



PHOTOGRAPH 1 of 2 – BH105 6.15m to 13.0m

Client: Health Infrastructure

RCA Australia

Project: John Hunter Health and Innovation Precinct

Location: John Hunter Hospital

RCA ref: 14399



PHOTOGRAPH 2 of 2 – BH105 13.0m to 20.83m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399

GEOTECHNICAL BOREHOLE LOG

BH106

SHEET 1 OF 6

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 04/10/2019

DATE COMPLETED: 09/10/2019

SURFACE RL: 76.60 m AHD

COORDS: 377830.00 m E 6356632.70 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T <div>(Not Encountered during augering)</div>	▲ <div></div> ▼		BH106a 0.10m	76.5	<div></div>	<div></div>	SM	FILL, Gravelly silty SAND, fine to medium grained, grey-brown, fine to medium gravel	D		FILL
			0.30m								
			BH106b 0.50m	0.5							
			PP>600kPa SPT 6, 7, 3/10mm N=R 0.81m	76.0							
			D 0.81m								
				75.5	1.0			CONTINUED AS CORED BOREHOLE			
				75.0	1.5						
				74.5	2.0						
				74.0	2.5						
				73.5	3.0						
				73.0	3.5						
				72.5	4.0						
				72.0	4.5						
LOGGED: RC/TH						CHECKED: MA				DATE: 28/10/2019	

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NMLC	<div><div></div><div>0% LOSS</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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NMLC	10% LOSS	100	79	71.5			Tuffaceous CLAYSTONE, pale grey and orange, interbedded with fine grained sandstone	HW			JT 85° Fe Clay PR S 3 mm	
				5.5								
				71.0								
	10% LOSS	72	14	5.65			Carbonaceous SILTSTONE, dark grey and black				CS 60 mm	
				5.98								BP 0 - 5° X PR S
				70.5								BP 0 - 5° X PR S
	10% LOSS	91	40	5.98			CORE LOSS 0.37m (5.98-6.35)					
				6.35								
				70.0								
	80% LOSS	100	66	6.5			Carbonaceous SILTSTONE, dark grey, black and brown	HW				
				6.61								
				69.5								
	100% LOSS	76	5	7.0			COAL, black Claystone seam from 6.65m to 6.68m Claystone seam from 6.76m to 6.79m	EW MW EW			DZ	
				7.0								DZ
				69.5								
10% LOSS	76	5	7.20			Claystone seam from 7.05m to 7.13m				DZ		
			7.31									
			69.0									
10% LOSS	76	5	7.36			CLAYSTONE, brown (decomposed and clayey)	EW			DZ		
			7.5			COAL, black	HW				FZ	
			68.5									
10% LOSS	76	5	7.79			SILTSTONE, grey, with some carbonaceous seams	EW HW			DZ		
			8.0			Becoming carbonaceous interbedded with coal bands at 8.0m					JT 30° CN PR RF	
			68.5								JT 30° X PR RF	
10% LOSS	76	5	8.22			COAL, black						
			8.42			Carbonaceous SILTSTONE, grey and black, with some coal bands					BP 5° CN PR RF	
			68.0									
10% LOSS	76	5	8.63			COAL, black						
			9.0			Pale grey tuff band from 8.81m to 8.87m					JT 85° Clay VNR PR RF	
			67.5									
10% LOSS	76	5	9.30			CORE LOSS 0.51m (9.30-9.81)						
			9.5									
			67.0									
10% LOSS	76	5	9.81			SILTSTONE, grey Decomposed and clayey from 9.81m to 9.89m	EW			DZ		

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NMLC	10% LOSS	76	5	66.5	SILTSTONE, grey	HW			JT 20° CN PR RF BP 5° CN PR RF JT 40° X PR RF JT 80° CN IR RF JT 50° CN PR RF
				66.0					JT 85° Clay CU RF BP 5° CN PR RF JT 60° CN PR RF
				10.85	COAL, black				FZ
				11.0					
				11.03	SILTSTONE, grey, with some carbonaceous/coal bands				BP 5° CN PR RF
				65.5	Coal band from 11.07m to 11.09m Carbonaceous band from 11.17m to 11.22m Carbonaceous band from 11.32m to 11.4m Becoming pale grey at 11.4m				
				11.5		EW			BP 5° CN PR RF
				11.55	SANDSTONE, medium grained, pale grey, some carbonaceous inclusions	SW			BP 5° CN PR RF BP 5° CN PR RF
				65.0					
				12.0					
NMLC	100% LOSS	100	90	64.5					
				12.5					JT 15° CN PR RF
				64.0					BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF
				13.00	Interbedded SILTSTONE and SANDSTONE, pale grey				BP 5° Fe SN PR RF JT 70° CN IR RF JT 5° CN PR RF JT 10° Fe SN PR RF JT 10° Fe SN PR RF
				63.5					JT 10° Fe SN PR RF JT 0° CN PR RF
				13.5					JT 5° Fe SN PR RF JT 5° Fe SN PR RF
				63.0	Vug at 13.75m				JT 10° Fe SN PR RF BP 10° CN PR RF BP 10° Fe SN PR RF BP 10° Fe SN PR RF
				14.0					
				62.5					
				14.5					BP 5° Fe SN PR RF
NMLC	100% LOSS	100	74	62.0					

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NMLC					61.5		Interbedded SILTSTONE and SANDSTONE, pale grey	SW			BP 5° CN PR RF
					15.5				BP 5° CN PR RF		
					61.0				BP 5° CN PR RF		
					16.0				BP 5° CN PR RF		
					60.5				BP 5° CN PR RF		
					16.5				JT 60° CN PR RF		
					60.0				BP 5° CN PR RF		
									BP 5° CN PR RF		
									BP 5° CN PR RF		
					17.0						
					59.5				JT 50° CN PR RF		
					17.5						
					59.0						
					18.0				JT 20° CN PR RF		
					58.5				JT 15° CN PR RF		
				18.48		JT 10° CN CU RF					
				58.0		JT 80° CN PR RF					
				18.96		JT 10° CN PR RF					
				57.5			MW				
				19.0		Interbedded SILTSTONE and SANDSTONE, pale grey	EW			DZ	
				19.06		COAL, black	SW			CS	
						Decomposed and clayey from 19.08m to 19.16m				CS 3 mm	
										CS 3 mm	
					19.5	Clay band from 19.39m to 19.4m				BP 5° CN PR RF	
					57.0					BP 5° CN PR RF	
					19.75					BP 5° CN PR RF	
					19.85	Carbonaceous SILTSTONE, dark grey	SW				
						SANDSTONE, fine to medium grained, grey	MW			DZ	
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CORED BOREHOLE LOG

BH106

SHEET 6 OF 6

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DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description					
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is(50) MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	100% LOSS	100	91	56.5	56.5		SANDSTONE, fine to medium grained, grey Decomposed and clayey from 20.05m to 20.1m	EW MW SW	EL 0.03 VL 2.43 L 2.43 M 4 H 3 VH 10 EH 10	10 30 100 300 500 1000 3000	BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF JT 10° CN PR RF BP 5° X PR RF
				22.30	22.30		CORED BOREHOLE BH106 TERMINATED AT 22.30 m				
				54.0	54.0						
				23.0	23.0						
				53.5	53.5						
				23.5	23.5						
				53.0	53.0						
				24.0	24.0						
				52.5	52.5						
				24.5	24.5						
				52.0	52.0						

LOGGED: RC/TH

CHECKED: MA

DATE: 28/10/2019



PHOTOGRAPH 1 of 3 – BH106 0.87m to 5.0m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399



PHOTOGRAPH 2 of 3 – BH106 5.0m to 15.0m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399



PHOTOGRAPH 3 of 3 – BH106 15.0m to 22.3m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

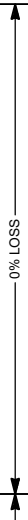
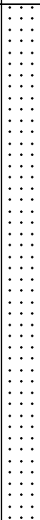

DATE COMMENCED: 10/10/2019

DATE COMPLETED: 11/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377791.50 m E 6356701.00 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description						
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is (50) MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)	
				71.0	0.5				EL VL L M H VH EH	10 30 100 300 1000 3000		
				70.5	1.0							
				70.0	1.5							
				69.5	2.0							
				69.0	2.5							
				68.5	3.0							
				68.0	3.28		START CORING AT 3.28m					
NMLC		100	54	68.0	3.5		SANDSTONE, fine to medium grained, pale grey, with orange-brown stained bands	HW			BP 5° Clay PR RF	
				67.5	4.0					BP 5° Clay PR RF JT 15° Clay PR RF 5 mm JT 10° Clay VNR PR RF		
				67.0	4.5		EW HW		DZ DZ DZ			
								BP 5° Clay PR RF 3 mm JT 85° SN PR RF BP 5° SN PR RF				
								Clay seam from 4.72m to 4.73m	HW MW		BP 5° SN PR RF	
LOGGED: TH							CHECKED: MA			DATE: 28/10/2019		

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 10/10/2019

DATE COMPLETED: 11/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377791.50 m E 6356701.00 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description											
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₅₀₎ MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)						
NMLC	0% LOSS	100	78	66.0	5.5		SANDSTONE, fine to medium grained, pale grey, with orange-brown stained bands	HW			JT 85° Fe SN PR RF						
				MW	BP 5° CN PR RF												
													Becoming fine grained sandstone at 5.35m				CS 5° 4 mm
																	BP 5° CN PR RF
																	JT 50° Clay VNR PR RF
																	CS 20° 30 mm
																	BP 10° Clay PR RF 3 mm
																	BP 10° CN PR RF
																	BP 5° Fe SN PR RF
																	BP 5° Fe SN PR RF
																	JT 45° Clay PR RF
																	BP 10° CN PR RF

LOGGED: TH

CHECKED: MA

DATE: 28/10/2019

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 10/10/2019

DATE COMPLETED: 11/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377791.50 m E 6356701.00 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description					
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is(50) MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	88	61.0	10.48		SANDSTONE, fine to medium grained, pale grey, with orange-brown stained bands	MW			BP 5° Fe SN PR RF
	0% LOSS	100	55	60.5	11.0		COAL, black Clay seam from 10.55m to 10.56m	SW MW EW SW MW			BP 5° CN PR RF CS 10 mm BP BP BP FZ FZ BP 5° Clay PR RF 3 mm JT 65° CN PR RF Clay seam
	0% LOSS	100	68	59.5	12.0		Extremely weathered claystone seam from 10.95m to 10.97m Claystone seam from 11.09m to 11.1m Carbonaceous sandstone seam from 11.19m to 11.23m Extremely weathered claystone seam (clayey) from 11.43m to 11.45m	EW SW MW			
	0% LOSS	100	94	56.5	14.5		Pebbly SANDSTONE, medium to coarse grained, grey, fine sub-rounded to sub-angular pebbles	SW MW			BP 5° X PR RF BP 0° CN PR RF BP 10° SN PR RF BP 10° CN UN RF BP 10° X PR RF 3 mm
	0% LOSS	100		57.5	14.0		8mm thick clay seam at 13.78m Decomposed and clayey from 13.81m to 13.81m	EW SW			CS 5° 8 mm DZ BP 5° Fe SN PR RF BP 15° Fe SN PR RF BP 5° Fe SN PR RF
											BP 10° CN PR RF BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF
LOGGED: TH						CHECKED: MA				DATE: 28/10/2019	

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 10/10/2019

DATE COMPLETED: 11/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377791.50 m E 6356701.00 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description					
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is (50) MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	94	56.0	15.5		Pebbly SANDSTONE, medium to coarse grained, grey, fine sub-rounded to sub-angular pebbles	SW			
	0% LOSS	100	100	55.0	16.0		Pebbly sandstone from 15.4m to 15.41m Decomposed and clayey from 15.43m to 15.45m Pebbly sandstone band from 15.7m to 15.75m Becoming medium to coarse grained sandstone to 15.75m	EW SW			DZ BP 5° X UN RF 1 mm BP 0° CN PR S
				55.0	16.5		CONGLOMERATE, grey, fine to medium sub-rounded to sub-angular clasts in sandstone matrix				
				54.5	17.0		Fine to medium grained, pale grey sandstone band from 17.23m to 17.32m				JT 50° CN PR RF
				54.0	17.5						
				53.5	18.0						
				53.0	18.5						
				52.5	19.0						
				52.0	19.5			SW MW			JT 10° Fe SN PR RF
				51.5							JT 15° Fe SN PR RF
LOGGED: TH							CHECKED: MA				DATE: 28/10/2019

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 10/10/2019

DATE COMPLETED: 11/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377791.50 m E 6356701.00 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description									
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₅₀₎ MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)				
	↓	100	100			○○									



PHOTOGRAPH 1 of 2 – BH107 3.28m to 13.0m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399



PHOTOGRAPH 2 of 2 – BH107 13.0m to 20.14m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 09/10/2019

DATE COMPLETED: 10/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377792.30 m E 6356683.20 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information						
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/WEATHERING	CONSISTENCY/RELATIVE DENSITY/STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS	
AD/T	↑ (Not Encountered during augering) ↓		BH108a QA3 0.10m					FILL, Silty Sandy GRAVEL, fine to medium, grey, sub-angular to angular, fine to coarse grained sand	D - M		FILL	
		0.50m	0.50m	71.0	0.20			FILL, Silty Clayey SAND, brown	M			
				0.5	0.30			FILL, Clayey Silty SAND, fine to coarse grained, yellow-brown, with fine gravel				
				SPT 5, 7, 4 N=11	D	70.5	1.0					
		0.95m	0.95m		1.20							
				1.50m	1.50m	70.0	1.5	CI	Sandy CLAY, medium plasticity, grey mottled pale brown	w>PL	St	RESIDUAL
				1.50m	150kPa							
				SPT 1, 2, 4 N=6	BH108b	69.5	2.0					
				1.95m	1.95m		2.50					
						69.0	3.0					
		3.00m	3.00m	68.5	3.5							
		PP>450kPa			4.00							
		SPT 6, 12, 13 N=25	D	68.0	4.5							
		3.45m	3.45m									
				67.5								
		4.50m	4.50m	67.0		CI-CH	SANDSTONE, fine to medium grained, orange	HW	VL	BEDROCK		
		4.57m	4.57m									
		SPT 15/65mm HB N=R						CONTINUED AS CORED BOREHOLE				
				66.5								
LOGGED: TH						CHECKED: MA			DATE: 28/10/2019			

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 09/10/2019

DATE COMPLETED: 10/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377792.30 m E 6356683.20 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description									
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₅₀₎ MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)				
					71.0 0.5 70.5 1.0 70.0 1.5 69.5 2.0 69.0 2.5 68.5 3.0 68.0 3.5 67.5 4.0 67.0 4.5 4.57										
NMLC	0% LOSS	100	88		66.5	<div><div></div></div>	SANDSTONE, medium grained, pale grey, with orange-brown stained zones, with numerous iron oxide annealed bedding partings and joints Decomposed and clayey from 4.88m to 4.9m	HW <							

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 09/10/2019

DATE COMPLETED: 10/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377792.30 m E 6356683.20 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information					Field Material Description				
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	88	66.0	5.5		SANDSTONE, medium grained, pale grey, with orange-brown stained zones, with numerous iron oxide annealed bedding partings and joints	HW	BP 10° Fe SN PR RF
	0% LOSS	100	83	65.5	6.0		Decomposed and clayey from 5.72m to 5.77m	EW	DZ
	0% LOSS	100	83	65.5	6.0		Clay seam from 5.95m to 5.99m	HW	BP 10° Fe SN PR RF
	0% LOSS	100	83	65.0	6.5		70mmØ pebble inclusion at 6.05m	EW	BP 5° Fe SN PR RF
	0% LOSS	100	83	65.0	6.5		Clay seam from 6.28m to 6.38m	HW	CS
	0% LOSS	100	83	64.5	7.0		Clay seam from 6.35m to 6.38m	EW	JT 40° Fe SN CU RF
	0% LOSS	100	83	64.5	7.0		Clay seam from 6.55m to 6.56m	HW	CS
	0% LOSS	100	83	64.5	7.0		Clay seam from 6.59m to 6.63m	EW	CS
	0% LOSS	100	83	64.5	7.0		Siltstone band from 6.63m to 6.85m	HW	BP 10° Fe SN PR RF
	0% LOSS	100	83	64.5	7.0			EW	CS
NMLC	0% LOSS	100	83	64.0	7.5			HW	BP 5° Fe SN PR RF
	0% LOSS	100	83	64.0	7.5			EW	BP 5° CN PR RF
	0% LOSS	100	83	64.0	7.5			HW	CS
	0% LOSS	100	83	63.5	8.0		45° Iron oxide annealed joint at 7.94m	MW	JT 10° Fe SN PR RF
	0% LOSS	100	83	63.5	8.0			EW	JT 20° Clay PR RF 5 mm
	0% LOSS	100	83	63.5	8.0			HW	BP 5° Fe SN PR RF
	0% LOSS	100	83	63.0	8.5			EW	BP 5° Fe SN PR RF
	0% LOSS	100	83	62.5	9.0		Coarse grained sandstone band from 9.04m to 9.14m	HW	JT 5° Fe SN IR RF
	0% LOSS	100	83	62.5	9.0		Pale grey sandstone band from 9.14m to 9.19m	EW	JT 10° Fe SN PR RF
	0% LOSS	100	83	62.0	9.5		Siltstone band from 9.5m to 9.59m	HW	BP 10° Fe SN PR RF
NMLC	0% LOSS	100	83	61.5			Becoming grey without orange-brown stained zones at 9.8m	SW - MW	BP 5° Fe SN PR RF
	0% LOSS	100	83	61.5				EW	JT 30° Fe SN PR RF
	0% LOSS	100	83	61.5				HW	BP 5° Fe SN PR RF
	0% LOSS	100	83	61.5				EW	BP 10° Fe SN PR RF
	0% LOSS	100	83	61.5				HW	
	0% LOSS	100	83	61.5				EW	
	0% LOSS	100	83	61.5				HW	
	0% LOSS	100	83	61.5				EW	
	0% LOSS	100	83	61.5				HW	
	0% LOSS	100	83	61.5				EW	

LOGGED: TH

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DATE: 28/10/2019

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 09/10/2019

DATE COMPLETED: 10/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377792.30 m E 6356683.20 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information					Field Material Description				
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
							SANDSTONE, medium grained, pale grey, with orange-brown stained zones, with numerous iron oxide annealed bedding partings and joints	SW MW	JT 40° Fe SN CU RF BP 0° Fe SN PR RF JT 45° Fe PR RF 3 mm JT 85° CN UN RF
							Decomposed and clayey from 11.39m to 11.41m		
							Clay seam from 11.5m to 11.52m	MW EW	BP 5° Fe SN PR RF DZ
							Interbedded COAL and Carbonaceous SILTSTONE, dark grey-black Decomposed claystone seam (clayey) from 11.59m to 11.6m	MW EW SW	CS CS BP 0° Clay VNR PR RF BP 0° Clay PR RF 5 mm
							Decomposed claystone seam (clayey) from 12.04m to 12.05m	EW SW	CS
							Decomposed claystone seam (clayey) from 12.3m to 12.36m	EW SW	CS
							SANDSTONE, medium grained, with some carbonaceous laminations/inclusions		BP 10° CN PR RF
							Decomposed and clayey from 13.09m to 13.13m	EW SW	DZ
							Decomposed and clayey from 14.27m to 14.31m	EW SW	JT 10° Fe SN PR RF DZ
								SW FR	BP 5° CN PR RF BP 5° CN PR RF BP 5° CN PR RF

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DATE: 28/10/2019

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital


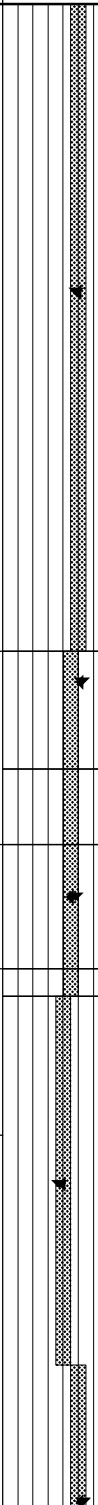
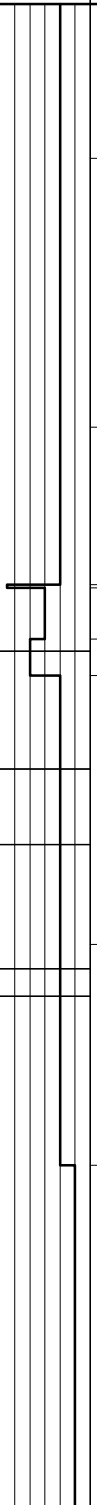
DATE COMMENCED: 09/10/2019

DATE COMPLETED: 10/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377792.30 m E 6356683.20 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description						
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₅₀₎ MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)	
NMLC	0% LOSS	100	93	56.0	15.5		SANDSTONE, medium grained, with some carbonaceous laminations/inclusions	SW - FR			BP 5° X PR RF	
				55.5	16.0		Orange-brown iron oxide staining surrounding joints from 16.92m to 16.93m				BP 5° CN PR RF	
				55.0	16.5		Orange-brown iron oxide staining from 17.1m to 17.14m				JT 5° Fe SN PR RF JT 5° Fe SN PR RF	
				54.5	17.0		CONGLOMERATE, brown, fine to medium clasts in sandstone matrix	MW - HW			JT 5° Fe SN PR RF JT 10° Fe SN PR RF	
				54.0	17.5		SANDSTONE, medium grained, pale brown					
				53.5	18.0		SANDSTONE, medium grained, grey, with some carbonaceous lamination/inclusions	SW			JT 30° CN PR RF	
				53.0	18.5		SANDSTONE, medium grained, pale brown	MW - HW				
				52.5	19.0		CONGLOMERATE, pale brown, fine to medium sub-rounded to sub-angular clasts in sandstone matrix, with some pebbly sandstone bands					
				52.0	19.5		Becoming grey, medium to Coarse clasts at 18.74m	SW			JT 0° Fe SN PR RF	
				51.5			Fine grained pebbly sandstone band from 19.0m to 19.11m					
				52.0	19.5		Fine grained pebbly sandstone band from 19.32m to 19.42m					
							Becoming pale brown at 19.53m Becoming fine to medium clasts 19.6m					
LOGGED: TH							CHECKED: MA				DATE: 28/10/2019	

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital


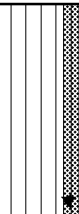
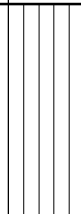
DATE COMMENCED: 09/10/2019

DATE COMPLETED: 10/10/2019

SURFACE RL: 71.40 m AHD

COORDS: 377792.30 m E 6356683.20 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description											
METHOD	WATER		CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₅₀₎ MPa			AVERAGE DEFECT SPACING (mm)			DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)	
NMLC		0% LOSS ↓	100	100	51.0	20.5		CONGLOMERATE, pale brown, fine to medium sub-rounded to sub-angular clasts in sandstone matrix, with some pebbly sandstone bands	MW • HW								
						20.70											
					50.5	21.0		CORED BOREHOLE BH108 TERMINATED AT 20.70 m									
					50.0	21.5											
					49.5	22.0											
					49.0	22.5											
					48.5	23.0											
					48.0	23.5											
					47.5	24.0											
					47.0	24.5											
					46.5												
LOGGED: TH									CHECKED: MA					DATE: 28/10/2019			

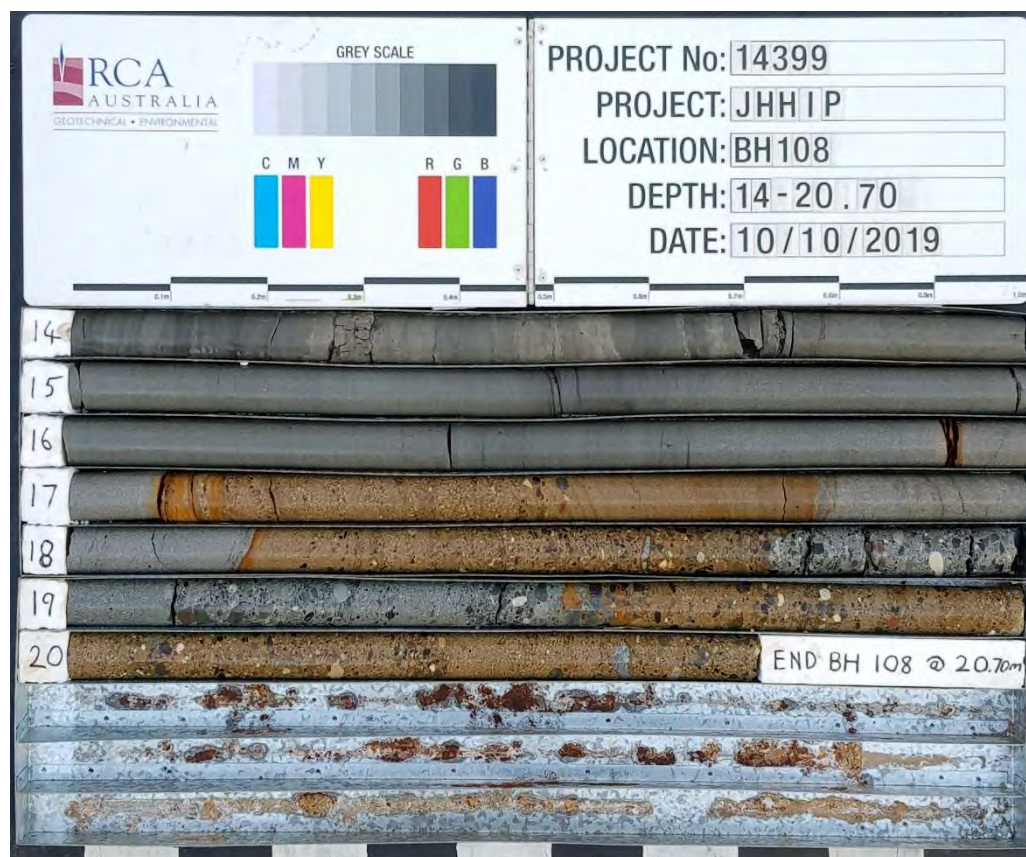


PHOTOGRAPH 1 of 2 – BH108 4.5m to 14.0m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399



PHOTOGRAPH 2 of 2 – BH108 14.0m to 20.7m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399

GEOTECHNICAL BOREHOLE LOG

BH109

SHEET 1 OF 5

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

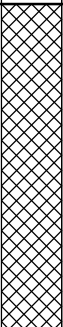
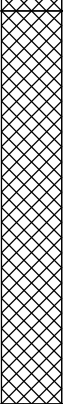
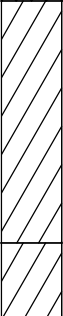
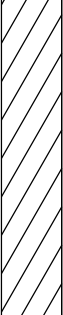
DATE COMMENCED: 01/10/2019

DATE COMPLETED: 01/10/2019

SURFACE RL: 76.03 m AHD

COORDS: 377782.40 m E 6356650.90 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	↑ (Not Encountered during augering)		BH109a 0.10m	76.0			SM	FILL, Silty SAND, fine to medium grained, brown, with organics	M		FILL
			0.40m BH109b 0.50m	75.5	0.5						
		SPT 3, 4, 3 N=7	D	75.0	1.0						
		0.95m	0.95m	75.0	1.10						
				74.5	1.5		CI	FILL, Gravelly Sandy CLAY, medium plasticity, grey, fine to medium sub-rounded gravel, trace of coal fragments	w>PL		
		1.50m PP100 - 190kPa	BH109c 1.70m	74.0	2.0						
		SPT 2, 4, 2 N=6	D	73.5	2.5						
		1.95m	1.95m	73.5	2.40						
		Is(50) d=0.35 a=0.74 MPa	2.45m	73.0	3.0		CH	Tuffaceous CLAY, high plasticity, pale grey	w>PL	St - VSt	RESIDUAL
				72.5	3.5						
		72.0	4.0								
		71.5	4.5								
							CH	CLAY, high plasticity, grey, highly weathered, very low to low siltstone layers	w~PL	H	
LOGGED: RC						CHECKED: MA			DATE: 28/10/2019		

GEOTECHNICAL BOREHOLE LOG

BH109

SHEET 2 OF 5

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital


DATE COMMENCED: 01/10/2019

DATE COMPLETED: 01/10/2019

SURFACE RL: 76.03 m AHD

COORDS: 377782.40 m E 6356650.90 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T <div>(Not Encountered during augering)</div>				71.0			CH	CLAY, high plasticity, grey, highly weathered, very low to low siltstone layers	w~PL	H	
		6.00m	6.00m		5.30		MH	Clayey SILT, high plasticity, black (weathered coal)	w<PL	H	
				70.5	5.5						
				70.0	6.0						
		SPT 5, 11, 17 N=28	D								
		6.45m	6.45m		6.5						
		7.00m	7.00m		7.00						
		SPT 17, 40/150mm N=R	D 7.15m		7.15			COAL, black	MW	L	BEDROCK
		7.30m	D 7.30m					Laminated SILTSTONE, grey and dark grey			
							CONTINUED AS CORED BOREHOLE				
				68.5	7.5						
				68.0	8.0						
				67.5	8.5						
				67.0	9.0						
				66.5	9.5						
LOGGED: RC						CHECKED: MA			DATE: 28/10/2019		

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 01/10/2019

DATE COMPLETED: 01/10/2019

SURFACE RL: 76.03 m AHD

COORDS: 377782.40 m E 6356650.90 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information					Field Material Description				
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				71.0					
					70.5				
					70.0				
					69.5				
					69.0				
					7.30		START CORING AT 7.30m		
					7.5		CORE LOSS 0.24m (7.30-7.54)		
					68.5		COAL, black	HW	DZ 100 mm
					7.64		SANDSTONE, fine grained, grey		DZ 23 mm
					7.70		COAL, black		BP 0° PR S
					7.90		COAL, black, Interbedded with SILTSTONE		JT 87° PR S
					68.0		COAL, black		FZ 6 mm
					8.00				
					67.5				CS 25 mm
					8.5				CS 6 mm
					8.68		SILTSTONE, grey		CS 12 mm
					67.0				FZ 130 mm
					9.0				BP 15° X PR RF
					9.5				JT 75 - 90° PR RF
									BP 4° PR S
LOGGED: RC					CHECKED: MA				
					DATE: 28/10/2019				

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

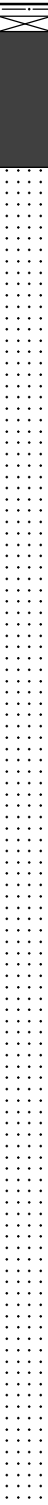






DATE COMMENCED: 01/10/2019

DATE COMPLETED: 01/10/2019

SURFACE RL: 76.03 m AHD

COORDS: 377782.40 m E 6356650.90 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description					
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₆₀₎ MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	98	94	66.0	10.04		CORE LOSS 0.05m (10.04-10.09)	HW			
				65.5	10.5		COAL, black, Interbedded with SILTSTONE, GREY				
					10.54		Grey carbonaceous siltstone layers at 10.25m				
							Grey carbonaceous siltstone layers from 10.31m to 10.34m				
							Grey carbonaceous siltstone layers from 10.49m to 10.54m				
							SANDSTONE, fine grained, pale grey and orange				
							Becoming fine to medium grained at 10.9m				
				65.0	11.0						
				64.5	11.5						
				64.0	12.0						
NMLC	0% LOSS	100	82	63.5	12.5						
				63.0	13.0						
				62.5	13.5						
				62.0	14.0						
NMLC	0% LOSS	100	98	61.5	14.5						
LOGGED: RC					CHECKED: MA					DATE: 28/10/2019	

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 01/10/2019

DATE COMPLETED: 01/10/2019

SURFACE RL: 76.03 m AHD

COORDS: 377782.40 m E 6356650.90 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information					Field Material Description						
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₆₀₎ MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	90	61.0			SANDSTONE, fine grained, pale grey and orange	HW			
				15.27			CLAYSTONE, pale grey and orange, Interbedded with SANDSTONE, fine to medium grained			CS 15 mm	
				60.5	15.5				JT 25° Fe Clay VNR PR S		
								JT 60° Fe PR RF			
								JT 55° Fe PR RF			
								JT 20° Fe PR S			
								BP 3° Fe PR S			
								BP 3° Fe PR S			
				59.5	16.5				JT 30° Fe PR RF		
				59.0	17.0				JT 0 - 90° U Healed		
					JT 45° PR S						
NMLC	0% LOSS	100	91	58.5	17.5		Becoming fine to medium grained at 17.8m	MW			JT 68° Fe PR S
				58.0	18.0						
				57.5	18.5				DZ 120 mm		
									CS 0° 2 mm		
									CS 5° 3 mm		
				57.0	19.0				CS 7° 2 mm		
									DZ 34 mm		
									DZ 15 mm		
				56.5	19.5				BP 10° X PR S		
CORED BOREHOLE BH109 TERMINATED AT 19.95 m											
LOGGED: RC					CHECKED: MA					DATE: 28/10/2019	



PHOTOGRAPH 1 of 2 – BH109 7.3m to 12.0m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399



PHOTOGRAPH 2 of 2 – BH109 12.0m to 19.95m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399

GEOTECHNICAL BOREHOLE LOG

BH110

SHEET 1 OF 6

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital


DATE COMMENCED: 14/10/2019

DATE COMPLETED: 15/10/2019

SURFACE RL: 77.95 m AHD

COORDS: 377858.70 m E 6356614.50 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		0.20m BH110a 0.30m					FILL/TOPSOIL, Gravelly Silty SAND, fine to medium grained, dark brown, fine to medium sub-rounded gravel, comprising red sandstone rock fragments	M		FILL / TOPSOIL
				77.5	0.5		CONTINUED AS CORED BOREHOLE				
				77.0	1.0						
				76.5	1.5						
				76.0	2.0						
				75.5	2.5						
				75.0	3.0						
				74.5	3.5						
				74.0	4.0						
				73.5	4.5						
				73.0							
LOGGED: TH						CHECKED: MA				DATE: 28/10/2019	

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 14/10/2019

DATE COMPLETED: 15/10/2019

SURFACE RL: 77.95 m AHD

COORDS: 377858.70 m E 6356614.50 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description																		
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₆₀₎ MPa					AVERAGE DEFECT SPACING (mm)					DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)					
									EL _{0.03}	VL _{0.1}	L _{0.3}	M ₁	H ₃	VH ₃	EH ₁₀	10	30	100	300	1000	3000			
							START CORING AT 0.37m																	
NMLC	<div><div></div><div>0% LOSS</div><div></div></div>	100	97	77.5	0.37		Interbedded CONGLOMERATE and Pebbly SANDSTONE, medium grained, grey and pale brown, fine to medium pebbles/clasts	SW - MW HW																
				77.0	1.0			MW HW																
				76.5	1.5			SW - MW HW																
				76.0	2.0																			
				75.5	2.5																			
				75.0	3.0																			
				74.5	3.39		SANDSTONE, medium grained, grey, with some orange-brown stained bands	MW																
				74.0	3.78		Tuffaceous SANDSTONE, medium grained, grey, with some iron stained annealed fractures	XW - HW																
				73.5	4.5			MW																
				73.0																				

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DATE: 28/10/2019

RCA_LIB_08_1_RCA_STANDARD.GLB Log RCA CORED BOREHOLE LOG 14399_BORES.GPJ <<DrawingFile>> 19/11/2019 14:53 Produced by gINT Professional. Developed by Dargal

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DATE: 28/10/2019

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description						
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is(50) MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)	
NMLC	60% LOSS	100	96		72.5		Tuffaceous SANDSTONE, medium grained, grey, with some iron stained annealed fractures	MW			JT 35° Fe SN PR RF DZ	
					72.0		JT 5° Fe SN PR RF SZ					
					71.5		BP 0° Fe SN PR RF					
					71.0		SZ					
					70.5		JT 70° SN U RF					
					70.0		JT 15° JT 60° Fe SN PR RF BP 10° CN PR RF DZ					
					8.02		Decomposed and clayey from 7.8m to 8.02m	XW			FZ DZ	
					8.23		COAL, dark grey-black					
					8.65		CORE LOSS 0.42m (8.23-8.65)					
							90% LOSS	86			44	
69.0	HW - MW HW HW - MW											
68.5	Weathered claystone seam clayey) from 9.46m to 9.49m	XW HW - MW	DZ JT 65° CN PR RF JT 65° CN PR RF									
68.0												
67.5												
67.0												
66.5												
66.0												
65.5												
65.0												

LOGGED: TH

CHECKED: MA

DATE: 28/10/2019

DRILL MODEL: Hanjin D&B 8d

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 14/10/2019

DATE COMPLETED: 15/10/2019

SURFACE RL: 77.95 m AHD

COORDS: 377858.70 m E 6356614.50 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information					Field Material Description				
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	100% LOSS	100	99	15.30	15.30		SANDSTONE, medium grained, grey, with some carbonaceous inclusions Pockets of decomposed sandstone material from 15.18m to 15.3m	SW	BP 10° CN PR RF
							Interbedded SILTSTONE and SANDSTONE (Laminite), medium grained sandstone, grey	XW	DZ
NMLC	100% LOSS	100	100	16.26	16.26		SANDSTONE, fine to medium grained, grey, some carbonaceous inclusions Carbonaceous seam, 4mm thick at 16.44m	MW	JT 65° CN PR RF BP 5° CN PR RF BP 5° CN PR RF
								SW	BP 5° SN PR RF
NMLC	100% LOSS	100	100	17.0	17.0				BP 0° SN PR RF
									BP 0° CN PR S
NMLC	100% LOSS	100	91	18.0	18.0				BP 5° CN PR S
									JT 10° CN PR RF
NMLC	100% LOSS	100	91	18.5	18.5				BP 5° CN PR RF
									JT 5° Fe SN CU RF
NMLC	100% LOSS	100	91	19.0	19.0				JT 80° Fe SN PR RF
									JT 10° CN PR RF
NMLC	100% LOSS	100	91	19.5	19.5				JT 45° CN CU RF
									JT 80° CN PR RF
NMLC	100% LOSS	100	91	19.5	19.5				BP 5° CN PR RF
									JT 15° Clay VNR PR RF
NMLC	100% LOSS	100	91	19.5	19.5				JT 60° CN PR RF
									JT 10° Clay VNR PR S

LOGGED: TH

CHECKED: MA

DATE: 28/10/2019

CORED BOREHOLE LOG

BH110

SHEET 6 OF 6

PROJECT No: 14399

CLIENT: Health Infrastructure

PROJECT: John Hunter Health and Innovation Precinct

LOCATION: John Hunter Hospital

DATE COMMENCED: 14/10/2019

DATE COMPLETED: 15/10/2019

SURFACE RL: 77.95 m AHD

COORDS: 377858.70 m E 6356614.50 m N MGA94 56

DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Description											
METHOD	WATER	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH Is ₍₅₀₎ MPa	AVERAGE DEFECT SPACING (mm)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)						
	↓	100	91				SANDSTONE, fine to medium grained, grey, some carbonaceous inclusions	SW			— JT 10° CN PR RF						
							CORED BOREHOLE BH110 TERMINATED AT 20.17 m										
					57.5	20.5											
					57.0	21.0											
					56.5	21.5											
					56.0	22.0											
					55.5	22.5											
					55.0	23.0											
					54.5	23.5											
					54.0	24.0											
					53.5	24.5											
					53.0												
LOGGED: TH							CHECKED: MA							DATE: 28/10/2019			



PHOTOGRAPH 1 of 3 – BH110 0.37m to 5.0m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399



PHOTOGRAPH 2 of 3 – BH110 5.0m to 15.0m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399



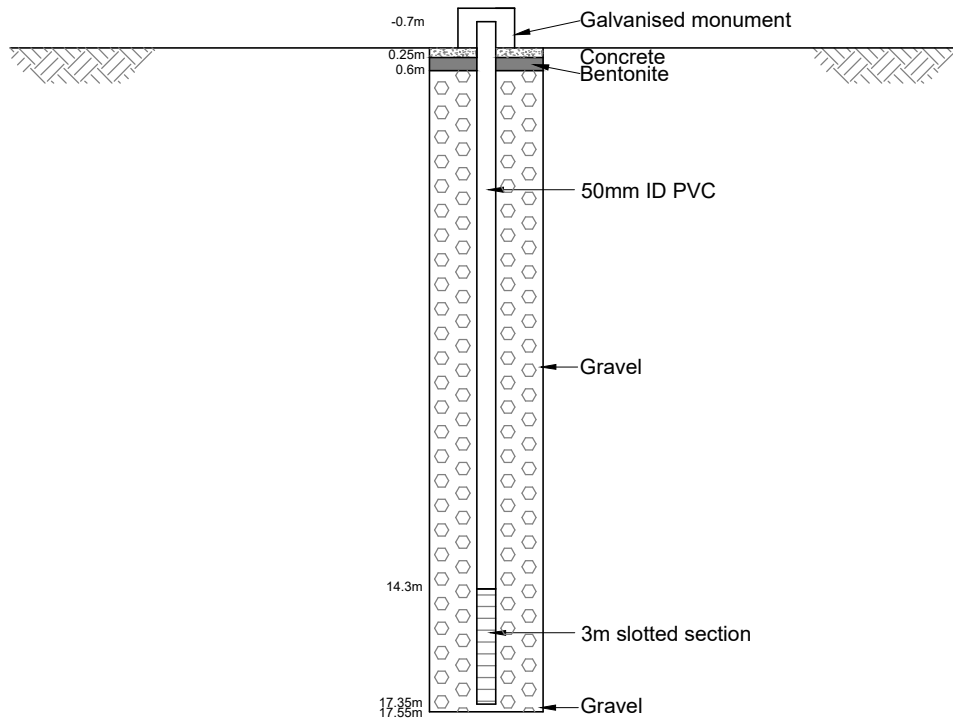
PHOTOGRAPH 3 of 3 – BH110 15.0m to 20.17m

Client: Health Infrastructure
Project: John Hunter Health and Innovation Precinct
Location: John Hunter Hospital

RCA Australia

RCA ref: 14399

BH102

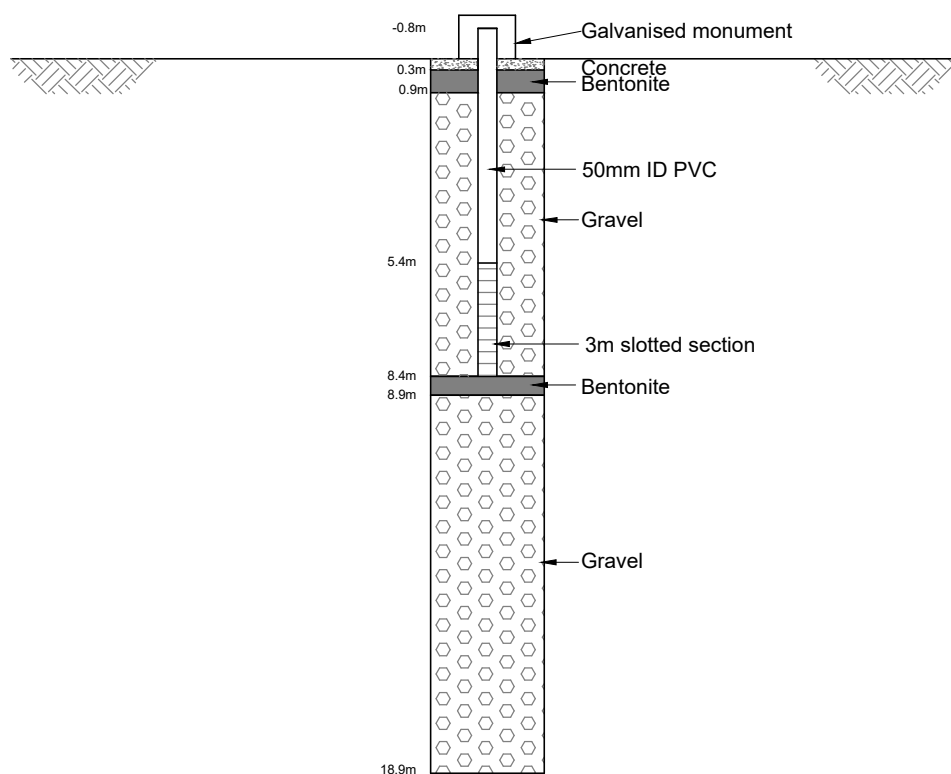


STANDPIPE PIEZOMETER CONSTRUCTION DETAILS BH102 JOHN HUNTER HEALTH AND INNOVATION PRECINCT

CLIENT		Health Infrastructure			
DRAWN BY	TH	SCALE	N.T.S	RCA Ref	14399
APPROVED BY	MA	DATE	3/12/2019	DRAWING No	1
				Rev	0
					OFFICE NEWCASTLE

CDT-DWG-A4V-001/1

BH103



STANDPIPE PIEZOMETER CONSTRUCTION DETAILS BH103 JOHN HUNTER HEALTH AND INNOVATION PRECINCT

CLIENT **Health Infrastructure**

DRAWN BY **TH**

SCALE **N.T.S**

RCA Ref **14399**

OFFICE
NEWCASTLE

APPROVED BY **MA**

DATE **3/12/2019**

DRAWING No **2**

Rev **0**

CDT-DWG-A4V-001/1

Explanatory Notes – Soil Description

In engineering terms, soil includes every type of uncemented or partially cemented material found in the ground. In practice, if the material can be remoulded by hand in its field condition or in water it is described as a soil. The dominant soil constituent is given in capital letters, with secondary textures in lower case. The dominant feature is assessed from AS 1726:2017 – *Geotechnical Site Investigations* and a soil symbol is used to define a soil layer.

METHOD

Method	Description
AD/T	Auger Drilling with tungsten carbide bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
AT	Air Track
BH	Backhoe
CT	Cable Tool Rig
DB	Washbore Drag Bit
DT	Diatube
E	Excavator
EH	Excavator with Hammer
HA	Hand Auger
HQ	Diamond Core-63mm diameter
N	Natural Exposure
NMLC	Diamond Core-52mm diameter
NQ	Diamond Core-47mm diameter
Percussion	Percussion Drilling
PT	Push Tube
RR	Rock Roller
V	Vacuum Excavation
WS	Washbore
X	Existing Excavation

WATER



Water level at date shown



Seepage

NOT ENCOUNTERED: The borehole/test pit was dry soon after excavation. Inflow may have been observed had the borehole/test pit been left open for a longer period.

NOT OBSERVED: The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.

SAMPLING

Sample	Description
B	Bulk Disturbed Sample
D	Disturbed Sample
SPT	Standard Penetration Test
U50	Undisturbed Sample - 50mm diameter
U75	Undisturbed Sample - 75mm diameter
ES	Soil Sample, Environmental
EW	Water Sample, Environmental
G	Gas Sample

SOIL CLASSIFICATION

The appropriate symbols are selected based on the result of visual examination, field tests and available laboratory test results, such as particle size analysis, liquid limit and plasticity index.

Group Symbol	Description
GW	Well graded gravel
GP	Poorly graded gravel
GM	Silty gravel
GC	Clayey gravel
SW	Well graded sand
SP	Poorly graded sand
SM	Silty sand
SC	Clayey sand
ML	Silt of low plasticity
CL	Clay of low plasticity
OL	Organic soil of low plasticity
CI	Clay of medium plasticity
MH	Silt of high plasticity
CH	Clay of high plasticity
OH	Organic soil of high plasticity
Pt	Peat, highly organic soil

MOISTURE CONDITION

For coarse grained soils, the following terms are used

Dry	- Non-cohesive and free-running
Moist	- Soil feels cool, darkened in colour - Soil tends to stick together
Wet	- Soil feels cool, darkened in colour - Soil tends to stick together, free water forms when handling

For fine grained soils, the following moisture content (w) terms are used:

w < PL	- Moist, dry of plastic limit
w ≈ PL	- Moist, near plastic limit.
w > PL	- Moist, wet of plastic limit.
w ≈ LL	- Wet, near liquid limit.
w > LL	- Wet, wet of liquid limit

PLASTICITY

Soil plasticity is a measure of the range of water content over which a soil exhibits plastic properties. The classification of the degree of plasticity in terms of the Liquid Limit (LL) is as follows.

Description of Plasticity	Range of Liquid Limit for Silt	Range of Liquid Limit for Clay
Non-plastic	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

COHESIVE SOILS – CONSISTENCY

The consistency of a cohesive soil is defined by descriptive terminology such as very soft, soft, firm, stiff, very stiff and hard. These terms are assessed by the shear strength of the soil as observed visually, by hand penetrometer, dynamic cone penetrometer or vane shear values and by resistance to deformation to hand moulding.

A hand penetrometer may be used in the field or the laboratory to provide an approximate assessment of the unconfined compressive strength (UCS) of cohesive soils. Undrained shear strength $c_u = 0.5 \times \text{UCS}$. Undrained shear strength values are recorded in kPa as follows:

Strength	Symbol	Indicative Undrained Shear Strength, c_u (kPa)
Very Soft	VS	≤12
Soft	S	>12 and ≤25
Firm	F	>25 and ≤50
Stiff	St	>50 and ≤100
Very Stiff	VSt	>100 and ≤200
Hard	H	>200
Friable	Fr	—

COHESIONLESS SOILS – RELATIVE DENSITY

Relative density terms such as very loose, loose, medium dense, dense and very dense are used to describe silty and sandy material, and these are usually based on resistance to drilling penetration, Standard Penetration Test (SPT) N values or Perth Sand Penetrometer resistance.

Term	Symbol	Density Index
Very Loose	VL	0 to 15
Loose	L	15 to 35
Medium Dense	MD	35 to 65
Dense	D	65 to 85
Very Dense	VD	>85

SOIL PARTICLE SIZE DESCRIPTIVE TERMS

Fraction	Name	Subdivision	Size (mm)
Oversize	Boulders		>200
	Cobbles		63 to 200
Coarse grained soil	Gravel	Coarse	19 to 63
		Medium	6.7 to 19
		Fine	2.36 to 6.7
	Sand	Coarse	0.6 to 2.36
		Medium	0.21 to 0.6
		Fine	0.075 to 0.21
Fine grained soil	Silt		0.002 to 0.075
	Clay		<0.002

Explanatory Notes - Rock Description

METHOD

Refer to soil description sheet.

WATER

Refer to soil description sheet.

ROCK QUALITY

The defect spacing is shown where applicable and the Rock Quality Designation (RQD) and Total Core Recovery (TCR) for each core run is given where:

$$TCR = \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100\%$$

$$RQD = \frac{\text{Sum of axial length of sound core pieces >100mm long}}{\text{Length of core run}} \times 100\%$$

ROCK MATERIAL WEATHERING

Rock material weathering is described using the abbreviations and definitions used in AS1726:2017– *Geotechnical Site Investigations*.

Term	Abbreviation	Definition
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered	<div> <div>HW</div> <div>DW</div> </div> The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.
Moderately Weathered	MW	
Slightly Weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	Rock shows no sign of decomposition of individual minerals or colour changes.

Where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock the term 'Distinctly Weathered' may be used. 'Distinctly Weathered' is defined as follows: 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in the pores'. There is some change in rock strength.

ROCK MATERIAL STRENGTH

Rock strength is described using AS1726:2017– *Geotechnical Site Investigations* and ISRM – *Commission on Standardisation of Laboratory and Field Tests*, 'Suggested method of determining the Uniaxial Compressive Strength of Rock materials and the Point Load Index' as follows:

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Point Load Index Is_{50} (MPa)
Very Low	VL	0.6 to 2	0.03 to 0.1
Low	L	2 to 6	0.1 to 0.3
Medium	M	6 to 20	0.3 to 1
High	H	20 to 60	1 to 3
Very High	VH	60 to 200	3 to 10
Extremely High	EH	>200	>10



Diametral Point Load Index test.



Axial Point Load Index test.

DEFECT SPACING/BEDDING THICKNESS

Depending on the project, may be either described as mean perpendicular spacing within a set of defects or bedding, or as the spacing between all defects within the rock mass.

Term	Defect Spacing	Bedding
Extremely closely spaced	<6 mm	Thinly laminated
	6 to 20 mm	Laminated
Very closely spaced	20 to 60 mm	Very thin
Closely spaced	0.06 to 0.2 m	Thin
Moderately widely spaced	0.2 to 0.6 m	Medium
Widely spaced	0.6 to 2.0 m	Thick
Very widely spaced	>2 m	Very thick

DEFECT DESCRIPTION

Type	Definition
JT	Joint
BP	Bedding Parting
CO	Contact
CS	Clay Seam
CZ	Crush Zone
DK	Dyke
DZ	Decomposed Zone
FC	Fracture
FZ	Fracture Zone
FL	Foliation
FLT	Fault
VN	Vein
SM	Seam
IS	Infilled Seam
SZ	Shear Zone

Planarity	Roughness
PR – Planar	VR – Very Rough
CU – Curved	RF – Rough
U – Undulating	S – Smooth
ST – Stepped	POL – Polished
IR – Irregular	SL – Slickensided

Symbol	Coating or Infill
CA	Calcite
Clay	Clay
CN	Clean
Fe	Iron oxide
KT	Chlorite
Qz	Quartz
X	Carbonaceous
SN	Stain
VNR	Veneer

The inclinations of defects are measured from perpendicular to the core axis.

Appendix C

Laboratory Test Reports

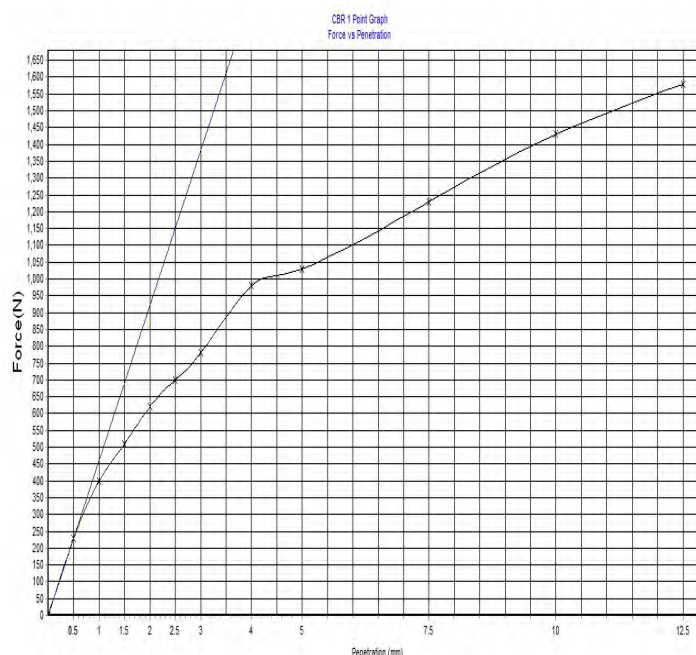
California Bearing Ratio Report (1 Point)

Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1

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Sample Number :	19-3511	SAMPLE LOCATION
Date Sampled :	8/10/2019	TP101
Date Tested :	22/10/2019	0.2-0.4m
Sampled By :	RCA Geotech	
Sampling Method :	AS 1289.1.2.1-6.5.4	
Material Source :		Lot Number :
Material Type :		Test Number :
Remarks :		

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m ³) :	1.623
Optimum Moisture Content (%) :	20.6
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	100.0
Dry Density Before Soak (t/m ³) :	1.623
Dry Density After Soak (t/m ³) :	1.617
Moisture Content Before Soak (%) :	20.7
Moisture Content After Soak (%) :	24.3
Density Ratio After Soak (%) :	100
Field Moisture Content (%) :	16.0
Top Moisture Content - After Penetration (%) :	26.2
Total Moisture Content - After Penetration (%) :	23.6
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	0.5
CBR Surcharge (kg) :	4.5
Oversize (%) :	2
Oversize Material Replaced (%) :	Excluded



CBR 2.5mm (%) : 5

CBR 5.0mm (%) : 5

CBR Value (%) : 5

Site Selection :	
Soil Description :	Sandy CLAY



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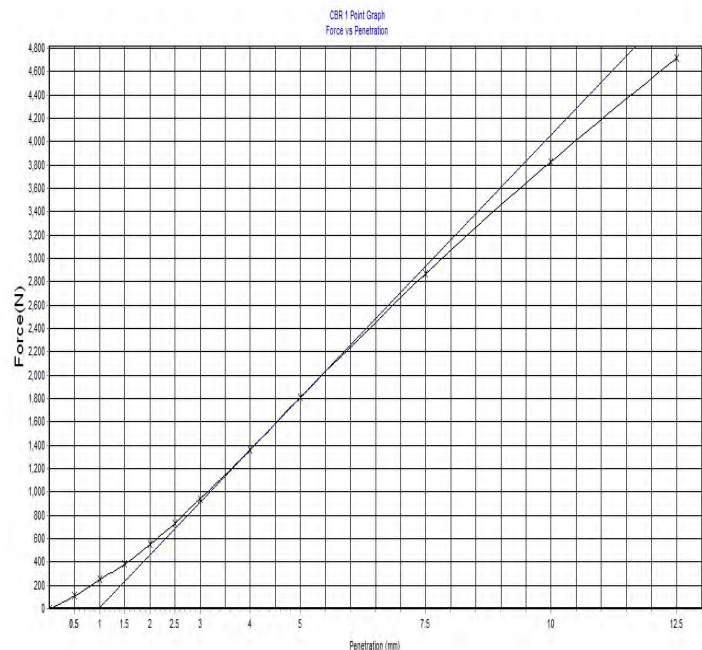
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Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1

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Sample Number :	19-3512	SAMPLE LOCATION	
Date Sampled :	8/10/2019	TP102	
Date Tested :	21/10/2019	0.3-0.4m	
Sampled By :	RCA Geotech		
Sampling Method :	AS 1289.1.2.1-6.5.4		
Material Source :		Lot Number :	
Material Type :		Test Number :	
Remarks :			

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m ³) :	1.86
Optimum Moisture Content (%) :	13.9
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	99.0
Dry Density Before Soak (t/m ³) :	1.863
Dry Density After Soak (t/m ³) :	1.86
Moisture Content Before Soak (%) :	13.8
Moisture Content After Soak (%) :	14.9
Density Ratio After Soak (%) :	100
Field Moisture Content (%) :	12.2
Top Moisture Content - After Penetration (%) :	15.0
Total Moisture Content - After Penetration (%) :	14.3
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	0.0
CBR Surcharge (kg) :	4.5
Oversize (%) :	5
Oversize Material Replaced (%) :	Excluded



CBR 2.5mm (%) : 9

CBR 5.0mm (%) : 11

CBR Value (%) : 11

Site Selection :	
Soil Description :	Silty SAND, traces of clay



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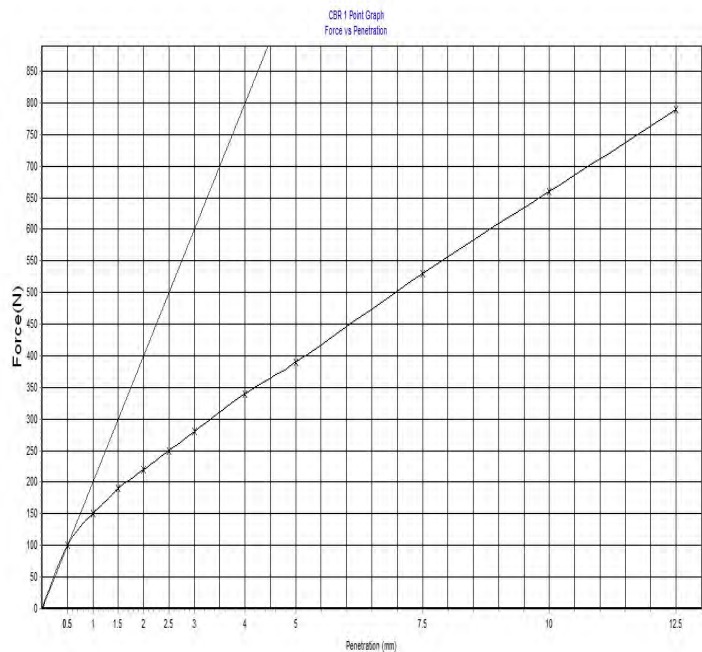
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Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1
Page 3 of 9			

Sample Number :	19-3513	SAMPLE LOCATION	
Date Sampled :	8/10/2019	TP103	
Date Tested :	21/10/2019	0.2-0.4m	
Sampled By :	RCA Geotech		
Sampling Method :	AS 1289.1.2.1-6.5.4		
Material Source :		Lot Number :	
Material Type :		Test Number :	
Remarks :			

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m ³) :	1.542
Optimum Moisture Content (%) :	23.8
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	101
Achieved Percentage of OMC :	97.0
Dry Density Before Soak (t/m ³) :	1.555
Dry Density After Soak (t/m ³) :	1.516
Moisture Content Before Soak (%) :	23.2
Moisture Content After Soak (%) :	27.8
Density Ratio After Soak (%) :	98
Field Moisture Content (%) :	24.7
Top Moisture Content - After Penetration (%) :	35.2
Total Moisture Content - After Penetration (%) :	26.5
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	2.5
CBR Surcharge (kg) :	4.5
Oversize (%) :	1
Oversize Material Replaced (%) :	Excluded



CBR 2.5mm (%) : 2

CBR 5.0mm (%) : 2

CBR Value (%) : 2

Site Selection :	
Soil Description :	CLAY



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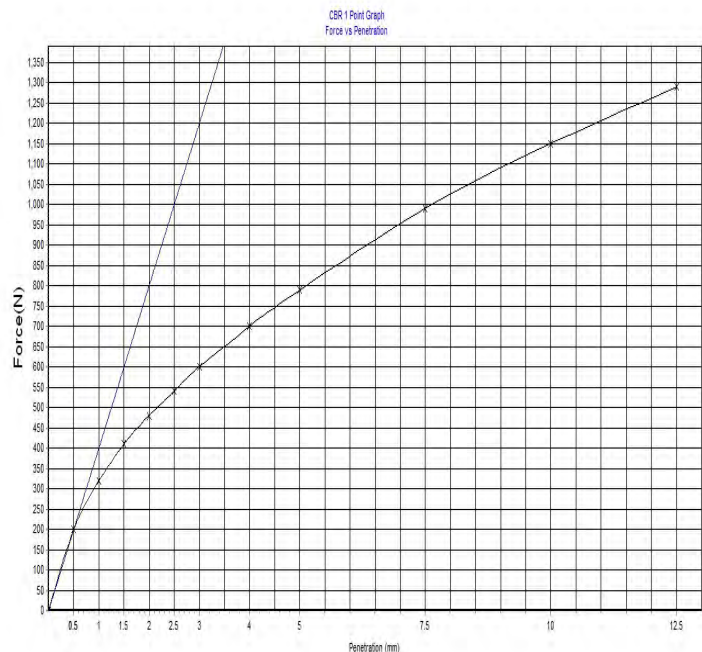
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Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1

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Sample Number :	19-3514	SAMPLE LOCATION
Date Sampled :	8/10/2019	TP104
Date Tested :	21/10/2019	0.4-0.5m
Sampled By :	RCA Geotech	
Sampling Method :	AS 1289.1.2.1-6.5.4	
Material Source :		Lot Number :
Material Type :		Test Number :
Remarks :		

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m ³) :	1.579
Optimum Moisture Content (%) :	20.1
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	101
Achieved Percentage of OMC :	99.0
Dry Density Before Soak (t/m ³) :	1.6
Dry Density After Soak (t/m ³) :	1.566
Moisture Content Before Soak (%) :	19.8
Moisture Content After Soak (%) :	25.7
Density Ratio After Soak (%) :	99
Field Moisture Content (%) :	19.7
Top Moisture Content - After Penetration (%) :	28.0
Total Moisture Content - After Penetration (%) :	24.4
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	2.0
CBR Surcharge (kg) :	4.5
Oversize (%) :	0



CBR 2.5mm (%) : 4

CBR 5.0mm (%) : 4

CBR Value (%) : 4

Site Selection :	
Soil Description :	CLAY with sand



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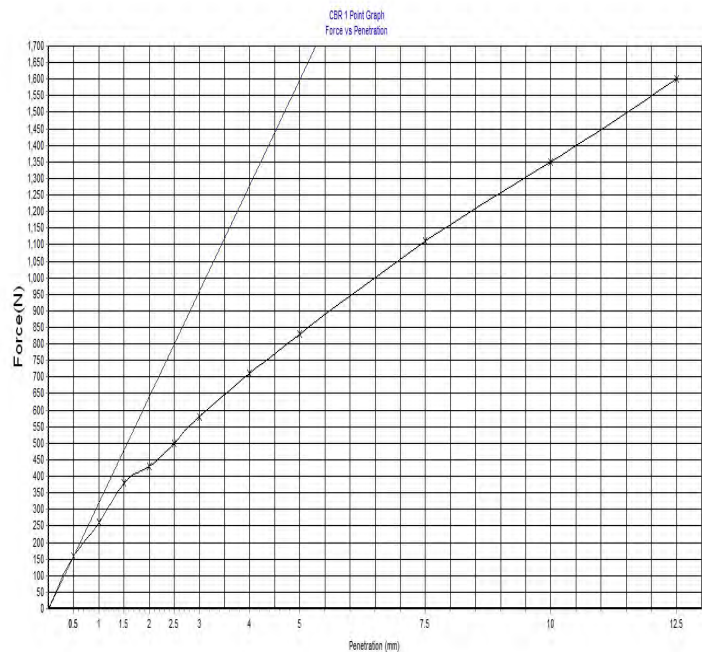
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California Bearing Ratio Report (1 Point)

Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1
Page 5 of 9			

Sample Number :	19-3515	SAMPLE LOCATION	
Date Sampled :	8/10/2019	TP105	
Date Tested :	21/10/2019	0.6-0.9m	
Sampled By :	RCA Geotech		
Sampling Method :	AS 1289.1.2.1-6.5.4		
Material Source :		Lot Number :	
Material Type :		Test Number :	
Remarks :			

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m³) :	1.634
Optimum Moisture Content (%) :	17.9
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	101.0
Dry Density Before Soak (t/m³) :	1.626
Dry Density After Soak (t/m³) :	1.598
Moisture Content Before Soak (%) :	18.0
Moisture Content After Soak (%) :	25.4
Density Ratio After Soak (%) :	98
Field Moisture Content (%) :	18.0
Top Moisture Content - After Penetration (%) :	28.2
Total Moisture Content - After Penetration (%) :	23.4
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	2.0
CBR Surcharge (kg) :	4.5
Oversize (%) :	5
Oversize Material Replaced (%) :	Excluded



CBR 2.5mm (%) :	4
CBR 5.0mm (%) :	4
CBR Value (%) :	4

Site Selection :	
Soil Description :	Extremely Weathered Sandy SILTSTONE



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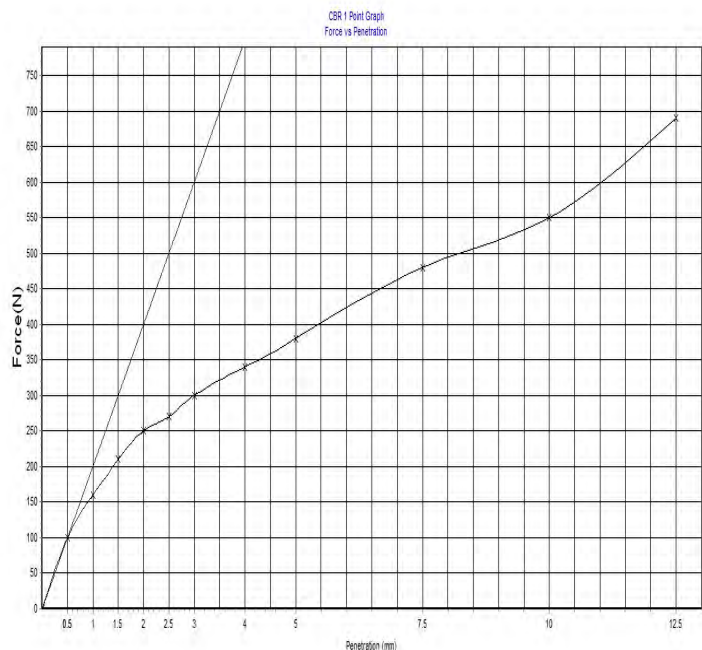
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California Bearing Ratio Report (1 Point)

Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1
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Sample Number :	19-3516	SAMPLE LOCATION	
Date Sampled :	8/10/2019	TP106	
Date Tested :	22/10/2019	0.2-0.5m	
Sampled By :	RCA Geotech		
Sampling Method :	AS 1289.1.2.1-6.5.4		
Material Source :		Lot Number :	
Material Type :		Test Number :	
Remarks :			

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m ³) :	1.421
Optimum Moisture Content (%) :	28.9
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	101.0
Dry Density Before Soak (t/m ³) :	1.416
Dry Density After Soak (t/m ³) :	1.359
Moisture Content Before Soak (%) :	29.3
Moisture Content After Soak (%) :	35.3
Density Ratio After Soak (%) :	96
Field Moisture Content (%) :	33.4
Top Moisture Content - After Penetration (%) :	53.9
Total Moisture Content - After Penetration (%) :	30.8
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	4.0
CBR Surcharge (kg) :	4.5
Oversize (%) :	1
Oversize Material Replaced (%) :	Excluded



CBR 2.5mm (%) :	2
CBR 5.0mm (%) :	2
CBR Value (%) :	2

Site Selection :	
Soil Description :	CLAY



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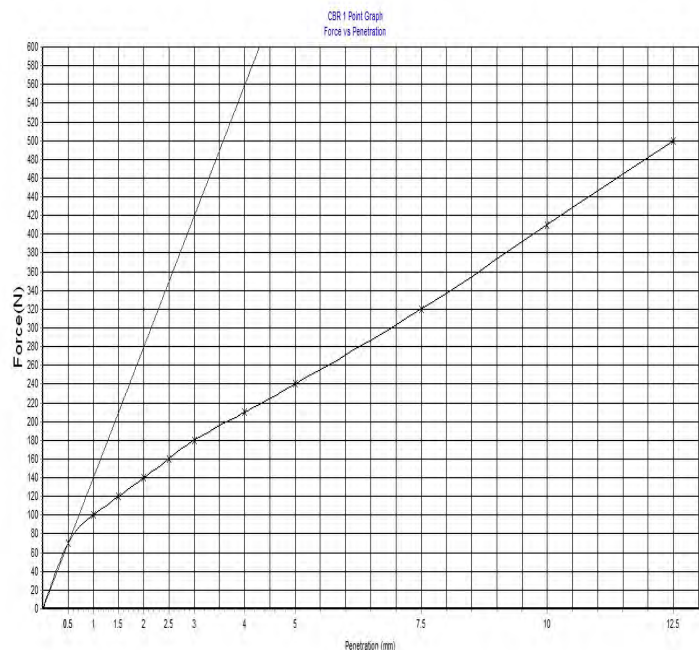
California Bearing Ratio Report (1 Point)

Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1

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Sample Number :	19-3517	SAMPLE LOCATION	
Date Sampled :	8/10/2019	TP107	
Date Tested :	22/10/2019	0.4-0.6m	
Sampled By :	RCA Geotech		
Sampling Method :	AS 1289.1.2.1-6.5.4		
Material Source :		Lot Number :	
Material Type :		Test Number :	
Remarks :			

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m ³) :	1.584
Optimum Moisture Content (%) :	22.0
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	101.0
Dry Density Before Soak (t/m ³) :	1.578
Dry Density After Soak (t/m ³) :	1.542
Moisture Content Before Soak (%) :	22.2
Moisture Content After Soak (%) :	28.6
Density Ratio After Soak (%) :	97
Field Moisture Content (%) :	26.3
Top Moisture Content - After Penetration (%) :	40.4
Total Moisture Content - After Penetration (%) :	27.7
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	2.5
CBR Surcharge (kg) :	4.5
Oversize (%) :	2
Oversize Material Replaced (%) :	Excluded



CBR 2.5mm (%) : 1

CBR 5.0mm (%) : 1

CBR Value (%) : 1

Site Selection :	
Soil Description :	CLAY with sand



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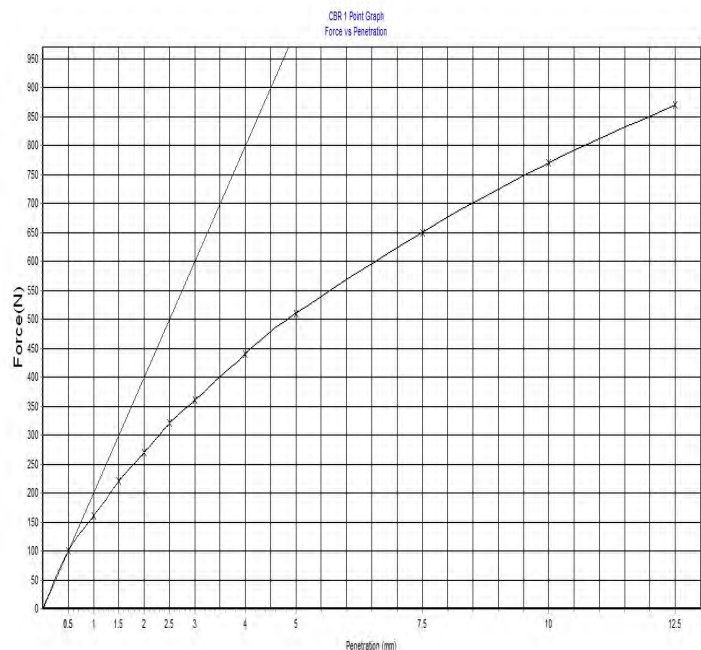
California Bearing Ratio Report (1 Point)

Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1

Page 8 of 9

Sample Number :	19-3518	SAMPLE LOCATION	
Date Sampled :	8/10/2019	TP108	
Date Tested :	21/10/2019	0.3-0.6m	
Sampled By :	RCA Geotech		
Sampling Method :	AS 1289.1.2.1-6.5.4		
Material Source :		Lot Number :	
Material Type :		Test Number :	
Remarks :			

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m³) :	1.561
Optimum Moisture Content (%) :	24.3
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	99
Achieved Percentage of OMC :	100.0
Dry Density Before Soak (t/m³) :	1.542
Dry Density After Soak (t/m³) :	1.519
Moisture Content Before Soak (%) :	24.4
Moisture Content After Soak (%) :	28.0
Density Ratio After Soak (%) :	97
Field Moisture Content (%) :	24.0
Top Moisture Content - After Penetration (%) :	31.7
Total Moisture Content - After Penetration (%) :	26.9
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	1.5
CBR Surcharge (kg) :	4.5
Oversize (%) :	0
Oversize Material Replaced (%) :	



CBR 2.5mm (%) : 2.5

CBR 5.0mm (%) : 2.5

CBR Value (%) : 2.5

Site Selection :	
Soil Description :	CLAY



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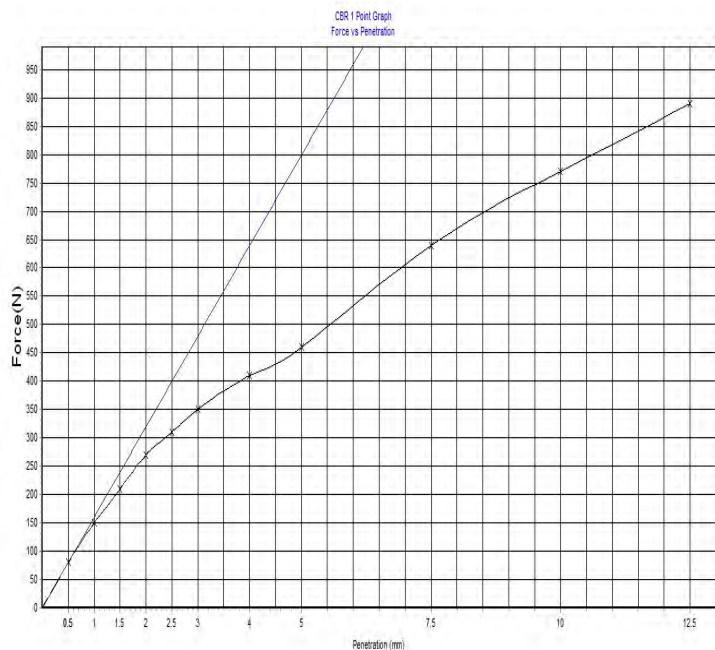
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California Bearing Ratio Report (1 Point)

Client :	NSW Health Infrastructure	Report Number:	14399 - 001
Project Number :	14399	Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.6.1.1
Page 9 of 9			

Sample Number :	19-3519	SAMPLE LOCATION	
Date Sampled :	8/10/2019	TP109	
Date Tested :	22/10/2019	0.4-0.7m	
Sampled By :	RCA Geotech		
Sampling Method :	AS 1289.1.2.1-6.5.4		
Material Source :		Lot Number :	
Material Type :		Test Number :	
Remarks :			

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m ³) :	1.714
Optimum Moisture Content (%) :	20.0
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	101.0
Dry Density Before Soak (t/m ³) :	1.706
Dry Density After Soak (t/m ³) :	1.672
Moisture Content Before Soak (%) :	20.1
Moisture Content After Soak (%) :	23.3
Density Ratio After Soak (%) :	98
Field Moisture Content (%) :	20.2
Top Moisture Content - After Penetration (%) :	27.4
Total Moisture Content - After Penetration (%) :	22.0
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	2.0
CBR Surcharge (kg) :	4.5
Oversize (%) :	1
Oversize Material Replaced (%) :	Excluded



CBR 2.5mm (%) : 2.5

CBR 5.0mm (%) : 2.5

CBR Value (%) : 2.5

Site Selection :	
Soil Description :	CLAY with gravel



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Joseph Scully - Laboratory Manager

NATA Accreditation Number :

9811

Document Code RF39-10

Emerson Class Report

Client :	NSW Health Infrastructure	Report Number:	14399 - 002
Project Name :	Geotechnical Investigation	Report Date :	24/10/2019
Project Number :	14399	Order Number :	HI19320
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.3.8.1

Page 1 of 3

Sample Number :	19-3511	19-3512	19-3513	19-3514
Test Number :				
Sampling Method :	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4
Date Sampled :	8/10/2019	8/10/2019	8/10/2019	8/10/2019
Date Tested :	17/10/2019	17/10/2019	17/10/2019	17/10/2019
Material Type :				
Material Source :				
Lot Number :				
Sample Location :	TP101 0.2-0.4m	TP102 0.3-0.4m	TP103 0.2-0.4m	TP104 0.4-0.5m
Primary Water Type :	Distilled Water	Distilled Water	Distilled Water	Distilled Water
Primary Soil Description :	Sandy CLAY	Silty SAND, traces of clay	CLAY	CLAY with sand
Primary Temperature :	23	23	23	23
Primary Emerson Class Number :	Class 2	Class 2	Class 5	Class 5
Secondary Water Type :				
Secondary Soil Description :				
Secondary Temperature :				
Secondary Emerson Class Number :				
Remarks :				



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Joseph Scully - Laboratory Manager

NATA Accreditation Number

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Emerson Class Report

Client :	NSW Health Infrastructure	Report Number:	14399 - 002
Project Name :	Geotechnical Investigation	Report Date :	24/10/2019
Project Number :	14399	Order Number :	HI19320
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.3.8.1

Page 2 of 3

Sample Number :	19-3515	19-3516	19-3517	19-3518
Test Number :				
Sampling Method :	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4
Date Sampled :	8/10/2019	8/10/2019	8/10/2019	8/10/2019
Date Tested :	17/10/2019	17/10/2019	17/10/2019	17/10/2019
Material Type :				
Material Source :				
Lot Number :				
Sample Location :	TP105 0.6-0.9m	TP106 0.2-0.5m	TP107 0.4-0.6m	TP108 0.3-0.6m
Primary Water Type :	Distilled Water	Distilled Water	Distilled Water	Distilled Water
Primary Soil Description :	Extremely Weathered Sandy SILTSTONE	CLAY	CLAY with sand	CLAY
Primary Temperature :	23	23	23	23
Primary Emerson Class Number :	Class 5	Class 5	Class 5	Class 5
Secondary Water Type :				
Secondary Soil Description :				
Secondary Temperature :				
Secondary Emerson Class Number :				
Remarks :				



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Joseph Scully - Laboratory Manager
NATA Accreditation Number
9811

Emerson Class Report

Client :	NSW Health Infrastructure	Report Number:	14399 - 002
Project Name :	Geotechnical Investigation	Report Date :	24/10/2019
Project Number :	14399	Order Number :	HI19320
Location:	John Hunter Health and Innovation Precinct	Test Method :	AS 1289.3.8.1

Page 3 of 3

Sample Number :	19-3519			
Test Number :				
Sampling Method :	AS 1289.1.2.1-6.5.4			
Date Sampled :	8/10/2019			
Date Tested :	17/10/2019			
Material Type :				
Material Source :				
Lot Number :				
Sample Location :	TP109 0.4-0.7m			
Primary Water Type :	Distilled Water			
Primary Soil Description :	CLAY with gravel			
Primary Temperature :	23			
Primary Emerson Class Number :	Class 1			
Secondary Water Type :				
Secondary Soil Description :				
Secondary Temperature :				
Secondary Emerson Class Number :				
Remarks :				



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Joseph Scully - Laboratory Manager

NATA Accreditation Number

9811

Document Code RF72-7

Atterberg Limits Report

Client :	NSW Health Infrastructure	Report Number:	14399 - 003
Address :		Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Project Number :	14399	Test Method :	AS1289.3.1.2, 3.2.1, 3.3.1
Location:	John Hunter Health and Innovation Precinct		

Page 1 of 3

Sample Number :	19-3511	19-3512	19-3513	19-3514
Test Number :				
Date Sampled :	8/10/2019	8/10/2019	8/10/2019	8/10/2019
Date Tested :	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Sampled By :	RCA Geotech	RCA Geotech	RCA Geotech	RCA Geotech
Sampling Method :	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4
Material Source :				
Material Type :				
Sample Location :	TP101 0.2-0.4m	TP102 0.3-0.4m	TP103 0.2-0.4m	TP104 0.4-0.5m
Lot Number :				
Moisture Method :	AS 1289.2.1.1	AS 1289.2.1.1	AS 1289.2.1.1	AS 1289.2.1.1
Sample History :	Oven dried prep (50°C)	Oven dried prep (50°C)	Oven dried prep (50°C)	Oven dried prep (50°C)
Sample Preparation :	Dry	Dry	Dry	Dry
Notes :				
Mould Length (mm) :				
Liquid Limit (%) :	51	17	41	41
Plastic Limit (%) :	21	15	21	20
Plasticity Index (%) :	30	2	20	21
Linear Shrinkage (%) :				
SPECIFICATION DETAILS				
Specification Number :				
Liquid Limit - Max :				
Plasticity Index - Max :				
Linear Shrinkage - Max :				
Remarks :	-			

Atterberg Limits Report

Client :	NSW Health Infrastructure	Report Number:	14399 - 003
Address :		Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Project Number :	14399	Test Method :	AS1289.3.1.2, 3.2.1, 3.3.1
Location:	John Hunter Health and Innovation Precinct		

Page 2 of 3

Sample Number :	19-3515	19-3516	19-3517	19-3518
Test Number :				
Date Sampled :	8/10/2019	8/10/2019	8/10/2019	8/10/2019
Date Tested :	18/10/2019	18/10/2019	21/10/2019	21/10/2019
Sampled By :	RCA Geotech	RCA Geotech	RCA Geotech	RCA Geotech
Sampling Method :	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4	AS 1289.1.2.1-6.5.4
Material Source :				
Material Type :				
Sample Location :	TP105 0.6-0.9m	TP106 0.2-0.5m	TP107 0.4-0.6m	TP108 0.3-0.6m
Lot Number :				
Moisture Method :	AS 1289.2.1.1	AS 1289.2.1.1	AS 1289.2.1.1	AS 1289.2.1.1
Sample History :	Oven dried prep (50°C)	Oven dried prep (50°C)	Oven dried prep (50°C)	Oven dried prep (50°C)
Sample Preparation :	Dry	Dry	Dry	Dry
Notes :				
Mould Length (mm) :				
Liquid Limit (%) :	41	86	70	60
Plastic Limit (%) :	23	23	26	21
Plasticity Index (%) :	18	63	44	39
Linear Shrinkage (%) :				
SPECIFICATION DETAILS				
Specification Number :				
Liquid Limit - Max :				
Plasticity Index - Max :				
Linear Shrinkage - Max :				
Remarks :	-			



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Joseph Scully - Laboratory Manager

NATA Accreditation Number :

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Document Code RF25-13

Atterberg Limits Report

Client :	NSW Health Infrastructure	Report Number:	14399 - 003
Address :		Report Date :	24/10/2019
Project Name :	Geotechnical Investigation	Order Number :	
Project Number :	14399	Test Method :	AS1289.3.1.2, 3.2.1, 3.3.1
Location:	John Hunter Health and Innovation Precinct		

Page 3 of 3

Sample Number :	19-3519			
Test Number :				
Date Sampled :	8/10/2019			
Date Tested :	21/10/2019			
Sampled By :	RCA Geotech			
Sampling Method :	AS 1289.1.2.1-6.5.4			
Material Source :				
Material Type :				
Sample Location :	TP109 0.4-0.7m			
Lot Number :				
Moisture Method :	AS 1289.2.1.1			
Sample History :	Oven dried prep (50°C)			
Sample Preparation :	Dry			
Notes :				
Mould Length (mm) :				
Liquid Limit (%) :	57			
Plastic Limit (%) :	21			
Plasticity Index (%) :	36			
Linear Shrinkage (%) :				
SPECIFICATION DETAILS				
Specification Number :				
Liquid Limit - Max :				
Plasticity Index - Max :				
Linear Shrinkage - Max :				
Remarks :	-			



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Joseph Scully - Laboratory Manager

NATA Accreditation Number :

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Document Code RF25-13

Atterberg Limits Report

Client :	NSW Health Infrastructure	Report Number:	14399 - 004
Project Name :	Geotechnical Investigation	Order Number :	HI19320
Project Number :	14399	Test Method :	AS1289.3.1.2, 3.2.1, 3.3.1
Location:	John Hunter Health and Innovation Precinct		

Page 1 of 1

Sample Number :	19-3917	19-3918		
Test Number :				
Date Sampled :	26/09/2019	26/09/2019		
Date Tested :	19/11/2019	19/11/2019		
Sampled By :	RCA Geotech	RCA Geotech		
Sampling Method :	AS SUPPLIED	AS SUPPLIED		
Material Source :				
Material Type :				
Sample Location :	BH105 1.5-1.95m	BH105 6.0-6.15m		
Lot Number :				
Moisture Method :	AS 1289.2.1.1	AS 1289.2.1.1		
Sample History :	Oven dried prep (50°C)	Oven dried prep (50°C)		
Sample Preparation :	Dry	Dry		
Notes :				
Mould Length (mm) :				
Liquid Limit (%) :	61	47		
Plastic Limit (%) :	26	22		
Plasticity Index (%) :	35	25		
Linear Shrinkage (%) :				

SPECIFICATION DETAILS

Specification Number :				
Liquid Limit - Max :				
Plasticity Index - Max :				
Linear Shrinkage - Max :				
Remarks :	-			



Accredited for compliance with ISO/IEC 17025 - Testing.

APPROVED SIGNATORY



Joseph Scully - Laboratory Manager

NATA Accreditation Number :

9811

Document Code RF25-13

CERTIFICATE OF ANALYSIS

Work Order : **ES1935812**
Client : **ROBERT CARR & ASSOCIATES P/L**
Contact : MR ROBERT CATER
Address : P O BOX 175
 CARRINGTON NSW, AUSTRALIA 2294
Telephone : +61 02 49029200
Project : 14399
Order number : 14399
C-O-C number : ----
Sampler : Rob Cater and Tom Hosking
Site : ----
Quote number : SYBQ/400/18
No. of samples received : 30
No. of samples analysed : 30

Page : 1 of 8
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 30-Oct-2019 16:07
Date Analysis Commenced : 04-Nov-2019
Issue Date : 07-Nov-2019 10:00



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA003 (NATA Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH101, 5.05-5.25	BH102, 3.43-3.62	BH103, 7.65-7.85	BH103, 9.65-9.85	BH103, 9.25-9.47
Client sampling date / time				03-Oct-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	01-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1935812-001	ES1935812-002	ES1935812-003	ES1935812-004	ES1935812-005
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)	----	0.1	pH Unit	5.5	4.8	6.7	6.5	6.1
pH (Fox)	----	0.1	pH Unit	3.8	2.5	2.3	3.6	2.8
Reaction Rate	----	1	Reaction Unit	2	2	3	2	4



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH106, 3.63-3.80	BH106, 3.80-4.00	BH106, 5.00-5.20	BH106, 6.80-7.00	BH106, 10.00-10.20
Client sampling date / time				07-Oct-2019 00:00	07-Oct-2019 00:00	07-Oct-2019 00:00	07-Oct-2019 00:00	07-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1935812-006	ES1935812-007	ES1935812-008	ES1935812-009	ES1935812-010
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)	----	0.1	pH Unit	5.4	5.4	4.9	4.4	5.8
pH (Fox)	----	0.1	pH Unit	3.7	2.5	3.4	2.8	3.2
Reaction Rate	----	1	Reaction Unit	2	2	2	2	4



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH106, 11.41-11.55	BH107, 10.31-10.48	BH107, 13.00-13.20	BH108, 6.54-6.77	BH109, 8.00-8.20
Client sampling date / time				07-Oct-2019 00:00	07-Oct-2019 00:00	11-Oct-2019 00:00	10-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1935812-011	ES1935812-012	ES1935812-013	ES1935812-014	ES1935812-015
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)	----	0.1	pH Unit	6.4	9.1	7.3	6.3	5.2
pH (Fox)	----	0.1	pH Unit	5.7	8.0	6.3	5.1	3.2
Reaction Rate	----	1	Reaction Unit	3	4	4	2	2

Page : 6 of 8
 Work Order : ES1935812
 Client : ROBERT CARR & ASSOCIATES P/L
 Project : 14399



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH109, 8.85-9.00	BH109, 14.00-14.15	BH110, 2.80-3.00	BH110, 7.83-8.00	BH110, 8.75-8.90
Client sampling date / time				02-Oct-2019 00:00	02-Oct-2019 00:00	14-Oct-2019 00:00	14-Oct-2019 00:00	14-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1935812-016	ES1935812-017	ES1935812-018	ES1935812-019	ES1935812-020
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)	----	0.1	pH Unit	6.0	8.1	6.5	6.0	5.2
pH (Fox)	----	0.1	pH Unit	3.2	6.7	4.4	2.4	2.3
Reaction Rate	----	1	Reaction Unit	3	2	2	2	3



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH101, 7.00-7.15	BH102, 3.30-3.37	BH104, 0.5-0.95	BH105, 9.67-9.90	BH106, 3.50-3.63
Client sampling date / time					03-Oct-2019 00:00	25-Sep-2019 00:00	01-Oct-2019 00:00	30-Sep-2019 00:00	07-Oct-2019 00:00
Compound	CAS Number	LOR	Unit		ES1935812-021	ES1935812-022	ES1935812-023	ES1935812-024	ES1935812-025
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		6.4	4.8	5.0	7.3	5.9
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		84	428	102	26	181
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		14.5	23.9	21.7	9.2	14.6
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		50	130	50	<10	60
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		60	970	80	<10	240



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH106, 13.00-13.16	BH107, 3.00-3.37	BH109, 5.80-5.60	BH109, 7.70-7.80	BH110, 5.85-6.00
Client sampling date / time					07-Oct-2019 00:00	11-Oct-2019 00:00	09-Oct-2019 00:00	02-Oct-2019 00:00	14-Oct-2019 00:00
Compound	CAS Number	LOR	Unit		ES1935812-026	ES1935812-027	ES1935812-028	ES1935812-029	ES1935812-030
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		9.1	5.1	5.2	5.3	7.1
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		53	600	180	89	32
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		10.1	13.6	27.5	17.6	9.7
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		10	350	280	10	<10
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		10	980	200	120	10

CERTIFICATE OF ANALYSIS

Work Order : **ES1936896**
Client : **ROBERT CARR & ASSOCIATES P/L**
Contact : MR ROBERT CATER
Address : P O BOX 175
 CARRINGTON NSW, AUSTRALIA 2294
Telephone : +61 02 49029200
Project : 14399
Order number : ----
C-O-C number : ----
Sampler : ROBERT CATER, TOM HOSKING
Site : ----
Quote number : SYBQ/400/18
No. of samples received : 7
No. of samples analysed : 7

Page : 1 of 4
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555
Date Samples Received : 30-Oct-2019 19:30
Date Analysis Commenced : 12-Nov-2019
Issue Date : 14-Nov-2019 16:36



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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

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Where moisture determination has been performed, results are reported on a dry weight basis.

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When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH102, 3.43-3.62	BH103, 7.65-7.85	BH103, 9.25-9.47	BH106, 3.80-4.00	BH106, 6.80-7.00
Client sampling date / time					25-Oct-2019 00:00	25-Oct-2019 00:00	01-Oct-2019 00:00	07-Oct-2019 00:00	07-Oct-2019 00:00
Compound	CAS Number	LOR	Unit		ES1936896-001	ES1936896-002	ES1936896-003	ES1936896-004	ES1936896-005
				Result	Result	Result	Result	Result	Result
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		4.3	4.6	5.2	4.7	3.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t		56	30	8	22	1020
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		0.09	0.05	<0.02	0.03	1.64
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S		0.007	0.009	0.046	0.012	0.015
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		<10	<10	29	<10	<10
EA033-D: Retained Acidity									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		<0.02	----	----	----	<0.02
HCl Extractable Sulfur (20Be)	----	0.02	% S		<0.02	----	----	----	<0.02
Net Acid Soluble Sulfur (20Je)	----	0.02	% S		<0.02	----	----	----	<0.02
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t		<10	----	----	----	<10
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S		<0.02	----	----	----	<0.02
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S		0.10	0.06	0.06	0.05	1.65
Net Acidity (acidity units)	----	10	mole H+ / t		60	36	37	29	1030
Liming Rate	----	1	kg CaCO3/t		4	3	3	2	77
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		0.10	0.06	0.06	0.05	1.65
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		60	36	37	29	1030
Liming Rate excluding ANC	----	1	kg CaCO3/t		4	3	3	2	77



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH110, 7.83-8.00	BH110, 8.75-8.90	----	----	----
Client sampling date / time					14-Oct-2019 00:00	14-Oct-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1936896-006	ES1936896-007	-----	-----	-----
				Result	Result		----	----	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		4.3	3.4	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t		92	1100	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		0.15	1.76	----	----	----
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S		0.006	0.015	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		<10	<10	----	----	----
EA033-D: Retained Acidity									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		<0.02	<0.02	----	----	----
HCl Extractable Sulfur (20Be)	----	0.02	% S		<0.02	<0.02	----	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S		<0.02	<0.02	----	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t		<10	<10	----	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S		<0.02	<0.02	----	----	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		0.15	1.77	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		96	1100	----	----	----
Liming Rate	----	1	kg CaCO3/t		7	83	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		0.15	1.77	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		96	1100	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t		7	83	----	----	----