 21 6
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3	ze mm	ving % Passing 100 100 94 88 88 88 88 83 83 81 79 79 77	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049 0.0029	edimentatio	27 26 24 21 18 15 12 9	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30	Mass of san	mm		10924 % dry mass 7 23 43 21 6 0.556 0.0843
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5	ze mm	ving % Passing 100 100 94 88 88 88 88 83 83 81 79 77 77 76	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049 0.0029	edimentatio	27 26 24 21 18 15 12 9	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Mass of san	mm		10924 % dry mass 7 23 43 21 6 0.556 0.0843 0.00339
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35	ze mm	ving % Passing 100 100 94 88 88 88 88 83 83 83 81 79 77 77 76 76 74	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049 0.0029	edimentatio	27 26 24 21 18 15 12 9	cle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C	Vlass of san	mm mm		10924 % dry mass 7 23 43 21 6 0.556 0.0843 0.00339 160
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2	ze mm	ving % Passing 100 100 94 88 88 88 88 83 83 83 81 79 77 76 76 74 70	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049 0.0029	edimentatio	27 26 24 21 18 15 12 9	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Vlass of san	mm mm		10924 % dry mass 7 23 43 21 6 0.556 0.0843 0.00339
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 2 1.18	ze mm	ving % Passing 100 100 94 88 88 88 88 83 83 81 79 77 76 76 74 70 67	Se Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0029 0.0015	edimentatic mm 9 1	on 6 Passing 27 26 24 21 18 15 12 9 5 5	cle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co	Vlass of san	mm mm		10924 % dry mass 7 23 43 21 6 0.556 0.0843 0.00339 160
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	ze mm	wing % Passing 100 100 100 94 88 85 83 81 79 77 76 74 70 67 61	Particle Size O.0630 O.0514 O.0366 O.0262 O.0187 O.0098 O.0049 O.0029 O.0029 O.0015 O.	edimentatic mm 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	on 6 Passing 27 26 24 21 18 15 12 9 5 	cle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C	Mass of san	mm mm mm		10924 % dry mass 7 23 43 21 6
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.42	ze mm	wing % Passing 100 100 100 94 88 85 83 81 79 77 76 74 70 67 61 57	Se Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0029 0.0015	edimentatic mm 9 1	on 6 Passing 27 26 24 21 18 15 12 9 5 	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		10924 % dry mass 7 23 43 21 6
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	ze mm	wing % Passing 100 100 100 94 88 85 83 81 79 77 76 74 70 67 61	Particle Size O.0630 O.0514 O.0366 O.0262 O.0187 O.0098 O.0049 O.0029 O.0029 O.0015 O.	edimentatic mm 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	on 6 Passing 27 26 24 21 18 15 12 9 5 	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		10924 % dry mass 7 23 43 21 6
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 14 10 6.3 5 3.35 2 1.18 0.6 0.42 0.3	ze mm	wing % Passing 100 100 100 100 94 88 88 83 81 79 77 76 74 70 67 61 57 50	Particle Size O.0630 O.0514 O.0366 O.0262 O.0187 O.0098 O.0049 O.0029 O.0029 O.0015 O.	edimentatic mm 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	on 6 Passing 27 26 24 21 18 15 12 9 5 	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		10924 % dry mass 7 23 43 21 6
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 2 1.18 0.6 0.42 0.3 0.21	ze mm 5 5 5 5 5 5 5 2 5	wing % Passing 100 100 100 100 94 88 88 88 83 81 79 77 76 74 70 67 61 57 50 43	Particle Size O.0630 O.0514 O.0366 O.0262 O.0187 O.0098 O.0049 O.0029 O.0029 O.0015 O.	edimentatic mm 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	on 6 Passing 27 26 24 21 18 15 12 9 5 	cle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of san	mm mm mm		10924 % dry mass 7 23 43 21 6
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.42 0.3 0.21 0.15	ze mm 5 5 5 5 5 5 5 2 5	wing % Passing 100 100 100 94 88 88 88 83 81 79 77 76 74 70 67 61 57 50 43 35	Se Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049 0.0029 0.0015 Particle den 2.65	edimentatic mm 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	on 6 Passing 27 26 24 21 18 15 12 9 5 	cle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C Curvature Co Remarks Preparation and	Mass of san	mm mm mm		10924 % dry mass 7 23 43 21 6 0.556 0.0843 0.00339 160 3.8 below
	0.001 Particle Si 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.42 0.3 0.21 0.15	ze mm 5 5 5 5 5 5 5 2 5	ving % Passing 100 100 94 88 88 88 83 81 79 77 77 76 76 74 70 67 61 57 50 43 35 27	Particle Size Particle Size 0.0630 0.0514 0.0366 0.0262 0.0187 0.0098 0.0049 0.0029 0.0015 0.	edimentatic mm 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	on 6 Passing 27 26 24 21 18 15 12 9 5 	cle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D10 Uniformity C Curvature Co Remarks Preparation and	Vlass of san	mm mm dance with BS133		10924 % dry mass 7 23 43 21 6

		USEW	AY		PARTICLE SIZE	ביטרב			Job Ref		17-0439
¥.		GEOTE	СН		FARTICLE SIZE		IBOTION		Borehole/Pit No.		BH08
Si	te Nar	ne		Coolnabacky 4	100kV GIS Substatio	on			Sample No.		4
So	oil Des	cription		Grey slightly sar	ndy gravelly silty CLAN	with low o	cobble conte	nt.	Depth, m		3.00
S	pecime	en Referei	nce	6	Specime Depth	n		m	Sample Type		В
Te	est Me	ethod		BS1377:Part 2:1	.990, clauses 9.2 and	9.5			KeyLAB ID	Cau	s2018070413
	-	CLAY	Fin	SILT e Medium	Coarse Fine	SAI Med		se Fine	GRAVEL Medium Coarse	COBBLES	BOULDERS
	100		Fin			i i i i	ium Coar	se Fine	Medium Coarse		
	90										
	80										
%	70		-								
bu	60										
Percentage Passing											
ige F	50										
centa	40										
Perc	30										
	30										
	20										
	10										
	0										
	—		Sie	ving	Sedin	entation		David	A		45700
	Pa	rticle Size	mm	% Passing	Particle Size mm	% Pa	assing	Dry N	lass of sample, g		15788
		125		100	0.0630		19	Sample Prop	oortions	%	6 dry mass
		90		100	0.0502		19	Cobbles			18
		75		90	0.0357		18	Gravel			43
	-	63 50		82 74	0.0254		17 16	Sand Silt			19 13
		37.5		66	0.0095		13	Clay			7
		28 20		60 55	0.0048		11 8	Grading Ana	lysis		
		14		51	0.0028	-	o 5	D100	m m	m	
		10		49				D60	m		27.9
		6.3 5		46 45				D30 D10	m m		0.385
		3.35		43				Uniformity C			6500
		2		39				Curvature Co			1.2
		1.18 0.6		36 33	Particle density	(assume	d)	Remarks			
		0.425		33	2.65	Mg/m3	/		testing in accordance with BS	1377 unless noted be	low
		0.3		28							
	-	0.212		25 23							
		0.063		19							
				Approve				:	Sheet printed		Fig
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				Stephen.Wa	atson		_	30	/07/2018 12:10		гıg

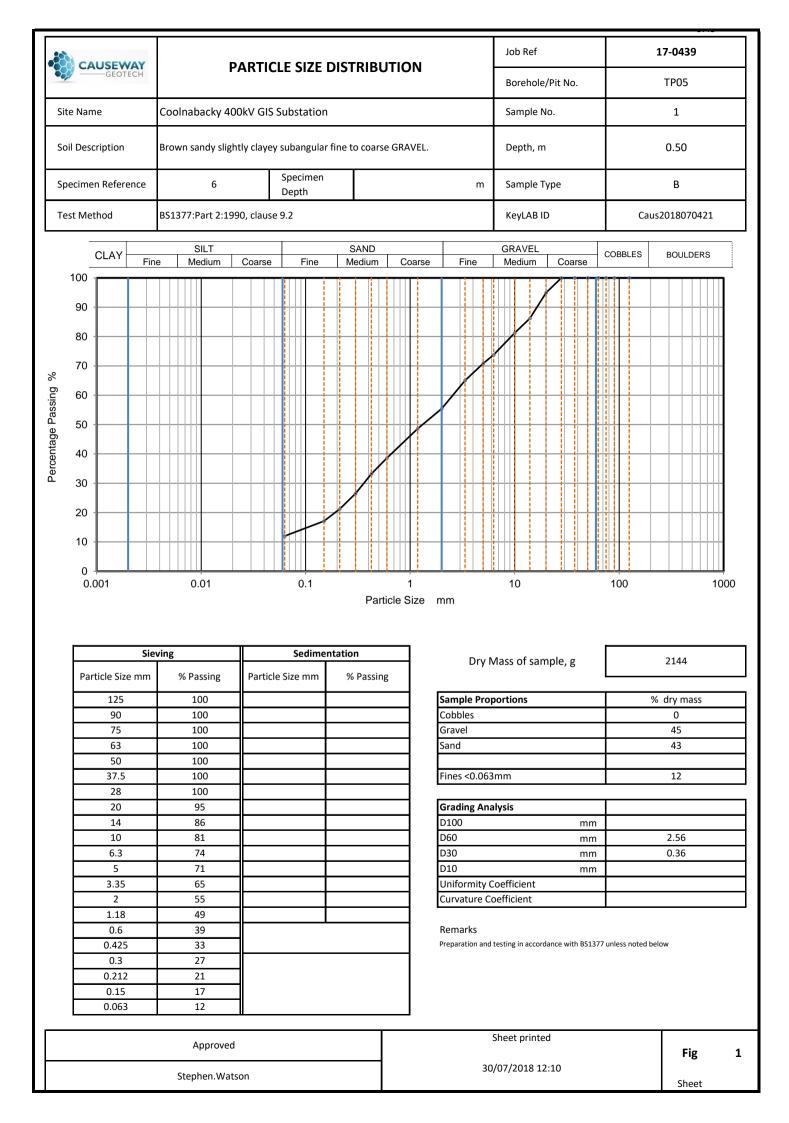
	С	AUSEW	YAY		PARTIC		DISTRIB			Job Ref	:	17-0439
	9 -	GEOT	ECH				DISTRIB	onon		Borehole/Pit No.		ВН09
Si	te Na	me		Coolnabacky 4	00kV GIS	Substatior	1			Sample No.		2
So	oil De	scription		Brown sandy cla	yey silty s	ubangular to	subroundec	l fine to coar	se GRAVEL.	Depth, m		1.00
S	pecim	en Refere	ence	6		Specimen Depth			m	Sample Type		В
Те	est M	ethod		BS1377:Part 2:1	990, claus	e 9.2				KeyLAB ID	Caus	2018070414
		CLAY	Fin	SILT e Medium	Coarse	Fine	SAND Medium	Coarse	Fine	GRAVEL Medium Coarse	COBBLES	BOULDERS
	100											
	90	-									/	
	80	-					_			/		
	70											
% ɓu	60											
Percentage Passing												
tage I	50											
ercent	40	-							-			
Pe	30	-				-						
	20											
	10											
	0	0.001		0.01		0.1		1		10	100	1000
							Pa	rticle Size	mm			
				ving	_	Sedime			Dry N	Mass of sample, g		12798
	Pa	article Siz	e mm	% Passing	Partic	le Size mm	% Passi	ng				
		125 90		100 100					Sample Prop Cobbles	portions	%	dry mass
		75		100					Gravel		1	52
	\vdash	63 50		89 82	_				Sand		+	22
		37.5		75					Fines < 0.063	Bmm	1	15
	F	28 20		72 67					Grading Ana	alysis		
		14 10		59 53					D100 D60	mm		14.6
	\vdash	6.3		53 47					D60 D30	mm mm	+	0.711
		5		45					D10	mm	1	
		3.35		42	_				Uniformity C]
	\vdash	2		37 34					Curvature Co	Defficient		
	\vdash	0.6		29					Remarks			
		0.425	;	26						testing in accordance with BS137	7 unless noted be	low
		0.3		23								
		0.212	1	21	_							
	\vdash	0.15	}	18 15								
		0.000		1				I				1
				Approve	d					Sheet printed		Fig 1
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				Stephen.wa								Sheet

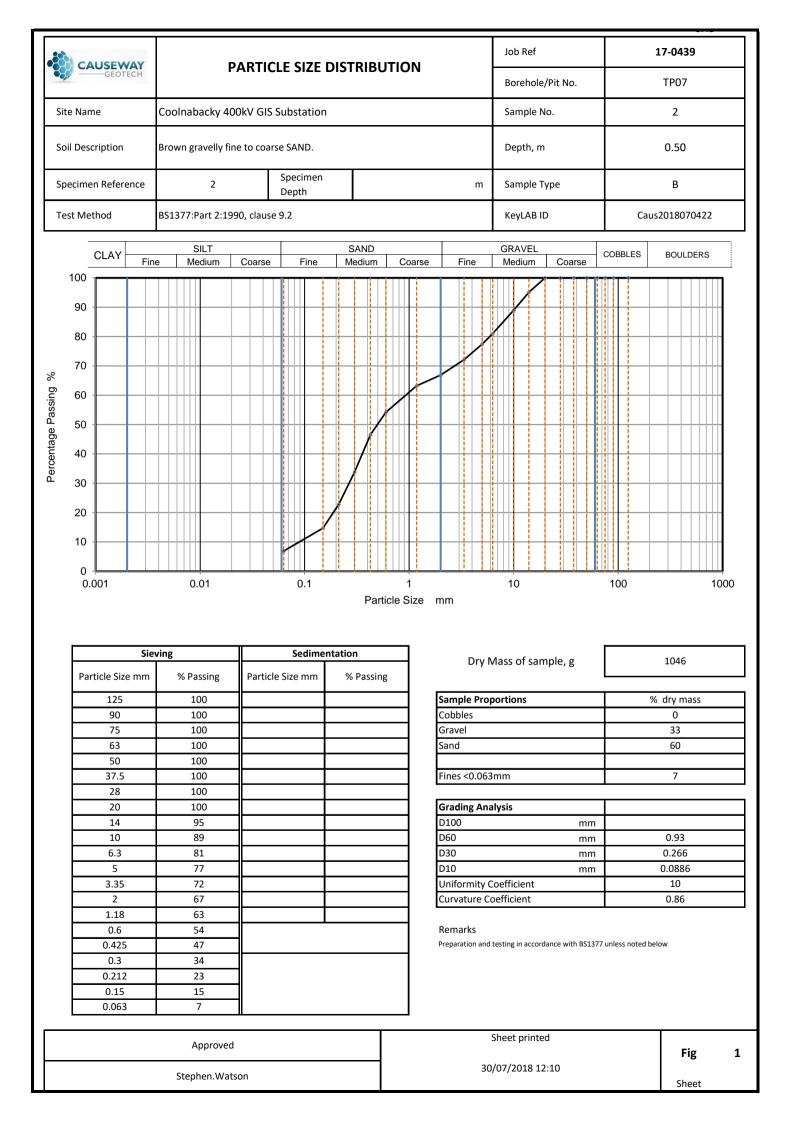
		AUSEW				LE SIZE					Job Ref	:	17-0439	
		-GEOT			ARTIC		DISTR	IDUI			Borehole/Pit No.		BH09	
Si	te Nar	me		Coolnabacky 4	00kV GIS	Substatio	n				Sample No.		5	
Sc	oil Des	cription		Grey sandy grave	elly silty CL	AY.					Depth, m		4.00	
Sp	pecime	en Refere	ence	6		Specimer Depth	1			m	Sample Type		В	
Τe	est Me	ethod		BS1377:Part 2:19	90, clause	es 9.2 and 9	0.5				KeyLAB ID	Caus	2018070415	
	-	CLAY	Fin	SILT le Medium	Coarse	Fine	SA Med		Coarse	Fine	GRAVEL Medium Coarse	COBBLES	BOULDERS	
	100]
	90													
	80					-								-
	70	<u> </u>												_
% ɓu	60													
Percentage Passing														
age P	50													
centa	40						_							1
Per	30							_						-
	20													
	10													1
			Sia	ving	-11	Sadim	entation	Particle	e Size	mm				
	Pa	rticle Size		% Passing	Particl	e Size mm		assing	-	Dry I	Mass of sample, g		3094	
		125		100		.0630		42	4	Sample Pro	portions	%	dry mass	
		90		100	0	.0481		41		Cobbles		,,	0	
		75 63		100 100		.0345 .0247		38 34	-	Gravel Sand		-	31 27	
		50		100	0	.0176		33		Silt			28	
		37.5 28		100 100		.0092 .0047		28 22	-	Clay			14	
		20		95	0	.0028		17		Grading Ana	alysis			
		14 10		92 88	0	.0015		11	-	D100 D60	mm mm		0.709	
		6.3		84					1	D30	mm		0.0119	
		5 3.35		81 78					_	D10 Uniformity (nm Coefficient	1		
		2		69						Curvature C				
		1.18		64	D	la alcorati	lasa	-1)	7	Dorest				
		0.6	;	59 56		le density 2.65	(assume Mg/m3	a)		Remarks Preparation and	testing in accordance with BS13	77 unless noted bel	low	
		0.3		53			-		1					
		0.212		50 46	-									
		0.15		46	1									
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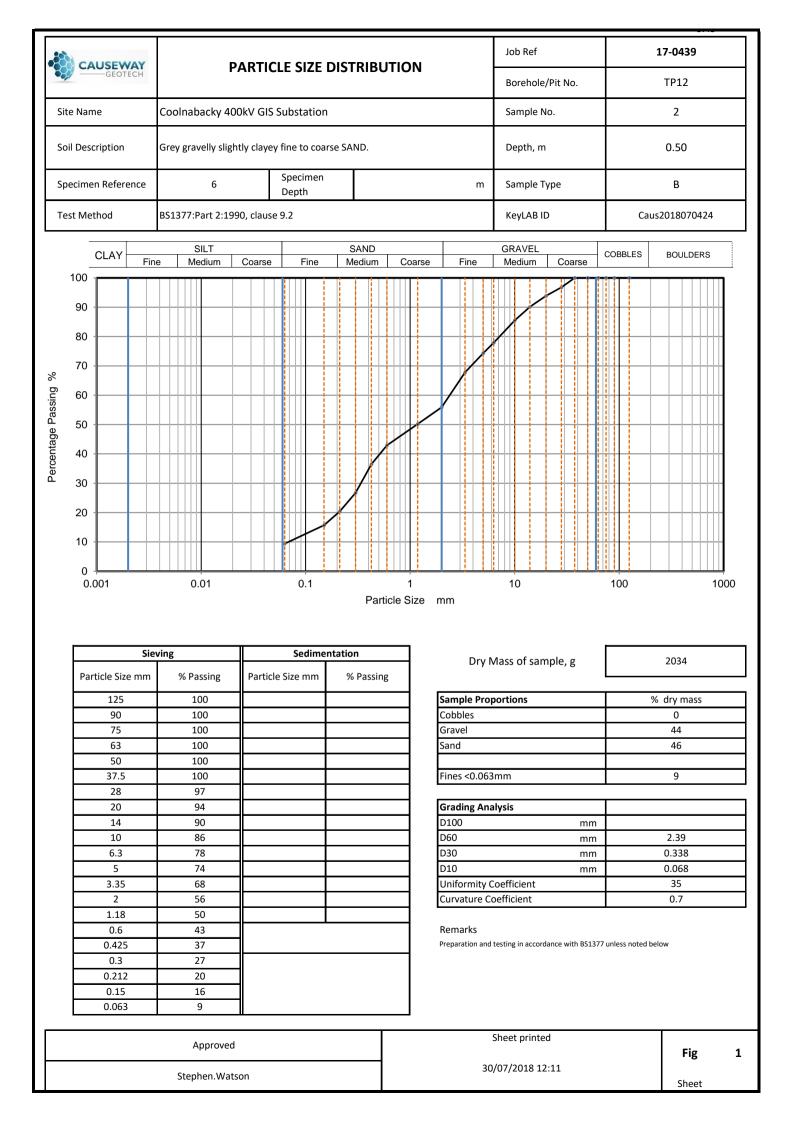
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		-GEOT	ECH			I	PAR	IICI		3120	וט:		IDU	511						Во	rehol	e/Pit	t No.					ТР	01		
Si	te Nam	ne		Coolr	naba	icky 40	00kV	GIS S	Subs	statio	on									Sa	mple	No.							2		
Sc	oil Desc	cription		Brown	n san	dy clay	yey roi	unde	d fin	ne to d	coarse	e GRA	AVEL	•						De	pth, ı	n						0.	50		
Sp	ecime	n Refere	ence			2			Spe Dep	cime oth	n							rr	ı	Sa	mple	Туре	e						3		
Te	est Met	thod		BS137	7:Pa	ort 2:19	990, cl	auses	s 9.2	and	9.5									Ke	yLAB	ID					Cau	s201	8070)418	
	_	CLAY	Fin	e	SIL Med		Coa	rse		Fine		SAI Med		(Coars	e		Fine			AVEL dium		Coar	se	со	BBLE	s	BC	DULDE	ERS	
	100																								/	Π					
	90																							/	/						
	80																						/								
%	70	<u> </u>																													+
sing	60							+		_		_										4		_			-	_	+		+
Percentage Passing	50 ·											_										_					_				-
entag	40																		1												
Perce	30																														
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		001	Sio	ving	0.0)1					onta		Par	ticle	1 Size	n	nm			1)				1	00					1000
	0.0			ving			Pa	rticle	S	Sedim	1	tion				e n	nm	Dry	y M) of sa	mpl	e, g		1	00		180	038		1000
	0.0	001 ticle Size			0.0 5 Pass 100	sing	Pa		S	Sedim e mm	1	t ion % Pa				_		Dry ple Pi		ass	of sa	mpl	e, g		1	00	%				1000
	0.0	ticle Size			5 Pass 100 100	sing D	Pa	0.0 0.0	S Size 0630 0510	Sedim e mm D	1	t ion % Pa	assir 17 16			•	Samı Cobb	ple P i oles		ass	of sa	mpl	e, g		1	00	%	6 drγ 1	r mas 2		1000
	0.0	ticle Size 125			5 Pass 100 100 97 88	sing D D	Pa	0.0 0.0 0.0	S Size	Sedim e mm D D	1	t ion % Pa	assin 17			•	Sam Cobb Grav Sand	ple P i oles el		ass	of sa	mpl	e, g			00	%	6 drγ 1 5	/ mas		1000
	0.0	ticle Size 125 90 75 63 50	e mm		5 Pass 100 100 97 88 85	sing D D	Pa	0.0 0.0 0.0 0.0	S 2 Size 0630 0510 0363 0260 0185	Sedim e mm D D S S	1	tion % Pa	assin 17 16 15 13 12				Samı Cobb Grav Sand Silt	ple P i oles el		ass	of sa	mpl	e, g			00	%	% dry 1 5 2 1	7 mas 2 0 2 3		1000
	0.0	ticle Size 125 90 75 63 50 37.5 28	e mm		5 Pass 100 97 88 85 79 70	sing D D S	Pa	0.0 0.0 0.0 0.0 0.0 0.0	S Size 0630 0510 0363 0260 0185 0096 0049	Sedim e mm 0 0 3 0 5 5 5 9	1	t ion % Pa	assir 17 16 15 13 12 11 9				Samı Cobb Grav Sand Silt Clay	p le P ples el	ropo	ass	of sa	mpl	e, g			00	%	% dry 1 5 2 1	7 mas 2 0 2		1000
	0.0	ticle Size 125 90 75 63 50 37.5	e mm		5 Pass 100 100 97 88 85 79	sing D D S	Pa	0.0 0.0 0.0 0.0 0.0 0.0 0.0	S Size 0630 0510 0363 0260 0185 0096	6edim e mm)))) 5 5 5 9 9	1	% Pa	assin 17 16 15 13 12 11				Samı Cobb Grav Sand Silt Clay	ple P bles el	ropo	ass	of sa	mpl				00	%	6 dry 1 5 2 1	7 mas 2 0 2 3		
	0.0	ticle Size 90 75 63 50 37.5 28 20 14 10	e mm		5 Pass 100 97 88 85 79 70 62 57 52	sing D D D D D D D D D D D D D D D D D D D	Pa Pa	0.0 0.0 0.0 0.0 0.0 0.0 0.0	Size Size 0630 0510 0363 0260 0185 0096 0049 0029	6edim e mm)))) 5 5 5 9 9	1	% Pa	assir 17 16 13 12 11 9 6				Sam Cobb Grav Sand Silt Clay Grad D100 D60	ple P bles el	ropo	ass	of sa	mpl		mm		00	%	6 dry 1 5 2 1 4	7 mas 2 0 2 3 4		
	0.0	ticle Size 90 75 63 50 37.5 28 20 14	e mm		5 Pass 100 100 97 88 85 79 70 62 57	sing D D D C C C C C	Pa	0.0 0.0 0.0 0.0 0.0 0.0 0.0	Size Size 0630 0510 0363 0260 0185 0096 0049 0029	6edim e mm)))) 5 5 5 9 9	1	% Pa	assir 17 16 13 12 11 9 6				Sam Cobb Grav Sand Silt Clay Grad D100	ple P bles el	ropo	ass	of sa	mpl					%	6 dry 1 5 2 1 1 7 17 0.3	7 mas 2 0 2 3 1	SS	
	0.0	ticle Size 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35	e mm		5 Pass 100 97 88 85 79 70 62 57 52 47 45 43	sing D D C C C C C C C C C C C C C C C C C	Pa	0.0 0.0 0.0 0.0 0.0 0.0 0.0	Size Size 0630 0510 0363 0260 0185 0096 0049 0029	6edim e mm)))) 5 5 5 9 9	1	% Pa	assir 17 16 13 12 11 9 6				Sam Cobb Grav Sand Silt Clay D100 D30 D100 Unife	ole Provide Pr	nopo nal ¹	ass prtio	of sa	mpl		mm mm			%	6 dry 1 5 2 1 1 7 0.3 0.00 0.000 25	7 mas 2 0 2 3 4 7.3 358 9687 00	SS	
	0.0	ticle Size 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2	e mm		5 Pass 100 97 88 85 79 70 62 57 52 47 45 43 38	sing 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Pa Pa	0.0 0.0 0.0 0.0 0.0 0.0 0.0	Size Size 0630 0510 0363 0260 0185 0096 0049 0029	6edim e mm)))) 5 5 5 9 9	1	% Pa	assir 17 16 13 12 11 9 6				Sam Cobb Grav Sand Silt Clay D100 D30 D100 Unife	ole Province	nopo nal ¹	ass prtio	of sa	mpl		mm mm			%	6 dry 1 5 2 1 1 7 0.3 0.00 0.000 25	7 mas 2 0 2 3 4 7.3 858 0687	SS	
	0.0	ticle Size 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35	e mm		5 Pass 100 97 88 85 79 70 62 57 52 47 45 43	sing D D C C C C C C C C C C C C C C C C C		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	S 2 Size 0630 0510 0363 0260 00185 0096 0049 0029 0015	6edim e mm)))) 5 5 5 9 9		% Pa	assir 17 16 15 13 12 11 9 6 3				Sam Cobb Grav Sand Silt Clay D100 D30 D100 Unife	ple Provide Providence	nopo nal ¹	ass prtio	of sa	mpl		mm mm			%	6 dry 1 5 2 1 1 7 0.3 0.00 0.000 25	7 mas 2 0 2 3 4 7.3 358 9687 00	SS	
	0.0	ticle Size 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425	e mm		5 Passs 100 97 88 85 79 70 62 57 52 47 45 43 38 36 33 33 32	sing 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0.0 0.0 0.0 0.0 0.0 0.0 0.0	S 2 Size 0630 0510 0363 0260 00185 0096 0049 0029 0015	Sedim e mm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		**************************************	assir 17 16 15 13 12 11 9 6 3				Sam Cobb Grav Sand Silt Clay D100 D60 D30 D100 Unifo Curv Rem	ple Provide Pr	vnal	ass prtio	of sa			mm mm				6 dry 1 5 2 1 1 0.3 0.000 25 1	7 mas 2 0 2 3 4 7.3 358 9687 00	SS	
	0.0	ticle Size 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6	e mm		5 Pass 100 97 88 85 79 70 62 57 52 47 43 38 36 33	sing D D D C C C C C C C C C C C C C C C C		0.0 0.0 0.0 0.0 0.0 0.0 0.0	\$ 2 Size 0630 0510 0363 0260 0049 0029 0049 0029 0015	Sedim e mm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		v Pa	assir 17 16 15 13 12 11 9 6 3				Sam Cobb Grav Sand Silt Clay D100 D60 D30 D100 Unifo Curv Rem	ple Provide Pr	vnal	ass prtio	of sa ns iient			mm mm				6 dry 1 5 2 1 1 7 0.3 0.000 255 1	7 mas 2 0 2 3 4 7.3 358 9687 00	SS	
	0.0	ticle 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 0.15	e mm		5 Passs 100 100 97 88 85 79 70 62 57 52 47 45 43 38 36 33 32 28 25 21	sing D D D C S S S S S S S S S S S S S		0.0 0.0 0.0 0.0 0.0 0.0 0.0	\$ 2 Size 0630 0510 0363 0260 0049 0029 0049 0029 0015	Sedim e mm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		v Pa	assir 17 16 15 13 12 11 9 6 3				Sam Cobb Grav Sand Silt Clay D100 D60 D30 D100 Unifo Curv Rem	ple Provide Pr	vnal	ass prtio	of sa ns iient			mm mm				6 dry 1 5 2 1 1 7 0.3 0.000 255 1	7 mas 2 0 2 3 4 7.3 358 9687 00	SS	
	0.0	ticle 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	e mm		5 Pass 100 100 97 88 85 79 70 62 57 52 47 45 43 38 36 33 32 28 25	sing D D D C S S S S S S S S S S S S S		0.0 0.0 0.0 0.0 0.0 0.0 0.0	\$ 2 Size 0630 0510 0363 0260 0049 0029 0049 0029 0015	Sedim e mm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		v Pa	assir 17 16 15 13 12 11 9 6 3				Sam Cobb Grav Sand Silt Clay D100 D60 D30 D100 Unifo Curv Rem	ple Provide Pr	vnal	ass prtio	of sa ns iient			mm mm				6 dry 1 5 2 1 1 0.3 0.000 25 1	7 mas 2 0 2 3 4 7.3 358 9687 00	SS	
	0.0	ticle 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 0.15	e mm		5 Pass 100 100 97 88 85 79 70 62 57 52 47 45 43 38 36 33 32 28 25 21 17	sing D D D C S S S S S S S S S S S S S		0.0 0.0 0.0 0.0 0.0 0.0 0.0	\$ 2 Size 0630 0510 0363 0260 0049 0029 0049 0029 0015	Sedim e mm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		v Pa	assir 17 16 15 13 12 11 9 6 3				Sam Cobb Grav Sand Silt Clay D100 D60 D30 D100 Unifo Curv Rem	ple Provide Pr	y Cco	ass prtio	of sa ns iient	rdanc	e with	mm mm				6 dry 1 5 2 1 1 0.3 0.000 25 1	7 mas 2 0 2 3 4 7.3 358 9687 00	55	

J.	CAUSEW			PARTICLE SIZE			Job Ref	1	7-0439
¥	GEOTE	СН		ANTICLE SIZE	DISTRIBU		Borehole/Pit No.		TP03
S	te Name		Coolnabacky 40	00kV GIS Substatio	n		Sample No.		1
S	oil Description		Brown slightly gr	avelly silty fine to coa	rse SAND.		Depth, m		0.50
S	oecimen Refere	nce	2	Specimen Depth		m	Sample Type		В
Т	est Method		BS1377:Part 2:19	90, clauses 9.2 and 9	.5		KeyLAB ID	Caus	2018070420
	CLAY		SILT		SAND		GRAVEL	COBBLES	BOULDERS
	100	Fir	e Medium	Coarse Fine	Medium	Coarse Fine	Medium Coarse	<u> </u>	
	90								
	80								
~	70								
% ɓi	60				/				
assir	00								
Percentage Passing	50								
enta(40								
oerce									
_	30								
	20								
	10								
	0								
		Sie	ving	Sedime	entation	le Size mm		j	
	Particle Size		% Passing	Particle Size mm	% Passing	Dry I	Mass of sample, g		1027
	125		100	0.0630	23	Sample Pro			
	90		100		23		nortions	0/	dry mass
	75			0.0544	20	Cobbles	portions	%	dry mass 0
	63 50		100	0.0387	20 17	Cobbles Gravel	portions	%	0 12
			100 100	0.0387 0.0274	20 17 16	Cobbles Gravel Sand	portions	%	0 12 66
	37.5		100	0.0387	20 17	Cobbles Gravel	portions	%	0 12
	37.5 28		100 100 100 100 100	0.0387 0.0274 0.0195 0.0101 0.0051	20 17 16 14 12 9	Cobbles Gravel Sand Silt Clay		%	0 12 66 19
	37.5		100 100 100 100	0.0387 0.0274 0.0195 0.0101	20 17 16 14 12	Cobbles Gravel Sand Silt			0 12 66 19
	37.5 28 20 14 10		100 100 100 100 100 100 100 99	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029	20 17 16 14 12 9 6	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60	alysis mm mm		0 12 66 19 4 0.347
	37.5 28 20 14 10 6.3		100 100 100 100 100 100 100 99 95	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029	20 17 16 14 12 9 6	Cobbles Gravel Sand Silt Clay Grading And D100 D60 D30	alysis mm mm		0 12 66 19 4 0.347 0.0969
	37.5 28 20 14 10		100 100 100 100 100 100 100 99	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029	20 17 16 14 12 9 6	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60	alysis mm mm mm mm		0 12 66 19 4 0.347
	37.5 28 20 14 10 6.3 5 3.35 2		100 100 100 100 100 100 100 99 95 94 91 89	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029	20 17 16 14 12 9 6	Cobbles Gravel Sand Silt Clay Grading And D100 D60 D30 D10	alysis mm mm mm Coefficient		0 12 66 19 4 0.347 0.0969 0.00706
	37.5 28 20 14 10 6.3 5 3.35 2 1.18		100 100 100 100 100 100 100 99 95 94 91 89 89 84	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029 0.0016	20 17 16 14 12 9 6 3 3	Cobbles Gravel Sand Silt Clay Grading And D100 D60 D30 D10 Uniformity 0	alysis mm mm mm Coefficient		0 12 66 19 4 0.347 0.0969 0.00706 49
	37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425		100 100 100 100 100 100 99 95 94 91 89 84 74 67	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029	20 17 16 14 12 9 6	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity O Curvature C	alysis mm mm mm Coefficient		0 12 66 19 4 0.347 0.0969 0.00706 49 3.8
	$ \begin{array}{r} 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 99 95 94 91 89 84 74 67 55	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029 0.0016	20 17 16 14 12 9 6 3 3 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity O Curvature C	alysis mm mm mm Coefficient oefficient		0 12 66 19 4 0.347 0.0969 0.00706 49 3.8
	37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425		100 100 100 100 100 100 99 95 94 91 89 84 74 67	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029 0.0016	20 17 16 14 12 9 6 3 3 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity O Curvature C	alysis mm mm mm Coefficient oefficient		0 12 66 19 4 0.347 0.0969 0.00706 49 3.8
	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 99 95 94 91 89 84 74 67 55 46	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029 0.0016	20 17 16 14 12 9 6 3 3 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity O Curvature C	alysis mm mm mm Coefficient oefficient		0 12 66 19 4 0.347 0.0969 0.00706 49 3.8
	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 99 95 94 91 89 84 74 67 55 46 37 23	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029 0.0016 Particle density 2.65	20 17 16 14 12 9 6 3 3 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity 0 Curvature C Remarks Preparation and	alysis mm mm mm Coefficient oefficient		0 12 66 19 4 0.347 0.0969 0.00706 49 3.8
	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 99 95 94 91 89 84 91 89 84 74 67 55 46 37	0.0387 0.0274 0.0195 0.0101 0.0051 0.0029 0.0016 Particle density 2.65	20 17 16 14 12 9 6 3 3 	Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity (Curvature C Remarks Preparation and	alysis mm mm Coefficient coefficient testing in accordance with BS13		0 12 66 19 4 0.347 0.0969 0.00706 49 3.8





K		AUSEW			PARTIC	I E CI7E	וופדסות			Job Ref			17-0439
¥		GEOTE	СН		PARTIC					Borehol	e/Pit No.		ТР09
Si	ite Nar	me		Coolnabacky 4	100kV GIS	Substatior	ı			Sample	No.		2
S	oil Des	scription		Brown slightly g	ravelly silty	fine to coai	rse SAND.			Depth, r	n		0.50
S	pecim	en Refere	nce	6		Specimen Depth			n	n Sample	Туре		В
Т	est Me	ethod		BS1377:Part 2:1	.990, clause	s 9.2 and 9.	.5			KeyLAB	ID	Cau	s2018070423
	-	CLAY	Fin	SILT e Medium	Coarse	Fine	SANE		se Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS
	100												
	90												
	00												
	80												
0	70			· · · · · · · · · · · · · · · · · · ·									
% ور	60												
assir	00						/						
Percentage Passing	50												
entaç	40												
erce	10						/						
ר	30						/						
	20					\boldsymbol{X}							
						-/							
	10												
	0 0.	0.001		0.01		0.1	Р	1 article Size	e mm	10		100	1000
	—												
			Sie	ving		Sedime	Intation					j	
				ving			ntation		Dr	y Mass of sa	mple, g		1320
	Pa	article Size		% Passing		e Size mm	% Pas	Ŭ			mple, g		
	Pa	125		% Passing 100	0.	e Size mm 0630	% Pas: 16		Sample P	y Mass of sa	mple, g	9	6 dry mass
	Pa			% Passing	0.	e Size mm	% Pas				mple, g	9	
	Pa	125 90 75 63		% Passing 100 100 100 100	0. 0. 0. 0.	e Size mm 0630 0507 0363 0260	% Pass 16 15 13 12		Sample P Cobbles Gravel Sand		mple, g	9	6 dry mass 0 15 69
	Pa	125 90 75 63 50		% Passing 100 100 100 100 100	0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260 0187	% Pas: 16 15 13 12 9		Sample P Cobbles Gravel Sand Silt		mple, g	9	6 dry mass 0 15 69 15
	Pa	125 90 75 63		% Passing 100 100 100 100	0. 0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260	% Pass 16 15 13 12		Sample P Cobbles Gravel Sand		mple, g	9	6 dry mass 0 15 69
	Pa	125 90 75 63 50 37.5 28 20		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029	% Pas: 16 15 13 12 9 6 3 2		Sample P Cobbles Gravel Sand Silt Clay Grading A	roportions		9	6 dry mass 0 15 69 15
	Pa	125 90 75 63 50 37.5 28 20 14		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260 0187 0099 0050	% Pass 16 15 13 12 9 6 3		Sample P Cobbles Gravel Sand Silt Clay Grading A D100	roportions	mm	9	6 dry mass 0 15 69 15 1 1
	Pa	125 90 75 63 50 37.5 28 20		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029	% Pas: 16 15 13 12 9 6 3 2		Sample P Cobbles Gravel Sand Silt Clay Grading A	roportions		9	6 dry mass 0 15 69 15
	Pa	125 90 75 63 50 37.5 28 20 14 10 6.3 5		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029	% Pas: 16 15 13 12 9 6 3 2		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10	nalysis	mm	9	6 dry mass 0 15 69 15 1 0.391 0.161 0.0201
	Pa	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029	% Pas: 16 15 13 12 9 6 3 2		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit	roportions malysis	mm mm	9	6 dry mass 0 15 69 15 1 0.391 0.391 0.161 0.0201 19
	Pa	125 90 75 63 50 37.5 28 20 14 10 6.3 5		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0.	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029	% Pas: 16 15 13 12 9 6 3 2		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit	nalysis	mm mm	9	6 dry mass 0 15 69 15 1 0.391 0.161 0.0201
	Pa	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6		% Passing 100 100 100 100 100 100 100 10		e Size mm 0630 0507 0363 0260 0187 0099 0050 0029 0016	% Pass 16 15 13 12 9 6 3 2 0 0		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit Curvature Remarks	roportions analysis y Coefficient Coefficient	mm mm mm		6 dry mass 0 15 69 15 1 0.391 0.161 0.0201 19 3.3
	Pa	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029 0016	% Pas: 16 15 13 12 9 6 3 2 0		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit Curvature Remarks	roportions analysis y Coefficient Coefficient	mm mm		6 dry mass 0 15 69 15 1 0.391 0.161 0.0201 19 3.3
	Pa	125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029 0016	% Pass 16 15 13 12 9 6 3 2 0 0		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit Curvature Remarks	roportions analysis y Coefficient Coefficient	mm mm mm		6 dry mass 0 15 69 15 1 0.391 0.161 0.0201 19 3.3
	Pa	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		% Passing 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029 0016	% Pass 16 15 13 12 9 6 3 2 0 0		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit Curvature Remarks	roportions analysis y Coefficient Coefficient	mm mm mm		6 dry mass 0 15 69 15 1 0.391 0.161 0.0201 19 3.3
	Pa	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 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029 0016	% Pass 16 15 13 12 9 6 3 2 0 0		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit Curvature Remarks	roportions analysis y Coefficient Coefficient	mm mm mm		6 dry mass 0 15 69 15 1 0.391 0.161 0.0201 19 3.3
	Pa	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 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029 0016	% Pass 16 15 13 12 9 6 3 2 0 0		Sample P Cobbles Gravel Sand Silt Clay Grading A D100 D60 D30 D10 Uniformit Curvature Remarks	roportions analysis y Coefficient Coefficient	mm mm mm		6 dry mass 0 15 69 15 1 0.391 0.161 0.0201 19 3.3 elow
	Pa	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 100 100 100 100 100 100 100 10	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	e Size mm 0630 0507 0363 0260 0187 0099 0050 0029 0016	% Pass 16 15 13 12 9 6 3 2 0 0		Sample P Cobbles Gravel Sand Silt Clay D100 D100 D10 Uniformit Curvature Remarks Preparation a	roportions malysis y Coefficient Coefficient	mm mm mm rdance with BS1377		6 dry mass 0 15 69 15 1 0.391 0.161 0.0201 19 3.3



_	CALISI	EWAY		PARTICLE SIZE	חופדפוס			Job Ref	1	17-0439
K		EOTECH		FANTICLE SIZE	מואוכוס			Borehole/Pit No.		TP14
Si	te Name		Coolnabacky 4	00kV GIS Substatio	n			Sample No.		4
S	oil Descripti	ion	Brown sandy gra	avelly silty CLAY.				Depth, m		1.50
S	pecimen Re	ference	2	Specimen Depth			m	Sample Type		В
Т	est Method		BS1377:Part 2:1	990, clauses 9.2 and 9	.5			KeyLAB ID	Caus	2018070425
	CLA	AY Fir	SILT ne Medium	Coarse Fine	SAND Medium	Coarse	Fine	GRAVEL Medium Coarse	COBBLES	BOULDERS
	100									
	90									
	80	_								
%	70	_						F		
	60	_								
Pase	50									
ntage	40 -									
Percentage Passing										
ш	30 -									
	20									
	10									
	0 0.001		0.01	0.1	Pa	1 rticle Size	mm	10	100	1000
		Sie			Pa	-			100	
	0.001	Size mm	0.01			rticle Size		10 Mass of sample, g	100	3957
	0.001 Particle	Size mm 25	ving % Passing 100	Particle Size mm	entation % Passi 25	rticle Size	Dry N Sample Proj	Mass of sample, g		3957 odry mass
	0.001 Particle	Size mm	ving % Passing	Sedimo Particle Size mm	entation % Passi	rticle Size	Dry N	Mass of sample, g		3957
	0.001 Particle 1. 5 7 6	Size mm 25 90 75 53	wing % Passing 100 100 100 100	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241	entation % Passi 25 24 22 21	rticle Size	Dry N Sample Proj Cobbles Gravel Sand	Mass of sample, g		3957 5 dry mass 0 42 33
	0.001 Particle 1 7 6 5	Size mm 25 90 75	wing % Passing 100 100 100	Sedime Particle Size mm 0.0626 0.0469 0.0337	% Passi 25 24 22	rticle Size	Dry N Sample Proj Cobbles Gravel	Mass of sample, g		3957 6 dry mass 0 42
	0.001 Particle 1 5 3 3 2	Size mm 25 90 75 53 50 7.5 28	ving % Passing 100 100 100 100 100 100 97	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.0173 0.0091 0.0047	Antation % Passi 25 24 22 21 19 17 13	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay	Mass of sample, g		3957 6 dry mass 0 42 33 16
	0.001 Particle 1 5 7 6 5 3 3 2 2 2	Size mm 25 90 75 63 50 7.5	ving % Passing 100 100 100 100 100 97 91 86	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.0173 0.0091	Anticipation % Passi 25 24 22 21 19 17	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100	Mass of sample, g	%	3957 6 dry mass 0 42 33 16
	0.001 Particle 11 5 5 7 6 5 5 7 7 6 5 5 7 7 6 5 5 7 7 7 7	Size mm 25 90 75 53 50 7.5 28 20 14 10	ving % Passing 100 100 100 100 100 100 97 91 86 79	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.0173 0.0091 0.0047 0.0028	Antation % Passi 25 24 22 21 19 17 13 10	rticle Size	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60	Mass of sample, g portions alysis mm mm	%	3957 6 dry mass 0 42 33 16 9 2.32
	0.001 Particle 1 1 5 7 6 5 3 3 7 6 5 3 7 6 5 3 7 7 6 6 3 7 7 6 6 1 1 1 7 7 6 6 1 1 1 1 6 6 1 1 1 1	Size mm 25 90 75 53 50 7.5 28 20 14 10 5.3 5	ving % Passing 100 100 100 100 100 100 97 91 86 79 91 86 79 73 70	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.0173 0.0091 0.0047 0.0028	Antation % Passi 25 24 22 21 19 17 13 10	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Dilto Dilto Dilto Dilto	Mass of sample, g portions alysis mm mm mm mm	%	3957 6 dry mass 0 42 33 16 9 2.32 0.148 0.00256
	0.001 Particle 1 1 5 7 6 5 3 7 6 5 5 3 7 6 5 5 3 7 6 6 5 5 3 7 7 6 6 5 3 7 7 6 6 5 3 7 7 6 6 5 3 7 7 6 6 5 3 7 7 6 6 9 7 7 9 7 7 9 7 7 9 7 9 7 7 9 7 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 7 9 7 7 9 7 9 7 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 9 7 9 7 9 9 7 9 9 7 9 9 7 9 9 7 9 9 9 9 9 7 9	Size mm 25 90 75 63 50 7.5 28 20 14 10 5.3	ving % Passing 100 100 100 100 100 100 97 91 86 79 91 86 79 73 70 66	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.0173 0.0091 0.0047 0.0028	Antation % Passi 25 24 22 21 19 17 13 10	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity C	Mass of sample, g portions alysis mm mm coefficient	%	3957 6 dry mass 0 42 33 16 9 2.32 0.148 0.00256 910
	0.001 Particle 1 1 2 7 6 5 3 3 2 2 2 2 1 1 1 6 6 3 1	Size mm 25 20 75 53 50 7.5 28 20 14 10 5.3 5 5 35 2 1.18	ving % Passing 100 100 100 100 100 100 97 91 86 79 73 73 70 66 58 54	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.0173 0.0091 0.0047 0.0028 0.0015	% Passi 25 24 22 21 19 17 13 10 7	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co	Mass of sample, g portions alysis mm mm coefficient	%	3957 6 dry mass 0 42 33 16 9 2.32 0.148 0.00256
	0.001 Particle 11 5 7 6 5 5 7 7 6 5 5 7 7 6 5 5 7 7 6 6 5 7 7 7 6 6 5 5 7 7 7 6 6 5 5 7 7 7 6 6 5 5 7 7 7 7	Size mm 25 20 75 53 50 7.5 28 20 14 10 5.3 5 .35 2	ving % Passing 100 100 100 100 100 100 97 91 86 79 73 73 70 66 58	Sedime Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.0173 0.0091 0.0047 0.0028	Antation % Passi 25 24 22 21 19 17 13 10	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g portions alysis mm mm coefficient		3957 o dry mass 0 42 33 16 9 2.32 0.148 0.00256 910 3.7
	0.001 Particle 1 9 7 6 5 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 6 5 7 7 7 6 5 7 7 6 5 7 7 7 6 5 7 7 6 5 7 7 6 6 7 7 7 6 6 7 7 7 6 6 7 7 7 7 6 6 7 7 7 6 6 7 7 7 7 6 6 7 7 7 7 6 6 7 7 7 7 7 7 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7	Size mm 25 90 75 53 50 7.5 28 20 14 10 5.3 5 .35 2 .18 0.6 4225 0.3	wing % Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 97 91 86 79 73 70 66 58 54 47 43 39	Sedimu Particle Size mm 0.0626 0.0469 0.0241 0.0241 0.0091 0.0047 0.0028 0.0015	entation % Passi 225 24 22 21 19 19 17 13 10 7 7	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g portions alysis mm mm Coefficient		3957 o dry mass 0 42 33 16 9 2.32 0.148 0.00256 910 3.7
	0.001 Particle 11 5 7 6 5 33 7 7 6 5 5 33 7 7 6 5 5 33 7 7 6 6 5 5 33 7 7 6 6 5 5 33 7 7 7 6 6 5 5 33 7 7 7 6 6 5 5 33 7 7 7 6 6 5 5 33 7 7 7 6 6 5 5 33 7 7 7 6 6 5 5 33 7 7 7 6 6 5 5 33 7 7 7 6 6 5 5 33 7 7 7 6 6 5 5 7 7 7 7 6 6 5 5 7 7 7 7 7	Size mm 25 90 75 53 50 7.5 28 20 14 10 5.3 5 .35 2 .18 0.6 425	% Passing 100 100 100 100 100 100 100 100 100 100 100 100 100 100 97 91 86 79 73 70 66 58 54 47 43	Sedimu Particle Size mm 0.0626 0.0469 0.0241 0.0241 0.0091 0.0047 0.0028 0.0015	entation % Passi 225 24 22 21 19 19 17 13 10 7 7	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g portions alysis mm mm Coefficient		3957 o dry mass 0 42 33 16 9 2.32 0.148 0.00256 910 3.7
	0.001 Particle 1 1 2 7 6 5 3 3 7 6 5 5 3 7 7 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 7 7 7 6 6 5 5 3 7 7 7 6 6 5 5 7 7 7 6 6 5 5 7 7 7 6 6 5 5 7 7 7 7	Size mm 25 90 75 53 50 7.5 28 20 14 10 5 .35 2 .18 0.6 425 0.3 212	ving % Passing 100 100 100 100 100 97 91 86 79 91 86 79 91 86 79 91 86 54 47 43 43 39 34	Sedimu Particle Size mm 0.0626 0.0469 0.0241 0.0241 0.0091 0.0047 0.0028 0.0015	entation % Passi 225 24 22 21 19 19 17 13 10 7 7	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks	Mass of sample, g portions alysis mm mm Coefficient		3957 o dry mass 0 42 33 16 9 2.32 0.148 0.00256 910 3.7
	0.001 Particle 1 1 2 7 6 5 3 3 7 6 5 5 3 7 7 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 3 7 7 6 6 5 5 7 7 7 6 6 5 5 3 7 7 7 6 6 5 5 7 7 7 6 6 5 5 7 7 7 6 6 5 5 7 7 7 7	Size mm 25 20 75 53 50 7.5 28 20 14 10 5 3.3 5 .35 2 .18 0.6 425 0.3 212 .15	ving % Passing 100 100 100 100 100 97 91 86 79 91 86 79 91 86 79 91 86 57 91 86 57 91 86 58 54 47 43 39 34 30	Sedim Particle Size mm 0.0626 0.0469 0.0337 0.0241 0.00173 0.0091 0.0047 0.0028 0.0015	entation % Passi 225 24 22 21 19 19 17 13 10 7 7	rticle Size	Dry N Sample Proj Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature Co Remarks Preparation and	Mass of sample, g portions alysis mm mm Coefficient		3957 6 dry mass 0 42 33 16 9 2.32 0.148 0.00256 910 3.7

	CAUSEV						N1		Job Ref		1	17-0439	
	GEOT			PARTICLE SIZE	DISTRID		IN		Borehole	/Pit No.		TP15	
Si	te Name		Coolnabacky 4	00kV GIS Substatio	n				Sample N	lo.		5	
So	oil Description		Grey sandy grave	elly silty CLAY.					Depth, m	I		1.70	
S	pecimen Refer	ence	6	Specimen Depth				m	Sample T	уре		В	
Te	est Method		BS1377:Part 2:19	990, clauses 9.2 and 9	.5				KeyLAB II	D	Caus	2018070426	
	CLAY	Fir	SILT ne Medium	Coarse Fine	SAND Medium	Co	arse	Fine	GRAVEL Medium	Coarse	COBBLES	BOULDERS	
	100												
	90												
	80									-			
	70												
% b	60												
Percentage Passing	60												
ge P	50												
centa	40												-
Perc	30												
	20												
	10												
	0.001		0.01	0.1		<u> </u> 1			10		100		 1000
		Sie	eving	Sedime	entation	ticle S		mm	1			4002	
	Particle Siz	e mm	% Passing	Particle Size mm	% Passir	ng		Dryn	Mass of san	ipie, g		4983	
	125		100	0.0630	23			Sample Pro	portions		%	dry mass	
	90 75		100 100	0.0485	22 20			Cobbles Gravel				0 53	
	63		100	0.0248	19			Sand				25	
	50 37.5		100 92	0.0176 0.0093	19 16			Silt Clav				15 8	
	37.5		83	0.0093	16			Clay			I	0	
	20		81	0.0028	10			Grading Ana	alysis				
	14 10		74 70	0.0015	6			D100 D60		mm mm		4.11	
	6.3		64					D30		mm	1	0.26	
	5 3.35		62 58	_				D10 Uniformity (Coefficient	mm		0.00274	
	3.35		47					Curvature Co			1	6	
	1.18		43					Dava 1					
	0.6	5	37 34	Particle density 2.65	(assumed) Mg/m3			Remarks Preparation and	testing in accord	lance with BS1377	7 unless noted bel	ow	
	0.3		31		<u> </u>								
	0.212		28 26										
	0.15		26										
	·		Approve	3		,			Sheet printe	d		Fi c	
\vdash								30)/07/2018 12	2:11		Fig	1
			Stephen.Wa	tson								Sheet	



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

Report No.:	18-21719-1		
Initial Date of Issue:	25-Jul-2018		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Aisling O'Kane Colm Hurley Darren O'Mahony Gabriella Horan John Cameron Lucy Newland Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Stephen Franey Stephen Watson		
Project	17-0439 ESB Site in Collnabacky, Co. Laois		
Quotation No.:		Date Received:	23-Jul-2018
Order No.:		Date Instructed:	23-Jul-2018
No. of Samples:	7		
Turnaround (Wkdays):	3	Results Due:	25-Jul-2018
Date Approved:	25-Jul-2018		
Approved By:			

l **Details:**

Robert Monk, Technical Manager

The right chemistry to deliver results Project: 17-0439 ESB Site in Collnabacky, Co. Laois

Results - Soil

Client: Causeway Geotech Ltd		Cher	mtest J	ob No.:	18-21719	18-21719	18-21719	18-21719	18-21719	18-21719	18-21719
Quotation No.:	Chemtest Sample ID.:		658257	658258	658259	658260	658261	658262	658263		
Order No.:	Client Location ID.: Client Sample Ref.:		BH01	BH02	BH03	BH07	BH09	TP02	TP09		
			2	2	4	3	5	2	2		
			Sampl	e Type:	SOIL						
			Top De	oth (m):	1.00	2.00	4.00	1.00	1.00	0.50	0.50
			Date Sa	ampled:	20-Jul-2018						
Determinand	Accred.	SOP	Units	LOD							
Moisture	N	2030	%	0.020	5.6	8.3	2.7	16	7.8	13	9.9
рН	U	2010		N/A	8.2	8.5	8.5	8.5	8.6	8.0	8.2
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chloride (Water Soluble)	U	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

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.co.uk



LABORATORY RESTRICTION REPORT

Project Reference	17-0439	То	Colm Hurley
Project Name	Coolnabacky, Co. Laois	Position	Project Manager
		From	Stephen Watson
TR reference	17-0439 / 1	Position	Laboratory Manager

The following sample(s) and test(s) are restricted as detailed below. Could you please complete the "Required Action" column and return the completed form to the laboratory.

Hole	5	Sample		Test		
Number		Depth (m)	Туре		Reason for Restriction	Required Action
				Moisture Content		
BH10	4	3	В	Atterberg limits	Sample damaged in transit to laboratory	Cancel
				PSD		
For electr	onic repor	ting a forn or printed	n of I name	e is	Laboratory Signature Stephen Watson	Project Manager Signature Colm Hurley
acceptab	le				Date 19 July 2018	Date 19 July 2018



APPENDIX H

SPT hammer energy measurement report





SPT Hammer Energy Test Report

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

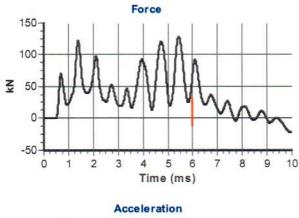
SPT Hammer Ref:	NT5.
Test Date:	14/04/2018
Report Date:	15/04/2018
File Name:	NT5spt
Test Operator:	CAUSEWAY

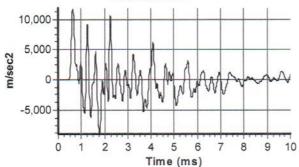
SPT Hammer Information

Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.5

Comments / Location

Causeway Yard





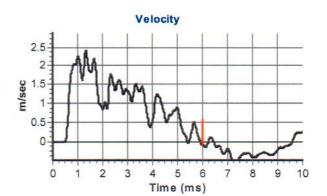
Calculations

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 Title: Field Operations Manager