



CCG-C-21-12093

COTTAM PARKWAY STATION, PRESTON

FACTUAL REPORT

MAY 2021



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Prepared for:

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DOCUMENT CONTROL FORM

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1.0 INTRODUCTION

CC GEOTECHNICAL LTD (CCG) was commissioned by **LANCASHIRE COUNTY CONCIL** (The Client) to provide geotechnical fieldwork and laboratory testing services in connection with a proposed construction project at Cottam Parkway Station, Preston, PR4 0RE.

The Client has indicated the proposed works include the construction of a carpark with an adjoining road and bridge crossing the Lancaster Canal.

The investigation was required to provide geotechnical properties of the underlying strata insofar as they relate to permanent and temporary design works and construction of the proposed bridge foundations, road and carpark.

2.0 SITE LOCATION & DESCRIPTION

The proposed Cottam Parkway Station is located approximately 5km west-northwest of Preston City centre and approximately 3km east of 'Salwick' railway station.

Presently, the site is privately owned farmland with multiple access gates. The planned carpark development runs parallel with the existing railway whereas the planned road and bridge runs perpendicular to the existing railway.

The sites topography is relatively flat with an average elevation across the site being 20.17mAOD.

3.0 PURPOSE & AIMS OF THE INVESTIGATION

The purpose of this investigation was to determine the geological sequence below ground level and the engineering properties of encountered strata.

The scope and extent of this investigation was determined by The Client.

The data reported herein provides geotechnical information on the ground conditions underlying the site and is presented as a factual compilation. No interpretations have been placed on the findings.

This report must be read in conjunction with the Notes on Limitations, presented in Appendix I.

4.0 FIELDWORK

4.1 Introduction

The fieldwork element of the investigation was carried out during the period 01st March – 26th March 2021, and comprised the following:

- Mobilisation of plant and personnel
- Surveying of borehole locations and elevations by GPS (Leica GS15)
- Sinking of 6nr boreholes by cable percussion methods (CP01-CP06)
- Advancement of each cable percussion borehole into the bedrock by chiselling
- Sinking of 18nr window sample holes up to 6.00mbgl

- Installation of 8nr groundwater and gas monitoring piezometer standpipes (CP01, 03, 04, 06) (WS05, 09, 14, 18)
- The mechanical excavation of 6nr trial pits up to 2.00mbgl (TP01 - TP06)
- Conducting 3nr falling head permeability tests. (FH 8/9, FH 12/13, FH 18/17)
- The recovery of small disturbed and bulk disturbed soil samples for geotechnical laboratory testing
- The recovery of undisturbed soil samples in cohesive strata for geotechnical laboratory testing

The fieldwork was carried out in accordance with the UK Specification for Ground Investigation: 2nd Edition: 2015, and BS10175:2011 +A2 2017, BS5930:2015 +A1 2020, and BS EN 1997-2:2007 Eurocode 7, insofar as they related to the scope of the investigation.

The locations of the exploratory positions were instructed by The Client and set out by **CCG**.

The layout of the investigation is as annotated on The Clients Drawings , provided in Appendix A.

4.1 Cable Percussion Boreholes

All boreholes were positioned clear of recorded buried services and the locations were scanned using a Cable Avoidance Tool (CAT) prior to the hand excavation of a starter pit extending to a typical depth of 1.2mbgl.

6nr boreholes (CP01-CP06) were advanced through superficial/drift deposits using cable percussion methods using a Dando 150 drilling rig deploying 150mm diameter tools and casings. All drill arisings were logged in detail, and bulk disturbed, and small disturbed samples were recovered at regular incremental depths.

In-situ SPT's and U100 sampling was carried out at alternating 1m depth intervals up to 10mbgl. Below 10mbgl alternating SPT and U100 tests were undertaken at 1.50m depth intervals with U100 samples recovered in suitable cohesive soils.

All cable percussion boreholes were terminated upon proving bedrock.

Logs of the boreholes annotated with position co-ordinates, elevation, sampling records, SPT 'N' values and undrained cohesion values are provided in Appendix B.

The SPT hammer calibration certificate is provided in Appendix D.

4.2 Dynamic Sampling Boreholes

All boreholes were positioned clear of recorded buried services and the locations were scanned using a Cable Avoidance Tool (CAT) prior to the hand excavation of a starter pit extending to a typical depth of 1.2mbgl.

3nr window sample boreholes were sunk to 6mbgl (WS11, WS12, WS14). WS13, scheduled for 6mbgl, refused at 2.9mbgl on a suspected boulder.

A further 8nr window sample boreholes were sunk to 3mbgl (WS07-WS10 and WS15-WS18) with 6nr window sample boreholes sunk to 4mbgl (WS01 - 06)

All window sample boreholes were advanced through superficial/drift deposits using dynamic sampling methods using a Dando terrier dynamic sampling rig. In this method of investigation, relatively “undisturbed” soil profile samples are recovered in 1m long Perspex liners. The Perspex tubes are split and carefully logged and subsampled. Subsamples for analysis are removed at appropriate depths from the profile and transferred to chilled amber glass jars and vials for laboratory analysis.

In-situ SPT’s were carried out at regular 1 m intervals to termination depth.

Logs of the boreholes, annotated with sampling details and SPT ‘N’ values are given in Appendix B.

All boreholes, excluding WS13, were terminated at The Clients instructed depth.

4.3 Trial Pit Excavations

6nr trial pit excavations were positioned clear of recorded buried services and were scanned using a Cable Avoidance Tool (CAT). All excavations were undertaken with an 8-tonne rubber tracked excavator and extended to a maximum termination depth of 2mbgl as instructed by The Client.

The exposures were carefully logged and sampled, and the arisings then returned to the excavations in the reverse sequence of their excavation to preserve, insofar as was possible, the original lithology.

Logs of the pits annotated with details of sub-sampling and hand shear vane test data are given in Appendix B.

Photographs of the trial pit exposures and arisings are provided at Appendix E.

Dynamic Cone Penetration (DCP) results are provided in Appendix H

4.4 Falling Head Permeability Tests

3nr falling head permeability tests (FH 8/9, 13/12 & 17/18) were conducted in accordance with the method described in BS5930. The FH 8/9 indicates the WS boreholes it was positioned between. Similarly for the other tests. This test involved the sinking of a 1m borehole, logging the arisings and casing off the borehole to 1mbgl. An

87mm Perspex liner was used to case off the borehole. The hole was then filled with water and monitored over a period of up to 2.5 hours.

Results are presented in Appendix C.

5.0 LABORATORY TESTING

5.1 Soil Engineering Testing

Selected samples of soils recovered from the intrusive investigation were subjected to the following program of engineering testing, undertaken at the UKAS accredited laboratory of **CCG**:

- 103nr soil samples were subjected to the determination of Moisture Content in accordance with BS1377: Part 2: 1990
- 63nr soil samples were subjected to the determination of Liquid & Plastic Limits BS 1377-2:1990
- 19nr Particle Size Distributions BS 1377-2:1990
- 3nr U100 soil samples were subjected to the determination of Unconsolidated Undrained Triaxial Compression in accordance with BS 1377: Part 7: 1990
- 10nr U100 soil samples were subjected to the determination of Unconsolidated Undrained Triaxial Compression (multi-stage) in accordance with BS 1377: Part 7: 1990
- 11nr One-dimensional Consolidation Test in accordance with BS 1377-5:1990
- 16nr Sedimentation by Hydrometer in accordance with BS 1377-2:1990

The soil engineering test results are presented in Appendix F.

5.2 LCC Framework Suites Chemical Testing.

Selected subsamples of soil and rock were subjected to a suite of chemical testing derived from LCC Framework suites. All testing was undertaken at a subcontract UKAS / MCERTS accredited laboratory.

The following programme of testing was undertaken on selected soil samples:

- 27nr Standard Soil Suites
- 27nr Asbestos Screen Tests
- 27nr Speciated TPH Tests
- 27nr Speciated PAH Tests
- 23nr Sulphate content of acid extract from soil tests
- 23nr Sulphate content of water extracted from soil tests.
- 2nr pH Test

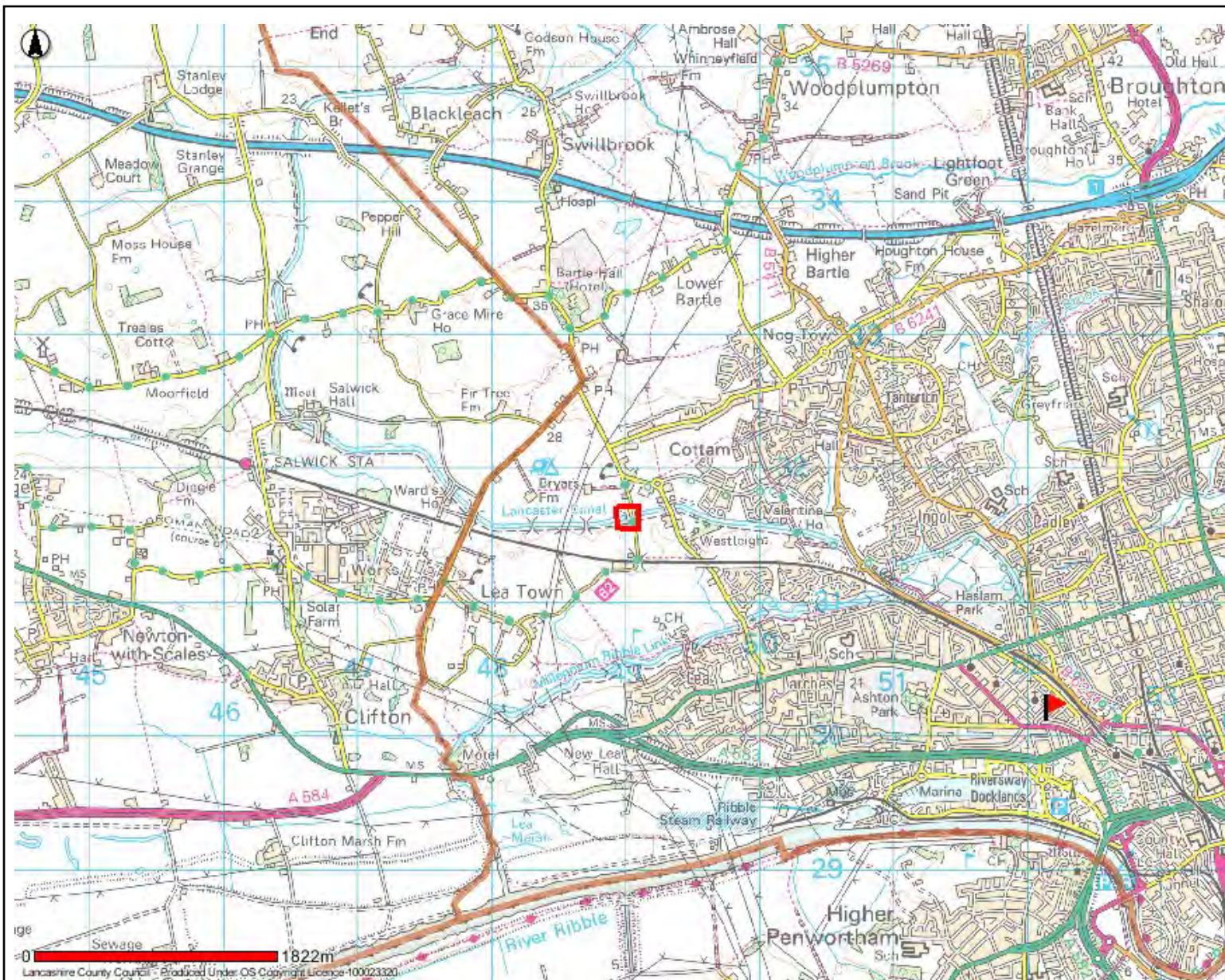
The results of the chemical analyses are presented in Appendix G.



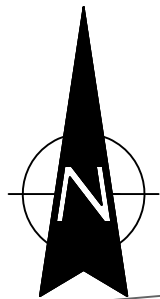
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Consulting Geotechnical and Geoenvironmental Engineers

APPENDIX A

DRAWINGS



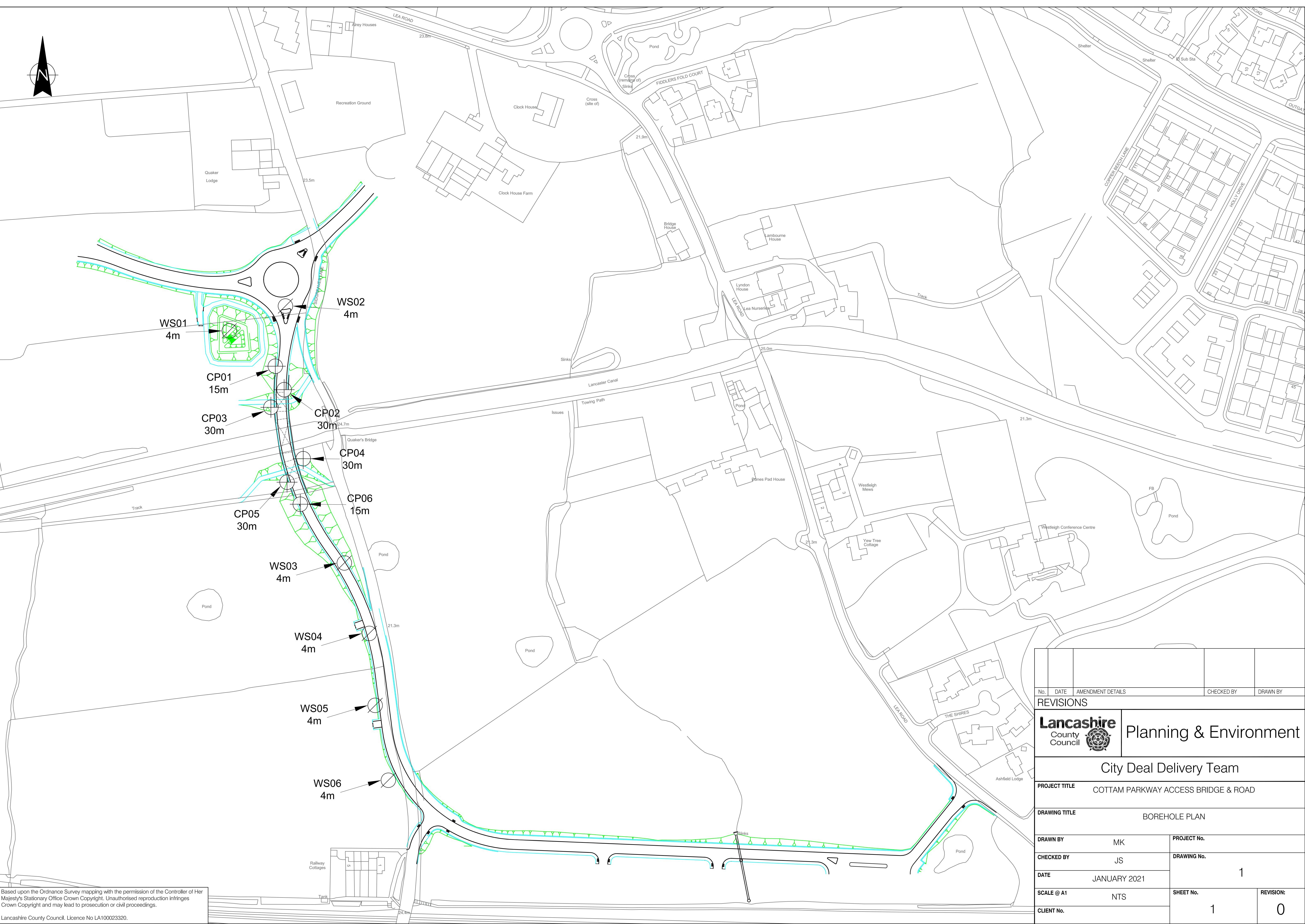
Cottom Parkway Access Bridge Proposed Location Map 2



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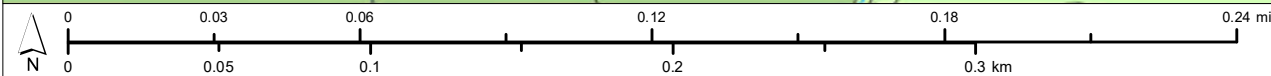
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REVISIONS				
<div>Lancashire County Council</div> <div></div>		Planning & Environment		
City Deal Delivery Team				
PROJECT TITLE		COTTAM PARKWAY ACCESS BRIDGE & ROAD		
DRAWING TITLE		BOREHOLE PLAN		
DRAWN BY		MK	PROJECT No.	
CHECKED BY		JS	DRAWING No.	
DATE		JANUARY 2021	1	
SCALE @ A1		NTS	SHEET No.	
CLIENT No.			1	REVISION: 0



Car Park Borehole Plan

Author:

Date Created: 01/03/2021



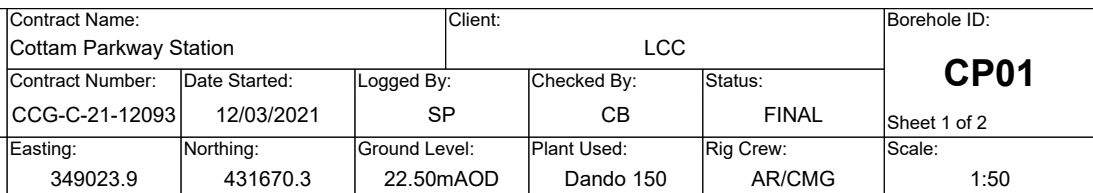
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Map Scale: 1:2,500
Map Centre: 349,295 431,400



APPENDIX B


BOREHOLE AND TRIAL PIT LOGS

















Samples & In Situ Testing	Strata Details	Groundwater
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Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation
0.15 0.20 0.30	D ES B	SPT(S) 1.20m, N=15 (2,2/4,3,3,5)	21.90	(0.60)		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular mudstone and sandstone (TOPSOIL)			
0.70 0.80 1.00	B ES D					Firm to stiff brown slightly sandy slightly gravelly silty CLAY of medium undrained shear strength with frequent silt and sand laminations. Gravel is fine to medium subangular to subrounded mudstone and sandstone.			
1.30 1.50	ES B				Soft and frequent rootlets at 0.60 - 1.00mbgl Firm CLAY @ 1.00 - 2.00mbgl				
2.00 2.00 2.00 - 2.45	D ES U				Firm to stiff CLAY @ >2.00mbgl	2			
2.50	B								
3.00 3.00	D ES			SPT(S) 3.00m, N=12 (2,3/3,3,3,3)	(11.20)				
3.50 3.70	B ES								
4.00 4.00 - 4.45	D U					4			
4.50	B								
5.00	D	SPT(S) 5.00m, N=11 (2,2/2,2,3,4)				5			
5.50	B								
6.00 6.00 - 6.45	D U					6			
6.50	B								
7.00	D	SPT(S) 7.00m, N=15 (3,3/3,4,4,4)				7			
7.50	B								
8.00 8.00 - 8.45	D U				8				
8.50	B				Clay becomes soft at 8.50 - 11.80mbgl				
9.00	D	SPT(S) 9.00m, N=13 (2,3/2,3,4,4)				9			
9.50	B								
10.00	D					Continued next sheet	10		


Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.					
12-03-2021	16:00	5.50	5.50	5.30	19.00	150	18.00	150						
13-03-2021	08:30	5.50	5.50											
13-03-2021	16:00	16.00	16.00											
15-03-2021	00:00	16.00	16.00	15.70										
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	
				0.00	1.00	PLAIN	20							
				1.00	18.00	SLOTTED	20							
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
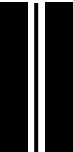

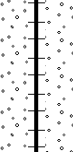

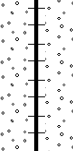

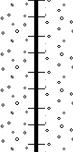

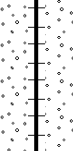

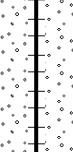

	Contract Name: Cottam Parkway Station				Client: LCC			Borehole ID: CP01		
	Contract Number: CCG-C-21-12093		Date Started: 12/03/2021		Logged By: SP		Checked By: CB		Status: FINAL	
	Easting: 349023.9		Northing: 431670.3		Ground Level: 22.50mAOD		Plant Used: Dando 150		Rig Crew: AR/CMG	
Cable Percussion Borehole Log								Scale: 1:50		
Weather:				Termination: As instructed				SPT Hammer: CCG6 Energy Ratio: 64%		
Samples & In Situ Testing				Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
10.00 - 10.45	U					Firm to stiff brown slightly sandy slightly gravelly silty CLAY of medium undrained shear strength with frequent silt and sand laminations. Gravel is fine to medium subangular to subrounded mudstone and sandstone.			11	
10.50	B									
11.00	D									
		SPT(S) 11.50m, N=11 (2,3/2,3,2,4)								
11.90	ES		10.70	11.80 (0.30)		Brown slightly sandy clayey SILT.			12	
12.00	B		10.40	12.10 (0.50)		Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded mudstone and sandstone.				
12.00	D		9.90	12.60		Medium dense brown sandy clayey SILT.				
13.00	D					Stiff brown slightly sandy slightly gravelly silty CLAY of very high undrained shear strength. Gravel is fine to medium well rounded mudstone and sandstone.			13	
13.00	ES	SPT(S) 13.00m, N=11 (3,2/2,3,3,3)		(1.10)						
13.50	B		8.80	13.70						
14.50 - 14.95	U								14	
15.00	B			(2.80)					15	
15.50	D									
		SPT(S) 16.00m, 50 (10,15/50 for 105mm)							16	
16.50	B		6.00	16.50		Reddish brown very weak highly weathered SANDSTONE recovered as very sandy silty fine to coarse subangular to subrounded GRAVEL			17	
17.00	D									
		SPT(S) 17.50m, 50 (25 for 85mm/50 for 160mm)		(2.50)					18	
18.00	B									
		SPT(S) 19.00m, 50 (25 for 85mm/50 for 190mm)	3.50	19.00		End of Borehole at 19.00m			19	
									20	
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.	
12-03-2021	16:00	5.50	5.50		19.00	150	18.00	150		
13-03-2021	08:30	5.50	5.50	5.30						
13-03-2021	16:00	16.00	16.00							
15-03-2021	00:00	16.00	16.00	15.70						
Chiselling					Installation				Water Strikes	
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)
				0.00	1.00	PLAIN	20			
				1.00	18.00	SLOTTED	20			
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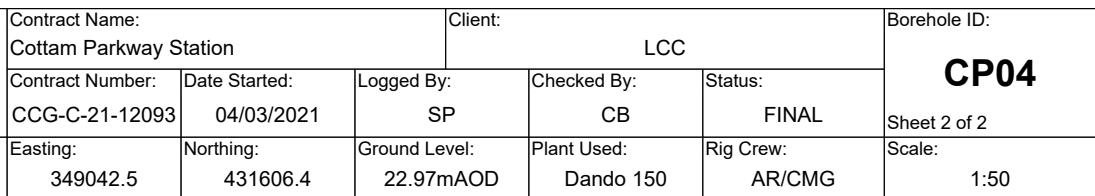
	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: CP02		
	Contract Number: CCG-C-21-12093	Date Started: 19/03/2021	Logged By: SP	Checked By: CB	Status: FINAL	Sheet 1 of 2			
	Cable Percussion Borehole Log		Easting: 349029.4	Northing: 431656.7	Ground Level: 22.34mAOD	Plant Used: Dando 150	Rig Crew: AR/CMG	Scale: 1:50	
Weather:			Termination: Refusal on sandstone bedrock			SPT Hammer: CCG6 Energy Ratio: 64%			
Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation	
0.15	ES	SPT(S) 1.20m, N=16 (1,3/4,4,4,4)	22.04	(0.30)		Grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to subrounded mudstone and sandstone. Grassed at surface (TOPSOIL)	1		
0.20	B								
0.20	D								
0.50	B								
0.50	D								
0.60	ES								
0.90	D	SPT(S) 3.00m, N=15 (2,3/4,3,4,4)	20.94	(1.10)		Firm to stiff light brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone	2		
1.00	B								
1.20	ES								
1.50	B								
1.70	ES								
2.00	D								
2.00 - 2.45	U	SPT(S) 5.00m, N=13 (2,2/3,3,3,4)	18.89	(2.05)		Firm to stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone	3		
2.50	B								
2.70	ES								
3.00	D								
3.50	ES								
3.60	B								
3.50	B	SPT(S) 7.00m, N=20 (3,4/4,5,5,6)	18.64	3.45		Brown slightly sandy clayey SILT.	4		
4.00	D								
4.00 - 4.45	U								
4.50	B								
5.00	D								
5.50	B								
6.00	D	SPT(S) 9.00m, N=14 (2,3/3,3,4,4)	(7.60)	3.70		Firm to stiff brown slightly sandy slightly gravelly silty CLAY with frequent sand and silt laminations. Gravel is fine to medium subangular to well rounded mudstone and sandstone.	5		
6.00 - 6.45	U								
6.50	B								
7.00	D								
7.50	B								
8.00	D								
8.00 - 8.45	U	SPT(S) 9.00m, N=14 (2,3/3,3,4,4)				Soft between 7.50 - 8.70mbgl	6		
8.50	B								
9.00	D								
9.50	B								
10.00	D								
Continued next sheet						10			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.
21-03-2021	08:00	5.00	5.00		18.80	150	18.80	150	
21-03-2021	16:00	16.00	16.00						
22-03-2021	08:00	16.00	16.00	15.50					
22-03-2021	15:00	18.80	18.80						
Chiselling					Installation				Water Strikes
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)
17.50	18.80	01:00	Chiseling through sandstone bedrock					13.20	13.20
								Sealed (m)	Time (mins)
								13.70	0
								Rose to (m)	Remarks
									Slight seepage
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	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: CP02	
	Contract Number: CCG-C-21-12093	Date Started: 19/03/2021	Logged By: SP	Checked By: CB	Status: FINAL			
Cable Percussion Borehole Log	Easting: 349029.4	Northing: 431656.7	Ground Level: 22.34mAOD	Plant Used: Dando 150	Rig Crew: AR/CMG	Scale: 1:50		
	Weather:			Termination: Refusal on sandstone bedrock		SPT Hammer: CCG6 Energy Ratio: 64%		
Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
10.00 - 10.45	U	SPT(S) 11.50m, N=12 (2,3/2,4,3,3)	11.04	11.30 (0.30)		Firm to stiff brown slightly sandy slightly gravelly silty CLAY with frequent sand and silt laminations. Gravel is fine to medium subangular to well rounded mudstone and sandstone.	11	
10.50	B							
11.00	D							
11.40	B							
11.50	ES							
12.00	ES	SPT(S) 13.00m, N=14 (4,3/4,3,3,4)	10.74	11.60		Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone.	12	
12.50	B							
13.00	D							
14.00 - 14.45	B							
14.50	U							
15.00	B	SPT(S) 16.00m, 50 (25 for 105mm/50 for 200mm)	8.64	13.70		Firm to stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone.	14	
15.40	D							
16.00	B							
16.50	B							
17.00	D							
18.00	B	SPT(S) 17.50m, 50 (25 for 95mm/50 for 155mm)	7.94	14.40		Very stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to subrounded sandstone and mudstone.	15	
18.50	D							
19.00								
19.50								
20.00								
18.00	B	SPT(S) 18.80m, N=100 (25 for 90mm/100 for 285mm)	6.04	16.30		Weak highly weathered reddish brown SANDSTONE recovered as brown very gravelly silty clayey SAND. Gravel is fine to coarse subrounded sandstone.	16	
18.50	D							
19.00								
19.50								
20.00								
18.00	B	SPT(S) 18.80m, N=100 (25 for 90mm/100 for 285mm)	3.54	18.80		End of Borehole at 18.80m	17	
18.50	D							
19.00								
19.50								
20.00								
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
21-03-2021	08:00	5.00	5.00		18.80	150	18.80	150
21-03-2021	16:00	16.00	16.00					
22-03-2021	08:00	16.00	16.00	15.50				
22-03-2021	15:00	18.80	18.80	18.50				
Chiselling			Installation		Water Strikes			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	
17.50	18.80	01:00	Chiseling through sandstone bedrock					
					Strike (m) Casing (m) Sealed (m) Time (mins) Rose to (m) Remarks			
					13.20 13.20 13.70 0 Slight seepage			
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	Contract Name: Cottam Parkway Station				Client: LCC			Borehole ID: CP03					
	Contract Number: CCG-C-21-12093		Date Started: 17/03/2021		Logged By: SP		Checked By: CB		Status: FINAL				
	Easting: 349019.8		Northing: 431641.8		Ground Level: 22.63mAOD		Plant Used: Dando 150		Rig Crew: AR/CMG				
Cable Percussion Borehole Log								Scale: 1:50					
Weather:				Termination: Refusal on sandstone bedrock				SPT Hammer: CCG6 Energy Ratio: 64%					
Samples & In Situ Testing				Strata Details					Groundwater				
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation			
0.15	ES	SPT(S) 1.20m, N=12 (1,2/3,3,3,3)	22.33	(0.30)		Soft grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular mudstone and sandstone. Frequent rootlets, Grassed at surface (TOPSOIL) Soft to firm light brown mottled grey slightly sandy silty CLAY. CLAY is soft at 0.30 - 1.00mbgl CLAY is firm at 1.00 - 1.30mbgl			1				
0.20	B												
0.20	D												
0.40	B												
0.50	ES												
0.60	D												
1.00	B	SPT(S) 3.00m, N=12 (2,2/3,3,3,3)	21.33	(1.00)		Firm to stiff brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength and occasional lamination of sand. Gravel is fine to coarse subangular to subrounded mudstone and sandstone.			2				
1.10	ES												
1.20	D												
1.50	B												
1.80	ES												
2.00	D												
2.00 - 2.45	U	SPT(S) 5.00m, N=12 (2,3/2,3,3,4)	(10.40)						3				
2.50	B												
2.60	ES												
3.00	D												
3.50	B												
3.60	ES												
4.00	D	SPT(S) 7.00m, N=16 (2,4/4,4,4,4)							4				
4.00 - 4.45	U												
4.50	B												
5.00	D												
5.50	B												
6.00	D												
6.00 - 6.45	U	SPT(S) 9.00m, N=15 (3,2/5,3,3,4)							5				
6.50	B												
7.00	D												
7.50	B												
8.00	D												
8.00 - 8.45	U												
8.50	B								6				
9.00	D												
9.50	B												
10.00	D												
Continued next sheet									10				
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.				
17-03-2021	16:00	11.00	11.00		17.50	150	17.00	150					
18-03-2021	08:30	11.00	11.00										
Chiselling					Installation				Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
16.00	17.50	01:00	Chiseling through sandstone bedrock	0.00	1.00	PLAIN	19	11.70	11.70	12.20	10	11.70	Slightly wet sands
				1.00	16.50	SLOTTED	19	12.90	12.90	15.00	15	12.90	Slightly wet sands
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



	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: CP03						
	Contract Number: CCG-C-21-12093		Date Started: 17/03/2021		Logged By: SP		Checked By: CB		Status: FINAL				
	Easting: 349019.8		Northing: 431641.8		Ground Level: 22.63mAOD		Plant Used: Dando 150		Rig Crew: AR/CMG				
Cable Percussion Borehole Log			Weather:			Termination: Refusal on sandstone bedrock			SPT Hammer: CCG6 Energy Ratio: 64%				
Samples & In Situ Testing			Strata Details						Groundwater				
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/Installation		
10.00 - 10.45	U					Firm to stiff brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength and occasional lamination of sand. Gravel is fine to coarse subangular to subrounded mudstone and sandstone.							
10.50	B												
11.00	D									11			
11.80	ES	SPT(S) 11.50m, N=20 (3,4/5,5,5,5)	10.93	11.70 (0.40)		Brown slightly sandy slightly gravelly clayey SILT. Gravel is fine to medium subrounded sandstone and mudstone.							
12.00	B		10.53	12.10 (0.80)		Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded mudstone and sandstone.				12			
12.00	D												
12.50	B												
12.50	D		9.73	12.90		Medium dense brown sandy clayey SILT.							
		SPT(S) 13.00m, N=15 (2,4/3,5,4,3)								13			
13.50	B												
13.60	ES												
14.00	D			(2.10)						14			
		SPT(S) 14.50m, N=13 (2,4/3,3,3,4)											
15.10	B		7.63	15.00 (0.60)		Firm to stiff brown slightly sandy silty CLAY with frequent laminations if silt and sand.				15			
15.50	D		7.03	15.60		Reddish brown very weak highly weathered SANDSTONE recovered as very sandy silty fine to coarse subangular to subrounded GRAVEL.				16			
16.50	B			(1.90)						17			
17.00	D		5.13	17.50		End of Borehole at 17.50m				18			
		SPT(S) 16.00m, 50 (10,14/50 for 295mm)								19			
		SPT(S) 17.20m, N=100 (11,14/100 for 230mm)								20			
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.				
17-03-2021	16:00	11.00	11.00		17.50	150	17.00	150					
18-03-2021	08:30	11.00	11.00										
Chiselling			Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
16.00	17.50	01:00	Chiseling through sandstone bedrock	0.00	1.00	PLAIN	19	11.70	11.70	12.20	10	11.70	Slightly wet sands
				1.00	16.50	SLOTTED	19	12.90	12.90	15.00	15	12.90	Slightly wet sands
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	Contract Name: Cottam Parkway Station				Client: LCC			Borehole ID: CP04			
	Contract Number: CCG-C-21-12093		Date Started: 04/03/2021		Logged By: SP		Checked By: CB		Status: FINAL		
	Easting: 349042.5		Northing: 431606.4		Ground Level: 22.97mAOD		Plant Used: Dando 150		Rig Crew: AR/CMG		
Cable Percussion Borehole Log								Scale: 1:50			
Weather: Dry				Termination: Refusal on sandstone bedrock				SPT Hammer: CCG6 Energy Ratio: 64%			
Samples & In Situ Testing				Strata Details					Groundwater		
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation	
0.40 0.50	B ES	SPT(S) 1.20m, N=8 (2,2/1,2,2,3)	22.77	0.20		Grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular sandstone and mudstone. Frequent rootlets, grassed at surface (TOPSOIL) Stiff brown slightly sandy slightly gravelly silty CLAY of very high undrained shear strength. Gravel is fine to medium subangular to subrounded mudstone and sandstone.			1		
1.50	B			(2.50)							
2.00 2.00 - 2.45	D U										
2.50 2.50	B ES	SPT(S) 3.00m, N=11 (3,2/2,3,3,3)	20.27	2.70		Medium dense brown very silty slightly clayey slightly gravelly SAND. Gravel is fine to medium subrounded sandstone.			3		
3.00	D			(1.00)							
3.50 3.50	B ES										
4.00 4.00 - 4.45	D U	SPT(S) 5.00m, N=19 (2,4/4,5,5,5)	19.27	3.70		Firm to stiff brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength. Gravel is fine to medium subangular to rounded mudstone and sandstone.			4		
4.50 4.50	B ES										
5.00	D										
5.50 5.50	B ES	SPT(S) 7.00m, N=24 (4,4/5,6,6,7)		(4.60)		Brown sandy slightly gravelly slightly clayey SILT. Gravel is fine to medium subrounded sandstone.			5		
6.00 6.00	D U										
6.50 6.50	B ES										
7.00	D	SPT(S) 9.00m, N=22 (3,5/4,6,5,7)		8.30		Firm brown slightly sandy slightly gravelly silty CLAY of medium undrained shear strength. Gravel is fine to medium subangular to rounded mudstone and sandstone.			6		
7.50 7.50	B ES										
8.00 8.00 - 8.45	D U										
8.50 8.50	B ES	SPT(S) 9.00m, N=22 (3,5/4,6,5,7)	14.67 14.47	8.50		Brown sandy slightly gravelly slightly clayey SILT. Gravel is fine to medium subrounded sandstone.			7		
9.00	D										
9.50 9.50	B ES										
10.00	D					Continued next sheet			10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:		
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.		
04-03-2021	16:00	11.00	11.00		18.00	150	18.00	150			
05-03-2021	08:30	11.00	11.00								
05-03-2021	16:00	18.00	18.00	16.90							
Chiselling					Installation				Water Strikes		
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	
				0.00	1.00	PLAIN	20	2.70	2.70	20	
				1.00	17.00	SLOTTED	20	8.30	8.30	20	
								12.90	12.90	10	
										Remarks	
										Water strike	
										Water strike	
										Water strike	
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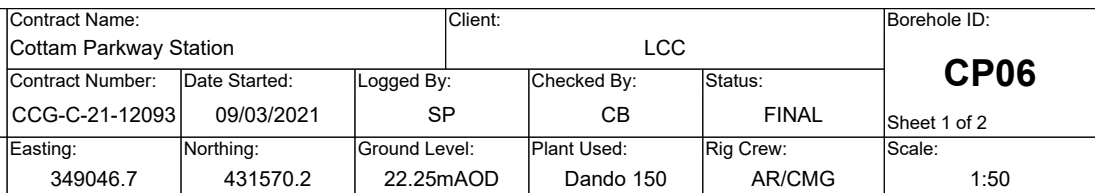
Samples & In Situ Testing	Strata Details	Groundwater
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Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.				
04-03-2021	16:00	11.00	11.00	16.90	18.00	150	18.00	150					
05-03-2021	08:30	11.00	11.00										
05-03-2021	16:00	18.00	18.00										
Chiselling					Installation				Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
				0.00	1.00	PLAIN	20	2.70	2.70	3.90	20	2.70	Water strike
				1.00	17.00	SLOTTED	20	8.30	8.30	8.60	20	8.10	Water strike
								12.90	12.90	13.80	10	12.90	Water strike
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		Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: CP05					
		Contract Number: CCG-C-21-12093	Date Started: 01/03/2021	Logged By: SP	Checked By: CB	Status: FINAL							
Cable Percussion Borehole Log		Easting: 349034.0	Northing: 431589.7	Ground Level: 22.50mAOD	Plant Used: Dando 150	Rig Crew: AR/CMG	Sheet 1 of 2 Scale: 1:50						
Weather: Dry			Termination: Refusal on sandstone bedrock			SPT Hammer: CCG6 Energy Ratio: 64%							
Samples & In Situ Testing				Strata Details				Groundwater					
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation				
0.20 0.30 0.30 0.60 0.70	ES B D B ES	SPT(S) 1.20m, N=7 (1,2/1,2,2,2)	22.00	(0.50) 0.50		Dark brown slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular mudstone and sandstone. Frequent rootlets grassed at surface (TOPSOIL)		1					
1.00 1.20 1.50 1.80 2.00 - 2.45	B ES B D U			(1.70)		Soft to firm brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone and mudstone. <i>Occasional rootlets at 0.50 - 1.00mbgl</i>							
						U100 Sample at 2.00mbgl sandy. Possibly failed.							
						Medium dense brown clayey silty SAND.							
2.50 2.50	ES EW	SPT(S) 2.50m, N=17 (2,4/4,5,4,4)	20.30	2.20 (0.70)		Medium dense brown clayey silty SAND.		2					
3.00 3.00 - 3.45	B U	SPT(S) 4.00m, N=11 (2,3/2,3,3,3)		2.90		Stiff becoming firm slightly sandy slightly gravelly silty CLAY of high becoming medium undrained shear strength. Gravel is fine to medium subrounded mudstone.							
3.50	B												
4.00	D												
4.50	B												
5.00 - 5.45	U			(4.70)					3				
5.50 5.50	D ES												
6.00	B	SPT(S) 6.00m, N=16 (1,4/3,4,5,4)											
6.50	D												
7.00 - 7.45	U												
7.50	B	SPT(S) 8.00m, N=23 (4,3/4,5,7,7)	14.90 14.70	7.60		Brown sandy silty clayey GRAVEL. Gravel is fine to medium angular to subangular mudstone and sandstone.		4					
				7.80		Firm to stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded mudstone.							
8.50	B												
9.00	D												
9.50	B												
10.00	D				Continued next sheet		10						
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)					
01-03-2021	16:00	4.50	4.50		18.20	150	18.20	150	1 hour hand excavated service avoidance pit.				
02-03-2021	08:30	4.50	4.50										
03-03-2021	08:30	15.60	15.80	15.60									
Chiselling			Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
15.80	18.20	03:00	Chiseling through mudstone boulder					2.20	2.20	2.90	30	2.20	Water Strike
								7.60	7.60	7.80	5	7.20	Water Strike
								12.50	12.50	14.00	10	12.50	Water Strike
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	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: CP05				
	Contract Number: CCG-C-21-12093		Date Started: 01/03/2021		Logged By: SP		Checked By: CB		Status: FINAL		
	Easting: 349034.0		Northing: 431589.7		Ground Level: 22.50mAOD		Plant Used: Dando 150		Rig Crew: AR/CMG		
Cable Percussion Borehole Log			Weather: Dry			Termination: Refusal on sandstone bedrock			SPT Hammer: CCG6 Energy Ratio: 64%		
Samples & In Situ Testing			Strata Details						Groundwater		
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/Installation	
10.50	B	SPT(S) 10.00m, N=21 (3,3/4,5,6,6)	10.01	(4.70)		Firm to stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded mudstone. Occasional small pockets of fine to medium SAND at 10.00-10.50mbgl			11		
11.00	D										
11.50 - 11.95	U										
12.00	B										
12.40	D										
12.80	B	SPT(S) 13.00m, N=18 (3,4/4,5,4,5)	8.51	(1.50)		Medium dense brown very silty clayey SAND.			12		
13.50	D										
14.50	B										
14.50 - 14.95	U		6.70	(1.80)		Firm to stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded mudstone.			13		
15.00	D										
15.50	B										
15.50	B	SPT(S) 15.80m, 50 (37 for 145mm/50 for 160mm)	6.00	(0.70)		Brown MUDSTONE (possibly a boulder)			14		
17.00	B										
17.50	B	SPT(S) 17.50m, 50 (25 for 5mm/50 for 10mm)	4.36	(1.65)		Very dense brown very gravelly silty SAND. Gravel is fine to medium subangular to subrounded mudstone and sandstone.			15		
17.50	D										
18.20	B	SPT(S) 18.20m, 100 (25 for 5mm/100 for 20mm)	4.30	(1.65)		Weak moderately weathered reddish brown SANDSTONE			16		
						End of Borehole at 18.20m			17		
									18		
									19		
									20		

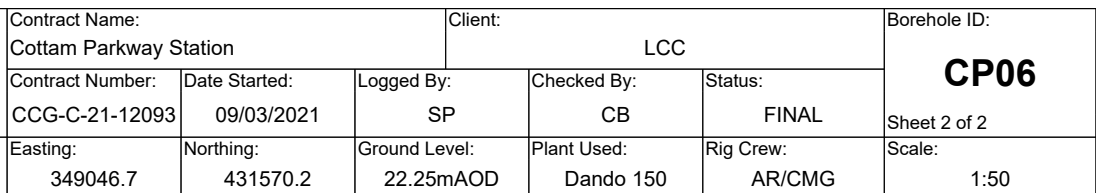
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.				
01-03-2021	16:00	4.50	4.50		18.20	150	18.20	150					
02-03-2021	08:30	4.50	4.50										
03-03-2021	08:30	15.60	15.80	15.60									
Chiselling					Installation				Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
15.80	18.20	03:00	Chiseling through mudstone boulder					2.20	2.20	2.90	30	2.20	Water Strike
								7.60	7.60	7.80	5	7.20	Water Strike
								12.50	12.50	14.00	10	12.50	Water Strike
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Samples & In Situ Testing	Strata Details	Groundwater
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






Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation	
0.15	ES	SPT(S) 1.20m, N=14 (2,2/3,3,3,5)	22.05	0.20		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular mudstone. Grassed at surface (TOPSOIL).	1		
0.50	B					Soft becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded mudstone and sandstone.			
0.60	D								
0.70	ES								
1.00	B								
1.40	D	SPT(S) 3.00m, N=27 (2,3/5,6,7,9)	19.45	(2.60)		Becomes firm at 1.00mbgl	2		
1.50	ES					Lens of water bearing brown silty clayey SAND at 1.40 - 1.50mbgl.			
2.00	B								
2.00 - 2.45	U								
2.40	D								
2.50	B	SPT(S) 5.00m, N=15 (1,2/3,4,4,4)	18.55	2.80		Medium dense brown silty slightly clayey SAND.	3		
2.50	ES								
3.00	D								
3.40	ES								
3.50	B								
3.60	D	SPT(S) 7.00m, N=22 (3,3/4,6,6,6)	(9.10)	3.70		Firm to stiff brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength with frequent pockets of sand and silt laminations. Gravel is fine to medium subangular to well rounded mudstone sandstone and granite.	4		
3.70	EW								
4.00 - 4.45	U								
4.50	B								
5.00	D								
5.50	B	SPT(S) 9.00m, N=21 (4,4/5,5,5,6)	(9.10)		CLAY has low undrained shear strength at 8.00 - 8.45mbgl.	5			
6.00	D								
6.00 - 6.45	U								
6.50	B								
7.00	D								
7.50	B	SPT(S) 9.00m, N=21 (4,4/5,5,5,6)	(9.10)		CLAY has low undrained shear strength at 8.00 - 8.45mbgl.	6			
8.00	D								
8.00 - 8.45	U								
8.50	B								
9.00	D								
9.50	B	SPT(S) 9.00m, N=21 (4,4/5,5,5,6)	(9.10)		CLAY has low undrained shear strength at 8.00 - 8.45mbgl.	7			
10.00	D								
						Continued next sheet	10		

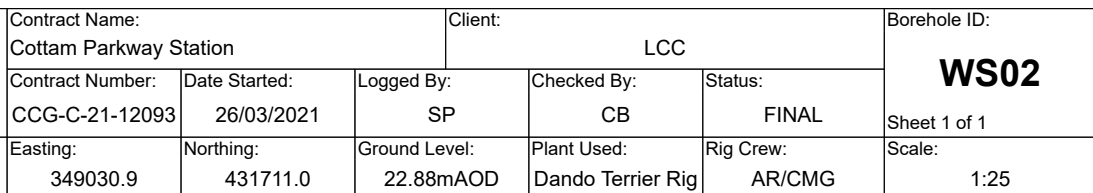
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.					
09-03-2021	16:00	9.50	9.50	8.70	18.00	150	18.00	150						
11-03-2021	08:00	9.50	9.50											
11-03-2021	16:00	18.00	18.00											
									Water Strikes					
Chiselling					Installation				Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	1.40	1.40	1.60	10	1.40	Water strike in sand lens
16.00	18.00	01:00	Chiseling in sandstone bedrock.		0.00 1.00	1.00 17.00	PLAIN SLOTTED	19 19	2.80	2.80	3.70	10	2.50	Water strike
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Samples & In Situ Testing			Strata Details						Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation	
10.00 - 10.45	U					Firm to stiff brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength with frequent pockets of sand and silt laminations. Gravel is fine to medium subangular to well rounded mudstone sandstone and granite.				
10.50	B									
11.00	D						11			
		SPT(S) 11.50m, N=22 (4,4/5,5,5,7)								
12.00	B						12			
12.50	D									
		SPT(S) 13.00m, N=15 (1,2/3,4,4,4)	9.45	12.80		Medium dense brown sandy clayey SILT.	13			
13.50	B			(1.40)						
14.00	D						14			
			8.05	14.20	Firm to stiff brown slightly sandy silty CLAY.					
14.50 - 14.95	U			(1.60)			15			
15.50	B									
15.50	D						16			
		SPT(S) 16.00m, N=50 (4,7/50 for 275mm)	6.45	15.80	Very weak brown weathered SANDSTONE recovered as a very sandy silty GRAVEL. Gravel is fine to coarse subangular sandstone.					
16.50	B			(2.00)			17			
17.00	D	SPT(S) 17.00m, 50 (12,13/50 for 200mm)								
			4.45	17.80		Weak reddish brown weathered SANDSTONE	18			
			4.25	18.00	End of Borehole at 18.00m					
							19			
							20			

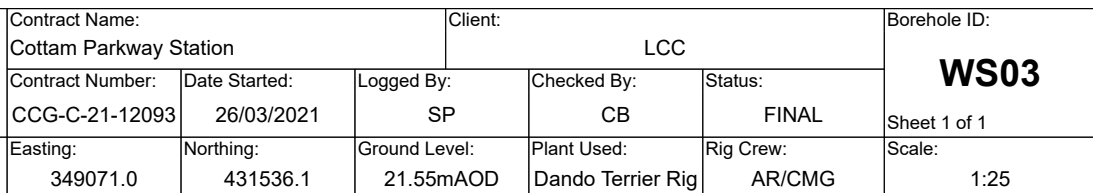
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavated service avoidance pit.					
09-03-2021	16:00	9.50	9.50	8.70	18.00	150	18.00	150						
11-03-2021	08:00	9.50	9.50											
11-03-2021	16:00	18.00	18.00											
									Water Strikes					
Chiselling					Installation				Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	1.40	1.40	1.60	10	1.40	Water strike in sand lens
16.00	18.00	01:00	Chiseling in sandstone bedrock.		0.00 1.00	1.00 17.00	PLAIN SLOTTED	19 19	2.80	2.80	3.70	10	2.50	Water strike
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	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: WS01	
	Contract Number: CCG-C-21-12093	Date Started: 25/03/2021	Logged By: SP	Checked By: CB	Status: FINAL			
Dynamic Sampling Borehole Log	Easting: 348992.5	Northing: 431694.5	Ground Level: 22.35mAOD	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMC	Sheet 1 of 1		
						Scale: 1:25		
Weather: Dry			Termination: As instructed			SPT Hammer: N/R, Energy Ratio: N/R		
Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.00 - 1.00 0.10	UT ES		22.15	0.20		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)	1	
0.50	ES	HVP=110				Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone and sandstone.		
1.00 1.00 - 2.00	ES UT	SPT(S)N=13 (1,2/3,3,3,4)					2	
1.50	D	HVP=110						
2.00 - 3.00	UT	SPT(S)N=16 (3,3/3,4,4,5) HVP=110		(3.80)			3	
2.50	D	HVP=110						
3.00 - 4.00	UT	SPT(S)N=22 (3,3/5,5,6,6) HVP=110					4	
		HVP=110						
		SPT(S)N=21 (3,3/4,5,6,6) HVP=110	18.35	4.00		End of Borehole at 4.00m	5	
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
Chiselling			Installation		Water Strikes			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	
					Strike (m) Casing (m) Sealed (m) Time (mins) Rose to (m) Remarks			
					0 BH DRY			
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



Samples & In Situ Testing	Strata Details	Groundwater
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Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation									
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0		BH DRY
									CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					










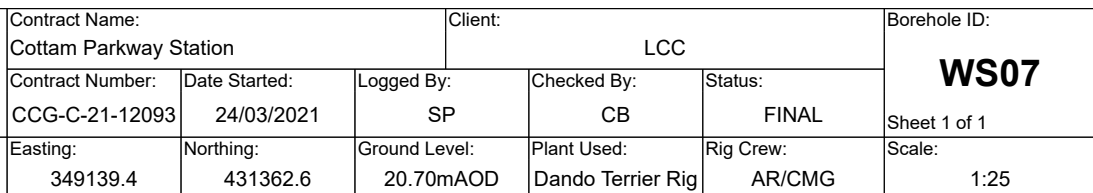
Samples & In Situ Testing	Strata Details	Groundwater
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Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	
Chiselling					Installation				
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	
Water Strikes									
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks				
1.10			0		Slight seepage				
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	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: WS04						
	Contract Number: CCG-C-21-12093		Date Started: 26/03/2021		Logged By: SP		Checked By: CB		Status: FINAL				
	Easting: 349088.0		Northing: 431488.4		Ground Level: 21.91mAOD		Plant Used: Dando Terrier Rig		Rig Crew: AR/CMG				
Dynamic Sampling Borehole Log										Sheet 1 of 1			
										Scale: 1:25			
Weather: Dry				Termination: As instructed				SPT Hammer: N/R, Energy Ratio: N/R					
Samples & In Situ Testing				Strata Details						Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description					Water Strike	Backfill/ Installation	
0.00 - 1.00	UT					Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL). Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded mudstone and sandstone.							
0.20	ES	HVP=70	21.71	0.20									
0.70	ES	HVP=65									1		
1.00 - 2.00	UT												
1.20	ES	SPT(S)N=16 (2,3/4,4,4,4)									2		
		HVP=110											
2.00 - 3.00	UT	SPT(S)N=17 (2,3/4,4,4,5)		(3.80)							3		
2.50	D	HVP=110											
3.00 - 4.00	UT	SPT(S)N=20 (4,3/4,5,5,7)									4		
		HVP=110											
		SPT(S)N=20 (2,3/4,5,5,6) HVP=110	17.91	4.00		End of Borehole at 4.00m					5		
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)					
Chiselling			Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
											0		BH DRY
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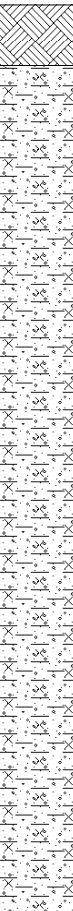
	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: WS05	
	Contract Number: CCG-C-21-12093	Date Started: 26/03/2021	Logged By: SP	Checked By: CB	Status: FINAL		Sheet 1 of 1	
Dynamic Sampling Borehole Log	Easting: 349092.1	Northing: 431438.7	Ground Level: 21.60mAO	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMG	Scale: 1:25		
	Weather: Dry			Termination: As instructed		SPT Hammer: N/R, Energy Ratio: N/R		
Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAO)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.00 - 1.00	UT							
0.20	ES		21.35	0.25		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)		
0.60	ES	HVP=90		(0.75)		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium rounded mudstone and sandstone		
1.00 - 2.00	UT		20.60	1.00		Medium dense brown very silty clayey slightly gravelly SAND with frequent pockets of clay. Gravel is fine to medium subrounded sandstone.	1	
1.10	ES			(0.40)				
1.20	B	SPT(S)N=11 (1,2/2,3,3,3)	20.20	1.40		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded mudstone and sandstone		
		HVP=110						
2.00	D	SPT(S)N=20 (2,3/4,5,6,5)		(1.50)			2	
2.00 - 3.00	UT							
		HVP=80						
3.00 - 4.00	UT	SPT(S)N=18 (2,2/3,5,6,6)	18.70	2.90		Brown silty clayey SAND.	3	
		HVP=110	18.50	3.10		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium rounded mudstone and sandstone		
				(0.90)				
		SPT(S)N=21 (2,2/3,5,6,7)	17.60	4.00		End of Borehole at 4.00m	4	
							5	
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
Chiselling			Installation		Water Strikes			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)
				0.00	1.00	PLAIN		1.00
				1.00	4.00	SLOTTED		
					Sealed (m) Time (mins) Rose to (m) Remarks 0			
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
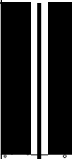

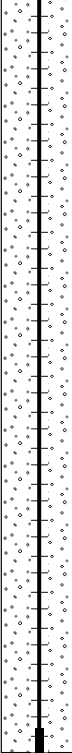


	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: WS06	
	Contract Number: CCG-C-21-12093	Date Started: 26/03/2021	Logged By: SP	Checked By: CB	Status: FINAL		Sheet 1 of 1	
Dynamic Sampling Borehole Log	Easting: 349101.0	Northing: 431388.0	Ground Level: 20.97mAOD	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMG	Scale: 1:25		
	Weather: Dry			Termination: As instructed		SPT Hammer: N/R, Energy Ratio: N/R		
Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.00 - 1.00	UT	HVP=110	20.72	0.25		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)		
0.15	ES							
0.40	ES							
1.00	ES	SPT(S)N=16 (2,3/3,4,5,4)	20.02	0.95		Medium dense brown silty clayey SAND	1	
1.00 - 2.00	UT							
1.50	D							
2.00 - 3.00	UT	HVP=110	19.77	1.20		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded mudstone and sandstone.		
3.00 - 4.00	UT	SPT(S)N=19 (2,2/4,5,4,6)	16.97	2.80		End of Borehole at 4.00m	4	
3.50	D	HVP=110	16.97	4.00		End of Borehole at 4.00m	4	
		SPT(S)N=14 (2,1/3,2,4,5)	16.97	4.00		End of Borehole at 4.00m	4	
							5	
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
Chiselling			Installation		Water Strikes			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	
					Strike (m) Casing (m) Sealed (m) Time (mins) Rose to (m) Remarks			
					0.95			
					0			
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


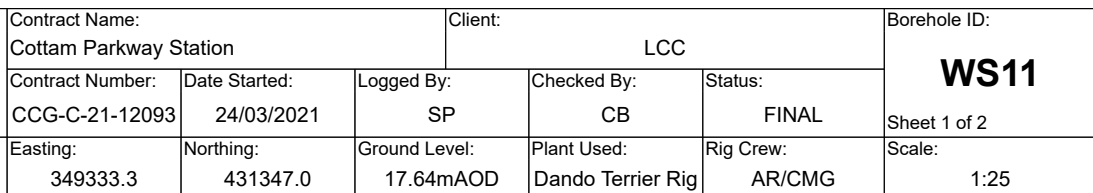
Samples & In Situ Testing	Strata Details	Groundwater
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Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	
									Water Strikes
Chiselling					Installation				Strike (m)
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Casing (m)
									Sealed (m)
									Time (mins)
									Rose to (m)
									Remarks
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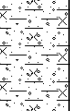
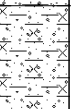
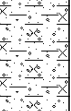
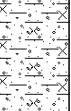
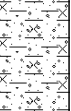
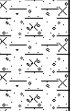

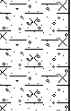
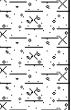
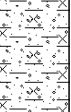
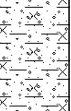
	Contract Name: Cottam Parkway Station				Client: LCC				Borehole ID: WS08		
	Contract Number: CCG-C-21-12093		Date Started: 24/03/2021		Logged By: SP		Checked By: CB		Status: FINAL		
	Easting: 349201.2		Northing: 431310.4		Ground Level: 20.51mAOD		Plant Used: Dando Terrier Rig		Rig Crew: LN		
Dynamic Sampling Borehole Log										Sheet 1 of 1	
										Scale: 1:25	
Weather:				Termination: As instructed				SPT Hammer: N/R, Energy Ratio: N/R			
Samples & In Situ Testing				Strata Details						Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation
0.00 - 1.00 0.10	UT ES		20.31	0.20		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL) Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded sandstone.				1	
0.50	ES	HVP=110									
1.00 1.00 - 2.00	ES UT	SPT(S)N=21 (2,2/4,5,5,7)									
1.50	D	HVP=110	(2.80)								
2.00 - 3.00	UT	SPT(S)N=15 (2,2/3,5,3,4)									
2.50	D	HVP=110								2	
		SPT(S)N=11 (1,2/2,3,3,3)	17.51	3.00		End of Borehole at 3.00m				3	
										4	
										5	
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:		
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)			
Chiselling					Installation		Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)
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	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: WS09	
	Contract Number: CCG-C-21-12093	Date Started: 24/03/2021	Logged By: SP	Checked By: CB	Status: FINAL		Sheet 1 of 1	
Dynamic Sampling Borehole Log	Easting: 349202.1	Northing: 431340.8	Ground Level: 20.73mAOD	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMG	Scale: 1:25		
	Weather: Dry			Termination: As instructed		SPT Hammer: N/R, Energy Ratio: N/R		
Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.00 - 1.00	UT		20.53	0.20		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL) Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded mudstone and sandstone.		
0.25	ES	HVP=60						
0.65	ES	HVP=100						
1.00 - 2.00	UT	SPT(S)N=12 (2,3/3,3,3,3)		(2.80)			1	
1.20	ES	HVP=110						
1.50	D							
2.00 - 3.00	UT	SPT(S)N=13 (2,2/3,3,4,4) HVP=110	17.73	3.00		End of Borehole at 3.00m	3	
3.50	D							
							4	
							5	
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
Chiselling			Installation		Water Strikes			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)
				0.00	0.50	PLAIN	19	Casing (m)
				0.50	3.00	SLOTTED	19	Sealed (m)
								Time (mins)
								Rose to (m)
								Remarks
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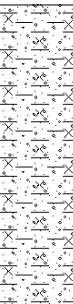
	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: WS10	
	Contract Number: CCG-C-21-12093	Date Started: 24/03/2021	Logged By: SP	Checked By: CB	Status: FINAL			
Dynamic Sampling Borehole Log	Easting: 349299.7	Northing: 431309.4	Ground Level: 18.35mAOD	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMG	Scale: 1:25		
	Weather: Dry		Termination: As instructed		SPT Hammer: N/R, Energy Ratio: N/R			
Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.00 - 1.00	UT	HVP=100	18.15	0.20		Soft grey slightly sandy slightly gravelly silty organic CLAY with inclusions of brick. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)	1	
0.15	ES							
0.40	ES							
0.70	ES							
1.00 - 2.00	UT	SPT(S)N=11 (1,2/2,3,3,3)	(2.80)		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded mudstone and sandstone.	2		
1.20	ES							
1.50	D							
2.00 - 3.00	UT	SPT(S)N=20 (5 for 78mm/4,5,6,5) HVP=110						
2.50	D	SPT(S)N=16 (2,2/3,4,5,4) HVP=110	15.35	3.00		End of Borehole at 3.00m	3	
							4	
							5	
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
Chiselling			Installation		Water Strikes			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)
								Casing (m)
								Sealed (m)
								Time (mins)
								Rose to (m)
								Remarks
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




Samples & In Situ Testing	Strata Details	Groundwater
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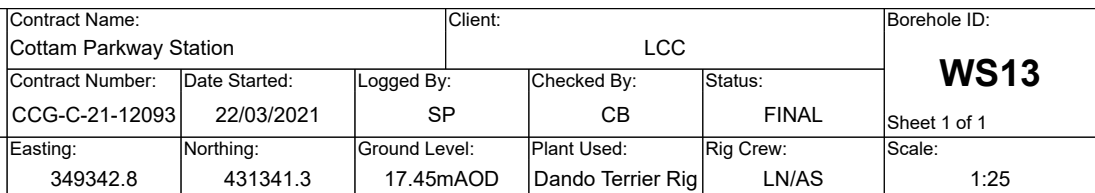
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	UT							
0.20	ES		17.29	(0.35)		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)		
0.50	ES	HVP=70		0.35 (0.40)		Firm brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded mudstone and sandstone.		
1.00	ES	SPT(S)N=11 (1,1/2,2,3,4)		16.89	0.75 (0.35)	Greyish brown very clayey gravelly SAND. Gravel is fine to coarse subangular sandstone.		
1.00 - 2.00	UT	HVP=100	16.54	1.10		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded mudstone and sandstone.	1	
1.50	D							
		SPT(S)N=20 (2,3/4,5,5,6)						
2.00 - 3.00	UT	HVP=110					2	
2.50	D	HVP=110						
3.00 - 4.00	UT	SPT(S)N=13 (1,2/2,3,3,5)		(4.90)			3	
3.50	D	HVP=110						
4.00 - 5.00	UT	SPT(S)N=11 (1,2/3,2,3,3)					4	
4.50	D	HVP=90						
5.00 - 6.00	UT	SPT(S)N=16 (3,4/4,4,4,4)					5	
Continued next sheet								

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0		Dry
									CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					

	Contract Name: Cottam Parkway Station				Client: LCC				Borehole ID: WS11				
	Contract Number: CCG-C-21-12093		Date Started: 24/03/2021		Logged By: SP		Checked By: CB		Status: FINAL				
	Easting: 349333.3		Northing: 431347.0		Ground Level: 17.64mAOD		Plant Used: Dando Terrier Rig		Rig Crew: AR/CMG				
Dynamic Sampling Borehole Log										Sheet 2 of 2			
										Scale: 1:25			
Weather: Dry				Termination: As instructed				SPT Hammer: N/R, Energy Ratio: N/R					
Samples & In Situ Testing				Strata Details						Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation		
		HVP=90				Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded mudstone and sandstone.							
		SPT(S)N=26 (4,5/4,6,7,9) HVP=110	11.64	6.00		End of Borehole at 6.00m				6			
										7			
										8			
										9			
										10			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)					
Chiselling					Installation				Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
											0		Dry
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






	Contract Name: Cottam Parkway Station			Client: LCC			Borehole ID: WS12						
	Contract Number: CCG-C-21-12093		Date Started: 23/03/2021		Logged By: SP		Checked By: CB		Status: FINAL				
	Easting: 349341.0		Northing: 431312.0		Ground Level: 17.18mAOD		Plant Used: Dando Terrier Rig		Rig Crew: LN/AS				
Dynamic Sampling Borehole Log										Sheet 1 of 2			
Weather: Dry		Termination: As instructed				SPT Hammer: N/R, Energy Ratio: N/R							
Samples & In Situ Testing				Strata Details						Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description					Water Strike	Backfill/ Installation	
0.00 - 1.00	UT	HVP=110	16.88	(0.30)		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)					1		
0.20	ES			0.30									Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subrounded mudstone and sandstone.
0.60	ES												
1.00 - 2.00	UT	SPT(S)N=16 (1,2/3,4,4,5)	(5.70)								2		
1.10	ES												
1.50	D	HVP=110											
2.00 - 3.00	UT	SPT(S)N=16 (2,3/3,4,4,5)											
		HVP=110											
3.00	D	SPT(S)N=19 (2,2/3,4,6,6)									3		
3.00 - 4.00	UT	HVP=110											
4.00 - 5.00	UT	SPT(S)N=14 (2,3/3,3,4,4)									4		
4.50	D	HVP=80											
5.00 - 6.00	UT	SPT(S)N=17 (2,4/4,5,4,4)				Continued next sheet					5		
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)					
Chiselling			Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
								4.10			0		Slight seepage
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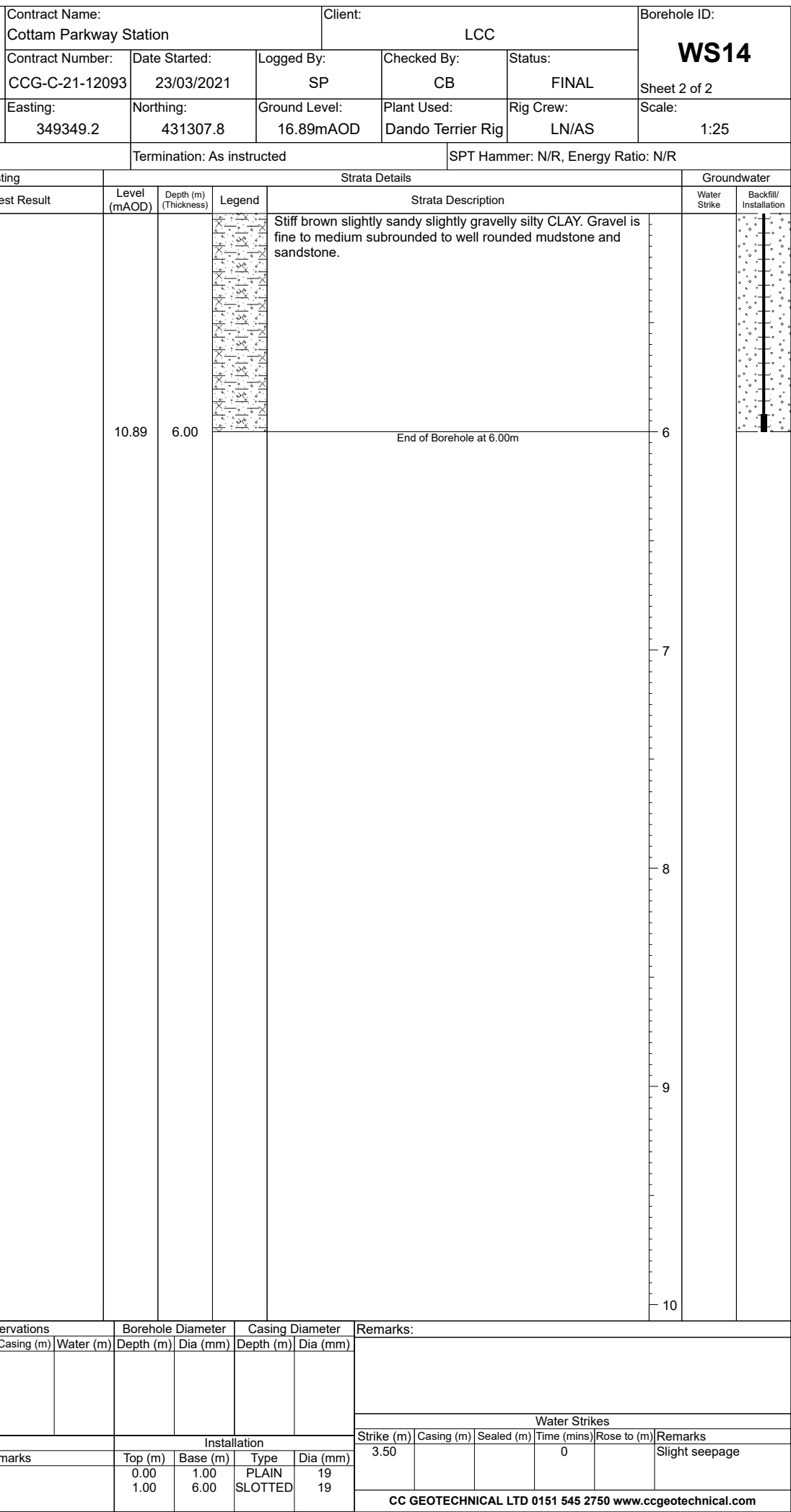
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	
								4.10			0		Slight seepage	
								CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com						



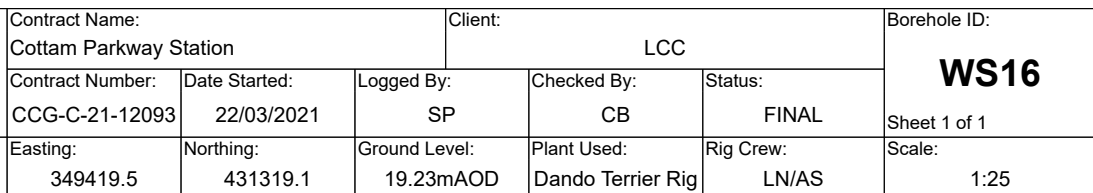
Samples & In Situ Testing	Strata Details	Groundwater
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Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
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	Contract Name: Cottam Parkway Station		Client: LCC			Borehole ID: WS14	
	Contract Number: CCG-C-21-12093	Date Started: 23/03/2021	Logged By: SP	Checked By: CB	Status: FINAL	Sheet 1 of 2	
Dynamic Sampling Borehole Log	Easting: 349349.2	Northing: 431307.8	Ground Level: 16.89mAOD	Plant Used: Dando Terrier Rig	Rig Crew: LN/AS	Scale: 1:25	
	Weather: Dry		Termination: As instructed		SPT Hammer: N/R, Energy Ratio: N/R		
Samples & In Situ Testing			Strata Details				Groundwater
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike
0.00 - 1.00	UT	HVP=90	16.69	0.20		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)	
0.25	ES						
0.60	ES						
1.00 - 2.00	UT	SPT(S)N=15 (1,3/3,3,4,5) HVP=90	(5.80)		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to well rounded mudstone and sandstone.		1
1.20	ES						
1.50	D						
2.00 - 3.00	UT	SPT(S)N=17 (1,3/3,4,5,5) HVP=110	(5.80)				2
2.50	D						
3.00 - 4.00	UT	SPT(S)N=13 (1,3/2,3,4,4) HVP=110					
4.00 - 5.00	UT	SPT(S)N=12 (2,2/3,3,3,3) HVP=80	(5.80)				3
4.50	D						
5.00 - 6.00	UT	SPT(S)N=12 (2,2/3,3,3,3)					
Continued next sheet							5
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	
Chiselling			Installation		Water Strikes		
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)
				0.00	1.00	PLAIN	19
				1.00	6.00	SLOTTED	19
					Strike (m)	Casing (m)	Sealed (m)
					3.50		
					Time (mins)	Rose to (m)	Remarks
					0		Slight seepage
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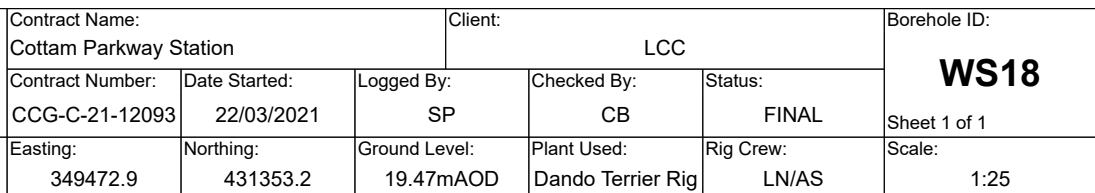
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	
									Water Strikes
									Strike (m)
Chiselling					Installation				
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	
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Samples & In Situ Testing	Strata Details	Groundwater
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Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	
Chiselling					Installation				
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	
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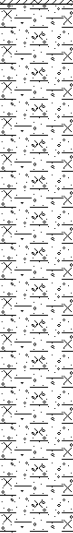
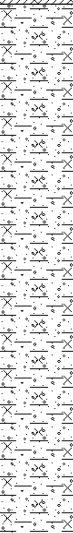
	Contract Name: Cottam Parkway Station				Client: LCC				Borehole ID: WS17				
	Contract Number: CCG-C-21-12093		Date Started: 22/03/2021		Logged By: SP		Checked By: CB		Status: FINAL				
	Easting: 349440.5		Northing: 431319.5		Ground Level: 19.36mAOD		Plant Used: Dando Terrier Rig		Rig Crew: LN/AS				
Dynamic Sampling Borehole Log										Sheet 1 of 1			
										Scale: 1:25			
Weather: Dr				Termination: As instructed				SPT Hammer: N/R, Energy Ratio: N/R					
Samples & In Situ Testing				Strata Details						Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation		
0.00 - 1.00	UT	HVP=90	19.06	(0.30)		Soft grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to medium subangular to well rounded mudstone and sandstone. Frequent rootlets, grassed at surface (TOPSOIL)				1			
0.20	ES			0.30									
0.50	ES												
0.80	ES												
1.00 - 2.00	UT	SPT(S)N=15 (1,2/3,3,4,5) HVP=110	(2.70)						2				
1.50	D												
2.00 - 3.00	UT	SPT(S)N=22 (5 for 78mm/5,5,6,6) HVP=110											
2.50	D												
		SPT(S)N=15 (2,3/3,3,4,5) HVP=110	16.36	3.00		End of Borehole at 3.00m				3			
										4			
										5			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)					
Chiselling					Installation		Water Strikes						
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com													




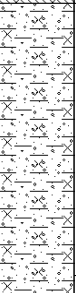


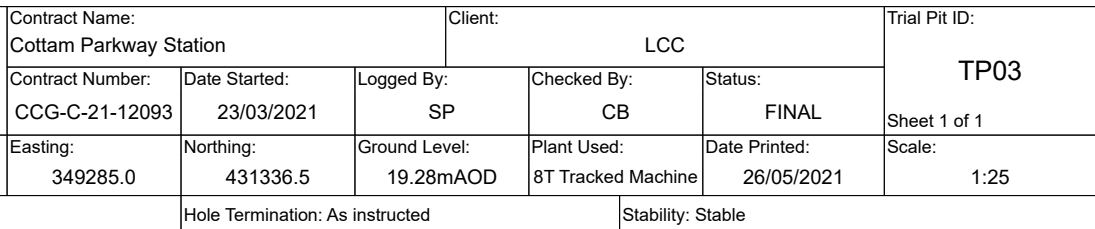
Samples & In Situ Testing	Strata Details	Groundwater
---------------------------	----------------	-------------

[illegible]

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	0.50	PLAIN	19						
					0.50	3.00	SLOTTED	19						
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com														

	Contract Name: Cottam Parkway Station			Client: LCC			Trial Pit ID: TP01																			
	Contract Number: CCG-C-21-12093	Date Started: 23/03/2021	Logged By: SP	Checked By: CB	Status: FINAL	Sheet 1 of 1																				
Trial Pit Log	Easting: 349157.0	Northing: 431325.0	Ground Level: 20.56mAOD	Plant Used: 8T Tracked Machine	Date Printed: 26/05/2021	Scale: 1:25																				
	Weather: Dry		Hole Termination: As instructed			Stability: Stable																				
Samples & In Situ Testing			Strata Details				Water	Backfill																		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description																				
0.10 0.10 0.20 0.30 0.40 0.50	B D ES D B ES	HVP=75kPa	20.32	0.25		Grey slightly sandy slightly gravelly silty CLAY (TOPSOIL)	1																			
0.70	D					Stiff brown mottled grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse sub-angular to rounded mudstone and sandstone																				
1.00	ES					HVP=100kPa																				
1.20	B																									
1.50	B								HVP=110kPa																	
1.70	D																									
2.00	B	18.57	2.00	End of Trial Pit at 2.00m		2																				
						3																				
Dimensions:			General Remarks:																							
Final Depth: 2.00m																										
<div><div>← Length (m) → 2.00m</div><div>↑ Width (m) ↓ 1.00m</div><div>Orientation: ° ←</div></div>																										
Inclination: °			<table><tr><td colspan="6">Water Strikes</td></tr><tr><td>Strike (m)</td><td>Casing (m)</td><td>Sealed (m)</td><td>Time (mins)</td><td>Rose to (m)</td><td>Remarks</td></tr><tr><td></td><td></td><td></td><td>0</td><td></td><td>TP DRY</td></tr></table>						Water Strikes						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks				0		TP DRY
Water Strikes																										
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																					
			0		TP DRY																					
CC GEOTECHNICAL LTD 0151 545 2750 www.cogeotechnical.com																										

	Contract Name: Cottam Parkway Station			Client: LCC			Trial Pit ID: TP02																					
	Contract Number: CCG-C-21-12093	Date Started: 23/03/2021	Logged By: SP	Checked By: CB	Status: FINAL	Sheet 1 of 1																						
	Easting: 349247.9		Northing: 431322.0		Ground Level: 19.96mAO		Plant Used: 8T Tracked Machine		Date Printed: 26/05/2021	Scale: 1:25																		
Trial Pit Log			Weather: Dry			Hole Termination: As instructed			Stability: Stable																			
Samples & In Situ Testing			Strata Details							Water	Backfill																	
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description																						
0.15 0.20 0.20	ES B D	HVP=75kPa	19.66	(0.30)		Grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium sub-angular to rounded mudstone and sandstone (TOPSOIL)			1																			
0.50 0.60 0.70	B ES D			(1.70)		Stiff brown mottled grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse sub-angular to rounded mudstone and sandstone																						
1.00 1.20	B D			17.96	2.00	Lens of SAND. Not water bearing at 1.20 - 1.30mbgl																						
1.50 1.80	ES D	End of Trial Pit at 2.00m				2																						
2.00	B						3																					
Dimensions:					General Remarks:																							
Final Depth: 2.00m					<div><div>← Length (m) → 2.60m</div><div>↑ Width (m) ↓ 1.00m</div><div>Orientation: ° ←</div></div> <table><tr><td colspan="6">Water Strikes</td></tr><tr><td>Strike (m)</td><td>Casing (m)</td><td>Sealed (m)</td><td>Time (mins)</td><td>Rose to (m)</td><td>Remarks</td></tr><tr><td></td><td></td><td></td><td>0</td><td></td><td>TP DRY</td></tr></table>						Water Strikes						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks				0		TP DRY
Water Strikes																												
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)							Remarks																	
			0								TP DRY																	
Inclination: °																												
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgteotechnical.com																												



Dimensions:

Final Depth: 2.00m

← Length (m) →

2.50m

↑ Width (m) ↓

1.00m

Orientation: °

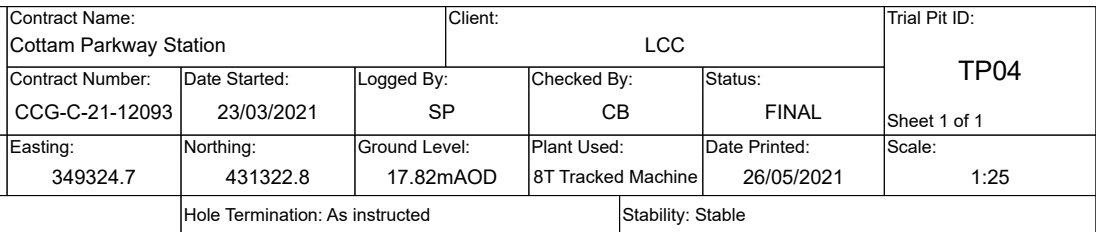
←

Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		TP DRY

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Dimensions:

Final Depth: 2.00m

← Length (m) →

2.70m

↑ Width (m) ↓

1.00m

Orientation: °



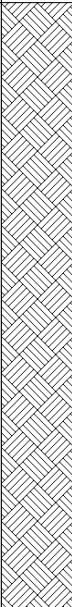

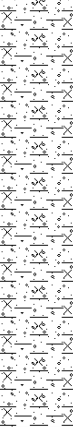
←








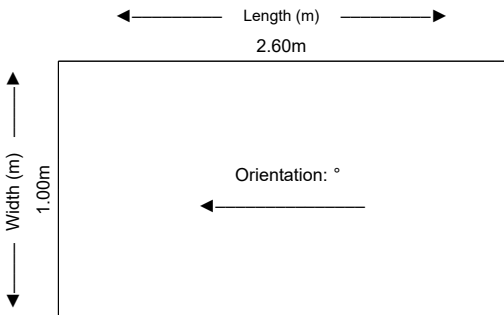
Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		TP DRY

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	Contract Name: Cottam Parkway Station			Client: LCC			Trial Pit ID: TP05																							
	Contract Number: CCG-C-21-12093	Date Started: 24/03/2021	Logged By: SP	Checked By: CB	Status: FINAL	Sheet 1 of 1																								
	Easting: 349381.3		Northing: 431309.8	Ground Level: 17.86mAOD	Plant Used: 8T Tracked Machine	Date Printed: 26/05/2021	Scale: 1:25																							
Trial Pit Log		Weather: Dry			Hole Termination: As instructed			Stability: Stable																						
Samples & In Situ Testing				Strata Details					Water	Backfill																				
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description																								
0.10 0.20	ES B	HVP=80kPa	17.56	(0.30)		Grey slightly sandy slightly gravelly silty organic CLAY with frequent rootlets. Gravel is fine to medium sub-angular to rounded mudstone and sandstone (Grassed TOPSOIL)			1																					
0.40 0.50	ES B			HVP=110kPa	0.30		Stiff brown slightly sandy slightly gravelly silty friable CLAY with a low cobble content. Gravel is fine to coarse sub-rounded to rounded mudstone and sandstone																							
0.70 0.90 1.00	D B ES				HVP=110kPa	(1.70)		End of Trial Pit at 2.00m																						
1.40	D																													
1.80	D																													
2.00	B	HVP=110kPa	15.86	2.00				2																						
										3																				
Dimensions:											General Remarks:																			
Final Depth: 2.00m											<table><tr><td colspan="6">Water Strikes</td></tr><tr><td>Strike (m)</td><td>Casing (m)</td><td>Sealed (m)</td><td>Time (mins)</td><td>Rose to (m)</td><td>Remarks</td></tr><tr><td></td><td></td><td></td><td>0</td><td></td><td>TP DRY</td></tr></table>		Water Strikes						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks				0		TP DRY
Water Strikes																														
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																									
			0		TP DRY																									
<div><div>← Length (m) → 2.20m</div><div>↑ Width (m) ↓ 1.00m</div><div>Orientation: ° ←</div></div>																														
Inclination: °											CC GEOTECHNICAL LTD 0151 545 2750 www.ccgteotechnical.com																			

	Contract Name: Cottam Parkway Station			Client: LCC			Trial Pit ID: TP06																			
	Contract Number: CCG-C-21-12093	Date Started: 24/03/2021	Logged By: SP	Checked By: CB	Status: FINAL	Sheet 1 of 1																				
Trial Pit Log	Easting: 349425.1	Northing: 431336.6	Ground Level: 19.08mAOD	Plant Used: 8T Tracked Machine	Date Printed: 26/05/2021	Scale: 1:25																				
	Weather: Dry			Hole Termination: As instructed		Stability: Stable																				
Samples & In Situ Testing			Strata Details				Water	Backfill																		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description																				
0.15	B	HVP=75kPa	18.78	(0.30)		Grey slightly sandy slightly gravelly silty organic CLAY. Gravel is fine to coarse sub-angular to rounded mudstone and sandstone (TOPSOIL)	1																			
0.25	ES			0.30					Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse sub-angular to rounded mudstone, sandstone and granite																	
0.40	B																									
0.50	D																									
0.60	ES																									
0.70	B																									
0.90	ES	HVP=110kPa		(1.70)																						
1.00	D																									
1.30	ES																									
1.40	B	HVP=110kPa																								
1.60	D																									
		HVP=110kPa																								
1.90	D																									
2.00	B		17.08	2.00		End of Trial Pit at 2.00m	2																			
							3																			
Dimensions:			General Remarks:																							
Final Depth: 2.00m																										
																										
Inclination: °			<table><tr><th colspan="6">Water Strikes</th></tr><tr><th>Strike (m)</th><th>Casing (m)</th><th>Sealed (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td></td><td></td><td></td><td>0</td><td></td><td>TP DRY</td></tr></table>						Water Strikes						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks				0		TP DRY
Water Strikes																										
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																					
			0		TP DRY																					
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APPENDIX C

FALLING HEAD TEST WORKSHEETS

CCG-C-21-12093: Cottam
Parkway Station: FH 8/9

FALLING HEAD TEST



Details of test Section	Situation B - BS5930	Ground Level (mAOD)	20.505
Height of standpipe	N/A	Filter Length	N/A
Depth below top of standpipe to response zone	N/A	Casing Elevation (mAOD)	20.505
Initial depth to water (mbgl)	N/A	Borehole Diameter (m)	0.100
Depth of Casing (mbgl)	0.920	Standpipe Diameter:	N/A
		Casing Diameter	85mm

Ref: BS5930:2015

Strata:
0.25: Grassed TOPSOIL
1.00: Brown slightly sandy slightly gravelly silty CLAY

Time Elapsed t (mins)	Depth at Time t From top of casing (m)	Head at Time t	Head Ratio (H/Ho)
0	0.025	0.980	1.000
2	0.055	0.950	0.969
4	0.100	0.905	0.923
6	0.140	0.865	0.883
8	0.170	0.835	0.852
10	0.170	0.835	0.852
30	0.185	0.820	0.837
60	0.185	0.820	0.837
90	0.190	0.815	0.832
120	0.190	0.815	0.832
150	0.190	0.815	0.832

Permeability:

$K = A/FT$

$K = 6.23E-08 \text{ m/s}$

Where:

A= Cross sectional area of FH1 (m²)
0.00567

F= Intake Factor (m) see BS5930
0.275

T= Basic time Lag (s)
331200

Notes:

Test carried out under Test B of Section 4 - BS 5930:2015

Basic lag time extrapolated for H/Ho to equal 0.370

Client: LCC

Calcs by: SP Checked by: CB Job Number: 21 -12093

CCG-C-21-12093: Cottam
Parkway Station: FH 13/12

FALLING HEAD TEST



Details of test Section	Situation B - BS5930	Ground Level (mAOD)	17.466
Height of standpipe	N/A	Filter Length	N/A
Depth below top of standpipe to response zone	N/A	Casing Elevation (mAOD)	17.466
Initial depth to water (mbgl)	N/A	Borehole Diameter (m)	0.100
Depth of Casing (mbgl)	0.980	Standpipe Diameter:	N/A
		Casing Diameter	85mm

Ref: BS5930:2015

Strata:
0.25: Grassed TOPSOIL
0.84: Brown slightly sandy slightly gravelly silty CLAY
1.00: Brown silty clayey SAND

Time Elapsed t (mins)	Depth at Time t From top of casing (m)	Head at Time t	Head Ratio (H/Ho)
0	0.000	0.980	1.000
1	0.200	0.780	0.796
2	0.200	0.780	0.796
3	0.210	0.770	0.786
4	0.210	0.770	0.786
6	0.210	0.770	0.786
8	0.215	0.765	0.781
10	0.215	0.765	0.781
30	0.215	0.765	0.781
60	0.220	0.760	0.776
90	0.220	0.760	0.776
120	0.220	0.760	0.776

Permeability:

$K = A/FT$

$K = 1.41E-07 \text{ m/s}$

Where:

A= Cross sectional area of FH1 (m²)
0.00567

F= Intake Factor (m) see BS5930
0.275

T= Basic time Lag (s)
145800

Notes:

Test carried out under Test B of Section 4 - BS 5930:2015

Basic lag time extrapolated for H/Ho to equal 0.370

Client: LCC

Calcs by: SP Checked by: CB Job Number: 21 -12093

CCG-C-21-12093: Cottam
Parkway Station: FH 17/18

FALLING HEAD TEST



Details of test Section	Situation B - BS5930	Ground Level (mAOD)	19.388
Height of standpipe	N/A	Filter Length	N/A
Depth below top of standpipe to response zone	N/A	Casing Elevation (mAOD)	19.388
Initial depth to water (mbgl)	N/A	Borehole Diameter (m)	0.100
Depth of Casing (mbgl)	0.985	Standpipe Diameter:	N/A
		Casing Diameter	85mm

Ref: BS5930:2015

Strata:
0.25: Grassed TOPSOIL
1.00: Brown slightly sandy slightly gravelly silty CLAY

Time Elapsed t (mins)	Depth at Time t From top of casing (m)	Head at Time t	Head Ratio (H/Ho)
0	0.000	0.985	1.000
1	0.000	0.985	1.000
2	0.005	0.980	0.995
3	0.005	0.980	0.995
4	0.005	0.980	0.995
6	0.010	0.975	0.990
8	0.010	0.975	0.990
10	0.015	0.970	0.985
30	0.030	0.955	0.970
60	0.035	0.950	0.964
90	0.035	0.950	0.964
120	0.035	0.950	0.964

Permeability:

$K = A/FT$

$K = 4.83E-08 \text{ m/s}$

Where:

A= Cross sectional area of FH1 (m²)
0.00567

F= Intake Factor (m) see BS5930
0.275

T= Basic time Lag (s)
426600

Notes:

Test carried out under Test B of Section 4 - BS 5930:2015

Basic lag time extrapolated for H/Ho to equal 0.370

Client: LCC

Calcs by: SP Checked by: CB Job Number: 21 -12093



APPENDIX D

SPT HAMMER CALIBRATION CERTIFICATES



SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

James Fisher Testing Services
40a Ruby House
Warrington
WA1 4RF

SPT Hammer Ref: CCG6
Test Date: 12/05/2020
Report Date: 12/05/2020
File Name: CCG6.spt
Test Operator: MVAABM

Instrumented Rod Data

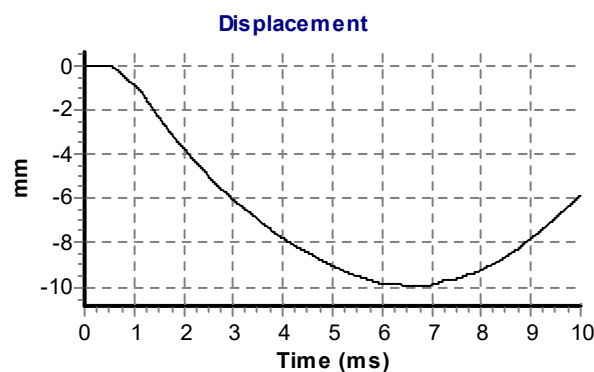
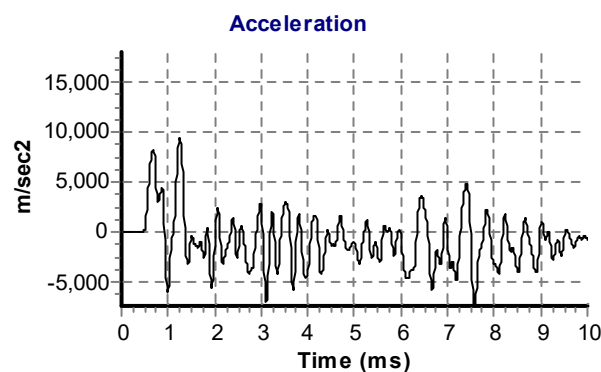
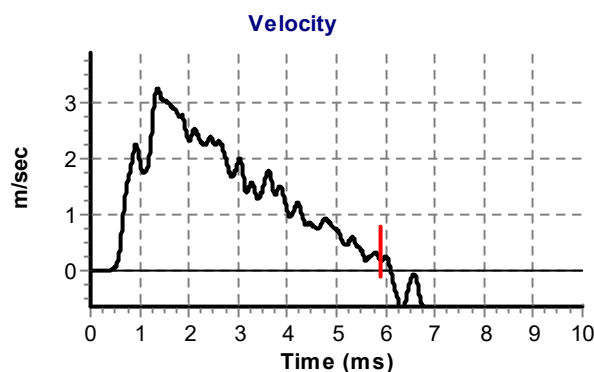
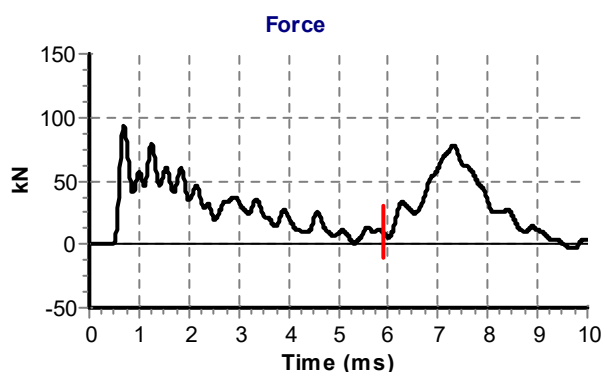
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.5
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 11855
Accelerometer No.2: 9983

SPT Hammer Information

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

Comments / Location

Location: JFTS Laboratory
Client: CCG
SPT Reference: CCG6



Calculations

Area of Rod A (mm²): 970
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 301

Energy Ratio E_r (%)

64

Signed: M.Valentine
Title: Technician



CC GEOTECHNICAL LIMITED
Consulting Geotechnical and Geoenvironmental Engineers

APPENDIX E

TRIAL PIT PHOTOGRAPHS



Site	Cottam Parkway Station
Job Number:	CCG-C-21-12093
Trial Pit Number:	TP01
Plate Number	1



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Site	Cottam Parkway Station	Trial Pit Number	TP01
Job Number:	CCG-C-21-12093	Plate Number	2



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Consulting Geotechnical and Geoenvironmental Engineers



Site	Cottam Parkway Station	Trial Pit Number	TP01
Job Number:	CCG-C-21-12093	Plate Number	3



Site	Cottam Parkway Station
Job Number:	CCG-C-21-12093
Trial Pit Number:	TP01
Plate Number	4



Site	Cottam Parkway Station
Job Number:	CCG-C-21-12093
Trial Pit Number:	TP02
Plate Number	1



CC GEOTECHNICAL LIMITED

Consulting Geotechnical and Geoenvironmental Engineers



Site	Cottam Parkway Station	Trial Pit Number	TP02
Job Number:	CCG-C-21-12093	Plate Number	2



CC GEOTECHNICAL LIMITED

Consulting Geotechnical and Geoenvironmental Engineers



Site	Cottam Parkway Station	Trial Pit Number	TP02
Job Number:	CCG-C-21-12093	Plate Number	3



Site	Cottam Parkway Station
Job Number:	CCG-C-21-12093
Trial Pit Number:	TP02
Plate Number	4



Site	Cottam Parkway Station
Job Number:	CCG-C-21-12093
Trial Pit Number:	TP03
Plate Number	1



Site	Cottam Parkway Station	Trial Pit Number	TP03
Job Number:	CCG-C-21-12093	Plate Number	2