# **SDL Adjustment Supply Measures Concept Design**

## **Geotechnical Investigation Report**

IS079600-002 | 2

Mallee Catchment Management Authority

September 2016







## **SDL** Adjustment Supply Measures Concept Design

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- Appendix B. Test Pit and Borehole Logs

Appendix C. CPT Results

- Appendix D. Laboratory Test Certificates
- Appendix E. Ground Profile- Cross Sections



## Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to present the findings of a geotechnical investigation conducted at Burra Creek, Nyah Forest and Vinifera Park for the development of the advanced concept designs in accordance with the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report was developed with the Client.

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## 1. Introduction

The Murray Darling Basin Plan sets a sustainable diversion limit (SDL) for each catchment and aquifer in the Basin. The SDLs act as a cap on water use and regulate the amount of water that can be extracted for consumptive use.

Jacobs was engaged by Mallee CMA to develop advanced concept designs for SDL Adjustment projects at Burra Creek, Nyah Forest and Vinifera Park. As part of the engagement, a geotechnical investigation was undertaken to assess the subsurface soil profile.

The results of the investigation presented in this report include:

- Brief description of previous investigations by others.
- Description of fieldwork and subsurface conditions by Jacobs including:
  - Test pit and borehole logs,
  - Cone Penetration Test (CPT) results, and
  - Laboratory Results.
- Discussion of site conditions.



## 2. Site Description

The sites for the proposed SDL Adjustment Projects are located in Burra Creek, Nyah Forest and Vinifera Park.

The Burra Creek site is located west of the Murray Valley Highway and north of Tooleybuc Township.

The Nyah site is located east of the Murray Valley Highway and west of the Murray River near the Nyah Township.

Vinifera Park is located north-east of the Murray Valley Highway and south-west of the Murray River near the Vinifera Township, Victoria.

All sites are located within State Forests and are accessed via unsealed access roads with the general surroundings consisting of large scattered trees and native bushland. The site locations are presented on **Figure 1**.

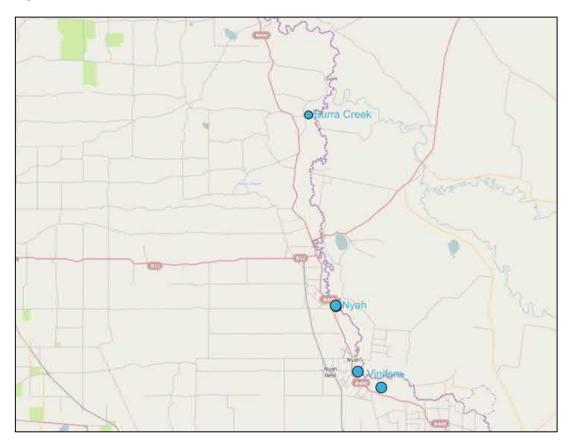


Figure 1 – SDL Adjustment Project Locations (not to scale)

Site location plans presenting the investigation locations are included in Error! Reference source not found..



## 3. Previous Geotechnical Investigations

The Aitken Rowe (2012) report describes the soil profiles at proposed structure locations at Nyah and Vinifera (no investigation was performed at Burra Creek).

The previous geotechnical investigation identified that the upper part of the subsurface soil profile generally comprises uncontrolled fill along access tracks. Underlying this fill layer, the profile generally consisted of firm to stiff, medium to high plasticity clay and this was described to be 5-6m depth. A Clayey silt/sand was described below this depth. Sand layers were also noted at shallower depths in the profile at some locations (i.e. within the clay layer).

Some observations drawn from the Aitken Rowe report are:

- Seepage was encountered in a number of the boreholes at about 5m depth, although it was not clear if this was the static groundwater level as no groundwater monitoring results were reported;
- The soils described in the report were noted as being moderately to highly dispersive;
- Sands were observed to generally be located at depth and was reported as being medium dense with a high fines content.
- The soils tested were generally regarded as non-aggressive towards concrete and steel.
- Some of the soil permeability values reported were anomalous; and
- No borrow area investigations were reported.



## 4. Jacobs Geotechnical Investigation

## 4.1 Scope of Work

Jacobs has undertaken this geotechnical investigation to supplement the results of the previous investigation (Aitken Rowe, 2012) to assess the suitability of the existing soil profiles for the proposed regulator and bank structures. The investigation comprised the following:

- Review of existing geotechnical information;
- Test Pit Investigation
  - Excavation of 16, 12 and 18 test pits along the proposed bank alignment and at the location of proposed regulator structures in Burra Creek, Nyah and Vinifera respectively.
  - Disturbed samples were collected from the test pits for laboratory testing for the assessment of index and strength characteristics for the soil profile. Shear vane tests were performed in-situ in the top 1.5m of the test pit to assess the undrained shear strength of any cohesive material.
  - Dynamic Cone Penetrometer (DCP) tests were performed adjacent to selected test pits to a target depth of 1.5m, or to effective penetration refusal. The purpose of the DCPs was to assess the relative in situ strength of the near surface soils.
  - Bulk samples were also collected from test pits at potential external borrow sources, with laboratory testing performed on these samples to determine their index and compaction characteristics.
- Borehole Investigation
  - Fifteen (15) boreholes were drilled across the three sites; to depths of up to 10m below ground level at nominated structure locations. These boreholes were typically drilled adjacent to CPT locations to allow correlation of the soil profile between the borehole and CPT information and to optimise borehole sampling.
  - Disturbed and undisturbed samples were collected from boreholes, with laboratory testing undertaken for the assessment of index, strength, permeability and shrink-swell characteristics. Shear vane tests were performed in the base of undisturbed push tube samples (63mm diameter) where possible to assess the undrained shear strength of cohesive material.
- Cone Penetration Testing (CPT)
  - CPT tests were performed at seventeen (17) locations across the three sites, to depths of up to 8.8m below ground level or to effective penetration refusal.

The investigation location plans are presented on figures in Error! Reference source not found..



## 4.2 Test Pit Investigation

The initial test pit investigation was undertaken between 21 to 27 October 2014 and a subsequent test pit investigation was undertaken on 22 June 2016.

The subsequent test pit investigation was undertaken to investigate a proposed bank between V3 and V4 structures. The investigations were undertaken under the supervision of an experienced engineering geologist or geotechnical engineer from Jacobs. The investigation methodology was consistent with Australian Standard AS 1726-1993 (Geotechnical Site Investigations) and Jacobs' standard work procedures.

A total of 46 test pits were excavated over the three sites, using; for the initial investigation, a Case CX36B tracked excavator equipped with a 350mm wide bucket and for the subsequent investigation, a backhoe. The excavator was supplied and operated by Ashley Shirnack Contracting and the backhoe was supplied and operated by Coburns Earthworks. The test pits were excavated beside the existing access tracks under the full-time supervision of cultural heritage representative from Mallee CMA.

The subsurface profile in each test pit was described and disturbed soil samples were collected for laboratory testing. Where possible, shear vane tests were performed in the walls of the test pits to assess the in-situ strength of the soils.

Upon completion, the test pits were backfilled with the excavated material, which was rolled and compacted in place with the excavator bucket at the surface.

Dynamic Cone Penetration (DCP) testing was conducted adjacent to selected test pits at bank locations i.e. where CPT testing was not conducted.

A summary of the test pit details is presented in Table 4-1 and the test pit logs are presented in Error! Reference source not found..

Test Pit ID	Feature/Location	are/Location Approximate Approximate Easting (m) <sup>1</sup> Northing (m		Final Depth (m bgl) <sup>2</sup>	DCP Test Depth (m bgl) <sup>2</sup>					
	Burra Creek									
BCTP01	B1	711711	6136858	2.70	-					
BCTP02		711723	6136840	0.40	-					
BCTP03		711737	6136812	2.30	-					
BCTP04	Bank	711895	6136697	1.05	1.3					
BCTP05		712145	6136616	1.50	1.4					
BCTP06		712227	6136433	1.00	1.5					
BCTP07		712346	6136337	1.25	1.5					
BCTP08		712569	6136054	1.00	1.5					
BCTP09		712733	6135122	1.00	1.5					
BCTP10		712783	6134825	1.00	1.5					
BCTP11		712958	6134590	1.00	1.5					
BCTP12	B2	712093	6131923	2.70	-					
BCTP13		712173	6131921	2.80	-					
BCTP14	B4	712769	6122005	2.70	-					
BCTP15		712754	6121990	0.10	-					
BCTP16		712738	6121981	2.80	-					

### Table 4-1 Summary of Test Pit Information



Test Pit ID	Feature/Location	Approximate Easting (m) <sup>1</sup>	Approximate Northing (m) <sup>1</sup>	Final Depth (m bgl) <sup>2</sup>	DCP Test Depth (m bgl) <sup>2</sup>
	-	N	lyah	1	1
NNTP01	Bank	714002	6112564	1.20	2.4
NNTP02		714264	6112583	1.00	2.2
NNTP03		714534	6112495	1.00	1.5
NNTP04	N1	714654	6112248	2.75	-
NNTP05		714709	6112155	1.00	-
NNTP06	N2	714776	6112072	2.65	-
NNTP07		714789	6112053	2.85	-
NNTP08	Bank	714821	6111972	1.00	1.5
NNTP09		716476	6110260	1.00	-
NSTP01	N5	716990	6107069	2.70	-
NSTP02		716985	6107048	2.6	-
NSTP03		716980	6107059	0.3	-
		Vir	nifera		
VNTP01	V1	717145	6103847	1.00	-
VNTP02	Bank	717231	6103783	1.80	1.5
VNTP03	V2	717383	6103606	2.20	-
VNTP04	Bank	717594	6103574	1.00	1.5
VSTP01	V4	720351	6102810	2.70	-
VSTP02		720342	6102800	2.30	-
VSTP03		720348	6102806	0.30	-
VSTP04	V3	720286	6101563	1.00	-
VSTP05		720255	6101579	2.00	-
VSTP06		720278	6101562	1.00	-
VSTP07	Bank between V3	720205	6101623	1.5	
VSTP08	and V4	720074	6101802	1.7	
VSTP09		720145	6102009	1.6	
VSTP10		720267	6102068	1.5	
VSTP11		720476	6102295	1.7	1.5
VSTP12		720474	6102501	1.5	
VSTP13		720450	6102694	1.6	
VSTP14		720372	6102800	1.4	

1: coordinates provided in WGS 84 54S

<sup>2</sup>: m bgl: metres below ground level



## 4.3 Borehole Investigation

The initial borehole geotechnical investigation was undertaken between 27 to 31 October 2014 and a subsequent borehole investigation was undertaken between 20 to 21 June 2016.

The subsequent borehole investigation was undertaken to investigate proposed drop structure locations and to provide additional information to inform the selection of geotechnical design parameters at the B1 structure location.

The investigations were undertaken under the supervision of an experienced geotechnical engineer from Jacobs. The investigation methodology was consistent with Australian Standard AS 1726-1993 (Geotechnical Site Investigations) and Jacobs' standard work procedures.

A total of 15 boreholes were drilled over the three sites at the proposed structure locations adjacent to corresponding CPTs.

The boreholes were drilled using a 4WD trailer mounted drilling rig which was supplied and operated by Civiltest Pty Ltd. All boreholes were located in the middle of the existing access tracks, except for those drilled at drop structure locations, and BCN-BH03, which was drilled to the north side of the access track embankment. The work was performed under the full-time supervision of cultural heritage representative from Mallee CMA.

The subsurface profile in each borehole was described and disturbed and undisturbed (U63 push tubes) soil samples were collected for laboratory testing. Where possible, shear vane tests were performed on the undisturbed soil samples to assess the in situ strength of the soils.

A summary of borehole details is presented in Table 4-2 and borehole logs are presented in Appendix B.

Test Pit ID	Proposed Structure	Adjacent CPT	Approximate Easting (m) <sup>1</sup>	Approximate Northing (m) <sup>1</sup>	Approximate Elevation (m AHD)	Final Depth (m bgl) <sup>2</sup>				
Burra Creek										
BCN-BH01	B1	BCN-CPT01	711722	6136843	56.6	10.0				
BCN-BH02	B1	BCN-CPT02	711728	6136836	56.8	10.0				
BCN-BH03	B1	-	711727	6136848	56.2	8.0				
BCN-BH04	Burra Drop Structure	-	712115	6136778	56.0	6.0				
BCM-BH01	B2	BCN-CPT03	712145	6131922	59.0	8.0				
BCM-BH02	B2	BCN-CPT04	712131	6131925	58.6	8.0				
BCS-BH01	B4	BCS-CPT01	712751	6121986	61.9	8.0				
			Nyah							
NN-BH01	N2	NN-CPT03	714789	6112069	62.1	8.0				
NN-BH02	Nyah Drop Structure	-	714949	6112164	61.0	6.0				
NS-BH01	N5	NS-CPT01	716984	6107058	63.8	3.8 (Refusal)				
			Vinifera							
VN-BH01	V1	VN-CPT01	717396	6103597	63.5	5.0				
VN-BH02	Vinifera Drop Structure	-	717340	6103976	63.5	9.0				
VS-BH01	V3	VS-CPT01	720288	6101567	65.4	6.5 (Refusal)				

#### Table 4-2 Summary of Borehole Information



Test Pit ID	Proposed Structure	Adjacent CPT	Approximate Approximate Easting (m) <sup>1</sup> Northing (m) <sup>1</sup>		Approximate Elevation (m AHD)	Final Depth (m bgl) <sup>2</sup>			
	Burra Creek								
VS-BH02	V3	VS-CPT03	720253	6101588	65.0	5.0 (Refusal)			
VS-BH03	V4	VS-CPT04	720347	6102790	64.4	5.0			

1: coordinates provided in WGS 84 54S

2: m bgl: metres below ground level

3:m AHD: metres Australian Height Datum

## 4.4 Cone Penetration Testing Investigation

The CPT investigation was undertaken between 27 to 29 October 2014, with a total of 17 CPT probes conducted over the three sites by Black Insitu Testing. All CPT probes were performed at proposed structure locations and were located in the middle of the existing access tracks. This work was performed under the supervision of cultural heritage representative from Mallee CMA.

A summary of the CPT details is presented in Table 4-3 and the CPT results are presented in Error! Reference source not found.

## Table 4-3 Summary of CPT information

Test Pit ID	Proposed Structure	Approximate Easting (m) <sup>1</sup>	Approximate Northing (m) <sup>1</sup>	Final Depth (m bgl) <sup>2</sup>						
	Burra Creek									
BCN-CPT01	B1	711722	6136843	6.22						
BCN-CPT02		711728	6136836	2.96						
BCN-CPT03	B2	712145	6131922	8.8						
BCN-CPT04		712131	6131925	8.75						
BCS-CPT01	B4	712751	6121986	8.84						
BCS-CPT02		712754	6121993	8.77						
		Nyah								
NN-CPT01A	N1a	714653	6112254	4.92						
NN-CPT02A	N1b	714704	6112160	5.50						
NN-CPT03	N2	714789	6112069	6.95						
NN-CPT04		714798 6112058		7.13						
NS-CPT01	N5	716984	6107058	5.76						
		Vinifera								
VN-CPT01	V1	717196	6103831	5.52						
VN-CPT02	V2	717395	6103596	8.4						
VS-CPT01	V3	720288	6101567	7.47						
VS-CPT02		720273	6101577	5.61						
VS-CPT03		720253	6101588	7.45						
VS-CPT04	V4	720347	6102790	5.45						

1: coordinates provided in WGS 84 54S

<sup>2</sup>: *m* bgl: metres below ground level



## 4.5 **Potential Borrow Locations**

An initial limited investigation of external borrow sources was undertaken; bulk samples were collected to identify whether the material was appropriate for bank construction. A summary of the locations is presented below in Table 4-44.

### Table 4-4 Summary of potential borrow locations

Location	Approximate Easting (m) <sup>1</sup>	Approximate Northing (m) <sup>1</sup>
Calcrete pit, Mallee Hwy, Piangil	692,560	6,117,885
Terry Benfield Property 4548 Murray Valley Hwy, Piangil	711,250	6,121,950
Shane Coburn Farm, Prentice Road, Koraleigh	723,335	6,104,005

Of the three potential borrow sites investigated, the first one (approximately 20km west of Piangil) represented an existing calcrete pit, with this material to be considered for use as beaching and capping material for the crest of the banks.

The Mawsons Quarry at Lake Boga (Quarry Rd, Kunat) which supplies granite rock, is another potential source for beaching.

The other two sites were investigated as potential sources of clay fill. Material from the second site (Terry Benfield's property) was previously used for the construction of access tracks in the State forests.

Bulk samples of the natural clay material at Nyah North (test pit NNTP04) and the fill material at Vinifera South (test pit VSTP05 at structure V3) were also collected and submitted for laboratory testing to assess their engineering properties, for potential borrow material.



## 5. Laboratory Testing

Geotechnical testing was performed on selected undisturbed and disturbed samples from the boreholes, test pits and borrow locations.

The samples from the geotechnical investigation in 2014 were tested by Civil Geotechnical Services in their NATA accredited laboratory in Croydon.

The samples collected from the subsequent geotechnical investigation in 2016 were sent to 'Civil Test' laboratories in Mildura, with tri-axial and hydrometer samples sent to 'Ground Science' Melbourne laboratory and 'Trilab' laboratory respectively. The testing program for both stages of investigation is summarised in Table 5-1.

A summary of the geotechnical laboratory testing results are provided in Table 5-2, Table 5-3 and Table 5-4 below and the laboratory certificates are provided in Error! Reference source not found..

#### Table 5-1 Summary of Laboratory Testing

Test Description	Applicable Australian Standard	No. of Tests
Visual Classification and Moisture Content	AS 1289.2.1.1	12
Atterberg Limits with Linear Shrinkage	AS 1289.3.1.2, 3.2.1, 3.3.1, 3.4.1	16
Particle Size Distribution (sieving – up to 2.36mm)	AS 1289.3.6.1	7
Particle Size Distribution (with hydrometer)	AS 1289.3.6.1 & AS1289.3.6.3	7
Emerson Class	AS 1289.3.8.1	20
Standard Compaction	AS 1289.5.1.1	1
Permeability (Undisturbed samples)	AS 1289.6.7.3	5
Shrink Swell Index	AS1289.7.1.1	2
Triaxial (Unconsolidated Undrained)	AS1289.6.4.1	5
Triaxial (Consolidated Undrained)	AS1289.6.4.2	1

#### Table 5-2 Summary of Soil Classification Results

Location	Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	% Fines	Emerson Class <sup>1</sup>	Emerson Class <sup>2</sup>	Permeability (m/s)
				Burra	Creek				
BCN-BH01	1.3-1.65	13.0	36	22	11.0	62	2	3	4 x 10 <sup>-11</sup>
	4.9	18.5	33	19	9.0	69	-	-	-
BCN-BH02	0.7-1.1	11.8	41	26	11.5	89	-	-	-
BCN-BH03	1.0-1.45	19.3	51	38	-	82	5	5	-
BCN-BH04	1.0-1.45	-	-	-	-	-	-	5	-
BCM-BH02	1.5-1.75	19.2	62	43	18.0	94	2	6	-
BCS-BH01	6.0-6.2	15.5	37	23	9.5	76	-	-	-
				N	yah				
NN-BH01	1.9-2.15	23.4	50	31	14.0	98	3	5	7 x 10 <sup>-11</sup>
	4.3-4.7	18.4	-	-	-	-	-	-	-
NN-BH02	1.0-1.45	10.4	38	26	-	85	5	5	
NS-BH01	1.5	8.4	30	16	7.5	70	-	-	-
NNTP04	1.5	20.7	50	30	13.0	98	3	5	-

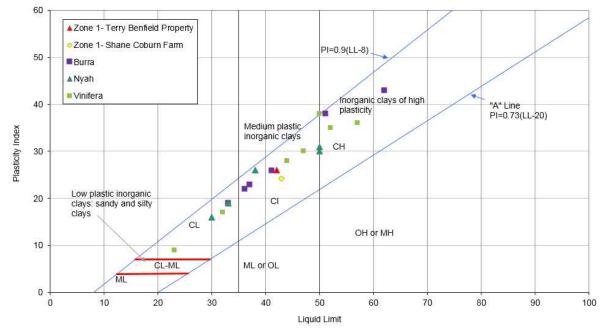


Location	Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	% Fines	Emerson Class <sup>1</sup>	Emerson Class <sup>2</sup>	Permeability (m/s)
Nyah- Murray River Bank 500m South- East of Sill 3.	River Bank	5.3	33	19	7	97	5	5	-
	1			Vin	ifera	1	1	1	1
VN-BH01	1.8-2.1	17.8	-	-	-	-	-	-	2 x 10 <sup>-11</sup>
	3.5	5.9	23	9	4.5	32	4	4	-
	4.0-4.45	14.6	47	30	13.0	58	-	-	3 x 10 <sup>-11</sup>
VN-BH02	1.5-1.95	-	-	-	-	-	-	5	-
VS-BH02	1.5-1.9	19.9	57	36	12.5	96	2	5	-
VS-BH03	0.8-1.25	16.3	44	28	11.5	-	-	-	2 x 10 <sup>-10</sup>
VSTP05	0.0-2.00	10.1	32	17	8.5	40	4	4	-
VSTP07	0.7-1.3	15.4	52	35	-	91	2	2	-
VSTP12	0.6-1.5	18	50	38	-	94	5	5	-
				External B	orrow Sites				
Calcrete pit, Piangil		3.7	23	6	3.0	25	4	4	-
Terry Benfield Property	N/A	5.7	42	26	13	65	3	3	-
Shane Coburn Farm		6.8	43	24	11	78	3	3	-

<sup>1</sup> Emerson Class testing conducted in distilled water

<sup>2</sup> Emerson Class testing conducted with Murray River water

The Atterberg Limit test results are summarised on the Casagrande Chart, show in Figure 2.



## Atterberg Limits

Figure 2 – SDL Adjustment Project Soil Plasticity Chart



## Table 5-3 Summary of Particle Size Distribution Results

Location	Donth (m)	Fine M	laterial	Coarse Material		
Location	Depth (m)	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	
· · ·		Burra Creek				
BCN-BH01	1.3-1.65	29	25	21	25	
	4.9	6	9	31	-	
BCN-BH02	0.7-1.1	8	9	11	-	
	1.5-1.75	9	4	5	1	
	1.0-1.45	43	39	18		
	3.0-3.45	20	56	24	-	
BCN-BH03	4.5-4.95	1	5	85	-	
	6.0-6.45	37	61	2	-	
		Nyah				
NN-BH01	1.9-2.15	46	50	4	-	
NN-BH02	1.0-1.45	27	58	15		
NS-BH01	1.5	27	28	45	-	
NNTP04	1.5	56	39	5	-	
Nyah- Murray River Bank 500m South-East of Sill 3.	River Bank	9	7	3		
· · ·		VInifera				
VS-BH01	3.5	17	10	69	4	
	4-4.45	5	9	40	1	
VS-BH02	1.5-1.9	9	6	4	-	
VSTP05	0.0 - 2.0	23	13	60	4	
VSTP07	0.7-1.3	47	44	9	-	
VSTP12	0.6-1.5	9	4	6		
· · ·		External Borrow Site	s			
Calcrete pit, Piangil		8	15	35	42	
Terry Benfield Property	N/A	38	23	38	1	
Shane Coburn Farm		38	36	26	-	

## Table 5-4 Summary of Standard Compaction Results

Location	Depth (m)	Field Moisture Content (%)	Maximum Dry Density (t/m³)	Optimum Moisture Content (%)
NNTP04	1.5	20.7	1.51	24.0
VSTP05	0.0 - 2.0	10.1	1.67	16.5
Calcrete pit, Piangil		3.7	1.94	12.0
Terry Benfield Property	N/A	5.7	1.66	18.0
Shane Coburn Farm		6.8	1.54	19.5

## Table 5-5 Summary of Shrink-Swell, Unconsolidated Undrained

Location	Depth (m)	Moisture Content (%)	Dry Density (t/m³)	Shrink-Swell Index (Iss) (%)	Undrained Shear Strength (kPa)
BCN-BH02	0.7-1.1	13.8	1.73	2.7	-
BCM-BH02	1.5-1.75	19.2	1.76	-	356
NN-BH01	1.9-2.15	23.4	1.59	-	151
	4.3-4.7	18.4	1.72	-	114
VS-BH02	1.5-1.9	19.9	1.68	-	548
	0.8-1.25	16.4	1.63	1.4	-
VS-BH03	3.0-3.25	15.6	1.83	-	397



## 6. Site Conditions

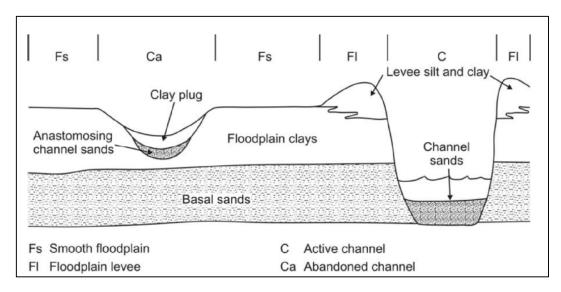
## 6.1 Summary of Geology

**Figure 3** is taken from Jacobs (2014a) – "Geology Study Report". It helps place the floodplain land units in a geological stratigraphic context for the sites being assessed in this report.

In geological terms "Floodplain Clays" and "Clay plug" are inferred to be of the Coonambidgal Formation, while "Basal sands" are inferred to be Monoman Formation sands.

"Levee silt and clay" and "Channel sands" are inferred to be recent River Deposits.

Other deeper geological units are not shown.



# Figure 3 - Relationship between stratigraphic units, geomorphic units, and surface materials in the area between Wakool Junction and the southern boundary (Clarke et al 2008)

The relationships between the geological formations and soil types encountered in this investigation is presented in **Figure 4** and descriptions of the materials encountered in each of the geological formations is summarised in Section 6.2.

## 6.2 Site Stratigraphy

The following section provides a description of the stratigraphic formations that were identified as part of the geological desktop study. The materials encountered during geotechnical investigations were generally consistent with these formations.

## **Recent floodplain deposits**

This has formed within the period of European settlement or after the main floodplain silty clay sediment was laid down, within the last few thousand years. These soils tend to be shallow intermittent surface layers of mixed material types including thin layers of sands, sandy clays to clays. This layer, where present, is typically between 0.1 to 0.2m thick.

More commonly, the floodplain comprises up to approximately 0.2 m of the Coonambidgal formation as the surface layer.



### **Connambidgal Formation**

This formation is understood to have the following depositional phases:

- Whole coloured grey to brownish grey, clay phase
- Mottled clay phase
- Sandy clay to clayey sand phase

The Coonambidgal formation is further divided according to soil type and topographic location by Skene and Sargeant (1966). The subdivisions include:

- Donnington clay
- Fish Point clay
- Speewa clay
- Swan Hill clay
- Unit G
- Types 1 to 5

These subdivisions are discussed in relation to the project sites in Jacobs (2014a).

#### **Monoman Formation**

This is a sandier geological unit than the overlying Coonambidgal formation and indicates a higher flow regime, or at least intermittent high flows depositing sand, where the clay component of river sediment (that is characteristic of the younger Connambidgal Formation) was largely flushed out to sea in suspension.

This sand may be related to the prior stream activity recorded elsewhere in the Murray Darling Basin where coarse to medium sands were the dominant channel fill in incised streams of various tributary rivers.

It is thought this was during glacial periods, when extensive snowmelt on the highlands caused floods to occur in spring or summer months. This would generally date to periods older than 12,000 years (or 12ka) and younger than 110,000 years (or 110ka) as presented in Page et al. (1991, 2009). These older sands have had time to consolidate and potentially become cemented as discussed below.

#### **Blanchetown Clay**

This unit was encountered in Burra test pits BC-TP02 and BC-TP03 near structure B1. It was also intersected in boreholes BH02, BH05 and BH06 in Aitken Rowe (2012). The depth of intersection of this unit was between 2.1m and 6.2m below floodplain surface. It acts as an impervious layer (aquaclude) trapping groundwater in the underlying Loxton-Parilla Sands throughout the lower Murray-Darling Basin.

#### **Loxton-Parilla Sands**

This unit was not encountered in the investigation test pits but was intersected in boreholes BH05 and BH06 (from Aitken Rowe, 2012) at regulator site V3. This unit, and the overlying Blanchetown clay, was encountered there because this regulator is near to the floodplain edge where older sediments are exposed in the original Murray River trench sides. These sands are the major source of regional deeper groundwater, including saline input into the Murray River and tributaries elsewhere, where this formation is shallowed by faulting and folding.

Table 6-1, Table 6-2 and Table 6-3 present summarises of the inferred stratigraphy in each of the test pits excavated as part of this investigation.

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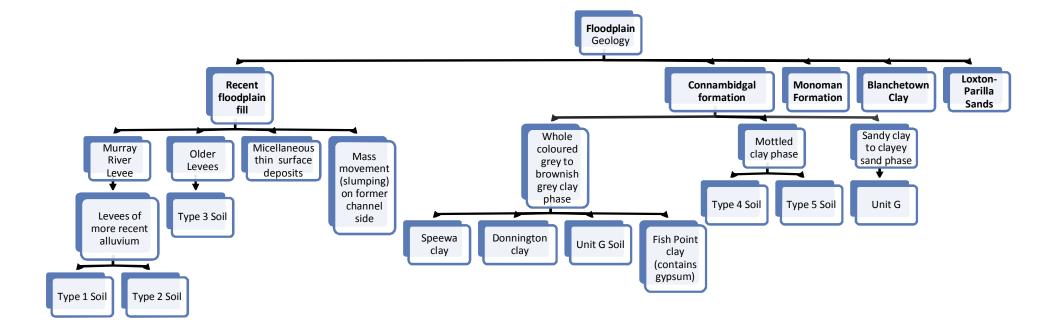


Figure 4 - Flow chart of association of the soils and sediment layers



## 6.3 Site Stratigraphy

The following section provides a description of the stratigraphic formations that were identified as part of the geological desktop study. The materials encountered during geotechnical investigations were generally consistent with these formations.

#### **Recent floodplain deposits**

This has formed within the period of European settlement or after the main floodplain silty clay sediment was laid down, within the last few thousand years. These soils tend to be shallow intermittent surface layers of mixed material types including thin layers of sands, sandy clays to clays. This layer, where present, is typically between 0.1 to 0.2m thick.

More commonly, the floodplain comprises up to approximately 0.2 m of the Coonambidgal formation as the surface layer.

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- Mottled clay phase
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- Fish Point clay
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- Swan Hill clay
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These subdivisions are discussed in relation to the project sites in Jacobs (2014a).

#### **Monoman Formation**

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This sand may be related to the prior stream activity recorded elsewhere in the Murray Darling Basin where coarse to medium sands were the dominant channel fill in incised streams of various tributary rivers.

It is thought this was during glacial periods, when extensive snowmelt on the highlands caused floods to occur in spring or summer months. This would generally date to periods older than 12,000 years (or 12ka) and younger than 110,000 years (or 110ka) as presented in Page et al. (1991, 2009). These older sands have had time to consolidate and potentially become cemented as discussed below.

#### **Blanchetown Clay**

This unit was encountered in Burra test pits BC-TP02 and BC-TP03 near structure B1. It was also intersected in boreholes BH02, BH05 and BH06 in Aitken Rowe (2012). The depth of intersection of this unit was between 2.1m and 6.2m below floodplain surface. It acts as an impervious layer (aquaclude) trapping groundwater in the underlying Loxton-Parilla Sands throughout the lower Murray-Darling Basin.

#### **Loxton-Parilla Sands**

This unit was not encountered in the investigation test pits but was intersected in boreholes BH05 and BH06 (from Aitken Rowe, 2012) at regulator site V3. This unit, and the overlying Blanchetown clay, was encountered there because this regulator is near to the floodplain edge where older sediments are exposed in the original



Murray River trench sides. These sands are the major source of regional deeper groundwater, including saline input into the Murray River and tributaries elsewhere, where this formation is shallowed by faulting and folding.

Test Pit	Depth From (m bgl)	Depth To (m bgl) (EOH = Base of test pit)	Formation	Layer	Comments
	0	0.3	-	Road Fill	
	0.3	1.2	Coonambidgal Formation	Swan Hill Clay	
BC TP01	1.2	2.4 Type 4 & 5 Soil			
	2.4	2.7+	Recent flood plain deposit- Channel sands	Sand	
BC TP02 (Creek bed about 2.3m below floodplain)	0	0.3	Blanchetown Clay	Dense mottled clay	Near to edge of floodplain where former river meander incised into the below formations.
· · ·	0	1.0	Coonambidgal Formation	Swan Hill Clay	
BC TP03	1.0	1.4	Recent flood plain deposit- Channel sands	Sand	
	1.4	1.7		Mottled Clay	
	1.7	2.3 EOH	Blanchetown Clay	Dense mottled clay	
BC TP04	0	1.05 EOH		Swan Hill Clay	
	0	0.15	Coonambidgal Formation	Levees of more recent alluvium (Type 3 soil)	
BC TP05	0.15	1.0		Mottled clay phase	
	1.0	1.5 EOH		Clayey Sand	
				Levees of more recent	
BC TP06	0	0.15	Coonambidgal Formation	alluvium (Type 3 soil)	
	0.15	1.9 EOH		Swan Hill Clay	
BC TP07	0	0.8	Coonambidgal Formation	Swan Hill Clay	
	0.8	1.205 EOH	Blanchetown Clay	Mottled clay	
BC TP08	0	0.15	-	Road Fill	
	0.15	1.0 EOH	Coonambidgal Formation	Speewa Clay	Old cut-off channel fill
BC TP09	0	0.2	Coonambidgal Formation	Levees of more recent alluvium (Type 3 soil)	Thin levee deposit of the present Murray River
Donios	0.2	1.0 EOH	Coonambiagari ormatori	Swan Hill Clay	Brown lower horizon characteristic
	0	0.2	Os an ann hidead Eann atian	Levees of more recent alluvium (Type 3 soil)	Thin levee deposit of the present Murray River
BC TP10	0.2	1.0 EOH	Coonambidgal Formation	Speewa Clay	Dark clay, no mottle above 1m
	0	0.35		Levees of more recent alluvium (Type 3 soil)	Thin levee deposit of the present Murray River
BC TP11	0.35	1.0 EOH	Coonambidgal Formation	Speewa Clay	Dark clay, no mottle above 1m
	0	0.7	Engineered Levee Fill	Clay (see test pit log)	Artificial levee for irrigation channel
BC TP12	0.7	2.3	Coonambidgal Formation	Speewa Clay	Dark clay, no mottle above 1m. Old channel fill.
	2.3	2.7 EOH	Blanchetown Clay	-	Indicated by reddish grey mottles
	0	1.6	Engineered Levee Fill	Clay (see test pit log)	Artificial levee for irrigation channel
BC TP13	1.6	2.7 EOH	Coonambidgal Formation	Speewa Clay	Dark clay, no mottle above 1m
		Far	Southern End – near Tooley	buc	
	0		Road fill	Clay	Northern end of culvert
BC TP14	0	0.2 2.7 EOH	Coonambidgal Formation	(see test pit log) Speewa Clay	near gate
BC TP15	0	0.1	Present creek bed sediment	-	Sandy
	0	0.3	Road fill	Clay (see test pit log)	Nar southern end on culvert
	0.3	0.7		Donnington clay	Brown clay, no mottles
BC TP16	0.7	2.8 EOH	Coonambidgal Formation	Fish Point Clay	Contains gypsum crystals below 2.6m. May be drying phase of ancient cut-off lagoon or lake. Possibly top of Blanchetown clay.

Table 6-1	Stratigraphy from	Test Pits	at Burra Creek
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Test Pit	Depth From (m BSL)	Depth To (m BSL) (EOH - Base of test pit)	Formation	Layer	Comments
	0	0.2			Alluvium layer of light brown silty sand.
NN TP01	0.2	1.2 EOH	Coonambidgal Formation	Type 4 soil	Grey brown and yellow brown mottled silty sandy clay. With carbonate nodules 0.7m Gilgai holes.
	0	0.4			Alluvium
NN TP02	0.4	1.0 EOH		Type 3 soil	Old surface - old meander channel fill.
NN TP03	0	0.2	Road fill		
NN TP03	0.2	0.4		Turne 2 seil	Mottled grey brown clay
INN TP03	0.4	1.0 EOH	Cooperation	Type 3 soil	Grey whole coloured clay
	0	1.8	Coonambidgal Formation		Mottled clay
NN TP04	1.8	2.0		Old Channel fill	Silt
	2.0	2.7 EOH			Mottled clay
NN TP05	0	0.2	Road fill		
	0.2	1.0 EOH		Type 3 soil	
NN TP06	0	1.2 EOH		Old Channel fill	Mottled clay
NN TP07	0	2.85 EOH	Coonambidgal Formation	Old Channel fill of Swan Hill Clay	Mottled clay. Excavator bucket refused at 2.85m (test pit abandoned).
NN TP08	0	1.0m EOH		Speewa clay	
NN TP09	0	0.2	Road fill	-	
	0.2	1.0 EOH		Swan Hill clay	Clay with red brown mottles
NS TP01	0	2.7 EOH	Coonambidgal Formation	Swan Hill clay	Reddish then yellow mottled clay
NS TP02	0	2.6 EOH		Swan Hill clay	Some layering.
NS TP03	0	0.3		Swan Hill clay	Creek bed between NS TP01 and 02.

## Table 6-2 Stratigraphy from Test Pits at Nyah

## Table 6-3 Stratigraphy from Test Pits at Vinifera

Test Pit	Depth From (m BSL)	Depth To (m BSL) (EOH - Base of test pit)	Formation	Layer	Comments
VN TP01	0	1.0m EOH		Speewa clay	Dark grey clay to 1m, no mottle.
	0	0.05		Topsoil	
VN TP02	0.05	1.6		Type 3 soil	Clay, mottled mid grey & yellow brown.
	1.6	1.8 EOH	Coorenaties Formation	(old levee)	Grey brown clay.
	0	0.3	Coonambidgal Formation	Topsoil	
VN TP03	0.3	1.2		Old levee deposit over Speewa clay	Clay, mottled grey brown and yellow brown along cracks.
	1.2	2.2 EOH		over Speewa clay	Clay, mid grey whole coloured
VN TP04	0	1.0 EOH		Speewa clay	
VS TP01	0	0.4	Fill		
V3 1P01	0.4	2.3 EOH		Speewa clay	Former channel fill
VS TP02	0	0.8		Type 5 soil	Mottled grey brown and red brown clay.
	0.8	2.7 EOH			whole coloured grey clay
VS TP03	0	0.3	Coonambidgal Formation	Creek bed	
	0	0.6		Unit G soils	Mottled grey and red brown clay.
VS TP04	0.6	1.0 EOH		(floodplain edge)	Sandy clay, grey and some red brown mottle with carbonate in cracks.
VS TP05	0	2.0 EOH	Fill	Regulator fill	
VS TP06	0	0.6	Coonambidgal Formation	Old channel fill	Silty sand dark with humus.
V3 1F 00	0.6	1.0	Coonambidgar i omfation		Sandy clay dark grey. Black



					clay at 1.0m.
VS TP07	0	1.5	Fill	Embankment Fill	Silty CLAY material generally, with a layer of sandy CLAY at 0.5-0.6m
	0	0.2		Topsoil	
VS TP08	0.2	1.7		Type 5 soil	Silty CLAY, grey. Roots observed to 0.7m depth
	0	0.2		Topsoil	
VS TP09	0.2	1.6		Type 5 soil	Silty CLAY, grey. Roots observed to 0.7m depth
VS TP10	0	0.4		Topsoil	
VSTPTU	0.4	1.5		Speewa clay	Silty CLAY, refusal at 0.7m
	0	0.4		Topsoil	
VS TP11	0.4	1.7	Coonambidgal Formation	Speewa clay	Silty CLAY, brown grey, becoming orange, grey
VS TP12	0	0.4		Topsoil, Creek Bed	Creek bed
V3 1P12	0.4	1.5		Speewa clay	stiff Silty CLAY, brown becoming dark grey
VS TP13	0	0.1		Topsoil	
VO 1713	0.1	1.6		Speewa clay	Silty CLAY, grey, brown
	0	0.2	]	Topsoil	
VS TP14	0.2	1.4		Speewa clay	Silty CLAY, brown becoming dark grey

## 6.4 Cemented Horizons

Geological and soil studies throughout the region have recorded hardened and cemented soil horizons due to the precipitation of iron oxides, calcium sulphate (gypsum), silica (hardpans and silcrete) and carbonates (calcrete, bush limestone).

The CPT and test pit investigations have revealed two intermittent cemented horizons. A shallow horizon was encountered at approximately 2.6 and 3.0m and a deeper horizon was encountered between approximately 5.6 m and 7.5 m.

Cemented material was inferred from either refusal of the excavator bucket or refusal of the CPT probe. Harder (but not cemented) horizons were inferred from a sharp increase in the CPT cone resistance. The cemented and semi-cemented layers inferred from the CPT testing are summarised in Table 6-4 below.

## Table 6-4 Cemented and semi-cemented layers inferred from CPT testing

Location		Final CPT		CEMENT	ED LAYERS	HARDENED (Semi-cemented) LAYERS		
	Structure	СРТ	Depth (m bgl)	Deep Refusal Depth (m bgl)	Shallow Refusal Depth (m bgl)	Deeper Denser Layer (m bgl)	Shallow Denser Layer (m bgl)	
	B1	BCN-CPT01	6.22	6.22	-	-	2.6	
		BCN-CPT02	2.96	-	2.96	-	-	
Burra	B2	BCN-CPT03	8.80	-	-	-	3.54	
Creek		BCN-CPT04	8.75	-	-	6.94	2.29	
	B4	BCS-CPT01	8.84	-	-	6.97	3.75	
		BCS-CPT02	8.77	-	-		1.47	
	N1a	NN-CPT01	2.62	-	2.62	-	-	
	N1b	NN-CPT02	5.81	-	-	-	-	
Nyah	N2	NN-CPT03	6.95	6.95	-	-	-	
		NN-CPT04	7.13	7.13	-	-	-	
		NS-CPT01	5.76	5.76	-	-	-	
Vinifera	V1	VN-CPT01	5.52	-	-	-	-	



V2	VN-CPT02	8.40		-	5.9	-
V3	VS-CPT01	7.47	7.47	-	2.9	0.7
	VS-CPT02	5.61	5.61	-	-	-
	VS-CPT03	7.45	7.45	-	4.4	3.5
V4	VS-CPT04	5.45	5.45	-	-	1.1

## 6.5 Groundwater

Perched groundwater tables appear to be related to these cemented or denser horizons. The water table was deeper than the depths investigated as part of the test pit investigations and was only encountered during the CPT and borehole investigations.

The groundwater level was measured after each of the boreholes were drilled where possible. No groundwater was encountered in the boreholes drilled at the regulator structure locations at Nyah and Vinifera. A summary of the groundwater observations at Burra Creek in terms of groundwater elevation and depth to groundwater are summarised in Table 6-5.

#### Table 6-5 Summary of Groundwater at Burra Creek

Test Pit ID	Proposed Structure	Approximate borehole Surface Elevation (m AHD)	GW Depth (m bgl)	GW Elevation (m AHD)	Final Borehole Depth (m bgl)
BCN-BH01		56.6	4.7	51.9	10.0
BCN-BH02	B1	56.8	5.2	51.6	10.0
BCN-BH03		56.2	4	52.2	8.0
BCN-BH04	Burra Drop Structure	56.0	5.6	50.4	6.5
BCM-BH01	B2	59.0	Not Encountered	Not Encountered	8.0
BCM-BH02		58.6	6.3	52.3	8.0
BCS-BH01	B4	61.9	Not Encountered	Not Encountered	8.0

## 6.6 Soil Erosion

Soil tunnel erosion was observed among gilgai depressions near and throughout the northern half of the Nyah floodplain.

Figure 5 presents a photograph of the surface appearance of a "crabhole" gilgai near test pit NNTP01, which indicates dispersive and expansive soil.

Emerson Class results for the natural clay soils ranged from 2 to 5 when tested with distilled water (analogous to rain water) which indicates these soils have potential for dispersion in their existing and remoulded states. The clay soils typically exhibited less potential for dispersion when tested with water from the Murray River.

As the clay soils exhibit dispersive characteristics, these properties should be considered in design and construction to avoid piping under the constructed bank and regulator structures.

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Figure 5 - Soil Tunnel Erosion at Nyah North



## 7. Structures and Banks

## 7.1 General

The following points should be considered for the sites where new banks and structures are proposed.

- **Uncontrolled fill:** Uncontrolled fill forms the majority of the existing access track embankments at the proposed structure locations and it is assumed all such material will be removed during construction.
- **Soil profile:** The soil profile at each site varies. Descriptions of each site in the proceeding sections, as well as test pit and borehole logs should be referred to.
- **Reactive / expansive clays:** Samples collected at site had a Liquid Limit range of results between 23% and 62%. Fissuring was noted in the high plasticity clay profile within the test pits, which indicates a potentially expansive clay soil profile. Expansive clays are more prone to wet-dry cracking and expansion.

**Dispersive soils:** The clay soils exhibited dispersive properties as outlined in Section 6.6. The clay soils were typically dry of optimum moisture content (OMC) which indicates moisture conditioning (wetting), as well as an appropriate level of compaction is required during preparation of the bank and structure foundations, as dry soils are generally more prone to dispersion. It is also recommended that a crest capping layer of granular (non-plastic) material should be included to protect against moisture loss and the development of crest surface cracking, which could act as a pathway for piping to initiate. Further measures should be considered during design of structures to prevent piping, including the use of cut-offs and filters.

Proper construction techniques to reduce the likelihood of piping should also be adopted, including; foundation excavation inspections and preparation, involving removing any desiccation cracking, defects, sand layers, proper moisture conditioning and compaction.

- Cemented / hard layers: Relatively shallow CPT and borehole refusal occurred at several locations, which
  may indicate cemented soil horizons (as discussed in Section 6.4). This should be considered for any
  proposed excavation or sheet piling at these locations.
- Borrow materials: An initial limited investigation of external borrow sources indicates the clay material
  tested is considered suitable for use for construction of banks subject to appropriate moisture conditioning
  and compaction control.

Following discussions with landowners, it is recommended that a further borrow source investigation and laboratory testing is undertaken at each proposed borrow site, in order to determine the quantity and characteristic properties of materials and mark out the extent of boundaries of suitable materials for construction use.

• **Groundwater:** Groundwater was encountered during the borehole and CPT investigations as noted in Section 6.5 and based on the recorded groundwater depths it is not anticipated groundwater will impact construction of the proposed structures, although groundwater levels may rise following periods of prolonged rainfall or inundation. It is assumed that coffer dams or other surface water control measures will be implemented during construction of any on-stream structures.

## 7.2 Burra Creek

## 7.2.1 Banks

The existing access track embankments consist of fill material, which is to be removed as part of construction.

The underlying natural soil profile across the Burra site generally comprises topsoil observed up to 0.35m deep, overlying medium to high plasticity clay soils (silty/ sandy clays) of stiff to hard consistency, with layers of dense clayey SAND in some areas. Fissuring and slickensides were generally observed in clay material, as well as roots were observed in some test pits.



The clay soils exhibited dispersive properties when tested with distilled water. Soils typically exhibited less potential for dispersion when tested with water from the Murray River. The clay soils were typically dry of optimum moisture content (OMC) which indicates moisture conditioning (wetting) is required during preparation of the foundation.

The concept design cost estimates should include allowance for stripping of topsoil and bulk excavation of fill material.

## 7.2.2 Regulator Structures

## **Structure B1**

The soil profile at B1 structure location is shown on cross section- Figure E1 provided in Appendix E.

In general the founding soils are expected to comprise stratified alluvial sandy soils with a silty clay capping.

The subsurface materials at the B1 structure site generally comprise:

Unit	Material Type	Consistency	Depth Range (m)		
			BCN-BH01	BCN-BH02	BCN-BH03
1	Access track Fill: Silty CLAY, with fine sand.	Very stiff	0 to 0.3	0 to 0.3	-
2	Silty CLAY to sandy CLAY, intermediate to high plasticity.	Stiff to very stiff	0.3 to 6.4	0.3 to 4.5	0 to 2.5
3	Clayey SAND to SAND with clay, or silty SAND/ sandy SILT. Fine to medium grained sand, low plasticity fines.	Medium dense to dense	6.4 to 9.2	4.5 to 9.8	2.5 to 8.0
4	Sandy CLAY intermediate plasticity, fine grained sand.	Stiff	9.2 to 10.0	9.8 to 10.0	-

'-' Not Encountered

The ground conditions encountered show that, the B1 structure foundations will sit on Silty CLAY to sandy CLAY material (Unit 2). This is the case, given that the existing access track embankment will be excavated out to form the foundation base.

Underlying Unit 2 are layers of clayey SAND to SAND with clay (Unit 3), which is prone to foundation backward erosion piping. It is therefore recommended that sheet piles are installed to act as a foundation seepage cut-off.

It is also recommended that the sheet piles extend through the B1 structure embankment to above the design water level. This measure is recommended to act as a barrier to piping erosion through the embankment; particularly given that the type of construction materials available may be moderately dispersive.

It should be noted that CPT refusal was encountered at a depth of 2.96m (RL 53.7) at location BCN-CPT02 and this may be indicative of a cemented horizon, which could act to be restrictive for driving of sheet piles at this location.

A tri-axial test; Consolidated Undrained test with pore pressure measurements, was undertaken to assist in the determination of drained design parameters, for assessing the structure in sliding stability. The results of the



test are presented in Appendix D. It should be noted that the test confining pressures were higher than might be expected for the structure on site.

#### **Structure B2**

The geotechnical investigations were conducted on the alignment of the existing embankment, which crosses the existing creek bed, as well as on the existing approach track. The investigations consisted of:

- Two Test Pits, 2.7m and 2.8m, located on the approach track
- Two CPT's to 8.8m and 8.75m located on the bank
- Two Boreholes to 8.0m located next to the CPT's

The boreholes and test pits showed that the existing embankment, consisted of uncontrolled fill (silty sandy clay) with at least 2.8m depth of this material encountered at test pit BCTP13.

The natural soil profile can be inferred from boreholes BCM-BH01 and BCM-BH02 to comprise very stiff, high plasticity silty clay.

Groundwater was encountered at a depth of 5.4m in borehole BCM-BH02 during the investigation, with no groundwater encountered in borehole BCM-BH01 over the same period.

## Structure B4

The soil profile at structure B4 comprises very stiff to hard, medium plasticity silty clay overlain by 0.3m of uncontrolled clayey silt fill as presented in borehole BCS-BH01.

The test pits and CPT probes performed at this location also indicated an upper profile of potentially sandy material (fill/natural) to an approximate depth of 1.5m. No groundwater was encountered during the investigation period.

The concept design cost estimates are to allow for bulk excavation of the potentially sandy material as well as stripping of topsoil.

#### 7.2.3 Drop Structure

Borehole BCN-BH04 was drilled at Burra drop structure, at a location as shown in Appendix A. A photograph of the borehole setup location is also shown in Appendix B.

The borehole indicates that the soil profile to approximately 4.5 m depth generally consists of stiff sandy CLAY/ silty CLAY of low to intermediate plasticity, dry to moist. Below this the soil is variable, with layers of soft to firm silty CLAY and loose wet SAND encountered below the water table at 5.6m depth (RL 50.4). A laboratory test taken on a sample at 1.0-1.45m depth in BCN-BH04, had an Emerson Class 5, which indicates less erodible characteristics.

## 7.3 Nyah

#### 7.3.1 Banks

#### Main Bank: between high ground at Sill 1 to high ground at Sill 3

Based on the results of the test pit investigations we expect that the proposed banks for Nyah will be founded on natural clay soils (silty/sandy clays) of high plasticity generally of stiff to very stiff consistency.



Some fill material was encountered at several locations. The fill typically comprised road base or previous embankment fill up to 0.2m deep. Topsoil material (silty sand) up to 0.2m deep was also encountered at several investigation locations.

At Nyah North, large erosion holes were noted adjacent to test pit NNTP01 as discussed in Section 6.6, with this being indicative of potentially highly dispersive soils.

The concept design cost estimates should include allowance for stripping of topsoil and bulk excavation of fill material. During detailed design, consideration will need to be given to the treatment of dispersive soils or incorporation of defensive design elements such as cut-offs and filters, to mitigate the risk of piping through the bank or structure foundations.

#### **Natural Levee adjacent to Murray River**

Along the top of the Murray River banks exists a naturally formed 'levee', or raised ground profile. Inherent to the concept design is the utilisation of this natural 'levee' to store water. Throughout most of the Nyah site this natural 'levee' is several meters, up to tens of metres thick. However within the Nyah site approximately 500m south-east of Sill 3, there exists a section (approx. 150m long) where the natural 'levee' is around 1 to 2m thick. A track was noted approximately 3m back from the natural 'levee' bank at this location.

A site inspection and field survey was undertaken at this thinner section of natural 'levee' in Nyah. A soil classification log of the Murray River bank and laboratory testing of samples was also undertaken at this location.

Results show that the river bank was near vertical and approximately 4m high to water surface at the time of investigation. Soils were; firm to stiff, Silty CLAY, low plasticity with trace fine sand. Eucalyptus tree roots were observed throughout the bank. For this thinner section of the natural 'levee' bank; it is recommended that a full height bank (design water level plus freeboard) is constructed set back from the natural 'levee' and ties into high ground either side, where the natural 'levee' is thicker.

## 7.3.2 Regulator Structures

### Structure N1a

The soil profile at structure N1a comprises firm to stiff silty clay of medium to high plasticity. A layer of soft clayey silt was encountered at a depth of 1.8m in test pit NNTP04 and this material should be removed if it is within the zone of influence of the structure foundations.

CPT refusal was encountered at a depth of 2.62m at location NN-CPT01 and this may be indicative of a cemented horizon, the CPT also indicates medium dense clayey sands and sands from approximately 3.5 to 4.8m depth.

During detailed design, consideration will need to be given to the potential impact of the layer of clayey silt on the proposed design. The proposed structure is relatively low height and the proposed clay seepage cut-off trench could be located to extend through this layer.

### Structure N1b

The soil profile at structure N1b comprises 0.2m of uncontrolled fill (road base), overlying firm to stiff silty clay of medium plasticity.

The concept design cost estimates should include allowance for stripping of topsoil and bulk excavation of fill material.



## Structure N2

The soil profile at structure N2 comprises 0.3m of uncontrolled fill (road base) overlying, stiff to very stiff silty clay of high plasticity. A layer of clayey sand of dense consistency was encountered at 7.0m depth.

The concept design cost estimates are to include allowance for stripping of topsoil and bulk excavation of fill material.

#### **Structure N5**

The soil profile at structure N5 comprises 0.9m depth of uncontrolled fill (road base), overlying very stiff to hard silty clay/ silty sandy clay of low to high plasticity. Borehole refusal was encountered at a depth of 3.8m at borehole NS-BH01 and this may be indicative of a cemented horizon.

The Aitken Rowe (2012) investigation undertook BH2 which was drilled near to the N5 structure site, to a depth of 6.0m without refusal. It showed a similar ground profile to that described above to a depth of 2.8m, which was shown to overlie material described as silty clayey SAND and sandy silty CLAY of medium dense and very stiff to hard consistency respectfully.

The concept design cost estimates are to include allowance for stripping of topsoil and bulk excavation of fill material.

### 7.3.3 Drop Structure

Borehole NN-BH02 was drilled at Nyah drop structure, at a location as shown in Appendix A. A photograph of the borehole setup location is also shown in Appendix B.

The borehole indicates that in the upper portion (top 4m depth); the soil profile, generally consists of stiff to very stiff sandy CLAY of low plasticity, dry to moist. The soil becomes variable below this, varying between soft to stiff silty CLAY and medium dense silty SAND. A laboratory test taken on a sample at 1.0-1.45m depth in NN-BH02, had an Emerson Class 5, which indicates less erodible characteristics.

## 7.4 Vinifera

## 7.4.1 Banks

### Vinifera North

The proposed banks for North Vinifera site will be founded on natural clay soils of intermediate to high plasticity, with the soil profile encountered at the test pit locations generally of stiff to very stiff consistency. Topsoil was observed up to 0.3m depth.

The concept design cost estimates should include allowance for stripping of topsoil and bulk excavation of fill material.

#### **Vinifera South**

The proposed bank for South Vinifera site (between V3 and V4 structures) will be constructed along the existing access track alignment.

Test pits show the soil profile generally consisted of topsoil 0.2 to 0.4m thick (noting that roots were observed to 0.7m deep in VS-TP9) overlying stiff silty CLAY of intermediate to high plasticity. Towards the V3 structure the access track runs along an existing inferred engineered fill embankment (fill placed and compacted in layers, as opposed to dumped fill).



Test Pit VS-TP07 was excavated through the existing embankment (on the South West side of the access track), and results showed the embankment consisted of silty CLAY and sandy CLAY of low to intermediate plasticity. DCP results showed the top 200mm of fill had 3 blows per 100mm, and below this between 6 to 15 blows per 100mm, indicating very stiff to hard consistency. Embankment materials were observed to be dry which makes the material more prone to dispersion and tests showed the material to have an Emerson Class 2 (dispersive) with both distilled and Murray River water.

It is recommended that:

- During construction phase further investigations are undertaken to assess the existing embankment's variability;
- Concept design cost estimates are to include contingency for replacement of sections of the bank if required;
- 3H:1V batters are constructed, requiring stripping, moisture conditioning and compaction of appropriate materials on embankment shoulders; and
- A well graded crushed rock capping layer of at least 150mm thick is placed on top of the embankment across its full width, to limit any possible desiccation cracking.

## 7.4.2 Regulator Structures

### **Structure V1**

The soil profile at structure V1 comprises, 0.3m of uncontrolled fill (road base), overlying; very stiff to hard clay of high plasticity.

The concept design cost estimates should include allowance for stripping of topsoil and bulk excavation of fill material.

### Structure V2

The soil profile at structure V2 comprises 0.3m of topsoil material (clayey), overlying; stiff to very stiff clay of medium to high plasticity. The CPT probe performed at this location (VN-CPT02) indicated medium dense to dense clayey sand / sandy clay soil at an approximate depth of 5.6m.

Further information on the soil profile at this location is also presented on the borehole log for BH4 in Aitken Rowe (2012).

The concept design cost estimates should include allowance for stripping of topsoil and bulk excavation of fill material.

#### Structure V3

Structure V3 is located at a creek bed. At this location there is an existing embankment that has been constructed approximately 2.5 to 3m high above natural ground level, at its highest point.

The ground profile at V3 structure is inferred from descriptions from boreholes VS-BH01 & BH02, and Aitken Rowe BH5 & 6, and generally consists of:

• **FILL:** Existing embankment fill at this location comprises uncontrolled fill including clay, sand and building rubble, of soft to firm consistency.

It has previously been reported that leakage through this embankment has been observed under high water levels. The extent of the uncontrolled fill is generally within the deepest sections; heading along the existing embankment towards the North, the embankment appears to become an engineered fill bank of stiff silty CLAY. This overlies;

 Clayey SAND, fine to coarse grained, dense, low to medium plasticity fines. This layer is shown in VS-BH01 and could consist of the base of the existing embankment fill. Overlying;



- Silty CLAY/ sandy CLAY, medium plasticity, firm to very stiff. This layer is within the natural ground profile and overlies;
- Silty Clayey SAND, fine to coarse grained with low plasticity fines. This layer is shown in Aitken Rowe BH5 & 6.

The concept designs should include provision for removal of the existing embankment and construction of a new embankment. The concept design should also provide for a foundation clay cut off that extends to a depth greater than the Clayey SAND layer observed in VS-BH01.

The 'Aitken Rowe 2012' Report shows that laboratory test results on samples taken of the Silty Clayey SAND layer observed in BH5 & 6 had fines content of 36-37%, liquid limits of 25-29% and Plasticity Index of 13-16%. Given this, it appears that the foundation would not likely be subject to backward erosion piping, which applies to cohesion less (non-plastic) soils.

### Structure V4

The soil profile at structure V4 comprises firm to very stiff clay of medium to high plasticity overlain by up to 0.4m of uncontrolled fill material (clay/clayey silt). The CPT probe performed at this location (VS-CPT04) indicates generally sandy clay between 0.5m to 2.0m depth.

The concept design cost estimates are to include allowance for stripping of topsoil and bulk excavation of unsuitable materials.

## 7.4.3 Drop Structure

The site of the drop structure at Vinifera consists of a dry natural channel that is approximately 3m deep near the confluence with the Murray River. Due to site access constraints, borehole VN-BH02 was not drilled at the channel invert, instead it was drilled on high ground to the immediate north side of the natural channel. The borehole location is shown in Appendix A. A photograph of the borehole setup location is shown in Appendix B.

The borehole shows that the soil profile generally consists of stiff to very stiff silty CLAY with sand, of low to intermediate plasticity, dry to moist. This becomes firm sandy CLAY, of intermediate plasticity and moist at a depth of 7m. A laboratory test taken on a sample at 1.5-1.95m depth in VN-BH02, had an Emerson Class 5, which indicates less erodible characteristics.

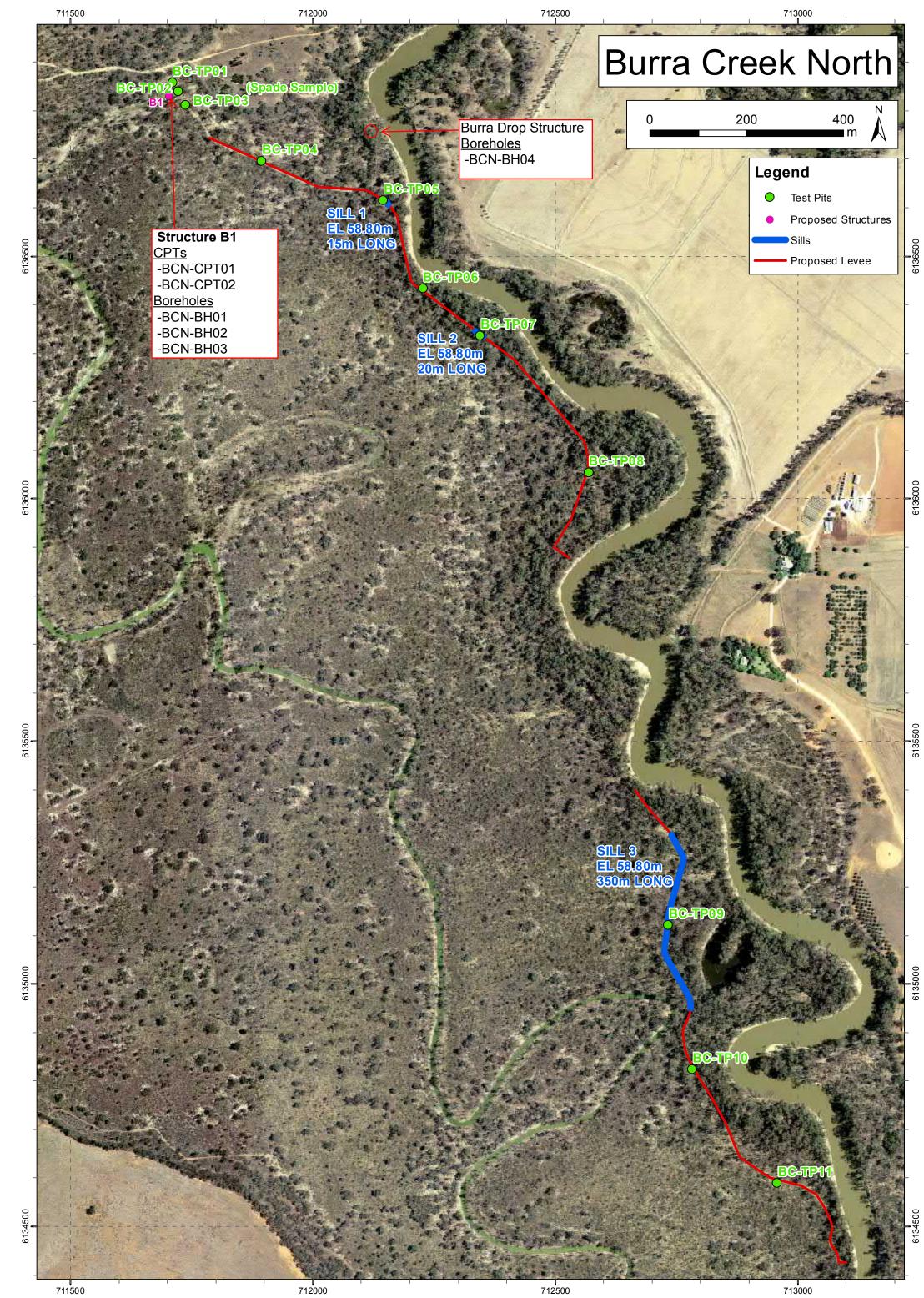


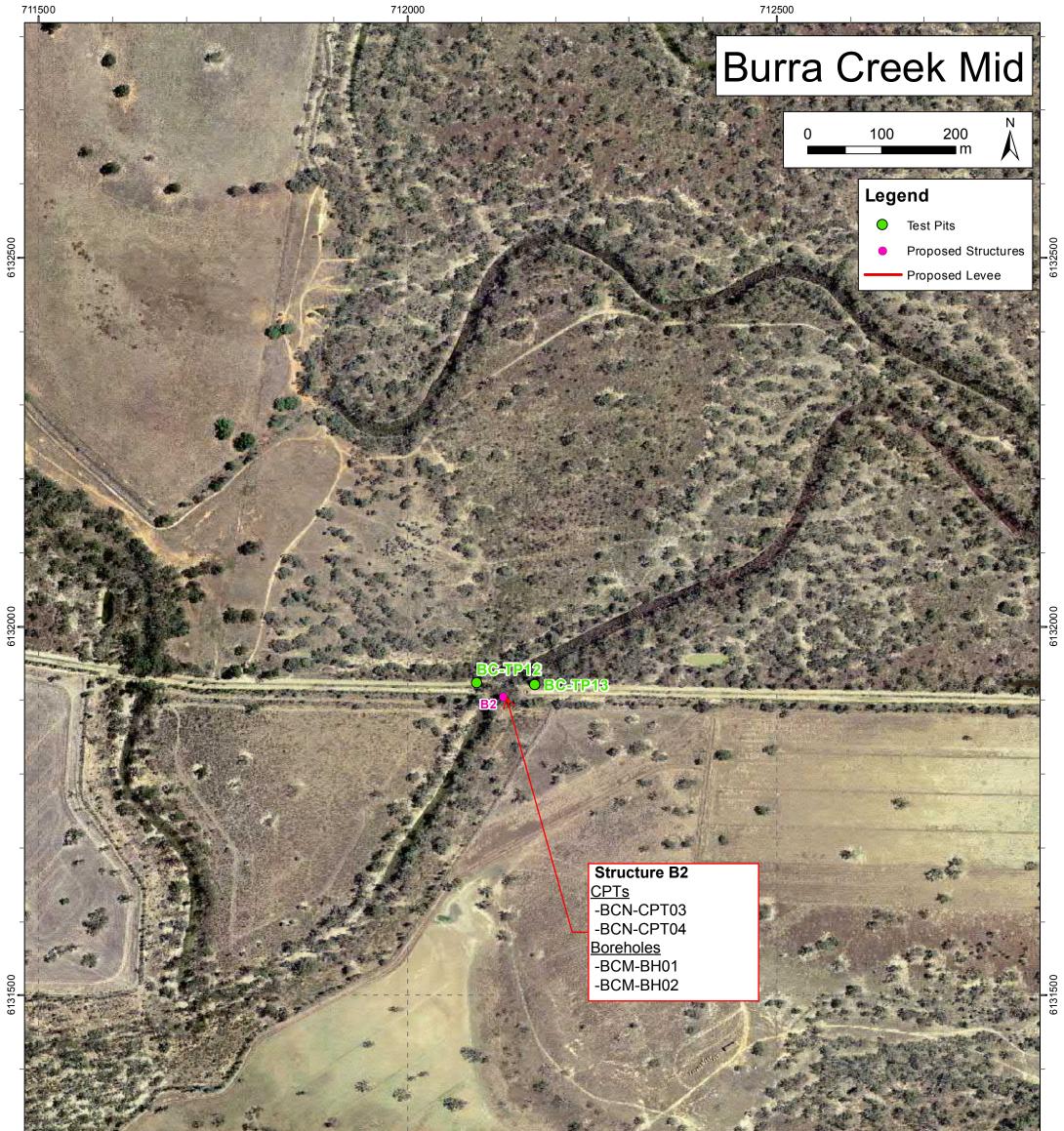
## 8. References

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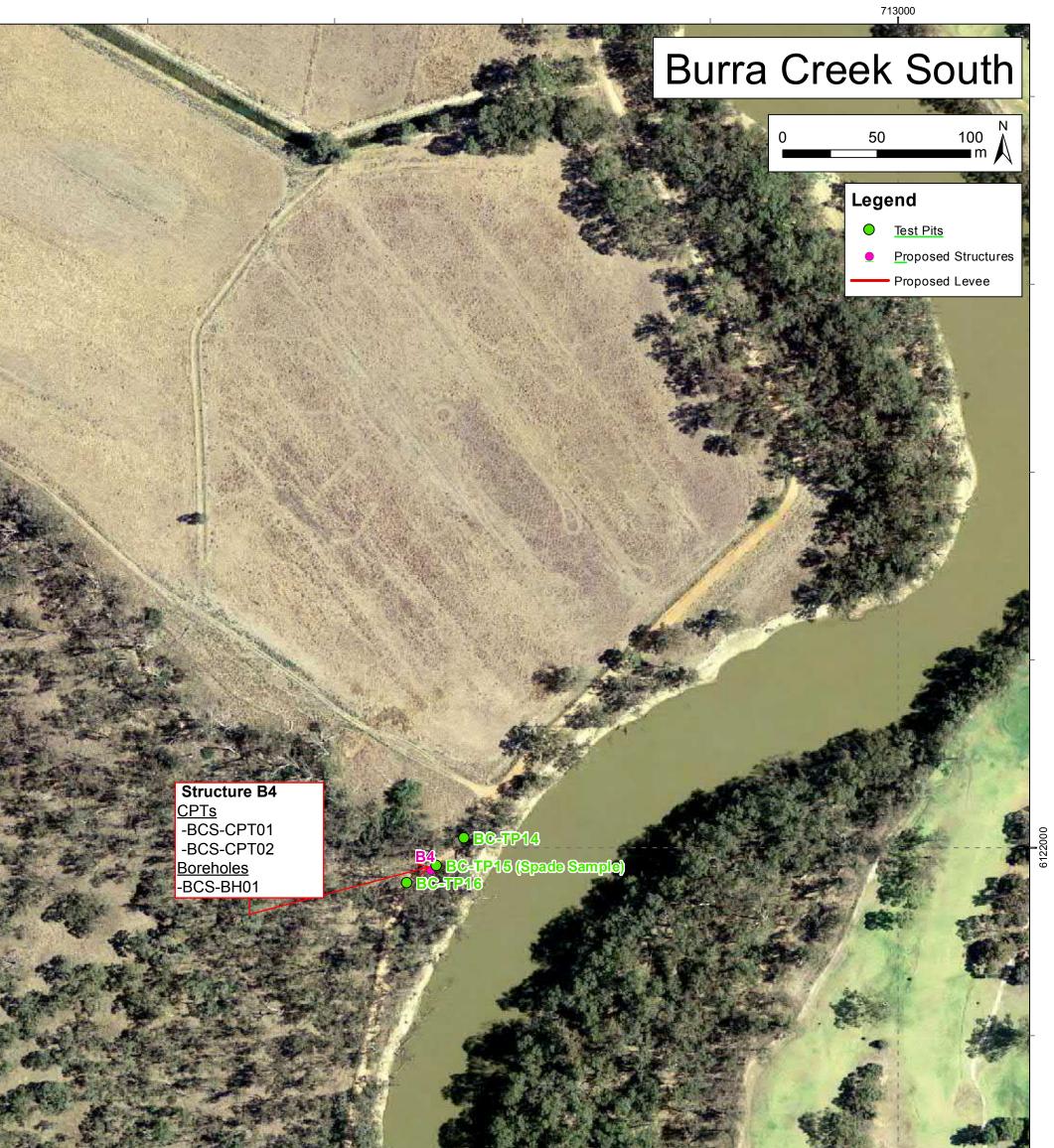


# Appendix A. Investigation Location Plans

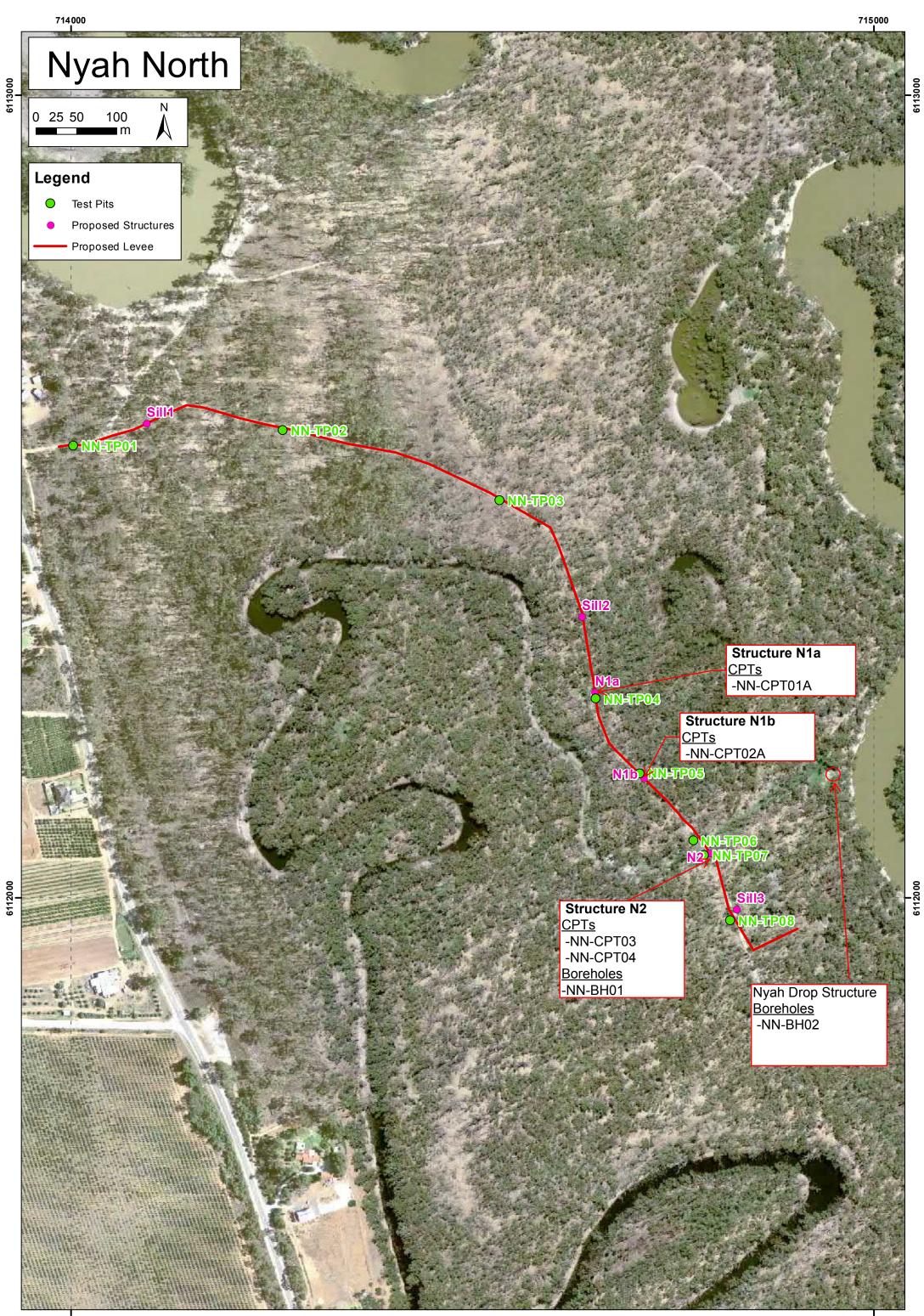




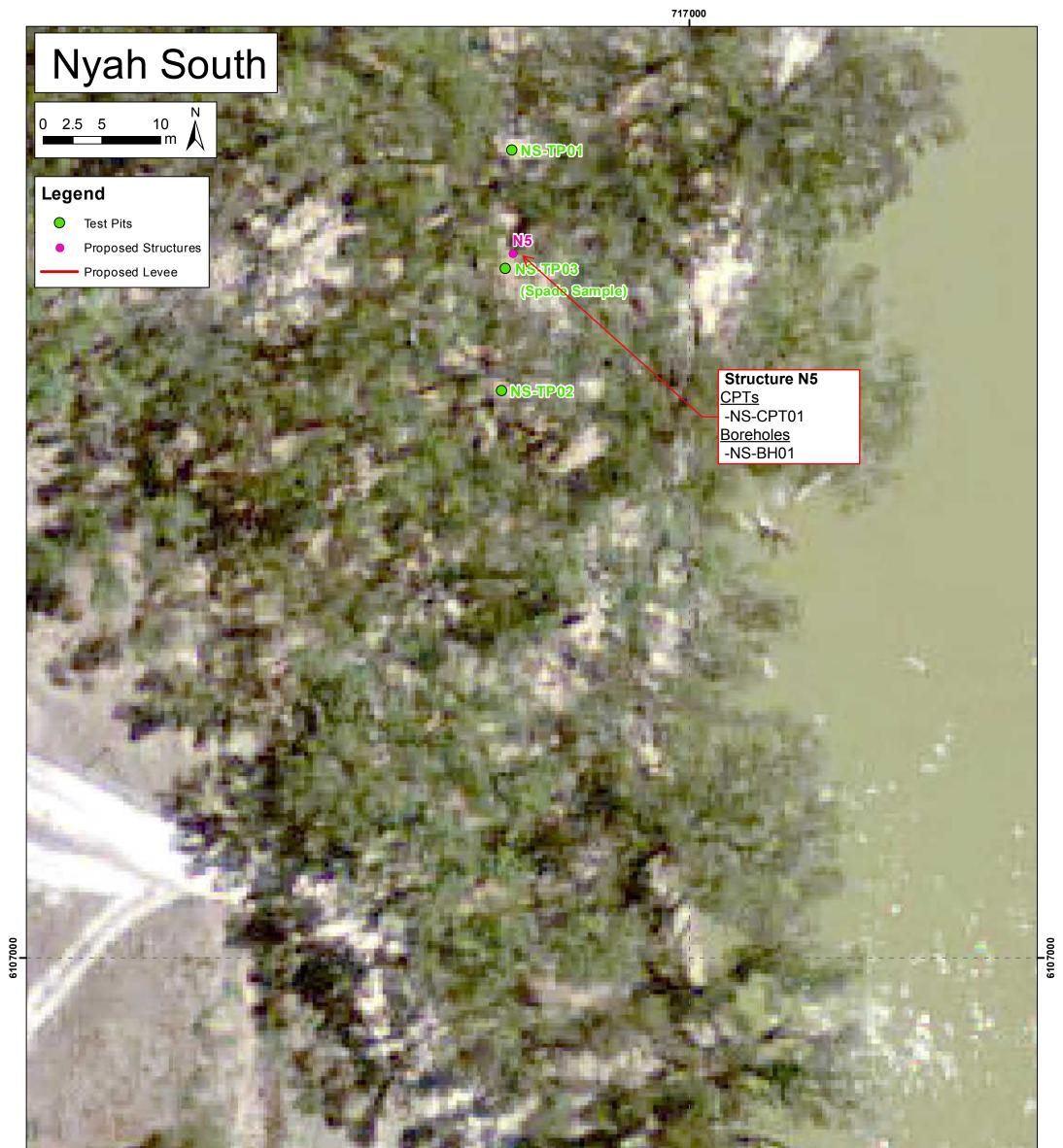






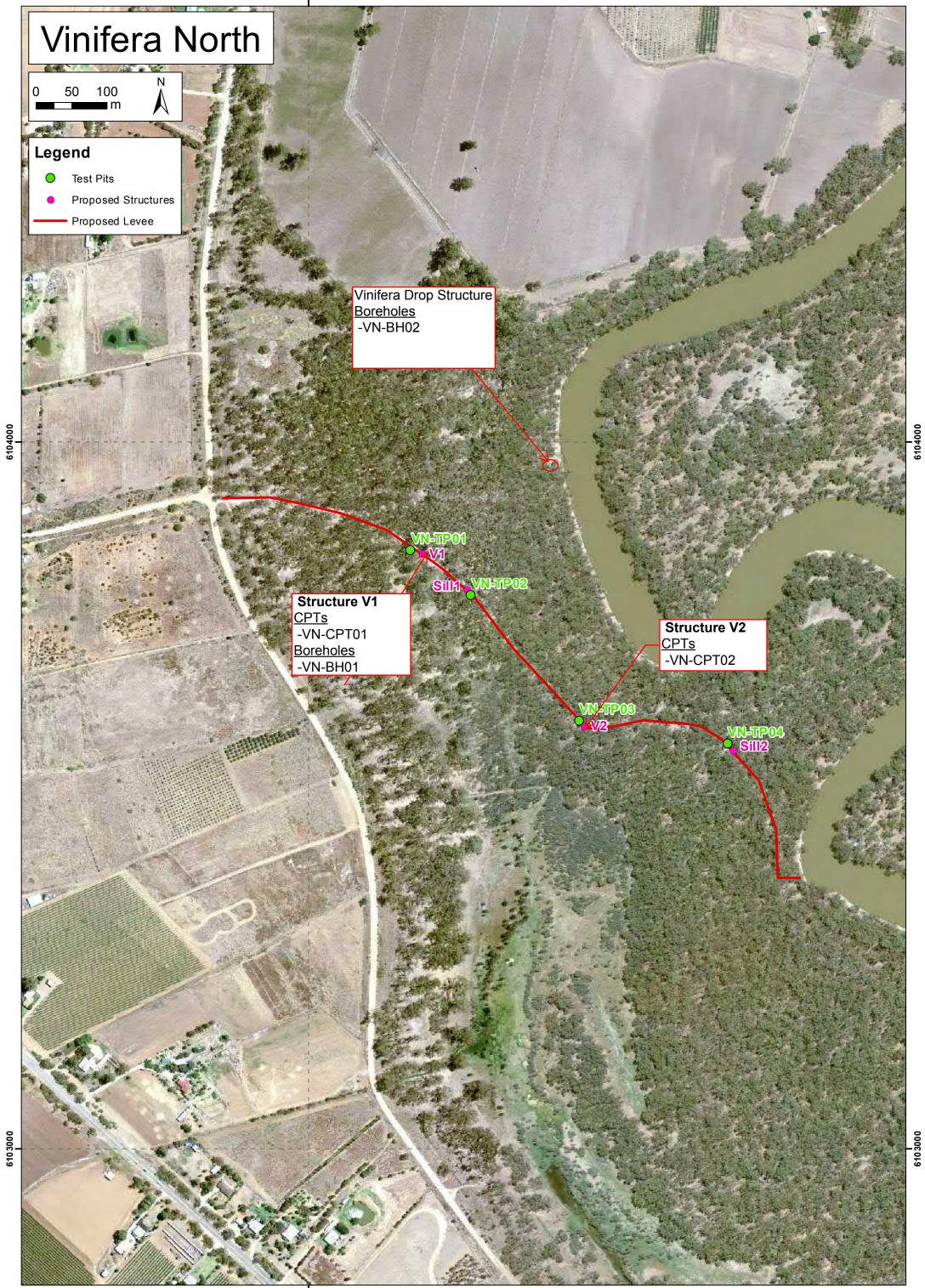




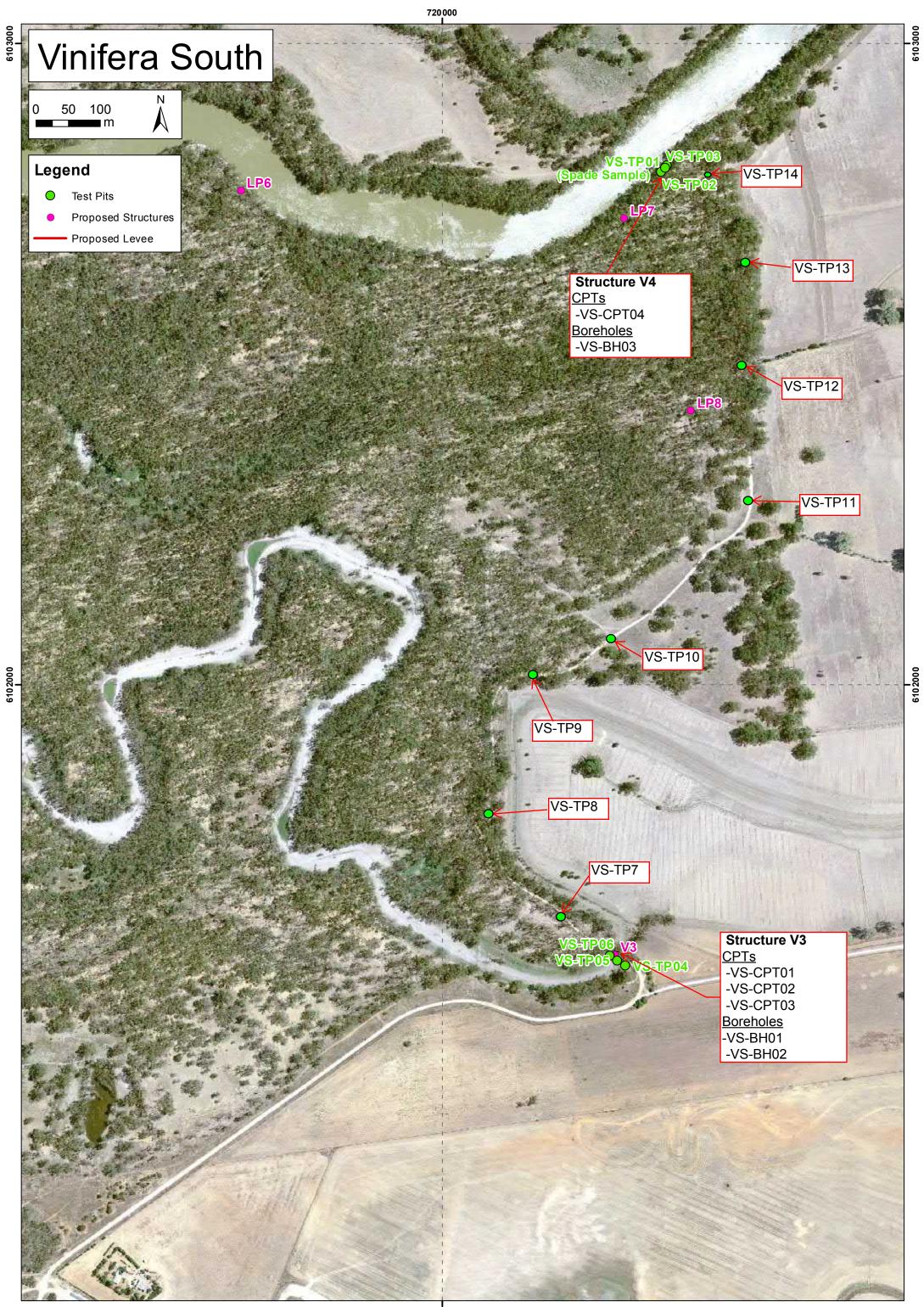






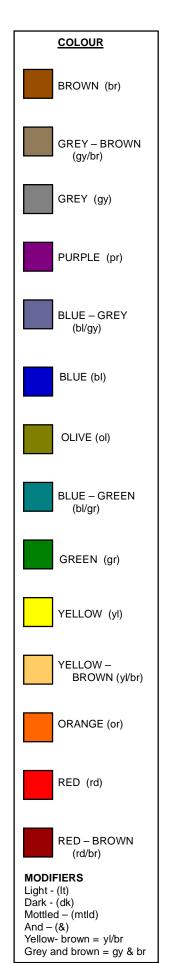








# Appendix B. Test Pit and Borehole Logs



## SOIL AND ROCK DESCRIPTION ABBREVIATIONS

Soil and rock descriptions on the logs are generally in accordance with the recommendations of AS1726. The order in which descriptions are provided on the logs is as follows:

#### SOIL:

SOIL TYPE (Unified Classification), colour, structure, particle characteristics, geological origin, other minor components. The consistency/density and moisture condition are listed as abbreviations in seperate columns.

#### ROCK:

ROCK TYPE (Degree of Weathering), colour, grain size, texture and fabric, structure, bedding dip and geological formation. A histogram of rock mass defect spacing and minor defect descriptions are listed under separate columns. Major defects are individually identified in the description column and shown on the graphic log as a single dashed lines for defects 10 to 100mm thick and as a seam between 2 dashed lines if > 100mm thick. The material in the seam is fully described.

Field tests are used to assess soil consistency, rock strength and grain size. Unless specifically stated otherwise, these assessments have been transferred directly to the record sheets and not modified. Descriptive terms used on the record sheets are explained on the following pages. Colour should be determined in the "moist" condition using the basic terms provided on the adjacent chart and black (bk) & white (wh). Abbreviations should be used for describing seams.

Other abbreviations used for field tests, consistency, density, strength, moisture condition and contaminant ranking are summarised at the base of the log sheets.

#### STRUCTURE

The structure of soil (or rock) is usually applicable to cohesive soils or rock. Typical terms used are; *intact* (no joints), *fissured* (closed joints), *voided* (confined to open joints), *slickensided* (sheared), *interbedded* (laminated) and *cemented*.

#### **GEOLOGICAL ORIGIN**

#### WEATHERED IN PLACE SOILS

Extremely weathered material Residual soil

#### TRANSPORTED SOILS

Aeolian soil Alluvial soil Colluvial soil Lacustrine soil Marine soil

#### FILL MATERIALS

Soil Fill Rock Fill Domestic Fill Industrial Fill Structure and fabric of parent rock visible Structure and fabric of parent rock not visible

Deposited by wind. Deposited by streams and rivers. Desposited on slopes (transported downslope) Deposited by lakes. Deposited in ocean, bays, beaches and estuaries.

Describe soil type, UCS symbol and add 'FILL'. Rock type, degree of weathering, and word 'FILL'. Percent soil or rock, whether pretrucible or not. Percent soil, whether contaminated, particle size & type of waste product, ie – brick, concrete, metal

### MOISTURE CONDITION

Term	Symbol		Description	
Term	Symbol	Cohesive Soils	Granular Soils	Rock
Dry	D	Cohesive; hard and friable or powdery, dry of Plastic Limit (PL)	Cohesion-less and free running	Dry on broken faces
Moist	М	Soil feels cool, darkened in colour, can be moulded, near PL	Soil feels cool, darkened in colour, tends to cohere	Rock is darkened, moisture on broken faces
Wet	w	Soil feels cool, dark, usually weakened, free water, >> PL	Soil feels cool, darkened in colour, tends to cohere	NA

### SHEET 1 SOIL AND ROCK DESCRIPTION ABBREVIATIONS

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SOIL AND ROCK DESCRIPTION
SOIL CLASSIFICATION

	(Excludi		D IDENTIFICATION PRC er than 60mm and basing	OCEDURES g fractions on estimated n	nass)	GROUP SYMBOLS	SYMBOL	TYPICAL NAMES	INFORMATION REQUIRED FOR DESCRIBING SOILS			LABORATORY CLASSIFICATION CRITERIA	A
5 mm	coarse 2.36mm	CLEAN GRAVELS (Little or no fines)		ze and substantial amoun s to bind coarse grains, no		GW	200 000	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name, symbol, indicate approximate % of sand and gravel,		e ained	$c_{\omega} = \frac{D_{60}}{D_{10}}$ Greater than 4 $c_c$	$= \frac{(D_{30})^2}{D_{10} x D_{60}}$ Between 1 & 3
than 0.075 r	ELS % of c	CLE GRA (Little fine		ze or range of sizes with nough fines to bind coa		GP	2°2°	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	max. size, angularity, surface condition, and strength of coarse grains: colour, amount plasticity of		size curv coarse gra	Not meeting all gradation requirements for G	W.
rger	2 2	GRAVELS WITH FINES (Appreciable amount of fines)	'Dirty' materials with ex strength	xcess of non-plastic fines,	zero to medium dry	GM		Silty gravels, gravel-sand-silt mixtures	fine component. For undisturbed soils add information on moisture content,		from grain 8mm size c Jiring	Atterberg limits below 'A' line or $I_{\rm p}$ less than 4	Above 'A' line with PI between 4
SRAINED SOILS than 63 mm is lar	More fraction	GRA) WITH (Appre amot						Ę	and sand 1 r than 0.06 V, SP M, SC cases requ	Atterberg limits above 'A' line with $I_{\rm p}$ greater than 7.	and 7 are borderline cases requiring use of dual symbols.		
COARSE GRAINED SOILS aterial less than 63 mm is la	arse 36mm	CLEAN SANDS (little or no fines)		ze and substantial amoun s to bind coarse grains, no		SW		Well graded sands, gravelly sands, little or no fines	Give local and other pertinent descriptive information.	entificatio	ttage smaller th s follows: GW, GP, SW, S GM, GC, SW, S Borderline cas use of dual sy	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_c$	$= \frac{(D_{30})^2}{D_{10} x D_{60}}$ Between 1 & 3
ofm	SANDS In 50% of coarse maller than 2.36mr	CLt SAN (little fin	Predominantly one size or range of sizes with some intermediate sizes, not enough fines to bind coarse grains, no dry strength     SW     Image: SW     Example:       Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength     SP     Poorly graded sands and gravely sands; little or no fines, uniform sands     SILTY SAND (SM), fine to coarse, light grave loarded arguely sands; little or no fines, uniform sands		ler field id	centages of gravel and sand from grain size curve percentage smaller than 0.00mm size coarse grain field as follows: GW GP, SW, SP GM, GC, SM, SC Bordefine cases requiring use of dual symbols	Not meeting all gradation requirements for SI	N					
than 50%	SAN More than 5( tction is small	SANDS WITH FINES (Appreciable amount of fines)	'Dirty' materials with ex strength	ccess of non-plastic fines,	zero to medium dry	SM		Silty sands, sand-silt mixtures	about 12% non-plastic fines, moist, dense alluvial sand.	given und	Atterberg limits below 'A' line or l₀ less		Above 'A' line with PI between 4 and 7 are borderline cases
More	Mo fractio	SAP WITH (Appre amol	'Dirty' materials with e strength	excess of plastic fines, i	medium to high dry	SC		Clayey sands, sand-clay mixtures		tions as	Determine p Depending soils are cla Less than 5 More than 1 5% to 12%	Atterberg limits above 'A' line with $I_{\rm p}$ greater than 7.	requiring use of dual symbols.
		IDENTIFI	CATION PROCEEDURE	S ON FRACTIONS < 0.2	mm					frac			
er than	50		DRY STRENGTH	DILATANCY	TOUGHNESS					ntifying the	Pla	sticity Chart (for laboratory classification o	f fine grained soils)
S mm is sma <b>ll</b> er	D CLAYS less than 5		None to low	Quick to slow	None	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with low plasticity. Silts of low to medium Liquid Limit.	Give typical name, symbol, indicate degree and character of plasticity, colour, amount and size of coarse	'e in ident	60		
ED SOILS than 63 m	SILTS AND quid limit les		Medium to high	None to very slow	Medium	CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.	grains.	size curv	50 (%) 40		
GRAINE rial less 0.075 n			Low to medium	Slow	Low	OL		Organic silts and organic silt-clays of low to medium plasticity	For undisturbed soils add information on moisture content, consistency, structure, stratification, odour.	Jse grain	s and the second	CL	ine
d	) CLAYS t greater 50		Low to medium	Slow to none	Low to medium	МН		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, silts of high Liquid Limit	Give local or geologic name and	5	Diastici Diastici		MH or OH
e than 50%	SILTS AND CL Liquid limit gre than 50		High to very high	None	High	СН		Inorganic clays of high plasticity	other pertinent descriptive information.		10	-ML ML or OL	
More	SILT? Liqui		Medium to high	None to very slow	Low to medium	ОН		Organic clays of high plasticity	Example: clayey SILT (ML), slightly plastic, brown, small percentage of sand, firm, dry, numerous vertical root			20 30 40 50 60	70 80 90 100
	HIGHLY ORG	ANIC SOILS	Readily identified by	colour, odour, spongy fee fibrous texture	I and frequently by	Pt		Peat and other highly organic soils	holes.			Liquid Limit (%)	

Boundary classifications - Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW-GC, well graded gravel-sand mixture with clay binder.



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### SOIL AND ROCK DESCRIPTION SOIL DESCRIPTION

### SOIL TYPE

Classification of soils for engineering purposes is based on the *Unified Classification System* which uses 75 microns as the division of fine grained and coarse grained soils.

The soil type is based on the particle size less than 63 mm diameter and the plasticity of the material passing the 425 mm sieve. If more than 50% of the material passes the 75 mm sieve it is a fine grained soil (CLAY or SILT). The predominant particle size is noted as the primary soil type and this may be modified by the coarse grained portion if it is greater than 30% of the total dry mass, ie SANDY CLAY. If there is less than 30% coarse grained material but more than 12% of the secondary particle size then the modifier is fine grained, ie SILTY CLAY. In the case of where there are less than 50% fines but more than 12% fines then the predominant coarse grained fraction (sand or gravel) is modified by the predominant fine grained soil type, ie SILTY GRAVEL. **Do not use** multiple soil type descriptions such as SILTY CLAYEY GRAVEL, make a decision on the predominant minor constituents or its engineering characteristics, ie. plastic then it is a clay. Where mixtures of soil occur, the secondary components should be described as per a primary material.

#### **GRAIN SIZE**

Soil Type	CLAY	SILT		SAND (SA)			GRAVEL (GR)		COBBLES			
(Abbrev.)	(CL) < 2 mm	(SI) 2 – 75 mm	Fine (f) 0.075-0.2 mm	Medium (m) 0.2-0.6 mm	Coarse (c) 0.6-2.36 mm	Fine (f) 2.36-6 mm	Medium (m) 6-20 mm	Coarse (c) 20-63 mm	(CO) 63-200 mm			
Shape & Texture	Shiny	Dull	very angular / angular / subangular / subrounded / rour									
Field Guide	Not visible under 10x	Visible under 10x	Visible by eye	Visible at < 1 m	Visible at < 3 m	Visible at < 5 m	Road gravel	Rail ballast	Beaching			
	Ve	ery Angular	Angular	Suban	gular	Subrounded	Rounde	d W	ell Rounded			
	~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		>	~		0	0		$\bigcirc$	

High Sphericity	0	$\bigcirc$	$\bigcirc$	$\mathcal{Q}$	0	$\bigcirc$
Low Sphericity	0	0	$\mathbb{O}$	0	0	0

#### DENSITY (non-cohesive soils) based on range of SPT blowcounts for fine to medium sands

Term	Very Loose	Loose	Medium Dense	Dense	Very Dense	Compact
Symbol	VL	L	MD	D	VD	со
SPT (N) Blowcount	0 - 4	4 - 10	10 - 30	30 - 50	50 - 100	> 50/150 mm
Density Index (%)	< 15	15 - 35	35 - 65	65 - 85	85 - 95	> 95
Field Guide	Ravels	Shovels easily	Shovelling very difficult	Pick required	Pick difficult	Cannot be picked

CONSISTENCY (cohesive soils) based on undrained strength (Su) (e	estimated in field from pocket penetrometer or shear vane)
--	--

Term	Very Soft	Soft	Firm	Stiff	Very Stiff	Hard
Symbol	VS	S	F	St	VSt	н
Undrained Shear Strength (kPa)	< 12	12 - 25	25 - 50	50 - 100	100 - 200	> 200
SPT (N) Blowcount	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	> 30
Field Guide	Exudes between the fingers when squeezed	Can be moulded by light finger pressure	Can be moulded by strong finger pressure	Cannot be moulded by fingers. Can be indented by thumb nail	Can be indented by thumb nail	Can be indented with difficulty with thumb nail

#### **MINOR COMPONENTS**

Term	Trace of	With some
% Minor Component	Coarse grained soils: < 5% Fine grained soils: <12%	Coarse grained soils: 5 – 12% Fine grained soils: 12 – 30%
Field Guide	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary components	Presence easily detectable by feel or eye, soil properties little different to general properties of primary component

### ORGANICS

Organic matter (non-waste fill) should be described as fibrous peat, charcoal, wood fragments, roots (>2mm diam.) or root fibres (<2mm diam.)

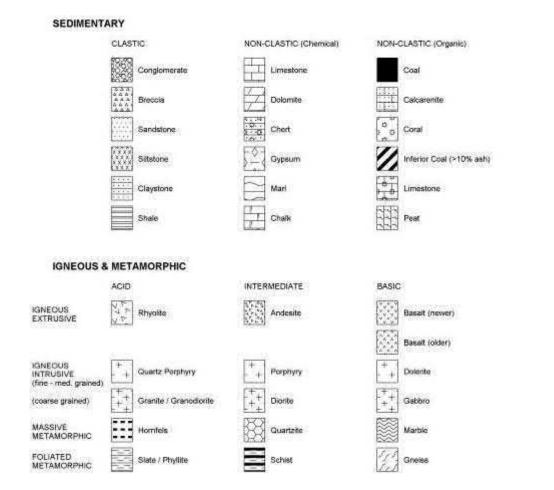


SHEET 3
SOIL & ROCK DESCRIPTION
SOIL DESCRIPTION

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### SOIL AND ROCK DESCRIPTION ROCK DESCRIPTION

## **GRAPHIC SYMBOLS**



### **STRENGTH**

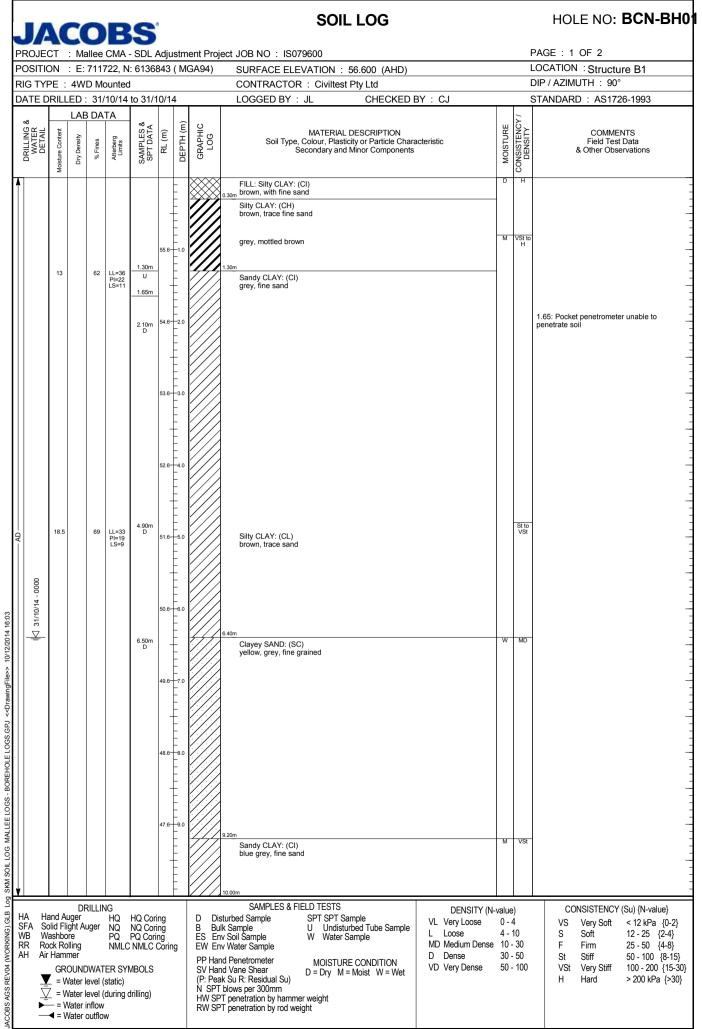
TERM	EXTREMELY LOW	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	EXTREMELY HIGH
SYMBOL	EL	VL	L	М	н	VH	EH
UCS	0.25 – 1MPa	1 – 5 MPa	5 – 25 MPa	25 – 50 MPa	50 – 100 MPa	100 – 250MPa	>250 MPa
FIELD GUIDE	INDENTED BY THUMB NAIL	EXCAVATED WITH SHARP END OF GEOLOGY PICK.	SHALLOW INDENTATION MADE BY FIRM BLOWS WITH SHARP END OF GEOLOGY PICK	SPECIMEN CAN FRACTURE WITH A SINGLE BLOW OF GEOLOGY HAMMER	SPECIMEN REQUIRES MORE THAN ONE BLOW OF A GEOLOGY HAMMER TO FRACTURE	SPECIMEN REQUIRES MANY BLOWS OF A GELOGICAL HAMMER TO FRACTURE IT.	SPECIMEN CAN ONLY BE CHIPPED WITH A GEOLOGICAL HAMMER. SAMPLE WILL RING WHEN HIT.



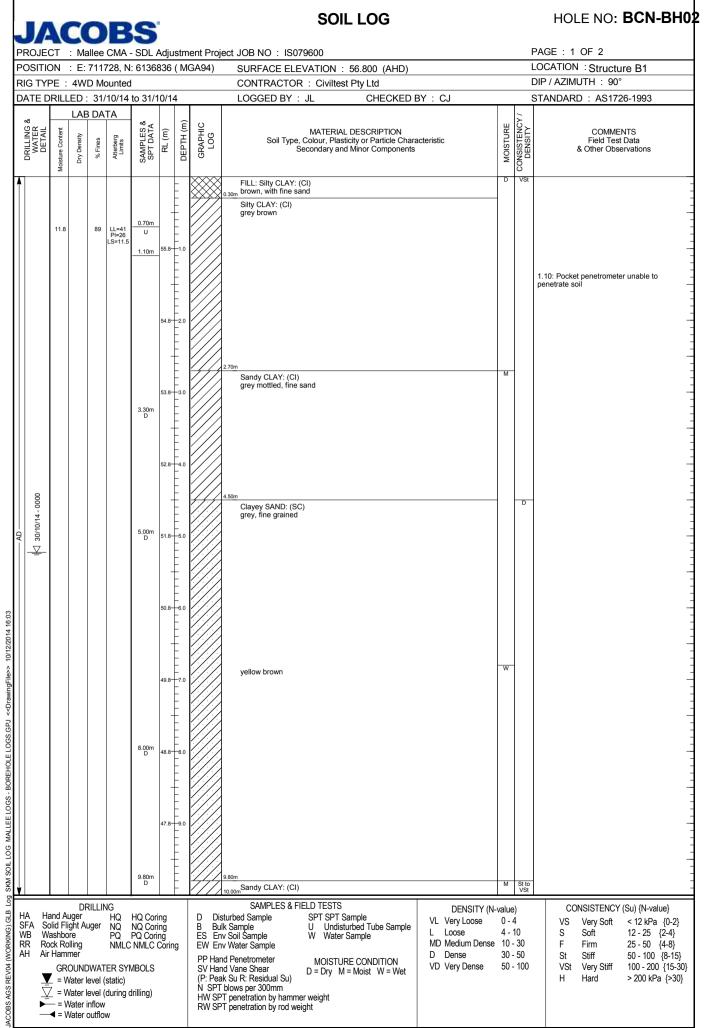
WCMS/110/GEOTECHNICAL/STANDARD PAGES/SOIL & ROCK DESCRIPTIONSH3.DOC

JA				S	1			SOII	LOG				HOLE NO: BCM-BH0
						stme	ent Proje	ect JOB NO : IS079600				PA	AGE : 1 OF 1
POSITION	N : E	E: 712	2145, N	l: 6131	922	( MC	GA94)	SURFACE ELEVATION :	59.000 (AHD)				DCATION : Structure B2
RIG TYPE								CONTRACTOR : Civiltes	-			DI	P/AZIMUTH: 90°
DATE DR				to 31/	10/14	1		LOGGED BY : JL	CHECKED I	BY : CJ		S	TANDARD : AS1726-1993
DRILLING & WATER DETAIL	Moisture Content	AB D/	_	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, Colour, Plast	DESCRIPTION icity or Particle Chara Minor Components	acteristic	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
				U 0.25m				FILL: Silty CLAY: (CH) grey			D	н	
					58.0	-1.0		Silty CLAY: (CI) brown, trace sand grey mottled brown-orange			M	VSt	
untered				2.00m	57.0-								
AD				5.50m D	55.0								
¥				7.50m D	52.0-			with fine sand				St to VSt	
					50.0-			Borehole terminated at 8.0m (Ta	.got Doputj				
SFA Solid WB Wasl RR Rock AH Air Ha	d Auge d Flight shbore c Rolling lammer GROU = Wate	Auger NDWA r level r level r level	HQ NQ PQ NMLC TER SYI (static) (during o		ring ring ing Coring	g	B Bull ES Env EW Env PP Han SV Han (P: Peal N SPT HW SP	/ Soil Śample W Water S / Water Sample d Penetrometer MOISTUR	urbed Tube Sample	DENSITY (N- VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense	0 - 4 - 10 30	4 10	CONSISTENCY (Su) {N-value}           VS         Very Soft         < 12 kPa

				E	S				SOIL LOG				HOLE NO: BCM-BH
							stme	ent Proje	ct JOB NO: IS079600			I	PAGE : 1 OF 1
OSITI	ON	: E:	712	131, N	: 6131	925 (	MC	GA94)	SURFACE ELEVATION : 58.600 (AHD)			l	LOCATION : Structure B2
IG TY	PE :	4W	D M	ounted	1				CONTRACTOR : Civiltest Pty Ltd			1	DIP / AZIMUTH : 90°
ATE [	ORILI				to 31/	10/14			LOGGED BY : JL CHECKED	BY : CJ	-	;	STANDARD : AS1726-1993
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Lines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Char. Secondary and Minor Components	acteristic	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
	-								FILL: Silty CLAY: (CI) brown, grey, trace fine sand		D	VSt	
						57.6	-1.0		<sup>90m</sup> Silty CLAY: (CH) dark grey, mottled brown		м	VSt to H	
	19.2		94	LL=62 PI=43 LS=18	1.50m U 1.75m 2.00m D	56.6			dark grey, brown				1.50: Pocket penetrometer unable to penetrate soil
					2.50m D	55.6			brown, trace sand			VSt	
4 - 0000  ◯ 30/10/14 - 0000						54.6			brown, grey			St to VSt	
I ⊲ 31/10/14 - 0					6.00m D	52.6	-6.0		trace fine sand				
					6.80m D	51.6	-7.0		brown, with fine sand 10m Sandy CLAY: (SC)		w	F to St	
					7.80m D				grey-blue, mottled brown				
						50.6	-8.0 ·		Borehole terminated at 8.0m (Target Depth)				
						49.6	- -9.0 - -						
	land A		RILLI		HQ Cor	ing		D Disti	SAMPLES & FIELD TESTS Irbed Sample SPT SPT Sample	DENSITY (N			CONSISTENCY (Su) {N-value}
FAS VBW RR HAi	iolid Fl Vashbo ock Ro r Ham GR = V	ight A ore olling mer OUNI Vater Vater	DWAT level ( level (	NQ PQ NMLC ER SYI static) during o	NQ Cor PQ Cor NMLC MBOLS	ring ing Coring	]	B Bulk ES Env EW Env PP Hand SV Hand (P: Peak N SPT b	Index sample     SPT Sample       Sample     U       Soil Sample     U       Water Sample     W       Water Sample     W       Penetrometer     MOISTURE CONDITION       Vane Shear     D = Dry       Su R: Residual Su)     D = Dry       lows per 300mm     penetration by hammer weight	VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense	30	10 - 30	VS         Very Soft         < 12 kPa         {0-2}         S         Soft         12 - 25         {2-4}         F         Firm         25 - 50         {4-8}         St         St         Store         Store </td



JA		~		•	C	1				SOIL	LOG				HOLE NO: BCN-B
							ıstm	ent Proi	ect JOB NO : ISC	79600					PAGE : 2 OF 2
POSITIC	ON	: E:	7117	722, N	1: 6136	843	( MC	GA94)	SURFACE EL	EVATION :	56.600 (AHD)				LOCATION : Structure B1
rig tyf	PE :	4WI	D Mo	ounted	ł				CONTRACTO	R : Civiltest	Pty Ltd				DIP / AZIMUTH : 90°
DATE D	RILL				to 31/	10/1	4		LOGGED BY	: JL	CHECKED	BY : CJ	1		STANDARD : AS1726-1993
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type	e, Colour, Plastic	DESCRIPTION ity or Particle Cha Minor Componen	aracteristic ts	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
	~					-			Borehole termina	ted at 10.0m (Ta	rget Depth)			0	
						45.6-									
						44.6-	- - - - - 12.0								
						-	-								
						43.6-									
						42.6-									
						-	-								
						41.6-									
						40.6-									
						-	-								
						39.6-									
						38.6-	- - - - - - - - - - - - - - - - - - -								
						-									
						37.6-									
		DF	ILLIN	IG			-		SAMPLES & F			DFN	ISITY (N-valu	(e)	CONSISTENCY (Su) {N-value}
WB Wa RR Ro AH Air	_ = W	iger oht Au re ling ner DUND ater le	iger WAT evel (i	hq Nq Pq NMLC	HQ Cor NQ Cor PQ Cor NMLC MBOLS	ring ing Corir	ng	B Bu ES En EW En PP Har SV Har (P <sup>.</sup> Pea	sturbed Sample k Sample v Soil Sample v Water Sample id Penetrometer id Vane Shear k Su R: Residual Su) blows per 300mm T penetration by hamn T penetration by rod w	W Water S MOISTUR D = Dry M =	mple rbed Tube Sample ample E CONDITION • Moist W = Wet	VL Very Loose	oose 0 - 4 - m Dense 10 30	4 10	VS         Very Soft         < 12 kPa         {0-           S         Soft         12 - 25         {2-4           F         Firm         25 - 50         {4-8           St         Stiff         50 - 100         {8-7



		2		B	S				SOIL LOG				HOLE NO: BCN-B
							tme	ent Projec	t JOB NO: IS079600			PA	AGE : 2 OF 2
				728, N		836 (	MG	GA94)	SURFACE ELEVATION : 56.800 (AHD				DCATION : Structure B1
				ounted					CONTRACTOR : Civiltest Pty Ltd				P / AZIMUTH : 90°
AIED	RILL		31/ DA	10/14 TA	to 31/	10/14			LOGGED BY : JL CHECKE	DBY:CJ			TANDARD : AS1726-1993
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Cl Secondary and Minor Compone	aracteristic Its	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
	2					+	+		blue grey, fine sand		7		
						E			Borehole terminated at 10.0m (Target Depth)				
						+							
						E							
						45.8-1	11.0						
						Ē							
						‡							
						Ē							
						44.8-1	12.0						
						Ē							
						‡							
						E							
						43.8-1	13.0						
						E							
						+							
						E							
						42.8-1	14.0						
						Ē							
						+							
						E							
						41.81	15.0						
						E							
						Ιŧ							
						40.8-1	16.0						
						ΙĒ							
						39.8-1	17.0						
						ΙĒ							
						38.8-1	18.0						
						ΙĒ							
						37.8-1	າສ.U						
						ļĒ							
						ΙĘ							
FA So	and Ai olid Fli	uger ght Ai	RILLIN	HQ NQ	HQ Cor NQ Cor	ring		B Bulk	SAMPLES & FIELD TESTS rbed Sample SPT SPT Sample Sample U Undisturbed Tube Samp	DENSITY ( VL Very Loose	0 -	4	CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0-2
B W	ashbo ock Ro	re	-	PQ	PQ Cor NMLC	ing		ES Env	Soil Sample W Water Sample Water Sample	L Loose MD Medium Den:	4- se 10		S Soft 12 - 25 {2-4} F Firm 25 - 50 {4-8}
H Air	Ham	ner	\\\/^ <del>`</del>					PP Hand	Penetrometer MOISTURE CONDITION	D Dense VD Very Dense		- 50 - 100	St Stiff 50 - 100 {8-15 VSt Very Stiff 100 - 200 {15-
				ER SYN static)	VIBOLS			(P: Peak	Vane Shear D = Dry M = Moist W = Wei Su R: Residual Su)	vo very Dense	50	100	H Hard > 200 kPa {>3
$\sum$	<u>Z</u> = W	later l	evel (	during c	Irilling)			HW SPT	ows per 300mm penetration by hammer weight				
-	— = V	vater i	nflow outflo						penetration by rod weight	1			

# File: IS079600 BCN-BH02 Page 2 OF 2

			~		2	S	1			SOIL LOG			HOLE NO: BCN-BH0
						/inifera				JOB NO : IS135300			PAGE: 1 OF 1
								3 (54	MGA94)	SURFACE ELEVATION : 56.200 (AHD)			LOCATION : Burra B1 Structure
		PE :			,				,	CONTRACTOR : Civil Test			DIP / AZIMUTH : 90°
					0/16 t	o 6/20/	/16			LOGGED BY : MS CHECKED BY : DG			STANDARD : AS1726
DRILLING &	WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTIBE	ö	COMMENTS Field Test Data & Other Observations
		19		82	LL=51 PI=38	1.00m SPT N*=11 <u>1.450m</u> U 1.95m	54.2			Silty CLAY (CH): High plasticity, grey, mottled black, orange, with some fine grained sand	N	St	1.00: SPT Recovery: 0.45 m
SFA	I < 20/06/16 - 0000			76		3.00m SPT 10, 11, 9 N*20 3.45m	53.2			Som Sandy SILT (ML): Low plasticity, yellow, grey, fine grained sand. Increasing fines content SAND with clay (SW):	C	MD	3.00: SPT Recovery: 0.45 m
00:01 010				15		4.50m SPT 1, 6, 9 N*=15 4.95m		5.0		Fine to medium grained, yellow, orange			4.50: SPT Recovery: 0.45 m
Processes revertive/order tog som solt too NTAIL BURKA VINTERA GEVECH JULY ZUIGGP3 Scienamignies ZavidZurg 10.355 日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日				98		SPT 1, 4, 11 N*=15 6.45m				Silty SAND / sandy SILT (SM): Fine to medium grained, orange, low plasticity fines.			6.00: Laboratory grading shows a high fines content, predominantly SILT. Obser- vations on-site during drilling, showed material to have silty sand content.; SPT Recovery: 0.45 m
א איז אטון ברטפ וווזאיז איזאיד דעה איז אווירביא אני							47.2			Borehole terminated at target depth. Borehole backfilled with drill cuttings. Ground water encountered at 4.0m depth during drilling.			
HA SF. WE WE MOLENNIC) THE SF. HA	A So B Wa Air Air	_ = N	uger ght Au re lling mer OUNE /ater I /ater I /ater i	OWAT evel ( evel (	HQ NQ PQ NMLC ER SY static) during	HQ Cor NQ Cor PQ Cor NMLC MBOLS drilling)	ring ing	ng	B Bulk ES Env EW Env PP Hand SV Hand (P: Peak N SPT b HW SPT	SAMPLES & FIELD TESTS     DENSIT       urbed Sample     SPT SPT Sample     VL     Very Loos       Sample     W     Water Sample     L     Loose       Water Sample     MOISTURE CONDITION     D     Dense       Penetrometer     MOISTURE CONDITION     D     Dense       Vane Shear     D = Dry     M = Moist     W = Wet       Iows per 300mm     penetration by hammer weight     penetration by rod weight     VD	e 0 4 ense 10 30	- 4 - 10	CONSISTENCY (Su) {N-value}           VS         Very Soft         <12 kPa

## BCN-BH03- (Burra B1 Structure):



Borehole Setup



SPT Depth 1.0-1.45m



SPT Depth 3.0-3.45m



SPT Depth 3.0-3.45m, close up view

## BCN-BH03- (Burra B1 Structure):



SPT Depth 4.5-4.95m



SPT Depth 4.5-4.95m, close up view



SPT Depth 6.0-6.45m



SPT Depth 6.0-6.45m, close up view

					Þ	S	1			SOIL LOG			HOLE NO: BCN-BH0
	ROJE					/inifera				JOB NO : IS135300			PAGE : 1 OF 1
								(54	MGA94)	SURFACE ELEVATION : 56.000 (AHD)			LOCATION : Burra Drop Structure
RI	G TY	PE :	Drill	Rig						CONTRACTOR : Civil Test			DIP / AZIMUTH : 90°
D/	ATE D	RILL	ED :	6/2	1/16 t	o 6/21	/16			LOGGED BY : MS CHECKED BY : DG			STANDARD : AS1726
	DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
	1 ≥ 11.06/16 - 0000					1.00m SPT 5,5,6 N*=11 1.45m 3.00m SPT 4.5,7 3.45m 4.95m 6.00m SPT 1.2,3 N*=5 6.45m	- 51.0 - 50.0 - 49.0 - 48.0			Sandy CLAY (CL): Low plasticity, light brown mottled orange, red, grey, fine to medium grained sand Silty CLAY (CI): intermediate plasticity, brown, orange, grey, with some fine to medium grained sand with some wood bits becoming grey, blue, mottled orange becoming grey, blue, mottled orange Silty CLAY (CI): Intermediate plasticity, grey, blue mottled orange, with some fine grained sand SAND with clay (SW): Fine to coarse grained, grey, white SAND with clay (SW): Fine to coarse grained, grey, white SAND with clay (SW): Fine to coarse grained, grey, white Sand Somo SAND with clay (SW): Fine to coarse grained, grey, white		- -	1.00: SPT Recovery: 0.45 m 3.00: SPT Recovery: 0.45 m 4.50: SPT Recovery: 0.45 m 6.00: SPT Recovery: 0.45 m
H S W R A	FA Si I/B W R Ro H Aii	_ = W	iger ght Au re lling ner DUND /ater le /ater le /ater i	WAT evel (: evel (:	HQ NQ PQ NMLC ER SYI static) during (	HQ Col NQ Col PQ Cor NMLC MBOLS drilling)	ring ing Cori	ng	B Bull ES Env EW Env PP Han SV Han (P: Peal N SPT HW SPT	SAMPLES & FIELD TESTS       DENSITY (N         urbed Sample       SPT SPT Sample         Sample       Undisturbed Tube Sample         Soil Sample       W Water Sample         Water Sample       MolSTURE CONDITION         I Penetrometer       MOISTURE CONDITION         Vane Shear       D = Dry M = Moist W = Wet         Su R: Residual Su)       D = Dry M = Moist W = Wet         yows per 300mm       'penetration by hammer weight	0 - 4 - 9 10 30	4 10	CONSISTENCY (Su) {N-value} VS Very Soft <12 kPa {0-2} S Soft 12 - 25 {2-4} F Firm 25 - 50 {4-8} St Stiff 50 - 100 {8-15} VSt Very Stiff 100 - 200 {15-30} H Hard > 200 kPa {>30}

## BCN-BH04- (Burra Drop Structure):



Borehole Setup



SPT Depth 1.0-1.45m



SPT Depth 1.0-1.45m, close up view

## BCN-BH04- (Burra Drop Structure):



SPT Depth 3.0-3.45m



SPT Depth 3.0-3.45m, close up view



SPT Depth 4.5-4.95m



SPT Depth 6.0-6.45m



SPT Depth 6.0-6.45m, close up view

JA			P	C				SOI	LOG				HOLE NO: BCS-BH
						stme	ent Proje	ct JOB NO: IS079600				F	PAGE : 1 OF 1
OSITION							,	SURFACE ELEVATION :	61.900 (AHD)			L	OCATION : Structure B4
IG TYPE :	4W	) Mo	unted					CONTRACTOR : Civiltes	t Pty Ltd			[	DIP / AZIMUTH : 90°
ATE DRILI			- 1	to 30/1	10/14	_		LOGGED BY : JL	CHECKED	BY : CJ	1	5	STANDARD : AS1726-1993
DRILLING & WATER DETAIL Moisture Content	Dry Density	Kines %	Atterberg	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, Colour, Plast	DESCRIPTION icity or Particle Char. I Minor Components		MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
								FILL: Clayey SILT: (ML) <sup>30m</sup> brown, with fine sand Silty CLAY: (CI) grey-brown, trace fine sand			D	VSt	
Not Encountered				<u>1.45m</u> U <u>1.95m</u> D	58.9			00m Silty CLAY: (CI) grey-brown			M	VSt to H	1.95: Pocket penetrometer unable to penetrate soil
15.5		76	LL=37 PI=23 LS=9.5	6.00m U 6.20m 7.10m D	54.9			grey mottled brown, with fine sar 00m Sandy CLAY: (CI) brown, fine sand, with fine grave grey 00m Borehole terminated at 8.0m (Ta	1			VSt	6.20: PP result = 4.9 kg/cm <sup>2</sup> VS peak = 168kPa VS residual = 67kPa
/B Washbo	uger ight Au ore	ıger	hq Nq Pq I	HQ Cori NQ Cori PQ Cori	ing ng		B Bulk ES Env	Soil Sample W Water	urbed Tube Sample	DENSITY (N- VL Very Loose L Loose MD Medium Dense	0 - 4 -	4 10	CONSISTENCY (Su) {N-value} VS Very Soft <12 kPa {0-2 S Soft 12 - 25 {2-4} E Firm 25 - 50 /4-8
SFA Solid FI WB Washbo RR Rock Ro AH Air Ham GR <u>↓</u> = V <u>↓</u> = V	ight Au ore olling mer OUNE Vater le Vater le	iger WATE evel (s	NQ PQ NMLC ER SYN	NQ Cori PQ Cori NMLC ( /IBOLS	ing ng	I	B Bulk ES Env EW Env PP Hand SV Hand (P: Peak N SPT b HW SPT	Sample U Undist Soil Sample W Water Water Sample Penetrometer MOISTUF	urbed Tube Sample		4 - 10 - 30 -	10	

		(		P	S				SOIL LOG			HOLE NO: NN-BHO
							ustm	ent Proj	ect JOB NO : IS079600			PAGE : 1 OF 1
POSITIC	NC	: E:	7147	789, N	: 6112	069	( M	GA94)	SURFACE ELEVATION : 62.100 (AHD)			LOCATION : Structure N2
						10/4			CONTRACTOR : Civiltest Pty Ltd			DIP / AZIMUTH : 90°
ATE D			29/ 3 DA		to 29/*	10/1	4		LOGGED BY : JL CHECKED BY : CJ		1	STANDARD : AS1726-1993
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
							E	***	FILL: Silty CLAY: (CI) 0.30m brown, trace fine sand and gravel	D	St	
					0.50m D	61.1-			Sity CLAY: (CI) dark brown, mottled orange	М	VSt	
	23.4		98	LL=50 PI=31 LS=14	1.90m U 2.15m D	- 	2.0		1.50m Silty CLAY: (CH) grey-brown, mottled orange			2.15: PP result = 3.3kg/cm² VS peak = 159kPa VS residual = 32kPa
Not Encountered	18.4				3.60m D 4.30m U 4.70m	58.1-	4.0		4.30m CLAY: (CL) grey, mottled orange-brown, trace fine to coarse sand			
					5.50m D	57.1- - 56.1-	5.0 			- W	St to H	4.70: PP result = 3.4kg/cm <sup>2</sup>
					7.10m D 7.80m D	- 55.1-	7.0		7.00m Clayey SAND: (SC) brown-orange 7.70m Sitty CLAY: (CI) 8.00m Brown-orange, with fine sand		D VSt to H	
						- 53.1-	9.0		Borehole terminated at 8.0m (Target Depth)			
SFA So VB Wa RR Ro AH Air	_ = V	uger ght Au re lling mer OUNE /ater I /ater I	)WAT evel ( evel (	HQ PQ NMLC ER SYN static) during c	HQ Cor NQ Cor PQ Cori NMLC //BOLS frilling)	ing ing	ng	B Bu ES En EW En PP Har SV Har (P: Pea N SPT HW SP	SAMPLES & FIELD TESTS turbed Sample SPT SPT Sample k Sample U Undisturbed Tube Sample y Soil Sample W Water Sample Water Sample W Water Sample Water Sample D = Dry M = Moist W = Wet Vane Shear D = Dry M = Moist W = Wet Su R. Residual Su) blows per 300mm I penetration by hammer weight D pensetration by rod weight	4 - Dense 10 30	4 10	CONSISTENCY (Su) {N-value}           VS         Very Soft         <12 kPa

J		~			G				SOIL LOG				HOLE NO: NN-BH02
PROJE									JOB NO : IS135300			I	PAGE : 1 OF 1
							(54	MGA94)	SURFACE ELEVATION : 61.000 (AHD)			I	LOCATION : Nyah Drop Structure
RIG TY			-						CONTRACTOR : Civil Test			I	DIP / AZIMUTH : 90°
DATEI	DRILL				o 6/20/	16			LOGGED BY : MS CHECKED BY : DG			;	STANDARD : AS1726
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components		MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
HA PIC	10.4		85	LL=38 PI=26	1.00m SPT 8.10, 11 N*=21 1.45m 2.00m SPT 4.6, 6 N*=12 3.45m 4.00m SPT 4.6, 6 N*=5 3.45m 5.5, 7 N*=5 4.45m 5.00m SPT 4.9, 9 N*=5 4.45m 5.95m 5.95m 5.95m	- 60.0-  - 59.0-             		S S	CLAY with sand (CL): Low plasticity, light brown mottled orange, grey, fine grained sand wood bits encountered Som Sity CLAY (CH): High plasticity, grey, blue Sity CLAY (CH): High plasticity, grey, blue Site to medium grained, brown, grey Som Dorehole terminated at target depth. Borehole backfilled with drill cuttings. Ground water not encountered during drilling.		M	St VSt St	1.00: SPT Recovery: 0.45 m         2.00: SPT Recovery: 0.45 m         3.00: SPT Recovery: 0.45 m         4.00: SPT Recovery: 0.45 m         5.00: SPT Recovery: 0.45 m         5.00: SPT Recovery: 0.45 m         5.50: SPT Recovery: 0.45 m
SFA S WB V RR R AH A	<b>y</b> = W	iger ght Ai re lling ner OUNE /ater li /ater li /ater i	)WAT evel ( evel ( nflow	HQ NQ PQ NMLC ER SY static) during	HQ Cori NQ Cori PQ Cori : NMLC ( MBOLS drilling)	53.0- - 52.0- - -		B Bulk ES Env EW Env PP Hand SV Hand (P: Peak N SPT b HW SPT	wheel Sample     SPT SPT Sample     VL Vei       Sample     U Undisturbed Tube Sample     L Loc       Soil Sample     Water Sample     MD Me       Water Sample     D De	ose edium Dense ense	0 - 4 4 - 1 10 - 30 -	4 10 • 30	CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0-2} S Soft 12 - 25 {2-4} F Firm 25 - 50 {4-8} St Stiff 50 - 100 {8-15} VSt Very Stiff 100 - 200 {15-30} H Hard > 200 kPa {>30}

## NN-BH02- (Nyah Drop Structure):



Borehole Setup



STP Depth 1.0-1.45m



STP Depth 2.0-2.45m



STP Depth 3.0-3.45m

## NN-BH02- (Nyah Drop Structure):



STP Depth 4.0-4.45m



STP Depth 5.0-5.45m



Depth 5.0-5.4, close up



Depth 5.4, close up



STP Depth 5.5-5.95m



STP Depth 5.5-5.95m, close up view

			~		P	S				SOIL	LOG				HOLE NO: <b>NS-BH</b>
								ustm	nent Proj	ect JOB NO: IS079600				I	PAGE : 1 OF 1
0	SITI	NC	: E:	716	984, N	l: 6107	058	( M	GA94)	SURFACE ELEVATION : 6	63.800 (AHD)				LOCATION : Structure N5
	G TYI	PE :	4W	D M	ounted	ł				CONTRACTOR : Civiltest	Pty Ltd			l	DIP / AZIMUTH : 90°
A	TED	RILL	ED	: 29/	/10/14	to 29/	10/1	4		LOGGED BY : JL	CHECKED E	BY : CJ		;	STANDARD : AS1726-1993
DRILING &	WATER	Moisture Content	Dry Density	% Lines	Atterberg	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, Colour, Plastic	DESCRIPTION ity or Particle Chara Minor Components	icteristic	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
		2						Ē		FILL: Silty CLAY: (CH) brown-grey, trace pink-white grave	el		D	VSt	
							62.8			0.90m Sandy CLAY: (CL)					
	ntered	8.4		70	LL=30 PI=16	1.50m D				brown, fine to medium sand					
	Not Encountered				LS=7.5	2.20m	61.8	2.0		2.00m Silty CLAY: (CH)				VSt to H	
						U 2.60m	.			brown					
							60.8-	3.0							2.60: Pocket penetrometer unable to penetrate soil
-						3.70m D	.			3.80m Borehole terminated at 3.8m (Ref	usal)				
							59.8	4.0			2001)				
							58.8-	5.0							
							57.8-	6.0							
								-							
							56.8-	7.0							
							55.8	8.0							
							54.8	9.0							
	A H	and A	Jaer	RILLI	HQ	HQ Cor	ring	<u> -</u>	D Dis	SAMPLES & FIELD TESTS turbed Sample SPT SPT Sa		DENSITY (N VL Very Loose	-value 0 -		CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0-
	3 W Ro	ashbo ock Ro Ham	re Iling mer		PQ NMLC	NQ Cor PQ Cor NMLC	ing Corir	ng	EW En PP Har	v Soil Śample W Water Sa v Water Sample d Penetrometer MOISTURE		L Loose MD Medium Dense D Dense VD Very Dense	30		S Soft 12 - 25 {2-4 F Firm 25 - 50 {4-8 St Stiff 50 - 100 {8- VSt Very Stiff 100 - 200 {11
	$\sum$	<u> </u>	/ater /ater	level (	(static) (during (				(P: Pea N SPT HW SP	k Su R: Residual Su) blows per 300mm T penetration by hammer weight T penetration by rod weight	Moist W = Wet	.,			H Hard > 200 kPa {>

				P	S				SOIL LOG			HOLE NO: VN-BHO
							stm	ent Proj	ect JOB NO : IS079600		I	PAGE : 1 OF 1
POSITIC	NC	: E:	7173	96, N	6103	597	( M(	GA94)	SURFACE ELEVATION : 63.500 (AHD)			LOCATION : Structure V1
RIG TYF									CONTRACTOR : Civiltest Pty Ltd			DIP / AZIMUTH : 90°
DATE D	RILL		29/		to 29/	10/14	1		LOGGED BY : JL CHECKED BY : CJ		1	STANDARD : AS1726-1993
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
							_	$\times\!\!\times\!\!\times$	FILL: Silty CLAY: (CH)	D	VSt	
Not Encountered					1.00m D <u>1.80m</u> U <u>2.10m</u>	62.5-			0.30m brown-grey, trace pink-white gravel Silty CLAY: (CH) dark grey-brown	M	VSt to H	2.10: PP result = 5.3kg/cm <sup>2</sup> Vane shear unable to penetrate soil
					4.20m D	- 59.5-			trace fine sand 5.00m Borehole terminated at 5.0m (Target Depth)			
						57.5						
SFA So WB Wa RR Ro AH Air	ashbo ock Ro Hami GR = V = V	uger ght Au ire illing mer OUND /ater le	iger WATE evel (s evel (c	HQ NQ PQ NMLC	HQ Cor NQ Cor PQ Cori NMLC /IBOLS Irilling)	ing ing	g	B Bul ES En EW En PP Har SV Har (P: Pea N SPT HW SP	SAMPLES & FIELD TESTS       DENSIT         turbed Sample       SPT SPT Sample         k Sample       U Undisturbed Tube Sample         v Soil Sample       W Water Sample         v Water Sample       MD Medium D         d Penetrometer       MOISTURE CONDITION         d Vane Shear       D = Dry M = Moist W = Wet         blows per 300mm       T penetration by hammer weight	4 - Vense 10 30	4 10	CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0-2 S Soft 12 - 25 {2-4} F Firm 25 - 50 {4-8} St Stiff 50 - 100 {8-1 VSt Very Stiff 100 - 200 {15 H Hard > 200 kPa {>3

JA		~		•	C				SOIL LOG HOLE NO: VN-BH02
PROJE									JOB NO : IS135300 PAGE : 1 OF 1
							(54	MGA94)	SURFACE ELEVATION : 63.500 (AHD)     LOCATION : Vinifera Drop Structure
RIG TYF	PE :	Drill	Rig						CONTRACTOR : Civil Test DIP / AZIMUTH : 90°
DATE D	RILL	ED :	6/2	1/16 t	o 6/21/	/16			LOGGED BY : MS CHECKED BY : DG STANDARD : AS1726
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components
						-	-		Sitty CLAY (CI): Intermediate plasticity, brown, grey, orange, with some fine to medium grained sand
					1.50m SPT 5, 5, 5 N*=10 1.95m	62.5-			St 1.50: SPT Recovery: 0.45 m
					3.00m SPT 9,11,11 N*=22 3.45m	- 60.5-	3.0		St to VSt 3.00: SPT Recovery: 0.45 m
0.5					4.50m SPT 4, 6, 8 N*=14 4.95m		5.0		4.50: SPT Recovery: 0.45 m
					6.00m SPT 5, 8, 8 N*=16 6.45m	- 57.5-			m Silty CLAY (CL): Low plasticity, orange, grey m
						55.5-	-7.0		Sandy CLAY (SC): Intermediate plasticity, brown, fine to medium grained sand
¥						- 54.5-	9.0	9.	Borehole terminated at target depth. Borehole backfilled with drill cuttings. Ground water not encountered during drilling
SFA Sc WB Wa RR Ro AH Air	_ = W	iger ght Au re lling ner DUND /ater le /ater le /ater i	WAT evel ( evel ( nflow	HQ NQ PQ NMLC ER SYI static) during (	HQ Cor NQ Cor PQ Cor NMLC MBOLS drilling)	ring	ng	B Bulk ES Env EW Env PP Hand SV Hand (P: Peak N SPT b HW SPT	SAMPLES & FIELD TESTS         bed Sample       SPT SPT Sample         Sample       U         u       Undisturbed Tube Sample         oil Sample       W         w       Water Sample         VE       Very Loose       0 - 4         L       Loose       4 - 10         MD       Medium Dense       10 - 30         Penetrometer       MOISTURE CONDITION         Vare Shear       D = Dry         D = Dry       M = Moist         ws per 300mm       enetration by hammer weight         enetration by rod weight       W

## VN-BH02- (Vinifera Drop Structure):



Borehole Setup



STP Depth 1.5-1.95m



STP Depth 3.0-3.45m



STP Depth 4.5-4.95m

VN-BH02- (Vinifera Drop Structure):



STP Depth 4.5-4.95m, close up view



STP Depth 6.0-6.45m

		~			S	1			SOIL LOG			HOLE NO: VS-BH01
							ustm	ient Proj	ect JOB NO : IS079600			PAGE : 1 OF 1
						567	' ( M	GA94)	SURFACE ELEVATION : 65.400 (AHD)			LOCATION : Structure V1 DIP / AZIMUTH : 90°
RIG TYI DATE D						10/1	14		CONTRACTOR : Civiltest Pty Ltd LOGGED BY : JL CHECKED BY : CJ			STANDARD : AS1726-1993
DRILLING & WATER DETAIL			% Fines		SAMPLES & SPT DATA	RL (m)	Ê	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
AU Not Encountered	5.9		32	LL=23 PI=9 LS=4.5 LL=47 PI=30 LS=13	3.50m D 4.45m 5.50m D	57.4			1.2mm       Fill:: Clayery SILT: (ML) brown, with fine sand         Sandy SiLT: (ML) dark grey-brown, trace pink-white gravel brown         300m         Clayey SAND (SC) dark brown, fine to coarse grained sand, low to medium plasticity fines         300m         Sam         Sam         Sam         540m         Silty CLAY: (Cl) dark brown, fine to medium sand         540m         Silty CLAY: (CH) brown-grey, trace sand         650m         Borehole terminated at 6.5m (Refusal)	M	VSt to H	
SFA So WB W RR Ro AH Air	_ = V	uger ght Au re illing mer OUND /ater le /ater le /ater i	)WAT evel ( evel ( nflow	HQ NQ PQ NMLC ER SYN static) during c	HQ Cor NQ Cor PQ Cori NMLC MBOLS drilling)	ing ing	ng	B Bu ES En EW En PP Har SV Har (P: Pea N SPT HW SP	SAMPLES & FIELD TESTS       DENSITY (N-         turbed Sample       SPT SPT Sample       VL Very Loose         k Sample       W Water Sample       L Loose         v Water Sample       W Water Sample       M Medium Dense         v Water Sample       D = Dry M = Moist W = Wet       D Dense         blows per 300mm       T penetration by hammer weight       T penetration by rod weight	0 - 4 - 10 30	4 10	CONSISTENCY (Su) {N-value}           VS         Very Soft         <12 kPa

CT DN PE : RILL	: Ma : E: 4W ED :	allee 7202	CMA			ıstm	ent Proj						
'E : RILL	4W ED :		253, N	0.6101				ect JOB NO : IS079600			PAGE : 1 OF 1		
RILL	ED :	D Mo	OSITION : E: 720253, N: 6101588								LOCATION : Structure V/3		
		RIG TYPE : 4WD Mounted DATE DRILLED : 29/10/14 t						CONTRACTOR : Civiltest Pty Ltd           LOGGED BY : JL         CHECKED BY : CJ		DIP / AZIMUTH : 90°			
ontent		29/ 3 DA		10 29/	10/1	4		LOGGED BY : JL CHECKED BY : CJ			STANDARD : AS1726-1993		
Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations		
						E		0.20m FILL: Clayey SILT: (ML)		D			
					-			Sandy SILT: (ML) dark grey					
19.9		96	LL=57 PI=36 LS=12.5	<u>1.50m</u> U				1.40m Silty CLAY: (CH) dark grey	м	н			
				2.00m D	63.0-	-2.0		grey			1.90: Pocket penetrometer unable to penetrate soil Vane shear unable to penetrate soil		
				3.20m D	62.0-	3.0		pale grey, trace sand, increase in silt	D	VSt	-		
					61.0-	4.0							
					60.0-	5.0		<sup>5.00m</sup> Borehole terminated at 5.0m (Refusal)					
					-	6.0							
					-								
						-							
						F							
					-	9.0							
lid Fli ishbo ck Ro Hamr GR(	uger ght Au re Iling ner OUNE	uger )WAT	HQ NQ PQ NMLC	NQ Co PQ Cor NMLC	ring ring Corir	ng	B Bu ES En EW En PP Har SV Har (P: Pea	turbed Sample SPT Sample VL Very Loose K Sample U Undisturbed Tube Sample L Loose Vater Sample W Water Sample WD Wedium Der Vater Sample MOISTURE CONDITION D Ense VD Very Dense d Vane Shear D = Dry M = Moist W = Wet VD Very Dense	0 - 4 - nse 10 30	4 10 - 30 - 50	CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0-2 S Soft 12 - 25 {2-4} F Firm 25 - 50 {4-8} St Stiff 50 - 100 {8-1 VSt Very Stiff 100 - 200 {15 H Hard > 200 kPa {>3		
	nd Ali shbok k Ronn GR = W	DF d Auger d Flight Au shbore k Rolling łammer GROUNE = Water I = Water I	DRILLIN d Auger d Flight Auger shbore k Rolling tammer GROUNDWAT = Water level ( = Water inflow	DRILLING Id Auger HQ Higher HJ Higher HJ Highe	19.9 96 LE-57 PI-36 U LS=12.5 U 1.90m 2.00	19.9 96 LILEST PIESS LS=12.5 1.50m 1.50m 0 1.90m 2.0m 63.0- 62.0- 3.20m 61.0- 61.0	19.9 BRILLING DRILLING Md Auger HQ HQ Coring HIGHINA Auger KRolling MMLC NMLC Coring KRolling MMLC NMLC Coring KROLLING KROL	19.9 96 ULLING DRILLING d Auger Mager HQ HQ Coring hbore ROUNDWATER SYMBOLS = Water level (during drilling) = Water inflow HQ HQ coring hbore ROUNDWATER SYMBOLS = Water inflow HQ HQ coring HQ HQ HQ HQ Coring HQ HQ HQ HQ Coring HQ HQ HQ Coring HQ HQ HQ Coring HQ HQ H	113     96     List 1 100     100     Stip (CLY; (CH) Gat grey       113     100     Stip (CLY; (CH) Gat grey     100       113     100     100     100       113     100     100     100       113     100     100     100       114     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       115     100     100     100       116     100     100     100       117     100     100     100       118     100     100     100       119     100     100     100       110     100     100     100       110     100     100     100<	iss     ex     iss     iss <td>Ites         Ites         <th< td=""></th<></td>	Ites         Ites <th< td=""></th<>		

	COE	S		SOIL	LOG			HOLE NO: VS-BHO
			stment Proje	ect JOB NO : IS079600			F	PAGE : 1 OF 1
	: E: 720347, N	,	,	SURFACE ELEVATION : 6	64.400 (AHD)		L	LOCATION : Structure V4
IG TYPE :	4WD Mountee	t		CONTRACTOR : Civiltest	Pty Ltd			DIP / AZIMUTH : 90°
ATE DRILL	ED: 31/10/14	to 31/10/14	L	LOGGED BY : JL	CHECKED BY : CJ	1	5	STANDARD : AS1726-1993
DRILLING & WATER DETAIL Moisture Content	Pry Density % Fines Atterberg Limits	SAMPLES & SPT DATA RL (m)	DEPTH (m) GRAPHIC LOG	Soil Type, Colour, Plastic	DESCRIPTION ity or Particle Characteristic Vinor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
			- 🕅	FILL: Clayey SILT: (ML) brown, trace fine sand		D	VSt	
Palatino Toon Not Euroon No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not No Not Not	LL=44 PI=28 LS=11.5	0.80m U 63.4- 1.25m D 62.4- 2.20m D 61.4- 3.25m 60.4-		Jadem (Jace Inte Sand		M	H H	1.25: Pocket penetrometer unable to penetrate soil Vane shear unable to penetrate soil 3.25: PP result = 5.4kg/cm <sup>2</sup> VS peak = 213kPa VS residual = 67kPa
		4.50m D 59.4 58.4 57.4		Borehole terminated at 5.0m (Targ	get Depth)			
VB Washbo RR Rock Ro H Air Ham	ight Auger NQ pre PQ olling NML(	HQ Coring NQ Coring PQ Coring C NMLC Coring	g B Bull ES Env EW Env PP Hand	Soil Sample W Water S Water Sample Penetrometer MOISTURE	mple VL Vi bed Tube Sample L Lo ample D D		4 10	CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0-2 S Soft 12 - 25 {2-4} F Firm 25 - 50 {4-8} St Stiff 50 - 100 {8-1 VSt Very Stiff 100 - 200 {15-

JA	20	DC

	PR	OJE	ст	: Ma	allee	СМА	SDL A	dva	anced	d Conce	pt Design JOB NO : IS079600 WBS#002		F	PAG	E : 1	1 (	DF 1
	PO	SITIC	DN	: E:	7117	711.00	00, N: 6	613	6858	8.000 ( N	IGA94) SURFACE ELEVATION :						: Burra Creek
- ł										vator (3.	· ·	ng					DTH : 0.35m
ŀ			XCA				0/14 to	24	/10/1	4	LOGGED BY : IW CHECKED BY :	1			NDAF	RD	:
	EXCAVATION &	WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY		<sup>10</sup> (blows/100mm) <sup>15</sup>	0	COMMENTS Field Test Data & Other Observations
ł	4							+	+		ROAD BASE (FILL): sandy silty CLAY (CI):		ö	2		Ñ	0.00: Hand Penetrometer
									F		grey						noted
JACOBS AGS REVOA (WORKING).GLB LOG SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <dreamingfile> 09/12/2014 15:40</dreamingfile>							0.50m B-2 bags 0.60m B-2 bags 1.40m B-2 bags 2.20m B-2 bags 2.20m B-2 bags 2.20m				100m         sandy slity CLAY (CH)         dark grey, with some grey sand layers 10mm thick         red brown sands between 0.5 and 1.0m depth. Possibly eroded from higher         red sandy ground.         1.20m         sandy slity CLAY (CI):         mottled dark grey with yellow staining, with some 20-30mm charcoal fragments         and burnt earth that appear to both be from fire induced collapse of channel bank.         1.00m         sandy slity CLAY (CI):         grey with yellow grey mottling         1.0m         sandy slity CLAY (CI):         grey with yellow grey mottling         1.0m         sandy slity CLAY (CI):         grey with yellow grey mottling         1.0m         sandy slity CLAY (CI):         grey with yellow grey mottling         1.0m         sandy slity CLAY (CI):         grey with yellow grey mottling         with some charcoal and fine white particles (gypsum)         2.40m         slity clayey SAND (SC):         fine grained, mottled pale grey and yellow		VSt				tests > 6 kg/cm <sup>2</sup> unless
EST P																	
LEE TI									F		pale grey, with some clay						
MAL	¥						2.70m B-2 bags		F	<u>  / / / / / / / / / / / / / / / / / / /</u>	2.70m End of test pit at 2.70m	-	-				
TLOG							Lougs	Ί									
OG SKM TEST PIT									-								
JACOBS AGS REV04 (WORKING).GLB Li	N E BH	Ex Ba	cavate ackhoe GF Z = 1	Existii or Buc ROUN Vater Vater Vater	ket DWA level level	ting B R TER SN (static) (during v	YMBOLS	er	r	D Sn ES En EW En HP Har HV Har	SAMPLES & FIELD TESTS     DENSIT       ilk Sample     U     Undisturbed Tube Sample       nall Disturbed Sample     W     Water Sample       vx Soil Sample     W     Water Sample       vv Water Sample     W     Water Sample       vv Water Sample     MD     Medium Dense       nd Penetrometer (UCS result)     D     Dense       vd Vane Shear (P: Peak Su, R: Residual Su)     VD     Very Dense       CO Compact     MOISTURE CON     D = Dry       rographs     YES     NO     MOISTURE CON	DITIO			VS S St VSt H		CONSISTENCY (Su) /ery Soft (0-12.5kPa) Soft (12.5-25kPa) Firm (25-50kPa) Stiff (50-100kPa) /ery Stiff (100-200kPa) Hard (>200kPa)

				7		P	S					TES	T PIT L	OG			НΟ	DLE	NC	):	встр	<b>P</b> 02
- E									nced	Conce	pt Design	JOB NC	) : IS07960	0 WBS#	002		F	PAGE	E : 1	1 C	)F 1	
÷										.000 ( N			CE ELEVAT								Burra C	
E							e CX36 )/14 to			ator (3.	6t) LOGGED BY			Ashley J : ECKED B	Shirnack Contrac	ting		STAN			DTH : 0	.35M
f			NOA		DA <sup>:</sup>					-	LOGGED DI		On				-	1			•	
	EXCAVATION & WATER	DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG		Colour, Pla	AL DESCRIPT sticity or Partic nd Minor Com	le Charact	teristic	MOISTURE	CONSISTENCY/DENSITY	5 DCP	<sup>10</sup> (blows/100mm) <sup>15</sup>	20	Fie	OMMENTS eld Test Data er Observations
ı							0.30m D	_	-		EMBANKMENT FILL red 0.30m silty sandy CLAY (SC dark crev, with some					D	St VSt - H				imported fi Hand Pene 6 kg/cm <sup>2</sup>	ankment and II material. etrometer tests > red creek bed
				FXC			0.40m				ark grey, with some adm End of test pit at 0.4t	Te/Mn con m					VSL-H				CONSISTE	
	N E BH		avato khoe GF = \ - = \ - = \	Existir or Buck ROUN Vater Vater Vater	ng cut ket DWA level	ting B R TER SY (static) (during v	Buld Ripp MBOLS drilling)	er S		D Srr ES En EW En HP Har HV Har	Ik Sample nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (UCS nd Vane Shear (P: Pea	U Un W Wa	disturbed Tube iter Sample	NO	DENS VL Very Loose L Loose MD Medium Dens D Dense VD Very Dense CO Compact MOISTURE CO D = Dry M = Mois	e NDITIO			VS S St VSt H	V S F S V	/ery Soft Soft Stiff /ery Stiff lard	NCY (SU) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)

				P	S	1			TEST PIT LOG		HC	DLE N	10:	BCTP03
							ncec	l Conce	pt Design JOB NO : IS079600 WBS#002		F	PAGE	: 1 (	OF 1
					,			.000 ( N	,					: Burra Creek
EQUIP DATE								ator (3.	6t) CONTRACTOR : Ashley J Shirnack Cor LOGGED BY : IW CHECKED BY :	tracting		STAND		IDTH : 0.35m
			B DA			24/		4			1 .	1		
EXCAVATION 8 WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm)	15 20	COMMENTS Field Test Data & Other Observations
							-		sity sandy CLAY (CI): dark grey, trace roots and charcoal	D	St - VSt			0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm Vane Shear unless noted
					0.30m B-2 bags 0.40m	-	-							0.25: Soil excavated in 50-150mm broken clods
							-0.5 - -			D - N	VSt - H			
					1.00m B-2 bags 1.10m		-1.0		1.00m SAND (SP) fine grained, grey to yellow, with some silt, trace clay, 1-2mm carbonate nodules		-			
— — — — — —							_		1.40m					
					1.50m B-2 bags 1.60m	_	-1.5 -		silty sandy CLAY (CI): grey to yellow, sand is fine grained	D				1.40: Increase in excavator resistance
•					2.10m B-2 bags 2.20m	_	- 		Fe/Mn staining 2-5%		н			
¥							-		2.30m End of Test Pit at 2.3m					
							-2.5							
							_							
N N E E BH E	<u> </u>	Existir or Buck ROUN Water Water	ket DWA level	ting B R TER SY (static) (during	Buld Ripp 'MBOLS drilling)	ber S		D Sm ES En EW En HP Har HV Har	Ilk Sample     U     Undisturbed Tube Sample     VL     Very Loc       nall Disturbed Sample     W     Water Sample     L     Loose       vv Soil Sample     MD     Medium     D     MD       vv Water Sample     MD     Medium     D     Dense       vd Vane Shear (P: Peak Su, R: Residual Su)     VD     VD     VD	Dense nse t		F	rS it 'St	CONSISTENCY (Su) Very Soft (0-12.5kPa) Soft (12.5-25kPa) Firm (25-50kPa) Stiff (50-100kPa) Very Stiff (100-200kPa) Hard (>200kPa)
	=							NOTE	S YES NO MOISIUR D = Dry M =	E CONDITIC Moist W =				

JA	~		-	C					TEST I	PIT LOG			HC	LE NO	): <b>BC</b>	CTP04
PROJECT						nced	l Conce	ot Design	JOB NO :	IS079600 WBS	#002		F	PAGE :	1 OF 1	
POSITION									SURFACE	ELEVATION :			L	OCATIO	N : Bu	ırra Creek
EQUIPME	ENT TY	PE :	Case	e CX36	ЪВЕ	xcav	vator (3.	6t)	CONTRAC	TOR : Ashley J	Shirnack Contra	cting	E	BUCKET	WIDTH	: 0.35m
DATE EX	CAVAT	ED :	24/10	0/14 to	24/	10/1	4	LOGGED BY	: IW	CHECKED	BY :			STANDA	RD :	
EXCAVATION & WATER DETAIL	Moisture Content Dry Density	A DA 8	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type	e, Colour, Plastici	DESCRIPTION ty or Particle Charac Minor Components	cteristic	MOISTURE	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm) 15		COMMENTS Field Test Data & Other Observations
				0.60m B-2 bags 0.70m 1.10m				surface.	ides (expansive). small carbonate (d	calcrete) nodules, inf	i holes developed at		VSI		0.00: tests noted	: Hand Penetrometer > 6 kg/cm <sup>2</sup> unless d enetration of 19mm e Shear unless noted
E Exca BH Back	EXC iral/Existi wator khoe Buc GROUN = Wate = Wate = Wate = Wate	ket IDWA r level r level r level r inflov	ting B R TER SN (static) (during v		er		D Sn ES En EW En HP Har HV Har	Ik Sample nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (UC: d Vane Shear (P: Pe	e W Water S	·	DEN: VL Very Loose L Loose MD Medium Der D Dense VD Very Dense CO Compact MOISTURE C D = Dry M = Mo	nse ONDITIO		VS S F St VSI H	Very S Soft Firm Stiff	(12.5-25kPa) (25-50kPa) (50-100kPa)

					P	S				TEST PIT LOG		ŀ	ю	LE NO	D:	BCTP05	
								ced	Conce	ot Design JOB NO: IS079600 WBS#002			F	PAGE :	1 (	OF 1	
ł									000 ( M							: Burra Creek	
ł									ator (3.0	,	Contracting					DTH : 0.35m	
ł	DATE			ED : B DA			24/10		+	LOGGED BY : IW CHECKED BY :		Τ			RD	:	
	EXCAVATION & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE		CONSISTENCY/DENSITY	5 DCP <sup>10</sup> (blows/100mm)	20	COMMENTS Field Test Data & Other Observations	
ľ	•							-		silty CLAY (CH): mottled yellow to grey, with some fine grained sand, with some Fe/Mn gravels/concretions	D		0			0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted	
										gravelscencetons	-	-				No penetration of 19mm Vane Shear unless noted	
											D - 1	м					
								. 1	$\square$								
						0.50m D-1 bag		0.5				5	St -		i I		
						0.60m		. 1					/St				
	ш  							. 1									
							-	· .		roots	м						
						1.00m D-1 bag		1.0		1.05m						1.00: Hand Penetrometer test 4.6 and 5.2 kg/cm <sup>2</sup>	-
						1.10m				clayey SAND (SC): yellow with yellow grey mottling							
													D				
								· .							i I		-
	¥					1.50m		1.5		1.50m							-
						D-1 bag 1.60m				End of test pit at 1.50m							-
10.40																	-
107/21/16							-										
J LIEV C								2.0									
							-										
- CLD.+																	
20 10 20																	
								2.5									_
3																	
															i I		
MNC 60-																	
	ΕE	Natural/ Excavat	/Existii or	-		Buldo Ripp			D Sm	SAMPLES & FIELD TESTS k Sample U Undisturbed Tube Sample VL Very Iall Disturbed Sample W Water Sample L Loo:				VS S	,	CONSISTENCY (Su) Very Soft (0-12.5kPa) Soft (12.5-25kPa)	
	BH I	Backho							ES En EW En	v Soil Sample V Mater Sample MD Med	lium Dense			F St		Firm (12.5-25kPa) Firm (25-50kPa) Stiff (50-100kPa)	
		<u> </u>	Water	level	(static)	(MBOLS			HP Har HV Har	nd Penetrometer (UCS result) D Den VD Very CO Con	y Dense			VS H	ť	Very Stiff (100-200kPa) Hard (>200kPa)	
00400		⊻ = ►= - <b>∢</b> =	Water	inflov	V	drilling)			PHOTO NOTES		· FURE CONDITION M = Moist W =		ət			、 ,	
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	6		P	S				TEST	PIT LOG			HO	IE NC	): <b>BC1</b>	P06
PROJECT						ed Conce	pt Design	JOB NO :	IS079600 WBS#	¥002		F	PAGE : 1	I OF 1	
POSITION									ELEVATION :			L	OCATIO	N : Burra	Creek
EQUIPME										Shirnack Contract	ting	E	BUCKET	WIDTH :	0.35m
DATE EX				)/14 to	24/10/	/14	LOGGED BY	: IW	CHECKED	BY :		1.	STANDAF	RD :	
EXCAVATION & WATER DETAIL	Moisture Content	AB DA	Atterberg	SAMPLES & FIELD DATA	RL (m)	GRAPHIC LOG		Colour, Plastic	DESCRIPTION bity or Particle Charac Minor Components	cteristic	MOISTURE	CONSISTENCY/DENSITY	5 10 15 (blows/100mm)	& C	COMMENTS Field Test Data ther Observations
				0.15m D-1 bag 0.25m 0.60m D-1 bag 0.70m		5	silty sandy CLAY (Cl mottled yellow grey a grey	): and yellow brow	vn, sand is fined grair	ied	D	St VSt-H		0.00: Ha tests > 6 noted No pene	nd Penetrometer kg/cm <sup>2</sup> unless etration of 19mm near unless noted
						5	End of test pit at 1.0								
E Exca BH Back	GROL GROL = Wat = Wat = Wat	JNDWA ter level	ting B R TER SY (static) (during v	Bulda Ripp 'MBOLS drilling)	er	D Sr ES Er EW Er HP Ha HV Ha	SAMPLES & I lk Sample nall Disturbed Sample to Soil Sample to Water Sample nd Penetrometer (UCS nd Vane Shear (P: Pea OGRAPHS	U Undist W Water	·	DENSI VL Very Loose L Loose MD Medium Dens D Dense VD Very Dense CO Compact MOISTURE CO D = Dry M = Mois	e NDITIC	N Wet	VS S F St VSt H	CONSIS <sup>®</sup> Very Soft Soft Firm Stiff Very Stiff Hard	(12.5-25kPa) (25-50kPa) (50-100kPa)

	J		~		P	S				TEST PIT LOG		Н	ЭL	E NO	: BCTP07	
								ced	Conce	ot Design JOB NO : IS079600 WBS#002			PA	AGE : 1	OF 1	
	POSITI									-					I : Burra Creek	
	EQUIP										cting		-		VIDTH : 0.35m	
	DATE	EXCA T				)/14 to	24/10	0/14 T	1	LOGGED BY : IW CHECKED BY :			-	ANDAR	D :	
	EXCAVATION & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY		5 DCP 10 (blows/100mm) 15	COMMENTS Field Test Data & Other Observations	
								1		silty CLAY (CH): dark grey, with some fine grained sand			,		0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted	
						0.50m D-1 bag 0.60m 1.20m 1.30m				with some roots at 0.15m yellow to grey-dark grey, with some gypsum, trace carbonate nodules <2%, silickensides, inferred expansive clay silty, sandy CLAY (CH-CI): increase in yellow grey mottle at 1.0m. 125m End of test pit at 1.25m	D	VSt -			No penetration of 19mm Vane Shear unless noted	
VODES AGS REVUT (VUORNING). GED LUG	E E BH B	<u> </u>	Existir or e Buck ROUN Water Water Water Water	ket DWA <sup>*</sup> level level inflov	ting B R TER SY (static) (during v	Bulda Ripp 'MBOLS drilling)	er		D Sm ES En EW En HP Har HV Har	SAMPLES & FIELD TESTS     DEN       k Sample     U     Undisturbed Tube Sample     VL     Very Loose       lall Disturbed Sample     W     Water Sample     VL     Very Loose       v Soil Sample     W     Water Sample     U     Undisturbed Tube Sample       v Water Sample     W     Water Sample     MD     Medium Det       ud Penetrometer (UCS result)     D     Dense     VD     Very Loose       ud Vane Shear (P: Peak Su, R: Residual Su)     VD     Very Dense     CO     Compact       DGRAPHS     YES     NO     MOISTURE C     D     D	ise DNDITIC			VS S F St VSt H	CONSISTENCY (Su)           Very Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           Very Stiff         (100-200kPa)           Hard         (>200kPa)	

JA			G					TEST	PIT LOG			HC	DLE N	0:	BCTP08
PROJECT					ncec	d Conce	pt Design	JOB NO :	IS079600 WBS	#002		I	PAGE :	1	OF 1
POSITION									ELEVATION :						: Burra Creek
EQUIPMEN	T TYPE	: Case	e CX36	βBE	xca	vator (3.	,		TOR : Ashley J	Shirnack Contractir	ıg	I	BUCKE	ΤW	IDTH : 0.35m
DATE EXCA			0/14 to	24/	10/1	4	LOGGED BY	: IW	CHECKED	BY :		1 .	STAND/	ARD	<b>)</b> :
EXCAVATION & WATER DETAIL Moisture Content	PLAN Density	_	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, Si	Colour, Plastici	DESCRIPTION ty or Particle Charac Minor Components	cteristic	MOISTURE	ONSISTENCY/DENSITY	5 DCP 10 (blows/100mm)	9 0	COMMENTS Field Test Data & Other Observation
					_		ROAD FILL:CLAY/S/ pale grey to yellow, v	AND with some silt			D	St	2		0.00: Hand Penetromete tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm
							<u>o.15m</u> silty sandy CLAY (CI dark grey trace roots slickensides observe <u>1.00m</u> End of test pit at 1.00	ad, inferred expa	ansive clay		м	VSt			1.00: Hand Penetromete test 5.3kg/cm <sup>2</sup>
E Excavat BH Backho Q Q E = Q E =	EXCAV/ /Existing c tor be Bucket ROUNDW Water lev Water lev Water our	utting B R ATER S el (static) el (during ow	YMBOLS	er		D Sr ES Er EW Er HP Ha HV Ha	SAMPLES & F Ik Sample nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (UCS nd Vane Shear (P: Pea OGRAPHS s	U Undistu W Water S Fresult)	·	DENSIT VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense CO Compact MOISTURE CONI D = Dry M = Moist	ΟΙΤΙΟ		V. S F S V. H	S t St	CONSISTENCY (Su) Very Soft (0-12.5kPa) Soft (12.5-25kPa) Firm (25-50kPa) Stiff (50-100kPa) Very Stiff (100-200kPa Hard (>200kPa)

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			~		P	S				TEST PIT LOG		НС	DLE	E NC	):	BCTP09
PI								ncec	I Conce	pt Design JOB NO : IS079600 WBS#002			PAG	iE : 1	1 C	DF 1
						-			.000 ( N							Burra Creek
									/ator (3.	, , ,	ting					DTH : 0.35m
		:XCA				)/14 to	24/	10/1	4	LOGGED BY : IW CHECKED BY :		1 .		NDAF	עא 	:
EVCAVATION 8		Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	:ONSISTENCY/DENSITY	2	<sup>10</sup> (blows/100mm) <sup>15</sup>	20	COMMENTS Field Test Data & Other Observations
								_		TOPSOIL: sily sandy CLAY (CI): pale grey and yellow grey mottle, sand is fine grained	м	VSt -	H			0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm Vane Shear unless noted
								_		0.20m silty sandy CLAY (CH) dark grey, trace roots and carbonate nodules						
								-0.5			D - N	1				
						0.60m D-1 bag 0.70m	-	_		slickensides, inferred expansive soil		– VSt				
								_		slickensides closely space 20-30mm, inferred highly expansive clay, 1-2%	м					
×						1.00m D-1 bag 1.10m	-	-1.0		Carbonate concretions 2-5mm diameter.						
								_								
								-1.5								
								_							     	
/12/2014 15:41								_							     	
rawingFile>> 09								-2.0								-
2014.GPJ < <d< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></d<>								_								
PIT LOGS 30 10								-2.5								
MALLEE TEST								_								
SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <drawingfile>&gt; 09/12/2014 15:41</drawingfile>								_								
JACOBS AGS REV04 (WORKING).GLB Log SKM	H Ba	cavati ackhoe GF	Existir or Buck ROUN Vater Vater Vater	ket DWA <sup>-</sup> level level inflov	ting B R TER SY (static) (during v	Buld Ripp 'MBOLS drilling)	er S		D Srr ES En EW En HP Har HV Har	SAMPLES & FIELD TESTS     DENS       Ik Sample     U     Undisturbed Tube Sample     VL     Very Loose       Iall Disturbed Sample     W     Water Sample     VL     Very Loose       V Soil Sample     W     Water Sample     MD     Medium Dens       Id Penetrometer (UCS result)     D     Dense     VD     Very Dense       Id Vane Shear (P: Peak Su, R: Residual Su)     CO     Compact     MOISTURE CO       OGRAPHS     YES     NO     MOISTURE CO	e NDITIC			I I VS S F St VSt H	V S F S V	CONSISTENCY (Su) /ery Soft (0-12.5kPa) Soft (12.5-25kPa) Firm (25-50kPa) Stiff (50-100kPa) /ery Stiff (100-200kPa) łard (>200kPa)

		~		P	S					TEST	PIT LOG			Н	IOL	E NC	): <b>BC1</b>	P10
							nced	Conce	ot Design	JOB NO	IS079600 WBS	S#002			PA	GE : 1	1 OF 1	
POSITI	ON	: E:	712	783.00	00, N: 6	6134	825	.000 ( N	IGA94)	SURFACE	ELEVATION :				LO	CATIO	N : Burra	Creek
								vator (3.	,		CTOR : Ashley		ontracting				WIDTH :	0.35m
DATE E	<u>=XCA</u>		ED : B DA		J/14 to	24/	10/1	4	LOGGED BY	: IVV	CHECKED	)BY :		Т		ANDAF	<u>י ט</u> א ו	
EXCAVATION & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type	, Colour, Plasti	DESCRIPTION city or Particle Chara Minor Components	acteristic		MOISIURE	CONSISTENCY/DENSITY	5 DCP <sup>10</sup> (blows/100mm)	& C	COMMENTS Field Test Data ther Observation
Å							-		TOPSOIL: sily sand yellow and grey mo	iy CLAY (CI): ttle, insect burr	ows observed, roots	s at 0.2m.			it - /St		tests > 6 noted	nd Penetrometer kg/cm <sup>2</sup> unless tration of 19mm lear unless noted
L					0.60m D-1 bag 0.70m	-			silty sandy CLAY (C dark grey		0.6m		D	- м у	/St		         0.60: Ha   test 5.5-	nd Penetrometer ≻6kg/cm²
1					1.00m D-1 bag	_			slickensides closely 1.00m End of test pit at 1.0		m, inferred highly ex	pansive clay	,	и :	St			
					1.10m													
E Ex BH Ba	xcavate lackhoe GF V = '	Existir or e Bucl ROUN Water Water Water	ket DWA level level	ting B R TER SN (static) (during v	Buld Ripp (MBOLS drilling)	er	-	D Sn ES Er EW En HP Har HV Har	Ik Sample nall Disturbed Sample v Soil Sample v Water Sample d Penetrometer (UC4 d Vane Shear (P: Pe	e W Water S result)	·	L Loose MD Mediu D Dense VD Very I CO Comp	e im Dense e Dense		et	         VS S F St VSt H	Very Soft Soft Firm Stiff	ENCY (Su) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa (>200kPa)

			~		Þ	S				TEST PIT LOG		HC	LE NC	: BCTP11
								nceo	d Conce	ot Design JOB NO : IS079600 WBS#002		F	PAGE : 1	I OF 1
						,			.000 ( N	,				N: Burra Creek
						e CX36 0/14 to			vator (3.	CONTRACTOR         Ashley J Shimack Contraction           LOGGED BY         IW         CHECKED BY :	g			WIDTH: 0.35m
	4			DA <sup>-</sup>			24/		-			<b>1</b>		
FXCAVATION	WATER	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	5 DCP <sup>10</sup> (blows/100mm)	COMMENTS Field Test Data & Other Observations
μ.						0.20m D-1 bag 0.30m 0.60m D-1 bag 0.70m	-			TOPSOIL: sily sandy CLAY (CI): pale grey and yellow grey mottle, grass roots <u>0.35m</u> silty sandy CLAY (CI): dark grey, 2% carbonate nodules 2-7mm diameter slickensides, inferred expansive clay	M	S - F		O.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm Vane Shear unless noted
JACOBS AGS REV04 (WORKING).GLB Log SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <drawingfile>&gt; 09/12/2014 15.41 空ロス  </drawingfile>				AVAT				-1.0 - - - - - - - - - - - - - - - - - - -		SAMPLES & FIELD TESTS DENSITY				
JACOBS AGS REV04 (WORKING).GLE	_	GF	or Buck ROUN Vater Vater Vater	ket DWA <sup>-</sup> level	(static) (during v	Buld Ripp /MBOLS drilling)	er		D Sn ES En EW En HP Har HV Har	Ik Sample       U       Undisturbed Tube Sample       VL       Very Loose         Iall Disturbed Sample       W       Water Sample       L       Loose         v Water Sample       MD       Medium Dense       MD       Medium Dense         v Water Sample       V       Very Loose       L       Loose         v Water Sample       MD       Medium Dense       D       Dense         v Vane Shear (P: Peak Su, R: Residual Su)       VD       Very Dense       CO       Compact         OGRAPHS       YES       NO       MOISTURE COND       D = Dry M = Moist			VS S F St VSt H	Very Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           Very Stiff         (100-200kPa)           Hard         (>200kPa)

JACOBS		
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					CMA		dvar	nced	l Concer	ot Design JOB NO : IS079600 WBS#002		P	AGE : 1 (	DF 1
									.000 ( M	•		LC	OCATION	: Burra Creek
EQ	UIPM	/ENT	TY	PE :	Case	e CX36	ΒE	xca\	vator (3.	t) CONTRACTOR : Ashley J Shirnack Contracting	g	В	UCKET WI	DTH : 0.35m
DA	TE E	XCA	VAT	ED :	24/10	)/14 to	24/	10/1	4	LOGGED BY : IW CHECKED BY :			TANDARD	:
EXCAVATION &	WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	5 10 (blows/100mm) 20	COMMENTS Field Test Data & Other Observations
SKM TEST PTLOG MALLEE TEST PTLOGS 30 10 2014 GPJ < <drawngfile>&gt; 09/12/2014 15:41</drawngfile>						0.50m D-1 bag 0.60m D-1 bag 1.10m D-1 bag 1.60m D-1 bag 2.20m D-1 bag 2.20m D-1 bag 2.20m D-1 bag 2.20m				FILL: silty sandy CLAY (CH): dark grey, with some red sand lenses         170m         170m         silty sandy CLAY (CH): high plasticity, dark grey         grey to dark grey, medium plasticity         yellow grey, with some gypsum and carbonate concretions, slickensides observed, inferred expansive clay         yellow mottle (5%), increase in carbonate nodules (5-10%), trace roots         slickensides, inferred expansive clay         20m         27m         End of test pit at 2.7m	м	F		2.10: Complex stratigraphy inferred old channel deposits
	Ex Ba	GF GF Z = 1 Z = 1 = 1	Existir or Buck ROUN Vater Vater Vater	ket DWA level level inflov	ting B R TER SN (static) (during v	Buld Ripp /MBOLS drilling)	er		D Srr ES En EW En HP Har HV Har	SAMPLES & FIELD TESTS (Sample U Undisturbed Tube Sample all Disturbed Sample W Water Sample Vater Sample (Water Sample d Penetrometer (UCS result) d Vane Shear (P: Peak Su, R: Residual Su) DGRAPHS VES NO MOISTURE CONDI		<u> </u>	VS S F St VSt	CONSISTENCY (Su) Very Soft (0-12.5kPa) Soft (12.5-25kPa) Firm (25-50kPa) Stiff (50-100kPa) Very Stiff (100-200kPa) Hard (>200kPa)
JACOBS		<b>-4</b> = \	Nater	outflo	W				NOTE	D = Dry M = Moist V	W = \	Net		201012 Dags 1 OF 1

				B	S				TEST PIT LOG		HC			
									Design JOB NO : IS079600 WBS#002					OF 1
					-			.000 ( M						I : Burra Creek
					e CX36 0/14 to			/ator (3.0	CONTRACTOR: Ashley J Shirnack Contract           LOGGED BY: IW         CHECKED BY:	ting				VIDTH : 0.35m
×			B DA		0/14 (0 	24/	10/1	4				1	NDAR	
EXCAVATION 8 WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	ONSISTENCY/DENSITY		(blows/100mm)	COMMENTS Field Test Data & Other Observatio
	2								LEVEE FILL: silty sandy CLAY (CI): dark grey, with some sand		8	2	1 1 1	0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted
							-							No penetration of 19mn Vane Shear unless note
							-							
							-							
							-0.5							
							-							
							-				F			
					1.00m		-1.0							
					B-2 bag 1.10m									
							$\left  - \right $							
										м				
							-1.5			IVI				
							-		burried leaf matter and tree branches (inferred old surface)					
					1.70m 1.60m D-1 bag	-			roots					1.70: Hand Pentrometer tests 5.5 to > 6 kg/cm <sup>2</sup>
							-2.0							
							-							
							[ ]		slickenslides observed, inferred expansive clay		VSt			
							-							
							-2.5							
									pale grey to grey, sluphur odour 2.80m End of test pit at 2.8m	_				
							-							
l Na	aturo!/	EXC	AVAT	TON ting B	بر ان ا	0707		B Bul	SAMPLES & FIELD TESTS DENS k Sample U Undisturbed Tube Sample VI Venu ossa	ITY	<u> </u>		<u></u>	CONSISTENCY (Su)
E Ex	aturai/i xcavato ackhoe	or		ung B R	Buld Ripp	ozer ier		D Sm	k Sample U Undisturbed Tube Sample VL Very Loose all Disturbed Sample W Water Sample L Loose v Water Sample MD Medium Dens	se			VS S F	Very Soft (0-12.5kPa) Soft (12.5-25kPa) Firm (25-50kPa)
	<u>۲</u> =۱	Water	level	(static)					d Penetrometer (UCS result) d Vane Shear (P: Peak Su, R: Residual Su) CO Compact				St VSt H	Stiff         (50-100kPa           Very Stiff         (100-200kP           Hard         (>200kPa)
►	∑ = \ ► = \ - <b>4</b> = \	Water	inflov	V	drilling)			PHOT NOTE		NDITIC	DN			

			~		P	S				TEST PIT LOG		НС	DLE	E NO	: E	BCTP14	
								nced	Conce	ot Design JOB NO : IS079600 WBS#002			PAG	6E:1	OF	- 1	
ł		 							.000 ( N							Burra Creek	
									vator (3.		ting					TH : 0.35m	
				DA		0/14 to	24/		4	LOGGED BY : IW CHECKED BY :		1 .	1	NDAR			_
	EXCAVATION & WATER	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	2	<sup>10</sup> (blows/100mm)	50	COMMENTS Field Test Data & Other Observations	
	•								$\times$	FILL: CLAY and CALCRETE GRAVEL					0 te	.00: Hand Penetrometer ests > 6 kg/cm <sup>2</sup> unless	
								-			D	F			n N	oted lo penetration of 19mm	-
								-	ÿ	0.20m			$\left\{ \right\}$		ľ	ane Shear unless noted	-
	μ					0.60m B-2 bags 0.70m				sility sandy CLAY (CH): grey	D	St - VSt					
3000 1531 FIL LOG IMALEEE 1501 FIL FOOD OU TO 20 10 20 14-01 0 1-00 18-10 000 18-20 1-000 18-20 1-000	•					2.85m D-1 bag 2.75m		1.5 		2.70m End of test pit at 2.70m	M						
ארטםס אפט הרעשין (איטהואואט). טרע העש	E	ral/E wato khoe GRi = V = V = V	ixistin r Buck OUNI Vater Vater Vater	et DWA <sup>-</sup> level	TER SY (static) (during	Bulda Ripp 'MBOLS drilling)	er		D Sn ES En EW En HP Har HV Har	SAMPLES & FIELD TESTS     DENS       k Sample     U     Undisturbed Tube Sample       v Soil Sample     W     Water Sample       v Water Sample     Dense     MD Medium Den       v denetrometer (UCS result)     Dense     VD Very Dense       vd Vane Shear (P: Peak Su, R: Residual Su)     VO     VD Very Dense       DGRAPHS     YES     NO     MOISTURE CC	se NDITIC	DN Wet		VS S F St VSt H	Ve So Fir Sti	m (25-50kPa) ff (50-100kPa) ry Stiff (100-200kPa)	



### **TEST PIT LOG**

	PRO	DJE	СТ	: Ma	allee	CMA	SDL A	dva	nceo	I Conce	pt Design	JOB NO : I	S079600 WBS	#002		F	PAG	E :	1	OF 1		
	POS	SITIO	DN	: E:	7127	754.00	00, N: 6	6121	990	.000 ( N			ELEVATION :							: Burra (		
- F										vator (3.				J Shirnack Contract	ing					IDTH : C	).35m	
			XCA				0/14 to	24/	10/1	4	LOGGED BY :	IW	CHECKED	BY :		1 .	1	NDA	١RD	):		
	EXCAVATION &	DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, C	MATERIAL DE olour, Plasticity condary and Mi	ESCRIPTION / or Particle Chara inor Components	cteristic	MOISTURE	CONSISTENCY/DENSITY		<sup>10</sup> (blows/100mm)	0	Fi	COMMENTS eld Test Data ner Observations	
							D 0.10m				silty clayey SAND (SC) dark grey 0.10m_	):				Ŭ				0.00: Surf Spade sa No penetr	ace of creek bed. mple collected. ation of 19mm	
								1	F		End of test pit at 0.1m									Vane She	ar	
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JACOBS AGS REV04 (WORKING).GLB Log SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <drawingfile>&gt;</drawingfile>	N E BH	Ex Ba	cavato ackhoe GF Z = 1	Existii or Buc ROUN Vater Vater Vater	ket IDWA level level	ting B R TER SN (static) (during v	Ripp YMBOLS	6		D Sn ES En EW En HP Har HV Har	SAMPLES & FIE Ik Sample nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (UCS re d Vane Shear (P: Peak S	U Undistur W Water S esult) Su, R: Residua		DENSI VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense CO Compact MOISTURE CON D = Dry M = Moisi	∍ NDITIO			V: S F St H	S St	CONSISTE Very Soft Soft Firm Stiff Very Stiff Hard	NCY (Su) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)	
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	PROJ	JECT	: Ma	allee	CMA	SDL A	dvan	nced	Conce	pt Design JOB NO : IS079600 WBS#002				E:1			
									.000 ( M						: Burra		
						e CX36 D/14 to			ator (3.)	6t)         CONTRACTOR         Ashley J Shimack Contract           LOGGED BY         IW         CHECKED BY         CHECKED BY	ing				/IDTH : (	J.35M	
		-		B DA						COOLED DT : MY CHECKED DT :							
	EXCAVATION & WATER	DE LAIL Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	5 DCP	<sup>10</sup> (blows/100mm) <sup>15</sup> 20	F & Oti	COMMENTS ield Test Data her Observations	
									$\otimes$	FILL: SAND (50%) CLAY (50%) sand is red, clay is grey					tests > 6	id Penetrometer kg/cm <sup>2</sup> unless	
								-				D-F	II.		No penet	ration of 19mm ar unless noted	-
								-									-
								-	¥¥	0.30m	_				0.30: infe	rred natural	-
										CLAY (CH): mottled pale grey and red brown, with Fe/Mn concretions				i i i	0.50. 1116	neu naturai	
																	-
						0.50m D-1 bag		-0.5	//		D						_
						0.60m		-						i i i			-
								-	44	0.70m	_						-
										CLAY (CH): grey, inferred expansive							_
													li.				
								-									-
								-1.0									_
						1.10m D-1 bag		-	///	increase in soil mositure		-					-
						1.20m											_
								-									-
	ш́ 							-					Li.				-
								-1.5									_
								_				VSt					-
													L į	i i i			
-								_									-
								-		roots observed, slickensided, inferred highly expansive clay							-
12/2/ 10								-					Li.				-
								-2.0	///		м						_
- Billion																	_
														i i i			
								-									-
								-									-
8								-									-
								-2.5									
									///	with some gypsum crystals in clay							-
								-					Li.				-
	¥					2.80m D-1 bag	$\left\{ \right\}$	-		2.80m End of test pit at 2.8m	+	-					
						2.90m		_									-
	N	Net	EXC	AVAT	ION	D. 11			B Bu	SAMPLES & FIELD TESTS DENSI Ik Sample U Undisturbed Tube Sample VI VeryLorge	TY				CONSIST		
0.0	N E BH	Natural Excava Backho	tor		ing B R	Buldo Ripp			D Sm	Ik Sample U Undisturbed Tube Sample VL Very Loose nall Disturbed Sample W Water Sample L Loose VSoil Sample				VS S	Very Soft Soft	(0-12.5kPa) (12.5-25kPa)	
	ווט								EW En	v Water Sample MD Medium Dense	Э			F St	Firm Stiff	(25-50kPa) (50-100kPa)	
					TER SN (static)	(MBOLS			HP Har HV Har	nd Vane Shear (P: Peak Su, R: Residual Su) VD Very Dense				VSt	Very Stiff	(100-200kPa)	
		=		level	(during	drilling)								Н	Hard	(>200kPa)	
		-4=							NOTE	S YES NO MOISTURE CON D = Dry M = Moist	NDITIC t W =	Wet					
ŝ																	

J		7		P	S	1			TES	T PIT LOG			HC	DLE NO	): <b>NN</b>	ГР01
							nceo	Conce	t Design JOB N	O:IS079600 WBS#	#002		F	PAGE :	I OF 1	
								.000 ( N		ACE ELEVATION :					N : Nyah	
EQUIP								vator (3.	t) CONTI LOGGED BY : IW	RACTOR : Ashley J CHECKED E		ng		BUCKET STANDAF	WIDTH :	0.35m
- *			BDA					4	LOGGED BY . IW	CHECKED	51.					
EXCAVATION 8 WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, Colour, Pl	IAL DESCRIPTION asticity or Particle Charac and Minor Components	teristic	MOISTURE	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm) 15	& (	COMMENTS Field Test Data Other Observations
					B-2 bags		-		silty SAND (SM): red to pale brown, inferred allu	vial deposit		D	MD - D		near tes dispersi	arge holes evident st pit. Inferred highly ive soil in subgrade. of soil may cause
					0.20m	_			20m silty sandy CLAY (CH): mottled grey brown and yellow	brown		D - M	St		No pen	iss beneath levee. and penetrometer 2.7.1.7.1 & g(cm <sup>2</sup> etration of 19mm hear unless noted
					bags 0.70m	_	-		carbonate nodules 8-10mm dia	imeter		м	VSt			
							-1.0		increase in carbonate nodules							
L						-	F		20m End of test pit at 1.2m							
							-									
							-1.5									
							-									
							2.0									
							-									
							-									
							-2.5									
							-									
							-									
E E BH E	<b>T</b> =	Existii or e Buc ROUN Water	ket IDWA <sup>:</sup> Ievel	ting B R TER SY (static)	Buld Ripp (MBOLS	ber S		D Sn ES En EW En HP Har	SAMPLES & FIELD TES Sample U U Il Disturbed Sample W W Soil Sample Water Sample I Penetrometer (UCS result) I Vane Shear (P: Peak Su, R: R	ndisturbed Tube Sample later Sample	DENSIT VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense CO Compact			VS S F St VSt H	CONSIS Very Sof Soft Firm Stiff Very Stiff Hard	(12.5-25kPa) (25-50kPa) (50-100kPa)
1		Water	r inflov	V				PHOT NOTE	GRAPHS YES	NO NO	MOISTURE CON D = Dry M = Moist	DITIC W =	N Wet			

		Λ(				S				TEST PIT LOG		HO	LE NO	: NNTI	P02	
	PRO	ECT	: Ma	allee	CMA	SDL A	dvan			ot Design JOB NO : IS079600 WBS#002			AGE:1			
t									.000 ( M ator (3.		tracting			N:Nyah N VIDTH:0		
- 1						0/14 to				LOGGED BY : IW CHECKED BY :	inacting		TANDAR			-
	EXCAVATION & WATER	Maisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm) 15	Fi & Oth	COMMENTS eld Test Data ler Observations	
	ш					0.20m D-1 bag 0.30m				silty CLAY (CH): with some fine sand, inferred alluvial deposit 0.40m CLAY (CH): dark grey and yellow brown mottled, inferred expansive clay	D	St - VSt		tests > 6 k noted No penetr	d Penetrometer (g/cm <sup>2</sup> unless ation of 19mm ar unless noted	-
	¥					0.95m D-1 bag	-	- - - -1.0		trace carbonate nodules	м	VSt				-
								-		End of test pit at 1.0m						-
2014 10:41								1.5  								-
								2.0 								
								2.5								-
								-								-
	N E BH	<u> </u>	/Existii tor e Buc ROUN Water Water Water	ket IDWA level level	ting B R TER SN (static) (during v	Buld Ripp /MBOLS	er		D Sm ES En EW En HP Har HV Har	Ik Sample     U     Undisturbed Tube Sample     VL     Very Loc       Iall Disturbed Sample     W     Water Sample     L     Loose       v Water Sample     MD     MD Medium     D     Dense       v Water Shear (P: Peak Su, R: Residual Su)     VD     Very De     CO	Dense nse t E CONDITIC		VS S F St VSt H	CONSISTE Very Soft Soft Firm Stiff Very Stiff Hard	NCY (Su) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)	-

				•	S					TEST	PIT LOG			НС	DLE N	0:	NNTP03
	-						nceo	l Conce	pt Design	JOB NO	: IS079600 WB	S#002			PAGE :	1	OF 1
POSITIC										SURFAC	E ELEVATION :				LOCATI	ON	: Nyah North
EQUIPN									-		CTOR : Ashley		ntracting				'IDTH : 0.35m
DATE E	XCA				)/14 to	23/	10/1	4	LOGGED BY	: IW	CHECKE	OBY:			STAND/		) : 
EXCAVATION & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, S	Colour, Plast	DESCRIPTION icity or Particle Char Minor Components	racteristic	BALLESIOM	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm)	15 20	COMMENTS Field Test Data & Other Observatio
							-		ROAD FILL (FILL): Mixture of graded re	d and dark gre	ey CLAY		D	F			0.00: Hand Penetromete tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm Vane Shear unless note
L							0.5		silty CLAY (CI): medium plasticity, m inferred expansive c dark grey		ey and red brown, sli	ckensides observed	i, D	St			
					1.00m D-2 small				mottled				w	VSt			0.80: Hand penetromete test 4.4 kg/cm² Vane Shear 115/18 kPa 183/29 kPa
		EXCA			bags	1			SAMPLES &	FIFI D TESTS							
E Exc BH Ba	GF	Existing or e Buck ROUNE Water I	g cuti et DWA <sup>-</sup> level level inflov	ting B R TER SY (static) (during v	Buld Ripp 'MBOLS drilling)	er S		D Sn ES En EW En HP Hai HV Hai	Ik Sample nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (UCS nd Vane Shear (P: Pea OGRAPHS	U Undia W Wate	sturbed Tube Sample r Sample	e VL Very Loo L Loose MD Medium D Dense VD Very De CO Compac	Dense nse t E CONDITI		V S F S V H	t St	CONSISTENCY (Su)           Very Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           Very Stiff         (100-200kPa)           Hard         (>200kPa)

JA		~		-	C	1				TEST	PIT LOG			HC	IE N	10:	NNT	P04
							nced	l Conce	pt Design	JOB NO	: IS079600 WBS	#002		F	PAGE	: 1	OF 1	
								.000 ( N	<u> </u>		E ELEVATION :			L	.OCAT	ION	: Nyah N	North
								vator (3.	-		-	J Shirnack Contrac	ting				/IDTH : 0	).35m
ATE E	XCA				0/14 tc 1	23/	10/1	4	LOGGED B	Y:IW	CHECKED	BY :		1.	STAND		): 	
EXCAVATION & WATER DETAIL	Moisture Content	Dry Density	% Lines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Typ	e, Colour, Plast	DESCRIPTION icity or Particle Chara Minor Components	acteristic	MOISTURE	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm)	0	Fie & Oth	COMMENTS eld Test Data ner Observatio
	_					-		////	silty CLAY (CI):					ŏ			0.00: Hand	d Penetromete g/cm <sup>2</sup> unless
							-		medium plasticity,	mottled grey an	d red brown						noted	ation of 19mm
							-0.5		0.35m silty CLAY (CH): mottled dark grey	and red brown, v	with some Fe/Mn conc	cretions		F			Vane She	a unless note
			98	LL=50 PI=30 LS=13	1.40m B-3 small bagg 1.50m sample 1.80m B-3 small bags	_	- -1.5 -		1.50m silty CLAY (CH): mottled grey and t 1.80m clayey SILT (MH): pale grey with yell		ng		D	VSt			1.80: Soil thumb pre compressas dispersabl	crumbles und ssure, inferred able and
					2.00m				2.00m								dispersabi	le.
							-2.0 - - - -2.5		silty CLAY (CH): mottled grey and y	yellow brown, wi	th some roots			VSt				
							$\begin{bmatrix} \\ \end{bmatrix}$											
							+		2.75m									
									End of test pit at 2	2.75m								
														1		ļļ		
							$\begin{bmatrix} \\ \end{bmatrix}$							1				
3H Ba	GF	Existir or Buck OUN Vater	ket DWA Ievel	ting B R TER S' (static)	YMBOL	6		D Sn ES Er EW Er	SAMPLES Ik Sample nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (U0 nd Vane Shear (P: P	le W Wate	sturbed Tube Sample r Sample	DENS VL Very Loose L Loose MD Medium Den: D Dense VD Very Dense CO Compact		<u> </u>	F	S = St /St	CONSISTE Very Soft Soft Firm Stiff Very Stiff Hard	NCY (Su) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa (100-200kP (>200kPa)
. ►		Nater	inflo	N	, uninng)	,		PHOT NOTE	OGRAPHS S	YES	NO NO	MOISTURE CC D = Dry M = Moi	NDITIC st W =	N Wet				

				~		-	S	•				TEST	PIT LO	G			HC	DLE	NC	): N	NTP	)5	
									ced	Conce	pt Design	JOB NO	: IS079600 V	VBS#00	)2		F	PAGI	Ξ:1	OF	1		
										.000 ( N											lyah Nor	th	
										ator (3.	6t)	CONTR	ACTOR : Ash	nley J Sł	hirnack Contracti	ng					H : 0.3	ōm	
		TE E	XCA				)/14 to	23/1	0/14	4	LOGGED BY	: IW	CHECK	KED BY	′ :			1	IDAF	RD :			
	EXCAVATION &	WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, St	Colour, Plas	L DESCRIPTION sticity or Particle C d Minor Compone	Character	istic	MOISTURE	CONSISTENCY/DENSITY	200	<sup>10</sup> (blows/100mm)	20	Field	/MENTS Test Data Observations	3
									-		ROAD MIX (FILL): Mixture of graded red	d and dark g	rey CLAY			D	s						
									- -0.5		CLAY (CI): medium plasticity, gr	ey with red b	rown mottle, roots	S		D	F			tes No	ts > 6 kg/c penetratic	enetrometer m <sup>2</sup> ın of 19mm ınless noted	_
									-							м	St						
	¥.						1.00m \D-1 bag	7	-1.0		End of test pit at 1.0r	n											
									-														
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TLOG									-														
SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <drawingfile>&gt; 09/12/2014 15:41</drawingfile>									-														
JACOBS AGS REV04 (WORKING).GLB Log	N E BH		cavato ackhoo GF Z = 1 Z = 1	Existir or Buck ROUN Water Water Water	ket DWA	TER SY (static) (during	Buld Ripp /MBOLS drilling)	er		D Sn ES En EW En HP Har HV Har	SAMPLES & F Ik Sample all Disturbed Sample v Soil Sample v Water Sample d Penetrometer (UCS nd Vane Shear (P: Pea OGRAPHS	U Und W Wat	isturbed Tube Sar er Sample sidual Su)	mple	DENSIT VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense CO Compact MOISTURE CON D = Dry M = Moist	DITIO	N Wet		VS S St VSt H	Very Soft Firm Stiff	( n (1 ( / Stiff (	Y (Su) D-12.5kPa) 12.5-25kPa) 25-50kPa) 50-100kPa) 100-200kPa) >200kPa)	

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			7		P	S				TEST PIT LOG			HC	DLE	ΞN	10:	NNTP	06	
PF	OJE	ст :	: Ma	allee	СМА	SDL A	dva	nceo	d Conce	ot Design JOB NO: IS079600 WBS#002			I	PAG	GE :	: 1	OF 1		
						-			.000 ( N								: Nyah No		
									vator (3.	· · ·	Contracting						IDTH : 0.3	35m	
	_			B DA		0/14 to	23/	10/1	4	LOGGED BY : IW CHECKED BY :				1		ARE			
EXCAVATION 8	WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components		MOISTURE	CONSISTENCY/DENSITY	Ľ	<sup>10</sup> (blows/100mm)	15 .	Fiel	OMMENTS d Test Data r Observations	
1 Log SKM TEST PTLLOG MALLEE TEST PTLLOGS 30 10 2014.GPJ < <drawingfile>&gt; 09/12/2014 15.41</drawingfile>			EXC		TON	1.30m B-3 begs 1.40m				205m         205m         End of test pit at 2.65m		. М. М.	St VSt - F				0.30: Hand tests > 6 kg. noted No penetrat	Penetrometer fcm <sup>2</sup> unless ioin of 19mm unless noted	
IS AGS REVU4 (WUKKING).GLB 면 I I	H Ba	EXCAVATION Natural/Existing cutting B Excavator Backhoe Bucket  GROUNDWATER SYMBOLS  GROUNDWATER SYMBOLS  SUBJECT Evel (static)  SUBJECT Evel (during drilling							D Srr ES En EW En HP Har HV Har	k Sample U Undisturbed Tube Sample VL Ven all Disturbed Sample W Water Sample L Loo Valter Sample d Penetrometer (UCS result) d Vane Shear (P: Peak Su, R: Residual Su) CO Con	y Loose se dium Dense nse y Dense npact TURE CONDI'				S F S	/S St /St	Very Soft Soft Firm Stiff Very Stiff	(0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)	
JACO										D = Dry	M = Moist V								

JA	BS

HOLE NO: NNTP07

					СМА		dvan	nced	Conce	ot Design JOB NO : IS079600 WBS#002		PA	GE : 1	OF 1
	POSI	TION	: E:	7147	789.00	00, N: 6	6112	053	.000 ( N					: Nyah North
									ator (3.		ng			/IDTH : 0.35m
		_				)/14 to	23/1	10/1	4	LOGGED BY : IW CHECKED BY :	1		ANDARD	) : 
	EXCAVATION &	DE I AIL Moisture Content		8 DA	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm) 20	COMMENTS Field Test Data & Other Observations
2 DUG 30MM ILST FTI LOG MALLEE ISJI FTI LOGS 30 10 2014; GTV 3 30112 GTM MINTINEZY 03012 2014 13:41			EXC			0.50m B-3 bags 0.60m B-3 small bags 2.00m B-3 bags 2.200m				silly CLAY(CI):         dark grey with red brown mottle, inferred channel fill         silly CLAY (CH):         grey brown, with some carbonate nodules on fissures, slickensides observed, inferred expansive clays         silly CLAY(CH):         silly CLAY(CH):         grey brown, with some carbonate nodules on fissures, slickensides observed, inferred expansive clays         silly CLAY(CH):         yellow grey with yellow mottle, slickensides observed, inferred highly expansive clay         grey to yellow grey         yellow brown, 0.2m diameter mottles         280m         End of test pit at 2.85m (refusal)	M	F St		0.40: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm Vane Shear unless noted 0.70: Hand Penetrometer tests 5.8-6 kg/cm <sup>2</sup> Vane shear 215/29 kPa 1.50: Vane shear 135/18 kPa
ACUBS AGS REVUT (WURNING).GLB	N E BH	Excavator R Ripper							D Sm ES En EW En HP Har HV Har	k Sample     U     Undisturbed Tube Sample       vall Disturbed Sample     W     Water Sample       v Soil Sample     W     Water Sample       v Water Sample     MD Medium Dense       u Penetrometer (UCS result)     D       ud Vane Shear (P: Peak Su, R: Residual Su)     VI Very Dense       COGRAPHS     MOISTLIPE CON	DITIC		S F St VSt	CONSISTENCY (Su)           Very Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           Very Stiff         (100-200kPa)           Hard         (>200kPa)

		Λ.			-	S	1			SOIL LOG			HOLE NO: NNTP08
								nced	Conce	bt DaksiBinNO : IS079600 WBS#002			PAGE : 1 OF 1
- H						: 6111				SURFACE ELEVATION :			LOCATION : Nyah North
- H						Excava			)	CONTRACTOR : Ashley J Shirnack Contracting			DIP / AZIMUTH : 90°
ł	DATE			23/		to 23/	10/14	4		LOGGED BY : IW CHECKED BY :			STANDARD :
	DRILLING & WATER	DETAIL Moisture Content		% Fines	Atterberg	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
								_		silty CLAY (CI): medium plasticity, dark grey	D	S - F	0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm Vane Shear unless noted
										0.30m CLAY (CH): dark grey	м	St	0.40: Hand Penetrometer tests 5.3 kg/cm <sup>2</sup>
								-					-
								_		1.00m			- 0.90: inferred increase in soil compaction
	-						-	1.0 		End of test pit at 1.0m			
								-					-
						1.60m 1.10m D-1 small	-	-1.5					-
10.10						bag		-					-
2011/12/2014								 -2.0					-
onm suil lug mallee iesi pii lugo su iu zu 14.6pj scutamingfiless iu/12/2014 10.10								-					-
LUGS 30 10 20								 -2.5					-
								-					
SNMI SUIL LUG MAL								-					-
JACOBS AGS REVU4 (WORKING).GLB LOG	AH     Air Hammer     PI       GROUNDWATER SYMBOLS     Si       ▼     = Water level (static)     (F       ↓     = Water level (during drilling)     N								B Bu ES En EW En PP Har SV Har (P: Pea N SPT HW SP	turbed Sample SPT SPT Sample VL Very Lo k Sample U Undisturbed Tube Sample L Loose	4 - n Dense 10 30	4 10	CONSISTENCY (Su) {N-value}           VS         Very Soft         <12 kPa

		~		-	S	1			SOIL LOG			HOLE NO: NNTPO
							nced	l Concep	t D <b>#Sig</b> rNO: IS079600 WBS#002			PAGE : 1 OF 1
					: 6110		<u>`</u>	,	SURFACE ELEVATION :			LOCATION : Nyah North
G TYF	PE :	Cas	se C>	(36B I	Excava	ator	(3.6t	:)	CONTRACTOR : Ashley J Shirnack Contracting			DIP / AZIMUTH : 90°
ATE D	RILL	ED :	23/	10/14	to 23/	10/1	4		LOGGED BY : IW CHECKED BY :		;	STANDARD :
DRILLING & WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
							-		ROAD FORMATION (FILL): CLAY, brown	D	F	0.00: Road formation soft when wet, tyre ruts evident Hand penetrometer gave 4.4 kg/cm2,>6 kg/cm2 and >6 kg/cm2 on three
							-		silty CLAY (CI): medium plasticity, red brown mottled grey, roots with crabholes (gilgai) evident on nearby natural surface	D M	s s	measurements. No penetration of 19mm Vane Shear unless noted
					0.50m B-3		-0.5					0.30: Soil crumbles in fingers to 3-5mm clods 0.40: Hand Penetrometer >6 kg/cm <sup>2</sup>
					bags 0.60m		-					
					0.90m		-					
					B-3 bags 1.00m		-1.0		.00m End of test pit at 1.0m			
							-					1.00: Hand Penetrometer >6 kg/cm <sup>2</sup>
							-					
							-1.5					
							-					
							-					
							-2.0					
							-					
							-					
							-2.5					
							-					
							_					
FA So /B Wa		uger ght Ai re	RILLIN uger	hq Nq Pq	HQ Cor NQ Cor PQ Cori	ing ing		B Bulk ES Env	SAMPLES & FIELD TESTS DENSITY (I urbed Sample SPT SPT Sample Sample U Undisturbed Tube Sample L Loose Soil Sample W Water Sample	0 - 4 -	4 10	CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0- S Soft 12 - 25 {2-4
H Air	Washbore     PQ     PQ coring     ES     E       Rock Rolling     NMLC NMLC Coring     EW     EW       Air Hammer     GROUNDWATER SYMBOLS     SV H:       ▼     = Water level (static)     (P: Pt			ng	EW Env PP Hand SV Hand (P: Peak	Water Sample     MD Medium Dens       Penetrometer     MOISTURE CONDITION       Vane Shear     D = Dry M = Moist W = Wet       Su R: Residual Su)     bows per 300mm	30	- 30 - 50 - 100	F         Firm         25 - 50         {4-8           St         Stiff         50 - 100         {8-7           VSt         Very Stiff         100 - 200         {15           H         Hard         > 200 kPa {>			
	— = V	later i	evel ( inflow outflov		drilling)			HW SPT	penetration by hammer weight penetration by rod weight			

JA	<b>C</b>		P	S				SOIL LOG			HOLE NO: NSTP01
						nced	l Concep	t D <b>#Siβi</b> nNO ∶ IS079600 WBS#002			PAGE : 1 OF 1
POSITION	I : E:	716	990, N	: 6107	069	( M0	GA94)	SURFACE ELEVATION :			LOCATION : Nyah South
RIG TYPE						· · · ·	)	CONTRACTOR : Ashley J Shirnack Contracting			DIP / AZIMUTH : 90°
DATE DRI				to 23/1	10/1	4		LOGGED BY : IW CHECKED BY :			STANDARD :
DRILLING & WATER DETAIL		% Fines	Atterberg	SAMPLES & SPT DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY / DENSITY	COMMENTS Field Test Data & Other Observations
								ROAD FORMATION (FILL): 100 Mixture of gravel, sand and calcrete, red brown	D		0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup>
						_		silty sandy CLAY (CI): mottled grey and red brown, with some Fe/Mn nodules			unless noted No penetration of 19mm Vane Shear unless noted
				0.80m B-2 bags 0.90m	-	-0.5		<sup>3.70m</sup> silty sandy CLAY (CI): dark grey with red grey mottle, fine sand lenses, with some Fe/Mn nodu (lightly cemented)	es D -	VSt-F	0.50: increase in digging resistance
				1.40m D-1 bag 1.50m	-	1.5		pale grey and yellow brown mottles, sand lenses 4-5mm thick and irregu with some charcoal increase in soil moisture	lar, M		
				1.90m D-2 bags 2.00m	-			increase in yellow mottle			1.80: Inferred creek bed
1					-			light grey and yellow mottle, sandy silty CLAY to clayey SAND with silt			
						-					
SFA Solid WB Wash RR Rock I AH Air Ha G ▼ =	I Auger Flight A bore Rolling ammer GROUN = Water	DWA1	HQ NQ PQ NMLC		ing ng	ng	B Bul ES En EW En PP Han SV Han (P: Pea N SPT	SAMPLES & FIELD TESTS       DENSI         turbed Sample       SPT SPT Sample       CSample       U Undisturbed Tube Sample         Soil Sample       W Water Sample       L Loose         Water Sample       W Water Sample       D Dense         VWater Sample       D = Dry M = Moist W = Wet       D Dense         Vane Shear       D = Dry M = Moist W = Wet       VD Very Den         blows per 300mm       penetration by hammer weight       D	4 Vense 10 30	- 4 - 10	CONSISTENCY (Su) {N-value} VS Very Soft < 12 kPa {0-/ S Soft 12 - 25 {2-4} F Firm 25 - 50 {4-8} St Stiff 50 - 100 {8-1 VSt Very Stiff 100 - 200 {15 H Hard > 200 kPa {-2}

JA				P	S					TEST	PIT LOG			HOL	E N	): NST	P02
							nced	d Conce	ot Design	JOB NO	: IS079600 WBS#	#002		PA	AGE :	1 OF 1	
					-			.000 ( N	,		E ELEVATION :					DN : Nyah	
EQUIPM								vator (3.	St) LOGGED I		CTOR : Ashley J CHECKED	Shirnack Contractin	g			WIDTH :	0.35m
~	ACA	LAB						4	LOGGLDI	DT . IVV	CHECKED						
EXCAVATION 8 WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil T	ype, Colour, Plast	DESCRIPTION icity or Particle Charact Minor Components	cteristic	MOISTURE	CONSISTENCY/DENSITY	5 DCP <sup>10</sup> (blows/100mm) <sup>15</sup>	۱ ۵۵	COMMENTS Field Test Data ther Observation
						$\vdash$		////	sandy silty CLA' mottled yellow g	Y (CI):				0		0.00: Ha	nd Penetromete kg/cm <sup>2</sup> unless
					0.30m D-1 bag 0.40m	-	- - -0.5		9.50m silty sandy CLA					VSt		noted No pene	tration of 19mm lear unless noted
					1.00m D-1 bag 1.10m	-	1.0						D	VSt - H			
					2.00m D-1 bag 2.10m		2.0		grey with red bro	C)/silty CLAY (CI): ellow mottle				VSt			
-					2.60m \ <u>D-T bag</u>	7	- -2.5 - -		2.60m End of test pit a	t 2.6m							
E Exc BH Bad	$avato ckhoe GF \underline{Z} = 1$	Buck OUNE Vater Vater	g cutti et DWAT level ( level (	ER SN (static)	YMBOLS	ber S		D Srr ES En EW En HP Har HV Har	k Sample all Disturbed Sam / Soil Sample / Water Sample d Penetrometer (I d Vane Shear (P:	S & FIELD TESTS U Undi nple W Wate UCS result) . Peak Su, R: Resi	sturbed Tube Sample r Sample	DENSITY VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense CO Compact	,		VS S F St VS H	Very Soft Soft Firm Stiff	ENCY (Su) (0-12.5kPa) (12.5-25kPa) (50-100kPa) (100-200kPa) (>200kPa)
		Nater Nater						PHOT NOTE	GRAPHS	YES	NO NO	MOISTURE COND D = Dry M = Moist	NTIO W =	N Wet			

				~		Ð	S	1				TEST	PIT LOG			ł	HOI	_E NC	): <b>NS</b>	ГР03
									ced	Conce	pt Design	JOB NO	: IS079600 WB	5#002			P	AGE :	1 OF 1	
- F										.000 ( N	0		E ELEVATION :						N : Nyah	n South
- F										vator (3.	-		CTOR : Ashley		Contracting				WIDTH :	0.35m
ŀ							)/14 to	23/1	0/14	4	LOGGED BY	: IW	CHECKED	) BY :				TANDA	RD :	
	EXCAVATION &	DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, St	Colour, Plast	- DESCRIPTION ticity or Particle Char d Minor Components	acteristic		MOISTURE	CONSISTENCY/DENSITY	5 DCP <sup>10</sup> (blows/100mm) <sup>15</sup>	& (	COMMENTS Field Test Data Other Observations
JACOBS AGS REVO4 (WORKING).GLB Log SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <dr>MinigFile&gt;&gt; 09/12/2014 15:41</dr>			Moisture	0,YD	8°FT	Atte	MVG 0.10m D-1 bag 0.20m				sitty sandy CLAY (CI medium plasticity, me <u>0.30m</u> End of test pit at 0.3r	): bttled pale gr				ΪOW D	1JSGNOO F		8 0.00: C	reek bed, sample d etration of 19mm
COBS AGS REV04 (WORKING).GLB LOG SKM TEST	N E BH		tural/E cavato ckhoe GR <u>Z</u> = V Z = V	r Buck OUNE Vater Vater Vater	g cutt et DWAT level level inflow	TER SY (static) (during	Buldd Ripp MBOLS drilling)	er	-	D Sm ES En EW En HP Har HV Har	SAMPLES & F Ik Sample nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (UCS nd Vane Shear (P: Pea OGRAPHS	U Undi W Wate	sturbed Tube Sample er Sample	L Loose MD Mediu D Dens VD Very CO Comp	e um Dense e Dense	TION V = W	l Vet	   	Very Sof Soft Firm Stiff	(12.5-25kPa) (25-50kPa) (50-100kPa)

						C					TEST	PIT LOG	ì			но	LE	NC	): \	VNTP	01	
- 1								hod	Conoor	ot Design		: IS079600 WE	20#000	5		F		E : 1		F 1		
	POSITI									•		E ELEVATION		<u></u>						Vinifera	North	
	EQUIP					-				,				rnack Contractir	ng					DTH : 0.3		
	DATE								-	LOGGED BY		CHECKE			•	S	STAN	NDAF	RD	:		
	٨ß		LAE	DA	TA											NSITY		(m				
	EXCAVATION 8 WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, Si	Colour, Plasti	DESCRIPTION city or Particle Cha Minor Component	aracteris ts	tic	MOISTURE	CONSISTENCY/DENSITY	DCP	<sup>10</sup> (blows/100mm)	50	Fiel	DMMENTS d Test Data er Observations	S
		Masur	DIY	%		0.50m B		1.5		LOOM LIOOM LIOOM End of test pit at 1.00					D M	20 consis	9			19mm Vane noted 0.20: Hand test 3.8kg/c	Penetrometer	
							-											 				-
3																						
																			· 1			-
AGO NE VOT (VV ONVINUT) OLO LOS	E E BH B	Natural/Existing cutting B Buldozer Excavator R Ripper Backhoe Bucket B EN Bulk Sample ES Env Soil Samp EW Env Water Sar								nall Disturbed Sample v Soil Sample v Water Sample nd Penetrometer (UCS nd Vane Shear (P: Pea	U Undis W Wate	turbed Tube Samp Sample Iual Su)		DENSIT VL Very Loose MD Medium Dense D Dense VD Very Dense CO Compact MOISTURE CONI				VS S F St VSt H	Ve Se Fi St	CONSISTEN fery Soft oft irm tiff fery Stiff lard	ICY (Su) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)	
2000												NO NO	[	D = Dry M = Moist								

	JACOBS							TEST	PIT LOG	j			HC	LE NC	): <b>VN</b>	ITP02	
PROJECT					ced	Concer	ot Design	JOB NO	: IS079600 WI	BS#00:	2		F	PAGE : 1	OF 1		
POSITION									CE ELEVATION				L	OCATIO	N : Vir	nifera North	
EQUIPMEN	IT TYPE	: Case	e CX36	BEx	cav	ator (3.6	St)	CONTR/	ACTOR : Ashle	ey J Sh	irnack Contractir	ng	E	BUCKET	WIDTH	: 0.35m	
DATE EXC.	AVATED	: 21/10	)/14 to	21/1	0/14	4	LOGGED BY	': IW	CHECKE	ED BY	:		5	STANDAF	RD :		
EXCAVATION & WATER DETAIL Moisture Content	Dry Density % Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type	e, Colour, Plas	L DESCRIPTION sticity or Particle Ch d Minor Componer	aracteris its	stic	MOISTURE	CONSISTENCY/DENSITY	5 DCP <sup>10</sup> (blows/100mm)		COMMENT Field Test D & Other Observ	ata
			0.80m D 0.90m 1.60m D				1.60m CLAY (CH): mottled grey and yo brown grey brown grey 1.80m CLAY (CH): pale grey brown, sl 1.80m End of test pit at 1.	ickensided, int	ferred expansive cla	ау		M	VSt		0.50: tests notec No p Vane	Hand Penetron	ess )mm
E Excava BH Backh	EXCAVA al/Existing cu ator oe Bucket GROUNDWA = Water leve = Water leve = Water inflo = Water outf	tting B R ATER SY I (static) I (during w		er		D Sm ES Env EW Env HP Han HV Han	k Sample all Disturbed Sample / Soil Sample / Water Sample d Penetrometer (UC d Vane Shear (P: Pe	e W Wat	listurbed Tube Samj er Sample		DENSIT VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense CO Compact MOISTURE CONI D = Dry M = Moist	DITIO		VS S F St VSt H		(12.5-25 (25-50kF (50-100k	(Pa) 5kPa) Pa) kPa) 0kPa)

JACOBS	TESTI
PROJECT : Mallee CMA SDL Advanced Concept Design	JOB NO :
POSITION : E: 717383.000, N: 6103606.000 (MGA94)	SURFACE
EQUIPMENT TYPE : Case CX36B Excavator (3.6t)	CONTRAC
	· I\//

## **PIT LOG**

HOLE NO: VNTP03

- F													S079600 WBS#	#002			PAGE			- <b>N</b> 140		
t			IIPMENT TYPE : Case CX36B Excavator (3.6t)         CONTRACTOR : Ashley J Shimack Contracting         BI           E EXCAVATED : 21/10/14 to 21/10/14         LOGGED BY : IW         CHECKED BY : ST         ST														OCATION : Vinifera North SUCKET WIDTH : 0.35m					
- F																STANDARD :						
										-	LOGGED DT :	100	ONEORED	51.		1 .			J .			
	EXCAVATION	WATER DETAIL	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, C	MATERIAL DE colour, Plasticity condary and Mir	SCRIPTION or Particle Charac nor Components	teristic	MOISTURE	CONSISTENCY/DENSITY	5 10 (blowe/100mm)	15 20	Fi & Oth	COMMENTS eld Test Data ler Observations		
JACOBS AGS REVOM (WORKING).GLB LOg SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <dreamingfile>&gt; 03/12/2014 15.41</dreamingfile>				FXC			0.30m 0.70m 0.200m 0.200m				TOPSOIL: CLAY (CI): grey brown, with grass 0.30m CLAY (CI): mottled grey brown and CLAY (CI): mottled grey brown and CLAY (CH): high plasticity, grey brown increase in soil moistur 2.20m End of test pit at 2.20n	d yellow brown				F F			1.00: Han tests > 6 I noted No penetr Vane She 1.20: Low resistance			
JACOBS AGS REV04 (WORKING).GLB	N E BH	Ex Ba	GF GF GF C = 1	Existir or e Buck ROUN Water Water Water	ng cut ket DWA level level inflov	ting B R TER SN (static) (during v	Buld Ripp (MBOLS drilling)	ber S		D Srr ES En EW En HP Har HV Har	Ik Sample nall Disturbed Sample v Soil Sample v Water Sample d Penetrometer (UCS re d Vane Shear (P: Peak OGRAPHS	U Undisturt W Water Sa		DENS VL Very Loose L Loose MD Medium Dens D Dense VD Very Dense CO Compact MOISTURE CO D = Dry M = Mois	ie NDITIC	N Wet		VS S F St VSt H	CONSISTE Very Soft Soft Firm Stiff Very Stiff Hard	NCY (Su) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)		

JA				C	1				TEST	PIT LOO	G			HC	DLE	NC	): \	VNTP	04	
						nced	l Conce	ot Design	JOB NO	: IS079600 W	VBS#00	)2			PAG	E:1	1 0	)F 1		
POSITIO															LOC	ATIO	N :	Vinifera	North	
QUIPM	ENT	YPE	: Cas	e CX36	6B E	xcav	ator (3.	6t)		ACTOR : Ashl		hirnack Contra	acting		BUC	KET	WIE	OTH : 0.3	35m	
DATE EX	(CAV	ATED	: 21/1	0/14 to	21/ <sup>.</sup>	10/1	4	LOGGED B	Y:IW	CHECK	ED BY	′ :			STA	NDAF	RD	:		-
EXCAVATION & WATER DETAIL	I	W Puersity	_	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Typ	oe, Colour, Plas	L DESCRIPTION ticity or Particle C d Minor Compone	Characteri	istic	MOISTURE	CONSISTENCY/DENSITY	5	<sup>10</sup> (blows/100mm) <sup>15</sup>	20	Field	OMMENTS d Test Data r Observatio	
						_		0.05QPSOIL: CLAY	(CI): grass roots				D	F			'   1	0.00: Hand I tests > 6 kg/ noted No penetrati		
L						0.5		high plasticity, gre	ıy brown with re	d brown mottle			м	St - VSt				0.50: Hand 1 4.6, 5.5, 5.2	unless note	ed
Ľ				1.00m	Ē	- - -1.0		1.00m End of test pit at 7	1.0m											
						-														
						-														
						-1.5														
						-														
						-														
						2.0														
						-														
						-														
						-														
						-2.5														
						-														
																				_
E Exc BH Bao	ural/Ex avator ckhoe E GRO = Wa = Wa	ucket UNDW/ ter leve	ATER S' el (static) el (during	Ripp YMBOLS	S		D Sm ES En EW En	SAMPLES k Sample hall Disturbed Samp v Soil Sample v Water Sample hd Penetrometer (Ut hd Vane Shear (P: F	le W Wate	isturbed Tube San er Sample	nple	DEN VL Very Loose L Loose MD Medium De D Dense VD Very Dense CO Compact	ense			VS S F St VSt H	V S Fi S V	oft irm tiff /ery Stiff	CY (Su) (0-12.5kPa) (12.5-25kPa (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)	a) I)
<ul> <li></li></ul>						PHOT NOTE	OGRAPHS	YES												

					P	S					TES	T PIT LO	DG			HC	LE N	0:	VSTP01
								nceo	d Conce	pt Design	JOB NO	D : IS079600	) WBS#0	02			PAGE :		
						-			.000 ( N	,				birpack Contract	ling				: Vinifera South DTH : 0.35m
						)/14 to			vator (3. 4	LOGGED BY			CKED BY	hirnack Contract	ung		STANDA		
EXCAVATION &	WATER	Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, S	Colour, Pla	AL DESCRIPTIC asticity or Particle and Minor Comp	e Characte	ristic	MOISTURE	CONSISTENCY/DENSITY	5 10 15 (blows/100mm)	20	COMMENTS Field Test Data & Other Observations
JACOBS AGS REV04 (WORKING).GLB Log SKM TEST PIT LOG MALLEE TEST PIT LOGS 30 10 2014.GPJ ≪DrawingFile>> 09/12/2014 15.41 ロートーーーーーーーーーーーーーーーーーーーーーーーーーーーーーーーーーーー						1.80m B-3 bags 1.70m				FILL: sitty CLAY (CI) yellow brown CLAY (CI): medium plasticity, da with some carbonate yellow grey 2.30m End of test pit at 2.3	ark grey e on fissure: m				D	- O			0.00: South side of regulator Fill from old levee (topsoil)
JACOBS AGS REV04 (WORKING).GLB Lo 耍 m Z	H Ba	GF	Existin or Buck ROUN Water Water Water	ket DWA <sup>-</sup> level level inflov	ting B R TER SY (static) (during v	Buld Ripp /MBOLS drilling)	er		D Sr ES Er EW Er HP Ha HV Ha	SAMPLES & I Ilk Sample nall Disturbed Sample tv Soil Sample nv Water Sample nd Penetrometer (UCS nd Vane Shear (P: Pea TOGRAPHS	U Ur W Wa	ndisturbed Tube s ater Sample	Sample	DENSI VL Very Loose L Loose MD Medium Dens D Dense VD Very Dense CO Compact MOISTURE CO D = Dry M = Mois	e NDITIC		VS S F St VS H	3 V S F St V	CONSISTENCY (Su)           /ery Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           /ery Stiff         (100-200kPa)           lard         (>200kPa)

JA	~		C	1			TEST PIT LOG		HC	DLE NO:	VSTP02
PROJECT					nced	Conce	Design JOB NO : IS079600 WBS#002		I	PAGE : 1	OF 1
OSITION			-								: Vinifera South
QUIPMEN								acting			IDTH : 0.35m
ATE EXC			0/14 to 1	21/	10/14	4	LOGGED BY : IW CHECKED BY :		1 .	STANDARE 	):
EXCAVATION & WATER DETAIL Meisture Content		% Fines Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	5 DCP 10 (blows/100mm) 15	COMMENTS Field Test Data & Other Observation
			0.30m B-3 bags 0.40m	-	-0.5		sandy silty CLAY (CL): low to medium plasticity, mottled grey brown and red brown				0.00: Hand Penetrometer tests > 6 kg/cm <sup>2</sup> unless noted No penetration of 19mm Vane Shear unless noted
			1.00m B-3 bags 1.10m	-	-1.0		<sup>80m</sup> CLAY (CH): high plasticity, dark grey		F		
			1.30m B-3 bags 1.40m	-	-1.5		<sup>30m</sup> CLAY (CH): high plasticity, dark grey to grey, slickensides evident, inferred expansive clay	, D			1.40: Hand Penetrometer 3.8, 5.3, 5.2 kg/cm <sup>2</sup>
<u>,</u>			2.60m B-2 bags 2.70m	-	-2.0 - - 		dark grey to grey with yellow, with some carbonate nodules (soft) <sup>70m</sup> End of test pit at 2.70m		St		2.25: Hand Penetrometer 5.8, 5.6 >6 kg/cm <sup>2</sup>
E Excav BH Backh	al/Existing ator noe Bucke GROUND	WATER S	YMBOLS	er		D Sm ES En EW En	SAMPLES & FIELD TESTS Sample U Undisturbed Tube Sample Il Disturbed Sample W Water Sample Soil Sample W Water Sample Water Sample MD Medium De Penetrometer (UCS result) I Vane Shear (P: Peak Su, R: Residual Su)	nse		VS S F VSt	CONSISTENCY (Su) Very Soft (0-12.5kPa) Soft (12.5-25kPa) Firm (25-50kPa) Stiff (50-100kPa) Very Stiff (100-200kPa
							GRAPHS YES NO D = Dry M = M	ONDITIO		Н	Hard (>200kPa)

JA									ST PIT LOG						VSTI	<b>&gt;</b> 03
PROJECT									NO : IS079600 WBS#	#002			PAGE			o Couth
POSITION				-					FACE ELEVATION : ITRACTOR : Ashley J	Shirpack Contractir					: Vinifer	
DATE EXC								LOGGED BY : IW	CHECKED E		·У		STANE			
~	LAB															
EXCAVATION & WATER DETAIL Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	Soil Type, Colour	ERIAL DESCRIPTION Plasticity or Particle Charac ry and Minor Components	teristic	MOISTURE	CONSISTENCY/DENSITY	5 10 (blowe/100mm)	15 20	F & Oti	COMMENTS eld Test Data her Observations
				B 0.30m		-		sandy CLAY (CI): medium plasticity, mottled re	ed brown to grey brown		D	н				ek bed, surface ny ar cannot
						-0.5		End of test pit at 0.3m								
						-										
						-1.0										
						_										
						-1.5										
						_										
						2.5										
						-							I I I			
E Excava BH Backh ⊈ = =	EXC/ al/Existing ator oe Buck GROUNE = Water = Water = Water	g cutt et DWAT level level	ing B R FER SY (static) (during		er		D Sn ES En EW En HP Har HV Har	SAMPLES & FIELD k Sample U all Disturbed Sample W / Soil Sample / Water Sample d Penetrometer (UCS result) d Vane Shear (P: Peak Su, R	Undisturbed Tube Sample Water Sample	DENSIT VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense CO Compact MOISTURE CONI		N.		     S F St VSt H	CONSIST Very Soft Soft Firm Stiff Very Stiff Hard	ENCY (Su) (0-12.5kPa) (12.5-25kPa) (25-50kPa) (50-100kPa) (100-200kPa) (>200kPa)

			7		P	S				TEST PIT LOG		НС	DLE	NO:	VSTP04
								ncec	d Conce	pt Design JOB NO : IS079600 WBS#002				E : 1	
						-			.000 ( N	,					: Vinifera South /IDTH : 0.35m
						)/14 to			vator (3. 4	CONTRACTOR         Ashley J Shimack Contracti           LOGGED BY         IW         CHECKED BY	ng				
		Moisture Content		% Lines		SAMPLES & FIELD DATA		DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	dCC	<sup>10</sup> (blows/100mm) <sup>15</sup> <sup>20</sup>	COMMENTS Field Test Data & Other Observations
Log SKM TEST PTLOG MALLEE TEST PTLOGS 30 10 2014.GPJ < <drawingfile>&gt; 09/12/2014 15:41</drawingfile>						0.40m B-3 bags 0.50m				CLAY (CH): mottled grey and red brown CLAY (C): pale grey for grey with red mottle, with some sand, carbonate deposits in fissures 1.00m End of test pit at 1.0m	M	vst			0.30: Hand Penetrometer test > 6 kg/cm <sup>2</sup> No penetration of 19mm Vane Shear
	Ex H Ba	cavate ackhoe GF	Existir or Buck ROUN Vater Vater Vater	ket DWA level level	ting B R TER SY (static) (during v	Buld Ripp 'MBOLS drilling)	er S		D Sn ES En EW En HP Har HV Har	Ik Sample     U     Undisturbed Tube Sample       nall Disturbed Sample     W     Water Sample       v Soil Sample     W     Water Sample       v Mater Sample     MD     Medium Dense       v Mater Sample     D     Dense       v Adver Sample     V     Very Loose       MD Penetrometer (UCS result)     D     Dense       vd Vane Shear (P: Peak Su, R: Residual Su)     VD     Very Dense       COGRAPHS     VER     VER	DITIC			VS S F St VSt H	CONSISTENCY (Su)           Very Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           Very Stiff         (100-200kPa)           Hard         (>200kPa)

JA	BS

### **TEST PIT LOG**

HOLE NO: VSTP05

- F											Appt Design JOB NO : IS079600 WBS#002 MGA94) SURFACE ELEVATION :					OF 1 : Vinifera South
- H										vator (3.		tina				/IDTH : 0.35m
- F							0/14 to				LOGGED BY : IW CHECKED BY :	ung		STAN		
ł					B DA			1		-			_			
	EXCAVATION 8	DETAIL	Moisture Content	Dry Density	% Fines	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	DCP	<sup>10</sup> (blows/100mm) <sup>15</sup> 20	COMMENTS Field Test Data & Other Observations
SKM TEST PITLOG MALLEE TEST PIT LOGS 30 10 2014.GPJ < <drawingfile>&gt; 09/12/2014 15.41</drawingfile>					40	LL322 PP=17 LS=8.5	B-2 bags				FILL: Mixture of CLAY, SAND and building materials clay is red and grey, sand is red	м	S-F			0.00: Hand Penetrometer test > 6 kg/cm <sup>2</sup> No penetration of 19mm Vane Shear
JACOBS AGS REV04 (WORKING).GLB L00	N E BH	Ex Ba	cavati ackho GF	Existii or e Buc ROUN Water Water Water Water	ket DWA level level	TER SI (static) (during	Buld Ripp (MBOLS drilling)	ber S		D Srr ES En EW En HP Har HV Har	SAMPLES & FIELD TESTS     DENS       ulk Sample     U     Undisturbed Tube Sample       mall Disturbed Sample     W     Water Sample       nv Soil Sample     W     Water Sample       nv Water Sample     MD     MD       nud Penetrometer (UCS result)     D     Dense       and Vane Shear (P: Peak Su, R: Residual Su)     VD     Very Dense       TOGRAPHS     YES     NO     MOISTURE CC       ES     YES     NO     MOISTURE CC	se			VS S F St VSt H	CONSISTENCY (Su)           Very Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           Very Stiff         (100-200kPa)           Hard         (>200kPa)

		~		P	S				TEST PIT LOG		НС	DLE	NO	: VSTP06
							nced	l Conce	pt Design JOB NO : IS079600 WBS#002			PAGI	Ξ:1	OF 1
								.000 ( N						N: Vinifera South
								vator (3.		ntracting				WIDTH : 0.35m
	EXCA		ED : DA		)/14 to	21/	10/1	4	LOGGED BY : IW CHECKED BY :			STAN		
EXCAVATION 8 WATER	DE IAIL Moisture Content	Dry Density	% Fines	Atterberg Limits	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY/DENSITY	و م د د	<sup>10</sup> (blows/100mm)	
μ μ					0.50m D 0.60m	-	- - -0.5		sitly clayey SAND (SC): dark grey, with some topsoil and humus 0.60m sandy CLAY (CI): medium plasticity, dark grey	м	L			0.00: Test pit located on th edge of a slope of an old billabong. No penetration of 19mm Vane Shear unless noted     0.30: Hand Penetrometer 3.2, 3.5, 3.5 kg/cm <sup>2</sup> 0.70: Hand Penetrometer = 6 kg/cm <sup>2</sup>
¥					0.80m D 0.90m	-			black 1.00m End of test pit at 1.0m		F			
AcoBS AdS REVO4 (WORKING) GLB Log SKM TEST PTLOG MALLEE TEST PTT LOGS 30 10 2014.GPJ < <drawngfile>&gt; 09/12/2014 15/41 空中こ</drawngfile>		EXC	AVAT	ION			- - - - - - - - - - - - - - - - - - -		SAMPLES & FIELD TESTS	DENSITY				
	<u> </u>	Existir or e Buck ROUN Water Water Water	ng cuti ket DWA <sup>-</sup> level level inflov	ting B R TER SY (static) (during	Buld Ripp 'MBOLS drilling)	er		D Sn ES En EW En HP Har HV Har	JIk Sample     U     Undisturbed Tube Sample     VL     Very Lo       mall Disturbed Sample     W     Water Sample     L     Losse       nv Soil Sample     MD     Molisturbed Tube Sample     MD     Medium       nv Mater Sample     MD     D     Dense       nd Penetrometer (UCS result)     D     D     Dense       nd Vane Shear (P: Peak Su, R: Residual Su)     VD     VD     VD	n Dense ense ct RE CONDITI			VS S F St VSt H	CONSISTENCY (Su)           Very Soft         (0-12.5kPa)           Soft         (12.5-25kPa)           Firm         (25-50kPa)           Stiff         (50-100kPa)           Very Stiff         (100-200kPa)           Hard         (>200kPa)

	~				S	£			TEST PIT LOG		HC	DLE NO:	VS-T	P07
					/inifera				JOB NO : IS135300			PAGE : 1	OF 1	
			·				623	.000 (54	MGA94) SURFACE ELEVATION : 65.200 (AHI	D)				a Southern
					khoe (C			<i>i</i> )	CONTRACTOR : Coburns Earthworks	i		BUCKET W		
_					/16 to 6	3/22/ <sup>-</sup>	16		LOGGED BY : MS CHECKED BY : DG			STANDARE	): AS17	26
EXCAVATION & WATER	Maisture Content		ADA 8	Atterberg	SAMPLES & FIELD DATA	RL (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	ONSISTENCY/DENSITY	5 10 (blows/100mm) 15 20	Fi	COMMENTS eld Test Data ner Observations
							_		TOPSOIL: Sandy SILT (ML), organics, roots		L			
									Silty CLAY (CI): Intermediate plasticity, brown					-
	15	.4	91	LL=52 PI=35	0.70m B	64.7-	-0.5 _		Sandy CLAY (CI): (Hermediate plasticity, brown, fine to medium grained sand Sitty CLAY (CH):		VSt			-
<b>番</b>				PI=35		64.2-			High plasticity, grey, orange	D				
					4.00-		-1.0 -				н			-
L.					1.30m	- 63.7-	-1.5		1.50m					
					4-4	1			Test Pit terminated at target depth. Ground water not encountered.	K	V			-
						R	1 A	TANK IN	NO MARTIN	A	-			- -
					5									
														-
							1							-
									A CONTRACTOR					-
								-	Station Providence	and the second s				-
					T			1		R.	N. Martin			
						12.15			A CARDON					
					A Providence	and the second					W. O. C. M.			
					N. N. S.	N-N	X			State	1000			-
					X		Seal -				and the standard			-
						Y					a de la de la			-
N E	Natura	al/Existi	CAVAT ng cut	TION tting B R		dozer		D Sm	SAMPLES & FIELD TESTS k Sample U Undisturbed Tube Sample VL Very L lall Disturbed Sample W Water Sample		-1		CONSISTE Very Soft	(0-12.5kPa)
BH	Backh	noe Buc			YMBOLS			ES En EW En	v Soil Sample L Loose MD Mediu v Water Sample	ım Dense e		F St	Soft Firm Stiff	(12.5-25kPa) (25-50kPa) (50-100kPa)
		= Water	r level r level	(static) (during	g drilling)				d Penetrometer (UCS result) d Vane Shear (P: Peak Su, R: Residual Su) D Dense VD Very I CO Comp	act			Very Stiff Hard	(100-200kPa) (>200kPa)
		= vvater = Water						NOTES	DGRAPHS YES NO MOISTU S D = Dry M	JRE CONDITIC I = Moist W =	N Wet			

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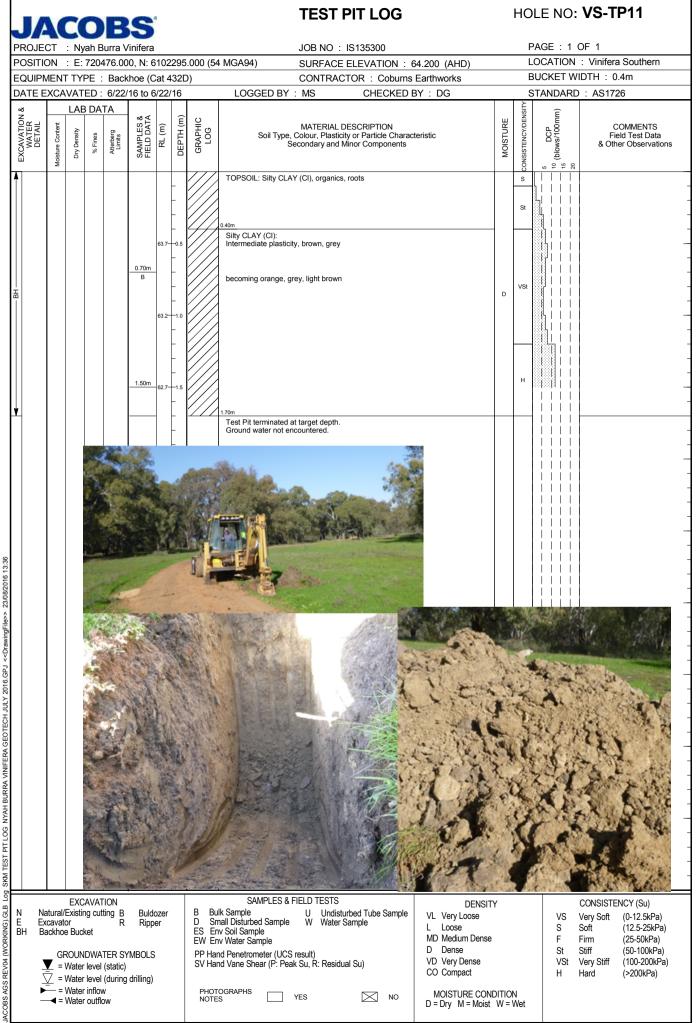
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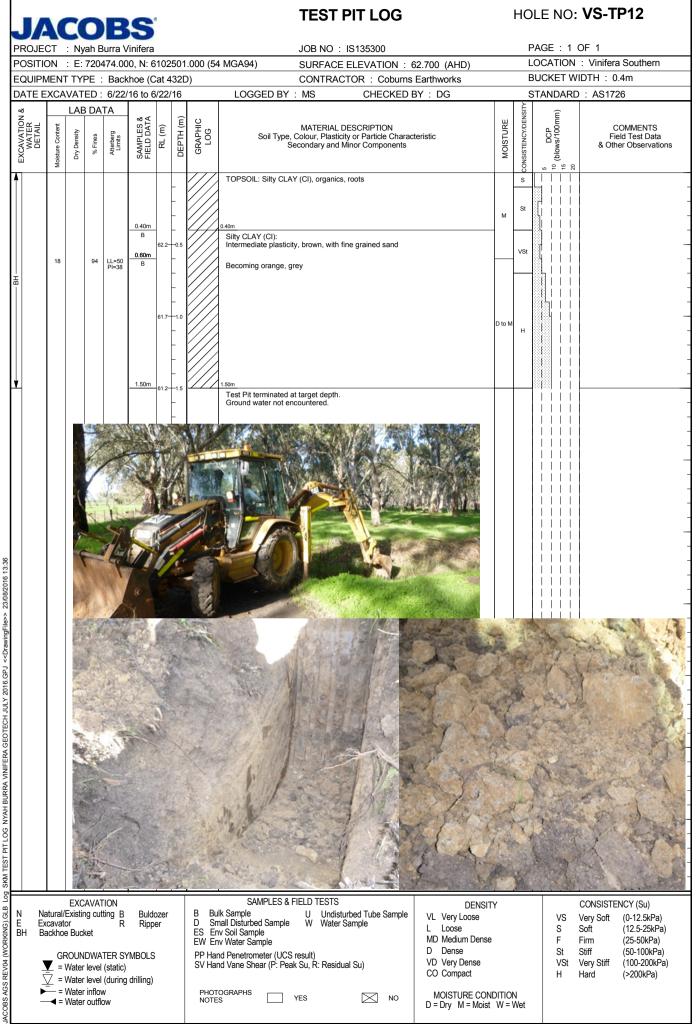
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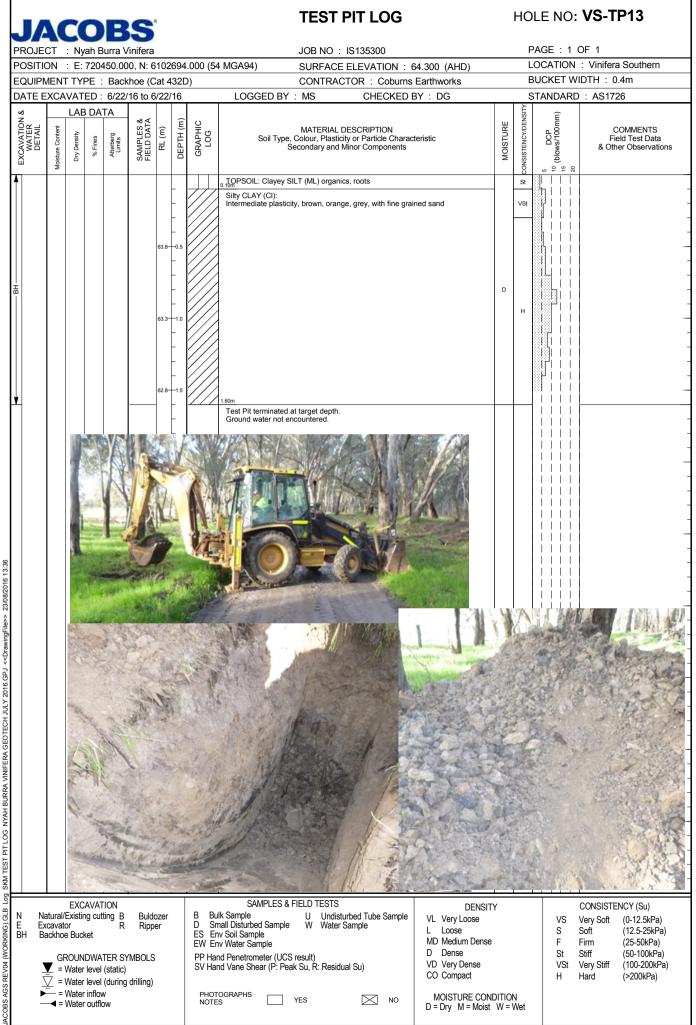
















# Appendix C. CPT Results

	[	qt in MPa		Sleeve fr	iction (fs	) in MPa		u2 in N	/IPa				Frictio	n ratio (Rf) in %	
	0	D 5 10 15	20	0 0.	3 0.6	6 0.9 <sup>·</sup>	1.2 · 1	-0.5	0	0.5	1	1.5	50	2 4 6	5 8 
												-1 - + - $-\frac{1}{1} - \frac{1}{1} -$			
	-0.5		1 1 7 -												
	-1		± <u> </u>								+ + +	$-1 - \pm -$ $-1 - \frac{1}{1} - \frac{1}{1} -$		·	
	-,		+ -+								+	-¦- <u>+</u> -	+		
_	-1.5		1												
natio			+ - -  + -			- + -! -   - + -  - + - 						-!- + - -!- + -			
r incli	-2		   + -												
ed fo	-2.5		+ _         									-'- ± - -¦- † -			
rrect	-				+ + - + - + -   + + - + - + -	-   -   -   -   -   -   -   -   -   -		+			+ +	$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$	$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$		- + -¦- + - - + -!- + -
) / co	-3											-'- ± -     - - ± -			
(G.L.	0.5		+ -		+			$=$ $\frac{1}{1}$ $-\frac{1}{1}$ $-\frac{1}{1}$ = $+$ $-1$ $ +$		·  - + - -	+ +	-¦- ¦ -	$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$		
level	-3.5		1 + - 1 _									-i- + -			
pun	-4		+ + +		1 1 1										
<- Depth in m below ground level (G.L.) / corrected for inclination			† - + - 1 _					+ +			ij_li	-¦- ¦ - -!- + - -!- ± -	+ - + + 		; - ;; -  ; -  - + -  ::
belo	-4.5		1 + 1								             	_1_ + _			
in m	-5		T - + - I						+			$-\frac{1}{1} - \frac{1}{1} - 1$			
Depth		+ + + - + - + <u> </u>	+ + - 1 _ 1	+		-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+		+ + 			+	-i- + -		<b>-5</b>	- + - - + - - + -!- + -
	-5.5	29.223 -> 	1			<b>S</b>				1 1	┍ ┑╴┝ ┑ <del>└ ┙╺┝ ┥</del> ┼ ┥╸┝ ┥	-  - + - - !- + -			
<u> </u>	-6	28.199	+ -  			-+- -+-  -L		- + -  - + 			+ +	-1- + - -1- ± -			- $+$ $-1 +$ $- +$ $-1 +$ $-1$ $-1 +$ $-1$ $-1$
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			+ - ⊥ _   T -			-+- -+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+						-  - + - -  - + - -  - + -			
	-7							+				-¦- ¦ - -¦- + -	+		
	-7.5		1 - 1							·	+ - + - +	- <sup>1</sup> - ± -			
			<del> </del> -	$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$		- + -  - + -  - + -  		+ + 	$  \frac{1}{1}$ $ \frac{1}{1}$ $-$		+	-!- + - -¦- + -			
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	-8.5		- - -			_ L _/ _   _ L _  _ L _  - T -] - F -] - T -  -   - T -] - F -] - T -						-!- ± - - - ± -			
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	-9.5							+				-¦- ¦ - -!- + -			
	-9.5		+ - ⊥ _			- + -  - + -  - + -   - L J + - + -  - L -		- + + + +			L J _ L J	-  - + - -  - ± -			- + - - + - - ⊥ _!_ ⊥ _
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			+ -	- + +				 + 				-  -  -  - -  -  + - _ !_			
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		Refusal at 6.22m qc > 30 M	Pa												
		Hole open to 3.53m	u												
				2		CI	ient	: Jaco	bs			Prec	drill :	0 m Predrillec	1
E	3L		22	25 cm <sup>2</sup> 5 cm <sup>2</sup>	G.L. 0			1	.: -3.32	2		Date		28/10/2014	
		INSTO LESTING		-		DL Works							e no.:	S15CFIIP.S12	299
				cation:	B1							Proje	ect no.:	A275	4.14

CPT no.:

Checked: AB

BCN-CPT01 1/1

Position:

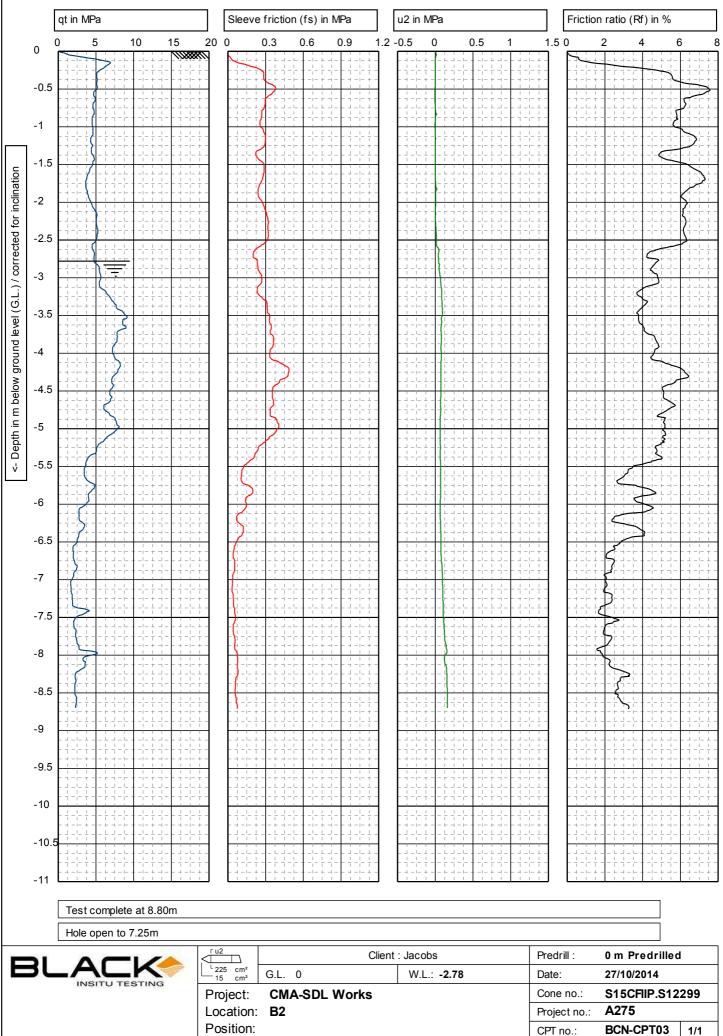
	[	qt in MPa		Sleeve	friction	(fs) in N	ЛРа		u2 in N	1Pa				Friction	n ratio (Rf) in %
	0	0 5 10 15	20	0	0.3	0.6	0.9 1	1.2	-0.5	0	0.5	1	1.5	0	2 4 6
	-0.5		¥ + + + +												
	-1					· + -'- + -'									
ation	-1.5		+ -												
for incline	-2		- + - - + - + -									+ + -	I- + - I I I- + - I- + -		
prrected :	-2.5		·								 	; -; -  ; - 			
.G.L.) / ct	-3		+ - + - + - + - + - + - + - + - + - + -								1 1	+ + -			
ind level (	-3.5		⊥ + - ⊥ _ -												
<- Depth in m below ground level (G.L.) / corrected for inclination	-4.5		+ -			1 1 1						+			
th in m b(	-5		+ -  + - + - + -												
<- Dep	-5.5										1	+			
	-6					· + -!- + -! - · + -!- + -! -					-    _       -    _				
	-6.5		+ + - + - + - + - + - + - + - + - +												
	-7 -7.5		+ -			·¦						<u> </u>			
	-7.5		T -									+ + -			
	-8.5		L _     -			· +					- L L. - L L. - L L. - L L. - L L.	L J J _ 			
	-9		+ -				+ -  - + -					+ -  -   - + - 			
	-9.5		+ + -									+ -i	I = 1 = 1 I = 4 = 1 I = 1 I = 4 = 1 I =		
	-10		F - -  + - + -									F 7			
	-10.5		 			·!						+ + + + + + + + + + + + + + + + + + +			
		Refusal at 2.96m Lifting True	ck												
		Hole open to 2.58m Dry													
-			_ru2	2			CI	ient	: Jacol	os			Pred	rill :	0 m Predrilled
-	ЗL	_ACK		25 cm <sup>2</sup> 5 cm <sup>2</sup>	G.L.	0	5	2.10	W.L				Date		28/10/2014
		INSITU TESTING		oject:		-SDL \	Norks			-				e no.:	S15CFIIP.S12299
				cation:	B1									ect no.:	A275
				sition:	ы								Proje		

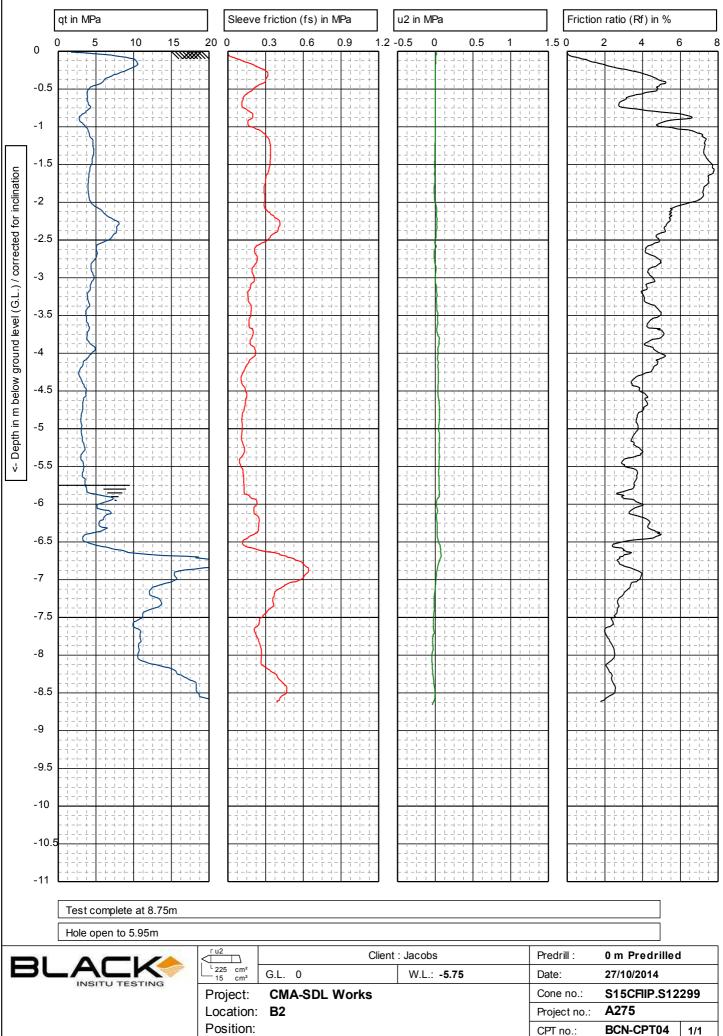
CPT no.:

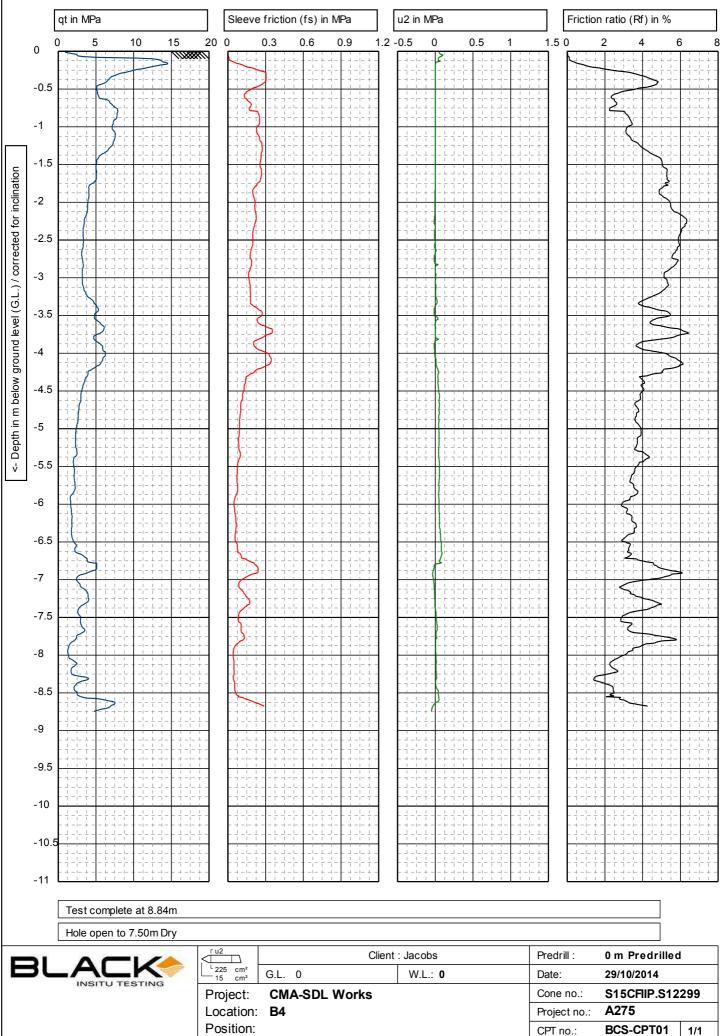
Checked: AB

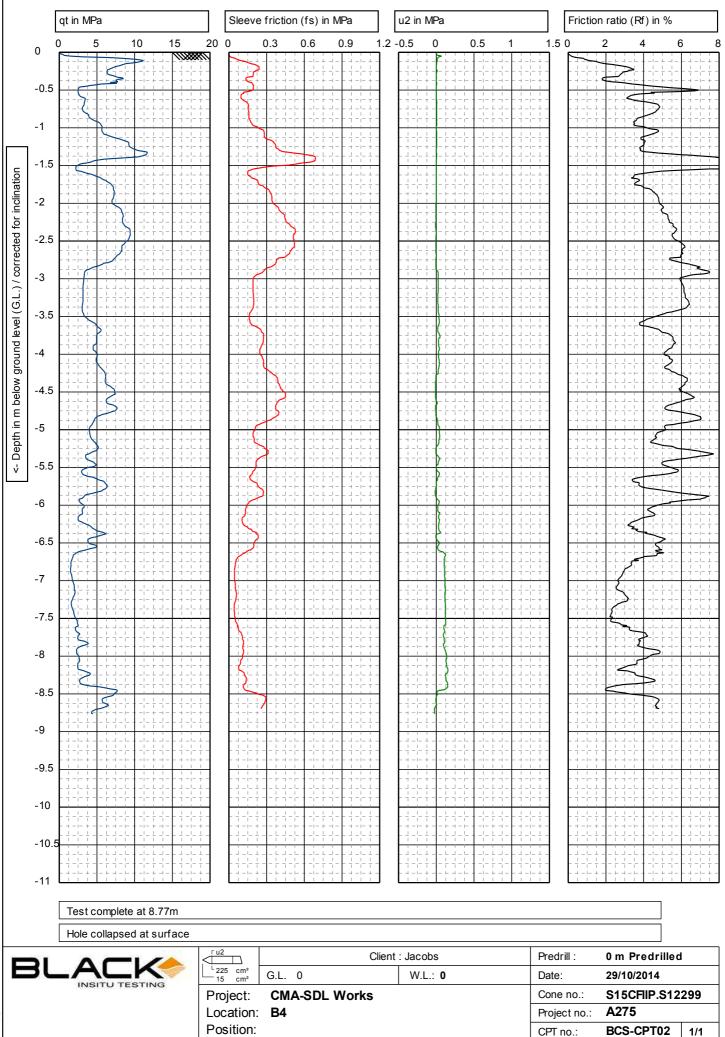
BCN-CPT02 1/1

Position:









	[	qt in MPa		Sleeve f	friction (	fs) in M	Pa		u2 in MF	Pa			Friction	n ratio (Rf) in %	
	0	0 5 10 15	20 0	) C	).3 (	).6 (	0.9 1	1.2	0.5 0	0.5	1	1.5	0	2 4 6	8
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nation										- L J _ L I _ I. 					
or incli	-2			<u> </u>					1 1 1 + - 		<u>     </u>         + -				
cted fo	-2.5	<mark> </mark>		+ + - + -			+ -		+ -		+				
<- Depth in m below ground level (G.L.) / corrected for inclination	-3			- + + - + - - + - + - 			- + -  - + -  				+ + -  	·  - + -			
(G.L.)	0.5				- L J - L -  - +		- + -!- + -  - + -!- + -		+ -  		+	- + -			+ - 
level	-3.5			- + -   + + - - + -   + + -					+ - + - 						
Jround	-4											·  - + -			
elow g	-4.5										11-11				
in m b	-5														
Depth	Ū								- + + - - 4 + - - 1 + - - 1		I.I.				
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	-7.5														
	-8			- + - - + - + - 							+				
	-8.5														
	-9		+								+				
	-9		-						- 4 - 1- 4 - - 7 - 7 - - 7 - 7 - - 4 - 1- 4 -						
	-9.5			+ -					 						
	-10			- + - + - + -							+				
	-10.5		+ - L _						- + -  - + -  		+ +				
	44		-							$-\frac{1}{12}$ $-\frac{1}{12}$	$\frac{1}{1}$ $-\frac{1}{1}$ $   \frac{1}{1}$ $-$	·  _ ± _ - - -  - + -			
	-11								<u> </u>			<u></u>			
		Refusal at 4.92m Inclination Hole open to 4.77m Dry													
			r u2				CI	ient	: Jacobs	3		Pred	rill :	0 m Predrilled	1
E	3L	_ACK		Cm <sup>2</sup> cm <sup>2</sup>	G.L. 0		0		W.L.:			Date		29/10/2014	-
		INSITU TESTING	Proj	0	CMA-	SDI V	Vorks			-			e no.:	S15CFIIP.S12	299
			-		N1a	JJL 1						<u> </u>	ect no.:	A275	
				ition:								<u> </u>			

Position:

CPT no.:

Checked: AB

NN-CPT01A 1/1

	[	qt in MPa			Sleeve	friction	(fs) in N	MPa	]	u2 in M	Pa			Friction	ratio (Rf) in %	
	0	5	10 15	20	0 (	0.3	0.6	0.9	1.2	-0.5	0	0.5 1	1.5	50	2 4	6
				+ + -					-			+ - - + -  - + -  + - - + -  - + -  + - - + -  - + -	-1 - + - $-1 - \frac{1}{1} -$ -1 - + -			
	-0.5			 + - + _ 					-							
	-1			∓ = ↓ ↓ _ ↓ _ + _					-							
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correct	-3		+ -'- + -' + -I- + -I - I - I	+ - + -					-			+ -'- + -'- + - + -!- + -!- + + -'- + -!- +	$-\frac{1}{1} - \frac{1}{1} - 1$	+ + 		
(G.L.) /				+ _ + _ + _				+ - 	-							
d level (	-3.5			 + - + _	- + + - + -				-				1 I I			
<- Depth in m below ground level (G.L.) / corrected for inclination	-4			+ - + -				+ -!- + -	-							
n below	-4.5			1 - - 					-							
oth in m	-5			+ - + + + -	- + -  - + - 				-							
<- Dep	-5.5								-							
	-6			+ - <u>+</u> - -					-							
	-6.5		+ _!_ + _! _ = _! _! _! _! _! _! _! _! _! _! _! _! _!	⊥ _ - - + - -					-				$-1 - \pm -$ $-1 - \pm -$ $-1 - \pm -$ $1 - \pm -$			
	-7			+ - + - + - + -					-							
				+ -					-							
	-7.5			+ _ + _ + _	- 4 - 1- 4 - - 1 - 1- 4 - - 1 - 1- 1				-				-  - + - -  - + -	+ +		
	-8			+ -   + -   _					-				-  - + -     -  - + - _  - ± -			
	-8.5			4					-			+	$-\frac{1}{1} - \frac{1}{1} - 1$			
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	-9.5			+ -					-							
	-10			⊥ _     -					-					 		
	-10.5			+ -				+ -	-	$\begin{array}{c} -\frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} \\ -\frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} \\ -\frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} \end{array}$		+	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			- $ +$ $+$ $ +$ $-$
				⊥ _   _   _ + _					-							
	-11	Test complete	at 5 50m						J							1 1 1 1
		Test complete														
		Hole open to 5	5. 1911 Dry	r u2	2				lie - '					النوا	0 m Dr	al
E	31		K		25 cm²	61	0	С	iient	: Jacob			Prec		0 m Predrille	α
		INSITU TE	STING	<u> </u>	5 cm²	G.L.		N		W.L.:	U		Date		29/10/2014	2200
					oject:		SDL	works						e no.:	S15CFIIP.S12	2299
					cation:	N1b							Proje	ect no.:	A275	414

CPT no.:

Checked: AB

1/1

NN-CPT02A

1.40

Position:

	[	qt in MPa		Sleeve	e frictio	n (fs) in	MPa		u2 in N	IPa			Friction	n ratio (Rf) in %
	0	0 5 10 15	20	0	0.3	0.6	0.9	1.2	-0.5	0	0.5 1	1.5	5 0	2 4 6
	U											- - + - -		
	-0.5					   - + - 			- + -  - + 	+		-  - + - 	- + -  - +	
	0.0		-			    - + -   L _						-i- + -		
	-1			+ + - +					$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$			-¦- ¦	$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$	
	•		-						$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$			-¦- <u>+</u> -	+	
	-1.5	╴┽╺ <mark>╴</mark> ┊╶┥╸╞╶╡╌╞╴┥╺╬╸╞╶┥╸╞╴╡										_!		
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or in			-	+		  - + - - + -  - + _	+ -   + -		+			-i- + -	+ +	
ed f	-2.5		-	+								-¦- + -	+	
rect		- + + + + + + + + + + + + + + + + + + +	-			-			$-\frac{1}{1}-\frac{1}{1}-\frac{1}{1}$		- + - -  -      - + - - + -  -	-¦- ¦ -	+	
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<- Depth in m below ground level (G.L.) / corrected for inclination	-4		-						+-	- <u> </u> +		-i- + -		
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elow	-4.5		-									- ' <u>+</u> 		
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				+								-!- + -		
	-11			+				J				1- + -	+	
		Refusal at 6.95m qc > 40 MP	<sup>b</sup> a											
		Hole open to 6.54m Dry												
				2			Cl	ient	: Jacob	s		Pred	Irill :	0 m Predrilled
-	36		22	25 cm²	G.L.	0			W.L.			Date		28/10/2014
		INSITU TESTING		oject:			Works		1			+	e no.:	S15CFIIP.S12299
				cation:								Proje	ect no.:	A275
				eition.										

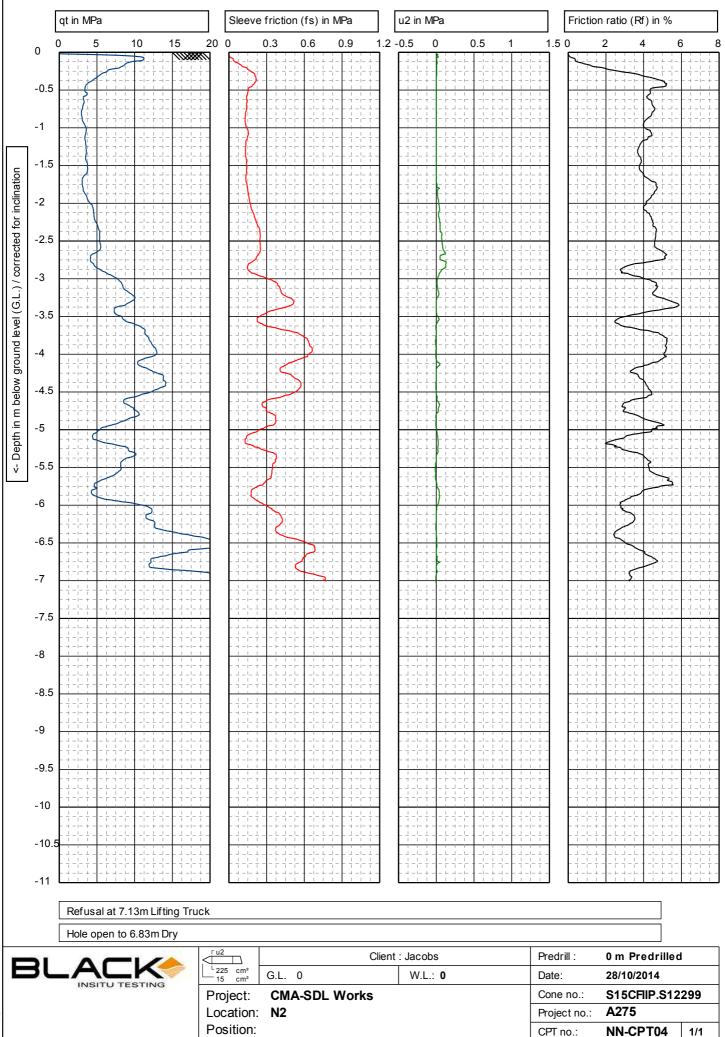
Position:

CPT no .:

Checked: AB

1/1

NN-CPT03



	[	qt in MPa	Sle	eeve fric	tion (fs) in	MPa	[	u2 in N	/IPa				Frictio	n ratio (Rf) in %
	0	0 5 10 15	20 0	0.3	0.6	0.9 1	.2	-0.5	0	0.5	1	1.5	50	2 4 6
	-0.5			<b>N</b> T T T T T								-+-   -+-   -+-		
	-1		L					+ + 		1 I I				
	-1.5		++ L	$-\frac{1}{1}$ $-\frac{1}{1}$ $-\frac{1}{1}$ $-\frac{1}{1}$ $-\frac{1}{1}$		1 + + - J					L J J _	$\begin{bmatrix} 1 \\ - \\ 1 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$		
clination	-2										+ - + - + -	$1 - \pm -$ $1 - \pm -$ $1 - \pm -$ $1 - \pm -$ $1 - \pm -$		
ed for in	-2.5		L								+			
correcte	-3		++			4 + + - J					+	1 - 1 - 1 - + - 1 - + - 1 - 1 -		
(C.L.)/											+			
nd level	-3.5		L	-i- + + -'- + + -'- + +		I I I I		+ + 				L L .		
w grout	-4		+ +									I- + -		
<- Depth in m below ground level (G.L.) / corrected for inclination	-4.5		<u> </u>								+ -1	_ + _  _ + _		<u> </u>
Depth i	-5								1 1 1	1 I I	L L			
<u> </u>	-5.5		+									-  -  -  - + - 		
	-6		-					+				1 1		
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	-9			$-1 - \pm \pm$ $-1 - \pm \pm$					L J -					
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	-10.5					)			L J -					
	-11				1 1 1 1				1 1			<u> </u>		<u> </u>
		Refusal at 5.76m Lifting True Hole open to 5.61m Dry	UK											
			r u2				000+		20			Dros	Irill ·	0 m Brodrillod
E	ΒL		225 c		0	Cli	ent	: Jaco W.L				Prec Date		0 m Predrilled 28/10/2014
	5110.02	INSITU TESTING	Projec		MA-SDL	Worke		L					e no.:	S15CFIIP.S12299
			Locati			4401KS								A275
1.40			Locali										ect no.:	A2/5

Position:

CPT no.:

Checked: AB

1/1

NS-CPT01

0 -0.5 -1 -1.5 -2 -2.5 -3 -3.5 -4 -4.5 -5.5 -5.5				
-1	5			
-1				
□_ <sub>-15</sub>	$5 \begin{bmatrix} -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1$			
-1.5 -2.5 -3.5 -3.5 -3.5 -4 -4 -4 -4 -4 -2.5 -3.5 -3.5 -3.5 -3.5 -4 -4 -2.5 -3.5 -4 -2.5 -3.5 -2.5 -3.5 -2.5 -3.5 -2.5 -3.5 -2.5 -3.5 -2.5 -3.5 -2.5 -3.5 -2.5 -3.5 -3.5 -3.5 -3.5 -4.5 -3.5 -4.5 -3.5 -4.5 -4.5 -4.5 -4.5 -4.5 -4.5 -4.5 -4	5			
-2 -2.5 -3.5 -3.5 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4	$5 \begin{bmatrix} -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1$			
-2.5 -3 -3 -3 -3.5 -3.5 -3.5 -3.5 -3.5 -3.	5 5 5 5 5 5 5 5 5 5 5 5 5 5			
0 -3 -3 -3.5 -3.5 -3.5 -3.5 -4.5	5 5 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7			
0) -3.5 and level -4	5			
punou Mol -4 5				
≥   -4.5	5			
				┝╶┼╶┨╶──┠╴┽╌╎╾┼╶┥╾┝╲┪╌╎╾┾╶┥╼┝╴┽╌╎╴┼
epth in r 2-				
	5			
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-9				
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-10	) <u>- +</u>		·	
-10.	0.5			
-11				
	Test complete at 5.52m			
	Hole open to 5.25m Dry			
			Client : Jacobs	Predrill : 0 m Predrilled
		<sup>L</sup> 225 cm <sup>2</sup> 15 cm <sup>2</sup> G.L. 0	W.L.: 0	Date: 28/10/2014
	INSITU TESTING	Project: CMA-SDL Works		Cone no.: S15CFIIP.S12299
		Location: V1		Project no.: A275

CPT no.:

Checked: AB

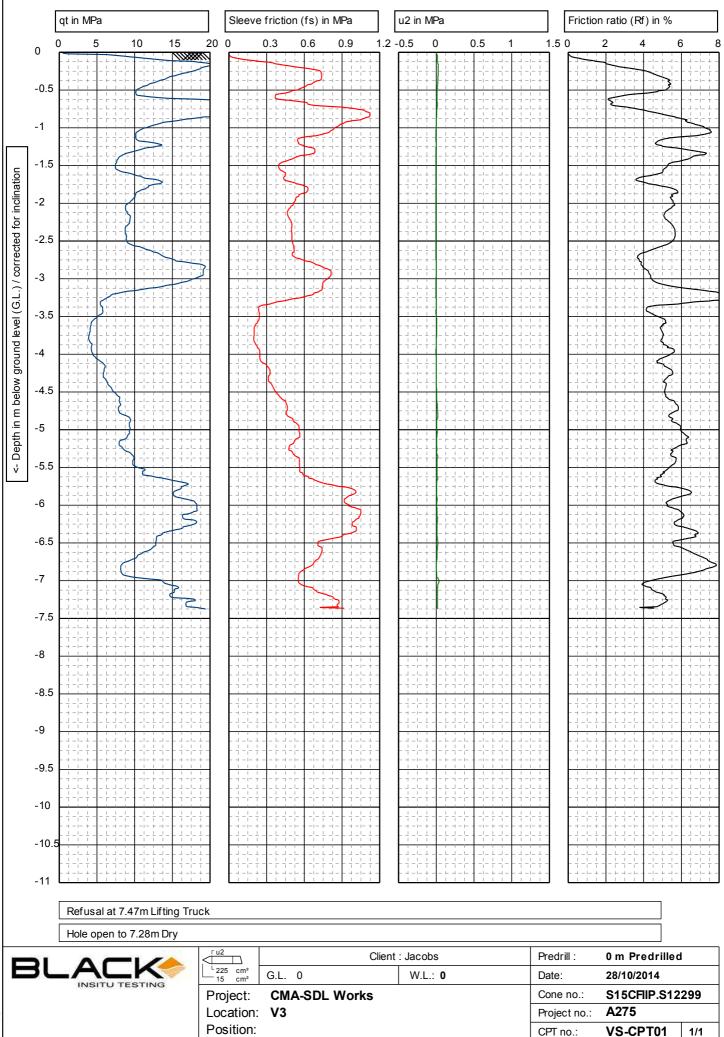
1/1

VN-CPT01

1.40

Position:

	[	qt in MPa	Sleeve friction (fs) in MPa	u2 in MPa	Friction ratio (Rf) in %
	0	0 5 10 15	20 0 0.3 0.6 0.9 1.2	-0.5 0 0.5 1	1.5 0 2 4 6 8
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	-6.5 -7				
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	-9.5	+ +			
	-10				
	-10.5 -11				$\begin{array}{c} 1 & 1 \\ - & - & - \\ - & - & - \\ - & - & - \\ - & - &$
		Test complete at 8.40m Hole open to 7.95m Dry			
-			Client	: Jacobs	Predrill : 0 m Predrilled
E	BL		Project: CMA-SDL Works	W.L.: 0	Date:         28/10/2014           Cone no.:         S15CFIIP.S12299
2			Location: V2 Position:		Project no.:         A275           CPT no.:         VN-CPT02         1/1



CPT no .:

Checked: AB

1/1

		qt in MPa		Sleeve f	friction (	fs) in M	1Pa		u2 in M	Pa			Frictio	n ratio (Rf) in %
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	-1.5		+ - 1 _					-	- + - - + -  					
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	-11	Defue at 5 64m Litting To												
		Refusal at 5.61m Lifting Tru Hole open to 5.38m Dry	ICK											
				2			С	lient	: Jacob	s		Prec	drill :	0 m Predrilled
E	3L	-ACK		25 cm <sup>2</sup> 5 cm <sup>2</sup>	G.L. 0				W.L.:			Date		28/10/2014
		INSITU TESTING		oject:	CMA-		Vorks		1			-	e no.:	S15CFIIP.S12299
				-	V3								ect no.:	A275
				eition:										

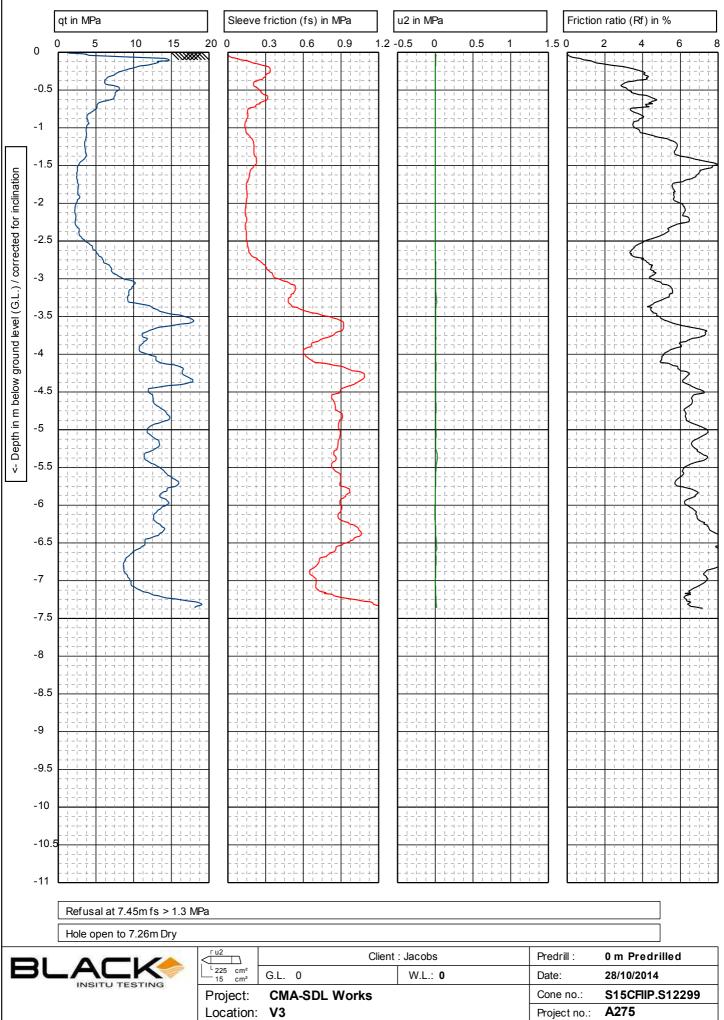
Position:

CPT no.:

Checked: AB

1/1

VS-CPT02



CPT no .:

Checked: AB

1/1

VS-CPT03

1.40

Position:

	(	qt in MPa			Sleeve	frictior	n (fs) in N	/Pa		u2 in M	Pa				Frictio	n ratio (Rf) in %	
0	0	5 1	0 15	20	0 (	).3	0.6	0.9	1.2	-0.5	0	0.5	1	1.5	0	2 4	6
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	ľ							С	lient	: Jacob	s			Pred	rill :	0 m Predrille	d
Ы		INSITU TES		L 22	25 cm² 5 cm²	G.L.	0			W.L.	: 0			Date	:	29/10/2014	
		INSTICTES			oject:		A-SDL \	Norks							e no.:	S15CFIIP.S1	2299
					cation:	V4								Proje	ect no.:	A275	4.4

Position:

CPT no.:

Checked: AB

1/1

VS-CPT04



# Appendix D. Laboratory Test Certificates



<b>CIVIL GEOTECI</b> 6 - 8 Rose Avenue											No ort No e of Iss		)		02 02/R 11/14	
Client Project Location	JACOBS SK ISO79600.00 VICTORIA	•			PROJE	CTS				Date	ted by e teste ecked b			ANF 27/ PJF	11/14	1
Sample Iden Sample Des		NN-TP04	@ 1.5	im						San	nple No	c		142	0209	98
	plasticity, pale	grey and br	own													
	il particle den	•			65 g/cr											
AS 1289.3.6 Method of di	6.1 and 3.6.3 - ispersion		<i>e Dist</i> chani			ard meth s in preti			analy	<u>sis using</u> 0%	g a Hyd	dro	meter			
Hydrometer	•	g/l	onan	our		iation to				-						
Particle	Percent															
Size (mm)	Passing			SIEVE (m	m)		0.075	20.00	0.300 0.425 0.600	1.18	2.36 4.75	6.7	9.5 13.2	19.U 26.5	53.0	75.0
100.0	100	100					*	£	* † *	<u> </u>	1	Ť	77	11	ŤŤ	**
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53.0 37.5	100	90							<b>†</b> - <b>†</b>			#			$\downarrow \downarrow \downarrow$	
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9.5	100	70		X	/							⋕			Ŀ₩	
6.7	100	10										╨			上 甘	
4.75	100	buj							<u> </u>			-#			1-11-	
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0.300 0.150	99 99	40													$\square$	
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0.032	87				*****				1-1			_#		1-1	<b>† †</b> †	
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0.0039 0.0028	65 59	0									<i></i>	ľ			<u> </u>	ŝ
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0.0012	51		0.0		SILT			S	SAND			G	RAVEL		60.0	
				10Z		0.06	P	articl	e Size	2.0 (mm)						
Gravel coarse	0.0%	Sar coa		٥	.3%	Silt coa	rse		۵	.0%		obk rav	oles el			0% 0%
medium	0.0%		dium		.3% .7%	med				.6%		ana				4%
fine	0.0%	fine		4	.4%	fine			16	.5%	Si	ilt			39.1	1%
Total	0.0%	Tot	al	5	.4%	Tota	al		39	.1%		lay otal			55.5 100.0	
											10	лdl				1 15 MAP 13



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025 Accreditation No 9909



Approved Signatory : Peter Fry

A362 V1.15 MAR 13



	HNICAL SER											F		ort No					202/	R10
	e, Croydon 3136													e of Iss	ue				11/1	4
Client	JACOBS SK	•												ed by				AN		
Project _ocation	ISO79600.00 VICTORIA	02 SDL	ADJ	USTI	MENTS	PROJE	CTS							e testeo cked b				27/ PJF	11/1 =	4
Sample Ider	ntification	VS-TF	P05	0 - 2	.0m							S	Sam	ple No	)			142	2020	99
Sample Des	cription																			
	D, fine to coars	se, dark	k brov	wn ar	nd grey,	fines of	low plas	sticity	у											
Assumed sc	oil particle den	sity			2.	.65 g/cr	п <sup>3</sup>													
	6.1 and 3.6.3 -	Particle									ana		-	a Hyd	Iro	met	er			
Method of d				chan	ical		s in pre					0	%							
lydrometer	type		g/l			Var	iation to	me	tho	d		-								
Particle	Percent			AS	SIEVE (m	m)														
Size	Passing			_	,	,		0.075	0.150		0.300 0.425	0.600 1.18		36	N	ь <sup>с</sup>	N 0	с,		0
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37.5	100		50					<u> </u>			±#			+	╈				$\pm \pm$	<u></u>
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13.2	99										*	-		1	#				$\mp$	
											#==			1	_					
9.5	99 00		70											<u>†</u> †	╨					
6.7	99									$+\!\!\!/$	$\pm \pm$			1	╢				$\pm$	
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0.425	88	Perc	00						А		+				+					
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0.018	32 30								_		$\square$				#				Ħ	
			10								77			<b>†</b> †	#		1	<b>F</b>	7-1	
0.0083	29 27							<u> </u>	_		++			<b>†</b> †	#				11	
0.0059	27										##			1	#		1		##	
0.0042	25		0	<u> </u>						+		+	-+		╨			┞┸		S S
0.0030	24			CLAY	fine	medium	coarse	fi	ne	m	nedium	coars	е	fine		mediu	um	CO	arse	BLE
0.0021	23			6		011 T					SAND				GI	RAVI	E/			COBBLES
0.0012	21					SILT									51					0.0
					002		0.0		Pa	articl	e Size	e (mm)	2.0							
Gravel			San				Silt									oles				.0%
coarse	0.0%		coa			.4%		arse				4.4%			av					.5%
medium "	1.3%			dium		.3%		dium	1			5.3%			and					.6%
fine Tatal	2.2%		fine			.9%	fine					4.1%		Sil						.8%
Total	3.5%		Tota	al	59	.6%	To	tal			1	3.8%		Cl						.1%
	3.5% ults of the tests, calit		i Ota	aı	59	.070	101	ai			1	3.070			ay otal				23 100 4362	).(



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	HNICAL SER	VICES										o No port No			142 142		2107
	e, Croydon 3136											te of Iss	ue		28/1		
Client	JACOBS SKI		BOU		)							sted by	40		ANF		
Project	ISO79600.00	•					CTS					te testec	1		25/1		1
Location	VICTORIA			551		- NOJE	010					ecked b			PJF		r
Sample Idei		PIANG	LE PI	Т							Sa	mple No	)		142	021	00
Sample Des	scription																
silty / clayey	GRAVEL, fine	e to med	dium,	pale	brown	and whit	e, fines	of low	' pla	sticity	, with fin	e to coa	rse s	sand			
Assumed so	oil particle dens	sity			2	.65 g/cr	п <sup>3</sup>										
AS 1289.3.6	6.1 and 3.6.3 -	Particle	e Size	Dist	tribution	- Sieve	and Hyd	Irome	ter								
Method of d	lispersion		Мес	chani	ical	Los	s in pret	reatm	ent		0%						
Hydrometer	r type		g/l				iation to				-						
Particle	Percent		1	۵۵	SIEVE (m	nm)											
Size	Passing			70				75	20	25	00 8	2 0		20	ις ις	0	。
(mm)								0.075	U: 15U	0.300 0.425	0.600 1.18	2.36 4.75	6.7 9.5	13 19.(	26.	53.1	75.
100.0	100		100												[	竹竹	**
75.0	100															ĿШ	_
53.0	100		90											*		ĿΗ	
37.5	100		30						+				++-	$\mathcal{A}$		-	
26.5	100													/		Į į	
20.5 19.0	100		80										##	-		ЦЦ	1
								1	井				#/#			凵	
13.2	91 91						••••••		<u></u>				X				
9.5	81		70									+		$\pm$			
6.7	73	-							H			11 1				+	
4.75	67	guix	~~													FΠ	-
2.36	59	rcent Passing	60						++			*		+		FΠ	-
1.18	53	it P.						-	##		$\vdash \checkmark$	<u> </u>	###			11	
0.600	48	nəc	50					+	##	++	<u> </u> /	+++	###	+			$\pm$
0.425	46	Perc							井		<b>*</b>						
0.300	42	Ц						1		$\downarrow \uparrow$				$\pm$		tΗ	
0.150	32		40					$\pm$	H	A-F		+	╢┦	+-		-+	+
0.075	25								H								
0.057	23							-	$\mathbf{X}^{+}$					4		μh	
0.046	22		30					$^{+/}$	Ħ	++		+++	##	+-		日	$\mp$
0.033	20							*	$\pm$				##	_		<u>t t</u>	1
0.021	20		20			ļ,		-	井		<u> </u>	<u></u>	#=	1		μt	+
0.015	18		20					1	$\pm$								-
0.010	16								H				<u>H</u>	$\pm$		ΕĦ	$\pm$
0.0080	16		10		$\times$			+	H		+	++	+++				+
0.0057	10 15			X	· · · · · · · · · · · · · · · · · · ·											FΠ	
0.0057	15		~						+-+-				###				-
			0	<u> </u>					+	 		<i>E</i>					ŝ
0.0030	10			CLAY	fine	medium	coarse	fine		medium	coarse	fine	me	dium	coa	rse	3BL L
0.0021 0.0013	8 7			0		SILT				SAND			GRA	VEL		7	COBBLES
0.0013	'		L	0.0	002		0.06	50				<b>!</b>				60	
Gravel			San	d			Silt	ŀ	Partio	le Size	(mm)		bbles			Λ	0%
coarse	0.0%		coal		c	9.4%	coa				3.6%		avel	2			0% 2%
medium	29.0%		med			2.3%		dium			5.1%	Sa					2 /0 3%
fine	13.2%		fine			2.6%	fine				5.6%	Sil					3%
Total	42.2%		Tota	a/		.3%	Tota				5.3%	Cla					2%
TUlai													tal			100.	

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	HNICAL SER											Rep	No Nort No				202/	
	, Croydon 3136												e of Iss	ue			11/1	4
Client	JACOBS SKI	•		,								Tes	sted by			AN	R	
Project	ISO79600.00	2 SDL	ADJL	JSTN	/ENTS	PROJE	CTS					Dat	e testec	d		25/	11/1	4
Location	VICTORIA											Che	ecked b	y		PJF	=	
Sample Iden	tification	TERRY	BEN	FIEL	D PRC	PERTY						Sar	nple No	)		142	2021	101
Sample Des	cription																	
sandy CLAY	, medium plas	sticity, b	rown	with	pale gr	ey, fine t	o mediu	m sai	nd									
Assumed so	il particle den	sity			2	.65 g/cı	п <sup>3</sup>											
AS 1289.3.6	.1 and 3.6.3 -	Particle	Size	Dist	ribution	- Sieve	and Hyd	drome	eter	-								
Method of di	spersion		Mec	hani	cal	Los	s in prei	treatm	nen	t		0%						
Hydrometer	type		g/l			Var	iation to	meth	od			-						
Particle	Percent		Г	AS S	SIEVE (m	nm)												
Size	Passing				(//	7		0.075	50	00,	125	<sup>20</sup> 8	5. 20		. ~ 0	2	v O	0
(mm)	Ŭ Ŭ							0.0	0.150	0.3	0.425	1.18	2.36 4.75	6.7	9.5 13.2 19.0	26.	37. 53.	75.
100.0	100	-	100 F									* *	****	Ť	**`	Í.Ť.	77	ŤŤ
75.0	100		þ						+	*	(†		111	#				Ħ
53.0	100		90						$\perp$	$\square$			<u>+</u>	⋕				Ħ
37.5	100		<i>-</i>						17	$\square$				₽			+	+ +
26.5	100		F						$\checkmark$					⋕			++	Ħ
20.5 19.0	100		80					_	Å					#				벆
									1					#				Ħ
13.2	100		Ŀ										<u></u>	#				
9.5	100		70					H	$\pm$	H	_			∄		H	$\pm 1$	H
6.7	100	-	p					¥	-					Ŧ			+-+	ŦŦ
4.75	100	ing	, F					/	-				111	⋕			11	Ħ
2.36	99	SSE	60					<u> </u>	+				<del>   </del>	#		L	+	炐
1.18	99	rcent Passing	È.						1				#	#			$\pm$	#
0.600	98	uə;	50			<u></u>	×		$\pm$					#			$\pm 1$	Ħ
0.425	97	Perc	<u> </u>															
0.300	95	ď	F		~~~~>				-					$\mathbb{T}$			$\mathbf{H}$	Ŧ
0.150	83		40		$\swarrow$				+					∓				₽₽
0.075	65		þ	$\neg A$										#			+-+	#
0.059	61		, i	X					-			ļ	<u> </u>	#		L.	11	井
0.047	58		30					<u> </u>	+				<u> </u>	#			++	벋
0.034	53		Ŀ						+					#				Ħ
0.024	53 51		20						-		_		<u>+</u>	∰			$\pm 1$	ŦŦ
0.024	50		20 F						-					Ŧ			+	Ŧ
			-						-					∓				厈
0.011	49 45		10					<b></b>	-	<b> </b>	_	<b>  </b>	<u> </u>	#	++-	<b>-</b>	11	#‡
0.0080	45		Ē						+				<u> </u>	#			$\pm$	##
0.0057	44		Ŀ											#				壯
0.0041	42		0 Ê						T		1		1	Τ				T S
0.0029	40			CLAY	fine	medium	coarse	fine		me	dium	coarse	fine	1	nedium	co	arse	37 E)
0.0020	38			Ы		0				.5/	ND	1		GF	RAVEL	I		COBBLES
0.0012	33		L		02	SILT				54		-	ļ	Gr	VA V LL		E	0.0
<u> </u>				0.0	02		0.0		Pari	ticle	Size	2. (mm)	.0					
Gravel	0.00/		Sanc		~	00/	Silt				40	00/	Co					).0%
coarse	0.0%		coars			).8% ).6%		arse dium				.8%	Gr					).8% 7 0%
medium fine	0.3% 0.5%		medi fine	um		).6% 3.5%	me fine	dium				.0% .5%	Sa Sil					7.9% 3.3%
				,		0.5% 7.9%	Tot						Sil Cla					5.3% 8.0%
Total	0.8%		Tota	1	- 21	' <b>u</b> %	101	al				.3%	1 1	31/				( ) ) ~ /



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	INICAL SERV Croydon 3136									Rep	No oort No e of Issi	10	14202 14202 28/11/	/R109
	-										ted by	ue		14
	JACOBS SKN	•				070							ANR	
	ISO79600.00 VICTORIA	2 SDL /	ADJUS	IMENIS	PROJE	615					e testec ecked by		25/11/ PJF	14
Sample Ident		SHANE	COBU	RN FARI	N					Sar	nple No	1	14202	102
Sample Desc	cription													
CLAY, mediu	m plasticity, p	ale grey	/ grey,	with fine	to coars	e sand								
Assumed soi	l particle dens	sity		2	.65 g/cı	п <sup>3</sup>								
	1 and 3.6.3 -	Particle	Size Di	stributior	n - Sieve	and Hyd	Irome	ter						
Method of dis	spersion		Mecha	nical	Los	s in pret	reatm	ent		0%				
Hydrometer t	ype		g/l		Var	iation to	metho	od		-				
Particle	Percent		A	S SIEVE (n	nm)									
Size	Passing						0.075	UCT.U	0.300 0.425	1.18	2.36 4.75	6.7 9.5 13.2	0.2 0.2	2.0
(mm)		1	00				0 0	s , ,	000	C	Ci 4	6 6 7 7 6 7 7 7	* २ ७ ४ * * *	ń κ̈́ ŧ <del>ki ×</del> ×́
100.0	100	,									<u> </u>	$\parallel \uparrow \uparrow$		
75.0	100								X	<u> </u>				
53.0	100		90					$\vdash$	+					
37.5	100							И						
26.5	100						+/							
19.0	100		80				X							
13.2	100			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~		/							
9.5	100		70			X		1						
6.7	100													
4.75	100	ing			·	$\succ$		<b>.</b>						
2.36	100	SSE	60		<u> /</u>				++		<u> </u>			
1.18	99	rcent Passing			<u> </u>			<u></u>						
0.600	96	nəc	50		L		+	Ħ						
0.425	94	Perc			×									
0.300	91	<u> </u>					1							
0.150	85		40						+					
0.075	78		$\times$											
0.050	71		30											
0.042	67						1							
0.030	64													
0.019	62		20					<u>├</u>	+		++	╫╌┼╌┼╌	<u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u>	+-
0.014	56													
0.010	52		10									++-+	<u> </u>	
0.0075	48		···						TT					
0.0053	46						-							
0.0038	43		0				1	Г		I				
0.0027	41		CLAY	fine	medium	coarse	fine	r	nedium	coarse	fine	medium	coarse	3LE(
0.0020	38		5			•			SAND	•		GRAVEL		COBBLES
0.0012	35			0.002	SILT	0.06	50				ļ		F	50.0
<b>•</b> • •				0.002				Partic	le Size	2. (mm)				
Gravel	0.00/		Sand		2 00/	Silt	* • •			E0/		bbles		0.0%
coarse medium	0.0% 0.1%		coarse medium		3.9% 3.2%	coa mer	rse dium			.5% 5.6%	Gra Sa	avel nd		0.5% 5.7%
fine	0.1%		fine		3.2% 3.6%	fine				8.4%	sa Sili			5.7% 5.5%
Total	0.5%		Total		5.7%	Tota				5.5%	Cla			8.3%
												tal		0.0%



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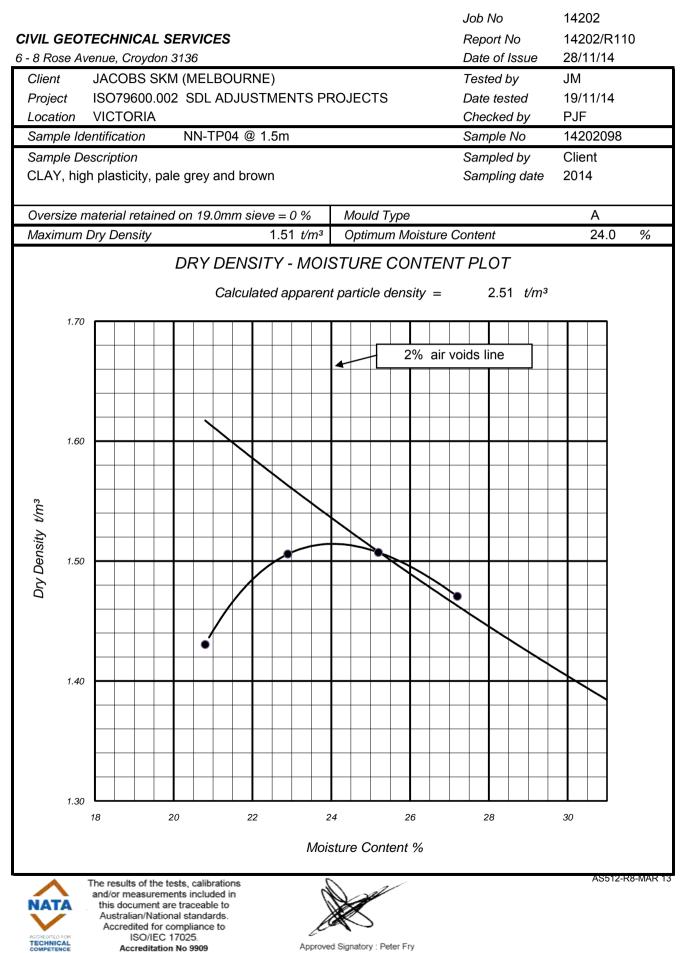


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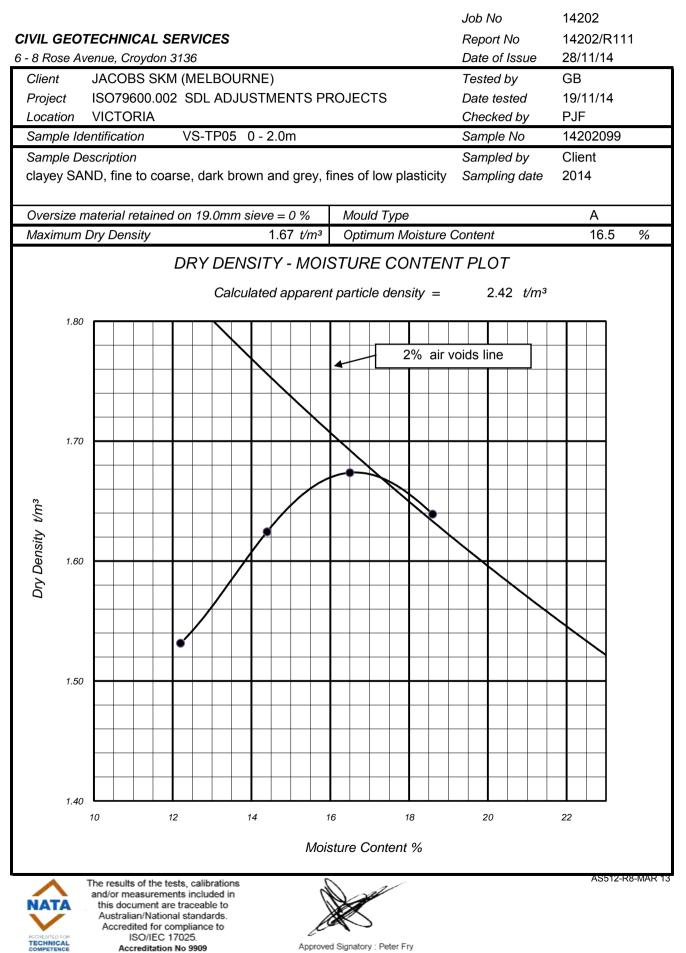


#### **STANDARD COMPACTION**

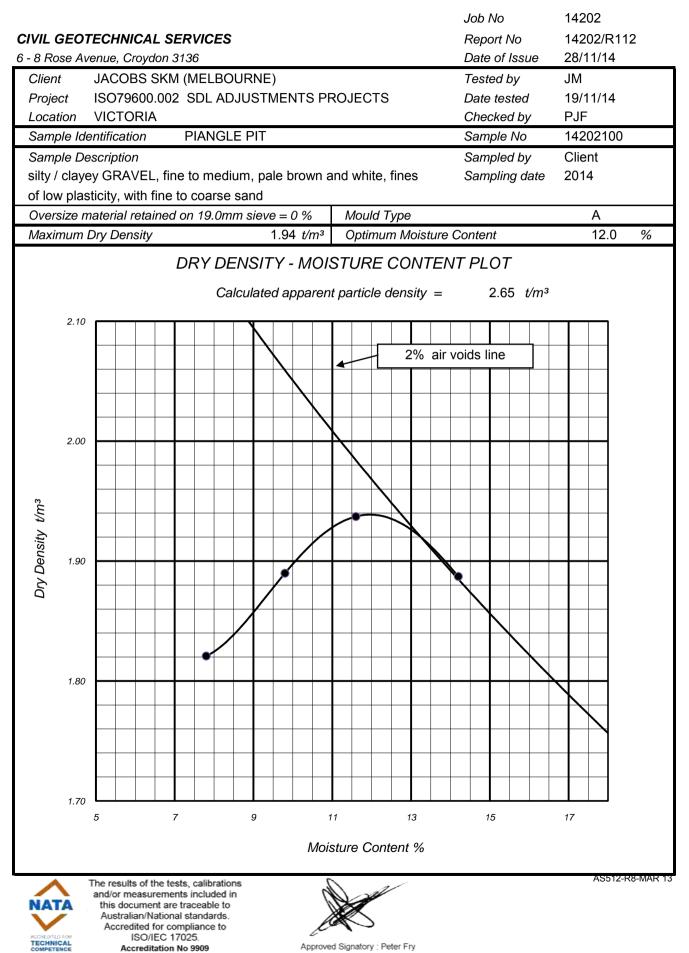
AS 1289.5.1.1



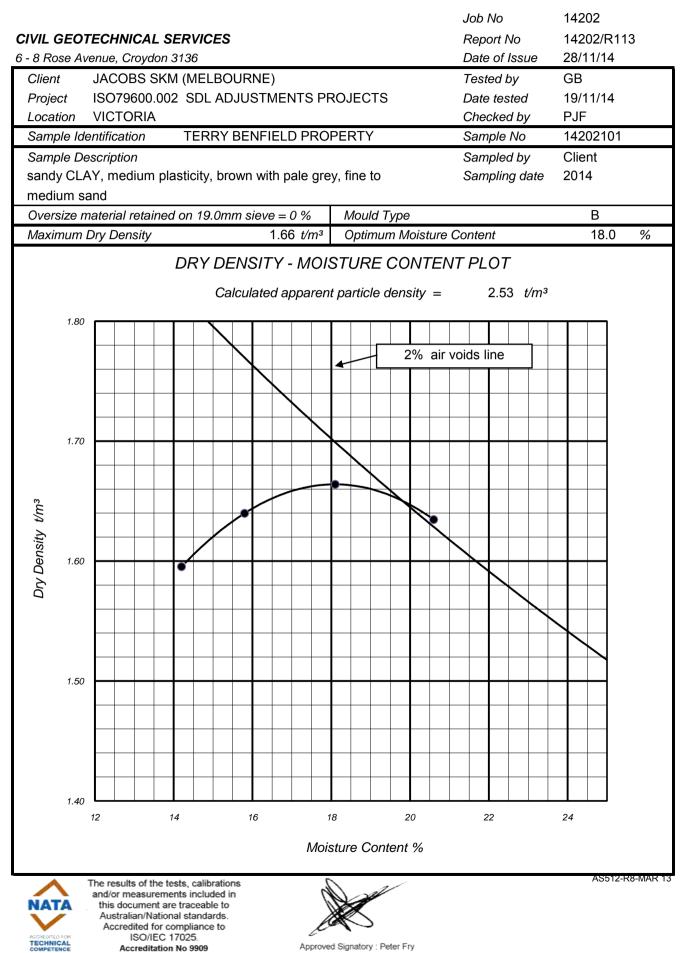




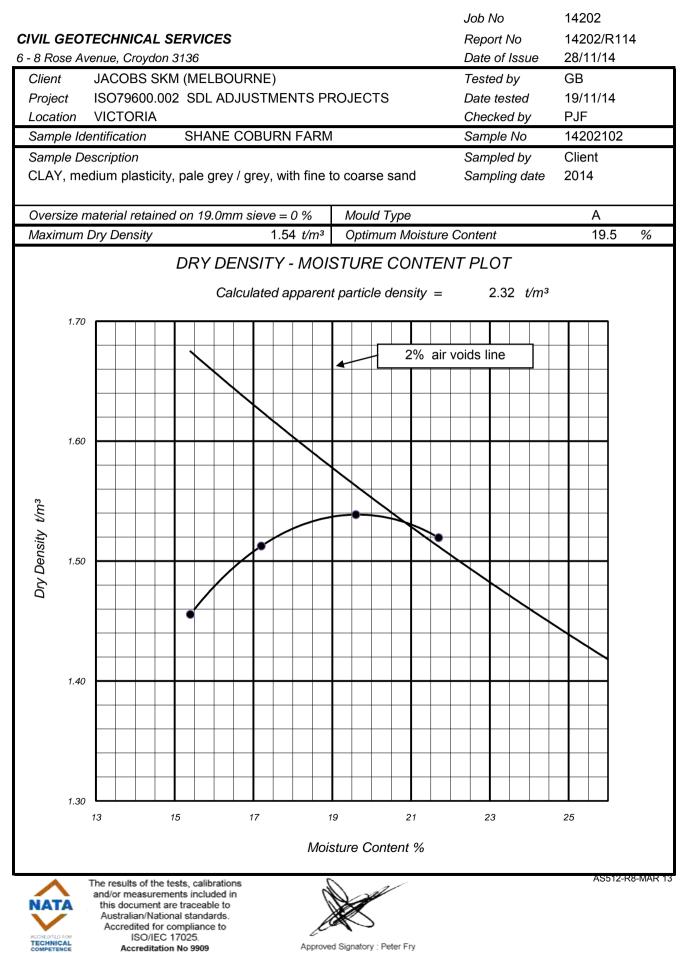














## AS 1289.2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1, 3.6.1, 3.8.1 & 6.4.1 (Clauses 4 and 5a)

	rdon 3136 S SKM (MELBOURNE) 00.002 SDL ADJUSTMENTS PROJECTS	Date of Issue         LBOURNE)         ADJUSTMENTS PROJECTS       Tested by Date tested Checked by         Soil Description       %<							14202/R115 28/11/14 SK 25/11/14 PJF			
Sample Identification	Soil Description							% Passing 75µm sieve	Emerson Class No*	Emerson Class No <sup>**</sup>		
14202098 NN-T -TP04 @ 1.5m	CLAY, high plasticity, pale grey and brown	20.7	-	50	20	30	13.0	98	3	5		
14202099 VS-T P05 0 - 2.0m	clayey SAND, fine to coarse, dark brown and grey, fines of low plasticity	10.1	-	32	15	17	8.5	40	4	4		
14202100 PIAN PIANGLE PIT	silty / clayey GRAVEL, fine to medium, pale brown and white, fines of low plasticity, with fine to coarse sand	3.7	-	23	17	6	3.0	25	4	4		
14202101 TERR ELD PROPERTY	sandy CLAY, medium plasticity, brown with pale grey, fine to medium sand	5.7	-	42	16	26	13.0	65	3	3		
14202102 SHAN COBURN FARM	CLAY, medium plasticity, pale grey / grey, with fine to coarse sand	6.8	_	43	19	24	11.0	78	3	3		
Notes AS 1289.3.1.2,3.2.1,3.4.	Dry/Wet sieve: Dry Te	ater used: mperature: ite sampled		Distille 20.2 2014				River v 20.2 2014	°C			



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	HNICAL SERV									Rep	No Dort No Te of Iss				43 43/F 12/1	
Client	JACOBS SKN		IRNE	)							ted by			AN		
Project	ISO79600.00	•		,		те					e teste	ส			12/1	1
Location	VIA MALLEE		1031		ROJEC	15					e lesle ecked b			PJF		+
Sample Iden	tification	BCN-BH0	1 1.3	3 - 1.65r	n					Sar	nple No	0		144	430	01
Sample Des	cription															
CLAY, mediu	um plasticity, p	ale grey, w	ith fin	e sand	and fine	to mediu	um gra	ave								
Assumed so	il particle dens	sity		2	.65 g/cr	п <sup>3</sup>										
AS 1289.3.6	.1 and 3.6.3 -	Particle Siz	e Dis	tribution	- Standa	ard meth	nod of	fine	e analj	/sis using	g a Hyc	Iror	neter			
Method of di	spersion	Me	chan	ical	Los	s in pret	reatm	ent		0%						
Hydrometer	type	g/l				iation to				-						
Particle	Percent		AS	SIEVE (m	ım)											
Size	Passing		1				0.075	0.150	0.300 0.425	0.600 1.18	2.36 4.75	$\sim$	9.5 13.2		с. О. С.	0.0
(mm)		100					0	<i>.</i> .	00	· · ·	0, 4,	6.	9.77	26	ς Υ	ř,
100.0	100	100									<u>+</u> <u>+</u>		-		<u>f</u> f	$\hat{\mathbf{n}}$
75.0	100												$\pm 17$		++	
53.0	100	90						$\mp$			<del>   </del>	#	71/	<b>#</b>   -	$\mp$	
37.5	100							1			<u> </u>	#	11		$\pm$	
26.5	100											<u></u>	$\mathbf{X}$			
19.0	100	80						+				╆	4-		++	
13.2	86							-	**	* *	**	1			++	
9.5	82							$\mathbf{X}$			1	-				
6.7	79	70					$\pm 7$				ļ	#			1	
4.75	75	Ľ					1/				ļ	#		11	+++	
		ius 60					*					Ŧ			$\pm \pm$	
2.36	75 75	rcent Passing 09					/								+	
1.18	75	It P				x										
0.600	75	19 50				<i>;</i> /		++		+	╂╂╂	∓		++	++	
0.425	75	Per														
0.300	75										111	#			1	
0.150	73	40					-				<b> </b>	#		#=	11	
0.075	62				×							#				
0.059	53	30			<b>]</b>					<u>+</u>	<u>ttt</u>	╨			$\pm$	
0.047	48	50	1	1												
0.034	44										<u> </u>  ]					
0.022	42	20						╞┼		+	╂╂╼╍╍┦	╢	+	╢╢	$\pm \mp$	
0.015	41							FF				╓			+	
0.011	39										╂╂╍╍╍╌┠	-#-			+++	
0.0081	36	10						##			<b>  </b>	#	-	##	++	
0.0058	33							##		<b>  </b>	<u> </u>	#		#1	##	
0.0041	33	0						$\frac{1}{1}$		<u> </u>	+++	<u>+</u> t-		╓╌	++	
0.0029	32	0	≥	fine	medium	coarse	fine		medium	coarse	fine	,	nedium	coa	arse	ES
0.0021	29		CLAY			1					-					COBBLES
0.0012	26				SILT				SAND			GF	RAVEL			
			0.	002		0.00	ŀ	Partic	cle Size	2. ( <i>mm</i> )	.0				60	.0
Gravel		Sa				Silt						obb				0%
coarse	0.0%		arse		0.2%	coa				1.9%		rave	el			8%
medium	21.8%		dium		.4%		dium			3.7%		and				3%
TINO	3.0%	fine			0.7%	fine				4.1%	Si					7%
fine Total	24.8%	To	6	<b>∩</b> 4	.3%	Tot	~		^	1.7%	~ ~	ay			~~	2%



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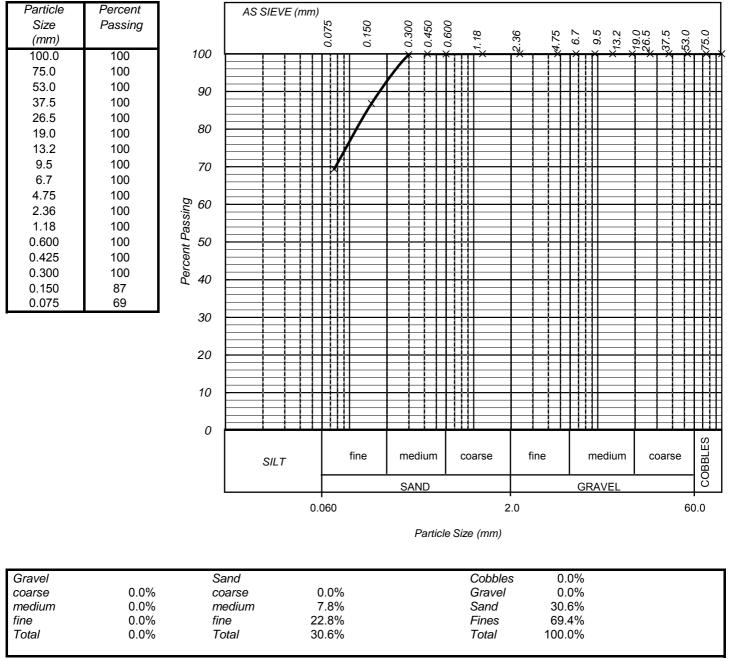
AS 1289.3.6.1

	ECHNICAL SERVICES enue, Croydon 3136	Job No Report No Date of Issue	14443 14443/R002 04/12/14
Client Project Location	JACOBS SKM (MELBOURNE) ISO79600.002 SDL ADJUSTMENT PROJECTS VIA MALLEE CMA	Tested by Date tested Checked by	BG 26/11/14 PJF
Sample Ide Sampling i	entification BCN-BH01 @ 4.9m method By Client	Sample No Sampled by Sampling date	14443002 Client 2014

### Sample Description

sandy CLAY, low plasticity, light grey with orange-brown, fine to medium sand

### Particle Size Distribution





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A361 V1.5 MAR 13



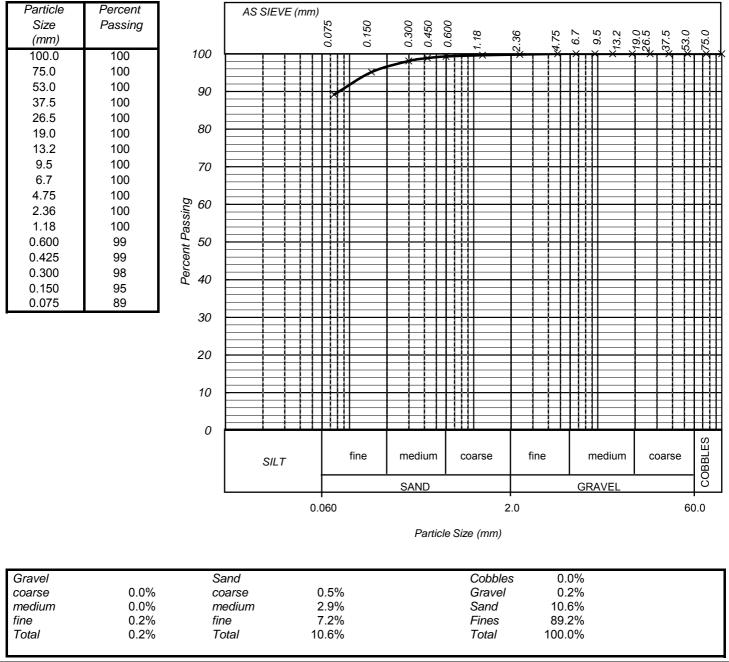
AS 1289.3.6.1

CIVIL GEOTECHNICAL SERVICES 6 - 8 Rose Avenue, Croydon 3136	Job No Report No Date of Issue	14443 14443/R003 04/12/14
ClientJACOBS SKM (MELBOURNE)ProjectISO79600.002 SDL ADJUSTMENT PROJECTSLocationVIA MALLEE CMA	Tested by Date tested Checked by	SK 02/12/14 PJF
Sample IdentificationBCN-BH020.7 - 1.1mSampling methodBy Client	Sample No Sampled by Sampling date	14443003 Client 2014

### Sample Description

CLAY, medium plasticity, light grey with brown, trace of fine to medium sand

#### Particle Size Distribution





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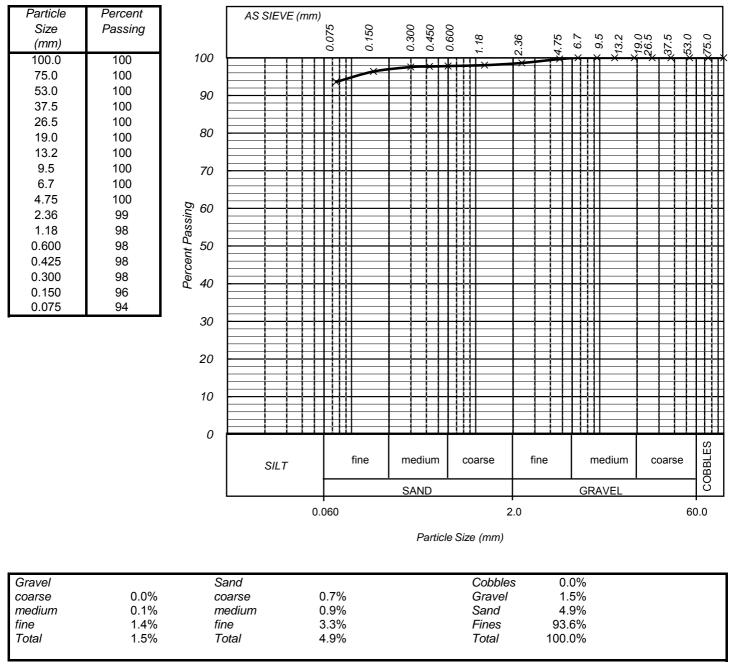


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and the second second		Job No	14443
CIVIL GEOTEO	CHNICAL SERVICES	Report No	14443/R004
6 - 8 Rose Aven	ue, Croydon 3136	Date of Issue	04/14/14
Client	JACOBS SKM (MELBOURNE)	Tested by	SK
Project	ISO79600.002 SDL ADJUSTMENT PROJECTS	Date tested	27/11/14
Location	VIA MALLEE CMA	Checked by	PJF
Sample Iden	ntification BCM-BH02 1.5 - 1.75m	Sample No	14443004
Sampling me	ethod By Client	Sampled by	Client
		Sampling date	2014.
Sample Des	cription		

CLAY, high plasticity, pale grey

### Particle Size Distribution





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A361 V1.5 MAR 13



	HNICAL SER ə, Croydon 3136									Rej	o No port No te of Iss					43 43/F 12/1	
	-			-,													7
Client	JACOBS SK	•		•		то					sted by				ANF		
Project Location	ISO79600.00 VIA MALLEE		JJUSI	MENTE	ROJEC	15					te teste ecked b				03/ <sup>,</sup> PJF	2/1	4
Sample Ider	ntification	NN-BH0	1 1.9	- 2.15m						Sar	nple No	0			144	430	06
Sample Des	scription																
CLAY, high	plasticity, pale	e grey and	orange	e / browr	I												
Assumed so	oil particle den	sity		2	.65 g/cr	т <sup>3</sup>											
	6.1 and 3.6.3 -								anal		g a Hyd	droi	mete	ər			
Method of d	lispersion	Ν	/lechar	nical		s in pret				0%							
Hydrometer	type	g	/I		Var	iation to	metho	od		-							
Particle	Percent		AS	SIEVE (m	ım)				<b>a</b> 15								
Size	Passing						0.075	UCT.U	0.300 0.425	0.600 1.18	2.36	2 ~	9.5	20.	5.5	3.0	2.0
(mm)		10	₁ L				0 0	S.	00	, <u>,</u> ,	<u>v</u> i 4	; ;; ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	6, 7	15	26	ο Υ	ř,
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75.0	100					<u> </u>		<u>+</u>			<u> </u>	-++				$\vdash$	
53.0	100	9	o ——						-				$\square$	_		H	_
37.5	100					<b>/</b>						-				$\mp$	_
26.5	100					/							_				
19.0	100	8	<u></u> د			ŕ					╂┼──┤	+				$\vdash$	
13.2	100				├ <i>X</i>												
9.5	100	-			×												
6.7	100	70			J							_					
4.75	100	D			1/			1			11			_			
2.36	100	ilisi 6	2		/				++						_		
2.30 1.18		as		×											_		_
	100	rcent Passing 9		X							++						
0.600	99	<u>9</u> 50	o ——	+*						+		-#-		_		++	
0.425	99	Per		*													
0.300	99		$\sim$														_
0.150	99	40	) <u> </u>								111	Ħ			_		
0.075	98							<b></b>									
0.051	95	30	, <u> </u>			<b></b>	<u> </u>			<u> </u>	<u> </u>	Ħ			_		+
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0.030	88																
0.022	82	20	י מ					++	- <u>+</u>	+	╂╂┦	╶╫╴			<u> </u>	$\square$	+-
0.014	77							H									
0.010	73										++	-					
0.0074	67	10	, <u> </u>					11		+	<b> </b>	Ħ				=	-
0.0054	58							##		<b>  </b>	#	#					
0.0039	54		,					<u>+</u>			++	-				+	- <u>+-</u>
0.0028	50	Ì		fine	medium	coarse	fine		medium	coarse	fine		mediu	m	coa	rse	ES
0.0020	46		CLAY														COBBLES
0.0012	41		Ĺ		SILT				SAND			Gł	RAVE	L			с С
				.002		0.0	F	Partic	le Size	2. ( <i>mm</i> )	.0					60	.0
Gravel			Sand			Silt						obb					0%
coarse	0.0%		oarse		.5%		irse			5.7%		rave					1%
medium "	0.0%		nedium		0.6%		dium			9.8%		and					6%
fine	0.1%		ne		2.5% 8.6%	fine Tot				4.9% 0.4%	Si	ilt lay					4% 9%
Total	0.1%		otal														

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	HNICAL SER												Rep	No Dort No e of Iss		e			143/ 12/1	
Client	JACOBS SK	M (MELE	BOUR	RNE)	)								Tes	ted by				AN	R	
Project Location	ISO79600.00 VIA MALLEE		ADJL	JSTŇ	/ENT F	ROJEC	TS							e teste ecked b				03/ PJF	12/1 <del>-</del>	4
Sample Idei	ntification	NS-BH	101 @	1.5	m								Sar	nple No	0			144	430	80
Sample Des	scription																			
sandy CLAY	<ol> <li>low plasticity</li> </ol>	v, brown,	fine	to m	edium	sand														
	oil particle den	•				.65 g/cr														
	6.1 and 3.6.3 -	Particle										naly		g a Hyd	dro	me	ter			
Method of d	•			hani	cal		s in pret						0%							
Hydrometer	type		g/l			Var	iation to	me	ethc	bd			-							
Particle	Percent		Г	40.0		m)														
Size	Percent Passing			AS S	SIEVE (m	m)		75	S	Ş	8	22	<u>~</u>	() IO			<u>.</u>			6
( <i>mm</i> )	i assiriy							0.075	0 150	2.5	<u> </u>	0.425	1.18	2.36	5.7	9.5	13.2	26.5	37.5 53.0	75.0
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73.0 53.0	100									X	4								$\square$	
33.0 37.5	100		90							F†					#				$\mp$	
26.5	100		-						-/						-				+	
20.5 19.0	100		80					F	1		-	-		111		-	+	Lt-	$^{++}$	Ħ
19.0 13.2	100								1		_	_			#	_	+		$\ddagger$	<u> </u>
9.5	100		ŀ					⊨∦						<u> </u>				<b>t</b> -t-	+-+	<u></u>
9.5 6.7	100		70					#			_			#	#	_	+	tt.	$\pm$	H-
6.7 4.75		£	ŀ					#			_			<u> </u>	⋕		-	t.		
	100 100	sinç	60					tt-			$\pm$						+	tt:	$\pm \pm$	
2.36 1.18	100 100	asi									$\pm$									
		cent Passing	E				1												$\pm \overline{1}$	
0.600	99 08	rcei	50				<i>*</i>	+		H	-+	+-			-	-	+-	H	+ <b>1</b>	$\vdash$
0.425	98 06	Per										_								
0.300	96																	EŦ	H	H
0.150	88 70		40			— <u> </u>					-				Ħ			FF	$\mp$	
0.075	70 56		-								-								$\square$	
0.060	56 51		30		- <del>**</del>	F				F	+				-#		+	F+-	$\mp$	Η-
0.048	51		-	×	<									1					+-+	
0.035	44														-#				+	
0.022	42		20								_			†i†	Ħ	-		<b> </b>	$^{++}$	=
0.016	39 36										_			ļ	=#	-	-	匚	$\ddagger$	
0.012	36		10								-			<b>  </b>	╧	=	+	<b> </b>	##	<b>[</b> ]
0.0084	33										_			<u> </u>	#	_		tt.	++	<u>h</u>
0.0060	31		ŀ								_	_		ļļ	#		-		##	
0.0042	31		0					┝┶		Ч			1	<u> </u>	+			╫┷		S
0.0030	30			СLАУ	fine	medium	coarse		fine		mea	lium	coarse	fine		med	ium	CO	arse	COBBLES
0.0021	27			O		SILT					SA	ND			G	RAV	'EL			COB
0.0012	26		L	0.0	02	5.27	0.0	60	_			<u> </u>	. 2.	.0					60	0.0
Croud			Se	4			0:11		Ρ	arti	cle S	Size	'mm)		0 h '	bla-			~	00/
Gravel coarse	0.0%		Sano coar		1	.0%	Silt coa		<b>`</b>			11	.5%		obl rav	bles				.0% .2%
medium	0.0%		med			.0% .3%	me						.5% .4%		anc					.2% .5%
fine	0.2%		fine			.2%	fine						.3%	Si		-				.2%
Total	0.2%		Tota	l.		.5%	Tot						.2%		lay				27	.1%
														Te	otal	1			100	.0%

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L GEOTEC	HNICAL SER	VICES												b No port No	)			144 144	143/I	R00
Rose Avenu	e, Croydon 3136	5												, ite of Is		Э		04/	12/1	4
Client	JACOBS SK	M (MEI	LBOU	RNE	)								Te	sted by	,			AN	R	
Project	ISO79600.00	•					TS							te teste					12/1	4
Location	VIA MALLEE			0011										ecked				PJF		•
Sample Ide	ntification	VS-B	H01 (	@ 3.5	5m								Sa	mple N	0			144	430	10
Sample Des	scription																			
	D, fine to coar	se dar	k brov	wn fi	nes of lo	ow plasti	citv													
				, in		n plaoti	ony													
Assumed so	oil particle den	sitv			2	.65 g/cr	т <sup>3</sup>													
	6.1 and 3.6.3 -	-	e Size	e Disi				hor	d of	fin	еа	nal	isis usir	na a Hv	dra	ome	ter			
Method of a		i artior		chan			s in pret					narj	0%		ure	,,,,,,	101			
Hydrometer			g/l	chan			iation to				L			,						
iyai Onietel	iype	_	9/1			val		111		'n			-							
Particle	Percent			AS	SIEVE (m	m)							_							
Size	Passing							0.075	0.450		300	0.425	0.600 1.18	2.36 1 75	2 ~	. ц	2.0	26.5		0.0
(mm)			100					<i>.</i>	Ċ	S	Ċ		<i>.</i> , <i>.</i> ,	~ ~	+ 'C	i Ö	200	26	537 53	75
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75.0	100							F		Π	_			11	F				$\mp$	
53.0	100		90					Ħ		Ħ					Ħ	FF-		中	$\mp$	FF-
37.5	100																		$\pm \pm$	
26.5	100											X								
19.0	100		80					H				$\mathcal{H}$	+		H		+	$\left\  \cdot \right\ $	++	
13.2	100											$\square$							+	
9.5	100																		11	
6.7	99		70								_/			_	Ħ		_		11	
		~									$\pm$						_			
4.75	98	sing	60								$\mathcal{H}$								++	
2.36	96	ass	60								$\vdash$							$\square$	+	
1.18	94	rcent Passing								H					H			<b> </b>		
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0.425	84	Perc								Ľ					LΠ		_			
0.300	72	ι L						h	$\rightarrow$	K-					++		+		$\pm$	
0.150	45		40				+						+	-+	++			}-+-	++	
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0.062	27							X	/	П					П			F-t-	#	
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0.012	22		10				<b></b>	TT-		P			<b></b>		Π	F-F-			77	Π-
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								<b>-</b>							ĻЦ		-	t.	##	<b>h</b>
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0.0030	19			CLAY	fine	medium	coarse		fine		me	dium	coarse	fine		mea	lium	CO	arse	BLE
0.0021	17			U D		SILT					S/	ND			G	RAV	/EL			COBBLES
0.0012	16			<u></u>	002	SIL I	0.0	60			-			2.0		-			60	0.0
Orrest									P	Parti	icle	Size	(mm)		\!	h.l.=				
Gravel	0.00/		Sar			E0/	Silt		~				D 40/			bles				.0%
coarse medium	0.0% 1.1%		coa			.5% .9%	COa						3.4% 3.0%		irav					.6%
medium fine	3.5%		meo fine	dium		.9% .4%	me fine		11				3.0% 3.3%		ano ilt	u				.8% .7%
	3.5% 4.6%		Tota			.4%	Tot						9.7%		liit Slay	,				.7% .9%
Total			100	~	00		101	~						0	uuy				10	.9 % .0%

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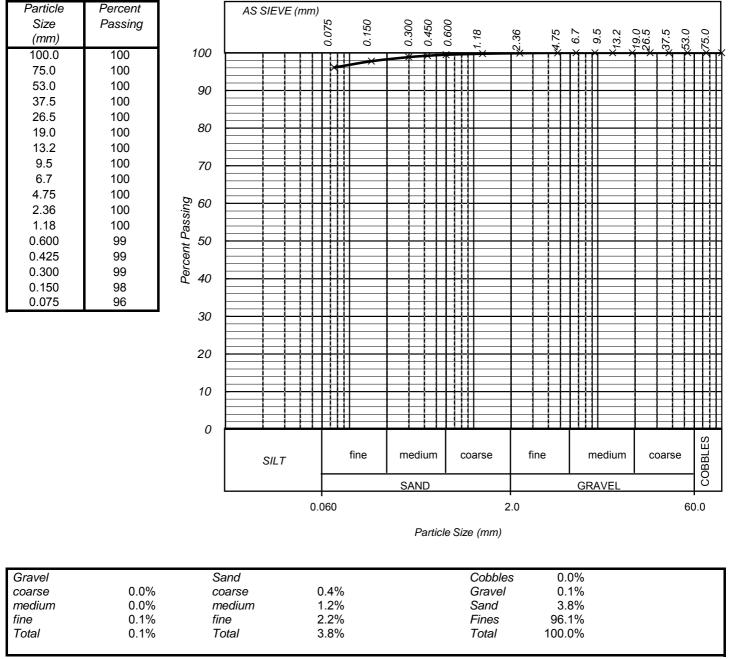


AS 1289.3.6.1

		Job No	14443
VIL GEOTE	CHNICAL SERVICES	Report No	14443/R009
i - 8 Rose Aven	ue, Croydon 3136	Date of Issue	03/12/14
Client	JACOBS SKM (MELBOURNE)	Tested by	SK
Project	ISO79600.002 SDL ADJUSTMENT PROJECTS	Date tested	27/11/14
Location	VIA MALLEE CMA	Checked by	PJF
Sample Ider	ntification VS-BH02 1.5 - 1.9m	Sample No	14443012
		Sampled by	Client
Sampling m	ethod By Client	Sampled by	Chefit

CLAY, high plasticity, pale grey and brown

### Particle Size Distribution





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A361 V1.5 MAR 13



8 Rose / Client Project Location	Avenue, Croydon 313 JACOBS SKM (I ISO79600.002 S VIA MALLEE CM	MELBOURN SDL ADJUS		PROJE	ECTS					Tes Dai	ue date sted by te tested ecked by	04/12/14 SK 27/11/14 PJF
Type of Type of	test description	BCM-BH0 U63 <i>Unconsoli</i> <i>without po</i> CLAY, hig Shear failu	dated un pre pressu h plastici	drained ure mea ty, pale	as <i>ure</i> e grey	ments					mple No mpling date	14443004 2014
Test Stage		Cell Pressu (kPa)	re			De	viator	Stress (kPa)	at failure	e S	train at failure (%)	Rate of strain (mm/min)
1		30						713			2.0	1.13
-	dry density moisture content		#DIV/0! #DIV/0!	t/m³ %		-	nt of sa	ample f samp				2 mm 3 mm
	750											
	700											
	600	× · · ·										
	(edx) 450	×										
	250 Deviator											
	250 ×											
	150 100											
	50 0 <b>×</b>											
	0	2 4	6	8		'0 n (%)	12	14	16	18	20	



U63 Unconsoli without po ion CLAY, hig	1.9 - 2.15m idated undrained simore pressure measure h plasticity, pale greater ure at 45 degrees to re	gle stage triaxial rements. ry and orange / brown	(%) 6.6 127.1	14443 14443/R011 04/12/14 SK 27/11/14 PJF 14443006 2014 <i>Rate of strair</i> <i>(mm/min)</i> 1.13 <i>mm</i> <i>mm</i>
DBS SKM (MELBOURN 9600.002 SDL ADJUS 1ALLEE CMA 14tion NN-BH01 U63 Unconsolit without po ion CLAY, hig Shear failu Cell Pressu (kPa) 40 ity content	1.9 - 2.15m idated undrained simore pressure measure h plasticity, pale greater ure at 45 degrees to re	gle stage triaxial rements. ry and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	Tested by Date tested Checked by Sample No Sampling date e Strain at failure (%) 6.6 127.1	SK 27/11/14 PJF 14443006 2014 <i>Rate of strair</i> ( <i>mm/min</i> ) 1.13
9600.002 SDL ADJUS ALLEE CMA ation NN-BH01 U63 Unconsolic without po ion CLAY, hig Shear failu Cell Pressur (kPa) 40 ity content	1.9 - 2.15m idated undrained simore pressure measure h plasticity, pale greater ure at 45 degrees to re	gle stage triaxial rements. ry and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	Date tested Checked by Sample No Sampling date e Strain at failure (%) 6.6 127.1	27/11/14 PJF 14443006 2014 <i>Rate of strair</i> (mm/min) 1.13 mm
ALLEE CMA ation NN-BH01 U63 Unconsoli without po ion CLAY, hig Shear failu Cell Pressur (kPa) 40	1.9 - 2.15m idated undrained simore pressure measure h plasticity, pale greau ure at 45 degrees to re	gle stage triaxial rements. ry and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	Checked by Sample No Sampling date e Strain at failure (%) 6.6 127.1	PJF         14443006         2014         Rate of strair (mm/min)         1.13         mm
ation NN-BH01 U63 Unconsoli without po ion CLAY, hig Shear failu Cell Pressu (kPa) 40	idated undrained sin pre pressure measur h plasticity, pale gre ure at 45 degrees to re 1.59 <i>t/m</i> <sup>3</sup> 23.4 %	rements. and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	Sample No Sampling date e Strain at failure (%) 6.6 127.1	14443006 2014 <i>Rate of strair</i> <i>(mm/min)</i> 1.13 <i>mm</i>
U63 Unconsoli without po ion CLAY, hig Shear failu Cell Pressu (kPa) 40	idated undrained sin pre pressure measur h plasticity, pale gre ure at 45 degrees to re 1.59 <i>t/m</i> <sup>3</sup> 23.4 %	rements. and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	Sampling date e Strain at failure (%) 6.6 127.1	2014 <i>Rate of strair</i> <i>(mm/min)</i> 1.13 <i>mm</i>
Unconsoli without po CLAY, hig Shear failu Cell Pressu (kPa) 40	ne pressure measur h plasticity, pale gre ure at 45 degrees to re 1.59 <i>t/m</i> <sup>3</sup> 23.4 %	rements. and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	e Strain at failure (%) 6.6 127.1	Rate of strain (mm/min) 1.13
ion CLAY, hig Shear failu <i>Cell Pressu</i> <i>(kPa)</i> 40	ne pressure measur h plasticity, pale gre ure at 45 degrees to re 1.59 <i>t/m</i> <sup>3</sup> 23.4 %	rements. and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	(%) 6.6 127.1	( <i>mm/min</i> ) 1.13
ion CLAY, hig Shear failu Cell Pressur (kPa) 40	h plasticity, pale gre ure at 45 degrees to re 1.59 <i>t/m</i> <sup>3</sup> 23.4 %	y and orange / brown horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	(%) 6.6 127.1	( <i>mm/min</i> ) 1.13
Shear failu Cell Pressu (kPa) 40 ity content	ure at 45 degrees to re 1.59 <i>t/m</i> <sup>3</sup> 23.4 %	horizontal axis Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	(%) 6.6 127.1	( <i>mm/min</i> ) 1.13
Cell Pressu (kPa) 40 ity content	ne 1.59 <i>t/m</i> ³ 23.4 %	Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	(%) 6.6 127.1	( <i>mm/min</i> ) 1.13
Cell Pressu (kPa) 40 ity content	ne 1.59 <i>t/m</i> ³ 23.4 %	Deviator Stress at failur (kPa) 303 Height of sample Diameter of sample	(%) 6.6 127.1	( <i>mm/min</i> ) 1.13
(kPa) 40 ity content	1.59 <i>t/m</i> ³ 23.4 %	(kPa) 303 Height of sample Diameter of sample	(%) 6.6 127.1	( <i>mm/min</i> ) 1.13
40 ity content	23.4 %	303 Height of sample Diameter of sample	6.6	1.13
ity content	23.4 %	Height of sample Diameter of sample	127.1	l mm
content	23.4 %	Diameter of sample		
content	23.4 %	Diameter of sample		
		- · · · ·	63.1	mm
320	STRES	S-STRAIN PLOT		
240 220 200 180				
o 🖌				
0 2 4	6 8 10	12 14 16 18	20 22	
	Stra	in (%)		
of the tasks antibustions	6		Δ <i>6</i> Δ1	1SS V1.1 MAR 13 PAGE
	220 180 180 180 140 140 120 100 80 60 40 20 40 20 40 20 40 20 40 40 20 40 40 40 40 40 40 40 40 40 4	260 240 220 180 180 160 140 120 100 80 60 40 2 4 6 8 10 Stra sof the tests, calibrations basurements included in ument are traceable to SO/IEC 17025.	260 200 180 160 100 100 100 0 2 4 6 8 10 12 14 16 18 Strain (%)	to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations to the tests, calibrations test to compliance to Source 1000000000000000000000000000000000000



WIL SETTECHNICAL SERVICES       Report No. 14434012 Issue data       Index data       Inde		AS 128	9.0.4.1	Job No	14443
8 Reservenue Crypto 3/30       Esue date       04/12/14         Chert AcOBS SMM (MELEOURNE)       Tester for SK       SK         Project ISO7800.002 SDLADUSTMENT PROJECTS       Date fester for Date fester for SK       SK         Sample identification       NN-BH01 1.4.3-4.7m       Sample koo 1444300.       Sample koo 1444300.         Type of asmic       UIS       UIS consolidated undrained single stage triaxia       Ester failur       1444300.         Sample description       CLAY, low plasticity, orange I brown and grey, trace of fine to coarse sand       Test (KPa)       Rester failure					
Client JACOBS SKM (MELBOURNE) Project ISO79600.002 SUL ADJUSTMENT PROJECTS Loardin VIA MALLEE CAA Sample identification NN-BH01 4.3 - 4.7m Sample identification NN-BH01 4.3 - 4.7m Sample identification Unconsolidated undrained single stage triaxial without poor pressure measurements. Sample description CLAY, low plasticity, orange / brown and grey, trace of fine to coarse sand Mode of failure Shear failure at 40 degrees to horizontal axis Test Cell Pressure (RPa) 023 8.6 1.13 Sample dry density 1.72 t/m <sup>3</sup> Height of sample 03.2 mm Sample dry density 1.72 t/m <sup>3</sup> Diameter of sample 03.2 mm STRESS - STRAIN PLOT 040 050 050 050 050 050 050 050				•	
Properties     Storgeomotology SDL ADJUSTMENT PROJECTS     Date testing     Zint it is directed by     Zint it is directe					
Location     VIAALLEE CMA     Checked by     P.F       Sample identification     NN-BH01 4.3 - 4.7.m     Sample No     14443007       Type of sample     Unconsolidated undrained single stage traixati     Barnoli date of market and the pressure measurements     Sample identification     NN-BH01 4.3 - 4.7.m       Type of sample     Unconsolidated undrained single stage traixati     Barnoli date of market and the pressure measurements     Sample identification     Nn-Bhon 1.4 - 4.7.m       Mode of failur     Stear failure at 40 degrees to horizontal axis     Strain at failure     Train at failure     Train of failure     Trai				•	
Sample identification Type of sample of sample type of test       NN-BH01 4.3 - 4.7m UB3 Unconsolidated undrained single stage traixial without pore pressure measurements.       Sample into Sample description       14443007 Sample into Unconsolidated undrained single stage traixial without pore pressure measurements.         Node of failure       Shear failure at 40 degrees to horizontal axis         Test       Cell Pressure (PPa)       Deviator Stress at failure (PPa)       Strain at failure (PPa)       Tate of strain (PPa)         1       90       228       8.6       1.13         Sample dry density Sample dry density       1.72       Um <sup>3</sup> Height of sample       126.7       mm         Sample dry density       1.72       Um <sup>3</sup> Height of sample       126.7       mm         Sample dry density       1.72       Um <sup>3</sup> Height of sample       126.7       mm         Sample dry density       1.72       Um <sup>3</sup> Height of sample       126.7       mm         Sample dry density       1.72       Um <sup>3</sup> Height of sample       126.7       mm         Sample dry density       1.72       Um <sup>3</sup> Height of sample       126.7       mm         Grad dry density       1.72       Um <sup>3</sup> Height of sample       126.7       mm         Grad dry density       1.72       Um <sup>3</sup> Height of sample       1.01       1.01 <t< td=""><td>•</td><td></td><td>, ,</td><td></td><td></td></t<>	•		, ,		
Type of sample Type of sample type of each model of sample description       Using Microsolidated undrained single stage trainal model of sample description       CLAY, low plasticity, orange / brown and grey, trace of fine to coarse samt       2014         Mode of silure       Shear failure at 00 degrees to horizontal axis       Image: coarse single description       Strain at tailuing in train iluing in the ta					14443007
				•	
<text>  Mithoda generation Carl from the solution of angle for the solution of ang</text>	•••	Unconsolidated undrained sing	gle stage triaxial	, ,	
Mode of lative     Table of definition		_			
Test       Cell Pressure       Deviator Stress at failure       Strain at failure       Rate of strain         Sample dry density       90       228       8.6       1.3         Sample dry density       1.72       tm³       Height of semple       126.7       mm         Sample moisture content       18.4       ************************************	Sample description	CLAY, low plasticity, orange / b	prown and grey, trace of fine to	coarse sand	
Test       Cell Pressure       Deviator Stress at tailure       Strin at tailure       Rate of strain         Sample dry density       90       228       8.6       1.3         Sample dry density       1.72       tm³       Height of semple       126.7       mm         Sample moisture content       18.4       %       Diameter of sample       63.2       mm         STRESS - STRAIN PLOT         Offene of sample       126.7       mm         Offene of sample       126.7       mm         Diameter of sample       126.7       mm         STRESS - STRAIN PLOT         Offene of sample       126.7       mm         Offene offene offene offene offene offene offene offene offene offene offene offene offene offene offene offene off					
Stage       (kPa)       (%)       (mm/min)         1       90       228       8.6       1.3         Sample dry density       1.72       t/min       Diameter of sample       126.7       mm         Sample dry density       1.72       t/min       Diameter of sample       126.7       mm         STRESS - STRAIN PLOT       0<	Mode of failure	Shear failure at 40 degrees to I	horizontal axis		•
1     90     28     86     1.3       Sample dry density     1.72     Unit     Height of sample     126.7     mm       Sample dry density     1.72     Unit     Height of sample     126.7     mm       Sample dry density     1.84     %     Dameter of sample     132.7     mm       STRESS - STRAIN PLOT       00000000000000000000000000000000000	Test			Strain at failure	Rate of strair
Single dry density       1.72       the ight of sample       12.7       12.7       12.7       12.7       12.7       12.7       12.7       12.7       12.7       12.7 <td< td=""><td>Stage</td><td>(kPa)</td><td>(kPa)</td><td>(%)</td><td>(mm/min)</td></td<>	Stage	(kPa)	(kPa)	(%)	(mm/min)
Single dry density       1.7.2       the ight of sample       12.6.7       md         STRES - STRIN PLOT       STRES - STRIN PLOT       Image: constraint of the image: constand of the i	1	00	200		4 4 0
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<page-header><section-header><figure><section-header><section-header><table-container><table-container><table-container><table-container><table-container><table-container>Sample models24 MDate of sample63.2 mmGERMANDEDEGarman and sample states transformed by t</table-container></table-container></table-container></table-container></table-container></table-container></section-header></section-header></figure></section-header></page-header>	Sample dry density	1.72 <i>t/m</i> <sup>3</sup>	Height of sample	126.7	nm
<figure><figure></figure></figure>		ontent 18.4 %		63.2	mm
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40       40 <td< td=""><td>4</td><td>50</td><td></td><td></td><td></td></td<>	4	50			
$ \begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ \end{array} \end{array} $	C.	~ <u> </u>			
A641SS V1.1 MAR 13 PAGE Accretion of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards, Accretion for compliance to ISO/IEC 17025.	4	40			
A641SS V1.1 MAR 13 PAGE Accretion of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards, Accretion for the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards, Accretion for the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards, Accretion for compliance to ISO/IEC 17025.					
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0 2 4 6 8 10 12 14 16 18 20 22 Strain (%) The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025.					
Strain (%)			12 14 16 18	20 22	
and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025.					
and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025.					
Australian/National standards. Accredited for compliance to ISO/IEC 17025.				A6415	SS V1.1 MAR 13 PAGE
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Approved Signatory : Peter Fry	TECHNICAL		У		



				Job No	14443
	TECHNICAL S			Report No Issue date	14443/R013 04/12/14
Client	Avenue, Croydor	KM (MELBOURNE)		Tested by	SK
Project		02 SDL ADJUSTMENT PROJECTS	2	Date tested	3r 27/11/14
Location				Checked by	PJF
	identification	VS-BH02 1.5 - 1.9m		Sample No	14443012
Type of s	-	U63		Sampling date	2014
Type of t	test	Unconsolidated undrained sing			
Sample	description	without pore pressure measure CLAY, high plasticity, pale gre			
Mode of	failure	Shear failure at 50 degrees to	horizontal axis		
Test	Test Cell Pressure Deviator Stress at failure				Rate of strair
Stage		(kPa)	(kPa)	(%)	(mm/min)
, I					
1		30	1097	7.6	1.13
Carrist	alun ( al = := : ')		lleight of commute	407.0	
-	dry density moisture conto	1.68 t/m³ nt 19.9 %	Height of sample	127.2 62.2	
Sampler	moisture conte	nii 19.9 %	Diameter of sample	02.2	
	000 Deviator Stress (kPa) 009 009 000 000 000 000				
	0 3				
	(	0 2 4 6 8 10 Stra	12 14 16 18 in (%)	20 22	
<b>A</b>	The require of the time	te calibratione		A6419	SS V1.1 MAR 13 PAGE
	The results of the tes and/or measuremen this document are	its included in		A6415	SS V1.1 MAR 13 PAGE



	TECHNICAL SERVICE Venue, Croydon 3136 JACOBS SKM (MELI			Job No Report No Issue date Tested by	14443 14443/R014 09/12/14 SK
Project Location	ISO79600.002 SDL	ADJUSTMENT PROJECTS		Date tested Checked by	08/12/14 ANR
Type of s Type of te	sample U6 est Un witi description sar	consolidated undrained sing hout pore pressure measure	ements. Ile grey with pale brown, trace	Sample No Sampling date e of fine to coarse sar	14443014 2014 nd
Test				Strain at failure	Rate of strain
Stage		(kPa)	(kPa)	(%)	(mm/min)
1	e	60	794	8.9	1.13
•	dry density	1.83 <i>t/m</i> <sup>3</sup>	Height of sample	127.2	
Sample n	noisture content	15.6 %	Diameter of sample	61.2	mm
	700 600 005 000 000 000 000 000 000 000 0				
	0	2 4 6 Strain	8 10 12 n (%)	14	
	The results of the tests, calibrations	\$		A6415	SS V1.1 MAR 13 PAGE 1
XCREDITED FOR ECHNICAL OMPETENCE	and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025 Accreditation No 9909	Heles Pobert Approved Signatory : Andrew	Roberts		



# SHRINK SWELL INDEX

AS 1289.7.1.1

IVIL GEOTECHNICAL SERVICES		Job No Report No	14443 14443/R015						
- 8 Rose Avenue, Croydon 3136		Date of Issue	05/12/14						
Client JACOBS SKM (MELBOURNE) Project ISO79600.002 SDL ADJUSTMENT PL Location VIA MALLEE CMA	ROJECTS	Tested by Date tested Checked by	SK 02/12/14 PJF						
Sample No		14443003							
Sample identification		BCN-BH02 0.7 - 1.1m							
Date sampled		2014							
Sampled by		Client							
Sampling method		By Client							
Sample type		U63							
Swell Test									
Moisture content before swell	%	11.4							
Moisture content after swell	%	26.8							
Swell (E <sub>sw</sub> )	%	6.9							
Shrinkage Test									
Sample dry density	t/m³	1.73							
Sample moisture content	%	13.8							
Shrinkage (E <sub>sh</sub> )	%	1.5							
Shrink Swell Index (I <sub>ss</sub> )		2.7							
Sample description									
		CLAY, medium plasticity, light grey trace of fine sand	and brown,						
Comments		Cracks developed in shrinkage s	pecimen						
Comments		Cracks developed in shrinkage s	pecimen						



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### SHRINK SWELL INDEX

AS 1289.7.1.1

CIVIL GEOTECHNICAL SERVICES		Job No Report No	14443 14443/R016						
5 - 8 Rose Avenue, Croydon 3136		Date of Issu							
Client JACOBS SKM (MELBOURNE)		Tested by	SK						
Project ISO79600.002 SDL ADJUSTMENT	PROJECTS	Date tested							
Location VIA MALLEE CMA		Checked by	ANR						
Sample No		14443013							
Sample identification		VS-BH03 0.8 - 1.25r	n						
Date sampled		2014							
Sampled by		Client							
Sampling method		By Client							
Sample type		U63							
Swell Test									
Moisture content before swell	%	18.6							
Moisture content after swell	%	23.6							
Swell (E <sub>sw</sub> )	%	2.6							
Shrinkage Test									
Sample dry density	t/m³	1.63							
Sample moisture content	%	16.4							
Shrinkage (E <sub>sh</sub> )	%	1.3							
Shrink Swell Index (I <sub>ss</sub> )		1.4							
Sample description		CLAY, medium plasticity, dark grey-	prown and white.						
Comments		Minor cracking in shrinkag	e core.						
		1 x horizontal <0.5mm and 1 ver	tical <0.5mm						
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AS 1289.6.7.3

	Job No 14443
CIVIL GEOTECHNICAL SERVICES	Report No 14443/R017
6 - 8 Rose Avenue, Croydon 3136	Date of Issue 05/12/14
Client JACOBS SKM (MELBOURNE)	Tested by ANR
Project ISO79600.002 SDL ADJUSTMENT PROJECT	
Location VIA MALLEE CMA	Checked by PJF
Sample No	14443001
Sample identification	BCN-BH01 1.3 - 1.65m
Date sampled	2014
Sampled by	Client
Sampling method	By Client
Sample type	U63
Specimen details before test	
Length of specimen mi	<i>m</i> 64.3
Diameter of specimen mi	<i>m</i> 60.6
Length to diameter ratio	1: 0.9
Dry density t/n	n <sup>3</sup> 1.90
Moisture content %	5 13.0
Specimen details after test	
Moisture content %	
Mean effective stress kP	
Permeant used	Distilled water
PERMEABILITY ( k ) m/s	ec 4E-11
Sample description	sandy CLAY, medium plasticity, pale grey, with fine sand and fine to medium gravel





A673U2 V1.4 MAR 13

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AS 1289.6.7.3

	Job No 14443
CIVIL GEOTECHNICAL SERVICES	Report No 14443/R018
6 - 8 Rose Avenue, Croydon 3136	Date of Issue 05/12/14
Client JACOBS SKM (MELBOURNE)	Tested by ANR
Project ISO79600.002 SDL ADJUSTMENT PROJECTS	Date tested 01/12/14
Location VIA MALLEE CMA	Date of Issue         05/12/14           Tested by         ANR           Date tested         01/12/14           CTS         Date tested         01/12/14           Checked by         PJF           14443006         NN-BH01         1.9 - 2.15m           2014         Client         By Client           U63         U63         U63
Sample No	
Sample identification	NN-BH01 1.9 - 2.15m
Date sampled	2014
Sampled by	Client
Sampling method	By Client
Sample type	U63
Specimen details before test	
Length of specimen mm	64.2
Diameter of specimen mm	63.4
Length to diameter ratio	1: 1.0
Dry density t/m³	1.56
Moisture content %	25.0
Specimen details after test	
Mean effective stress kPa	
CIVIL GEOTECHNICAL SERVICES     Report No     14443/R018       6-8 Rose Avenue, Croydon 3136     Date of Issue     05/12/14       Client     JACOBS SKM (MELBOURNE)     Tested by     ANR       Project     Date tested     01/12/14       Location VIA MALLEE CMA     Checked by     P.JF       Sample No     14443006       Sample No     14443006       Sampled     2014       Sampled     2014       Sampled by     Client       Sample dype     U63	
PERMEABILITY ( k ) m/sec	7E-11
Sample description	CLAY, high plasticity, pale grey and orange / brown
	<u> </u>





A673U2 V1.4 MAR 13

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AS 1289.6.7.3

		Job No 14443						
IVIL GEOTECHNICAL SERVICES		Report No 14443/R01	9					
- 8 Rose Avenue, Croydon 3136		Date of Issue 09/12/14						
Client JACOBS SKM (MELBOURNE)		Tested by ANR						
Project ISO79600.002 SDL ADJUSTMENT PROJ	ECTS	Date tested 04-08/12/1	4					
Location VIA MALLEE CMA		Checked by ANR						
Sample No		14443009						
Sample identification		VN-BH01 1.8 - 2.1m						
Date sampled		2014						
Sampled by		Client						
Sampling method		By Client						
Sample type		U63						
Specimen details before test Length of specimen	mm	63.8						
Diameter of specimen	mm mm	63.4						
Length to diameter ratio		1: 1.0						
Dry density	t∕m³	1.79						
Moisture content	%	17.8						
Moisture content Specimen details after test	%	17.8						
Specimen details after test								
	%	20.9						
Specimen details after test Moisture content								
Specimen details after test Moisture content Mean effective stress	%	20.9 100						
Specimen details after test Moisture content Mean effective stress	%	20.9 100						
Specimen details after test Moisture content Mean effective stress Permeant used	% kPa	20.9 100 Distilled water						
Specimen details after test Moisture content Mean effective stress Permeant used	% kPa	20.9 100 Distilled water	h brown					



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AS 1289.6.7.3

Report No         14443/R020           Date of Issue         09/12/14           Tested by         ANR           Date tested         04-08/12/14           Checked by         ANR           14443011         VS-BH01           VS-BH01         4.0 - 4.45m           2014         Client           U63         U63
Tested by         ANR           Date tested         04-08/12/14           Checked by         ANR           14443011         VS-BH01           VS-BH01         4.0 - 4.45m           2014         Client           By Client         U63           64.7         64.7
Date tested         04-08/12/14           Checked by         ANR           14443011         VS-BH01           VS-BH01         4.0 - 4.45m           2014         Client           By Client         U63           04-08/12/14         04-08/12/14           64.7         64.7
Checked by         ANR           14443011         VS-BH01         4.0 - 4.45m           2014         Client         000000000000000000000000000000000000
14443011         VS-BH01       4.0 - 4.45m         2014         Client         By Client         U63         64.7
VS-BH01 4.0 - 4.45m 2014 Client By Client U63 64.7
VS-BH01 4.0 - 4.45m 2014 Client By Client U63 64.7
2014 Client By Client U63 64.7
Client By Client U63 64.7
By Client U63 64.7
U63 64.7
64.7
62.3
1: 1.0
1.82
14.0
19.5
100
Distilled water
o 40-11
3 x 10 <sup>-11</sup>
CLAY, medium plasticity, dark grey and brow fine to medium sand
,



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AS 1289.6.7.3

		Job No	14443
		Report No	14443/R021
-		Date of Issue	
		Tested by	ANR
,	OJECIS	Date tested	04-/08/12/14
ample identification ate sampled ampled by ampling method ample type becimen details before test ength of specimen mr ameter of specimen mr ameter of specimen mr orgth to diameter ratio by density t/m oisture content % becimen details after test oisture content % ean effective stress kP armeant used PERMEABILITY ( k ) m/se		Checked by	ANR
Sample No		144430	13
Sample identification		VS-BH03 0.8	3 - 1.25m
Date sampled		2014	
		Clien	
		By Clie U63	
Specimen details before test			
Length of specimen	mm	64.2	
Diameter of specimen	mm	63.2	
Length to diameter ratio		1: 1.(	
Dry density	t∕m³	1.76	
Moisture content	%	16.3	
Specimen details after test			
Moisture content	%	22.0	
Mean effective stress	kPa	100	
Permeant used		Distilled v	vater
PERMEABILITY ( k )	m/sec	2 x 10	-10
Sample description		CLAY, medium plasticity, dan Sand lense running vertio	



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### AS 1289.2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1, 3.6.1 & 3.8.1

8 Rose Avenue, Crog Client JACOB Project ISO796	iect ISO79600.002 SDL ADJUSTMENT PROJECTS							14443 14443/R02 09/12/14 SK/ANR 27/11-9/12/ ANR	
Sample Identification	Soil Description	Field Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	% Passing 75µm sieve	Emerson Class No*	
14443001 BCN-BH01 1.3 - 1.65m	sandy CLAY, medium plasticity, pale grey, with fine sand and fine to medium gravel	13.0	36	14	22	11.0	62	2	
14443002 BCN-BH01 @ 4.9m	sandy CLAY, low plasticity, light grey with orange-brown, fine to medium sand	18.5	33	14	19	9.0	69	-	
14443003 BCN-BH02 0.7 - 1.1m	CLAY, medium plasticity, light grey with brown, trace of fine to medium sand	11.8	41	15	26	11.5	89	-	
14443004 BCM-BH02 1.5 - 1.75m	CLAY, high plasticity, pale grey	19.2	62	19	43	18.0	94	2	
14443005 BCS-BH01 6.0 - 6.2m	CLAY, medium plasticity, pale brown / grey and orange-brown, with fine to medium sand	15.5	37	14	23	9.5	76	-	
14443006 NN-BH01 1.9 - 2.15m	CLAY, high plasticity, pale grey and orange / brown	23.4	50	19	31	14.0	98	3	
14443007 NN-BH01 1 4.3 - 4.7m	CLAY, low plasticity, orange / brown and grey, trace of fine to coarse sand	18.4	-	-	-	-	-	-	
14443008 NS-BH01 @ 1.5m	sandy CLAY, low plasticity, brown, fine to medium sand	8.4	30	14	16	7.5	70	-	
Notes AS 1289.3.1.2,3.2.1,3.4.	1 Method of drying: Oven dried AS 1289.3.8.1* Dry/Wet sieve: Dry	Water I Tempe			Distille	d wate 20.5		<u> </u>	



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### AS 1289.2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1, 3.6.1 & 3.8.1

Project ISO796				Job No Report No Date of Issue Tested by Date tested Checked by			14443 14443/R02 09/12/14 SK/ANR 27/11-8/12/ ANR	
Sample Identification	Soil Description	Field Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	% Passing 75µm sieve	Emerson Class No*
14443010 VS-BH01 @ 3.5m	clayey SAND, fine to coarse, dark brown, fines of low plasticity	5.9	23	14	9	4.5	32	4
14443011 VS-BH01 4.0 - 4.45m	sandy CLAY, medium plasticity, dark grey and brown, fine to medium sand	14.6	47	17	30	13.0	58	-
14443012 VS-BH02 1.5 - 1.9m	CLAY, high plasticity, pale grey and brown	19.9	57	21	36	12.5	96	2
14443013 VS-BH03 0.8 - 1.25m	CLAY, medium plasticity, dark grey-brown and white, trace of fine sand.	16.3	44	16	28	11.5	-	-
Notes S 1289.3.1.2,3.2.1,3.4.1	Method of drying: Oven dried AS 1289.3.8.1* Dry/Wet sieve: Dry Curing time: >24hrs the tests, calibrations	Water Tempe Date si	rature:		Distille 2014	d water 20.5		- MAH



and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025. Accreditation No 9909

Ala Pobert

Approved Signatory : Andrew Roberts



## AS 1289.2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1, 3.6.1, 3.8.1 & 6.4.1 (Clauses 4 and 5a)

	S SKM (MELBOURNE)				Te	te of l sted b	у			
-	00.002 SDL ADJUSTMENT PROJECTS LLEE CMA					te tes ecked		XXXX	(	
Sample Identification	Soil Description	Field Moisture Content %	Dry Density t/m³	Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	% Passing 75µm sieve	Emerson Class No*	Emerson Class No**
14443001 BCN-BH01 1.3 - 1.65m	sandy CLAY, medium plasticity, pale grey, with fine sand and fine to medium gravel	14.1	-	36	14	22	11.0	62	2	3
14443002 BCN-BH01 @ 4.9m	sandy CLAY, low plasticity, light grey with orange-brown, fine to medium sand	18.5	-	33	14	19	9.0	69	-	-
14443003 BCN-BH02 0.7 - 1.1m	CLAY, medium plasticity, light grey with trace of fine to medium sand san	11.8	-	41	15	26	-	89	-	-
14443004 BCM-BH02 1.5 - 1.75m	CLAY, high plasticity, pale grey	-	-	62	19	43	18.0	94	2	6
14443005 BCS-BH01 6.0 - 6.2m	CLAY, medium plasticity, pale brown / grey and orange-brown, with fine to medium sand	15.5	-	37	14	23	9.5	76	-	-
14443006 NN-BH01 1.9 - 2.15m	CLAY, high plasticity, pale grey and orange / brown	-	-	50	19	31	14.0	98	3	5
14443007 NN-BH01 4.3 - 4.7m	CLAY, low plasticity, orange / brown and grey, trace of fine to coarse sand	-	-	-	-	-	-	-	-	-
14443008 NS-BH01 @ 1.5m	sandy CLAY, low plasticity, brown, fine to medium sand	8.4	-	30	14	16	7.5	70	-	-
14443009 VN-BH01 1.8 - 2.1m	CLAY, high plasticity, dark grey / grey with brown	-	-	-	-	-	-	-	-	-

SUMMARY4 V1.3 MAR 13



ABN 91 006 855 689

SOIL TESTING & GEOTECHNICAL CONSULTANTS

ACN 006 855 689

Unit 2 48 Tenth Street MILDURA Tel: (03) 5023 2870 Fax: (03) 5023 2866 Also at: MORNINGTON (Head Office) (03) 5975 6644, MITCHAM (03) 9874 5844 & WODONGA (02) 6024 4343.

3160187 - 2					
10/08/2016					
AS1289.2.1.1					
242500 JR #18515					
163-2193 B					
AS1289.1.2.1(6.5.4					
22/06/2016					
20/07/2016					
Insitu					
Site Derived					
Refer To Plan					
VS - TP12					
0.6 - 1.5 Metres					
105-110					
CLAY					
18.0					
ar L					

10784

Document Code RF120-11



ABN 91 006 855 689

## SOIL TESTING & GEOTECHNICAL CONSULTANTS

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Client :		Jacobs		Report Number:	3160187 - 3
Address :		e por ale	Flinders Street, MELBOURNE, VIC,	Report Date :	10/08/2016
Project Name	1	Regulator St	ructures	Order Number :	
DATE NO.	roject Name : roject Number : ample Number : ampled By : ate Sampled : ate Tested : aterial Type : aterial Source : emarks : AS Sieve Percent Passing 200 150 100 75 53 37.5 26.5 19 13.2 9.5	3160187		Test Method :	A\$1289.3.6.1
Location:	553		Creek, Vinifera, Vinifera Sth & Burra B1		1 of 2
Sample Number : 163-21				SAMPLE I	OCATION
Sampling Met	hod :	AS1289.1.2.1(	6.5.3)	Refer	To Plan
Sampled By :		Ryan Smith		BCN -	- BH03
	15	22/06/2016			
Date Tested :		25/07/2016		A CONTRACTOR OF THE OWNER OWNE	5 Metres
		Insitu		Test Number :	4
	se :	Site Derived		Lot Number :	2
Remarks :	110010-0162	5		Specification Number :	6
AS Sieve Size(mm)		Specification Limits			
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0.075	15	8 3			
() ()		<u>s</u> - 2	10		
		3 3			
				0.425 0.6 1.18 AS Sieve Size (mm)	2.36 4.75
				APPROVED	SIGNATORY
~				1	
NATA		Accredited	for compliance with ISO/IEC 17025.	110	
V					tior Lab Technician Lation Number
ACCREDITATION					784



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Unit 2 48 Tenth Street MILDURA Tel: (03) 5023 2870 Fax: (03) 5023 2866 Also at: MORNINGTON (Head Office) (03) 5975 6644, MITCHAM (03) 9874 5844 & WODONGA (02) 6024 4343.

		Ра	rti	cle Size Distributi	on Report	
Client :		Jacobs			Report Number:	3160187 - 3
Address :		Level 11, 46 3000	2 Flin	ders Street, MELBOURNE, VIC,	Report Date :	10/08/2016
Project Name	e :	Regulator St	ructu	res	Order Number :	
Project Numb	ber:	3160187			Test Method :	AS1289.3.6.1
Location:			Cree	م, Vinifera, Vinifera Sth & Burra B1		Page 2 of 2
Sample Num	her :	163-2193			SAN	1PLE LOCATION
Sample Num Sampling Me		AS1289.1.2.1	(654	)		Refer To Plan
Sampled By		Ryan Smith	(0.5.4	,		VS - TP12
Date Sample		22/06/2016				
Date Tested		25/07/2016		3	0.	6 - 1.5 Metres
Material Type		Insitu			Test Number :	8
Material Sou		Site Derived		. E	Lot Number :	
Remarks :					Specification Number	8
AS Sieve	Percent	Cassification	<u> </u>		opedined on number	
Size(mm)	Percent Passing	Specification Limits				
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150			100		(A	y
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75			10			
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37.5			50			
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6.7			(%)Buissi			
4.75			å 50			
2.36			Percent			
1.18			Č 40			
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			12			
			1	0.075	0.15	03
				0.010	AS Sieve Size(mm)	~~
		N				
					APPRO	OVED SIGNATORY
		Accredited	l for d	compliance with ISO/IEC 17025.		- Senior Lab Technician ccreditation Number 10784
Y					l Docume	10784 nt Code RF141-14

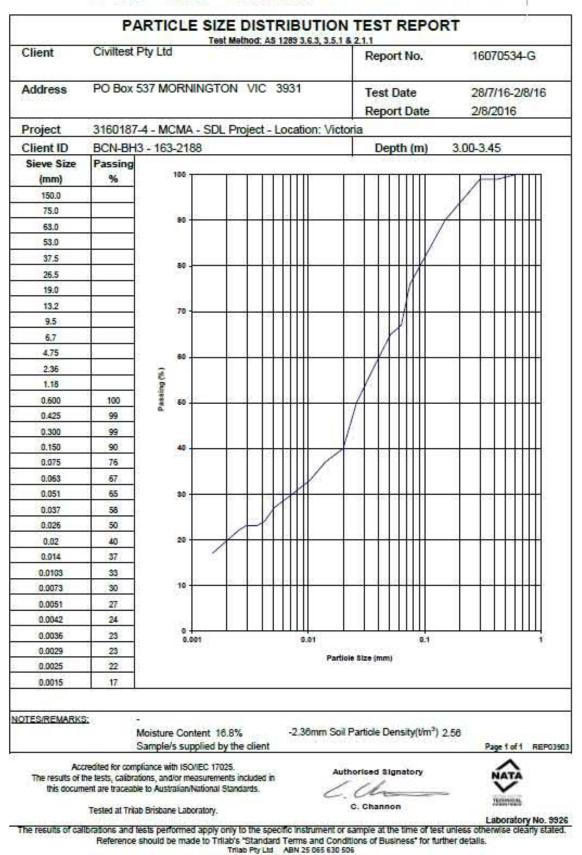


Bricbane 346A Bitsen Road, Geebung QLD 4034 Ph: +61 7 3265 5656 Porth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

Client	Civiltest P	ty Ltd					Report No.				Report No. 16070533-G									
Address	PO Box 537 MORNINGTON VIC 3931										Test Date Report Date			28/7/16-3/8/10 3/8/2016						
Project	3160187-4	4 - MCM	A - SDL	Proi	ect -	Loc	atio	on: Vict		tite =										
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Accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.				1	Authorised Signatory							NATA								
	Tested at Trilab	Brisbane La	boratory.						0.0	- martine 2					1	y No. 95				



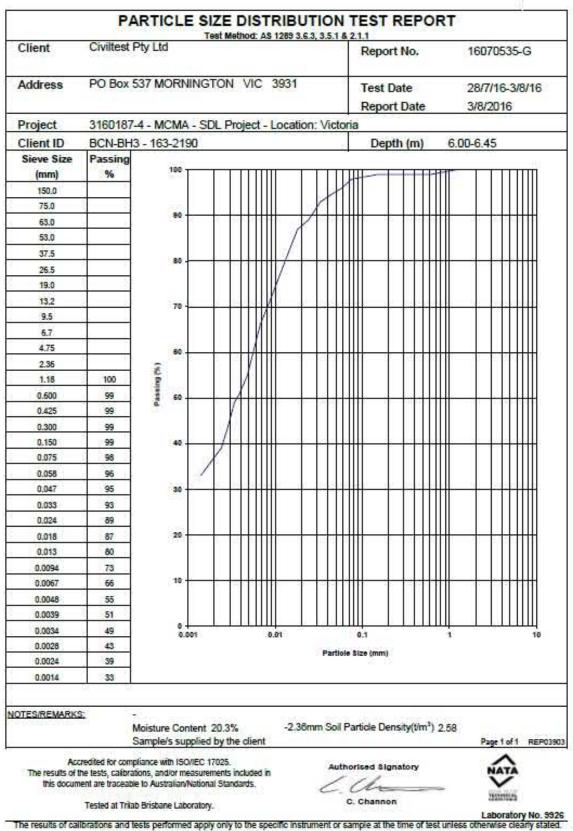
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ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



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ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



Brisbane 346A Bisen Road, Geebung GLD 4034 Ph: +61 7 3265 5656 Perth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

Client	Civiltest P	ty Ltd	1051	ALC: NO	a. 40	1200		6.3, 3.5.1		1000	por	tN	ю.		16070536-G							
Address	PO Box 5	37 MORN	INGTO	N V	/IC	393	1		8	Test Date					28/7/16-2/8/16							
							Report Date						B	2/8/2016								
Project	3160187-4	4 - MCMA	- SDL	Proie	ect -	loca	atic	on: Vic	192		1		-									
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The results of t	credited for compl the tests, calibration tent are traceable	ons, and/or me	asuremen	its inclu			Authorised Signatory								NATA							
	Tested at Trilab	Brisbane Lab	oratory.				C. Channon								Laboratory No. 1							

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



Brisbane 345A Bitsen Road, Gesbung QLD 4034 Ph: +61 7 3265 5656 Porth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

Client	Civiltest P	Pty Ltd	Test	metre	00. 4	4.0	1203 3	.6.3,	3.3.1	-		epor	t No	).		No.	160	705	37-	G
Address	PO Box 5	37 MORN	INGTO	N	VIC	10	931				Т	est [	)ate	8		22	28/7	/16	-3/	8/1
											R	epor	t Da	te			3/8/3			
Project	3160187-	4 - MCMA	- SDL	Proj	ect	-1	ocati	on:	Vic	tori		67								
Client ID	1.22 C 1.	163-2192		di inte			NY SAFE	And the		-	.С	Dep	th (r	n)	-	0.70	)-1.3	0		
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The results of I	credited for comp the tests, calibrati tent are traceable	liance with ISO ions, and/or me	VIEC 1702 asuremen	5. ts încl	uded	14 14			AL	atho	orice	d Sig	nator	У			13		TA	ME

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	Atte	rberg Limits I	Report		
Client :	Jacobs		Report Number:	3160187 - 5	
Address :	Level 11, 462 Flinders Str 3000	eet, MELBOURNE, VIC,	Report Date :	10/08/2016	
Project Name :	Regulator Structures		Order Number :		
Project Number : Location:	3160187 Nyah, Burra Creek, Vinifera, Vinifera Sth & Burra B1 ,		Test Method : Page 1 of 1	A51289.3.1.2, 3.2.1 3.3.1, 3.4.1	
Sample Number :	163-2187	163-2191	163-2192	163-2193	
Test Number :	2	6	7	8	
Date Sampled :	22/06/2016	22/06/2016	22/06/2016	22/06/2016	
Date Tested :	2/08/2016	2/08/2016	2/08/2016	2/08/2016	
Sampled By :	Ryan Smith	Ryan Smith	Ryan Smith	Ryan Smith	
Sampling Method :	ethod : A\$1289.1.2.1(6.5.3) AS		AS1289.1.2.1(6.5.4)	AS1289.1.2.1(6.5.4)	
Material Source :	Site Derived	Site Derived	Site Derived	Site Derived	
Material Type :	Insitu	Insitu	Insitu	Insitu	
Sample Location :	Refer To Plan BCN - BH03	Refer To Plan NN - BH02	Refer To Plan VS - TP07	Refer To Plan VS - TP12	
	1.0 - 1.45 Metres	1.0 - 1.45 Metres	0.7 - 1.3 Metres	0.6 - 1.5 Metres	
Lot Number :	(m)			÷.	
Moisture Method :	AS1289.2.1.1	A51289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Sample History :	Oven Dried	Oven Dried	Oven Dried	Oven Dried	
Sample Preparation :	Dry	Dry	Dry	Dry	
Notes :	No Cracking or Crumbling	No Cracking or Crumbling	Crumbling Occurred	No Cracking or Crumbling	
Mould Length (mm) :	8	ġ.	250.0	3	
Liquid Limit (%) ;	51	38	52	50	
Plastic Limit (%) :	13	12	17	12	
Plasticity Index (%) :	38	26	35	38	
Linear Shrinkage (%) :			10.0		
		SPECIFICATION DETAIL	S	197 197	
Specification Number :			1		
Liquid Limit-Max :				1	
Plasticity Index-Max :			1		
Linear Shrinkage-Max :				2	
Remarks :	+	\$3	8	22	



Accredited for compliance with ISO/IEC 17025.

APPROVED SIGNATORY

Ryan Smith - Senior Lab Technician NATA Accreditation Number : 10784

Document Code HF25-23



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Emerson Class Report						
Client : Address : Project Name : Project Number : Location :	Jacobs Level 11, 462 Flinders Street, MELBOURNE, VIC, 3000 Regulator Structures 3160187 Nyah, Burra Creek, Vinifera, Vinifera Sth & Burra B1, Vic		Report Number:         3160187 - 6           Report Date :         10/08/2016           Order Number :         Test Method :           Page 1 of 1         Page 1 of 1			
Sample Number :	163-2187	163-2191	163-2192	163-2193		
Test Number :	2	6	7	8		
Sampling Method :	AS1289.1.2.1(6.5.3)	AS1289.1.2.1(6.5.3)	A\$1289.1.2.1(6.5.4)	AS1289.1.2.1(6.5.4)		
Date Sampled :	22/06/2016	22/06/2016	22/06/2016	22/06/2016		
Date Tested :	20/07/2016	20/07/2016	20/07/2016	20/07/2016		
Material Type :	Insitu	Insitu	Insitu	Insitu		
Material Source :	Site Derived	Site Derived	Site Derived	Site Derived		
Lot Number :	375	8 (1)	8 12	1 1		
Sample Location :	Refer To Plan BCN - BH03 1.0 - 1.45 Metres	Refer To Plan NN - BH02 1.0 - 1.45 Metres	Refer To Plan VS - TP07 0.7 - 1.3 Metres	Refer To Plan VS - TP12 D.6 - 1.5 Metres		
Water Type :	Distilled Water	Distilled Water	Distilled Water	Distilled Water		
Soil Description :	Cley Sandy	Clay Sandy	Clay Sandy	Clay Sandy		
Water Temperature :	16	16	16	16		
Emerson Class Number :	Class 5	Class 5	Class 2	Class 5		
Remarks :		-L)				



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Emerson Class Report						
Client : Address : Project Name : Project Number : Location:	Jacobs Level 11, 462 Flinders Street, Regulator Structures 3160187 Nyah, Burra Creek, Vinifera, V		Report Number: Report Date : Order Number : Test Method : Page	3160187 - 7 10/08/2016 A51289.3.8.1 1 of 1		
Sample Number :	163-2194	163-2195	163-2196	163-2197		
Test Number :	9	10	11	12		
Sampling Method :	AS1289.1.2.1(6.5.3)	AS1289.1.2.1(6.5.3)	AS1289.1.2.1(6.5.4)	AS1289.1.2.1(6.5.4)		
Date Sampled :	22/06/2016	22/06/2016	22/06/2016	22/06/2016		
Date Tested :	20/07/2016	20/07/2016	20/07/2016	20/07/2016		
Material Type :	Insitu	Insitu	Insttu	Insitu		
Material Source :	Site Derived	Site Derived	Site Derived	Site Derived		
Lot Number :		1.	2.4			
Sample Location :	Refer To Plan BCN - BH03 Tested with Raw Murray Water 1.0 - 1.45 Metres	Refer To Plan NN - BH02 Tested with Raw Murray Water 1.0 - 1.45 Metres	Refer To Plan VS - 1707 Tested with Raw Murray Water 0.7 - 1.3 Metres	Refer To Plan VS - TP12 Tested with Raw Murray Water 0.6 - 1.5 Metres		
Water Type :	River Water	River Water	River Water	River Water		
Soil Description :	Clay Sandy	Clay Sandy	Clay Sandy	Clay Sandy		
Water Temperature :	16	16	16	16		
Emerson Class Number :	Class 5	Class 5	Class 2	Class 5		
Remarks :	16	1		4D		



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6357 fritt	Moisture Content	No. No. of Concession	100000000000000000000000000000000000000	
Client :	Jacobs	Report Number:	3160187 - 8a	
Address :	Level 11, 462 Flinders Street, MELBOURNE, VIC, 3000	Report Date :	10/08/2016	
Project Name :	Regulator Structures	Order Number : Test Method : AS1289.2.1.1 Page 1 of 1		
Project Number :	3160187			
Location:	Nyah, Burra Creek, Vinifera, Vinifera Sth & Burra B1 , Vic			
Sample Number :	163-2396	2- 2-	1	
Test Number :	13	8	8	
Sampling Method :	AS1289.1.2.1(6.5.4)	2	8	
Date Sampled :	22/06/2016			
Date Tested :	2/08/2016	1		
Material Type :	Insitu	5.1		
Material Source :	Site Derived			
Sample Location :	Nyah- Murray River bank, 500m South East of Sill 3			
Oven Temperature (°C) :	105-110	6	12	
Soll Description :	Qay Sandy		f.	
Moisture Content (%) :	5.3			
Sample Number :		<u>2</u> 4		
Test Number :		12	-	
Sampling Method :	1	Si		
Date Sampled :	1			
Date Tested :	2	24	9	
Material Type :		×.		
Material Source :		14		
Sample Location :				
Oven Temperature (°C) :				
Soil Description :				
Moisture Content (%) :	1	8		
Remarks :	This Amended Report Replaces: 3160187-8	Cari	02	
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			<b>Z</b>	ality of M		- nepe		
Client :		Jacobs			Report Num	ber:	3160187 - 9a	
Address :		Level 11, 462 Flinders Street, MELBOURNE, VIC, 3000			Report Date	5	9/08/2016	
Project Name	e c	Regulator St	ructur	es		Order Numb	ert	
Project Numi		3160187		-				AS1289.3.6.1
ocation:			Creek,	Vinifera, Vinife	era Sth & Burn			
Sample Num	ber :	163-2396				ľ.	SAMPLE	LOCATION
Sampling Me	thod :	AS1289.1.2.1(6	5.5.4)			Î	Nyah- Muri	rav River
Sampled By	1	Ryan Smith					,	n South East
Date Sample	d t	22/06/2016					of Sill 3	
Date Tested	ŧ	8/08/2016						
Material Type	e :	Insitu				Test Numbe	1	13
Material Sour	rce :	Site Derived				Lot Number		÷ .
Remarks :		This Amended	Report	t Replaces:31601	87-9	Specification	Number :	
AS Sieve Size(mm)	Percent Passing	Specification Limits						
75.0			180.			<u></u>		
63.0		6 S	10		and the second			
53.0			-	-				
37.5								
26.5								
19.0			- 24					
13.2				-				
9.5		]]	<u>8</u> **-					
6.7		]]	Parametric					
4.75			Cant Pa					
2.36	100		20.00					
1.18	100		1.121.2					
0.600	100							
0.425	100	8						
0.300	100	0 0	8					
0.150	99	x >	100					
0.075	97	x >						
				)75	£.	0 50	u .	110
			0.0		4	AS Sieve Size		
Spe	cification I	all through the	Pla	asticity Results	the second second	and the second second		ance with the Followi
	STREET, BETTER	d Limit (%) : 33		Shrinkage Comments :		Cracking & Curling Occurred		
		Limit (%): 14		Mould Length (mm) :		250		
		sticity Index (%) : 19					Oven Dried	
	1.1.1.1.1.1.1.1.2.2.1	rinkage (%) :		7	Test Method	l;	AS1289.3.1	.2, 3.2.1, 3.3.1, 3.4.1
	ion :							

Document Code RF145-11



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Emerson Class Report						
Client : Address : Project Name : Project Number : Location:	Jacobs Level 11, 462 Flinders Stree Regulator Structures 3160187 Nyah, Burra Creek, Vinifera	et, MELBOURNE, VIC, 3000 , Vinifera Sth & Burra B1 , Vic	Report Number: Report Date : Order Number : Test Method : Pag	3160187 - 103 9/08/2016 AS1289.3.8.1 Page 1 of 1		
Sample Number :	163-2396	163-2461	4 			
Test Number :	13	13				
Sampling Method :	AS1289.1.2.1(6.5.4)	AS1289.1.2.1(6.5.4)				
Date Sampled :	22/06/2016	22/06/2016				
Date Tested :	22/06/2016	2/08/2016				
Material Type :	Insitu	Insitu	3	0		
Material Source :	Site Derived	Site Derived				
Lot Number :		12	\	1		
Sample Location :	Nyah- Murray River bank, 500m South East of Sill 3	Nyah- Murray River bank, 500m South East of Sill 3 Tested with River Water				
Water Type :	Distilled Water	River Water		2 		
Soli Description :	Clay Sandy	Clay Sandy		8		
Water Temperature :	16	16				
Emerson Class Number :	Class 5	Class 5		1		
Remarks :		This Amended Repor	t Replaces: 3160187-10	-10		



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Emerson Class Report						
Client : Address : Project Name : Project Number : Location:	Jacobs Level 11, 462 Flinders Street, Regulator Structures 3160187 Nyah, Burra Creek, Vinifera, V		Report Number: Report Date : Order Number : Test Method : Pag	3160187 - 12 24/08/2016 A51289.3.8.1 Page 1 of 1		
Sample Number :	163-2646	163-2647		8		
Test Number :	14	15				
Sampling Method :	AS1289.1.2.1(6.5.4)	AS1289.1.2.1(6.5.4)				
Date Sampled :	22/06/2016	22/06/2016				
Date Tested :	24/08/2016	24/08/2016				
Material Type :	Insitu	Insitu				
Material Source :	Site Derived	Site Derived	3			
Lot Number :	a a a a a a a a a a a a a a a a a a a			8		
Sample Location :	Refer To Pian VN-BH02 Tested with Raw Murray Water 1.5 - 1.95	Refer To Plan BCN-BH04 Tested with Raw Murray Water 1.0 - 1.45				
Water Type :	Murray River Water	Murray River Water				
Soil Description :	CLAY	CLAY sandy				
Water Temperature :	16	16	e:	SZ.		
Emerson Class Number :	Class 5	Class 5				
Remarks 1		1				



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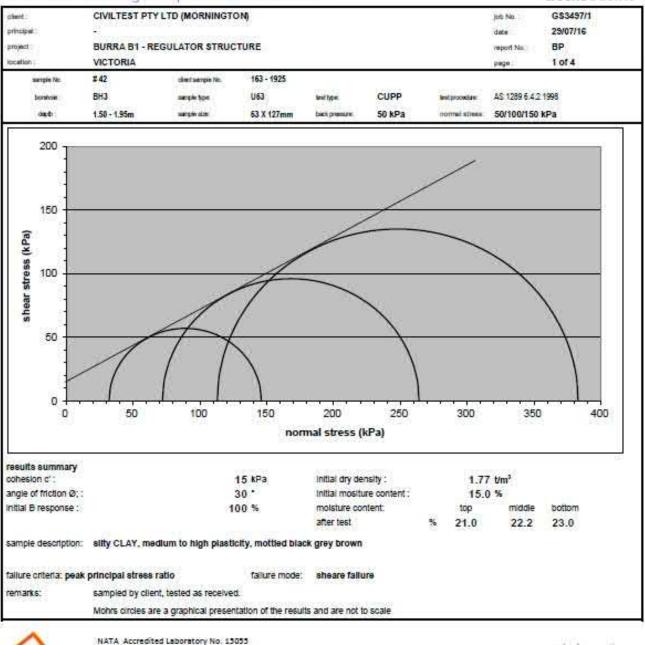
L L

Michael Bate - Branch Manager NATA Accreditation Number 10784

A C N105 704 078 El Brock Secat Thomaslown VIC, P 03 9464 4617 F 03 9464 468



# CU TRIAXIAL - Multistage with pore water measurement





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Kamal Fernando Agrowd Signary hollenned

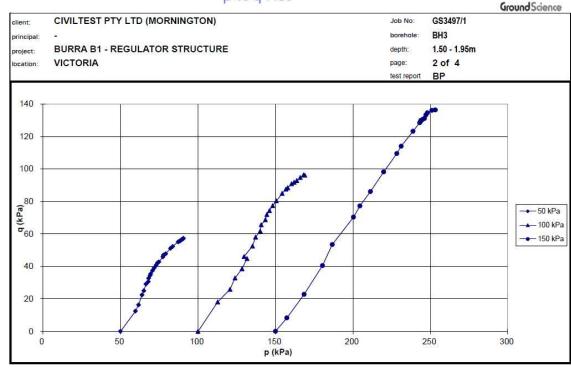
Date

10-Aug-16

GB009/R Aug 12 Version 4 App EG



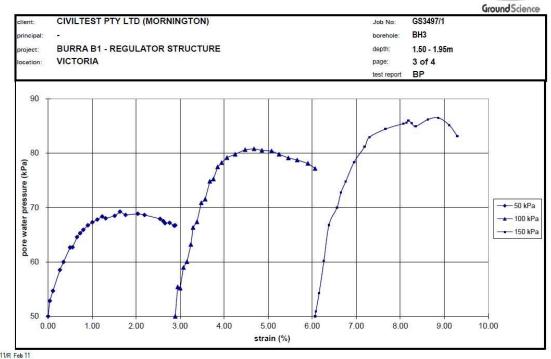
# p vs q Plot



GS011/R Feb 11 version 2 App EG

Pore Water Pressure vs Strain %

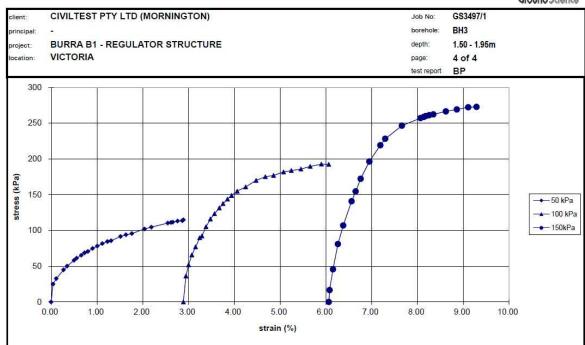






# Stress vs Strain %





GS012/R Feb 11 verion 2 App EG



# Appendix E. Ground Profile- Cross Sections

